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专题发言

S-0001

麻醉学临床研究重要进展

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目的 较全面综述近一年麻醉学领域临床研究的重要进展
方法 检索 PUBMED 中近一年麻醉学临床研究结果，包括临床麻醉、重症监护治疗以及疼痛诊疗等麻醉学相关域
结果 展现重要临床研究结果
结论 期望麻醉学临床重要研究结果给同行带来思考

论文发言

OR-0001

B16F10 黑色素瘤细胞膜仿生纳米粒在心肺复苏后脑损伤的治疗作用及机制研究

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目的 血脑屏障（BBB）是药物治疗心肺复苏后脑损伤的主要瓶颈，并且传统策略开放 BBB 效率低，生物相容性差，药物在脑内分布不理想。因此，本课题基于心肺复苏后脑内强效氧化应激微环境，尝试开发一种新型的活性氧（ROS）响应性双亲型材料，并采用仿生化策略，以细胞作为药物载体，借助皮肤黑色素瘤细胞具有高度侵袭性脑转移的特性，构建仿生纳米药物递送系统，实现药物的脑靶向高效递送和释放。

方法 ①仿生纳米粒的制备和表征检测：通过溶剂挥发法和反复挤出法构建 B16F10（小鼠皮肤黑色素瘤细胞）细胞膜包载的载甲氧基雌二醇（2ME2）仿生纳米粒（BM@TP/2ME2），并对其理化性质进行表征；②仿生纳米粒的生物安全性评价：评估 BM@TP/2ME2 的体外细胞毒性，以及体内短期生物相容性和长期致瘤风险；③仿生纳米粒的时空分布研究：利用荧光纳米粒和绘制药代曲线考察 BM@TP/2ME2 在体内外跨越 BBB 的能力，并利用 CRISPR-Cas9 技术探讨其跨越 BBB 的潜在机制；④仿生纳米粒的药效评估和机制验证：构建体内窒息性大鼠心脏骤停模型和体外糖氧剥夺/再灌注（OGD/R）模型。各组给予相应药物处理后，对各组皮层神经元的凋亡、氧化应激、神经炎症和自噬相关指标以及神经功能恢复情况进行检测；⑤仿生纳米粒修复受损 BBB 的前期探索：利用体外 OGD/R 模型和普通载药纳米粒，初步考察脑血管内皮细胞屏障相关蛋白表达的恢复情况。

结果 ①BM@TP/2ME2 大小均一，理化性质稳定；②2ME2 浓度低于 5 μmol/L 时，BM@TP/2ME2 无明显的细胞毒性，且在体内同样具有良好的生物安全性；③BM@TP/2ME2 通过 CD44v6/透明质酸介导在体内外高效跨越 BBB ④BM@TP/2ME2 可通过清除皮层神经元内过量 ROS，缓解氧化应激，抑制 AIM2 炎症小体介导的神经炎症，恢复神经元受损自噬流，从而减少神经元凋亡，恢复部分神经功能；⑤普通载药纳米粒显示出对体外 BBB 的初步治疗作用，为后续仿生纳米粒探索提供支持。

结论 制备成功的仿生纳米粒 BM@TP/2ME2 具有稳定的理化性质且在体内外具有良好的生物安全性。BM@TP/2ME2 主要通过 CD44v6/透明质酸介导转运跨越 BBB，被摄入的纳米粒在心肺复苏后皮层神经元内强氧化应激的微环境作用下崩解释放出 2ME2。游离的 2ME2 并通过恢复皮层神经元内氧化还原平衡体系来控制神经炎症的发生与进展，进而恢复受损的自噬流，最终发挥神经保护作用。同时，仿生纳米粒有望用于脑缺血再灌注损伤后 BBB 完整性和屏障功能的恢复。

OR-0002

下丘脑背内侧核调控躁狂样行为和心功能障碍的机制研究

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目的 睡眠剥夺常导致情绪紊乱与心功能障碍，但目前相关的神经环路机制还不明确。下丘脑背内侧核（DMH）是调控睡眠状态的重要核团之一，其中 DMH 中的 γ-氨基丁酸（GABA）神经元是 DMH 中参与促觉醒的重要神经元亚群。除此之外，DMH 还参与调节情绪状态与心血管功能。但 DMH 中 GABA 神经元是否参与睡眠剥夺后高度觉醒状态下的情绪紊乱以及心功能障碍还是未知的。本研究通过特异性调控小鼠 DMH-GABA 神经元活性，探讨 DMH-GABA 神经元在小鼠躁狂样行为和心功能障碍中的作用及其机制，为睡眠剥夺后情绪障碍和心功能障碍的神经调控提供理论依据。

方法 所有实验均使用 6 至 8 周龄雄性 C57BL/6J 小鼠。构建急性和慢性睡眠剥夺模型，对小鼠进行 DMH 核团的 c-Fos 染色；使用化学遗传学、光遗传学、立体定位神经核团注射等手段，对小鼠 DMH-GABA 神经元进行干预，并对小鼠进行行为学检测、心功能检测以及检测心肌组织中促凋亡基因蛋白相对表达量。

结果

（1）与对照组相比，急性睡眠剥夺组和慢性睡眠剥夺组小鼠 DMH 核团的 c-Fos 阳性细胞数量增加。

（2）与 mCherry 组相比，单次化学遗传学激活 DMH-GABA 神经元的 hM3Dq 组小鼠躁狂样行为增加：a.旷场实验活动距离增加；b.十字高架实验中开放臂/闭合臂的距离比值和时间比值增加；c.悬尾实验和强迫游泳实验不动时间减少，糖水偏嗜度增加；d.CNO 起效期间的昼夜节律的运动活动百分比增加。而化学遗传学抑制/毁损 DMH 的 GABA 神经元，无躁狂样行为表现。

（3）a.与 GFP 组相比，光遗传学激活 DMH 的 GABA 神经元或 DMH-VTA 环路的 ChR2 组小鼠躁狂样行为更为明显，在光照期间旷场中运动总距离增加，悬尾不动时间减少。光遗传学激活 DMH-NTS 环路后，无躁狂样行为表现。

（4）与 mCherry 组相比，hM3Dq 组小鼠连续化学遗传学激活 4 周后引起小鼠心功能下降：a.心率增加，低频/高频比值上升，ST 段明显抬高以及 QRS 间期延长；b.心脏超声显示 EF 值和 FS 值也降低，LVIDd 值和 LVIDs 值增大；c.心肌组织中促凋亡基因 Bax 蛋白和 caspase-3 蛋白剪接体相对表达量均增加。

（5）与 hM3Dq 组相比，hM3Dq+LiCl 组小鼠躁狂样行为与心功能均改善：a.旷场实验中运动距离减少，十字高架实验中开放臂/闭合臂的距离比值和时间比值也减少，悬尾实验和强迫游泳的不动时间也增加；b.心脏超声显示 EF 值和 FS 值增加，LVIDd 值和 LVIDs 值减小；心肌组织促凋亡基因 Bax 蛋白和 caspase-3 蛋白剪接体相对表达量也减少。

结论 睡眠剥夺后 DMH 核团 c-Fos 表达增高。激活 DMH-GABA 神经元引起小鼠躁狂样行为及心功能障碍，其中 DMH-VTA 环路参与小鼠躁狂样行为调控。LiCl 治疗可改善 DMH-GABA 神经元激活引起的躁狂样行为和心功能障碍。

OR-0003

Identification of differential m6A RNA methylomes and ALKBH5 as a potential prevention target in the developmental neurotoxicity induced by multiple sevoflurane exposures

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Background Sevoflurane is a commonly used inhaled anesthetic for pediatric patients, and clinical research showed that sevoflurane anesthesia is associated with a greater risk of developing neurocognitive disorder. Multiple exposures to sevoflurane during the neonatal period have been found to induce the learning and memory impairment in young animals. N6-Methyladenosine (m6A), as the most common mRNA modification in eukaryotes, has emerged as a crucial regulator of brain function in processes including synaptic plasticity, neurodevelopment and learning and memory. However, the relevance of m6A RNA methylation in the multiple sevoflurane exposures-induced developmental neurotoxicity remains mostly elusive. The present study aims to

Methods and results: In this study, our behavioral test indicated that the mice received multiple sevoflurane exposures showed defects in learning and memory. We also evaluated the genome-

wide m6A RNA modification and genes expression in hippocampus of mice received with multiple sevoflurane exposures using m6A-sequencing (m6A-seq) and RNA-sequencing (RNA-seq). A total of 1155 different m6A methylated peaks were identified, with 787 significantly hypermethylated peaks and 368 significantly hypomethylated peaks. The analysis of Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathways revealed that the modified m6A peaks were primarily associated with the processes such as inositol phosphate metabolism, phosphatidylinositol signaling system, autophagy, AMPK signaling pathway and long-term depression. Moreover, 279 differentially expressed genes (DEGs) were identified, consisting of 111 upregulated genes and 168 downregulated genes. The GO and KEGG analysis revealed that DEGs were primarily related to the glutamatergic synapse, voltage-gated channel activity, neuron projection morphogenesis, PPAR signaling pathway and ferroptosis. Besides, we discovered 19 genes with differences in the m6A methylated modification and differential expression in the hippocampus. Among these genes, we determined that a total of 9 differential expressed genes, including Atg4d, Dnajb4, Pcdhgb8, Hspa5, Gm29427, Bod1l, B3galt2, Spef1 and Traf6, may be closely associated with the occurrence of developmental neurotoxicity induced by multiple sevoflurane exposures. We further found that the ALKBH5, YTHDC1, YTHDC2, YTHDF1, YTHDF2, and YTHDF3 protein levels, but not METTL3 and WTAP, were increased in the hippocampus of mice that received multiple sevoflurane exposures. And the IOX1, as an inhibitor of ALKBH5, significantly improved the learning and memory defects induced by multiple sevoflurane exposures.

Conclusion The current study revealed that the role of m6A methylated modification and m6A-related regulators in sevoflurane induced cognitive impairment, which might provide a novel insight into identifying biomarkers and therapeutic strategies for inhaled anesthetic induced developmental neurotoxicity.

OR-0004

Homer1a 介导 mGluR5-Homer 复合体动态调控吗啡镇痛与耐受

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目的 本文聚焦吗啡诱导的即早基因 Homer1a 表达与 ERK1/2 磷酸化，研究 Homer1a 竞争性解聚 mGluR5-Homer 复合体介导胞内内质网 Ca^{2+}释放对吗啡急性镇痛和与慢性耐受过程的影响及作用机制。

方法 （1）体内实验验证急性吗啡介导的镇痛作用，观察 Homer1a 的表达情况及 ERK1/2 的磷酸化水平。

（2）行为学实验研究调控 Homer1a 表达和 mGluR5-Homer 复合体连接状态对吗啡抗伤害性效应的影响。

（3）体内实验研究 Homer1a 和 ERK1/2 磷酸化调节 mGluR5-Homer 复合体介导吗啡急性抗伤害性效应的作用机制。

（4）原位杂交及免疫荧光检测 Homer1a 的细胞定位及其与 mGluR5 等的位置关系。

（5）体内实验研究吗啡慢性应用发生耐受后 Homer1a 的表达情况及 ERK1/2 的磷酸化水平。

（6）行为学实验研究调控 Homer1a 和 ERK1/2 磷酸化介导 mGluR5-Homer 复合体的连接改变对吗啡慢性应用过程中镇痛效果的影响。

（7）体内实验研究 Homer1a 和 ERK1/2 磷酸化调节 mGluR5-Homer 复合体影响吗啡耐受的作用机制。

结果 （1）急性注射吗啡诱导 Homer1a 表达增加，同时能够诱导 ERK1/2 发生磷酸化。

（2）ERK1/2 磷酸化介导 mGluR5 的磷酸化，后者增加了长链型 Homer1b/c 同 mGluR5 结合的结合力，促进胞内 Ca^{2+}释放。急性吗啡诱导的 Homer1a 竞争性解聚 mGluR5-Homer 复合体，抑制神经元兴奋性。
（3）调控 Homer1a 表达，或改变 mGluR5- Homer 复合体的连接（mGluR5 KO， mGluR5 F/R，mGluR5 TS-AA， Homer1 KO）能够影响吗啡介导的急性抗伤害性效应。
（4）通过荧光原位杂交技术和免疫荧光成像，发现吗啡诱导的 Homer1a 在神经元中表达，在神经胶质细胞中未表达。并且与神经元中的 mGluR5 存在共定位。
（5）慢性吗啡应用后，不再诱导 Homer1a 表达，但仍诱导 ERK1/2 发生磷酸化。这一阶段 mGluR5-Homer 复合体连接增加，并介导胞内 Ca^{2+}浓度升高，损害吗啡的镇痛效果，表现为吗啡耐受。
（6）外源性补充 Homer1a，或通过遗传学方式修饰 mGluR5 与 Homer1b/c 之间的结合位点，减少 mGluR5-Homer 复合介导的 Ca^{2+}释放，能够明显延缓吗啡耐受。
结论 吗啡注射诱导的 Homer1a 表达与 ERK1/2 磷酸化调控 mGluR5-Homer 复合体聚合是吗啡急性镇痛与慢性耐受作用中的关键因素。调控 Homer1a 表达增加或 mGluR5-Homer 复合体交联减少可增强吗啡抗伤害性作用，延缓并逆转吗啡耐受。基于此设计的工具性 Homer1a 多肽对改善阿片类药物长时程应用的效率与安全性具有很强的临床转化应用潜力。

OR-0005

Functional Alternations of Frontal-temporal Cerebral Cortex in Propofol-induced General Anesthesia: A multi-channel fNIRS Study

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Background General anesthesia is considered an ideal model for research of consciousness. However, the distinctive neural features of this procedure remain among the least understood aspects of the human brain.
Methods In present work, we utilized a 52-channel functional near-infrared spectroscopy (fNIRS) machine to measure the cortical activity and analyse the reconfiguration of the functional connectivity and topological properties of brain networks in 60 adults as they moved from wakefulness to unresponsiveness, following induction by propofol.
Results Based on the functional near-infrared spectroscopy measurements and data analysis, we obtained the following findings: We found a brief and regionally differential cortical activation in the bilateral frontal-temporal lobe immediately after the administration of propofol (T: induce 3 vs. stage 1, i.e., wakefulness: $P<0.001$, induce 3 vs. stage 2 i.e., general anesthesia lasting: $P<0.001$; F: induce 3 vs. stage 1: $P<0.01$, induce 3 vs stage 2: $P<0.01$). Additionally, we demonstrated that, compared with wakefulness, propofol-induced anesthesia did not inhibit functional connectivity in the frontal-temporal cortex. Propofol caused the path length to increase significantly while leading the clustering coefficient, small worldness, and local and global efficiencies to decrease significantly ($P<0.001$ at certain threshold values). Finally, we detected diminished network metrics in specific nodes involving the dorsolateral prefrontal cortex, Wernicke's area, Broca's area, and premotor cortex following loss of consciousness.
Conclusion The functional connectivity and brain network pattern of the frontal-temporal cortex was ultimately altered under propofol induced unconsciousness. Furthermore, cortical activation temporarily flashed during induction period, which was most significant in the temporal area, while no inhibition of cortical activity was found in the anesthetized state compared to wakefulness.

OR-0006

Pioglitazone Inhibits Neuroinflammation, Tau Hyperphosphorylation and Reduces Spatial Learning and Memory Impairment in db/db mice by Blocking JNK but not GSK3β

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Aims： Increasing evidences have shown that diabetes may impair the brain function. However, the underlying mechanism and effective intervention are still unclear. Pioglitazone is a widely used anti-diabetic drug. The current study aimed to investigate the effect of pioglitazone on cognitive functions in db/db mice, and to explore the possible role of JNK/GSK3β in this effect.
Materials and methods: Four-week-old db/db mice or their control db+ (BKS) mice were randomly divided into db+, db/db, db/db+pioglitazone (db/db+Pio) and db/db+DMSO groups (n = 9 per group). At 20 weeks of age, mice were subjected to open field, new object recognition, Y maze spontaneous alternation and Y maze food bait tests. Blood was collected to evaluate cholesterol and HbA1C tests. Another set of animals were used for western blot analysis of the hippocampus. High glucose cultured primary neurons was used for ELISA and WB analysis. The effect of JNK and GSK3β specific inhibitors was also evaluated in the in vitro model.
Results Pioglitazone prevented hyperglycemia and attenuated spatial cognitive dysfunction in db/db mice. Although Aβ42, APP, BACE1, IDE, synaptophysin and PSD95 expression in the hippocampus were similar among groups, expression of neprilysin, an Aβ degrading enzyme, was reduced in db/db group. This reduction was blocked by pioglitazone treatment. Pioglitazone also inhibited tau hyperphosphorylation at T231 and S396 in db/db mice. Total PPARγ expression was reduced, while PPARγ pS112 and pS273 were elevated in the hippocampus of db/db mice. Phosphorylation of JNK p46/p54 was increased. Phosphorylation of GSK3β pS9 (which is a deactivation site for GSK), but not GSK3α pY279 or GSK3β pY216, were also increased in db/db mice. These effects were all blocked by pioglitazone treatment in db/db mice. Furthermore, pioglitazone inhibited high glucose induced LDH, IL-1β and TNFα release, as well as tau pT231 and tau pS396 elevation in neuron cultures. JNK and GSK3β specific inhibitors reduced LDH, IL-1β and TNFα release and blocked tau hyperphosphorylation at pT231 and pS396 without synergistic effect with pioglitazone in high glucose cultured neurons.
Conclusions Our results indicate that pioglitazone prevents diabetes induced spatial learning and memory dysfunction, neuronal injury, and tau hyperphosphorylation at pT231 and pS396 through inhibition of JNK at p46/p54. GSK3β inactivation at pS9 may act as an endogenous mechanism against Tau phosphorylation and Aβ deposition, while pioglitazone treatment spared the inactivation of GSK3β pS9 in the diabetic brain.

OR-0007

噬菌体鸡尾酒靶向裂解霍氏肠杆菌治疗致死性脓毒症

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目的 脓毒症(Sepsis)是由感染引起的危及生命的器官功能障碍，是一个高病死率的临床综合征。尽管过去二十年通过对脓毒症识别和治疗方法的改善，但至今脓毒症患者的死亡率仍在 20%-30%，

占全球死亡总病例的 20%。脓毒症不仅严重威胁人类健康，也给医疗卫生带来了巨大的经济负担，关注并控制脓毒症、拯救患者生命刻不容缓。然而，致死性脓毒症的机制与防治措施至今尚未阐明。
方法 利用粪便宏基因组测序明确致死性脓毒症患者、小鼠的肠道细菌特征。建立盲肠结扎穿孔脓毒症小鼠模型，通过抗生素实验、粪菌移植实验证实肠道菌群是影响脓毒症预后的重要因素；进一步通过无菌小鼠证实霍氏肠杆菌是致死性脓毒症的关键致病菌。构建 SodB 基因敲除霍氏肠杆菌，通过体内、外实验探讨霍氏肠杆菌抗生素耐受、逃逸巨噬细胞铁死亡应激吞噬作用的潜在机制。最后通过宏病毒组测序明确致死性脓毒症患者、小鼠的肠道病毒特征，筛选出特异性识别霍氏肠杆菌的噬菌体用于治疗致死性脓毒症。
结果 我们发现致死性脓毒症患者、小鼠均表现出显著的预后个体差异现象。使用抗生素清除小鼠的肠道菌群后，脓毒症小鼠的死亡率明显增加；进一步，粪菌移植实验证实肠道菌群是影响脓毒症预后的重要因素。粪便宏基因组测序结果发现，霍氏肠杆菌在致死性脓毒症患者、小鼠中丰度明显更高。霍氏肠杆菌灌胃、腹腔注射给小鼠均显著增加了脓毒症小鼠的死亡率和器官损伤水平。机制上，霍氏肠杆菌对多种抗生素均耐药，且可逃逸巨噬细胞铁死亡应激的吞噬作用。敲除霍氏肠杆菌的 SodB 基因明显降低了细菌毒力，抑制了霍氏肠杆菌逃逸巨噬细胞铁死亡应激吞噬作用的能力。噬菌体疗法有效降低了脓毒症小鼠的霍氏肠杆菌丰度、器官损伤水平和死亡率。
结论 霍氏肠杆菌多重抗生素耐药且能通过 SodB 逃逸巨噬细胞铁死亡应激的吞噬作用，靶向裂解霍氏肠杆菌的噬菌体疗法显著改善了脓毒症预后，该研究揭示了致死性脓毒症的关键致病菌及致病机制，并提供了潜在有效的治疗方向。

OR-0008

基于光遗传学技术的转换纳米颗粒的研发及其改善围术期神经认知障碍的研究

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目的 围术期神经认知障碍（Perioperative neurocognitive disorders，PND）是麻醉及手术患者常见的一类并发症。目前虽然已经有多项研究着眼于 PND 的防治措施，但仍缺乏 PND 治疗的特异性手段。因此，深入研究 PND 的机制，确定治疗靶点，并制定有效的治疗方法至关重要。研究表明，神经精神类疾病引起的认知障碍与皮质神经元兴奋抑制失衡有关，据此推测，PND 的认知损害症状可能与神经元兴奋抑制失衡有关。根据 PND 小鼠神经元激活情况的变化，拟基于光遗传学技术制备一种上转换纳米颗粒（Upconversion nanoparticles，UCNPs），用于深部脑区神经元活动的无创调控，并验证其在神经元调控中的安全性及可行性及探讨上转换光遗传学技术能否通过调控神经元活动成为 PND 的有效防治手段。
方法 构建小鼠胫骨骨折内固定手术诱导的 PND 模型，测定 PND 小鼠与对照组相比的行为学改变，通过脑区筛选及神经元类型标记，验证 PND 小鼠不同脑区神经元激活的变化；通过病毒转染的方法使特定脑区神经元表达激活型的光敏蛋白 ChR2，根据其激发波长，合成一种可在 808 nm 近红外光激发下发出 450-475 nm 可见光的 UCNPs，通过透射电镜、发射光谱、粒径、生物学分布等对 UCNPs 进行表征，并测定 UCNPs 的生物安全性及近红外光光学干预的安全性及可行性，同时验证上转换光遗传学技术对神经元活动调控的有效性；最后构建 PND 小鼠模型，通过病毒转染的手段使特定脑区神经元表达光敏蛋白并进行 UCNPs 的局部注射，观察近红外光照射疗法对 PND 小鼠行为的影响。
结果 PND 小鼠胫骨骨折内固定术后空间认知功能明显下降，DTT 脑区中的兴奋性神经元激活明显减少；成功制备了一种能在 808 nm 近红外光激发下发出蓝色可见光的 UCNPs，粒径大小均一，在脑内可长期稳定存在于注射部位，体外孵育不影响细胞活力，脑区注射不引起局部的炎症反应，具有安全性，808 nm 近红外光对于脑组织具有良好的穿透性，其脉冲式照射不引起脑部皮层组织

的炎症反应及细胞凋亡，上转换光遗传学技术无论在体外还是体内，均可有效地调控特定脑区神经元的活动；上转换光遗传学技术可通过激活 DTT 脑区兴奋性神经元的活动改善小鼠 PND 症状。
结论 胫骨骨折内固定手术诱导的小鼠 PND 模型主要表现为空间认知功能的下降，且与 DTT 脑区兴奋性神经元激活减少有关，基于光遗传学技术，成功制备了一种 UNCPs，UNCPs 的注射不引起局部炎症，近红外光的脉冲照射也不引起脑部皮层组织的炎症反应及细胞凋亡，上转换光遗传学技术安全有效，并可最终通过调控特定脑区神经元的活动并改善 PND 小鼠的认知功能下降的症状。

OR-0009

新生期艾司氯胺酮暴露增强小胶质细胞突触修剪诱发青春期社交缺陷

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目的 每年有数百万儿童接受全身麻醉，其对神经发育的影响是一个世界范围内的重要问题。尽管在 3 岁前接受短期全身麻醉的儿童和青少年的一般智商没有明显变化，但父母和照顾者的问卷报告显示早期麻醉暴露与学龄儿童执行功能或远离群体的社交行为改变之间存在关联。同时，非人灵长类动物和啮齿类动物的基础研究表明，新生期全麻暴露会导致发育的大脑功能发生改变，出现包括社交在内的复杂认知功能的改变。艾司氯胺酮（Esketamine, ESK）作为广泛应用于小儿的全麻药物，其对社交行为的影响及机制尚不清楚。本研究将探究新生期 ESK 对青春期社交行为的作用及其机制。
方法 （1）C57BL/6 小鼠于生后 7 天（Postnatal day 7, P7）进行 ESK 腹腔注射，设计不同浓度（70、80、90、100mg/kg），以确定最佳麻醉浓度。（2）自 P28 进行传统行为学和 3D-AI 辅助的精细行为分析。（3）对全脑小胶质细胞进行免疫荧光染色，观察不同发育阶段小胶质细胞数量发生改变的脑区及其形态和突触修剪功能变化。（4）使用膜片钳和高尔基染色技术观察前额叶（Prefrontal cortex, PFC）锥体神经元突触传递和形态的影响。（5）通过转录组测序检测新生期 ESK 暴露对不同发育阶段 PFC 小胶质细胞基因表达的影响，筛选出差异表达基因，进行富集分析。（6）Arg1 抑制剂 nor-NOHA 干预和小胶质细胞内特异性下调 Arg1 后观察青春期小鼠 PFC 小胶质细胞形态、锥体神经元形态和突触传递、社交行为的改变。
结果 （1）90 mg/kg ESK 为新生小鼠的最佳麻醉浓度。（2）ESK 诱发青春期社交缺陷，并不伴随学习记忆受损。（3）ESK 暴露后小鼠新皮层和海马小胶质细胞数量趋势从 P7-P28 显著变化。PFC 小胶质细胞显著激活，突触修剪增强。（4）ESK 组小鼠 PFC 锥体神经元的 sEPSC 频率（$P<0.001$）和振幅显著增加（$P<0.001$）。ESK 组小鼠 PFC 基树突分支复杂程度升高，基/顶树突棘密度均明显降低。（5）新生期 ESK 暴露导致不同发育阶段 PFC 小胶质细胞激活相关基因差异表达，Arginine biosynthesis 中差异基因（包括 Arg2, Nos2, Ass1, Arg1）在该通路占比最高，其中 Arg1 表达升高与小胶质细胞吞噬功能增强显著相关。（6）Nor-NOHA 缓解 ESK 导致的 PFC 小胶质细胞激活，突触传递和社交行为异常。（7）小胶质细胞 Arg1 特异性下调改善 ESK 导致的社交缺陷。
结论 新生期 ESK 暴露诱发青春期小鼠社交缺陷，这是由于 PFC 小胶质细胞突触修剪障碍导致的突触传递受损，揭示了预防新生期全身麻醉引起的神经发育障碍的潜在靶点。

OR-0010

运动改善术后负性情绪的皮层丘脑环路机制

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目的 手术后患者常常经历负性情绪，如焦虑和恐惧，严重影响患者的身心健康，延迟术后康复，因此探究改善术后负性情绪的干预手段具有重要的临床意义。以往研究表明运动能够通过缓解负性情绪和促进认知改善心理健康。然而，对于运动和情绪这两大脑功能之间相互作用改善术后负性情绪的神经机制尚不清楚。初级运动皮层（M1）是皮层重要的运动结构，除了运动信息整合之外，M1 还参与调节疼痛和高级认知功能，很可能是构成机体躯体-情绪反应整合机制的重要一环。然而，M1 与负责情绪调控的脑区之间是否存在相关的神经环路连接，以及该连接是否介导术后负性情绪的改善仍知之甚少。

方法 本课题通过腹部探查小鼠模型，结合动物行为学、化学遗传学、离体电生理、清醒动物光纤钙信号记录、神经递质探针及免疫荧光染色等技术，从神经元、突触和神经环路层面阐释 M1 的情绪调控效应。

结果 术前自主运动的小鼠术后表现为显著降低的条件恐惧冻结时间、增加的旷场中央区和十字高架开放臂停留时间，运动小鼠 M1 谷氨酸能（$M1^{Glu}$）神经元的即刻早期基因表达和动作电位发放频率增加，提示运动提高小鼠 M1 神经元的兴奋性。运动小鼠进入条件恐惧和十字高架测试环境时，$M1^{Glu}$ 神经元钙信号显著增强。进一步运用化学遗传学手段激活 $M1^{Glu}$ 神经元可模拟运动缓解小鼠负性情绪，抑制 $M1^{Glu}$ 神经元逆转运动对小鼠负性情绪的改善作用。以上结果表明 $M1^{Glu}$ 神经元是介导运动改善负性情绪的关键神经元。随后，去甲肾上腺素（NE）神经递质探针记录显示运动小鼠进入恐惧和焦虑环境时，M1 脑区 NE 信号显著增强，药理学抑制 NE 受体可消退运动缓解小鼠的负性情绪。病毒追踪及电生理研究发现，$M1^{Glu}$ 神经元除对丘脑后核谷氨酸能（PO^{Glu}）神经元提供直接的、兴奋性单突触连接外，还通过轴突侧枝靶向未定带 GABA 能（ZI^{GABA}）神经元提供抑制性突触连接，ZI^{GABA} 继而投射到 PO^{Glu} 神经元，这两条神经环路的净效应是降低 PO^{Glu} 神经元活性。病毒消融 ZI 和化学遗传学调控实验证明 $M1^{Glu}$-ZI^{GABA}-PO^{Glu} 神经环路介导运动对手术小鼠负性情绪的改善效应。

结论 本研究揭示了 NE 参与的 $M1^{Glu}$-ZI^{GABA}-PO^{Glu} 三级神经环路介导运动改善术后小鼠的负性情绪，刻画了 M1 介导的 PO 兴奋性单突触和抑制性双突触的汇合级联精确调控神经元功能，有助于深入认识 M1 的非运动功能和机体躯体-非躯体反应整合的神经机制，为运动改善围术期情绪障碍提供新的证据，也为靶向运动皮层的侵入性和非侵入性干预提供新思路。

OR-0011

新型核-壳结构纳米载体实现美洛昔康/布比卡因双药控释可行性的研究

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目的 术后疼痛管理是加速术后康复（ERAS）的重要部分，尤其在术后 48 小时内，急性炎症反应作为局部病理生理特征，引起疼痛的同时，在神经损伤的基础上进一步增强伤害性刺激的传入，从而加重了术后疼痛的进展。同时，多模式镇痛（MMA）通过联合使用机制不同的药物如局部麻醉药和非甾体抗炎药（NSAIDs），相较于单独使用一类药物显示出更好的镇痛效果。然而，很少有

缓释药物载体的构建基于术后疼痛的病理生理学机制及 MMA 理念。因此，本研究设计了一种搭载 NSAIDs 及局部麻醉药的核-壳结构纳米药物递送体系（DDS），旨在通过多药的顺序缓释，调节手术创伤部位的病理生理改变，以更加有效地缓解术后疼痛。

方法 本研究通过纳米沉淀法和薄膜分散法构建一种核-壳结构纳米 DDS。通过将美洛昔康（MLX）封装在脂质层外壳中得到负载 MLX 的脂质膜（LPM），使得高剂量的 MLX 能够在术后 48 小时内释放，以减轻术后引起的急性炎症性疼痛；布比卡因（BUP）封装在聚乳酸-羟基乙酸共聚物（PLGA）纳米颗粒核心中，得到负载 BUP 的纳米颗粒（NPB），提供长期释放以阻断伤害性刺激的传入。本研究使用动态光散射法和透射电子显微镜对此 DDS 进行粒径、zeta 电位、PDI 和形貌的表征；使用高效液相测定其载药和体外释药特点；通过对比大鼠 Brennan's 足底切口模型各组间行为学差异，对其镇痛效果进行评价；并使用液相色谱-质谱联用对各组大鼠局部组织的前列腺素 E2（PGE2）含量进行测定，使用免疫组织化学法对组织的白细胞介素 1β（IL-1β）和肿瘤坏死因子-α（TNF-α）水平进行评估，以评价该 DDS 的抗炎效果；使用免疫荧光染色观察实验各组脊髓神经元激活（c-FOS）、星形胶质细胞（GFAP）及小胶质细胞（Iba-1）激活情况；使用 CCK-8 对细胞活力检测以评价其细胞毒性，并使用 H&E 染色评价其在体局部组织炎症反应和全身脏器毒性。

结果 本研究构建的核-壳结构纳米 DDS（NPB@LPM）粒径为 182.2 ± 0.8 nm，PDI 为 0.262，MLX 载药率为 4.44 ± 0.27%，BUP 载药率为 12.27 ± 0.85%。其能够符合术后急性疼痛的病理生理学发展机制，在术后 48 h 内释放 MLX 达 39.6 ± 0.96%，并持续释放 BUP 约 7 天。NPB@LPM 对大鼠术后提供了长达 7 天的显著镇痛效果；且具有较好的抗炎作用，与其他对照组相比，能够显著降低术后早期局部组织中炎症因子（PGE2、IL-1β 和 TNF-α）的含量。此外，NPB@LPM 与游离 BUP 相比，具有较低的细胞毒性；在大鼠体内使用的组织炎症反应较轻，各组的神经元、星形胶质细胞及小胶质细胞激活情况无明显差异，且未表现出器官毒性，总体具有较好的生物相容性和药物安全性。

结论 本研究依据术后病理生理特征，结合临床术后镇痛需求制备了一种新型的核-壳结构纳米体系 NPB@LPM，结合术后急性疼痛的病理生理学发展机制，实现了 MLX 在急性炎症期快速释放产生抗炎作用，及 BUP 的持续释放产生长效局麻镇痛效果，在术后急性疼痛模型中产生了显著的镇痛效果，并具备良好的生物相容性。该研究不仅验证了 NPB@LPM 在术后急性疼痛管理中的应用潜力，也为未来研发具有 MMA 和长效镇痛效果的 DDS 提供了可行策略。

OR-0012

Development of a Predictive Model for Postoperative Complications in Older Patients Based on Federated Learning: A Multicenter Study

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Purpose Postoperative complications, such as postoperative delirium (POD) and acute kidney injury (AKI), significantly impact older patients' recovery and overall health outcomes. These complications can lead to extended hospital stays, increased mortality rates, and higher medical costs. Traditional machine learning approaches to predict these complications face challenges related to data privacy and the need for large centralized datasets. This study aims to develop a federated learning-based predictive model for POD and AKI using data from multiple hospitals, comparing its performance to centralized machine learning models.

Methods This multicenter study utilized data from seven hospitals to develop and validate predictive models for POD and AKI in elderly surgical patients. Data from 8800 patients were used for training and internal validation, with an additional 1519 patients used for external validation. The study included patients aged 65 years or older who underwent non-cardiac, non-

neurosurgical procedures between April 2020 and April 2022. Patients with significant missing data or minor surgical procedures were excluded.

The primary outcome was the incidence of POD within 7 days postoperatively, diagnosed using the Confusion Assessment Method (CAM). AKI was defined according to the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines, characterized by significant increases in serum creatinine levels post-surgery.

Data preprocessing involved handling missing values through imputation, standardizing numerical variables, and one-hot encoding categorical variables. The Synthetic Minority Over-Sampling Technique (SMOTE) and Edited Nearest Neighbours (ENN) were used to address class imbalance. Federated learning algorithms, including Federated Averaging (FedAvg), Federated Proximal Optimization (FedProx), and Federated Local Self-Distillation (FedLSD), were employed to train models across institutions while preserving data privacy. The performance of these federated models was compared to centralized models using various machine learning algorithms: Multi-Layer Perceptron (MLP), Logistic Regression (LR), eXtreme Gradient Boosting (XGBoost), Support Vector Classification (SVC), Random Forest (RF), and Gradient Boosting Machine (GBM).

Results The study included 7285 patients in the training and internal validation set, and 842 patients in the external validation set. The incidence of POD and AKI varied across the different hospitals. For instance, POD incidence rates ranged from 6.7% to 16.7% in the training set, while AKI rates ranged from 1.4% to 5.7%.

Central Learning POD Prediction Models:

- GBM: AUCs of 0.902 (training), 0.695 (internal validation), and 0.521 (external validation).
- RF: AUCs of 0.940 (training), 0.695 (internal validation), and 0.530 (external validation).
- SVC: AUCs of 0.919 (training), 0.661 (internal validation), and 0.561 (external validation).
- XGBoost: AUCs of 0.828 (training), 0.674 (internal validation), and 0.526 (external validation).
- LR: AUCs of 0.825 (training), 0.713 (internal validation), and 0.706 (external validation).
- MLP: AUCs of 0.867 (training), 0.716 (internal validation), and 0.710 (external validation).

LR and MLP models exhibited relatively higher AUC values and consistent performance across various metrics, indicating robust generalizability. Conversely, models like GBM and RF showed a noticeable decline in performance during external validation.

Federated Learning POD Prediction Models:

- Federated models using LR had AUCs of 0.710 (internal validation) and 0.704 (external validation).
- Federated models using MLP had AUCs of 0.707 (internal validation) and 0.703 (external validation).

The DeLong test indicated no significant differences between federated and centralized models, suggesting comparable predictive accuracy while ensuring data privacy.

Central Learning AKI Prediction Models:

- GBM: AUCs of 0.979 (training), 0.796 (internal validation), and 0.607 (external validation).
- RF: AUCs of 0.964 (training), 0.759 (internal validation), and 0.632 (external validation).
- SVC: AUCs of 0.950 (training), 0.788 (internal validation), and 0.601 (external validation).
- XGBoost: AUCs of 0.962 (training), 0.773 (internal validation), and 0.604 (external validation).
- LR: AUCs of 0.880 (training), 0.805 (internal validation), and 0.615 (external validation).
- MLP: AUCs of 0.942 (training), 0.790 (internal validation), and 0.718 (external validation).

Similar to POD prediction models, LR and MLP demonstrated higher robustness across different datasets.

Federated Learning AKI Prediction Models:

- Federated models using LR had AUCs of 0.798 (internal validation) and 0.627 (external validation).
- Federated models using MLP had AUCs of 0.784 (internal validation) and 0.705 (external validation).

These results suggest that federated learning models achieve similar performance to centralized models, demonstrating comparable predictive accuracy while supporting decentralized data training.

Conclusion Federated learning offers a promising approach for developing predictive models for postoperative complications like POD and AKI, leveraging data from multiple institutions while addressing privacy concerns. The models developed in this study showed robust predictive accuracy comparable to centralized models, highlighting their potential to enhance patient care through early intervention. Future studies should continue to explore and refine federated learning techniques, expanding datasets and incorporating advanced machine learning methods to further improve predictive accuracy and clinical applicability. The collaborative nature of federated learning also promotes knowledge sharing among institutions, which could lead to more sophisticated and accurate predictive models, ultimately benefiting patient care on a larger scale.

OR-0013

Incidence, mortality, and predictive factors associated with acute respiratory distress syndrome in multiple trauma patients living in high-altitude areas: A retrospective study in Shigatse

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Background Acute respiratory distress syndrome (ARDS) is a severe complication that can lead to fatalities in multiple trauma patients. Nevertheless, the incidence rate and early prediction of ARDS among multiple trauma patients residing in high-altitude areas remain unknown.
Methods This study included a total of 168 multiple trauma patients who received treatment at Shigatse People's Hospital Intensive Care Unit (ICU) between January 1, 2019 and December 31, 2021. The clinical characteristics of the patients and the incidence rate of ARDS were assessed. Univariable and multivariable logistic regression models were employed to identify potential risk factors for ARDS, and the predictive effects of these risk factors were analyzed.
Results In the high-altitude area, the incidence of ARDS among multiple trauma patients was 37.5% (63/168), with a hospital mortality rate of 16.1% (27/168). Injury Severity Score (ISS) and thoracic injuries were identified as significant predictors for ARDS using the logistic regression model, with an area under the curve (AUC) of 0.75 and 0.75, respectively. Furthermore, a novel predictive risk score combining ISS and thoracic injuries demonstrated improved predictive ability, achieving an AUC of 0.82.
Conclusions This study presents the incidence of ARDS in multiple trauma patients residing in the Tibetan region, and identifies two critical predictive factors along with a risk score for early prediction of ARDS. These findings have the potential to enhance clinicians' ability to accurately assess the risk of ARDS and proactively prevent its onset.

OR-0014

丙泊酚抑制蓝斑神经元曲张体释放去甲肾上腺素的机制研究

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目的 全身麻醉导致意识丧失的机制一直是医学和神经科学领域亟待解决的重大科学问题之一。既往研究表明蓝斑（locus coeruleus, LC）神经元及其所释放的去甲肾上腺素（norepinephrine，NE）

参与了丙泊酚全身麻醉的诱导和苏醒过程，但丙泊酚是如何作用于 LC 神经元从而调节其 NE 释放的机制还不清楚。我们前期工作发现，丙泊酚通过作用于突触前神经元上的 $GABA_A$ 受体，抑制 LC 神经元的兴奋性突触输入，同时也可作用与 LC 神经元本身上的 $GABA_A$ 受体，抑制其动作电位的发放。目前已知神经元上 $GABA_A$ 受体分布除胞体及树突外，也可分布于轴突及突触前包括曲张体（varicosity）部位。那么，丙泊酚是否可以通过作用于轴突及突触前上的这些 $GABA_A$ 受体，从而直接影响突触前 NE 的释放呢？目前这个问题尚没有答案。因此，在本研究中，我们进一步探究丙泊酚是否可以直接作用于 LC 神经元轴突末梢的突触前 $GABA_A$ 受体，从而调控突触前 NE 的释放、参与麻醉过程。

方法 （1）运用去甲肾上腺素分子探针在体成像技术，在活体斑马鱼上实时检测麻醉前后 NE 的释放。

（2）运用在体神经元突触钙信号成像技术，检测麻醉前后 LC 神经元突触活动。

（3）运用在体电生理全细胞记录方法，对 LC 神经元胞体注电流，以精准控制动作电位的发放。

（4）运用单细胞测序技术，研究 LC 神经元上 $GABA_A$ 受体的表达。

（5）运用质粒构建及斑马鱼胚胎显微注射方法，标记 LC 神经元轴突上 $GABA_A$ 受体。

结果 （1）丙泊酚抑制 LC 神经元突触前钙活动和 NE 释放。

（2）丙泊酚通过激活 LC 神经元突触前 $GABA_A$ 受体抑制 NE 释放。

（3）丙泊酚抑制 LC 神经元突触前 NE 释放能力存在曲张体异质性。

（4）LC 神经元轴突曲张体上表达 $GABA_A$ 受体。

结论 （1）丙泊酚可以直接作用于 LC 神经元突触前 $GABA_A$ 受体抑制突触前曲张体钙离子活动，进而抑制突触前 NE 的释放，从而发挥麻醉作用。

（2）丙泊酚对同一个 LC 神经元轴突上不同的曲张体抑制作用存在异质性，且抑制效率与曲张体原本的释放能力呈现强度依耐性。

OR-0015

单细胞转录组测序揭示小鼠脊髓少突胶质细胞介导吗啡耐受形成

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目的 应用单细胞转录组测序技术描绘吗啡耐受后小鼠脊髓组织单个细胞转录景观，并进一步探讨吗啡耐受形成的潜在机制。

方法 6 至 8 周龄雄性 C57BL/6J 小鼠被随机分为 3 组（每组 10 只），吗啡耐受组（MT）通过鞘内注射吗啡（10μg/每天 2 次/连续 5 天）建立吗啡耐受模型；单次吗啡组（MS）在第 1 天至第 4 天注射鞘内注射等体积生理盐水，仅第 5 天注射吗啡（10μg/1 次）；生理盐水组（SN）小鼠鞘内注射等体积的生理盐水（10μg/每天 2 次/连续 5 天）作为对照。在注射 60 分钟后应用热甩尾实验评估吗啡的镇痛效果。5 天后收集脊髓组织用于单细胞 RNA 测序。获得数据应用 Seurat R 包进行后续分析。

结果 数据质控及过滤后，我们共捕获了 44911 个细胞（SN: 11009；MS: 16642; MT: 17260），确定了 11 个主要的细胞群。结果显示，吗啡耐受后少突胶质细胞（Oligodendrocyte, OL）在细胞比例和转录调控方面发生了剧烈改变。在单次吗啡给药后，OL 比例明显下降，而在耐受形成后急剧升高并超过基础水平（SN: 15.7%; MS: 7.0%; MT: 26.2%）。我们进一步将 OL 分为了 7 个亚群，并确定了 OL 的两种不同的转录命运，即 Fate-OL1 和 Fate-OL2。Fate-OL1 特征与胶质生成和髓鞘生长有关。Fate-OL2 特征与免疫激活相关。吗啡耐受形成后，少突胶质细胞前体（Oligodendrocyte progenitor cell, OPC）向 Fate-OL2 分支分化明显增强，同时 Fate-OL1 分支细胞亚群出现分化障碍，大量细胞停滞于分化间期。此外，Fate-OL2 分支细胞及部分 Fate-OL1 分化间期细胞表现出炎症激活及髓鞘生成障碍特征，伴随哺乳动物雷帕霉素靶蛋白 1、干扰素、活性氧、

转化生长因子 β、肿瘤坏死因子 α 等炎症相关通路显著上调以及髓鞘生成相关通路的显著下调。进一步热板实验显示，应用免疫调节剂特立氟安靶向促进 OPC 分化可明显减轻吗啡诱导的耐受性。
结论 我们的研究表明，OL 可能在吗啡耐受形成中起到重要作用，这可能与吗啡诱导的 OL 异常增殖、分化障碍以及炎症相关通路上调有关。免疫调节剂特立氟安靶向促进 OPC 分化可部分逆转吗啡诱导的耐受过程。

OR-0016

外侧臂旁核-丘脑室旁核谷氨酸能神经通路参与疼痛及其相关焦虑的调控

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目的 慢性疼痛是临床常见的慢性疾病之一，严重影响患者的身心健康。慢性疼痛的患者通常患有焦虑症，但其发生机制尚未明了。以往的研究显示，外侧臂旁核（The lateral parabrachial nucleus, LPB）与疼痛感知和情绪反应密切相关。然而，LPB 向丘脑室旁核（paraventricular nucleus of the thalamus, PVT）的谷氨酸能投射在疼痛及其相关焦虑样情绪中的作用仍不清楚。本课题旨在探究 LPB-PVT 谷氨酸能神经投射在慢性炎性痛模型中对疼痛及其焦虑情绪的调控作用。
方法 采用左足底后爪注射完全弗氏佐剂（Complete Freund's adjuvant, CFA）建立慢性疼痛及其焦虑模型；采用在体光纤成像技术和 c-Fos 免疫荧光染色检测神经元兴奋性；采用病毒示踪技术观察 LPB 与 PVT 的投射联系；采用光遗传和化学遗传技术调控 LPB^{Glu}-PVT 神经通路，分别使用 Hargreaves 和 von Frey 实验检测小鼠后足机械痛缩足阈值和热缩足潜伏期；采用旷场实验和高架十字迷宫实验评估小鼠疼痛相关焦虑样行为。
结果 1.免疫荧光染色结果显示，与生理盐水组相比，CFA 组小鼠 LPB 谷氨酸能神经元 c-Fos 蛋白表达增多；在体光纤钙成像结果显示，疼痛刺激可显著增加 CFA 小鼠 LPB 谷氨酸能神经元 Ca2+荧光变化率。提示 CFA 慢性疼痛状态下 LPB 谷氨酸能神经元兴奋性升高。
2.化学遗传学抑制 LPB 谷氨酸能神经元，与生理盐水组相比，CFA 组小鼠的痛觉过敏和焦虑样行为得到缓解；化学遗传激活 LPB 谷氨酸能神经元，使正常小鼠的机械痛和热痛阈值降低，并产生焦虑样行为。提示 LPB 谷氨酸能神经元参与疼痛相关焦虑样行为的调控。
3.病毒示踪结果表明，LPB 谷氨酸能神经元与 PVT 谷氨酸能神经元存在神经纤维联系；光遗传激活 LPB 谷氨酸能神经元，PVT 谷氨酸能神经元 Ca2+荧光变化率显著升高。提示 PVT 谷氨酸能神经元接受来自 LPB 谷氨酸能神经纤维投射。
4.免疫荧光染色结果显示，与生理盐水组相比，CFA 组小鼠 PVT 谷氨酸能神经元 c-Fos 蛋白表达增多；在体光纤成像结果显示，疼痛刺激可显著增加 CFA 小鼠 PVT 谷氨酸能神经元兴奋性。提示 CFA 慢性疼痛状态下 PVT 谷氨酸能神经元兴奋性升高。
5.通过化学遗传和光遗传学特异性抑制 LPB^{Glu}-PVT 神经投射，可以缓解 CFA 小鼠的痛觉过敏及其相关焦虑样行为；通过化学遗传和光遗传学特异性激活 LPB^{Glu}-PVT 神经投射，能够引起正常小鼠的痛觉过敏，并产生焦虑样行为。提示 LPB^{Glu}-PVT 神经投射参与疼痛及其焦虑样行为的调控。
结论 CFA 慢性疼痛增加 LPB、PVT 谷氨酸能神经元兴奋性，LPB 谷氨酸能神经元通过支配 PVT 谷氨酸能神经元参与疼痛相关焦虑样行为的调控。

OR-0017

术前额顶叶低频振荡活动与儿童苏醒期谵妄相关

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目的 探究全身麻醉患儿术前多通道原始脑电信号的神经振荡特征，以及该特征与术后患儿发生苏醒期谵妄(emergence delirium, ED)的关系，为临床上儿童 ED 提取出特异性预防和诊断指标。
方法 选择耳鼻喉科择期行扁桃体/腺样体切除术的儿童，年龄为 2～9 岁。待患儿入手术室后保持闭眼、安静、平躺状态，采用原始 8 通道脑电放大器记录 3min 以上的脑电数据。使用标准麻醉方案实施手术麻醉。手术结束后，在麻醉恢复室观察患儿的苏醒情况，评估并记录：苏醒时间、拔管时间和拔管后（0、10、20、30 分钟及出室时）的谵妄评分。儿童 ED 根据精神障碍诊断与统计手册 IV 或 5 标准进行评估 （即 PAED 评分）。脑电图频谱分析采用 FOOOF 方法分解为周期性振荡和非周期性振荡，周期性振荡可提取出绝对功率谱、center 频率、相对功率谱、峰值频率等节律性特征，非周期性振荡可以刻化为呈现幂律分布（呈 power-law 分布，即低频能量高，高频能量低）功率谱的斜率。根据 PAED 评分将患儿分为发生 ED 组和未发生 ED 组，比较两组儿童脑电的周期性振荡和非周期性振荡参数特征差异；使用线性相关分析探讨这些参数与 PAED 评分之间是否存在线性相关关系；最后通过分类器筛选可以用于预测 ED 发生的相关 EEG 参数。
结果 在最终纳入分析的 60 名儿童中，有 27 名出现苏醒期谵妄（ED 组），而另外 33 名未发生苏醒期谵妄（noED 组）。我们发现两组患儿的脑电差异主要存在于周期性振荡，而非非周期振荡。通过对周期性神经振荡的进一步分析对比，在额顶叶区域的低频神经振荡（low-frequency oscillations, LFO）（3-14 Hz）活动中观察到了两组之间显着的周期性差异。noED 组额顶叶区域 LFO 的绝对功率谱和峰值频率高于 ED 组（平均值[标准差]，4.323 [1.324] vs 3.654 [1.116]、8.477 [0.844] vs 8.015 [0.046]；P=0.051、0.017）。此外，LFO 的绝对功率谱和峰值频率与 PAED 峰值评分呈负线性相关。此外，theta 振荡的相对功率谱、theta 与 alpha 的比率与 PAED 峰值评分呈正相关，而 alpha 振荡的相对功率与 PAED 峰值评分呈负线性关系。分类结果显示 theta 相对功率谱、alpha 相对功率谱和 theta 与 alpha 比率三个指标的 ROC 特征曲线下面积分别为 0.609（95% CI，0.450-0.747）、0.714（0.567-0.845）和 0.700（0.557-0.837）。
结论 术前清醒脑电图活动中额顶叶的低频振荡可能是代表儿童 ED 风险的神经生物标志物。 此外，alpha 活性的减少和 theta 活性的增加可以为了解 ED 的神经机制提供有价值的见解。

OR-0018

The Effect of Serratus Anterior Plane Block Combined with Oxycodone Multimodal Preventive Analgesia on Analgesic Effect in Elderly Patients Undergoing Thoracoscopic Lobectomy

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Objective Thoracotomy is one of the most painful surgeries; therefore, video-assisted thoracoscopic surgery (VATS) was developed to reduce the surgical stress of thoracotomy. Although VATS results in reduced postoperative pain compared with thoracotomy, it is still painful. Serratus anterior plane block is a novel technique that provides lateral chest wall analgesia by

blocking the lateral branch of the intercostal nerve. It is simple to perform, highly safe, with few complications, provides effective analgesia, does not block sympathetic nerves, and maintains hemodynamic stability. Oxycodone has potent analgesic properties, uniquely effective in relieving visceral pain, and a mild respiratory depression profile. The aim of this study is to investigate the effects of serratus anterior plane block with ropivacaine combined with oxycodone multimodal preventive analgesia on analgesic effect in elderly patients undergoing thoracoscopic lobectomy.

Methods 80 elderly patients(>65 years) undergoing thoracoscopic lobectomy were randomly divided into 4 groups by random number table method: serratus anterior plane block with ropivacaine combined with oxycodone before skin incision is group M1,serratus anterior plane block with ropivacaine before skin incision combined without oxycodone is group M2, intravenous injusion of oxycodone before skin incision combined without serratus anterior plane block is group M3,and group C is control group, each group had 20 cases．In group M1，ultrasound-guided serratus anterior plane block with 0.375% ropivacaine 30 ml and intravenous infusion of oxycodone 0.1mg／kg 3 min before induction; In group M2，ultrasound-guided serratus anterior plane block with 0.375% ropivacaine 30 ml and intravenous infusion of normal saline 0.1mg／kg 3 min before induction; In group M3，ultrasound-guided serratus anterior plane block with 0.375% normal saline 30 ml and intravenous infusion of normal saline 0.1mg／kg 3 min before induction; In group C，ultrasound-guided serratus anterior plane block with 0.375% normal saline 30 ml and intravenous infusion of normal saline 0.1mg／kg 3 min before induction, and the rest treatments were the same．Anesthesia maintenance was based on Pti analgesia index monitoring (40-60) to adjustment the dosage of remifentanil. Four groups of patients received routine postoperative intravenous self-control analgesia．The sedative and coughing pain scores(VAS)were recorded in four groups at 6h, 24h, 48h and 72h postoperatively．Heart rate, arterial systolic pressure, arterial diastolic pressure, mean arterial pressure, sedation index, and analgesia index were measured at the following time points: before induction of general anesthesia (T0)、at intubation (T1)、at incision (T2)、 30 minutes after the start of surgery (T3)、60 minutes after the start of surgery (T4)、 90 minutes after the start of surgery (T5)、 120 minutes after the start of surgery (T6)、 at extubation (T7), and upon exiting the recovery room (T8). Record the intraoperative and postoperative opioid consumption. Record the intraoperative dosage of vasoactive drugs. Record the occurrence of adverse (postoperative nausea and vomiting, respiratory depression, and pruritus)reactions．Record the time of the patient's first ambulation postoperatively.

Results In group M1, M2, and M3 ,the sedative and coughing pain scores(VAS)at 6h, 24h, 48h, and 72h postoperatively were significantly lower than that of group C, the differences were statistically significant($P<0.05$). The sedative and coughing pain scores(VAS)at 24h and 48h postoperatively in the M1 group were significantly lower than those in the other three groups, the differences were statistically significant. The intraoperative and postoperative opioid consumption and the incidence of postoperative adverse reactions in the M1 group were significantly lower than those in the other three groups, the differences were statistically significant. In the M1 group, the time to first ambulation postoperatively was significantly shortened than those in the other three groups, the differences were statistically significant. Heart rate, arterial systolic pressure, arterial diastolic pressure, mean arterial pressure at intubation (T1)、at incision (T2) in the M1 group were significantly lower than those in the other three groups, the differences were statistically significant. There were no statistically significant differences in heart rate, arterial systolic pressure, arterial diastolic pressure, mean arterial pressure, sedation index, and analgesia index among the four groups at 30 minutes after the start of surgery (T3)、60 minutes after the start of surgery (T4)、 90 minutes after the start of surgery (T5)、 120 minutes after the start of surgery (T6)、 at extubation (T7), and upon exiting the recovery room (T8) ($P>0.05$). However, the dosage of vasoactive drugs was significantly reduced in group M1.

Conlusion Serratus anterior plane block combined with oxycodone for multimodal preventive analgesia can reduce perioperative pain in elderly patients undergoing thoracoscopic lobectomy, decrease intraoperative and postoperative opioid consumption, and improve the quality of recovery in elderly patients. Multimodal preventive analgesia can provide clinical reference for

ensuring a safer and more pain-free perioperative period for elderly patients undergoing surgical treatment.

OR-0019

微创食管癌根治术后恢复质量影响因素的二次分析

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目的 由于手术创伤导致的严重炎症和应激反应、疼痛、和术后并发症等因素存在，食管癌患者术后恢复质量较差，恢复周期长，医疗负担重，生活质量低。术后 4-6 周是术后恢复轨迹的关键点，也被定义为后期恢复阶段，该阶段受疼痛、情绪和不良反应的影响，与术后长期恢复相关。由于缺乏与食管癌手术后恢复质量相关的数据，本研究拟探索微创食管癌根治术患者术后差-中恢复质量的发生率及影响因素，以期为微创食管癌根治术患者提供更优的围术期方案，改善患者长期预后。
方法 基于一项比较吸入麻醉与静脉麻醉对微创食管癌根治术后肺部并发症影响的单中心随机对照试验的数据进行二次分析。纳入 2019 年 5 月-2021 年 12 月在四川大学华西医院择期行微创食管癌根治术患者，主要结局指标是术后 30 天时通过 QoR-15 量表测量的恢复质量，并按照优、良、中和差进行分级。次要结局指标包括住院时间、手术并发症发生率和严重程度，以及通过 Logistic 回归分析术后差-中恢复质量（定义为 QoR-15 评分≤121）的影响因素。
结果 分析 541 例患者，在术后 30 天时，优、良、中和差恢复质量的患者分别为 101 例（18.7%）、273 例（50.5%）、147 例（27.2%）、20 例（3.7%）。与良-优恢复质量组相比，差-中恢复质量组住院时间更长（17 [14, 22]天 vs.16 [14, 19]天，P=0.004），非计划入 ICU 的患者更多（11 [6.6%] vs.9 [2.4%]，P=0.017），手术并发症发生率更高（115 [68.9%] vs. 213 [57.0%]，P=0.009），更严重（Clavien-Dindo 分级：I 级，5 [3.0%] vs. 6 [1.6%]；II 级，76 [45.5%] vs. 156 [41.7%]；IIIa 级，27 [16.2%] vs. 47 [12.6%]；IIIb 级，2 [1.2%] vs. 1 [0.3%]；IVa 级，3 [1.8%] vs. 3[0.8%]；IVb 级，2 [1.2%] vs. 0 [0.0%]；P=0.029）。多因素 Logistic 回归分析提示，术前存在疼痛（优势比（OR）=1.527；95% 置信区间（CI） [1.032, 2.258]，P=0.034）、营养风险筛查-2002 评分≥3[OR=1.617, 95%CI (1.069, 2.447), P=0.023]和术后第 7 天 QoR-15 评分＜128.5[OR=0.984, 95%CI (0.967, 0.993), P=0.001]是术后 30 天差-中 QoR 的预测因素。
结论 30.9%行微创食管癌根治术患者在术后 30 天时表现为差-中恢复质量，术前存在疼痛、营养风险筛查-2002 评分≥3 和术后第 7 天 QoR-15 评分＜128.5 是微创食管癌根治术后 30 天差-中恢复质量的独立预测因素，因此，改善术前疼痛和营养状况可能有助于提升患者术后恢复质量。

OR-0020

Arterial-venous oxygen difference as a potential indicator for erythrocyte transfusion during cardiac surgery

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Backgrounds Erythrocyte transfusion decisions, generally based on hemoglobin levels, may also benefit from considering tissue oxygen supply and consumption indicators. We aimed to investigate whether the arterial-venous oxygen difference can serve as a transfusion trigger during cardiac surgery.
Method This single-center, prospective observational study collected data on 1560 cardiac surgery patients at our medical center, among whom 314 with EuroSCORE ≥ 6 were analyzed.

Attending physicians were free to apply their typical intraoperative transfusion strategies. Arterial and venous blood were sampled to allow determination of respective oxygen levels. The primary outcome was the composite of all-cause mortality, non-fatal myocardial infarction, stroke, and new-onset renal failure with dialysis. Logistic regression was used to determine whether the arterial-venous oxygen difference was associated with the primary outcome. The threshold oxygen difference that predicted the primary outcome was determined to be 5.2 mL based on receiver operating characteristic curves, and patients were classified into an "appropriate" group if their oxygen difference ≥ 5.2 mL and they received red blood cell transfusion, or if their difference < 5.2 mL and they did not receive transfusion. All other patients were classified into an "inappropriate" group, and the two groups were compared in terms of the composite outcome.
Results Greater arterial-venous oxygen difference was associated with significantly higher risk of the composite outcome (adjusted OR 1.60, 95%CI 1.21 to 2.10; P < 0.001), and the oxygen difference predicted the composite outcome with an area of 79% under the receiver operating characteristic curve. The frequency of the composite outcome was significantly lower in the 150 patients in the appropriate group than in the 164 in the inappropriate group (17.33% vs. 34.15%, P < 0.001). The “appropriate” group was at significantly lower risk of the composite outcome (adjusted OR 0.51, 95%CI 0.28 to 0.93; P = 0.027). Similar results were obtained after matching patients in the two groups using propensity scoring.
Conclusion Larger intraoperative difference in oxygen content between arterial and venous blood is associated with greater risk of adverse outcomes after cardiac surgery, and this oxygen difference may be a potential indicator for deciding intraoperative transfusion.

OR-0021

心脏瓣膜置换术后心肌损伤：个案报道与文献分析

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目的 为心脏瓣膜术后发生心肌损伤的深入研究提供参考
方法 回顾 1 例女性联合瓣膜病变患者行双瓣置换术后发生术后心肌损伤的过程，结合文献分析存在的原因。
结果 长时间的升主动脉阻断、较大的左心室重量，以及使用 HTK 液是术后心肌损伤的独立风险因素。
结论 该患者术前存在明显的左室肥厚，升主动脉阻断时间长达 3h，以及采用 HTK 液，是其术后心肌损伤的重要原因。

OR-0022

目标导向灌注策略降低婴幼儿心脏术后急性肾损伤：一项随机对照研究

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目的 探讨与传统基于体重、体表面积及温度的流量管理模式相比，婴幼儿体外循环（CPB）中目标导向灌注（GDP）策略，即维持 CPB 中最低 DO2i≥360 mL/min/m2，能否显著降低婴幼儿心脏术后急性肾损伤（CSA-AKI）的发生率、改善患儿预后。

方法 本研究为单中心随机对照临床研究。纳入 2020 年 3 月-2022 年 2 月在四川大学华西医院接受择期 CPB 下心脏手术的婴幼儿（1 月≤年龄≤3 岁）患者。符合入选标准的患儿将被随机 1：1 分配至对照组（根据患儿体重、体表面积和 CPB 温度，给与灌注流量 2.8～3.2 L/min/m2，不计算 DO2i）或 GDP 组（根据 CPB 中血气检测结果计算 DO2i，通过提高灌注流量、超滤和/或输注红细胞悬液以维持 CPB 中 DO2i≥360 mL/min/m2）。GDP 组 DO2i 检测时点为 CPB 主动脉阻断后 5 分钟、主动脉阻断期间每间隔 30 分钟、复温到 35℃时、主动脉开放前。主要研究结局指标为术后 7 天内 CSA-AKI 的发生率，以改良儿童肾脏疾病风险分级作为 CSA-AKI 的诊断标准；次要结局指标包括：(1) 住院期间术后重要并发症发生率：低心排综合征，术后 30 天内二次手术；(2) 近期临床预后指标：小儿重症监护室停留时间，机械通气时间，住院时间，住院费用等；(3) 术后 30 天全因死亡率。

结果 研究期间共筛选 679 例小儿心脏手术患者，其中 367 名患者未能达到纳入标准而被排除；后由于数据缺失及术中深低温，本研究剔除了 27 例患儿（GDP 组 13 例，对照组 14 例）。最终有 285 例患儿纳入数据统计分析（GDP 组 143 例，对照组 142 例）。结果显示，对照组 CSA-AKI 发生率为 38.7%，GDP 组 CSA-AKI 发生率 24.5%，对照组 CSA-AKI 的发生率显著高于 GDP 组（RR 0.63，95%CI 0.44-0.90，P=0.010）。亚组分析结果显示，对照组 CSA-AKI 危险期发生率（30.3%）明显高于 GDP 组（18.2%）（RR 0.60，95%CI 0.39-0.92，P=0.017），而损伤期与衰竭期两组的发生率无统计学差异（P＞0.05），且两组均无处于 CSA-AKI 丧失期或终末期的患儿。此外，CPB 时间在 60 min≤CPB≤120min 范围内的患儿，GDP 组有 22 例（25.3%）发生了 CSA-AKI，对照组有 43 例（41.9%）发生 CSA-AKI，GDP 组 CSA-AKI 的发生率明显低于对照组（RR 0.56，95%CI 0.35-0.90，P=0.018）。而就低心排综合征、二次手术等次要结局指标而言，两组之间无统计学差异（P＞0.05）。

结论 CPB 期间维持最低 DO2i≥360 mL/min/m2 的 GDP 策略，可显著降低婴幼儿 CSA-AKI 的发生率。但本研究 GDP 策略只能降低婴幼儿 CSA-AKI 危险期发生率，对分级程度更严重的 CSA-AKI 无明显影响；同时，当 CPB 时间在 60min~ 120min 范围内时，该 GDP 策略可有效降低婴幼儿 CSA-AKI 的发生率，而对于更短或更长时间 CPB 则无明显影响。因此，还需要进一步的研究来确定可以降低婴幼儿更严重的肾损伤水平的干预措施。

OR-0023

VA-ECMO 联合 IABP 治疗心源性休克患者的疗效及预后分析

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目的 观察静脉动脉体外膜氧合（VA-ECMO）联合主动脉内球囊反博（IABP）治疗心源性休克患者的临床疗效及预后。

方法 回顾分析 2015 年 9 月至 2021 年 6 月在我院接受 VA-ECMO 治疗的心源性休克患者，单独接受 VA-ECMO 治疗的患者为 ECMO 组；接受 VA-ECMO 联合 IABP 治疗的患者为 ECMO+IABP 组。比较两组患者性别、年龄、体重指数（BMI)、原发病、急性生理学与慢性健康状况评分Ⅱ（APACHEⅡ）、体外心肺复苏（ECPR）、ECMO 插管位置等一般资料，接受 ECMO 治疗前（T1）和撤机后（T2）心率（HR）、平均动脉压（MAP）、中心静脉压（CVP）、左心室射血分数（LVEF）等血流动力学指标以及肌钙蛋白（cTn）、乳酸（LAC）、脑钠肽（BNP）、肌酐（Cr）等血液指标；比较两组患者 ECMO 运行时间、撤机成功率、重症监护病房（ICU）住院时间、住院时间、与 ECMO 治疗相关并发症（出血、血栓、下肢缺血、感染、肾衰竭等）、住院死亡率和 1 年内生存率。

结果 共 31 例患者纳入分析，其中 ECMO 组 12 例，ECMO+IABP 组 19 例。两组患者的一般资料差异无统计学意义（P>0.05）。T1 时，2 组患者的血流动力指标和血液指标差异无统计学意义（P>0.05）；T2 时，ECMO+IABP 组患者 MAP 和 LVEF 高于 ECMO 组，LAC 低于 ECMO 组

（P<0.05）。2 组患者患者 T2 时的 MAP、LVEF 均高于 T1 时，HR、CVP、cTn、LAC、BNP、Cr 低于 T1 时（P<0.05）。2 组患者在 ECMO 运行时间、ICU 住院时间、住院时间、与 ECMO 治疗相关并发症方面比较差异无统计学意义（P>0.05）；ECMO+IABP 组患者住院死亡率低于 ECMO 组，比较差异有统计学意义（P<0.05）。

结论 VA-ECMO 联合 IABP 治疗心源性休克的患者，可改善患者的血流动力学、纠正休克状态，降低患者的住院死亡率而不增加相关并发症的发生率。

OR-0024

竖脊肌平面阻滞与腰方肌阻滞在腹腔镜肾切除术后镇痛效果的评价：一项随机对照试验

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目的 腰方肌阻滞和竖脊肌平面阻滞均可改善腹腔镜肾切除术后的镇痛效果。在此，我们比较了两种神经阻滞技术在该患者群体中的镇痛效果。

方法 在本随机对照试验中，110 例计划择期行腹腔镜肾切除术的患者在术前随机接受超声引导下腰方肌阻滞(n=55)或竖脊肌平面阻滞(n=55)。两组均采用标准化全麻和患者自控舒芬太尼镇痛泵，无背景量输注。在术后 2、6、12、24 和 48 小时用数字评分量表(11 分制，0=无疼痛，10=最严重疼痛)评估疼痛强度。我们的主要结局是术后 24 小时内阿片类药物的累积消耗量。

结果 所有 110 例患者(平均年龄 53 岁，女性 57.3%)均纳入意向性治疗分析。术后 24 小时内舒芬太尼的等效消耗量方面，竖棘平面阻滞组患者(中位数 13μg，四分位数范围 4-33μg)低于腰方肌阻滞组患者(中位数 25μg，四分位数范围 13-39；中位数差异-8μg, 95% CI：-15 至 0，P=0.041)。竖棘平面阻滞组术后 2、6、12、24 h 疼痛强度较低(静息时：中位差-1 分，P 值均为≤0.009；活动时：中位数差异-2 至-1 分， P 均＜0.001)。手术当晚主观睡眠质量(0-100 分范围内，得分越高越好；中位数差 12,95% CI：2-23, P=0.018)和 24 h 恢复质量(0-150 范围，得分越高越好；中位差为 8,95% CI：2- 15，P=0.012)。无手术相关不良事件发生。

结论 与腰方肌阻滞相比，竖脊肌平面阻滞在腹腔镜肾切除术后 24 h 内镇痛效果更好，表现为阿片类药物消耗更低，疼痛强度更低。

OR-0025

Effect of bronchial blocker intubation in lateral position on patients undergoing thoracic surgery

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目的 Background: Most patients who undergo bronchial blocker intubation in the conventional supine position need external laryngeal manipulation after lateral positioning for thoracic surgery. No randomized study investigates lateral bronchial blocker intubation. We therefore aimed to evaluate the effect of bronchial blocker intubation in lateral position on patients with thoracic surgery compared to supine intubation, and to confirm whether lateral bronchial blocker intubation could reduce external laryngeal manipulations perioperatively.

方法 This randomized, controlled trial enrolled patients who underwent one-lung ventilation surgery with bronchial blockers between December 2022 and May 2024. Patients in the lateral

group were intubated in the lateral position, while those in the supine group were intubated in the supine position. Primary outcomes were the duration of bronchial blocker intubation.
结果 Results: Of the 206 initially enrolled patients, 177completed the study, with 90 and 87 randomized to the lateral and supine groups, respectively. The median duration of bronchial blocker intubation was shorter in the lateral group than in the supine group (78.29 s vs. 99.36 s, p = 0.006). Lateral bronchial blocker intubation was associated with a shorter duration from anesthesia induction to time-out (18.44 min vs.20.87 min, p = 0.001).
结论 Conclusions: Lateral bronchial blocker is associated with shorter bronchial blocker intubation duration. These results indicate that lateral bronchial blocker intubation is an efficient and effective technique for one-lung ventilation.

OR-0026

改良 Steward 法的建立和临床应用

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目的 建立并验证改良 Steward 法，探讨更合适、更精准的 PACU 转出标准。
方法 第一部分：观察 2020 年 2 月至 6 月全麻后入 PACU 的 601 例患者。记录患者的年龄、性别、BMI、手术时长、术中舒芬太尼用量，记录患者术后 24h 内发生低氧血症的时间，氧饱和度的具体数值以及相应的处理。由此建立改良 Steward 法为完全清醒+肢体能做有意识的活动+拔管后不吸氧情况下 10min 无低氧血症发生。第二部分：在第一部分的研究基础上，选择 2020 年 10 月至 2020 年 12 月全麻后入 PACU 的 1056 例患者完全随机分为 Steward 评分组（S 组）和改良 Steward 评分组（G 组），每组 578 例。记录患者性别、年龄，BMI、ASA 分级，记录患者 Steward 评分≥4 分或改良 Steward 法达到出室标准后至术后 24 内有低氧血症发生率、低氧血症发生时间及相应处理。
结果 第一部分结果为 101 例患者发生低氧血症，首次发生低氧血症的时间为拔管后 4.21±1.89min，均小于 10min。第二部分拔管后 24h 内两组患者达到相应标准后，S 组有 137 例患者发生低氧血症（占全部患者的 23.7%），G 组有 8 例患者发生低氧血症（占全部患者的 1.5%)，两组差异有统计学意义。
结论 改良 Steward 评分法作为 PACU 转出标准优于 Steward 评分法。

OR-0027

以胜任力为导向的麻醉科住院医师分层递进培训模式的建立

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目的 随着“健康中国”战略的深入实施，医学教育及其创新模式面临着新的机遇与挑战，传统的医学教育模式已无法满足当今医学的飞速发展。《住院医师规范化培训内容与标准（2022 年版）》中提出了要进行分层递进培训模式的教学改革。为细化和落实国家培训标准内容和教学改革的要求，我院麻醉科住院医师规范化培训基地旨在构建一个更为客观和详尽的分层递进培训和考核模式，以胜任力为导向，突出专业特色，并对该模式进行初步的评价与分析，为教学改革的实施提供实践依据。
方法 我院麻醉基地在最新教育学理论的指导下，结合医疗体系的现实、麻醉学科的自身特点和过往的培训经验，以岗位胜任力为导向，以培训年限作为分层的主要依据，亚专科作为次要依据，根

据三个不同年级住院医师的培训目标，探索并建立了从轮转方案、教学活动、培训课程、考核标准等多个环节的分层递进培训模式的具体实施方案，制定了麻醉基地《轮转培训方案》和《出科考核方案》。自 2022 年 7 月起，我院麻醉基地对在陪的住院医师全面推行分层递进的培训模式，针对不同年级的住院医师进行亚专科轮转，安排相应的理论、技能培训课程和亚专科出科考核。并通过对 2021 年 8 月至 2023 年 7 月间方案实施前后 44 名在陪住院医师、共 231 人次的出科考核成绩进行分析比较，评估该方案是否达到预期效果。

结果 纳入统计的有效的出科考核成绩共计 231 人次，其中方案实施前考试人次 109，方案实施后考试人次 122。除心胸外科麻醉外，其他各亚专科成绩均有所提升；超过一半的亚专科，包括普通外科麻醉、骨科与矫形外科麻醉、眼耳鼻咽喉科麻醉+口腔麻醉、手术室外麻醉+麻醉恢复室和疼痛治疗亚专科的出科考成绩提高具有统计学意义（$P<0.05$）。

结论 出科考成绩的提高证实了分层递进的培训模式取得了初步成效，可有效地促进麻醉科住院医生理论知识、技能操作和岗位胜任力的提升。此分层递进培训模式的建立，为探索更为细致和有针对性的培训方案和评价模式、进一步构建中国式毕业后医学教育“里程碑”计划奠定基础。

OR-0028

围术期 TEE 监测三月班-华西维思模教学系统的学习经验与总结

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目的 TEE 作为麻醉专业的核心技术，能够提供实时优质的图像，帮助麻醉医生在围术期进行精准的诊断和处理。由于大部分麻醉医师存在超声领域的知识欠缺，所以规范化、标准化和系统化的 TEE 培训显得迫切必要和重要。华西维思模教学系统采用“多模式+多模态”的方法，将心脏超声理论、重建心脏模型和实践操作有机结合，学员通过三月班的学习达到 TEE 初级水平。

方法 每月进行一轮猪心解剖、TTE 和可穿戴超声培训。

猪心解剖帮助学员建立心脏模型，了解超声切面和心脏解剖的关系；维思模超声断层解剖数字人和超声联合教学的特色“心超芭蕾”课程，学员快速生动理解 TTE 基本切面和解剖结构；可穿戴超声的五大应用场景(休克患者的持续监测、心衰患者的心功能持续监测、危急重症患者的院前急救及转运、心脏外科微创手术超声引导监测、特殊人群居家连续心动监测)及其科研方向、临床设计的培训。

每天除临床 TEE 学习外，还有“四个一”的学习轴线，即“一词”、“一案”、“一文”和“一阅”组成。

“一词”指从医学专有名词出发，结合“宋式线性图”中的壁、腔、瓣、流来分析泵功能和通道功能的变化，同时结合一手临床和二手文献资料，由点及面的系统解读名词。

“一案”指每天学员选择一择期手术案例，宋海波老师手术间床旁教学，重建个体化的病理生理学模型、据此进行术中诊疗决策和管控相关风险。

“一文”指三个月读三本书，即“围术期二维经食管超声心动图实用手册”、“经食管超声心动图实用技术”和“心脏病学超声心动图精要”，做到心脏内科和外科相关知识架构网格化。

“一阅”指针对疑难、特殊或代表性的 TEE 案例，通过维思模 V 站上传基本资料、基本切面、问题切面、术野照片、相关文献查阅学习等全面的阅片和复盘过程。

结果 以临床问题为导向进行毕业选题，以个案报道、系统性综述或 PPT 汇报等形式展示学习成果。

结论 围术期 TEE 三月班-华西维思模教学系统长达 15 年的探索与总结，对全国推动围术期心脏超声技术的普及和应用有示范作用。

OR-0029

微剂量右美托咪定辅助镇痛对阻塞性睡眠呼吸暂停高危患者术后睡眠结构的影响:一项随机对照研究

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目的 阻塞性睡眠呼吸暂停（obstructive sleep apnea, OSA）在外科手术患者中很常见，如果不能得到及时发现和处理，有可能会导致严重的后果。右美托咪定（dexmedetomidine）作为一种高选择性的 α2-肾上腺素能受体激动剂，可以通过激活内源性睡眠促进通路发挥镇静作用。既往研究发现，微剂量右美托咪定辅助阿片类药物镇痛可以改善术后患者的睡眠结构，同时不产生明显的镇静作用。本研究的目的是验证微剂量右美托咪定辅助镇痛能否改善 OSA 高危患者的术后睡眠结构。
方法 这是一项随机、双盲、安慰剂对照试验，共入组 152 例 STOP-Bang 评分（评分范围 0-8 分，分数越高 OSA 风险越大）≥3 分且血清碳酸氢根水平（HCO_3^-）≥28 mmol/L 的非心脏手术患者。所有患者术后均接受经鼻高流量氧疗（high-flow nasal cannula, HFNC），使用静脉自控镇痛泵进行术后镇痛，配方为 0.5 mg/ml 的吗啡辅以随机分配的生理盐水或右美托咪定（中位输注速率 0.02 μg/kg/h）。在手术当晚 9:00 至次日晨 6:00 进行多导睡眠监测。主观睡眠质量采用 Richards-Campbell 睡眠量表评估（分数范围为 0 至 100，分数越高表示睡眠越好），术后 1-5 天每天评估一次（8:00-10:00）。镇静水平采用 Richmond 躁动-镇静评分评估（评分范围为-5 [无法唤醒] 到 +4 [激越]，0 表示正常的平静状态），术后 1-5 日每日评估两次（8:00-10:00，18:00-20:00）。本研究的主要观察指标为 N2 期睡眠百分比，次要和探索性观察指标包括其他睡眠结构参数、睡眠-呼吸参数以及主观睡眠质量。
结果 152 例患者（中位数 62 岁；74%为男性）均被纳入意向性治疗分析，每组 76 人；123 例患者被纳入睡眠结构分析，其中右美托咪定组 62 人，安慰剂组 61 人。多导睡眠监测显示，微剂量右美托咪定辅助镇痛增加了 N2 期睡眠百分比（中位数差 10% [95% CI 1%, 21%]; P = 0.029）；同时减少了 N1 期睡眠的百分比（中位数差 -10%[95% CI -20%, -1%]; P = 0.042）。分层分析显示，N2 期睡眠百分比在上午手术患者中右美托咪定组高于安慰剂组（中位数差 16% [95% CI 2%, 31%]; P=0.034），而在下午/晚间手术患者中组间无显著差异；N2 期睡眠百分比在 65 岁以下患者中右美托咪定组高于安慰剂组（中位数差 13% [95% CI 2%, 29%]; P=0.028），而在 65 岁及以上患者中组间无显著差异。其他睡眠结构和睡眠-呼吸参数以及不良事件发生率在两组之间无显著差异。右美托咪定组患者手术当晚的主观睡眠质量略有改善，但无统计学显著性（中位数差 6 [95% CI 0, 13]; P=0.060）。所有时间点 Richmond 躁动-镇静评分均为中位数 0（四分位数 0, 0），组间无差异。
结论 对于非心脏术后接受经鼻高流量氧疗的 OSA 高危患者，微剂量右美托咪定辅助镇痛可轻微改善睡眠质量而不增加不良事件，但其临床影响需要进一步研究。

OR-0030

基于机器学习算法预测无痛胃肠镜检查术后早期恶心呕吐的发生

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目的 术后恶心呕吐在胃肠镜检查人群中的发生率约为 10%，而在相关高危人群中的发生率则高达 80%，不仅降低了患者的舒适度，而且延长麻醉恢复室的停留时间，不符合患者对于术后加速康复的殷切需求。因此，针对高危患者进行术后恶心呕吐的预防及处理至关重要。机器学习(ML)算法能

够采用先进的计算机技术来分析众多变量之间的复杂关系，并可以依靠大量数据尽可能准确和快速地做出预测。目前机器学习已经被广泛地的用于医疗领域，包括用于疾病的诊断、风险的预测以及临床决策等。本研究旨在探究机器学习算法预测无痛胃肠镜检查患者术后早期恶心呕吐发生的可行性。

方法 本研究纳入了 2024 年 6 月至 8 月期间在郑州大学第一附属医院择期行无痛胃肠镜检查的患者。研究收集了患者的人口统计学资料、病历资料与手术相关信息，包括年龄、性别、身高、体重、ASA 分级（美国麻醉医师协会的身体状态分级）、既往恶心呕吐病史、晕动症病史、既往阿片药物使用史、检查类型、检查时间以及术中最高和最低血压等。为了评估不同机器学习模型在预测这些变量中的表现，使用 Python 3.11.9 构建了八个不同的机器学习模型，具体包括：K 近邻算法（KNN）、朴素贝叶斯（ Naive Bayes ）、支持向量机（SVM）、随机森林（Random Forest）、极限梯度提升（XG Boost）、轻量级梯度提升机（Light GBM）、多层感知器（MLP）和逻辑回归（Logistic Regression）。这些模型通过 5 折交叉验证法进行训练，以确保模型的泛化性能和稳定性。在模型性能评估方面，研究计算了每个模型在训练集和测试集上的多项指标，包括平均受试者工作特征曲线下面积（AUC 值）、准确度（Accuracy）、精确度（Precision）、F1 得分（F1 Score）、召回率（Recall）、特异度（Specificity）和 Cohen 的卡帕系数（Cohen Kappa Score）。这些指标全面地反映了模型在不同方面的性能。此外，研究还使用了 Python 的 subplot 包绘制了各个模型的受试者工作特征（ROC）曲线，以可视化各模型在不同阈值下的表现，从而更直观地比较各模型的优劣。这些结果为进一步优化和选择适用于临床应用的预测模型提供了科学依据。

结果 本研究共纳入了 428 名患者，其中发生术后恶心呕吐的患者有 124 名。使用机器学习算法成功建立了 8 种无痛胃肠镜检查术后恶心呕吐的预测模型，多层感知器（MLP）模型在测试数据集上的平均 AUC 值最高，为 0.83，预测恶心呕吐发生的效果最好，并且准确率和精确率也优于其他模型分别为 0.813 和.815。

结论 结果证明多层感知器预测无痛胃肠镜检查患者术后早期恶心呕吐的效果优于其他算法，证明其有良好的术后恶心呕吐预测能力。

OR-0031

Application of Real-Time Blood Pressure Prediction for Postoperative Major Adverse Cardiac Events: A Multimodal Deep Learning Approach

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目 的 Effective approaches for fusing intraoperative blood pressure measurements and perioperative variables to predict the risk of major adverse cardiovascular events more accurately and in real time are lacking, we intended to examine the performance of advanced multimodal deep learning utilizing real-time blood pressure and perioperative variables to predict the risk of postoperative major adverse cardiovascular events.

方法 Datasets of older patients who underwent noncardiac surgery with eligible blood pressure monitoring records were reviewed and divided into training and test datasets. Perioperative structured variables and unstructured blood pressure data were used as input independently or combined with distinct models: the classical Revised Cardiac Risk Index, machine-learning models with preoperative and intraoperative structured variables, a deep-learning Transformer model with only real-time blood pressure data, and a multimodal deep-learning model with perioperative structured variables and unstructured blood pressure data.Major adverse cardiovascular events within postoperative 30 days were the primary outcome.

结果 Among the 14345 patients included in our analysis, 655 (4.6%) experienced major adverse cardiovascular events. The multimodal deep-learning model with structured variants and continuous blood pressure exhibited the best predictive performance, with an AUROC of 0.840. With only continuous blood pressure, the Transformer model showed a prediction performance with an AUROC of 0.790. The two models established by deep learning performed better than the existing Revised Cardiac Risk Index model whose AUROC was 0.608, as well as machine learning models whose highest AUROC was 0.736 with combining variables.
结论 Based on multimodal deep-learning techniques, intraoperative continuous blood pressure data can be integrated with perioperative biostatistical variants, providing an accurate risk prediction for major adverse cardiovascular events during surgery.

OR-0032

Establishment and validation of a prediction model for hypoxemia in middle-aged and elderly outpatient patients undergoing painless gastroscopy diagnosis and treatment: a retrospective cohort study

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Background Gastrointestinal endoscopy is the most commonly used method to diagnose and treat digestive system diseases. Due to the increase in the demand of patients for comfortable medical services, painless and comfortable gastrointestinal endoscopy services gained popularity very fast. Painless gastrointestinal endoscopy diagnosis and treatment services not only alleviate the pain and discomfort of patients caused by various factors, such as stress, pain, bloating, nausea, and vomiting but also create better diagnostic and treatment conditions for digestive endoscopists. However, they also involve certain risks. Hypoxemia caused by airway obstruction and respiratory depression is a very common complication associated with anesthesia in painless gastroscopy diagnosis and treatment services; hypoxemia has an incidence rate of 1.8–69.0%. With the aging of the social population, the number of cases of hypoxemia among middle-aged and elderly patients is increasing. However, tools for predicting hypoxemia in middle-aged and elderly patients are lacking. Machine learning (ML), the application core of AI, covers multiple fields, including probability, statistics, and computer science. ML can efficiently perform complex nonlinear data processing, risk prediction, disease diagnosis, and other functions; thus, providing us with new technological means to study various diseases and investigate new research perspectives. In this study, we investigated the risk factors for hypoxemia in middle-aged and elderly outpatients undergoing painless gastroscopy based on machine learning and constructed a risk prediction model.
Methods In this retrospective study, we included the data on 1,348 outpatients undergoing painless gastroscopy. The clinical data of 984 patients who visited the First Affiliated Hospital of Army Medical University from March 1, 2023 to May 31, 2023 were used for model establishment, with data was accessed on December 22, 2023; and the clinical data of 364 patients who visited the Third Affiliated Hospital of Zunyi Medical University from July 1, 2023 to September 31, 2023 were used for external validation of the model, with data was accessed on October 20, 2023. The clinical data of the patients were collected on sex, age, body mass index (BMI), baseline pulse rate, baseline SpO2, previous underlying medical history (presence of hypertension, diabetes, coronary heart disease, cerebral infarction, chronic obstructive pulmonary disease, and asthma), snoring history, smoking history, drinking history, airway assessment (short neck and micrognathia), electrocardiogram results, ASA class, opioid-assisted sedation, induction dose of etomidate and propofol mixture, repeated pharyngeal irritation, intraoperative coughing,

intraoperative motion, the addition of anesthetic drugs, intraoperative biopsy, and operating time of gastroscopy. In total, 26 characteristic variables were included, and BorutaShap was used for feature selection. Five machine learning algorithm models, including logistic regression (LR), support vector machine (SVM), random forest (RF), extreme gradient boosting (XGB), and light gradient boosting machine (LightGBM), were selected. The feature variables selected by BorutaShap were incorporated into five machine learning algorithms. The best models were selected based on the area under the receiver operating characteristic curve (AUROC). Model feature importance was explained and analyzed using Shapley Additive Explanations (SHAP). The endpoint event of this study was considered to be hypoxemia during the procedure, defined as at least one occurrence of pulse oxygen saturation below 90% without probe misalignment or interference from the beginning of anesthesia induction to the end of painless gastroscopy.
Results In the final cohort of 984 patients, 11% of patients (108/984) experienced hypoxemia during the painless gastroscopy procedure. The AUROCs of the five models were as follows: Logistic Regression (AUROC = 0.893, 95CI: 0.881–0.899), SVM (AUROC = 0.855, 95CI: 0.812–0.884), Random Forest (AUROC = 0.914, 95CI: 0.889–0.924), XGB (AUROC = 0.902, 95CI: 0.865–0.919), and LightGBM (AUROC = 0.891, 95CI: 0.847–0.917). Regarding the explanation of the importance of SHAP features, preoperative variables (baseline SpO2, body mass index, and micrognathia) and intraoperative variables (operating time of gastroscopy, induction dose of etomidate and propofol mixture, append anesthetic, cough, and repeated pharyngeal irritation) significantly contributed to the model.
Conclusions We identified eight potential risk factors related to the occurrence of hypoxemia in middle-aged and elderly patients undergoing painless gastroscopy, based on machine learning feature engineering. The eight potential risk factors included the operating time of gastroscopy, baseline SpO2, BMI, induction dose of etomidate and propofol mixture, append anesthetic, micrognathia, cough, and repeated pharyngeal irritation. Among them, preoperative baseline pulse oxygen saturation was negatively correlated with the occurrence of hypoxemia. The other seven feature variables were positively correlated with the occurrence of hypoxemia. Among the five machine learning algorithms, RF exhibited the best predictive performance in the internal test set and had a certain degree of generalization ability in the external validation set, which indicated that the RF model was more suitable for the data framework of this study. This model was more likely to enhance the accuracy of hypoxemia prediction in middle-aged and elderly patients undergoing painless gastroscopy, and thus, it is suitable for assisting anesthesiologists in clinical decision-making. Based on the information obtained from the model, anesthesiologists can take active and reasonable preventive intervention measures to reduce the incidence of hypoxemia in middle-aged and elderly outpatients undergoing painless gastroscopy and increase the safety of perioperative anesthesia in such patients.

OR-0033

单节段微创腰椎融合术后局部及静脉应用倍他米松对术后慢性腰痛发生的影响：一项单中心、单盲随机对照研究

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目的 腰痛是腰椎手术后常见并发症，术后早期护理不当甚至可能演变为长期慢性腰痛，甚至发展成为腰椎手术失败综合征，给患者生活质量带来巨大影响，造成严重的家庭及社会经济负担。皮质类固醇激素因其出色的抗炎抗水肿作用在腰椎术后被广泛应用。目前尚无高质量临床研究评价其不同给药方式对于术后慢性腰痛的影响及其适用人群尚。因此在这项研究中我们评价了单节段腰椎微创手术后静脉输注倍他米松以及局部缓释倍他米松对于远期慢性腰痛发生的影响及其相关副作用。

方法 这是一项单中心前瞻性单盲随机对照研究。252 名在我院接受单节段腰椎微创融合手术的患者被随机分配在手术后接受局部倍他米松缓释治疗或静脉输注倍他米松进行抗炎以及减轻神经根水肿治疗。在手术后 3 个月、6 个月以及 12 个月对患者进行随访。主要结局指标是慢性腰痛发生情况、神经根性疼痛发生情况、疼痛部位及程度。同时使用 ODI 功能评分、匹兹堡睡眠评分、健康指数量表（EQ-5D）评价了随访时患者的腰椎功能、睡眠质量、生活质量以及镇痛药物的使用情况。对每个时间点进行了意向性治疗分析（ITT）以及符合研究方案分析(PP)。比较了两组间的平均值并报告了效应值及置信区间。
结果 术后 3 月时两组患者神经根性疼痛发生率及疼痛程度无明显差异，相比于倍他米松静脉滴注治疗，倍他米松局部缓释治疗组患者在术后 6 月及 12 月随访时神经根性疼痛发生率较低（P=0.012，P=0.007）、腰椎 ODI 评分显著高于静脉输注组（P=0.023，P=0.015）同时局部缓释治疗组患者疼痛对生活干扰及睡眠干扰效应显著小于静脉滴注组,并在两个随访时间点保持增益。
结论 与静脉滴注倍他米松相比，局部缓释倍他米松治疗显著降低术后慢性腰痛发生率，改善患者神经根性疼痛发生情况，提高患者术后生活质量。在随访期内睡眠方面有持续改善，基于其疼痛治疗方面的有效性，无相关禁忌症的患者推荐使用。

OR-0034

Study on the mechanism of electroacupuncture in Golgi stress of endotoxic acute lung injury

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Background Sepsis is a life-threatening condition involving organ dysfunction characterized by a generalized inflammatory syndrome, and the associated mortality rate is high. Electroacupuncture (EA) benefits endotoxemia-induced lung injury, mainly through lung inflammation reduction and cellular homeostasis, although the anti-inflammatory mechanisms underlying these benefits remain completely understood.
Methods Mice were pretreated with EA or sham EA therapy 5 days before the induction of endotoxemia through the administration of lipopolysaccharide (LPS) and cecal ligation and puncture (CLP). Histopathological changes, systemic inflammation, and cell death in the lungs were assessed. Transmission electron microscopy was employed to identify the structure of the Golgi complex visually.
Results EA pretreatment effectively rescued the lung from pathological changes, lung edema, cell apoptosis, and survival rate in septic mice, along with the improvement of physiological parameters. Endotoxemia strongly induces fragmented Golgi stacks, leading to fragmentation and disintegration of its shape, inducing cell apoptosis, and causing the outbreak of a large amount of inflammation in the lungs. EA therapy can significantly inhibit the fragmented process of Golgi stress from rescuing the morphological changes and exerting anti-inflammatory effects. And this protective effect may be related to the upregulation of cAMP-responsive element binding protein 3 (CREB3) and ADP-Ribosylation Factor 4 (ARF4), one of the key pathways involved in Golgi stress response. However, Sham EA (SEA) treatment did not substantially improve the fragmentation, stacking, and separation of Golgi organization, and inflammatory damage induced by endotoxemia remains.
Conclusion EA pretreatment at ST36 + BL13 acupoints could improve the Golgi stress response induced by endotoxemia and suppress inflammatory lung injury. This improvement effect may be related to the enhancement of the CREB3-ARF4 signaling pathway.

OR-0035

颊针疗法治疗阴道分娩产后尿潴留的临床观察

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目的 在常规治疗基础上，观察颊针对产后尿潴留患者症状的改善及膀胱排空功能的影响，为针灸治疗产后尿潴留在治法上提供新思路、新方法。
方法 选择广州市妇女儿童医疗中心 2023 年 3 月-2023 年 12 月收治的 60 例符合阴道分娩产后尿潴留标准的病人，随机分为治疗组和对照组，每组各 30 例。对照组患者予诱导排尿及开塞露塞肛治疗；治疗组在对照组治疗基础上行颊针治疗，每次 30min，每日 1 次，共治疗 2 次。比较两组患者治疗前后膀胱残余尿量、自主排尿量、排尽尿液时间、膀胱功能积分及导尿率评定临床疗效。
结果 治疗后，两组患者膀胱残余尿量较治疗前均减少（P<0.05），排尽尿液时间较治疗前均缩短（P<0.05），自主排尿量较治疗前均增加（P<0.05）。治疗组排尽尿液时间［(0.90±0.86)min］短于对照组［（1.88±1.52）min］；排尽尿液后膀胱残余尿量［95.00(75.00,112.75)mL］少于对照组［136.50(108.75,232.50)mL］；自主排尿量［200.00(89.50,345.00)mL］多于对照组［105.50(85.50,150.00)mL］；膀胱功能积分［0.70±1.09］小于对照组［1.77±1.10］；导尿率(13.3%)低于对照组(40.0%);有效率为(86.7%)）高于对照组的(60.0%)，差异均有统计学意义（P<0.05）。
结论 （1）两种治疗方案均能有效治疗阴道分娩产后尿潴留，但颊针疗法的治疗效果优于常规治疗措施，能更好的改善产后尿潴留症状，值得临床推广。
（2）颊针疗法能更好的缩短排尽尿液时间、增加自主排尿量、降低膀胱功能积分、减少膀胱残余尿量，提高阴道分娩产后尿潴留患者膀胱排空功能，提升了患者的生活质量。

OR-0036

脓毒症致病性中性粒细胞亚群的临床应用价值

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目的 脓毒症可导致多器官功能障碍，是重症监护病房（ICU）患者死亡的首位原因。中性粒细胞（neutrophil, Neu）参与脓毒症损伤期间的初始早期宿主防御反应，而监测 Neu 的变化可用于辅助诊断脓毒症和指导临床治疗。挖掘关键的致病性中性粒细胞亚群并鉴定其可靠的生物标志物可能为脓毒症提供精准治疗方法。
方法 对湖南省多家三级甲等医院 ICU 和呼吸 ICU(RICU)的 175 名患者进行前瞻性研究，观察致病性 Neu 包括 proBDNF+CD16int Neu 以及 p75NTR+CD64+ Neu 的诊断价值。对照组为年龄和性别匹配的健康志愿者。采用质谱流式技术比较 2 组循环 Neu 亚群比例变化，通过 logistic 回归分析进行相关性分析、ROC 曲线评价其临床价值。
结果 与健康对照组相比，脓毒症患者外周血致病性 $proBDNF^{+}CD16^{int}$ Neu 以及 $p75^{NTR+}CD64^{+}$ Neu 的百分比显著上调，具有统计学差异。两群致病性中性粒细胞亚群对脓毒症均具有较高的诊断价值，与脓毒症相关的快速序贯器官衰竭评分（qSOFA）、炎症与预后相关指标（NLR、MLR、PLR、CRP、PCT、LAC）、多脏器损伤（氧合指数 OI、国际标准化比值 INR，内生肌酐清除率 Ccr ）呈正相关。
结论 循环致病性 $proBDNF^{+}CD16^{int}$ Neu 以及 $p75^{NTR+}CD64^{+}$ Neu 可能是脓毒症的潜在生物标志物。靶向清除致病性 Neu 亚群可能为脓毒症患者提供一种全新的治疗方法。

OR-0037

Impact of low dose glucocorticoids in surgical patients with abdominal sepsis: A multicenter retrospective cohort study

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Background Sepsis, a life-threatening organ dysfunction caused by a dysregulated host response to infection, is an urgent medical and health-care problem affecting millions of people worldwide. Intra-abdominal infection ranks among the primary causes of sepsis, second only to pulmonary infection. Timely surgical intervention to achieve source control of infection is crucial for eligible patients to prevent disease progression. Septic patients with abdominal infections are at a high risk of developing septic shock in the early stages, making hemodynamic management more challenging during anesthesia. Glucocorticoids (GCs) play a pivotal role as regulators of significant pathophysiological processes, including inflammation, immunity, vasoreactivity, and metabolism. Theoretically, GCs could mitigate the inflammatory response during surgery, regulate vascular reactivity, and preserve endothelial barrier function, thereby enhancing hemodynamic stability and organ perfusion in patients with sepsis. However, the safety and efficacy of GCs in sepsis remain contentious in recent published clinical trials. To date, the effects of GCs in septic surgical patients have not been reported in the literature. This study aimed to investigate the potential impact of intraoperative GCs administration on clinical outcome and hemodynamic parameters of surgical patients with abdominal sepsis.

Methods This retrospective cohort study included a 1:1 propensity score–matched cohort of surgical patients afflicted with abdominal sepsis at 2 medical centers from January, 2008, through December, 2022. The inclusion criteria for this study comprised the following points: 1. Presence of evident abdominal infections; 2. Conformity to the Sepsis 3.0 diagnostic criteria; 3. Underwent general anesthesia and surgical procedures; 4. Age over 18 years old. Patients with a history of severe cardiopulmonary, hepatic, renal dysfunction, or those with infections originating outside the abdomen, or individuals undergoing unplanned surgery due to postoperative complications were excluded. Additionally, patients receiving long-term oral or intravenous GC therapy before surgery were excluded in further analysis. Dosage of GCs was documented in hydrocortisone equivalents, with 1 mg of prednisolone/prednisone/methylprednisolone equaling 5 mg of hydrocortisone, and 1 mg of dexamethasone equaling 20 mg of hydrocortisone. Patients were classified into the low-GCs group (equivalent dose of hydrocortisone ≤ 200 mg), high-GCs group (equivalent dose of hydrocortisone > 200 mg), and non-GCs group according to the dosage of steroids used intraoperatively, and in-hospital mortality was designated as the primary outcome.

Results A total of 476 patients fulfilled the inclusion criteria and finally included in the data analysis. The overall in-hospital mortality rate was 7.56%. Intraoperative adjunctive GCs therapy was administered to 259 patients (54.41%), with 213 (82.24%) receiving a low dose of GCs and 46 patients (17.76%) receiving more than 200 mg hydrocortisone or equivalent. Methylprednisolone was the most commonly used intraoperative corticosteroid, administered to 153 patients (59.07%), followed by dexamethasone (119 patients, 45.95%), with a combination of both used for 13 patients. After propensity score matching (PSM), there were 168 cases in both the low-GCs group and the non-GCs group, with no significant differences observed between the groups regarding mortality rate, length of hospital-stay, and duration of intensive care unit (ICU) stay. However, the low-GCs group exhibited a higher intraoperative urine output compared to non-GCs group (2.39 ± 1.90 ml/kg/h vs 1.82 ± 1.43 ml/kg/h, P = 0.002).

174 individuals (36.55%) presented with septic shock before undergoing surgery. Among these patients, 86 (49.43%) received adjuvant GCs therapy. After PSM, a significantly lower proportion of vasopressor use were observed in low-GCs group compared to non-GCs group on the first

postoperative day (POD1) (21.43% [9/42] vs 42.86%, [18/42], P = 0.035). Additionally, there was a higher urine output (1.45 ml/kg/h, IQR 1.32 - 2.22 vs 1.16 ml/kg/h, IQR 0.46 - 1.49, P = 0.031) on the POD1 in the low-GCs group. However, there was no significant difference in postoperative ICU admissions or in-hospital death between the two groups.
Moreover, to determine the prophylactic use of GCs on the hemodynamic status during surgical procedures, patients who received a low dose of GCs during anesthesia induction were identified. After PSM, a total of 296 patients were divided into low-GCs or non-GCs groups, with 148 patients in each group. The results showed that prophylactic use of GCs during anesthesia induction did not decrease the incidence of intraoperative hypotension or necessity of vasopressors use, implying that prophylactic GCs use seemed to have minimal effects on the intraoperative hemodynamic status in patients with sepsis.
Forty-six patients received a high dose of GCs, with a median dose of 400mg hydrocortisone or its equivalent. After PSM, no significant difference in ICU length of stay, hospital length of stay, or in-hospital mortality was observed between the two groups. These findings suggested that administering higher doses of steroids did not confer any beneficial effects on patient outcomes, underscoring the importance of cautious application.
Conclusion Intraoperative administration of low-dose GCs demonstrates a transient improvement in hemodynamics of patients with septic shock, however, it did not lead to improved clinical outcomes. Further research remains necessary to elucidate the optimal perioperative dosing strategy.

OR-0038

急诊手术患者术中乳酸最大值与术后住院期间死亡率关系：一项单中心回顾性队列研究

付逸博、申乐、黄宇光
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目的 血清乳酸水平可作为循环功能障碍所致氧供需失衡的标志物。在重症患者中，乳酸升高通常是由于组织缺氧导致的无氧糖酵解。因此，乳酸升高也是重症患者以及术后患者死亡的预测因子。急诊手术患者多数病情危重，且术前评估与优化不够完善，通过术中乳酸水平预测患者术后的预后尤为重要。一般观念认为，动脉血气乳酸值应≤2.0 mmol/L，而对于血清乳酸值对术后死亡预测的定量关系并不明确，因此，本研究将通过分析急诊手术患者的术中乳酸最大值与预后的相关性，进一步评价乳酸对预后的预测价值。
方法 本研究回顾性收集了国内某大型三甲医院 2017.7-2023.7 期间所有监测了术中动脉血气（含乳酸）的急诊手术病例，其中基线数据以及患者的预后信息提取自医院 HIS 系统；术中数据提取自手术麻醉信息系统。对患者术中所有血气结果进行比较，选取乳酸最大值当次结果进行分析，将患者术中乳酸最大值结果与患者住院期间生存死亡结果绘制 ROC 曲线分析并得到乳酸 cut-off 值，以乳酸 cut-off 值为分界，将患者根据乳酸值高低分为两组，对两组患者的基线数据、术中数据以及预后数据进行对比分析，其中连续变量中符合正态分布的采用独立样本 t 检验，不符合正态分布的数据采用 Mann-Whitney U 检验；分类变量采用卡方检验。本研究已通过医院伦理委员会审查，并已在国家卫健委临床研究网站备案。
结果 共有 2518 例患者数据纳入统计分析，根据 ROC 曲线，计算得乳酸对患者围术期生存预测的 cut-off 值为 2.95mmol/L，以乳酸值 2.95mmol/L 为分界，将患者分为高乳酸组和低乳酸组，通过对比两组患者在术中和术后的各项指标发现，乳酸更高组的患者，术中出血量、输血量、补液量等，以及住院时长、住院期间总花费等均显著高于低乳酸患者（$p<0.05$）。对术中各项指标进行单因素与多因素回归分析进一步提示，术中血清乳酸值与术后死亡有显著正向关系（OR=1.28, $p<0.001$）。

结论 本研究通过探究急诊手术患者术中动脉血气乳酸最大值与围术期死亡率的关系，证实了血清乳酸与围术期死亡率之间明确相关，结果提示术中动脉血气乳酸值高于 2.95mmol/L 对预测术后死亡风险具有提示意义，血清乳酸每增大 1mmol/L，死亡率增加 28%，为临床参考乳酸最大值预测术后住院期间死亡率提供了新的依据。

OR-0039

The delivery of PD-L1 siRNA by neutrophil-targeted lipid nanoparticles effectively ameliorates sepsis

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Background Sepsis is a complex disorder characterized by life-threatening organ dysfunction, which arises from a dysregulated host response to infection. The high morbidity and mortality rates associated with sepsis present a significant global health challenge. During sepsis, the host response is profoundly disrupted, characterized by sustained hyperinflammation and immunosuppression, which play central roles in disease progression. Despite advancements in our understanding of sepsis pathophysiology, targeted therapies aimed at restoring the dysregulated host response in septic patients have proven unsuccessful. Currently, treatment strategies primarily involve fluid resuscitation, broad-spectrum antibiotic therapy, and life support treatment. Hence, there is an urgent need to develop a promising new therapeutic approach capable of effectively modulating both the inflammatory storm and immunosuppression.
Sepsis and malignancy share similar immunosuppressive mechanisms, characterized by T-lymphocyte dysfunction, rendering immune checkpoint inhibitors a promising clinical approach for sepsis treatment. Programmed death ligand 1 (PD-L1) can be expressed on various cell types during sepsis, with several reports supporting its aberrant activation as the primary cause of immunosuppression in this condition. Neutrophils, being the predominant peripheral blood white blood cells, play a crucial role in sepsis. We have demonstrated the high expression of PD-L1 in neutrophils in sepsis, contributing to the disease progression. In a murine model of sepsis induced by cecal ligation and puncture (CLP), knockdown of PD-L1 in neutrophils resulted in increased survival rates and attenuated lung and brain injuries. Despite this progress, a therapeutic strategy specifically targeting septic neutrophils to alleviate their PD-L1 expression has yet to be developed, which might provide a novel and much-needed strategy for sepsis treatment.
Small interfering RNA (siRNA) has been designed to down-regulate specific genes within cells, thus modulating specific cellular functions. However, due to its polyanionic nature, siRNA is unable to cross the cell membrane, necessitating an effective delivery strategy for cytoplasmic entry into the target cells. Lipid nanoparticles (LNPs) are the most advanced nonviral platform clinically approved for siRNA delivery and are based on ionizable lipids, attracting significant attention in the field of RNA therapy. Nevertheless, in vivo transfecting of siRNA into leukocytes poses a challenge, and currently, there are no LNPs available to facilitate PD-L1 siRNA delivery to neutrophils. This underscores the need for further exploration in developing novel delivery strategies to target neutrophils and modulate their PD-L1 expression in cases of sepsis.
In this study, we developed a novel LNP formulation to safely deliver PD-L1 siRNA to neutrophils affected by sepsis, resulting in the efficient downregulation of PD-L1 expression. This innovative approach has the potential to alleviate sepsis-induced multi-organ failure and improve survival, making it a promising therapeutic option for sepsis treatment.
Methods Formulation of siRNA-LNPs, Characterization of LNP, Animals, CLP model and LNPs injection, Survival analysis of CLP mice, Isolation, purification of mouse bone marrow neutrophils, LNPs treatment in neutrophils in vitro, In vivo evaluation of the effect of LNPs by flow cytometry, In vivo imaging of LNPs delivery, Quantitative RT-PCR analysis, Immunofluorescence, TUNEL staining, Histopathological analysis, Cell-free DNA quantification in plasma, Statistical analysis

Results In our study, we successfully demonstrated the efficacy of a targeted delivery system using lipid nanoparticles (LNPs) to deliver PD-L1 siRNA specifically to neutrophils. This approach resulted in the specific downregulation of PD-L1 expression in neutrophils. As a result, we observed a significant improvement in the migratory capacity of septic neutrophils, leading to enhanced survival in septic mice. Additionally, this intervention led to a reduction in inflammation levels and mitigated multi-organ damage. These findings highlight the potential of neutrophil-targeted PD-L1 siRNA delivery using LNPs as an effective strategy against sepsis and septic organ injury.

We and others have demonstrated the presence of a sepsis-specific cell population known as PD-L1+ neutrophils, which play a crucial role in sepsis development. Elevated expression of PD-L1 on neutrophils has been associated with sepsis-induced immunosuppression, heightened inflammation, increased NET release, impaired migratory capacity, multi-organ damage, and decreased survival. Conversely, knockdown of neutrophil PD-L1 has shown the potential to reverse these detrimental effects. In our current study, we demonstrate the specific knockdown of neutrophil PD-L1 and attenuation of sepsis-induced alterations through the use of si-PD-L1-anti-Ly6G-LNP and si-PD-L1-polypeptide-LNP. While the use of anti-PD-L1 antibodies has proven potent in sepsis treatment in preclinical studies, their effectiveness still requires validation through clinical trials. Notably, anti-PD-L1 antibodies have been known to induce organ-specific inflammation in oncology treatments. Consequently, we express concern regarding the potential manifestation of similar adverse effects in sepsis therapy. Presently, siRNA-LNP therapy stands as a safer treatment modality, supported by our study's findings that demonstrate no observable damage to the mouse organism upon siRNA-LNP administration. Furthermore, traditional production methods for therapeutic proteins often involve costly chemical synthesis or recombinant cell production, rendering them susceptible to protein denaturation, aggregation, and precipitation due to fluctuations in external or internal factors like temperature, pH, and chemical environment. These factors may also incite an immune response in patients. In stark contrast, siRNA therapies exploit ribosomes for the translation of therapeutic proteins, thereby circumventing the challenges posed by storage conditions and high immunogenicity. The coupling of LNPs with specific antibodies or peptides presents a more convenient avenue for disease treatment.

Conclusion In summary, the development of PD-L1 siRNA-loaded LNPs provides a promising new method for treating sepsis. These LNPs effectively reduce PD-L1 expression in neutrophils, leading to improved survival rates and reduced inflammation in septic mice. They also prevent immune cell apoptosis and neutrophil NET release, while maintaining immune homeostasis and organ function. Additionally, these LNPs demonstrate good biocompatibility and show excellent therapeutic efficacy in treating polymicrobial sepsis, resulting in the reduction of multi-organ damage. Overall, this study offers a novel and potentially translatable approach to addressing the inflammatory and immune aspects of sepsis treatment.

OR-0040

Association between stress hyperglycemia ratio with short-term and long-term mortality in critically ill patients with ischemic stroke.

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Hospital

Ischemic stroke (IS) is one of the most common types of cerebrovascular disease, accounting for about 70% of all cerebrovascular diseases and 85% of strokes , with high rates of disability and death , especially in critically ill patients . Studies showed that up to 60% of critical stroke patients were severely disabled or died within 90 days . Therefore, early identification of risk factors associated with progressive IS is particularly important for clinical management.

As one of the manifestations of stress, hyperglycemia has been proven to be associated with poor prognosis in a lot of diseases . Hyperglycemia is seen in more than 40% of patients with acute IS and is associated with poorer functional outcomes and higher mortality rates . In previous studies, stress hyperglycemia defined by fasting or admission blood glucose (ABG) was often confounded by diabetes-related background hyperglycemia . However, unlike absolute hyperglycemia levels, stress hyperglycemia assessed by Glucose/ glycated hemoglobin (HbA1c) ratio provides a more objective representation of the relative elevation of glucose levels and may be useful in predicting short-term and long-term mortality in patients with IS in the intensive care unit (ICU).

Background Hyperglycemia on admission is associated with poor prognosis in ischemic stroke (IS) patients. We aimed to investigate the relationship between stress hyperglycemia ratio (SHR) and short-term or long-term mortality in IS patients in the ICU and to explore whether this relationship is influenced by diabetes status.

Methods We collected patients with severe IS requiring ICU admission in the Medical Information Mart for Intensive Care (MIMIC-IV) database and calculated SHR. Outcomes included 30-day, 90-day, and 1-year mortality. Eight items had varying degrees of missing data (Supplementary Table 1), except for BMI, which had a missing proportion of <5%. We used the random forest method to interpolate data with a missing proportion <5%. Missing data for BMI were included in the study as categorical data.

Patient characteristics were reported as mean ± SD for normally or approximately normally distributed continuous variables, median and interquartile distance for non-normally distributed continuous variables, and frequency and proportion for categorical variables. One-way ANOVA or Kruskal-Wallis test was used to compare differences between groups for continuous variables, and Fisher's exact test was used to compare differences between groups for categorical variables.

Multivariate Cox regression was used to assess the association between SHR and mortality, adjusting for potential confounders including age, gender, race, diabetes, CKD, arterial fibrillation, myocardial infarction, congestive heart failure, hypertension, SAPS-II, SOFA, GCS, antiplatelet and anticoagulant drug use, thrombolytic therapy, HbA1c, WBC, RDW, hemoglobin, creatinine, sodium and potassium. Results were shown as hazard ratios (HR) and 95% confidence intervals (CIs). Multicollinearity between continuous variables was assessed by the Variance Inflation Factor. Survival curves were constructed by the Kaplan-Meier method and compared using the log-rank test. The area under the curves (AUC) of the receiver operating characteristic (ROC) curves was used to assess and compare the predictive ability of SHR, FBG, and HbA1c on mortality over time. We further explored the association of quartiles of SHR with diabetes status and risk of death and calculated P values for the interaction.

Two‐tailed values of P <0.05 was considered statistically significant. All analyses were performed with R statistical software version 4.2.2 (The R Foundation).

The association between SHR and mortality in patients with critical IS was elucidated using Multivariate Cox regression and subgroup analysis for diabetes.

Result A total of 1376 patients were recruited. After adjusting for potential confounders, patients in the third and fourth quartiles had a significantly increased risk of death at 30 days, 90 days, and 1 year compared to the first quartile of SHR (Q3 VS Q1: HR 1.56-1.80, all $p < 0.02$; Q4 vs Q1: HR 1.75-2.15, all $p < 0.001$; all p for trend < 0.001). In addition, the highest quartile of SHR was significantly associated with short-term or long-term mortality compared with the first quartile, regardless of diabetes status.

Conclusions Our results suggest that stress hyperglycemia, defined by the Glucose/HbA1c ratio, is associated with increased short-term and long-term mortality in patients with ischemic stroke, independent of the patient's diabetes status.

OR-0041

Analysis of risk factors of maternal fever during epidural analgesia labor : a Logistic regression analysis

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Background Several studies have found that women who received epidural analgesia during childbirth were more likely to have elevated body temperature. Maternal fever was associated with an increased risk of adverse outcomes in mothers and newborns. It is unclear what factors are related. This study aims to explore the related factors of fever in epidural analgesia childbirth through retrospective investigation.
Methods We retrospectively analyzed the data of women who receiving labor epidural analgesia in our maternity ward from May 2016 to August 2016. Women with intrapartum fever during epidural labor analgesia were selected as study group, and women with normal body temperature were selected as control group. Binomial logistic regression method was used to analyze the related factors of intrapartum fever during labor analgesia.
Results Ninety-eight women were selected in this study. High BMI, long interval time from premature rupture of fetal membrane to the end of delivery, vaginal examination for many times were correlated with intrapartum fever during labor analgesia (P<0. 05).
Conclusion Intrapartum fever during labor analgesia is correlated with many factors, the number of vaginal examination should be reduced and the time of labor analgesia should be shortened in the high risk population of intrapartum fever.

OR-0042

Does prolonged anesthesia induction to delivery affect neonatal plasma remifentanil concentrations?

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Objective Remifentanil, in combination with etomidate and sevoflurane, is commonly used in clinics for general anesthesia induction in cesarean section (CS). This study aimed to evaluate the correlation between the induction to delivery (I-D) time and neonatal plasma drug concentration and anesthesia, as well as its effects on neonates.
Methods Fifty-two parturients in whom general anesthesia was induced for CS were divided into group A (I-D<8 min) and group B (I-D≥8 min). Maternal arterial (MA), umbilical venous (UV), and umbilical arterial (UA) blood samples were collected at delivery to analyze the remifentanil and etomidate concentrations using liquid chromatography-tandem mass spectrometry.
Results There were no statistically significant differences between the two groups in terms of plasma concentrations of remifentanil in the MA, UA, and UV blood (P > 0.05). The plasma concentration of etomidate in MA and UV was higher in group A than that in group B (P<0.05), whereas the UA/UV ratio of etomidate was higher in group B than that in group A (P<0.05). The Spearman rank correlation test showed no correlation between the I-D time and plasma remifentanil concentration in the MA, UA, and UV plasma (P>0.05). The concentrations of etomidate in the MA and UV were negatively correlated with the I-D time (P < 0.05).
Conclusion Prolonged I-D time did not significantly influence the maternal or neonatal plasma concentration of remifentanil. It is safe to administer remifentanil target-controlled infusion in combination with etomidate and sevoflurane for general anesthesia induction during CS.

OR-0043

失血性休克血压维持策略探讨

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目的 失血性休克是一种由于大量失血导致的循环衰竭状态，严重影响心、脑、肾等的血液供应，对患者的生命健康构成极大威胁。失血性休克时多以 SBP 90mmHg 或 MAP 65mmHg 为目标，但考虑到不同脏器的自身调节、麻醉后脏器基本代谢、低血压本身对代谢的影响，失血程度、手术情况、以及患者的预后等问题，特别是失血未控制时，血压维持多少更能增加生存率仍需深入研究。本文通过分析病理生理和相关研究动态，探讨机体在严重失血性休克，出血未控制的麻醉状态下，重要脏器的氧耗变化，为失血性休克血压维持策略提供临床与理论依据。
方法 检索 PubMed、国家图书馆、Library of Congress、万方数据等数据库。
结果 静息状态心肌耗氧量约为 27ml/min，心肌氧摄取率高（51~80%），氧储备差。失血性休克对心脏耗氧量的影响。其中，心率每增加 50%，心肌耗氧量增加 50%；左心室收缩压上升速率增加 50%，心肌耗氧量增加 45%；后负荷增加 50%，心肌耗氧量增加 50%。麻醉抑制应激，严格控制心率、降低心肌收缩性是降低心肌氧耗的关键。适当降低后负荷不仅能增加 CO，而且较少心肌氧耗；休克后期，氧供下降，内环境的失衡，逐渐出现心肌抑制、损伤，发生心力衰竭。此时应围绕心脏氧供需，维持适当血压和血色素等。
脑组织在静息时 CBF 平均 50ml/min，消耗全身 25%的氧。严重低血压时（MAP<70mmHg），脑血流量（CBF）的自身调节失代偿。但休克初期脑氧饱和度仍可通过神经血管耦合（Neuro-vascular Coupling, NVC）维持稳定，同时降低的脑耗氧量使 rScO2 短暂正常，CBF＜10ml/min 则可发生脑细胞不可逆损伤。脑能量的 60%用于支持电生理活动，麻醉状态有效抑制脑电活动，使脑氧耗显著下降，大脑耐受低血压缺血性损伤能力进一步增强，促使大脑有较强的抗低血压能力。生理条件下，大多数肾小管距离身血管较远，组织氧分压只有 8~10mmHg；此外，肾小管的功能活动非常旺盛，耗氧量很大，重吸收 1mmol 的 NaCl 需要耗氧 30μmol，约占肾耗氧量的 70%~80%。故肾髓质对缺氧具有易感性，严重低血压对肾小管的功能损害巨大，报道失血性休克与缺血性 AKI 密切相关。 然而，低血压时肾小球滤过率迅速下降，当血压降到 40-50mmHg 时肾小球滤过率降到 0，此时，肾小管的代谢降到最低。
结论 失血性休克（出血未控制）时血压需要尽量控制，维持的血压目标值应考虑到心、脑、肾等重要器官的耗氧及其低血压和麻醉状态下的变化，该目标值需要大量的临床试验及实验近一步探讨。

OR-0044

先天性胆管支气管瘘应用双支气管封堵器麻醉管理 1 例

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目的 介绍双支气管封堵器在先天性胆管支气管瘘的麻醉管理中应用
方法 1 例 2 岁 8 月患儿，临床表现及胸部 CT 检查可疑胆管支气管瘘，术前应用纤维支气管镜辅助将支气管封堵器置于胆管支气管瘘气管端瘘口，封堵瘘口后进行造影，确诊胆管支气管瘘，排除胆道畸形，全麻下行电视胸腔镜辅助气管胆管瘘切除术。入室后行 ECG、SpO2、PETCO2 及无创压监测。咪唑安定 0.1mg/kg，丙泊酚 1-2mg/kg，舒芬太尼 0.5ug/kg、顺阿曲库铵 0.2 mg/kg 诱导完成气管插管，呼吸机控制通气，桡动脉穿刺测压，颈内静脉置双腔导管监测中心静脉压。插管方式，先置入一根 5F 支气管封堵器，再插入 ID5.0mm 带囊气管插管，通过气管导管置入第二根 5F

支气管封堵器，纤支镜指示下将第一根置入右侧主支气管封堵，行单肺通气，第二根置入瘘口，封堵瘘管的支气管端，防止手术操作时挤压瘘管导致大量胆汁酸溢入气管及对侧肺，避免肺部化学炎性损伤及窒息。胸腔镜手术时除沿气管异常分支确认目标瘘管外，观察孔插入胸腔镜后移动支气管封堵器，可进一步确认目标瘘管，避免切错其他组织。同时对于术后需要保留气管导管的患者，采用支气管封堵器行单肺通气，术后无需更换气管导管。术中麻醉维持以七氟醚 MAC 0.5-0.7，右美托咪定 1ug.kg-1.h-1，瑞芬太尼 0.2-3ug kg-1.min-1 维持麻醉。循环稳定，通气良好，无低氧血症。
结果 双支气管封堵器在先天性胆管支气管瘘的麻醉管理中应用，通气良好，肺隔离效果满意。
结论 应用双支气管封堵器在先天性胆管支气管瘘手术中，可达到良好单肺通气效果，减少肺部化学性损伤。

OR-0045

BIS 指导麻醉以降低儿科患者术后谵妄的风险：一项前瞻性随机试验

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目的 本研究旨在探讨在 BIS 指导下进行麻醉是否可以降低 3 岁以下接受非心脏手术的儿童发生 POD 的风险。
方法 1. 研究对象：
1.1 入排标准：拟行择期非心脏手术且预期手术时间>1h 的 6 个月~3 岁患儿。符合以下任一标准的患者被排除:(1)拒绝参与;(2)视力或听力障碍妨碍谵妄评估;(3)昏迷、深度镇静等严重意识障碍。
1.2 干预措施：
在术前 1 日筛选符合条件的患者。在获得书面知情同意后，收集基线变量，包括人口统计学数据、合并症和全身麻醉史。采用 CAPD 筛查谵妄。
所有患者入手术室后均接受麻醉期间心率和节律、外周动脉血氧合(SpO2)、袖带压和呼气末二氧化碳的标准监测。
麻醉诱导:丙泊酚(3~5mg/Kg)、舒芬太尼(0.1~0.2μg/Kg)或芬太尼(1~3μg/Kg)、罗库溴铵(0.1~0.2mg/Kg)。气管插管后采用七氟醚(2%~5%)和瑞芬太尼(0.05~0.2μg/Kg/h)维持麻醉深度。丙泊酚(4~10mg/Kg/h)可在必要时使用。
麻醉诱导至拔管期间监测 BIS。每间隔 1min 记录 BIS 值。BIS 指导组患者调整七氟醚浓度，维持 BIS 在 50~60 之间。对照组按常规护理，主要根据血压、心率、气道压的变化来维持麻醉深度。手术结束后停用全身麻醉药。患者插管后转入重症监护病房，或拔管后转入 PACU。改良 Aldrete 评分≥9 分者拔除气管导管。新斯的明(0.02~0.04mg/Kg)和阿托品(0.01~0.02mg/Kg)可作为必要的肌松拮抗剂。
术后静脉镇痛采用舒芬太尼(2μg/Kg 稀释至 50ml 储液袋)。以 2ml/h 的固定速率输注。镇痛目的为保持面部、腿部、活动、哭泣和安慰(FLACC)疼痛评分≤3 分。若 FLACC≥4 分，在 PACU 可追加舒芬太尼 0.1μg/Kg，在普通病房追加氟比洛芬酯 1~2mg/Kg。
2. 研究指标：
2.1 主要结局指标：术后 3 日内 POD 的发生率。采用康奈尔儿童谵妄评估量表(CAPD)评估 POD，每日 2 次(分别在 0700—0900 和 18:00—20:00)。若各时间点 CAPD≥10 分，则判定为 POD。
2.2 次要结局指标：包括术后 30 日内非谵妄并发症发生率和全因死亡率。

3. 盲法与随机：由 SAS 9.2 (SAS Institute, Cary, NC)以 1：1 的比例生成随机数字，区组大小为 4。这些数字被依次密封在不透明的信封里。指定不参与干预管理和术后随访的研究人员进行随机编号分配。
4. 样本量：非心脏手术患儿 POD 的发生率约为 20%。基于成人患者的证据，我们假设 bis 指导麻醉可以使儿童患者 POD 的风险降低 35%(即 POD 的发生率由 20%降低至 13%)。在总体 α 为 0.05，失访率为 5%的情况下，以 90%的统计学功效计算，每组需要 650 例患者。期中分析 A 组和 B 组术后谵妄发生率分别为 10%(20/195)和 4% (8/195)(P= 0.020)。重新计算样本量，每组 396 例。
5. 统计分析：疗效分析在意向治疗人群和符合方案人群中进行。两组患者 POD 发生率比较采用卡方检验，效应量以相对危险度及其 95%可信区间(CI)表示。采用预先设定的因素进行亚组分析:年龄(≤12 月龄 vs.>12 月龄)、性别(女性 vs.男性)、全身麻醉史(是 vs.否)和麻醉类型(吸入麻醉 vs.全凭静脉麻醉)。
在探索性分析中，我们使用与主要结局相同的方法分析了苏醒期谵妄的发生率。术后住院时间以中位数(IQR)表示，采用独立样本 Mann-Whitney U 检验进行分析。两组间差异的中位数采用 Hodges-Lehmann 检验。
以双侧 P<0.05 为差异有统计学意义。统计分析采用 SPSS 26.0 软件。
结 果 BIS 指导组 POD 发生率明显低于对照组 [5.9%(23/389) 比 12.3%(48/391)，RR0.482,95%CI0.299~0.776,P=0.002]。符合方案分析显示 6.7%(23/342)比 13.8%(43/347)，RR0.543,95%CI0.335~0.880,P=0.002。77.9%(74/95)的谵妄事件发生在术后第 1 天。在预先设定的亚组分析中，年龄较大(>12 个月)、男性、无全身麻醉史、使用七氟醚麻醉的患儿，BIS 指导组 POD 发生率较低。
结论 本研究发现 BIS 指导麻醉可显著降低 3 岁以下非心脏手术患儿术后苏醒期谵妄和 POD 的风险。这一发现实现了脑电图引导麻醉在儿童中的应用，但需要进一步研究以探讨不同麻醉药物的最佳脑电图参数及其最佳目标。

OR-0046

Enhancement of pulmonary myofibroblast VEGFa expression contributes to the recovery of mechanical ventilation-induced lung endothelial barrier injury on alveolar stage

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Objective The alveolar stage of lung development refers to the process of alveolar formation. It starts just before birth and spans infancy period, lasting until about 3 years of age for human and 28 postnatal days for mouse. Therefore, the surface area of respiratory membrane rapidly increases during infancy. Mechanical ventilation (MV) was reported to induce lung injury and pulmonary dysplasia in premature neonates, but it is unknown whether the healthy lung of full-term born infants is susceptible to MV. This study aims to investigate whether MV affects the alveolar stage of lung development in full-term born infants and to reveal the underlying mechanisms.
Methods Clinically, infants with retinoblastoma need to repeat intermittent transcatheter intracranial vascular embolization (TIVE) to retard tumor growth. Characteristics of these patients and their ventilating indices during TIVE surgery were collected. Data was then analyzed to quantify the effects of MV to tidal volume, pulmonary compliance and airway pressure with regression analysis. To establish murine MV model of alveolar stage, C57BL/6 littermate mice around postnatal day (P) 19 to P37 were subjected to MV for 1 hour repeatedly on P19, P21 and P23. Mice lungs were then harvested at different time points after MV. Whole lung RNA

sequencing results with gene ontology and ingenuity pathway analysis helped to predict potential factors that regulated MV induced pulmonary endothelial barrier damage. In vitro experiments in FACS-sorted mouse myofibroblast cells and pulmonary vascular endothelial cells (PVECs) were performed to further study the underlying mechanisms.
Results Preliminary research in infant patients showed deteriorated tidal volume and pulmonary compliance after repeated intermittent MV, which was however nonpersistent. Consistent phenomenon to clinical study was showed in murine MV model that MV induced pulmonary endothelial barrier damage would further recover. It demonstrated the possibility of VEGFa to increase PVECs proliferation and attenuate endothelial barrier injury after MV, by performing whole lung tissue RNA sequencing and ingenuity pathway analysis. Although MV induced PVECs apoptosis, the proliferation of lung myofibroblast cells were subsequently promoted after MV, contributing to higher VEGFa expression. In vitro study also showed that increased VEGFa synthesis and secretion of myofibroblast cells, which significantly boosted FACS-sorted PVECs proliferation. Further studies indicated that PDGF-Ra/JAK2/STAT3 as the potential upstream signaling pathway to regulate VEGFa expression in myofibroblast cells.
Conclusion Our preliminary study showed that MV could lead to nonpersistent lung injury in both human infants and murine MV model of alveolar stage. While MV induced PVECs apoptosis, it stimulated myofibroblast cells multiplication. Regulated via PDGF-Ra/JAK2/STAT3 signaling pathway, VEGFa synthesis and secretion of pulmonary myofibroblast cells were enhanced after MV, which helped to repair MV induced pulmonary endothelial barrier injury by increasing PVECs proliferation. Our studies clarify the role and mechanism of pulmonary myofibroblast VEGFa in MV induced pulmonary injury during alveolar stage in infant healthy lung, whose results could provide new strategies for the prevention and treatment of MV induced pulmonary dysplasia and pulmonary endothelial barrier disease.

OR-0047

一项“重度脊柱侧凸手术标准化麻醉临床路径”的开发和临床安全性与有效性前瞻性评价

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目的 本研究旨报道一项“重度脊柱侧凸手术标准化麻醉临床路径”（Standardized Anesthesia Protocol for Severe Scoliosis Surgery，SAPSSS）的开发过程，并评价其在重度脊柱侧凸手术中的应用安全性和有效性。
方法 本研究全面回顾该临床路径的开发和维护过程，并系统描述其中关键步骤。采用前瞻性队列研究评价其安全性和有效性。其中，安全性评价的结局指标为该路径相关并发症和不良反应的发生率，根据相关文献和临床经验制定《相关并发症和不良反应清单》，并针对重度脊柱侧凸手术制定《修订版 Clavien-Dindo 并发症和不良反应严重程度分级表》用于量化分级。有效性评价的主要终点指标为术中稳定性，根据文献制定《修改版术中稳定性分级系统》，量化术中不稳定性程度；次要指标包括术中唤醒表现和快速复苏方案（ERAS）应用情况，评价使用该临床路径后的术中唤醒成功率和术后复苏优化程度。安全性和有效性评价共纳入 474 例 2021 年 10 月 8 日至 2023 年 3 月 31 日间在本院接受手术的重度脊柱侧凸患者。
结果 该临床路径自 2016 年前开始研发，经历了文献回顾、专家咨询、临床测试和迭代修订等步骤，最终形成一套包含 22 个步骤的标准化流程，涵盖麻醉准备、麻醉诱导、术中管理和术后复苏管理 4 个阶段。该临床路径在重度脊柱侧凸手术中的主要并发症为轻度（I 级，n = 59，12.4%）或中度（II 级，n = 28，5.9%），无严重不良事件（III 级或更高）发生。路径有效保证了术中稳定性，无相关的严重或危急事件发生，并促进了术中唤醒成功进行，仅 7 例患者（1.5%）发生中度、可控

的唤醒延迟。ERAS 方案使用比例达 96.0%，绝大多数患者可直接从复苏室转入病房，不需转入重症监护。

结论 SAPSSS 临床路径在重度脊柱侧凸手术中表现出良好的安全性和有效性，能有效减少术中和术后相关的并发症，维持术中稳定性，支持术中唤醒神经生理监测，并与 ERAS 方案成功结合，为提高患者安全和手术结局提供保障。SAPSSS 临床路径的开发和实施为其它类似复杂手术的麻醉管理提供了参考，有望推动脊柱侧凸手术麻醉最佳实践指南的制定。

OR-0048

Fascia Iliaca Block Combined with Low-Dose Spinal Anesthesia for Hip Fracture Surgery in the Elderly: Effects on Severe Hypotension and Analgesia

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Background Hip fracture surgeries in elderly patients often require spinal or general anesthesia, posing risks of severe hypotension and inadequate pain management. The optimal anesthesia type for minimizing these risks remains undetermined. Preliminary studies suggest that a combination of fascia iliaca block (FIB) and low-dose low-specific-gravity spinal anesthesia (LLSA) might offer a solution, but comprehensive evidence is lacking.
Objectives: This study aims to assess the efficacy of combining FIB with LLSA in reducing severe hypotension and enhancing analgesia during hip fracture surgery in elderly patients.
Study Design: A prospective, randomized controlled trial was conducted.
Setting: The study comprised 68 patients. They were separated into 2 equal parallel groups 34 patients each: the FIB+LLSA group and the general anesthesia (GA) group.
Methods Participants aged 75-96 years undergoing primary hip arthroplasty for hip fracture were randomized to receive either FIB+LLSA or GA. The primary outcome was the incidence of severe hypotension, with secondary outcomes including postoperative pain, use of rescue analgesia, vasopressor quantity, and complications.
Results The study found a significantly lower incidence of severe hypotension in the FIB+LLSA group compared to the GA group (32.4% vs. 67.6%). Additionally, postoperative pain scores were significantly lower, and the need for rescue analgesia was reduced in the FIB+LLSA group. Vasopressor use during surgery was also significantly lower in the FIB+LLSA group. The length of hospital stay was shorter in the FIB+LLSA group, with an average of 5.9 days compared to 6.7 days in the GA group.
Limitations: The study's limitations include its single-center nature, which may limit the generalizability of the findings. Additionally, the inability to conduct a double-blind study could introduce biases, though measures were taken to minimize this. The sample size might not be sufficient to determine the broader implications of LLSA.
Conclusions Combining FIB with LLSA for elderly patients undergoing hip fracture surgery significantly reduces the incidence of severe intraoperative hypotension and postoperative pain. It also decreases the need for rescue analgesia and shortens hospital stays, suggesting that FIB+LLSA could be a beneficial regional anesthesia technique for elderly hip fracture surgery patients, aligning with enhanced recovery protocols.

OR-0049

血清前白蛋白是老年髋部骨折手术患者 1 年死亡率的独立影响因素

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目的 人口老龄化已成为中国人口结构变化的趋势，在这一背景下，髋部骨折已经成为常见病和多发病。对于老年人来说，髋部骨折发病率高、住院率高、致死率高。我们希望能寻找到影响老年髋部骨折患者术后死亡率的危险因素，为临床诊疗提供一定的参考。血清前白蛋白是一个可以评估患者营养状况和肝功能状态的指标，但是对于老年髋部骨折患者预后的影响仍不清楚。因此，本研究旨在评估分析该指标和其他因素对于此类患者预后的预测价值，旨在能以此为依据尽早对高危患者做出干预措施，提高患者术后生存率。

方法 本研究为回顾性研究。我们依据研究目的和住院医疗情况制定了相应的患者纳入及排除标准，收集了 2019 年度于温州医科大学附属第二医院行髋部骨折手术治疗的老年患者的完整病历资料（人口学、医学检查及治疗等），并通过门诊或电话随访的方式确定患者术后 1 年的生存情况。使用单因素及多因素回归分析与患者术后 1 年死亡率相关的因素，包括：年龄、性别、ASA 分级、查尔森合并症指数、入院 Braden 评分、血清前白蛋白及多项血液学指标等，随后我们将单因素得到的具有统计学意义的影响因素共同纳入多因素 Cox 回归分析，并得到各因素的 Kaplan-Meier 生存曲线。

结果 初步入选的 674 例老年患者根据排除标准剔除 47 例，最终共 627 例患者纳入此研究。此队列包括男性患者 153 人，女性患者 474 人；患者年龄区间为 65-100 岁，平均年龄为 80.7 岁。7 名患者术后 1 月内死亡，15 名患者术后 2 月内死亡，23 名患者术后 3 月内死亡，29 名患者术后 6 月内死亡，63 名患者术后 1 年内死亡；该队列中患者术后 1 月死亡率为 1.17%、半年死亡率为 4.63%、1 年死亡率为 10.05%。单因素 Cox 分析与术后 1 年死亡相关、有统计学差异的指标分别为年龄、性别、ASA 分级、入院 Braden 评分、术前血红蛋白值、查尔森合并症指数、胆碱酯酶、血清白蛋白、血清前白蛋白、术前房颤、术后镇痛方式。在多因素 Cox 回归分析中，高龄（≥80 岁）[HR=2.251，95%CI(1.064，4.765)，P=0.034]、入院 Braden 评分（≤14 分）[HR=2.082，95%CI(1.076，4.028)，P=0.029]、查尔森合并症指数（≥3 分）[HR=2.789，95%CI(1.425，5.457)，P=0.003]、术前血清前白蛋白（＜134mg/L）[HR=2.257，95%CI(1.205，4.288)，P=0.011]是髋部骨折老年患者术后 1 年内死亡的危险因素。

结论 本次研究表明老年髋部骨折手术患者 1 年死亡率为 10.05%，低于发达国家报道的死亡率。血清前白蛋白水平是老年髋部骨折后 1 年死亡的独立影响因素。其他独立影响因素包括年龄、查尔森合并症指数、入院 Braden 评分、术后白蛋白水平。此外，ASA 分级、性别、术前房颤等因素对患者术后 1 年死亡率的影响仍需更多的研究。

OR-0050

Effect of Intranasal Insulin on Perioperative Cognitive Function in Older Adults: A Randomized, Placebo-Controlled, Double-Blind Clinical Trial

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Background Postoperative cognitvie impairment are common neural complications in older surgical patients and exacerbate the burden of medical care on families and society. The objective of the study is to observe the effect of intranasal insulin therapy on the changes of postoperative cognitvie function.
Methods This was a prospective, randomized, double-blind, placebo-controlled trial with a 1:1 ratio.
Participants
The inclusion criteria were: (1) age ≥65 years; (2) scheduled to undergo elective orthopedic surgery with general anesthesia; (3) American Society of Anesthesiologists (ASA) physical status score of Ⅱ−Ⅲ; and (4) expected operation time of ≥2 hours. The exclusion criteria were: (1) refused to participate; (2) inability to cooperate with cognitive testing or pre-operative MMSE score <23 points; (3) patient with history of insulin allergy or diabetes patient who has achieved injection of insulin within one week prior hospitalization; (4) asthma or nasal lesions (infection, tumor, defect, etc,) with potential risks for intranasal insulin administration; and (5) history of CNS diseases. Patients were withdrawn from the study if: (1) surgery was canceled, changed to non-general anesthesia, or the operation time was <2 hours; (2) the patient refused to continue the study; (3) the patient transferred to the intensive care unit (ICU) or died after surgery; (4) the patient was discharged within 3 days after the operation; (5) the patient experienced any serious adverse event, such as cardiovascular accident, re-operation, or anesthesia or surgical accidents; and (6) the patient received any non-study insulin treatment during hospitalization.
Participants were randomly assigned to the Group S or Group I to receive saline or insulin treatment, respectively. The random numbers were generated with SPSS Version 26.0 and the random number seed was 20210501.
Clinical interventions
Patients in Group I or Group S received intranasal treatment with of 40 IU insulin (Humulin R, Eli Lilly and Company, USA) or the same volume of saline, respectively, at four time points during the study: 5 min before anesthesia induction and between 9:00 am and 10:00 am on the first through third days after surgery. The drug was received from the manufacturer in vials with 300 IU/3 ml. For each patient, a nasal spray device (Aptar Pharma, USA) was filled with 2 ml (200 IU) to be used for all four treatments. The nasal spray device sprays 100 μl of solution per pump; at each time point, 4 pumps were administered into both nostrils or into the same nostril if a gastric tube was placed at 10-s intervals to allow normal breathing.
Cognitive function tests
Anesthesiologists who had been trained to administer cognitive function tests interviewed the participants between 3:00 pm and 6:00 pm on the day before surgery and again on the third day after surgery using the Chinese version of the MMSE and the MoCA-B. In addition, the 3-minute Diagnostic Interview for CAM (3D-CAM) was conducted on each of the three consecutive days after surgery[4]. To avoid missing the occurrence of delirium between cognitive assessments, the medical records of patients with suspected POD were reviewed by a neurologist blinded to therapy group assignment and a final determination was made in accordance with Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) criteria. The same investigator conducted follow up at each time point for each patient.
Blood sample measurements

An extra 5-ml blood sample was obtained in the morning on the day before and the day after surgery by nurses during routine blood work requested by the physician performing the surgery to minimize invasive procedures. Another 5-ml blood sample was collected during surgery 1 h after skin incision. Blood samples in anticoagulation tubes (Becton, Dickinson and Company, America) were immediately stored at 4 ℃ and transferred to a laboratory for centrifugation within 2 h. Blood glucose levels were determined using a blood glucose meter (Johnson & Johnson, USA) and then centrifuged for 15 min at 3,000 rpm at 4 ℃. The serum supernatant was collected and stored at -80 ℃ for further analysis. Enzyme-linked immunosorbent serologic assay (ELISA) kits (MEIMIAN, China) were used to measure levels of perioperative insulin, postoperative interleukin-6 (IL-6), postoperative tumor necrosis factor-α (TNF-α), and postoperative S100-β according to the respective manufacturer instructions. C-reactive protein (CRP) is routinely measured on the day after surgery, and the value of postoperative CRP entered into medical records was used for our study.

Anesthesia and surgery

All patients in the study received general anesthesia with nearly identical protocols. Anesthesia was induced using etomidate, sufentanil, and rocuronium. Endotracheal intubation was performed after muscle relaxation followed by mechanical ventilation. Anesthesia was maintained using sevoflurane, propofol, and remifentanil. The anesthesia depth was maintained at 40% to 60% of the bispectral index (BIS) and end-tidal carbon dioxide partial tension (PetCO2) was controlled at 35 to 45 mmHg. Heart rate, blood pressure and other clinical management was determined by the assigned anesthesiologist for each patient during surgery. A patient-controlled intravenous device delivered analgesia with combined sufentanil and flurbiprofen.

Data collection

Demographics and medical information including age; sex; body mass index (BMI); education level; ASA grade; history of hypertension, diabetes, and coronary disease; and surgery and anesthesia time were transcribed from the electronic medical record system. Adverse events were recorded, including hypoglycemia, anaphylactic reaction to intranasal treatment, nasal discomfort described by participant, and other reasons for patient refusal of intranasal treatment.

Outcomes

The primary outcome was the effect of intranasal insulin on changes in perioperative cognitive function, which was defined as the value difference between MMSE scores before and after surgery. Secondary outcomes included the effect of intranasal insulin on differences between MoCA-B scores before and after surgery; the effect of intranasal insulin on POD incidence during the three days after surgery; HOMA-IR changes during the perioperative period; and the effect of intranasal insulin on postoperative IL-6, TNF-α, S100-β, and CRP levels.

The change in MMSE scores= Postoperative MMSE score - Preoperative MMSE score. The change in MoCA-B scores= Postoperative MoCA-B score - Preoperative MoCA-B score. POD was diagnosed according to the usage rules of the Chinese version of the 3D-CAM scale. HOMA-IR = Fasting Insulin (μU/ml) × Fasting Glucose (mmol/l) / 22.5.

Sample size and statistical analysis

PASS version 15.0 was used to calculate the required sample size for a group allocation of 1:1 with $\alpha = 0.05$, $\beta = 0.20$, standard deviation = 2.00. And the difference of mean perioperative MMSE change was anticipated to be 1.00 according to the preliminary study involving. The determined sample size of 64 patients per group was increased to 70 patients per group to account for up to a 10% dropout rate.

Statistical analyses were conducted by using SPSS version 26.0. Quantitative data are expressed as mean±standard deviation (SD) or median (interquartile range) with normal or non-normal distributions, and categorical variables are expressed as number (percentage). Statistical differences between groups were determined using Student’s t-test or the Mann Whitney U test for quantitative data with normal or non-normal distributions, respectively. The chi-square test or Fisher’s exact test were used for categorical data analysis. Two-way analysis of variance (ANOVA) was used to compare fasting blood glucose, fasting insulin, and HOMA-IR between groups at different time points. P values <0.05 were regarded as statistically significant.

Blinding

The participants and their relatives, cognitive testing researchers, nasal spray operation researchers, data collection researchers and technicians conducting ELISA testing were all blinded to the grouping information. Unblinding will occur only after all data, including cognitive scores, biochemical indicators, case information, and outcome diagnoses, have been collected. The unblinded data were overseen by the Quality Control division of the Clinical Research Ethics Committee of the Chinese PLA General Hospital.

After the random number table was determined, the grouping information was sealed in opaque envelopes. The patients who were determined to be included in the study were numbered by sequence of enrollment and the corresponding envelope was checked by the independent researcher who prepared the drugs and devices. The filled nasal spray devices were prepared and labeled with the patient name, and were provided to the researchers who conducted the nasal spray operation.

Results:

This study initially screened 578 elderly patients from orthopedics department, of whom 65 were expected to receive spinal anesthesia, 221 were anticipated to have a surgery time less than 2 hours, 21 had a history of central nervous system disorders, 95 refused to participate, 23 had recent insulin usage and 13 were unable to cooperate with cognitive testing. A total of 140 participants were enrolled and 128 patients completed all procedures and were included in the final analysis. Among the 128 patients analyzed, 64 patients were assigned to Group S and 64 patients were assigned to Group I. There were no significant differences between Group S and Group I in age, sex, BMI, education level, smoking status, alcohol use, comorbidities, medication for diabetes, ASA grade, operation type, or operation time . No complications related to intranasal insulin administration were reported by any patient.

The baseline MMSE (p=0.767) and MoCA-B (p=0.870) scores were similar between the two groups. However, insulin treatment resulted in an improvement of 0.53 ± 1.36 points in the postoperative MMSE scores for Group I, whereas the postoperative MMSE scores for patients in Group S decreased by 0.38 ± 1.43 points compared to their preoperative scores. The changes of MMSE scores in Group I were significantly higher than Group S (p<0.001). Postoperative MoCA-B scores in Group I were also significantly higher compared to Group S (25 (2.25) versus 24 (4), respectively; p=0.017). And insulin treatment increased the postoperative MoCA-B scores by 0.89 ± 1.58 in Group I, whereas the postoperative MoCA-B scores in Group S decreased by 0.14 ± 1.93 points compared to their preoperative scores. The changes of MoCA-B scores in Group I were significantly higher than Group S (p=0.001). Moreover, insulin treatment significantly decreased the incidence of POD during the three days after surgery in Group I compared to Group S (10.9% versus 26.6%, respectively; p=0.024).

Postoperative levels of IL-6, TNF-α, and S100β were measured in a blood sample taken the day after surgery, and postoperative CRP levels, which are routinely assessed by the attending physician the day after surgery, were recorded (Table 3). A significant lower IL-6 levels (p=0.034) and S100β levels (p=0.044) were found in Group I than in Group S. The levels of TNF-α (p=0.592) and CRP (p=0.235) were similar in both groups.

The there was no statistical difference in perioperative HOMA-IR values between Group I and Group S. However, in both groups, the HOMA-IR values during surgery and the day after surgery were significantly increased compared to baseline. Also, there was no difference in blood glucose levels during surgery or the day after surgery between Group S and Group I.

Conclusions Intranasal insulin administration is thus suggested as a potential therapy to prevent and treat PNDs in older patients undergoing surgery. However, a more standardized multicenter, large-sample study is needed to further validate these results.

OR-0051

通路 miR-139-3p/Pik3cg 的持续表达参与了术后谵妄导致的长期脑网络结构变化

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目的 术后谵妄(POD)是在麻醉手术后 7 日内出现的短暂性一过性剧烈波动的神经心理变化状态，常发生于麻醉手术后 3-4 日，多见于老年患者。近年来研究发现短期的谵妄状态与长期的脑网络异常变化存在显著相关，然而其具体原因却尚不明确。本研究目的在于通过对发生 POD 的老龄大鼠长期脑网络变化进行检查以及海马的测序分析，探究短暂认知障碍导致长期脑网络变化的原因。
方法 以老龄大鼠(19 月龄，雄性，SD 品系)在七氟烷全身麻醉下（5%诱导，3%维持）行胫骨骨折内固定手术诱发谵妄样行为进行机制研究。对照组在相同条件下仅在外表行表皮切开缝合而无后续内固定操作。新物体识别(NOR)和旷场实验(OFT)被用于对谵妄行为和认知障碍进行确认，时间分别为造模后 1 日、3 日以及 7 日。对于外周和中枢神经系统的炎症因子采用酶联免疫吸附试验(ELISA)进行定量检查。对海马内小 RNA(miRNA)及其后续基因表达的差异采用全转录组测序并采用实时定量聚合酶链式反应(RT- PCR)进行验证，时间分别为造模后 3 日、7 日以及 30 日。脑网络采用静息态功能磁共振(rs-fMRI)进行检查，其变化以海马为种子点进行基于种子点的功能连接(FC)进行定量分析，时间分别为造模后 3 日、7 日以及 30 日。
结果 麻醉手术诱发了显著存在的外周炎症反应。行为学检查确认了老龄大鼠在短暂谵妄后存在可持续到 30 日以后的脑网络变化。海马内部存在包括 IL-1β 在内的长期持续的炎症因子变化(图 A)。在以海马为种子点的分析中，大鼠脑内默认网络(DMN)存在可持续到麻醉手术后 30 日的显著变化(图 B)。在全转录组测序中，发现 miR-139-3p/Pik3cg 通路存在可持续到麻醉手术后 30 日的显著变化，并且 miR-139-3p 和 Pik3cg 在麻醉手术后各时间点的 FC 存在显著相关(图 C)。
结论 麻醉手术导致的短暂谵妄样反应(麻醉手术后 7 日内)导致了老龄大鼠 DMN 长期(麻醉手术 30 日后)存在 FC 异常，其具体表现为海马相关的 FC 变化。通路 miR-139-3p/Pik3cg 的持续变化可能参与了海马相关的 FC 异常。本研究为临床中对 POD 可能导致的长期认知障碍和脑网络结构变化的干预提供了干预靶点选择和前期研究基础。

OR-0052

Ultrasound-assisted Lumbar Puncture with a Horizontal and Perpendicular Interlaminar Approach Based on Positioning in Elderly Patients: an Observational Study of a New Technology

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Background: Degenerative spine in the elderly resulting in supraspinal ossification, interspinous osteoarthritis, and facet joint osteoarthritis can impede both median and paramedian needle access. Moreover, the physiological anterior curvature of lumbar vertebrae may become larger, vanish, or even turn posteriorly convex, which leads to an altered craniocaudal orientation of the needle trajectory. Previous studies have shown that ultrasound-assisted intralaminar puncture can improve the accuracy of recognizing the level of the intervertebral space, selecting the optimal puncture space, and predicting the depth of the spinal canal and the angle of the needle trajectory, thus reducing the number of puncture attempts, and increasing the first-pass success

rate. However, the previously described ultrasound-assisted technique necessitates replicating the probe’s orientation as the needle insertion angle, and the angle of the probe represents the main source of the major limitations of the technique. On the one hand, it might be quite challenging to accurately locate the midpoint of the short sides of the probe when the ultrasound probe is tilted either cephalad or caudad in the transverse view. On the other hand, replicating the angle of the probe requires a very high level of visuospatial memory and angular control capacity. It often results in multiple redirections, producing pain and deforming the needle tip, leading to an increased risk of dura sac lesions. Therefore, it is advisable to explore strategies for minimizing the frequency of redirections in elderly patients. We hypothesize that if the needle was inserted through the angle anesthesiologists are most familiar with and controllable, the first-pass success rate for lumbar puncture would improve. Therefore, this prospective observational study aimed to assess the success rate and describe the technical considerations of this ultrasound-assisted lumbar puncture technique with a horizontal and perpendicular interlaminar approach based on a modified position in an elderly population.

Methods A total of 60 patients (≥75 years of age) who underwent lumbar puncture from October 2023 to January 2024 were included in this prospective observational study. A modified preprocedural ultrasound-assisted technique scan was done systematically: (1) Draw the spinous process line; (2) Recognizing the puncture interlaminar space: Place the probe parallel to the spinous process line and scan the probe from the sacral side to the cephalad side in parasagittal oblique (PSO) view under a standard lateral decubitus position. Recognize the sacrum and interlaminar space and mark. The interlarminar space with highest definition of anterior complex and posterior complex would be selected as the target puncture space; (3) Adjusting the patient's shoulders and hips relative position according to the craniocaudal orientation of the probe to ensure that the probe could be placed perpendicular to the edge of the bed while the center of the target thecal sac was centered on the screen in PSO view. Mark the midpoint of long edge of the probe as the target space (a-c); (4) Marking the needle insertion site on the transverse view: the ultrasound probe was placed horizontally and perpendicular to the edge of the bed at the selected interspace. If axial rotation was present, the center of the vertebral canal would be located at the left side of the interspinous ligaments (d-f). If there was no axial rotation, as indicated center of the vertebral canal located just below the interspinous ligaments (g, h), anteriorly oblique positioning was utilized to create an axial rotation (i, j). Once the center of the spinal canal was in the middle of the ultrasound screen, the midpoints of the probe's long and short borders were marked. The intersection of the two markings corresponded to the needle entry point. Measure the distance from skin to thecal sac. (4) The needle was advanced horizontally to the floor and perpendicular to the edge of the bed until the intrathecal space was accessed. The main outcome measured first-pass success rate. Procedure-related variables including time to mark the needle entry point, needling time, number of needle passes, number of attempts, VAS score (0-10) and satisfaction score (0-10) were measured. The postprocedural adverse effect including headache, backache and abnormal perception in 3 days were also recorded.

Results All 60 procedures were successful. The first-pass success rate was 73% (44/60), and the first-attempt success rate was 95% (57/60). During the procedure, the mean time for marking the needle insertion site was 245 seconds and the median needling time was 83 seconds. The median [interquartile range, IQR] number of needle passes and attempts were 1 [1-2] and 1 [1-1], respectively. The pain and satisfaction scores were 1 (1-1) and 9 (9-10), respectively. The adverse effects were infrequent and mild.

Conclusion The ultrasound-assisted technique with a horizontal and perpendicular interlaminar approach based on positioning appears to be a feasible option for facilitating lumbar punctures in the elderly. This approach customizes punctures based on the unique anatomical features and posture correction to enable a controllable needle trajectory through an individualized needle entry site identified with ultrasound assistance. Further studies are required to compare the performance of this technique with landmark-based techniques and previously reported ultrasound-assisted techniques.

OR-0053

麻醉重症监护室护理管理质量指标体系构建

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目的 构建麻醉重症监护室(AICU)护理管理质量指标体系，为 AICU 专科护理管理监测和评价提供参考依据。
方法 基于“结构-过程-结果”三维质量结构模型， 结合查阅分析及小组成员反复讨论，拟定 AICU 护理管理质量指标体系初稿，采用两轮德尔菲专家函询法对指标进行修订与完善，确定 AICU 护理管理质量指标体系，并采用层次分析法确定各指标权重。
结果 两轮函询问卷的有效回收率为 100%和 95.2%，专家权威系数为 0.924 和 0.909，变异系数为 0.000~0.268 和 0.000~0.213，肯德尔和谐系数为 0.112 和 0.164，各指标权重的一致性检验显示，一致性比率均＜0.1。AICU 护理管理质量指标体系由一级指标 3 项、二级指标 13 项、三级指标 89 项组成。
结论 构建的 AICU 护理管理质量指标体系科学合理、内容全面、实用性强，可为 AICU 护理质量管理提供参考依据。

OR-0054

基于信息化的麻醉后苏醒室护理敏感指标的应用

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目的 为了在某大型医院内 4 个麻醉后苏醒室（PACU）,验证基于信息化收集、汇总、分析 PACU 的敏感指标应用价值。
方法 依据国内外文献和国卫办医函文件，选择具有代表性的几个敏感指标并进行定义：包括结构指标,如单位时间内护理时数；过程指标，苏醒室转入率、平均苏醒时间；结果指标，如苏醒延迟发生率等指标。通过麻醉信息系统在 4 个 PACU 内收集 2021-2023 年期间，每位病人的苏醒时长、苏醒人数、苏醒延迟发生例数、手术病人例数等数据，通过人力资源系统收集 PACU 内护士提供的护理时数，计算出各项敏感指标，并进行横向和纵向比较。
结果 PACU 人力资源能够满足患者需要的护理时数，超过 0.5（0.65-4.66），即单位时间内 1 位护士护理 2 位病人（护患比为 1:2）；PACU1 护理时数在 0.65-2.13 之间，PACU2 护理时数在 0.65-2.40 之间，PACU2 护理时数在 0.81-2.16 之间，PACU4 护理时数在 1.06-4.66 之间。PACU 的转入率维持在(54.15%-78.90%)，PACU1 转入率在 63.07-78.78%，PACU2 转入率在 58.33%-78.90%，PACU3 转入率在 64.91%-77.56%，PACU4 转入率在 54.15%-71.69%。平均苏醒时间在 20.91min-56.55min，PACU1 平均苏醒时间在 20.29-29.45min，PACU2 平均苏醒时间在 34.97-56.55min，PACU3 平均苏醒时间在 30.21-40.63，PACU4 平均苏醒时间,30.47-40.60。苏醒延迟发生率维持在 0-6.36%，PACU1 苏醒延迟发生率在 0-0.16%，PACU2 苏醒延迟发生率在 0.60%-6.36%，PACU3 苏醒延迟发生率在 0.03%-0.66%，PACU4 苏醒延迟发生率在 0-0.67%。
结论 护理时数主要受人力资源配置与患者的需求影响，PACU 转入率主要受苏醒室开放时长、区域内手术类别、PACU 开展的业务影响，平均苏醒时间主要受区域内手术类别、苏醒室开展的业务、人力资源影响，苏醒延迟发生率主要受区域类手术类别、苏醒室开展的业务、人力资源等影响。
基于信息化平台收集、汇总和分析每周、每月、每季度、每年 PACU 护理敏感质量指标数据,可有效提高护理敏感质量指标统计的及时性和准确性，有利于及时动态调整人力资源和排班模式和时长，

加强护理质量的过程控制，降低管理时间成本，促进护理质量的改善，护理管理也更加规范科学，值得应用推广。

OR-0055

Perianesthesia nursing for elderly patients undergoing gastrointestinal endoscopy in an outpatient setting: reconstruction of nursing procedure

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Background and aims Accompanying the aging of the general population in China, the proportion of elderly patients undergoing gastrointestinal endoscopy is also increasing. There is a need for better patient experience and tolerance in line with patient expectation and acceptability. The increased use of sedation brings safety concerns. Recent studies have evaluated the safety and feasibility of gastrointestinal endoscopic investigation and treatment in elderlys in an outpatient setting. However, all sedative drugs commonly used in gastrointestinal endoscopy have shown associations with various adverse effects, specifically in the geriatric population. Admission for observation after gastrointestinal endoscopy in elderly patients is still a national standard. We reconstructed the perianesthesia nursing procudure to optimize resource utilization and enhance patient safety in an outpatient setting. The aim of this study was to evaluate the safety and feasibility of new nursing procedure.

Methods An evidence-based perianesthesia nursing procedure for elderly patients undergoing gastrointestinal endoscopy in an outpatient setting was formulated by anesthesia nurses and anesthesiologists. This new procedure included four sections: conducting a thorough anesthetist-led, perianesthesia nurse-delivered pre-anesthetic assessment, providing continuous physical status monitoring at pre-anesthesia prepare room, providing a thorough post-anesthesia monitoring and nursing care, and taking place a tailored education with continuous physical status monitoring at pre-discharge room. An anesthesiologist or a perianesthesia nurse administered an oral pre-endoscopy questionnaire to detect underlying conditions among outpatients aged over 60 years in pre-anesthetic assessment clinic. All high-risk conditions reported through the information system that was designed for outpatient setting. A significant number of patients were anxious prior to an endoscopy. Perianesthesia nurse at pre-anesthetic assessment clinic also provided comprehensive information about what to expect from the sensation of the procedure and effects of any sedative drug, to provide better understanding. At the day of procedure, anesthesiologist reviewed those risk conditions and selected sedative agents. Elderly patients were labeled as high-risk group, the multi-disciplinary bedside handover and inserting peripheral intravenous catheter with ultrasound-guided were utilized to improve safety. All patients undergoing endoscopy under deep sedation or general anesthesia, ECG, automated non-invasive blood pressure, respiratory rate, oxygen saturations and core body temperature monitored every 3 min and recorded automatically. Monitoring of sedation and supplemental oxygen extend into the recovery room until the patient’s conscious state had consistently returned to baseline. Sufficient perianesthesia nurses trained in sedation, monitoring and the recognition of complications, taking responsible for ensuring the safe and complete recovery of the patient after endoscopy. After recovery period, patients were formally assessed by anesthesiologists for suitability for discharge with a formal record to demonstrate recovery from sedation and the absence of complications. A tailored education with continuous physical status monitoring and sedation-related complications were provided by nurse before discharge. Patients and family members also received special instructions including not drive a vehicle or ride a bicycle, or make important decisions, or drink alcohol for 24 hours after the procedure. We also assessed patient comfort continually during the procedure and sedation/analgesia titrated

appropriately. Measuring comfort in real time allowed nurses to adjust any procedure-related factors contributing to discomfort. Patients and family members were encouraged to involve in shared decision-making during the whole endoscopic procedure. Satisfaction survey was distributed before discharge. We provided continuous on-job training to all endoscopy staff (including perianesthesia nurses, anesthesiologists, nursing students and medical students) responsible for assessment of risk, administering sedation and monitoring of patients in the recognition and management of related complications. This was a single-center, observational study that included outpatients aged over 60 years undergoing gastrointestinal endoscopy at one tertiary hospital in Beijing between November 2023and March 2024. The primary outcomes were the safety of new nursing procedure and factors associated with post procedure admission.
Results This study included 1409 elderly patients (60- to 72-year-olds, with median age 67-year) undergoing gastrointestinal endoscopic investigation and treatment in the outpatient setting. 65% of patients were with comorbidity of coronary artery diseases, hypertension, cerebrovascular diseases, diabetes or sleep apnea hypopnea syndrome. The mean length of stay in the PACU was 37 min and the mean length of stay in the hospital was 77 min. There was no severe adverse event associated with sedation was observed. All patients were formally assessed by anesthesiologists for suitability for discharge with stable condition. There was no delayed bleeding, perforation and non-planed admission in the outpatient setting. Inpatient admission occurred when patients needed advanced endoscopic treatment and surgical procedures. Patients and family members were more likely to select gastrointestinal endoscopy in the outpatient setting and had higher satisfactions.
Conclusions An evidence-based perianesthesia nursing procedure may enhance patient safety among elderly patients undergoing gastrointestinal endoscopy in an outpatient setting.

OR-0056

瑞马唑仑和丙泊酚对高龄衰弱患者内镜下逆行胰胆管造影术中血流动力学和术后早期恢复质量效果的比较

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中国人民解放军北部战区总医院

目的 比较瑞马唑仑和丙泊酚对高龄衰弱患者内镜下逆行胰胆管造影术（ERCP）中血流动力学和术后早期恢复质量的影响。
方法 前瞻性纳入 2022 年 11 月至 2023 年 5 月北部战区总医院择期行 ERCP 的高龄（年龄≥75 岁）衰弱患者 108 例，根据使用的不同麻醉药物，采用随机数字表法将患者分为两组：瑞马唑仑组［R 组，男 33 例，女 20 例，年龄（81.5±4.9）岁］和丙泊酚组［P 组，男 26 例，女 29 例，年龄（82.3±6.0）岁］。R 组麻醉诱导静脉注射瑞马唑仑 0.15~0.20 mg/kg 和阿芬太尼 5.0 μg/kg，麻醉维持静脉泵注瑞马唑仑 0.4~0.8 mg·kg-1·h-1 和阿芬太尼 0.5 μg·kg-1·min-1；P 组麻醉诱导静脉注射丙泊酚 1.0~1.5 mg/kg 和阿芬太尼 5.0 μg/kg，麻醉维持泵注丙泊酚 2.0~6.0 mg·kg-1·h-1 和阿芬太尼 0.5 μg·kg-1·min-1。主要观察指标为两组患者术中低血压［平均动脉压（MAP）＜65 mmHg（1 mmHg＝0.133 kPa）或较基础值下降＞20%］、严重低血压（MAP＜55 mmHg）的发生率；次要观察指标为两组患者在入室麻醉诱导前（T0）、麻醉诱导后 1 min（T1）、内镜通过口咽部（T2）、取石即刻（T3）、内镜撤出口咽部（T4）、患者苏醒（T5）不同时点的 MAP、心率、脉搏血氧饱和度（SpO2）、脑电双频指数（BIS），术中血管活性药物的使用量以及心动过缓、低氧血症、注射痛的发生率和术后 15 项恢复质量量表（QoR-15）评分情况。
结果 R 组患者术中低血压的发生率为 24.5%（13/53），低于 P 组的 43.6%（24/55）（P=0.036）；两组患者术中严重低血压的发生率分别为 0%（0/53）和 5.5%（3/55），差异无统计学意义（P=0.225）。与 T0 时点比较，两组 T1~T4 时点 MAP 降低，BIS 降低（均 P＜0.05）；

两组 T1~T2 时点心率减慢，SpO2 降低（均 P＜0.05）。与 P 组比较，R 组 T1~T4 时点 MAP 升高，T1~T2 时点心率增快，SpO2 升高，BIS 升高（均 P＜0.05）。R 组患者术中血管活性药物的使用量为 93.9±21.4 μg，低于 P 组的 123.3±29.7 μg（P＜0.001）；R 组患者术中心动过缓、低氧血症、注射痛的发生率分别为 5.7%（3/53）、13.2%（7/53）、3.8%（2/53），低于 P 组的 18.2%（10/55）、30.9%（17/55）、16.4%（9/55）（均 P＜0.05）。两组患者术中呛咳体动、呃逆的发生率差异均无统计学意义（均 P＞0.05）；R 组患者苏醒时间为 11.8±3.0 min，长于 P 组的 10.3±3.3 min（P=0.016），苏醒期躁动发生率为 3.8%（2/53），低于 P 组的 16.4%（9/55）（P=0.031）。两组患者 PACU 停留时间、术后恶心呕吐的发生率差异均无统计学意义（均 P＞0.05）。两组患者术后 1 d 的 QoR-15 评分分别为 131.9±4.7 和 129.3±5.7 分，差异有统计学意义（P=0.010），术后 3 d 的 QoR-15 评分分别为 134.8±4.3 和 133.6±5.0 分，差异无统计学意义（P=0.205）。

结论 与丙泊酚比较，瑞马唑仑可以降低高龄衰弱患者 ERCP 术中低血压、心动过缓、注射痛的发生率，减少术中血管活性药物的使用量，对血流动力学的影响较小，虽延长了患者的苏醒时间，但未影响术后早期恢复质量。

OR-0057

全静脉即时拔管对成人肝移植患者预后的影响: 一项回顾性队列研究

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Background Although step-down emergence and extubation are universally practiced after liver transplantation, prolonged mechanical ventilation and positive end-expiratory pressure may enhance the predisposition to ventilator-associated complications and be associated with inferior outcomes.

Methods In this retrospective cohort study, we screened 339 patients undergoing liver transplantation. After propensity score matching, 35 patients in group F (total intravenous-based immediate extubation, TIIE) and 107 patients in group C (balanced anesthesia with step-down extubation) with balanced and comparable pre- and intraoperative profiles were selected for analysis. Patients in group F received propofol- and remifentanil-based total intravenous anesthesia, followed by immediate tracheal extubation. Patients in group C received sevoflurane-based balanced anesthesia and were step-down extubated in the intensive care unit. The primary outcomes are postoperative respiratory support time and postoperative ICU stays. Other postoperative outcomes were compared between the two groups.

Results Group F had significantly shorter postoperative respiratory support time compared to group C (median, 0.08 vs. 17 hours; P < 0.001). The duration of postoperative intensive unit care stay in group F was significantly shorter than that in group C (mean, 5.84 vs. 7.08 days; P = 0.019). Group F had a lower incidence of bacterial infection (20.0% vs. 42.1%; P = 0.019) and continuous renal replacement therapy use (2.86% vs. 13.08%; odds ratio, 0.195; P = 0.088) than group C. No significant difference in the early mortality rate, percentage reduction of bilirubin, incidence of exploratory laparotomy, pneumonia, or thrombosis was observed between groups.

Conclusion TIIE is associated with a shorter intensive unit care stay, lower incidence of bacterial infection, and less use of continuous renal replacement therapy.

OR-0058

远程缺血预处理可改善肾移植后的移植物功能：系统评价和荟萃分析以及试验序贯分析

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目的 远程缺血预处理（RIC）有可能通过减少缺血再灌注损伤来改善肾移植后的移植物功能;然而，目前的临床证据尚无定论。这项荟萃分析与试验序贯分析（TSA）旨在确定 RIC 是否能改善肾移植后的移植物功能。
方法 在截至 2023 年 6 月 20 日的 PubMed、Cochrane 图书馆和 EMBASE 数据库中进行全面检索，以筛选出所有研究 RIC 对肾移植后移植物功能影响的随机对照试验。主要结局是肾移植后移植功能延迟（DGF）的发生率。次要结局包括急性排斥反应的发生率、移植物衰竭、3 个月和 12 个月的估计肾小球滤过率（eGFR）以及住院时间。根据 RIC 过程（预处理、预处理或后处理）、实施部位（上肢或下肢）和移植物来源（活体或已故供体）进行亚组分析。
结果 我们的 meta 分析纳入了 8 项试验，涉及 1038 名患者。与对照组相比，RIC 没有显著降低 DGF 的发生率（8.8%vs.15.3%;风险比=0.76,95%置信区间[CI]，0.48-1.21，P=0.25，I^2=16%），TSA 结果显示未达到所需的信息量。然而，TSA 提供了充分的证据，RIC 组在移植后 3 个月时 eGFR 显著升高（平均差=2.74ml/min/1.73m，95%CI：1.44-4.05ml/min/1.73m，P<0.0001，I^2=0%）。次要结果在其他次要结局之间具有可比性。RIC 的治疗效果在亚组分析之间没有差异。
结论 在这项荟萃分析和试验序贯分析中，RIC 并未显著降低肾移植后 DGF 的发生率。尽管如此，RIC 与 3 个月 eGFR 呈正相关。鉴于本研究纳入的患者数量有限，需要设计完善的大样本量临床试验来验证 RIC 的肾保护作用。

OR-0059

Effect of intraoperative phrenic nerve stimulation on postoperative pulmonary complications in neurosurgical patients: a prospective, randomized controlled clinical trial

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Objective Postoperative pulmonary complications (PPCs) commonly occur in neurosurgical patients and are associated with poor clinical outcomes. Phrenic nerve stimulation (PNS) has been reported to improve lung function and reduce the rate of pneumonia in mechanical ventilated patients. However, its effect on neurosurgical patients is largely unknown. Given the occurrence rate of PPCs exceeding 30% in this population, it is important to investigate the effect of intraoperative PNS on these complications.
Methods Patients undergoing elective craniotomy at our hospital between January 2024 to June 2024, who met the inclusion and exclusion criteria, were enrolled in this study. Patients were randomly assigned to control group and intervention group. In the intervention group, intraoperative PNS (10 min with interval of 30 min) administered using commercial PNS equipment. PNS intensity was individualized by phrenic ultrasonography before the surgery, ensuring significant diaphragm contraction upon stimulation. PPCs was defined as having occurred within the first 7 days after surgery, including pneumonia, bronchospasm, atelectasis, pulmonary edema, respiratory failure, pleural effusion, pneumothorax, or unexpected requirement of invasive or noninvasive mechanical ventilation. As an exploratory study, no sample size

calculation was performed, and 40 patients were selected for each group based on convenience sampling.

Results In total, 80 patients were enrolled, with no patient dropping out from the control group and the intervention group. There was no difference on the demographic characteristics of both groups. The average intensity of PNS given to the patients was 25 ±3U. The total incidence of PPCs was 38.75%, with 42.5% occurring in the control group and 35% occurring in the intervention group (P=0.491). Most (29%) PPCs occurred on the third day after surgery, with a median onset of PPCs at third day [IQR: 2-3]. There was no significant difference between the two groups in the median onset of PPCs (2[IQR: 1.5-3.5] vs 3 [IQR: 1.75-3.25], P=0.957).

Conclusions In conclusion, our study administered PNS for the first time to neurosurgical patients during surgery and found that it reduced the rate of PPCs by 7.5%. Although this reduction did not reach statistical significance, our findings suggest a promising novel therapeutic approach for potentially mitigating these complications.

OR-0060

Characteristics of Prefrontal Cortex EEG and Anesthesia Depth Monitoring in Parkinson's Patients with rapid-eye-movement sleep behaviour disorder

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Background/Objective Rapid Eye Movement (REM) Sleep Behavior Disorder (RBD) involves muscle atonia and noticeable motor behaviors during REM sleep, associated with abnormal electroencephalogram (EEG) activity in the prefrontal cortex. RBD is closely intertwined with Parkinson's disease (PD), affecting a significant number of PD patients. Monitoring anesthesia depth using prefrontal cortex EEG during subthalamic nucleus (STN) deep brain stimulation (DBS) under general anesthesia is crucial for precise anesthesia management. It remains unclear whether PD patients with concurrent RBD exhibit abnormal EEG patterns in the prefrontal cortex that might impact the assessment of anesthesia depth. This study aims to analyze frontal cortex EEG characteristics during propofol anesthesia for STN-DBS in PD patients with RBD and assess potential effects on derived parameters of anesthesia depth monitoring.

Method This retrospective study analyzed prefrontal cortex EEG data from 43 PD patients undergoing propofol anesthesia for STN-DBS. Patients were grouped based on the presence of RBD into two groups: without RBD (n=23) and with RBD (n=20). They were evaluated across three stages: awake state, propofol anesthesia, and shallow anesthesia during microelectrode recording (MER). Baseline characteristics, preoperative medications, prefrontal imaging features, as well as motor and non-motor evaluations were documented. The analysis encompassed power spectral density (PSD) of prefrontal cortex EEG and derived parameters such as Patient State Index (PSI), spectral edge frequency (SEF) on both hemispheres, and suppression ratio.

Result Compared to patients without RBD, those with RBD showed significantly lower PSI during awake state (91.80±5.65 vs. 87.62±7.63, p=0.03). However, there were no statistically significant differences in PSI, SEF, or suppression ratio between the two groups across different consciousness states. PSD analysis revealed enhanced gamma band suppression during propofol anesthesia (-16.24±1.69 vs. -17.80±2.72, p=0.03) and MER (-16.50±2.18 vs. -18.49±3.46, p=0.01) in RBD patients.

Conclusion PD patients with concurrent RBD exhibit lower PSI during awake state, but this does not affect anesthesia depth monitoring during subsequent stages. Enhanced gamma band suppression observed in RBD patients during propofol anesthesia and MER suggests altered regulatory states of motor control at different depths of consciousness, highlighting the need for further mechanistic investigation.

OR-0061

伤害指数监测在妇科腹腔镜手术 ERAS 路径中的临床应用价值

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目的 探讨伤害指数（index of consciousness 2, IoC2）监测指导妇科腹腔镜手术加速康复外科（enhancedrecoveryaftersurgery，ERAS）路径中镇痛的管理，对加速患者康复、提高康复质量的临床价值。
方法 2 组患者采用相同的给药方案。C 组麻醉插管时机的选择及术中麻醉药剂量的调整均根据麻醉医生经验和患者生命体征；T 组在 IoC2 值降至 30±5 时进行气管插管，术中将 IoC1 维持在 40-60，IoC2 维持在 30-50 之间。记录患者术前术毕血糖值的波动，记录在术毕、麻醉恢复室（postanesthesiacareunit，PACU）期间、病房期间疼痛、恶心呕吐的发生频率，以及患者的饮水时间、半流食时间、下地活动时间、肠排气时间的长短
结果 54 例患者纳入本研究，2 组患者的一般资料比较，差异无统计学意义（P＞0.05）；插管后，2 组患者心率变异大小的比较有统计学意义（13.00 vs 9.35；Z=2.113，P=0.039）；术前术毕血糖波动的大小有统计学意义（1.14 vs 0.53；Z=3.166，P=0.003）；术毕时刻，疼痛发生率的比较有统计学意义（c2=4.0；P=0.046）；术毕时刻追加止疼药的次数比较有统计学意义（0.26 vs 0.04；Z=-2.277，P=0.023）；术毕至饮水时间的比较有统计学意义（4.54 vs 2.55；Z=-2.062，P=0.039）；术毕至下地活动时间的比较有统计学意义（8.57 vs 5.69；Z=-2.822，P=0.005）；术毕至肠排气时间的比较有统计学意义（13.84 vs 10.71；Z=2.007，P=0.045）。
结论 在妇科 ERAS 的实施过程中使用伤害指数监测进行镇痛和应激的管理，可以进一步加速患者的康复，提高患者的恢复质量。

OR-0062

The preventive effects of dexmedetomidine on acute kidney injury after major abdominal surgery : a propensity score matched cohort study

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Background Major abdominal surgery, which defined as intraperitoneal approach performed under general anesthesia with duration no less than 120min, is a kind of high-risk surgery type for postoperative AKI among non-cardiac surgeries. Based on the apparent renal protective effect of dexmedetomidine demonstrated in cardiac surgery and animal study, this study assumed that the dexmedetomidine could prevent the postoperative AKI after major abdominal surgery.
Method Patients undergoing elective major abdominal surgery from January 2019 to July 2021 in West China Hospital were enrolled. According to whether exposure to intravenous use of dexmedetomidine, patients were divided to Dex group and Control group. The primary outcome

was the incidence of acute kidney injury (AKI) in the postoperative 7 days. Secondary outcomes included urine output during operation, length of hospital stays, incidence of postoperative dialysis; mortality in hospital; incidence of hypotension and bradycardia during operation.
Main results After propensity score matching with ratio of 1:1, a total of 8836 patients were successfully matched. The dexmedetomidine administration has no association with incidence of postoperative AKI (3.4% vs. 3.3%; P=0.769), dialysis (0.1% vs. 0.1%; P=1.000), intraoperative hypotension (19.4% vs. 18.9%; P=0.607), ICU admission (7.4% vs. 7.2%; P=0.744), in-hospital mortality (0.2% vs. 0.2%; P=0.466) and length of hospital stays 9.25 (8.00,12.00) vs. 9.00 (8.00,12.00) days; P=0.057), but has association with increased urine output (450.00 (250.00, 700.00) vs. 400.00 (200.00, 600.00) ml; P<0.001) and higher incidence of bradycardia (37.0% vs. 30.6%; P<0.001) during operation in the matched cohort. In loading dose subgroup, the use of dexmedetomidine decreased the incidence of AKI (OR: 0.44, 95% CI (0.23, 0.76), P=0.006).The association between dexmedetomidine and AKI was absence in subgroups of high or low infusion rate and no loading dose using. Conclusions: The renal protective of Dexmedetomidine in major abdominal surgery might hve dose effect and administration of dexmedetomidine with loading dose can reduced the incidence of AKI
Conclusion Dexmedetomidine might have a dose-dependent preventive effect on AKI after major abdominal surgery. The use of dexmedetomidine with loading dose could reduce the incidence of postoperative AKI and had the function of renal protection.

OR-0063

远程缺血预处理对二尖瓣置换术患者心肌缺血再灌注损伤的影响

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目的 体外循环下的心内直视手术需要暂时阻断冠状动脉血流，在血流重新恢复后可能出现心肌缺血再灌注损伤。远程缺血预处理（RIPC）被证明对肝、肾、脑、皮肤、肠道等多个器官具有保护作用，但其对心脏的保护作用还存在争议。本研究目的是在临床水平上探索 RIPC 对二尖瓣置换术患者心肌缺血再灌注损伤的影响。
方法 将拟接受体外循环下二尖瓣置换术患者随机分为 RIPC 组和对照组。RIPC 组接受远程缺血预适应处理，方案为使用缺血治疗仪（宣医通 IPC-906D）对双上肢施加 180 mmHg 压力，5 分钟缺血和 5 分钟再灌注为 1 个循环，重复 4 个循环，对照组不做干预。术前收集患者一般资料，包括患者姓名、住院号、年龄、性别、身高、体重、既往病史、生命体征等信息。术前、术后 1 天、3 天和 5 天收集患者心脏超声数据，术前、术后 2 小时、1 天、2 天、3 天和 5 天收集患者血液检测血清 BNP、CK-MB、MB 和 TnT 水平，并收集两组患者总住院日，ICU 住院日和住院总费用信息。所有数据均采用 SPSS statistics 26.0 进行统计分析，两组间比较采用独立样本 t 检验或 Mann-Whitney U 检验统计分析。分类变量比较采用卡方检验或秩和检验，P<0.05 为有显著性差异。
结果 本研究纳入了 28 名于四川大学华西天府医院接受体外循环二尖瓣置换术患者，RIPC 组 13 人，对照组 15 人。基线资料分析显示，两组患者基线年龄、性别、高血压患病、糖尿病患病、BMI、术前血压和心率无显著差异（P>0.05）。心脏超声结果显示，RIPC 组术后 3 天左心室的收缩末期内径（ESD）和收缩末期容积（ESV）显著低于对照组（P＜0.01）。RIPC 组术后 3 天 EF 值和 FS 值显著高于对照组（P＜0.05）。心肌标志物指标中，两组患者各时间点血清 BNP、CK-MB、MB 和 TnT 水平无显著差异，住院总时长、ICU 住院时长和住院总费用同样无显著差异（P>0.05）。术后 3 个月的随访中，对照组 1 名患者出院后死亡，RIPC 组无出院后死亡患者。
结论 远程缺血预处理对二尖瓣置换术患者术后短期心功能有保护作用，可改善患者术后 3 天心脏收缩功能。

OR-0064

From the Anesthesia Perspective on Complications in Patients with Infected Abdominal Aortic Aneurysm Excision

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Background Infected abdominal aortic aneurysm (IAAA) refers to an abdominal aortic aneurysm below the renal artery with microbial invasion of the aneurysm wall, accounting for 0.7% to 2.6% of abdominal aortic aneurysms. Its incidence is 0.6-2% in Europe and the United States, but as high as 13% in East Asia. Most patients have cardiovascular diseases, and the pathogens are mainly bacteria, with common ones including Salmonella, Staphylococcus, Escherichia coli, etc. They have a high risk of rupture, severe complications, poor prognosis, and a mortality rate of 26-44%.
Objective: To provide clinical reference for perioperative management and prevention of complications in patients undergoing resection of infected abdominal aortic aneurysm.
Methods: By systematically introducing the patient's current medical history, past medical history, clinical auxiliary examination, laboratory examination, anesthesia management, and postoperative diagnosis and treatment process, we share the experience of perioperative management in a patient with infected abdominal aortic aneurysm resection.
Case summary: The patient is a 71-year-old male, 174 cm, 90 kg, who had recurrent fever, chills, and abdominal pain 20 days ago, with the highest body temperature of 40.6°C, and had a transient convulsion. Blood culture indicated Salmonella, and he was treated with moxifloxacin for infection. Three days ago, aortoiliac CTA at the local hospital suggested "pseudoaneurysm of the abdominal aorta." Past medical history: Hypertension for 10 years, taking nifedipine and valsartan, blood pressure controlled; in 2018, two coronary stents were implanted due to coronary heart disease, and another stent was implanted in 2021. Personal history: Smoking for 50 years, 10 cigarettes/day, drinking for 30 years. Preoperative examination: T: 36.6°C, P: 63 beats/min, R: 18 breaths/min, BP: 130/70 mmHg. Blood routine (neutrophil ratio, 0.74, hemoglobin, 113 g/L); Inflammatory indicators (CRP, 2.239 mg/dl, IL-6, 15.65 pg/ml); Blood gas analysis, liver and kidney function, coagulation function were normal. ECG: Abnormal T wave, elevated U wave, elevated P wave; Cardiac ultrasound, chest CT showed no obvious abnormalities. Coronary CTA: CAD RADS 4/S, the right coronary wall thickened in the proximal, middle, and distal segments, the narrowest part located in the distal segment (stenosis 70-99%), the left anterior descending branch narrowest in the proximal segment (stenosis 70-99%). Myocardial perfusion: No myocardial ischemic changes were found. Thoracoabdominal aorta CT examination + 3D reconstruction: The possibility of a false aneurysm at the distal abdominal aorta is high, with mural thrombus formation at the distal abdominal aorta; Ectopic right subclavian artery; Diffuse sclerosis of the aorta and its branches, with varying degrees of lumen stenosis. Diagnosis: Infected pseudoaneurysm of the abdominal aorta; Salmonella infection; Coronary atherosclerotic heart disease, post-coronary stent implantation; Hypertensive disease. Proposed surgery: Axillary bifemoral arterial bypass + resection of infected pseudoaneurysm of the abdominal aorta. Proposed anesthesia: Tracheal intubation for general anesthesia.
Conclusion: IAAA presents a variety of challenges to the patient and anesthesia, not only ensuring the stability of surgical anesthesia but also ensuring the protection of various organs, homeostasis, and good coagulation function. The surgery tests not only the surgeon's operational ability but also the anesthesiologist's predictive and decision-making skills.

OR-0065

Identification of an immune-related genes signature to predict clinical outcome in sepsis

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Background Sepsis as characterized by immune disfunction is the major cause of mortality in the intensive care unit. Sepsis exhibits high heterogeneity, with immune suppression characterized by apoptosis, epigenetic reprogramming, and downregulation of activating cell surface molecules in various cell types being a prevalent feature among many patients. In recent years, there has been growing interest in leveraging genomic and transcriptomic data to unravel the molecular mechanisms underlying sepsis heterogeneity and identify biomarkers with prognostic value12.However, early predictions of sepsis at high mortality risk remains elusive.
Objective Our aim is to construct an immune-related genes (IRGs) signature for septic outcome and clarify the molecular and immune characteristics in IRGs signature-defined subgroups of sepsis.
Methods The datasets GSE185263 was obtained from the Gene Expression Omnibus (GEO) database. Differential analysis of the gene expression matrix (DEGs) and weighted correlation network analysis (WGCNA) was performed to identify common IRGs between sepsis patients and healthy controls. Using least absolute shrinkage and selection operator regression (LASSO), best subset selection and stepwise regression, 7 key IRGs were screened. Then, random forest model was used to predict clinical outcome of patients and the reliability of the 7 key IRGs signature's independent predictive value in the training and validation cohorts was assessed. We also performed a nomogram through logistic regression to class sepsis patients into 2 subgroups by different risk score. Next, GO and KEGG enrichment analysis was utilized to investigate and characterize the DEG of sepsis patients at different risks. Finally, immune cells and microenvironment between subgroups of septic patients, were detected through CIBERSORT, Xcell and ssGSEA algorithm.
Results The 50 common IRGs showed significant differences in the sepsis patients and healthy controls with 27 upregulated and 23 downregulated. The IRGs signature, comprised of 7 genes, of which DEFA3, PRTN3, CXCR5, CD40LG, IL7R, PLCG1 and PTGDR, showed significantly associated with poor outcome of sepsis in training cohort and in external validation cohort. Based on the 7 key IRGs signature, in training cohort, high-risk group compared with low-risk group had higher 28 days mortality (22.99% vs 6.98%, $P<0.05$) and higher organ failure with SOFA score (2.13 vs 3.67, $P<0.05$), as well as in validation cohort, higher mortality (28.57% vs 5.88%, $P<0.05$) higher organ failure with SOFA score (2.53 vs 4.75, $P<0.05$) were also detected. In addition, activation of neutrophil extracellular trap formation and extrinsic apoptotic signaling pathway were enriched whereas reduced B and T cell receptor signaling pathway and p53 signaling pathway were enriched in high-risk patients.
Conclusion Sepsis is considered to be related to dysregulated immune response and along with the dysfunctional and fraction-changed immune cell types. The sepsis microenvironment refers to the hypoxia, lowered pH levels, immunosuppression and various signal molecules. In the past decade, studies had been focused on the immune cells in the occurrence and development of sepsis. With the development of second-generation sequencing technology, there is increasing evidence that IRGs play vital roles in diagnose sepsis.In this study, In this study, we constructed a 7 IRGs signature, containing DEFA3, PRTN3, CXCR5, CD40LG, IL7R, PLCG1 and PTGDR, with promising prediction on 28 days mortality and higher SOFA score in septic patients, which represents a step forward in our quest to unravel the complex pathophysiology of this life-threatening condition. In addition, the immune infiltration program was utilized to validate the DEG enrich analysis result and get a more in-depth understanding of the effects that are brought about by the infiltration of immune cells in high-risk sepsis. This study employed a variety of

bioinformatics analysis methods, including differential analysis of gene expression matrices, weighted correlation network analysis, LASSO regression, best subset selection, stepwise regression, and random forest modeling, to identify common IRGs between sepsis patients and healthy controls. Additionally, we utilized logistic regression to construct a predictive model and developed a diagnostic nomogram to classify sepsis patients into two subgroups with different risk levels. These analyses provided important insights into the immune status and disease progression of sepsis patients, thereby offering valuable information for future clinical research and the development of treatment strategies. Further validation of this signature in independent patient cohorts and prospective studies is warranted to confirm its clinical utility and facilitate its translation into routine clinical practice.

OR-0066

右美托咪定调控自噬治疗急性肺损伤的研究进展

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目的 急性肺损伤(acute lung injury，ALI)是指在严重肺部/肺外感染、休克及创伤等疾病过程中，肺泡上皮细胞和毛细血管内皮细胞损伤，造成的弥漫性肺间质及肺泡水肿，这一病理过程可引起呼吸功能不全或呼吸衰竭，损伤到一定程度可引起急性呼吸窘迫综合征(acute respiratory distress syndrome，ARDS)。ARDS 以呼吸急促、发绀、氧运输功能障碍、低肺泡通气/血流灌注比以及肺顺应性降低为特征。ALI/ARDS 的常规治疗策略包括保护性机械通气疗法、药物治疗、中草药治疗、体外膜肺氧合疗法、液体管理疗法等，虽然目前 ALI 的治疗方法已经取得了部分进展，但仍无针对 ALI 的特效药，与 ALI/ARDS 患者相关的死亡率仍然很高。因此，探索针对 ALI 的有效治疗至关重要且刻不容缓。
方法 本文通过对自噬发生的机制、右美托咪定调控自噬治疗急性肺损伤的机制以及其他治疗急性肺损伤的方法进行综述，为防治急性肺损伤的策略提供良性补充。
结果 急性肺损伤有多种治疗机制，尽管临床上正在研究许多干预措施，但有效的药物疗法却寥寥无几，其中右美托咪定可以通过不同机制减轻多种因素导致的急性肺损伤，如呼吸机相关性肺损伤、休克所致急性肺损伤、缺血/再灌注引起肺损伤等。
结论 目前许多研究表明右美托咪定可以通过调节自噬治疗急性肺损伤，但这些研究成果大多来自动物实验和细胞实验，且具体的机制尚未研究清楚，基于自噬的治疗措施的临床应用仍然是一个巨大的挑战，右美托咪定影响自噬的具体机制以及治疗器官损伤的作用将是我们未来的研究方向。

OR-0067

Random Forest Algorithm for Predicting Hypotension after Radical Oral Cancer Resection and Free Flap Reconstruction

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Background The postoperative period is critical for a patient’s recovery, and postoperative hypotension, specifically, is a risk factor for adverse perioperative outcomes. The goal of this study is to investigate the risk factors for postoperative low blood pressure, and build a machine

learning model based on these features for real-time prediction in oral cancer patients following reconstruction surgery.
Methods We conducted a retrospective cohort analysis of adults who underwent oral cancer resection and free flap reconstruction surgery and admitted to the Anesthesia intensive care unit recovery from December 2022 to December 2023. Patient demographic details, biochemical results, and hemodynamics observations were taken from electronic medical records. Seven machine-learning techniques were attempted, with postoperative hypotension (mean arterial pressure less than 55 mmHg) as primary outcome. The best performing machine learning (ML) model was tuned and final performance assessed using split-set validation, followed by the identification of risk factors and model interpretability.
Results Of 727 patients, 412 cases were finally included, with 66 (16.2 %) experiencing postoperative hypotension, resulting in higher inpatient costs and longer durations of stay. Ten of the 50 variables were selected by the Boruta algorithm to develop the machine learning model. Area under the receiver operating characteristic curve for Random Forest was 0.805 (95% CI, 0.674 to 0.935), making it the best-performing model among the six other ML models. Shapley additive explanation (SHAP) and further feature importance analysis revealed that systolic pressure, Heart rate, Tumor size, Lactic acid, Diastolic pressure, Surgical time, total liquid infusion volumes and BMI were significant risk factors for postoperative hypotension, indicating that the Random Forest model had good interpretability and reliability.
Conclusions Random Forest model being the best-performing model for predicting postoperative hypotension occurrence after free flap reconstruction surgery in oral cancer patients. Our models are intended to help clinicians make decisions about whether to closely follow screened high-risk patients and take further interventions.

OR-0068

区域神经阻滞用于正颌手术后去阿片化镇痛对术后疼痛及呕吐的影响：一项回顾性队列研究

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目的 背景：正颌手术可能导致术后剧烈疼痛，术后镇痛多采用阿片类药物行患者自控静脉镇痛（patient controlled intravenous analgesia, PCIA），虽镇痛效果明确，但阿片类药物增加术后恶心呕吐的发生风险。区域神经阻滞（nerve block, NB）是实现术后去阿片化镇痛的核心策略，明显降低术后恶心呕吐发生率。但是区域神经阻滞是否可以用于正颌手术后去阿片化镇痛，目前尚无明确定论。
目的：评价区域神经阻滞用于正颌手术后去阿片化镇痛对术后疼痛及呕吐的影响。
方法 本研究是一项回顾性队列研究，纳入空军军医大学口腔医院 2018 年 08 月至 2020 年 09 月期间 354 例已行正颌手术患者。回顾电子病历，根据患者采用术后镇痛方法将患者分为 NB 组（n = 262）和 PCIA 组（n = 92）。NB 组患者麻醉诱导后手术开始前接受区域神经阻滞（双侧上颌神经阻滞联合双侧下牙槽神经阻滞）用于术后去阿片化镇痛，PCIA 组患者手术结束即刻接受 PCIA。主要结局事件为术后 24 h 中重度疼痛发生率及术后 24 h 呕吐发生率。计算 OR 值，并采用 logistic 多因素回归分析校正混杂因素对主要结局事件影响。次要结局事件为术后 48 h 中重度疼痛发生率、术后 48 h 呕吐发生率、术中出血量、术后首次饮水时间、术后首次下床活动时间、术后 24 h QoR-40 恢复质量评分、患者满意度、术后住院时间。
结果 NB 组术后 24 h 中重度疼痛发生率为 7.6%，PCIA 组发生率为 10.9%，差异无统计学意义（OR = 0.68, 95% CI: 0.30-1.51, P = 0.34）。logistic 多因素回归分析校正混杂因素后，组间差异仍无统计学意义（OR = 0.60, 95% CI: 0.22-1.65, P = 0.32）。NB 组术后 24 h 呕吐发生率（38.5%）明显低于 PCIA 组（65.2%），差异有统计学意义（OR = 0.33, 95% CI: 0.20-0.55, P <

0.001），logistic 多因素回归分析校正混杂因素后，差异仍具有统计学意义（OR = 0.32, 95% CI: 0.17-0.62, P = 0.001）。与 PCIA 组比较，NB 组术中出血量减少、术后首次饮水时间缩短且术后住院时间缩短（P < 0.001）。术后 48 h 中重度疼痛发生率、术后 48 h 呕吐发生率、术后首次下床活动时间、术后 24 h QoR-40 恢复质量评分及患者满意度，组间比较差异无统计学意义（P ＞ 0.05）。

结论 该研究表明，区域神经阻滞用于正颌手术患者术后去阿片化镇痛，其镇痛效果与 PCIA 相当，且可以降低术后呕吐发生风险。区域神经阻滞可能成为正颌手术患者术后镇痛的首选方式。

OR-0069

超声引导下前锯肌联合胸横肌阻滞在乳腺癌术中应用的研究

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目的 超声引导下前锯肌联合胸横肌阻滞在乳腺癌术中应用的研究

方法 选取择期行乳腺癌改良根治术的患者 80 例,年龄 45-60 岁,BMI 在 18.5-23.9kg/m2 之间,ASAⅠ-Ⅱ级,经伦理委员会批准及患者家属知情同意,依照随机数字表分为两组,每组 40 例:Ⅰ组的患者采用 0.375%罗哌卡因 25ml 行前锯肌平面阻滞(包括腋前线第 4 肋间前锯肌阻滞 20ml+腋前线第 2 肋间前锯肌阻滞 5ml)+0.375%罗哌卡因 15ml 行胸横肌平面阻滞+全麻组(实验组);Ⅱ组的患者采用 0.375%罗哌卡因 25ml 行单纯前锯肌平面阻滞(包括腋前线第 4 肋间前锯肌阻滞 20ml+腋前线第 2 肋间前锯肌阻滞 5ml)+全麻组(对照组)。全身麻醉诱导后进行神经阻滞,记录手术时间,记录患者术中瑞芬太尼药物用量,记录患者术后 6、10、18、24h 的视觉模拟评分(visual analogue scale,VAS)评判疼痛程度,记录患者术后 24h 内恶心、呕吐、呼吸抑制及瘙痒等不良事件的发生情况,记录术后 24h 内补救镇痛的情况。

结果 两组年龄、手术时间、BMI 比较差异无统计学意义(P>0.05)。Ⅰ组术中瑞芬太尼用量明显少于Ⅱ组,差异有统计学意义(P<0.05)。术后 6h 两组之间的 VAS 评分差异无统计学意义(P>0.05),术后 10h、18h、24h 的 VAS 评分Ⅰ组显著低于Ⅱ组,差异有统计学意义(P<0.05)。Ⅰ、Ⅱ两组术后不良反应的发生情况差异无统计学意义(P>0.05)。Ⅰ、Ⅱ两组术后 24 内补救镇痛情况差异有统计学意义(P<0.05)。

结论 前锯肌联合胸横肌阻滞复合全麻相比与单纯前锯肌阻滞能减少术中瑞芬太尼用量和降低术后疼痛视觉模拟评分(VAS),减少术后补救镇痛,更适用于乳腺癌改良根治术。

OR-0070

非气管插管麻醉对胸腔镜肺部手术患者术后膈肌功能和肺部并发症的影响

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目的 膈肌功能障碍和肺部感染、肺不张、胸腔积液等肺部并发症是胸腔镜肺部手术患者术后常见的并发症，严重影响患者的术后康复。本研究拟探索非气管插管保留自主呼吸麻醉对单孔胸腔镜肺占位切除术患者术后膈肌功能和肺部并发症的影响。

方法 选择 2022 年 10 月至 2023 年 12 月于我院择期行单孔胸腔镜肺占位切除术的患者。纳入标准：BMI≤30kg/m2；ASA 分级 I-III 级；年龄≥18 岁，≤70 岁。排除标准：术前超声评估发现膈肌功能障

碍；存在严重的心肺等重要脏器功能不全；既往有胸腹部手术史等。本研究（注册号 ChiCTR2200064252）共纳入 160 例患者，采用随机数字表法将其分为 2 组（n=80），试验组患者采用全身麻醉联合超声引导下胸椎旁和迷走神经阻滞，在术中保留自主呼吸，通过面罩或喉罩进行通气，对照组患者采用常规双腔气管插管全身麻醉联合超声引导下胸椎旁阻滞，两组患者给予相同标准的术后镇痛。主要观察指标为患者术后 24 小时膈肌功能障碍的发生率，将凸阵探头置于患者锁骨中线和腋前线之间的低位肋骨下缘，利用 M 型超声分别评估患者平静呼吸下术侧和健侧膈肌的移动度，测量 3 个呼吸周期的膈肌移动度并取平均值，小于 1cm 则为膈肌功能障碍。次要观察指标为患者术后 7 天内肺部并发症的发生率，采用欧洲围手术期临床结果（European perioperative clinical outcome, EPCO）标准随访两组患者肺部并发症的发生情况。

结果 最终共有 155 名患者完成研究，试验组 78 例，对照组 77 例，两组患者在性别、年龄、BMI、ASA、吸烟史、加泰罗尼亚肺部并发症风险评分、手术类型和术中补液量等基线特征方面无统计学差异。试验组患者术后 24 小时膈肌功能障碍发生率为 34.6%，对照组为 58.4%，差异具有统计学意义（$\chi2=8.843$，$P=0.003$），其中，试验组患者术侧膈肌功能障碍的发生率为 33.3%，对照组为 53.2%，差异具有统计学意义（$\chi2=6.261$，$P=0.012$），试验组患者术后健侧膈肌功能障碍的发生率为 9.0%，对照组为 16.9%，差异无统计学意义（$\chi2=2.157$，$P=0.142$）；另外，试验组患者术后 7 天内肺部并发症发生率为 17.9%，而对照组患者术后 7 天内肺部并发症发生率为 32.5%，差异具有统计学意义（$\chi2=4.338$，$P=0.037$）；而且在所有肺部并发症中，肺部感染的发生率降低最为明显，试验组为 7.7% ，而对照组为 20.8%，差异具有统计学差异（$\chi2=5.449$，$P=0.02$）。

结论 非气管插管保留自主呼吸麻醉可以降低胸腔镜肺占位切除术患者术后膈肌功能障碍和肺部并发症的发生率，促进患者术后康复。

OR-0071

Acute Kidney Disease Risk and Postoperative Glycemic Variability in Patients Undergoing Cardiac Surgery: A Multicenter Cohort Analysis

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Objective Patients undergoing cardiac surgery often experience glucose metabolic disorders, which have become a significant concern. Glycemic variability (GV) is a general term that encompasses several measures of short-term and long-term changes in blood glucose levels, which is an integral component of glucose homeostasis, reflecting the dynamic nature of glycemic control. Rapid fluctuations in blood glucose levels in short terms can induce oxidative stress, vascular inflammation, and endothelial dysfunction, potentially leading to organ damage, including kidney dysfunction. Although studies have indicated a strong correlation between elevated postoperative GV and a range of postoperative complications, no previous research has specifically investigated the relationship between postoperative GV and acute kidney disease (AKD). In this study, several methods of modelling postoperative GV were used to examine the association between GV and AKD risk and subtypes of AKD.

Methods We undertook a retrospective study involving a total of 8,090 adult patients from three academic medical centers in Nanjing and Hefei, who underwent cardiac surgery with cardiopulmonary bypass between January 2015 and September 2023. Seven-day postoperative GV was calculated using the standard derivation (SD), coefficient of variation (CV), mean amplitude of glycemic excursion (MAGE), average daily risk range (ADRR), and time out of target range (TOR). The primary focus was on the occurrence of AKD between 8- and 90-day post-

surgery, which was further categorized into persistent AKD and delayed AKD depending on the acute kidney injury (AKI) status in the first 7 days. AKI and AKD were determined based on serum creatinine levels over 0-7 days and 8-90 days, respectively, according to KDIGO criteria. Multivariable time-to-event analysis determined the associations between GV metrics and postoperative outcomes. The relationship between incident AKD and GV measures was assessed using Fine-Gray competing risk models, considering death as a competing risk. The changes in Akaike's Information Criterion (AIC) and deviance were determined to inspect the added explained variance of each additive model in contrast to the baseline model without considering GV.

Results A total of 8,090 patients met the inclusion criteria, with a median age of 63 years, and 41.3% were female. During the 8–90-day postoperative period, 522 patients (6.5%) developed AKD. The incidence of persistent and delayed AKD were 5.4% (N=436) and 1.1% (N=86), respectively. All indices of GV measures were significantly higher in AKD patients compared to their non-AKD counterparts ($p<0.001$ for each metric). After adjusting for relevant covariates, the competing risk models showed that 7-day GV metrics were significantly associated with elevated AKD risk (standardized hazard ratio (sHR): from 1.20 (95% confidence interval (CI): 1.12 - 1.27) for SD, to 1.30 (95% CI: 1.20 - 1.40) for TOR. Various indices demonstrate positive incremental changes in AIC as well as deviance, all with a significant p-value of <0.001, indicating that GV independently contributes to the model fit. All GV measures suggested a potential link between 7-day GV and AKD, primarily driven by persistent AKD (HR: from 1.20 (95% CI: 1.09 - 1.31) for ADRR, to 1.35 (95% CI: 1.23 - 1.48) for TOR). However, standardized HRs for delayed AKD seemed closer to the null hypothesis (HR: from 1.15 (95% CI: 0.92 - 1.43) for TOR, to 1.27 (95% CI: 0.99 - 1.64) for ADRR). Further stratified analyses were conducted based on preoperative diabetes status and intraoperative hemodynamic levels. Non-diabetic patients showed higher effect sizes compared to those with pre-existing diabetes or prediabetes (sHR: from 1.26-1.54 for non-diabetic patients vs. 1.11-1.25 for patients with diabetes and/or prediabetes). When stratified by different mean atrial pressure (MAP) thresholds (≤75, 65, and 55 mmHg) and central venous pressure (CVP) thresholds (≥10, 12, and 16 mmHg), a reduction in time-weighted mean MAP or an increase in time-weight mean CVP did not significantly alter the effect of GV. Finally, optimal cutoff points for each GV metric were estimated by minimizing the p-value of the log-rank test or by maximizing the univariate area under the receiver operating characteristic (AUROC) curve to identify patients susceptible to AKD events (SD: 1.69, CV: 21.98, MAGE: 2.66, ADRR: 5.53, TOR: 9.97).

Conclusions Our findings address a knowledge gap regarding the relationship between postoperative glycemic control and postoperative renal dysfunction. This retrospective study highlights the needs for prospective clinical data addressing the relationship between GV and AKD. It is plausible that there is an association between poor glycemic control and the occurrence of AKD which, if demonstrated, would indicate an important modifiable therapeutic target.

OR-0072

Effect of Controlled Low Central Venous Pressure on Postoperative Acute Kidney Injury in Cardiac Surgery: A Randomized Clinical Trial

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BACKGROUND. Postoperative acute kidney injury (AKI) is a serious complication of cardiac surgery associated with prolonged hospitalization, increased costs and mortality. Venous

congestion during cardiac surgery rather than hypotension is independently associated with the postoperative adverse kidney events, for both AKI within 7 days postoperative and longer-term acute kidney disease (AKD) that develops between 8- and 90-day postoperative window. Central venous pressure (CVP) is used as an indicator to quantify the degree of venous congestion, and high CVP may reflect severe venous congestion, contributing to decreased organ perfusion pressure and negatively affect renal microcirculation. Controlled low central venous pressure (CLCVP) has been widely used in hepatectomy, but there are few studies on its application in cardiac surgery settings. Actively targeting lower CVP levels using fluid restriction, reverse Trendelenburg position, vasodilators and other methods by anesthetics, can significantly reduce major intraoperative bleeding events. This study aimed to determine whether targeting central venous pressure (CVP) readings of ≤10 mm Hg using vasoactive drugs and reverse Trendelenburg position was associated with a lower incidence of AKI than usual care in patients undergoing cardiac surgery requiring cardiopulmonary bypass (CPB).

METHODS. We conducted a randomized controlled trial. Patients were randomized in a 1:1 ratio to receive CLCVP technique or usual care. Approximately 20 minutes post-CPB, the CLCVP technique was initiated, involving the administration of nitroglycerin and adjustment of body position until the conclusion of the surgery. Patients were placed in a reverse Trendelenburg position with the head elevated by 10°. Nitroglycerin was administered incrementally, starting at a dose of 0.25-1 μg/kg/min, with the option to increase by 0.25 μg/kg/min every 3 minutes based on maintaining an acceptable MAP. Standard vasoactive medications such as norepinephrine were administered as needed to ensure a MAP ≥60 mmHg. The control group received standard care without intervention. The primary outcome was incidence of 7 days postoperative AKI defined by the Kidney Disease: Improving Global Outcomes (KDIGO) Clinical Practice Guideline. Secondary outcomes included Stage 2+ AKI, all-cause in-hospital mortality, ICU and hospitalization length of stay, and renal replacement therapy. According to the KDIGO criteria, AKI diagnostic criteria are defined as an absolute increase in serum creatinine (SCr) of ≥0.3 mg/dL (≥26.5 μmol/L) within 48 hours or an increase to 1.5 times baseline within 7 days, or a urine output (UO) of less than 0.5 ml/kg/h for 6 consecutive hours.

RESULTS. A total of 976 patients were assessed for eligibility from 15 May 2023 to 29 November 2023, and 531 underwent randomization, with 266 assigned to CLCVP group and 265 to usual care. 11 patients did not receive surgery and 15 subjects received off-pump coronary artery bypass grafting (CABG), they were not included in the analysis. There were no patients lost to follow-up. Data from 505 eligible subjects were included in the final analysis. Baseline demographic and clinical characteristics including operation types and surgery-related characteristics were similar between groups. Most subjects underwent valve replacement surgery-only, followed by CABG-only and combined CABG-valve procedure. There were fewer patients with postoperative AKI in the CLCVP group (114 [44.9%]) compared with the control group (150 [59.8%]) (Absolute risk reduction (ARR): -14.9%; 95% confidence interval [CI]: (-23.5%, -6.3%); P=0.001). Eight (3.1%) participants in the CLCVP group and 14 (5.6%) participants in the control group developed AKI of Stage 2 and above (ARR: -2.4%; 95% CI: (-6.0, 1.1%); P=0.263). Median time-weighted CVP was lower in the CLCVP group (6.7 mm Hg vs. 8.1 mm Hg, P<0.001). There was no statistically significant difference in mean arterial pressure (MAP) between the two groups. Renal replacement therapy was initiated in a patient from control group and none among patients undergoing CLCVP (0% vs. 0.4%, ARR: -0.4%; 95% CI: (-1.2%, 0.4%); P=0.995). All-cause 30-day mortality was similar between subjects allocated to CLCVP (2/254 [0.8%]) or standard care (4/251 [1.6%]), ARR: -0.7%; 95% CI: (-1.1%, 2.6%); P=0.448. Besides, patients in CLCVP group demonstrated trends towards both shorter ICU and inpatient length of stay. Prespecified subgroup analyses demonstrated comparable rates of primary outcomes between subgroups, consistent with the findings from full analytical set. When UO was included in the definition of AKI, the incidence of AKI was different between the control group and the intervention group, while no significant difference was found in the incidence of AKI between groups when UO was not included.

CONCLUSION. This randomized clinical trial demonstrated that cardiac surgery patients with CLCVP exhibited lower CVP and fewer postoperative kidney injuries compared to those receiving usual care. This justifies advancing to a large multicenter open-label prospective randomized

study to conclusively determine whether the renoprotective effect of CLCVP in cardiac surgery patients correlates with improved long-term renal outcomes compared to usual care.

OR-0073

七氟烷通过细胞外囊泡及脂质代谢促进人宫颈癌细胞的增殖侵袭及迁移能力

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目的 探讨细胞外囊泡和脂质代谢介导七氟烷促宫颈癌增殖、侵袭及迁移的可能机制。
方法 于麻醉诱导前及手术缝合皮肤时采集七氟烷麻醉下行手术治疗的宫颈癌患者静脉血，超速离心法提取血浆源性 EVs 并分别使用透射电镜鉴定其结构特征、纳米颗粒示踪分析（NTA）及 western blot 鉴定。分别采用细胞计数试剂 CCK8 检测 Hela 细胞增殖能力，Transwell 小室检测其侵袭能力，划痕实验检测其迁移能力。运用高分辨液相色谱-质谱（LC-MS）技术获取 Hela 细胞中脂类化合物代谢变化，运用多元统计分析并结合京都基因和基因组百科全书（KEGG）数据库及人类代谢数据库（HMDB）进行脂质组学研究。采用 western blot 检测脂质分子所富集的信号通路上蛋白质变化。
结果 1. CCK8 实验显示，与麻醉前宫颈癌患者血浆源性 EVs（Pre_EVs）相比，七氟烷麻醉后宫颈癌患者血浆源性 EVs（Post_EVs）可使与之共孵育 24 h、48 h 及 72 h 的 Hela 细胞在 450 nm 波长光照下的吸光度显著增加。2. Transwell 实验显示，与 Pre_EVs 相比，Hela 细胞在与 Post_EVs 共孵育 24 h 后，穿过基质胶的细胞数量显著增加。3. 划痕实验显示，与 Pre_EVs 相比，Hela 细胞在与 Post_EVs 共孵育 12 h、24 h 及 48 h 后，划痕附近伤口面积显著缩小。4. LC-MS 显示，经 Post_EVs 共孵育的 Hela 细胞与经 Pre_EVs 共孵育的 Hela 细胞之间，脂质分子的代谢特征在热图中清晰地聚为两大类，并且基于本次实验结果建立正交偏最小二乘判别分析(OPLS-DA)模型，能较为稳健地预测七氟烷麻醉通过宫颈癌患者血浆源性 EVs 对 Hela 细胞中脂质代谢的改变。相比于 Pre_EVs，Post_EVs 使 Hela 细胞中 101 种阳离子模式[ESI（+）]脂质分子的相对表达丰度上调，72 种相对表达丰度下调；而阴离子模式[ESI（-）]下，有 99 种脂质分子相对表达丰度上调，77 种相对表达丰度下调。根据 KEGG 富集分析及 KEGG 通路图，进一步筛选出可能参与差异脂质分子调节 Hela 细胞增殖、侵袭及迁移的潜在功能代谢通路：EGFR 酪氨酸激酶抑制剂耐药性及 NF-κB 信号通路。富集到以上信号通路的脂质分子为 5 个甘油二酯（DG）类化合物。Post_EVs 组中 DG 的相对表达丰度显著高于 Pre_EVs 组。Hela 细胞中 DG 的相对表达丰度与七氟烷诱导的 Hela 细胞的增殖、侵袭及迁移具有正相关。此外，蛋白印记分析显示，相比于 Pre_EVs 组，Post_EVs 组中 EGFR、PKCα 以及 NF-κB p65 分子被显著激活。
结论 1. 七氟烷通过宫颈癌患者血浆源性 EVs 途径增强 Hela 细胞增殖、侵袭及迁移能力。2. Hela 细胞中 DG 的相对表达丰度与七氟烷的促细胞恶性生物学行为呈正相关。3. 七氟烷通过宫颈癌患者血浆源性 EVs 途径激活 Hela 细胞中 EGFR、PKCα 及 NF-κB p65 分子可能是 DG 参与七氟烷促进 Hela 细胞恶性生物学行为的潜在机制之一。

OR-0074

Copper and Cuproptosis-Related Genes in Hepatocellular Carcinoma: Therapeutic Biomarkers Targeting Tumor Immune Microenvironment and Immune Checkpoints

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Background Hepatocellular carcinoma (HCC) is one of the most common cancers worldwide, and has a high immune heterogeneity and mortality. Emerging studies suggest that copper (Cu) plays a key role in cell survival. However, the relationship between Cu and tumor development remains unclear.
Methods We explored the effects of Cu and cuproptosis-related genes (CRGs) in patients with HCC in the TCGA-LIHC (The Cancer Genome Atlas-Liver cancer, n = 347) and ICGC-LIRI-JP (International Cancer Genome Consortium-Liver Cancer-Riken-Japan, n = 203) datasets. Prognostic genes were identified by survival analysis, and a least absolute shrinkage and selection operator (Lasso) regression model was constructed from the prognostic genes in the two datasets. Next, the differentially expressed genes (DEGs) and signal pathways enrichment were analyzed. Moreover, the effects of CRGs in tumor immune cell infiltration, co-expression with immune checkpoint genes (ICGs), and validation in different tumor immune microenvironment (TIM) were performed. Finally, validation using clinical samples and a nomogram for predicting prognosis of patients with HCC were conducted.
Results A total of 59 CRGs were included for analysis, and 15 genes that significantly influenced the survival of patients in the two datasets were identified. Patients were grouped by risk score, and pathway enrichment analysis suggested that immune-related pathways were substantially enriched in both datasets. Tumor immune cell infiltration analysis and clinical validation revealed that PRNP (Prion protein), SNCA (Synuclein alpha), and COX17 (Cytochrome c oxidase copper chaperone COX17) may be closely correlated with immune cell infiltration and ICGs expression. A nomogram was established to predict the prognosis of patients with HCC using the patient characteristics and risk score.
Conclusion CRGs may regulate the development of HCC by targeting the TIM and ICGs. CRGs such as PRNP, SNCA and COX17 could be promising targets for HCC immune therapy in the future.

壁报交流

PO-0001

Propofol inhibits oxidative stress-induced neuronal ferroptosis and promotes neural remodeling through the AMPK/SIRT1/PGC-1α axis.

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Objective Propofol is a fast and potent sedative anesthetic drug widely used in clinical practice, and studies have shown that propofol exerts a protective effect on neuronal cells. Injury to neuronal cells by oxidative stress can lead to neuronal cell ferroptosis. Mitochondrial quality control and energy metabolism regulation play important roles in the process of ferroptosis. In this study, we aimed to investigate the mechanism by which propofol inhibits neuronal cell ferroptosis and promotes synaptic plasticity by mitochondrial energy regulation.
Methods We first treated HT22 cells with different concentrations of RSL3, followed by propofol treatment, and then detected the levels of ROS by immunofluorescence. Western blotting and RT-qPCR were used to detect the expression levels of the ferroptosis-related genes GPX4, SLC7A11, COX-2, ACSL4, NRF2, and FTH1 as well as the mitochondrial energy regulation-related genes AMPK, SIRT1, and PGC-1α. Subsequently, after treating HT22 cells with RSL3, HT22 cells were treated with an inhibitor of SIRT1, and then propofol was added. The level of ROS was detected by immunofluorescence, the level of $Fe^{2+}$was detected by colorimetric assay. The expression levels of the mitochondrial energy regulation-related genes, AMPK, SIRT1 and PGC-1α, and the synaptic plasticity-related genes SYN1 and PSD-95, were detected by western blot and RT-qPCR. The localization and expression of SYN1 and PSD-95 were detected by immunofluorescence.
Results In the RSL3-Low+propofol group, propofol treatment significantly down-regulated the expression levels of ROS, COX-2 and ACSL4, and significantly increased the expression levels of GPX4, SLC7A11, NRF2, FTH1, AMPK, SIRT1 and PGC-1α in comparison with the mock goup and the RSL3-High+propofol group.In the Selisistat+propofol group, the levels of ROS and Fe^{2+} were significantly higher than in the propofol group,SIRT1 and PGC-1α expression levels were significantly down-regulated compared to the mock group and the propofol group. In the propofol group, the expression levels of AMPK, SIRT1, PGC-1α, SYN1 and PSD-95 were significantly up-regulated compared to the mock group and the Selisistat+propofol group.
Conclusion Propofol inhibits oxidative stress-induced neuronal cell ferroptosis and promotes synaptic plasticity via the AMPK/SIRT1/PGC-1α axis.

PO-0002

Activating astrocytic α2A adrenoceptors in hippocampus reduces glutamate toxicity to attenuate sepsis-associated encephalopathy in mice

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Background Glutamate metabolism disorder is an important mechanism of sepsis-associated encephalopathy (SAE). Astrocytes regulate glutamate metabolism. In septic mice, α2A adrenoceptor (α2A-AR) activation in the central nervous system provides neuroprotection. α2A-ARs are expressed abundantly in hippocampal astrocytes. This study was performed to determine whether hippocampal astrocytic α2A-AR activation confers neuroprotection against

SAE and whether this protective effect is astrocyte specific and achieved by the modulation of glutamate metabolism.
Methods Male C57BL/6 mice with and without α2A-AR knockdown were subjected to cecal ligation and puncture (CLP). They were treated with intrahippocampal guanfacine (an α2A-AR agonist) or intraperitoneal dexmedetomidine in the presence or absence of dihydrokainic acid [DHK; a glutamate transporter 1 (GLT-1) antagonist] and/or UCPH-101 [a glutamate/aspartate transporter (GLAST) antagonist]. Hippocampal tissue was collected for the measurement of astrocyte reactivity, GLT-1 and GLAST expression, and glutamate receptor subunit 2B (GluN2B) phosphorylation. Invivo real-time extracellular glutamate concentrations in the hippocampus were measured by ultra-performance liquid chromatography tandem mass spectrometry combined with microdialysis, and in vivo real-time hippocampal glutamatergic neuron excitability was assessed by calcium imaging. The mice were subjected to the Barnes maze and fear conditioning tests to assess their learning and memory. Golgi staining was performed to assess changes in the hippocampal synaptic structure. In vitro, primary astrocytes with and without α2A-AR knockdown were stimulated with lipopolysaccharide (LPS) and treated with guanfacine or dexmedetomidine in the presence or absence of 8-bromo- cyclic adenosine monophosphate (8-Br-cAMP, a cAMP analog). LPS-treated primary and BV2 microglia were also treated with guanfacine or dexmedetomidine. Astrocyte reactivity, PKA catalytic subunit, GLT-1 an GLAST expression were determined in primary astrocytes. Interleukin-1β, interleukin-6 and tumor necrosis factor-alpha in the medium of microglia culture were measured.
Results CLP induced synaptic injury, impaired neurocognitive function, increased astrocyte reactivity and reduced GLT-1 and GLAST expression in the hippocampus of mice. The extracellular glutamate concentration, phosphorylation of GluN2B at Tyr-1472 and glutamatergic neuron excitability in the hippocampus were increased in the hippocampus of septic mice. Intraperitoneal dexmedetomidine or intrahippocampal guanfacine administration attenuated these effects. Hippocampal astrocytes expressed abundant α2A-ARs; expression was also detected in neurons but not microglia. Specific knockdown of α2A-ARs in hippocampal astrocytes and simultaneous intrahippocampal DHK and UCPH-101 administration blocked the neuroprotective effects of dexmedetomidine and guanfacine. Intrahippocampal administration of DHK or UCPH-101 alone had no such effect. In vitro, guanfacine or dexmedetomidine inhibited astrocyte reactivity, reduced PKA catalytic subunit expression, and increased GLT-1 and GLAST expression in primary astrocytes but not in primary astrocytes that received α2A-AR knockdown or were treated with 8-Br-cAMP. Guanfacine or dexmedetomidine inhibited microglial reactivity in BV2 but not primary microglia.
Conclusions Our results suggest that neurocognitive protection against SAE after hippocampal α2A-AR activation is astrocyte specific. This protection may involve the inhibition of astrocyte reactivity and alleviation of glutamate neurotoxicity, thereby reducing synaptic injury. The cAMP/protein kinase A (PKA) signaling pathway is a potential cellular mechanism by which activating α2A-AR modulates astrocytic function.

PO-0003

缺血性脑卒中半暗带突触丢失机制及功能保护研究

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目的 观察缺血性脑卒中（Ischemic stroke，IS）后小胶质细胞与突触丢失之间的关系， 探究小胶质细胞通过何种机制影响神经突触，靶向调控小胶质细胞改善卒中后神经功能障碍；针对缺血性脑卒中代谢微环境中乳酸、氧自由基堆积，开发调控乳酸、氧自由基的双靶点材料，验证改善微环境的神经保护作用及机制。

方法 首先，建立小鼠局灶性脑缺血再灌注模型，通过立体定位注射特异性标记不同类型突触、免疫荧光染色、3D 成像，观察造模后神经突触变化以及小胶质细胞对不同类型突触的作用；随后采用药理性耗竭小胶质细胞的方法，进行行为学及突触染色，观察 IS 小胶质细胞的作用。分选小胶质细胞进行转录组测序，对筛选出来的关键基因（Clec7a），首先在体外调控小胶质细胞 Clec7a 表达，将其突触体与小胶质细胞共培养；随后构建小胶质细胞特异性敲除 Clec7a 的转基因小鼠（Clec7aiΔMG），采用磁共振、TTC、免疫荧光、3D 成像、行为学检测等，观察梗死体积、神经突触、小胶质细胞吞噬突触、神经功能的变化明确特异性敲除小胶质细胞 Clec7a 能否通过抑制突触丢失改善卒中梗死体积及神经功能。最后，采用免疫荧光、分子模拟、分子对接、免疫共沉淀、质谱，明确 MD2 为 Clec7a 识别突触的配体，并采用原代培养特异性敲除 Clec7a 的小胶质细胞，在体外将其与 MD2-/-转基因小鼠的突触体共培养，进一步明确 Clec7a-MD2 调控小胶质细胞吞噬突触。

在第一部分我们明确了突触功能障碍在 IS 中的关键作用，而突触是大脑中主要能量消耗部位，缺血性脑卒中后糖代谢异常、乳酸堆积、氧自由基增加损伤神经元及突触功能，因此我们构建了能特异性降解乳酸和氧自由基的多酶纳米材料--GLC-NGs。首先验证了 GLC-NGs 在体外降解乳酸和氧自由基的效果。在体内研究中，注射不同浓度的 GLC-NGs 治疗缺血性脑卒中，采用磁共振、神经功能相关行为学筛选最佳剂量的 GLC-NGs；随后通过脑血流检测、神经功能学评分、TTC 染色、尼氏染色和 H&E 染色等方法对比了 GLC-NGs 与临床常用的神经保护剂--依达拉奉（Edar）对梗死体积、神经功能的作用。采用免疫荧光、流式细胞术、RT-PCR 探究 GLC-NGs 与 Edar 对氧自由基的清除作用，采用微透析、磁共振波谱成像、Elisa 对比 GLC-NGs 与 Edar 对乳酸的清除作用。最后采用乳酸化组学探究乳酸在缺血性脑卒中发挥的作用，进一步明确 GLC-NGs 诱导神经保护的机制。

结果 IS 后小鼠运动感觉及远期认知功能受损，小鼠小胶质细胞活化、吞噬兴奋性突触增加，介导突触丢失。集落刺激因子 1 受体抑制剂 PLX5622 耗竭小鼠脑内小胶质细胞可显著改善中风后小鼠受损的运动、感觉及远期认知功能，减小梗死体积、改善神经功能。通过分选小胶质细胞后行转录组测序，发现 Clec7a 在小胶质细胞吞噬突触中发挥关键作用；体外过表达 BV2 细胞 Clec7a 促进其吞噬突触，体外敲低 BV2 细胞 Clec7a 抑制其吞噬突触。Clec7aiΔMG 造模后小鼠梗死体积减小、运动感觉及远期认知功能改善，小胶质细胞吞噬神经突触减少、突触数量增加。同时还发现 MD2 与神经突触存在共定位，免疫共沉淀及质谱结果均显示 Clec7a 与 MD2 存在相互作用，Clec7aiΔMG 小胶质细胞吞噬突触减少，MD2-/-突触体被小胶质细胞吞噬数量减少，提示 Clec7a 可能通过识别 MD2 发挥吞噬神经突触的功能。

缺血性脑卒中后出现乳酸堆积、氧自由基增加。GLC-NGs 在体外可以有效的降解乳酸和氧自由基。根据不同浓度 GLC-NGs 治疗的结果，选择 2.5 mg/Kg 的剂量。GLC-NGs 可以显著减小缺血性脑卒中梗死体积，改善感觉、运动及认知功能，提高卒中后远期生存率；且其效果显著优于 Edar。机制研究发现，GLC-NGs 与 Edar 均能降低氧自由基，改善 DNA 损伤、脂质氧化损伤，抑制小胶质细胞介导的炎症反应；此外 GLC-NGs 能降解卒中后升高的乳酸水平，蛋白组的结果提示卒中后乳酸化关键酶—Crebbp/p300 表达下调，乳酸化组学的结果也提示，GLC-NGs 通过降解乳酸调控突触功能、挽救卒中后突触丢失，可能是 GLC-NGs 效果优于 Edar 的机制。

结论 1. 小胶质细胞通过吞噬介导缺血性脑卒中后突触丢失。

2. 小胶质细胞通过其表面 Clec7a 识别突触 MD2 发挥吞噬突触的作用。

3. 敲除小胶质细胞 Clec7a 可以抑制其吞噬突触，恢复突触数量，减小梗死体积，改善神经功能。

4. IS 乳酸、氧自由基堆积，伴随 DNA 氧化损伤、脂质氧化损伤、炎症反应激活、Crebbp 蛋白表达下调、突触乳酸化修饰异常、突触丢失。GLC-NGs 可以降解乳酸、氧自由基，逆转上述异常改变，减少梗死灶的体积，同时能够明显改善缺血性卒中后的神经功能。

PO-0004

硬膜外泵注利多卡因对改善慢性肾病大鼠肾功能恶化和纤维化的机制研究

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目的 目前已有许多研究证实，慢性肾病（CKD）患者的交感神经兴奋过度增高。交感神经兴奋可加快患者心率、增加心输出量，使患者的心脏容量负荷增加，同时激活肾素－血管紧张素－醛固酮系统，最终引起血压升高。交感神经也可直接作用于肾脏引起血压升高。持续的高血压可使肾小球毛细血管压力升高，导致肾小球硬化，导致 CKD 患者肾功能进行性恶化。肾交感神经兴奋性增高还可引起氧自由基、炎性介质、细胞因子水平升高，一方面引发心血管并发症，使肾灌注进一步减少，肾功降低，钠水潴留，加重水肿；另一方面可促进肾小球系膜增生，加剧肾纤维化或肾小球硬化，进而加速肾功的减退。因此，有效抑制交感神经过度兴奋是延缓慢性肾功能不全病程进展的关键。临床实践和实验室研究的证据显示，通过去除传入神经和交感神经实现的肾动脉去交感神经支配术对改善慢性肾脏疾病(CKD)患者的肾功能和降低高血压具有良好的治疗作用。硬膜外麻醉被认为可以完全阻滞目标节段的交感神经。基于这一观点，我们假设利多卡因硬膜外阻滞可以改善 CKD 大鼠的肾功能恶化。

方法 将体重 250 ~ 300g 的 Sprague-Dawley 雄性大鼠随机分为 4 组:对照组、CKD 组、CKD+假手术组和 CKD+利多卡因硬膜外阻滞组。通过切除大鼠的左肾下、上三分之一和右肾，诱导形成 CKD 大鼠模型。CKD 大鼠和对照组大鼠在肾脏功能、肾脏组织病理学和交感神经激活方面存在明显的差异。这些指标符合 CKD 大鼠的典型表型。对 CKD+利多卡因硬膜外阻滞组给予持续一周泵注 0.8%利多卡因。

结果 利多卡因硬膜外阻滞可改善肾功能及组织病理损伤，包括间质纤维化和细胞凋亡，完全或部分逆转肾功能和心血管指标的异常。

结论 利多卡因硬膜外阻滞可能通过降低 CKD 大鼠的肾区及其他靶器官的交感神经活动而起到肾保护作用。在动物模型上探索硬膜外阻滞治疗慢性肾功能不全的效果和机制有重要的理论创新和实践意义。

PO-0005

Heme oxygenase-1 attenuates endotoxin-induced acute lung injury by suppressing macrophage pyroptosis via inhibiting ZBP1/NLRP3 pathway

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目的 Heme oxygenase-1 (HO-1) has been found to have anti-inflammatory and antioxidative properties, aiding in the restoration of homeostasis in various pathological conditions. The function of HO-1 in LPS-induced ZBP1/NLRP3 activation, leading to alveolar macrophage pyroptosis, is yet to be explored.

方法 The study used WT and HO-1 knockout mice to investigate the role of HO-1 in LPS-induced acute lung injury (ALI). Lung tissues were analyzed using Western blot and immunofluorescence

staining to quantify the expression of NLRP3, caspase-1, and GSDMD. Alveolar macrophages were isolated to determine their involvement in NLRP3 activity.
结果 HO-1 alleviated LPS-induced lung injury, as evidenced by decreased pathological alterations in lung tissues and improved survival rates in WT mice compared to HO-1 knockout mice. HO-1 deficiency led to an increase in NLRP3-mediated pyroptosis in both in vivo and in vitro models. The ZBP1/NLRP3 pathway was activated in HO-1-mediated macrophage pyroptosis. The secretion of IL-1β and IL-18 was elevated in LPS-primed cells, and the expression of ZBP1, NLRP3, caspase-1, and GSDMD-N was increased in HO-1 knockout mice.
结论 HO-1 plays a significant role in mitigating sepsis-induced ALI. It modulates macrophage pyroptosis by inhibiting the ZBP1/NLRP3 signaling pathway. These findings suggest that targeting this pathway could be a potential therapeutic strategy for ALI treatment.

PO-0006

环泊酚激活胆碱能抗炎通路对脓毒症大鼠心肌组织的保护作用研究

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目的 胆碱能抗炎通路是一种神经内分泌抗炎通路，通过迷走神经来抑制炎症的发展, 它将中枢神经系统与免疫系统相连, 在调控炎症中起关键性的作用。本实验主要研究环泊酚激活胆碱能抗炎通路对脓毒症大鼠心肌组织的保护。
方法 1.清洁级雄性 SD 大鼠脓毒症模型的建立：采用同种系鼠 60 只随机分为三组。在腹腔注射戊巴比妥钠麻醉后备皮，假手术组只结扎阑尾后关腹，不行其他处理。其余两组采用盲肠结扎穿孔法（CLP)来制作大鼠脓毒症模型。
2.脓毒症模型术后药物处理：药物组：环泊酚在脓毒症模型术后即刻采取尾静脉注射 5 分钟内缓慢微量泵注完。假手术组和不给药物处理的脓毒症模型组术后腹腔注射林格氏液 5ml/100g 补液。术后不符合标准的剔除。并记录每组大鼠的生存质量和生存率。
3.不同实验组在术后的 6 小时和 12 小时的脑尿钠肽（BNP）和高迁移率族蛋白 B1(HMGB1)的表达：在术后 6 小时和 12 小时各处死每个实验组一半大鼠即刻开腹取血。提取血浆用来做酶联免疫吸附试验(ELISA)测定 BNP 和 HMGB1 的表达情况。
4.观察心肌组织 HE 染色病理切片：12h 时间点处死剩下的大鼠，取左心室组织，甲醛固定，石蜡包埋，切片，HE 染色，光学显微镜下观察组织病理学结果。
结果 1.大鼠死亡率：假手术组大鼠没发生死亡。脓毒症模型组大鼠死亡率为 20%，明显高于环泊酚组为 10%。说明环泊酚组可提高脓毒症的生存率。
2.各组 HGMB1 的表达：脓毒症模型组术后 6h 和 12hHGMB1 表达均明显高于假手术组且有显著差异(P<0.05)，环泊酚组术后 6 小时和 12 小时的 HGMB1 表达水平均显著低于脓毒症模型（P<0.05)。并且术后 12 小时的 HGMB1 均高于 6 小时的表达水平(P<0.05)。
3. 各组的 BNP 表达：脓毒症模型术后 6h 的 BNP 表达水平均高于假手术组(P>0.05）,但无明显差异。脓毒症模型术后 12h 各组的 BNP 表达有明显的差异(P<0.05)，且均高于假手术组。环泊酚组的 12hBNP 表达水平明显低于脓毒症模型组(P<0.05)。
4.脓毒症大鼠心肌的 HE 染色：假手术组的心肌组织的病理结构未见改变，组织结构正常。脓毒症模型组的心肌组织可见血管充血水肿并有少量炎性细胞浸润，环泊酚组较脓毒症模型组的有所改善。
结论 1. 环泊酚可减轻脓毒症大鼠的全身炎症反应，降低大鼠的死亡率。
2. 环泊酚对脓毒症大鼠炎性因子所致的心肌损伤具有明显的保护作用。

PO-0007

CLUH 调控 PINK1/Parkin 介导的线粒体自噬加重脓毒症急性肺损伤

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目的 由于脓毒症严重危害人类健康，随着社会经济的长足进步反而还有不断恶化的势头，因此被 WHO 列为全球优先关注的卫生问题。多器官功能障碍是脓毒症的突出特点，急性肺损伤（acute lung injury, ALI）是其中最常见的并发症，超过 40%的患者还会发展成急性呼吸窘迫综合征，是脓毒症高致死率的最重要原因。但由于脓毒症 ALI 的机制尚未完全阐明、治疗手段也相对有限，是导致患者预后差的主要原因。本研究的目的在于阐释脓毒症 ALI 的发病机制，寻找到有临床意义的干预靶点。
方法 分别通过盲肠结扎穿孔（CLP）构建小鼠脓毒症模型（在体）以及小鼠肺微血管内皮细胞 LPS 刺激模型（离体），采用免疫荧光共定位、流式细胞技术、透射电镜、siRNA 干扰和腺病毒转染过表达等技术。
结果 通过在体免疫荧光共定位、离体流式细胞技术等，发现焦亡是脓毒症时肺血管内皮细胞的主要损伤形式。随后通过构建小鼠 CLP 脓毒症模型，对肺组织切片进行活化 NLRP3 炎性小体和内皮细胞的免疫荧光共定位实验，发现肺血管内皮中有大量 NLRP 炎性小体活化；当给予抑制剂降低 NLRP3 炎性小体的活化程度之后，血管内皮细胞的存活数量明显回升，伴随着肺部病理损伤减轻、肺水减少、肺部屏障功能恢复、肺部炎症缓解等，从而证实了 NLPR3 炎性小体大量活化是导致脓毒症时肺血管内皮焦亡的主要原因。然后离体实验中使用线粒体自噬功能的激动剂，发现在破损线粒体减少的同时，NLRP3 炎性小体的活化程度降低；在体实验也发现使用线粒体自噬激动剂后肺部 caspase-1 表达减少，肺部炎症有所缓解，表明脓毒症时，肺血管内皮细胞中线粒体自噬功能下降是导致 NLRP3 炎性小体大量活化的主要因素。最后，通过生物信息学分析及离体实验验证，发现 RNA 结合蛋白 CLUH 通过 PINK1/Parkin 信号通路调控线粒体自噬功能，进而影响 NLRP3 炎性小体活化，最终导致肺血管内皮细胞焦亡、脓毒症 ALI 发生。
结论 脓毒症抑制了 RNA 结合蛋白 CLUH 的表达，后者表达下调抑制了 PINK1/Parkin 通路介导的线粒体自噬功能，进而促进 NLRP3 炎性小体活化，导致肺血管内皮细胞焦亡并最终引发 ALI。

PO-0008

Astrocytic NLRP3 cKO protects against mild TBI-induced depression-like behaviors in mice via immunologically silent apoptosis

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Background Reports indicate that depression is a common mental health issue following traumatic brain injury (TBI). In a prior study, we identified that astrocytic NLRP3 mediated pyroptosis-induced emotional changes in a mouse model of hemorrhagic shock and resuscitation (HSR). However, there is limited understanding of the potential of astrocytic NLRP3 in treating depression under TBI condition. This study aimed to determine whether astrocytic

NLRP3 knockout (KO) could mitigate depressive-like behaviors following TBI and explore potential variations in such behaviors between genders post-TBI.
Methods Feeney's weight-drop experiment induced mild TBI in mice. We assessed behavioral and pathological changes at 24 h, 7, 30, 31, and 32 d post-TBI using neurological severity scores (NSS), social interaction test (SI), tail suspension test (TST), forced swimming test (FST), immunofluorescence assays, and local field potential (LFP) recordings.
Results Our findings indicated that astrocyte-specific NLRP3 KO increased cleaved caspase-1, co-localized with astrocytes, activated A1-type astrocytes, M1-type microglia, and significantly alleviated TBI-induced depression-like behaviors. It also led to the upregulation of A2-type astrocytes and apoptosis-associated factors, including cleaved caspase-3 post-TBI. Additionally, our results suggested that astrocyte-specific NLRP3 deletion might mitigate synaptic atrophy in LH, CA1, and NAc, resulting in improved θ-γ phase coupling in the social interaction test (SI). Moreover, consistent with previous research, our findings highlighted the neuroprotective potential of astrocyte-specific NLRP3 deletion through the activation of caspase-3 in mice. Notably, under TBI conditions, astrocyte-specific NLRP3 exhibited greater neuroprotective effects in female knockout mice compared to males.
Conclusion Astrocyte NLRP3 knockout demonstrated a protective mechanism in mice subjected to mild TBI, possibly attributed to the inhibition of pyroptosis through the NLRP3-cleaved caspase-1 signaling pathway in astrocytes, along with the activation of immunologically silent apoptosis triggered by the caspase cascade.

PO-0009

Cordycepin covalently binds NLRP3 and inhibits RIPK1/RIPK3 mediated necroptosis in sepsis-associated acute lung injury

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Background Sepsis, which is deemed as a systemic inflammation reaction syndrome in the face of infectious stimuli, is the primary cause of death in ICUs. Sepsis-induced acute lung injury (ALI) is a common acute and critical illness in clinic. According to statistics, there are about 3 million patients with sepsis-induced acute lung injury in the world every year. The case fatality rate of sepsis-induced acute lung injury is as high as 35%-46%, and the case fatality rate of severe ARDS in novel coronavirus pneumonia is as high as 59.3%. Due to the complex pathogenesis of sepsis, there is no specific method for western medicine to treat sepsis, the antibiotics and supportive treatment are still the main treatment.
Cordycepin is recognized by its beneficial roles in terms of the anti-inflammatory, antioxidant and anti-tumor activitie, regulating signaling pathways such as NF-κB, RIP2/Caspase-1, TGF-β/Smads and Nrf2/HO-1. Recent studies have shown that cordyceps can inhibit M1/M2 macrophage polarization through NF-κB/p65, and alleviate lung injury and immune deficiency in endotoxin mice. However, the treatment efficacy and potential causal links of cordycepin in sepsis-induced acute lung injury are still elusive.
Methods By virtue of the STITCH database, we identified the targets of cordycepin. Differentially expressed genes in sepsis-induced acute lung injury were acquired from the GEO database. The PPI network of intersected targets was established. GO and KEGG pathway enrichment analysis was completed. Hub genes were analyzed by cytoHubba plug-in. In the process of experimental validation, a mouse sepsis model was established by lipopolysaccharide (LPS), and the treated mice were intraperitoneally injected with cordycepin 60 min prior to LPS injections. Survival conditions, lung functions and antioxidant levels of the mice were assessed. The inflammation

and injury were detected by HE and TUNEL. The levels of key genes and signal pathway expression were analyzed by RT-PCR and Western blot.
Results Through the network pharmacology molecular docking technology, using the "Multi-target-single ligand" docking mode according to space and energy matching, small molecular compounds and biological macromolecules are mutually recognized to form molecular complexes, and it is predicted that NLRP3 can directly bind with cordycepin, which is a potential target of cordycepin. RIPK1/RIPK3 mediated necroptosis were identified as the main regulatory pathway of cordycepin. In vivo researches unraveled that cordycepin can improve the survival rate and lung function of LPS-treated mice, inhibit inflammatory factors, and regulate the expression of key therapeutic targets and key pathway.
Conclusion Network pharmacological method offers a predicative strategy to explore the treatment efficacy and causal links of cordycepin in sepsis-associated acute lung injury. Through experimental verification, we discover that cordycepin can reduce sepsis-associated acute lung injury by covalently bindiing NLRP3 and TRIF/RIPK3 mediated necroptosis. Our research might offer a novel treatment method for improving sepsis-induced acute lung injury.

PO-0010

血管紧张素受体拮抗剂在脓毒症相关性急性肾损伤中的作用

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目的 评价血管紧张素受体拮抗剂对脓毒症相关性急性肾损伤的作用及其与线粒体功能之间的关系
方法 一、对 MIMIC-IV v2.2 数据库进行分析，将 SA-AKI 患者分为 ARB 使用组（n=832）及未使用 ARB 组（n=12502），回顾性研究 SA-AKI 患者死亡率与 ARB 类药物使用的关系。
二、探讨不同时间点脓毒症小鼠肾组织中 AT1R 和 PINK1、Parkin 表达的关系。将小鼠分为假手术（Sham）组（n=12）和脓毒症相关性急性肾损伤（SA-AKI）组（n=48），利用 CLP 法制备脓毒症小鼠模型，检测 CLP 后 24h 内不同时间点小鼠肾组织中 AT1R 及 PINK1，Parkin 的表达情况。
三、以氯沙坦为例探讨 ARB 对脓毒症小鼠急性肾损伤的作用及其与线粒体功能的关系。将小鼠分为假手术（Sham）组，假手术+氯沙坦（Sham+LOS）组，脓毒症相关性急性肾损伤（SA-AKI）组和脓毒症相关性急性肾损伤+氯沙坦（SA-AKI+LOS）组（n=32）。于 CLP 造模前，连续 3d 给予 Sham+LOS 组及 SA-AKI+LOS 组小鼠腹腔注射氯沙坦 5mg/kg，于造模或假手术后 18h 检测各组小鼠炎症因子，肾功能，肾组织病理学损伤，肾组织线粒体形态与功能，线粒体自噬及线粒体动力学相关蛋白的表达情况，观察小鼠生存情况。
结果 一、相较于未使用 ARB 组，ARB 使用组患者 CRRT 使用率，ICU 停留时间，院内死亡率，28 天死亡率及 90 天死亡率均较低（P<0.05），中位生存时间更长（P<0.05）。
二、与 Sham 组相比，小鼠肾组织中 AT1R 表达下调，PINK1 和 Parkin 表达均上调，在 CLP 后 18h 时，AT1R 表达一过性升高（P<0.05），PINK1 和 Parkin 表达有一过性下调（P<0.05）。
三、氯沙坦可以明显改善脓毒症小鼠生存率（P<0.05），降低其血清炎症因子（P<0.05），改善小鼠肾组织病理学损伤及肾功能（P<0.05），改善小鼠肾组织线粒体形态与功能（P<0.05），增加脓毒症小鼠肾组织线粒体自噬与融合相关蛋白表达（P<0.05），减少线粒体分裂相关蛋白表达（P<0.05）。
结论 血管紧张素受体拮抗剂可以降低 SA-AKI 患者死亡率，氯沙坦可以降低脓毒症小鼠死亡率，改善其肾损伤，机制可能与促进线粒体自噬，抑制线粒体分裂及促进线粒体融合有关。

PO-0011

Remimazolam ameliorates ventilator-induced lung injury by restoring mitochondrial dynamics balance via PINK1/HO-1 pathway

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Background Remimazolam, a novel benzodiazepine sedative, offers advantages of a short-acting profile and lack of accumulation, rendering it a potential therapeutic option for long-term sedation in mechanically ventilated patients. Oxidative stress and mitochondrial dysfunction contribute to the pathogenesis of acute lung injury (ALI) and ventilator-induced lung injury (VILI). This study aimed to investigate the therapeutic effects of remimazolam in VILI and elucidate the underlying mechanisms.
Methods An in vivo VILI model was established by high tidal volume ventilation in wild-type and heme oxygenase-1 (HO-1) conditional knockout mice. Lung injury, oxidative stress, mitochondrial dynamics, and apoptosis were evaluated in lung tissues. Cyclic stretch (CS) was employed in the A549 cell line to mimic VILI in vitro. PTEN-induced putative kinase 1 (PINK1) downregulation was achieved through siRNA transfection. Hemin, an HO-1 inducer, was administered to induce HO-1 in A549 cells. Remimazolam was administered in vivo and in vitro to determine its therapeutic effect. Intermolecular interactions were preliminarily explored through co-immunoprecipitation (CoIP) and immunofluorescence.
Results Remimazolam therapy significantly alleviated mechanical strain-induced pulmonary oxidative stress, apoptosis, and imbalanced mitochondrial dynamics by modulating the uncontrolled fusion-fission processes. Genetic ablation of either HO-1 or PINK1 significantly blunted the protective effects of remimazolam. HO-1 colocalized and interacted with PINK1 in A549 cells. Furthermore, the HO-1 inducer hemin failed to fully restore VILI and mitochondrial dynamics alterations caused by PINK1 deficiency, despite remimazolam treatment.
Conclusions Remimazolam administration significantly ameliorated VILI by regulating oxidative stress and restoring the equilibrium of mitochondrial dynamics through the PINK1/HO-1 signaling pathway, suggesting that the sedative remimazolam represents a prospective therapeutic strategy for ALI/VILI.

PO-0012

短链脂肪酸改善脓毒症脑病小鼠认知功能障碍的转录组分析及相关机制研究

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目的 通过转录组学测序分析 SCFAs 改善脓毒症脑病小鼠认知功能障碍的可能作用机制
方法 雄性 SPF 级 C57BL/6 小鼠 60 只，8-12 周龄，体重 20-25g，随机将小鼠分为 3 组（n=20）：脓毒症组（CLP 组）、短链脂肪酸+脓毒症组（SCFAs+CLP 组）、假手术组（Sham 组）。SCFAs 治疗方案：在 CLP 造模前 14 天，在饮用水中添加 67.5mM 乙酸盐、40mM 丁酸盐、25.9mM 丙酸盐，并持续至 CLP 术后 14 天，采用经典的盲肠结扎穿孔手术来模拟脓毒症模型。分别于术后第 4、7、14 天每组取 5 只小鼠行 Y 迷宫实验。术后第 14 天取 CLP 组和（SCFAs+CLP）

组（n=4）小鼠脑组织进行转录组测序，利用 GO 数据库、KEGG 数据库进行富集分析。最后每组处死 5 只小鼠取脑组织采用 Western blot 实验验证测序结果。
结果 模型组与 Sham 组相比，CLP 组的小鼠术后第 4、7、14 天进入新异臂的次数和停留时间减少（P<0.05）；治疗干预组与 CLP 组相比，SCFAs+CLP 组的小鼠术后第 4、7、14 天进入新异臂的次数和停留时间增加（P<0.05）。转录组分析：SCFAs+CLP 组与 CLP 组相比，共筛选出 438 个显著的 DEGs，其中 175 个基因表达显著上调，263 个基因表达显著下调。模型组与 Sham 组相比，CLP 组小鼠脑组织的 GABRR2 蛋白表达增加（P<0.05）；治疗干预组与 CLP 组相比，SCFAs+CLP 组小鼠脑组织的 GABRR2 蛋白表达减少（P<0.05）； Sham 组和 SCFAs+CLP 组两组间的各项指标表达无差异（P>0.05）。
结论 转录组测序分析发现 SCFAs+CLP 组与 CLP 组相比，共筛选出 438 个显著的 DEGs，其中 175 个显著表达上调基因，263 个显著表达下调基因；SCFAs 可改善脓毒症脑病小鼠认知功能障碍，INSL5、P2RX2、C5AR1、IAPP 等基因与小鼠脓毒症脑病发展相关，为疾病治疗方向提供新思路；SCFAs 可能通过调节 GABRR2 蛋白表达从而改善 SAE 小鼠认知功能

PO-0013

肥胖背景下肺内 GFI1 升高抑制 ACOD1 表达加重 LPS 诱导的急性肺损伤

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目的 肥胖作为日益加剧的全球健康问题，严重威胁人类健康。研究显示，肥胖可加重急性肺损伤和急性呼吸窘迫综合征的炎症反应，但其机制尚不明确。顺乌头酸脱羧酶（ACOD1）是一种三羧酸循环相关酶，主要存在于巨噬细胞线粒体中，其催化产物衣康酸能抑制巨噬细胞的促炎表型。我们的测序结果显示肥胖小鼠肺组织内 ACOD1 的 mRNA 较正常小鼠明显降低。而研究显示 ACOD1 的表达可能受到多个转录因子的调控。在肥胖背景下 ACOD1 表达变化是否与肺损伤有关尚不清楚。
方法 小鼠喂食高脂饮食诱导肥胖，喂食常规饮食作为对照。经气管滴注 LPS（5mg/kg）建立急性肺损伤模型。24h 后检测肺组织、原代肺泡巨噬细胞 ACOD1 的 mRNA 和蛋白水平表达，测量肺损伤程度、巨噬细胞极化情况及炎症水平。体外使用棕榈酸（PA）处理小鼠肺泡巨噬细胞系（MH-s）后暴露于 LPS（100ng/ml）。检测 ACOD1 表达水平、巨噬细胞极化情况及炎症水平。体内使用腺相关病毒，体外使用慢病毒敲低或过表达 ACOD1，再次检测上述肺损伤及炎症指标。利用 JASPAR（http://jaspar.genereg.net/）和 GTRD（http://gtrd.biouml.org/）数据库预测 ACOD1 的转录相关因子，小鼠肺组织中验证相关转录因子表达情况，筛选关键转录因子。染色质免疫共沉淀（ChIP）验证关键转录因子与 ACOD1 启动子是否直接结合。体内使用腺相关病毒，在肥胖背景下敲低关键转录因子，检测下游 ACOD1 表达、肺损伤及炎症指标，探讨肥胖背景下关键转录因子调控 ACOD1 表达在急性肺损伤中的作用。
结果 相较对照组，肥胖背景下 LPS 暴露后肺损伤更重、巨噬细胞 M1 极化更多、炎症反应更重，ACOD1 表达更低。在对照组中敲低 ACOD1，可加重 LPS 暴露后的肺损伤，增多巨噬细胞 M1 极化，加重炎症；而在肥胖组中过表达 ACOD1，可相对减轻 LPS 暴露后的肺损伤，减少巨噬细胞 M1 极化，减轻炎症。JASPAR 和 GTRD 数据库筛选得到 JUND、JUN、STAT5a、STAT5b、PRDM1、LHX3、GFI1 和 PAX7 共 8 个转录相关因子，其中仅 GFI1 在肥胖时较对照组在蛋白水平上表达增加。ChIP 证实独立生长因子 1（GFI1）与 ACOD1 启动子区域直接结合。在肥胖背景下敲低 GFI1 后，ACOD1 表达增加，LPS 暴露后的肺损伤减轻、M1 极化减少、炎症减轻。
结论 肥胖背景下 GFI1 蛋白水平升高，从而抑制下游 ACOD1 表达，增加巨噬细胞 M1 极化，加重急性肺损伤。

PO-0014

vlPAG-DMH/RtTg 调控七氟烷诱导意识改变与觉醒行为分离作用的神经环路研究

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目的 麻醉苏醒过程中，行为与意识的恢复可能并不同步。行为与意识的同步性需要各脑区之间的协调工作。但目前对麻醉中意识改变与觉醒行为分离作用的神经和环路机制知之甚少。腹外侧中脑导水管周围灰质（vlPAG）在麻醉-觉醒的调控中发挥了重要作用，但 vlPAG 谷氨酸能（Glu）神经元及其神经环路对麻醉-觉醒意识与行为的调控作用仍未确定。本研究将针对该科学问题展开研究。
方法 本研究选用了 8-10 周龄的 Vglut2-Cre 雄性小鼠。采用立体定位仪和微量注射泵进行腺相关病毒注射对 $vlPAG^{Glu}$ 神经元进行转染。本研究应用钙成像技术探究 $vlPAG^{Glu}$ 神经元在麻醉-觉醒中的活性变化。应用光遗传学技术和化学遗传学技术激活神经元活性，观察对麻醉诱导、维持与恢复的影响。利用翻正反射消失（Loss of righting reflex, LORR）时间与翻正反射恢复（Recovery of righting reflex, RORR）时间作为麻醉诱导与觉醒的评判标准。从小鼠腿部运动、头部运动、胡须活动、翻正活动以及能否爬动等五个方面进行小鼠体动评分，评估小鼠麻醉维持中觉醒行为。麻醉-觉醒过程中对小鼠进行脑电记录，分析脑电爆发抑制率（Burst suppression ratio, BSR）与脑电各频段功率谱百分比以判断小鼠麻醉深度。
结果 七氟烷麻醉诱导过程 $vlPAG^{Glu}$ 神经元活性逐渐降低。麻醉恢复过程中，神经元活性趋向恢复。光遗传学激活 $vlPAG^{Glu}$ 神经元，使 LORR 时间显著缩短，而 RORR 时间明显延长，行为学上表现为促进麻醉的作用；但在麻醉维持过程中光刺激发现 BSR 明显下降，脑电结果显示为促进意识觉醒的作用。在较浅麻醉深度下光刺激可引起脑电频谱的促觉醒改变，但未出现相应的体动行为学变化。对 $vlPAG^{Glu}$ 神经元进行化学遗传学激活，同样发现 LORR 时间缩短，RORR 时间延长，行为学结果显示促进麻醉作用；但麻醉维持期 BSR 显著下降，脑电显示促进意识觉醒。光遗传学激活 $vlPAG^{Glu}$-下丘脑背内侧核（Dorsomedial hypothalamus, DMH），可使 LORR 时间延长，RORR 时间缩短，麻醉维持期间光刺激可导致脑电 BSR 下降；在较浅麻醉深度下光刺激，可诱发小鼠脑电觉醒和体动行为学评分增加。光遗传学激活 $vlPAG^{Glu}$-脑桥网状背盖核（Reticulotegmental nucleus, RtTg），使 LORR 时间缩短，而 RORR 时间延长，行为学上表现为促进麻醉的作用；但在麻醉维持过程中光刺激发现 BSR 明显下降，脑电结果显示为促进意识觉醒的作用。在较浅麻醉深度下光刺激可引起脑电频谱的促觉醒改变，但未出现相应的体动行为学变化。
结论 激活 $vlPAG^{Glu}$ 神经元可促进脑电觉醒，同时介导了麻醉后翻正反射的消失和对小鼠体动的抑制，使麻醉中意识与行为呈分离改变。$vlPAG^{Glu}$ 神经元的不同下游投射介导了麻醉后不同的行为与意识调控作用。激活 $vlPAG^{Glu}$-DMH 发挥促进觉醒作用，意识与行为变化一致。而激活 $vlPAG^{Glu}$-RtTg 在促进脑电觉醒的同时，介导了麻醉后翻正反射消失和对小鼠体动的抑制，使麻醉中意识与行为呈分离改变。为麻醉过程中行为与意识分离状态的诸多临床问题提供神经与理论基础。

PO-0015

Mechanism of novel extracellular vesicle Migrasomes involved in macrophages-to -myofibroblast transition contributed to septics-associated pulmonary fibrosis

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目的 This study utilized LPS-induced activation of fibroblasts cellular models and a mice model of LPS-induced septic pulmonary fibrosis to explore the role of migrasome in the development of septic pulmonary fibrosis.
方法 We utilized a mouse model to investigate pulmonary fibrosis related to sepsis. Expression levels of α-smooth muscle actin (α-SMA) and Collagen I in lung tissues were analyzed by Western blot, while fibrosis extent was assessed via H&E and Masson staining. Cell migration capability was evaluated using a wound healing assay. Migrasome-specific markers such as Integrin α5, NDST1, and TSPAN4 were detected through Western blot. The formation of migrasomes was visualized using WGA staining, and their microstructures were examined via transmission electron microscopy (TEM) after isolation by density gradient ultracentrifugation. In vitro interactions were studied using a co-culture model of fibroblasts and macrophages. The expression and localization of MMT cells were determined by flow cytometry and immunofluorescence.
结果 1.LPS stimulations increase fibroblasts migrasomes releasing in pulmonary fibrosis.
2.Macrophage-myofibroblast transition promotes fibrosis formation in LPS-induced pulmonary fibrosis.
3. Fibroblast released mtDNA-MS contributes to macrophage-myofibroblast transition in LPS-induced pulmonary fibrosis.
结论 LPS stimulation of fibroblasts activates them, enhancing their migration and increasing migrasome release. Migrasomes, particularly mtDNA-containing migrasomes, may play a crucial role in intercellular interactions by promoting MMT, thereby contributing to the development of sepsis-associated pulmonary fibrosis.

PO-0016

Microglia upregulation dominated Glia-Vascular Unit crosstalk promotes postoperative cognitive dysfunction

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Background Postoperative cognitive dysfunction (POCD) significantly impacts the recovery and long-term outcomes of elderly patients. With the advancement of research, the role of the glial vascular unit (GVU), a multicellular network, in the progression of POCD has been increasingly valued. Substantial evidence indicates that neuroinflammation plays a crucial role in the development of POCD. Anesthesia and surgical trauma-induced systemic inflammatory responses enter the central nervous system (CNS) through the damaged GVU, subsequently causing neuroinflammation in hippocampus. The activation of microglia is a critical driver in this pathological process. However, the role and phenotypic heterogeneity of microglia during this period are not fully understood. Therefore, our objective is to elucidate the mechanisms of POCD

driven by microglia activation and explore the feasibility of mitigating POCD through targeted neuroinflammatory interventions.

Methods Exploratory laparotomy was conducted to create a model of POCD in 18-month mice. The hippocampi of mice in control and surgery group were removed one day after the procedure for single-cell RNA sequencing (scRNA-seq). The application of fluorescence in situ hybridization (FISH) coupled immunofluorescence (IF) assay enables visualization of the expression levels and locations of target RNA transcripts in microglia subpopulations. Behavioral experiments, including fear conditioning and Morris water maze tests, were conducted to evaluate the effects of the TNF inhibitor etanercept on cognitive functions in POCD model.

Results We identified a total of 20684 hippocampal cells through single-cell RNA sequencing (scRNA-seq) of a POCD model. Following classification, 10 cell types were identified including the major components of GVU. They are microglia, astrocytes, and endothelial cells. Microglia and astrocytes were further clustered into eight and six subpopulations with different activation states. Compared to astrocytes, microglia subpopulations underwent dramatic changes perioperatively. Using the CellChat package, we examined interactions among microglial, astrocyte subpopulations, and endothelial cells during the perioperative period. Homeostatic and reactive astrocytes showed the highest number and strength of interactions, highlighting their pivotal role in GVU dynamics. Endothelial cells and inflammation-associated microglia (IAM) also interacted extensively with various cell types. Intercellular communication within GVU was significantly upregulated in surgery group. We selected four signaling pathways of interest for further investigation. The TNF signaling pathway is crucial for inflammatory responses and immune regulation within GVU, showing communication among microglia subpopulations. In surgery group, IAM exerts a dominant influence on this pathway. Considering the substantial activation of IAM, we infer that the TNF signaling pathway in GVU becomes unbalanced due to the effects of surgical factors leading to IAM activation and subsequent central inflammatory responses, with downstream signaling through the Tnf-tnfrsf1a receptor playing a decisive role. The TGF-β signaling pathway, vital for brain development and function, primarily interacts among microglial subpopulations. In control group, homeostatic microglia (HM) acts as the main regulator of this pathway. In contrast, in surgery group, IAM and transition state microglia (TSM) are involved, showing a significant increase in IAM to TSM. Considering the neuroprotective functions of TGF-β, we hypothesize that IAM signals may polarize TSM towards an M2 phenotype, mitigating excessive central inflammation through a negative feedback mechanism. Chemerin, an adipokine with immunomodulatory properties, is expressed from astrocytes to microglia. In control group, signals are sent by astrocytes, and received by HM, and TMS, whereas in surgery group, IAM becomes the primary signal receiver. Communication between angiogenesis associated astrocytes (AAA) and IAM significantly increases in surgery group. Based on literature, we infer that AAA releases chemerin signals to chemotactically attract IAM to the GVU vicinity, exerting a pro-inflammatory effect. Lastly, APP signaling pathway, crucial in neuro-degenerative diseases like Alzheimer's disease, showed strong signals from endothelial cells (ECs) to microglia, with no significant difference between groups which indicates associated inhibitory microglia (DIM) involvement in ECs’ clearance of central metabolic products, potentially relevant to POCD.

Conclusion This study indicates significant perioperative changes in hippocampal microglia, with increased IAM-dominated GVU crosstalk promoting neuroinflammation and impairing postoperative cognitive function.

PO-0017

Circadian Regulation of Melatonin-Mediated Cardioprotection and the Role of PER2

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Background: Myocardial infarction frequently arises from ischemia-reperfusion (I/R) injury, a multifaceted pathological process characterized by cardiomyocyte death and compromised cardiac function. Emerging evidence suggests an intricate interplay between I/R injury and circadian rhythms, with an elevated risk of infarction observed during the early morning hours[1]. Melatonin, a hormone crucial for cardiovascular health and exhibiting a strong circadian rhythm, has shown potential in mitigating I/R injury[2]. However, its effectiveness might be influenced by the timing of administration due to varying melatonin levels throughout the day.The gene Per2 plays a key role in regulating circadian rhythms and protecting the heart. Studies suggest that Per2 deficiency increases susceptibility to I/R injury, particularly during the early morning[3]. Melatonin demonstrates the capacity to induce Per2 expression, but this effect appears to be time-dependent.Therefore, elucidating how the timing of melatonin administration and its subsequent effects on Per2 expression impact its cardioprotective efficacy could hold significant clinical value.

Methods: Mice will receive melatonin at either daytime (ZT1) or nighttime (ZT13) before myocardial I/R injury induction to assess differences in cardiac protection and expression of melatonin and circadian clock genes (Per2, Bmal1, Cry2). In vitro (H9c2 cells with H/R injury) and in vivo models with downregulated Per2 will be used to evaluate whether Per2 is essential for the observed time-dependent cardioprotective effects of melatonin.

Results: Melatonin pre-treatment at nighttime (ZT13) exhibited superior cardioprotective effects compared to daytime (ZT1) administration(Figure 1A-H), aligning with the diurnal expression pattern of the circadian clock gene Per2(Figure 2A-D). Per2 expression was naturally higher at night and further enhanced without altering its peak phase by nighttime melatonin(Figure 2E-F). Downregulating Per2 in both cellular and animal models weakened melatonin's protective effects, leading to increased cell death, larger infarct size, and reduced cardiac function(Figure 3A-H), (Figure 4A-E), (Figure 5A-F).

Conclusions: This study reveals a striking dependence of melatonin's cardioprotective efficacy on its administration timing. Nighttime melatonin administration (ZT13) conferred superior protection against myocardial I/R injury compared to daytime (ZT1), aligning with the natural peak in both melatonin levels and Per2 expression.

We further established Per2 as a crucial mediator of this protection, as its downregulation significantly diminished melatonin's beneficial effects. This finding aligns with previous research highlighting the vulnerability of the heart to I/R injury during the early morning hours, potentially due to a mismatch between oxidative stress and antioxidant defenses. Melatonin's ability to bolster antioxidant capacity and promote metabolic flexibility further supports its role in protecting the heart.

By mimicking the natural rhythm of melatonin production with ZT13 administration, we observed enhanced cardioprotection, likely due to optimized rhythm stabilization and Per2 modulation. These results emphasize the importance of considering circadian rhythms when optimizing therapeutic strategies for I/R injury and maximizing the benefits of melatonin for heart health.

PO-0018

P-eIF2α/ATF4 信号通路参与紫杉醇相关周围神经损伤的机制研究

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目的 周围神经损伤是紫杉醇治疗乳腺癌、宫颈癌和卵巢癌等肿瘤期间常见的副作用，其症状主要是刺痛、烧灼痛、麻木和对冷热刺激过敏等，严重影响患者的生活质量。目前研究已确认周围初级感觉神经元的轴突远端退化变性是该病的主要病理特征，但其具体机制尚不明确。整合应激反应是一种进化上保守的细胞内生物信号网络，帮助细胞、组织和机体适应复杂的环境变化以维持健康。以往的研究发现整合应激反应中的 P-eIF2α/ATF4 信号通路与紫杉醇耐药以及多种神经退行性疾病的发病过程密切相关，然而该信号通路是否也参与紫杉醇化疗引起的周围神经损伤还未见报道。本研究的目的是探讨 P-eIF2α/ATF4 信号通路在紫杉醇化疗引发的周围神经损伤发生发展中的作用与机制。

方法 首先，我们使用紫杉醇对 C57BL/6J 小鼠和体外培养的原代小鼠背根神经节（Dorsal Root Ganglion, DRG）神经元进行干预，通过疼痛阈值测量、TUNEL 染色、ELISA、免疫荧光染色和蛋白质印迹等实验技术，明确紫杉醇对周围初级感觉神经元和 P-eIF2α/ATF4 信号通路表达的影响。其次，我们运用慢病毒感染体外培养的原代 DRG 神经元细胞，上调其 ATF4 的表达，通过免疫荧光染色、蛋白质印迹、TMRE 染色、ATP 检测和 ROS 检测等实验技术，观察上调 ATF4 对原代 DRG 神经元轴突和线粒体功能的影响。

最后，我们采用 P-eIF2α/ATF4 信号通路抑制剂—ISRIB 干预紫杉醇相关周围神经损伤的动物和细胞模型，通过疼痛阈值测量、免疫荧光染色、蛋白质印迹、透射电子显微镜、JC-1 染色、ATP 检测和 ROS 检测等实验技术，探索抑制 P-eIF2α/ATF4 信号通路对紫杉醇所致周围初级感觉神经元轴突和线粒体损伤的影响。

结果 1. P-eIF2α 和 ATF4 在正常小鼠的 DRG 组织内有大量表达。具体而言，Tuj1、NF200 和 Peripherin 标记的神经元胞体内都可以观察到 ATF4 与 P-eIF2α 的阳性荧光染色。对阳性表达的神经元胞体切片的面积进行统计分析，结果表明 ATF4 和 P-eIF2α 广泛分布于大、中和小型感觉神经元中。

2. 紫杉醇化疗可以导致实验小鼠的冷热和机械痛觉阈值明显降低、DRG 组织中 TUNEL 染色阳性细胞核以及炎性细胞因子 TNF-α、IL-6 和 IL-1β 增多、足底表皮内神经末梢分布密度降低。蛋白质印迹检测显示，小鼠 DRG 组织中的 ATF4 在紫杉醇化疗开始后的第 3 天表达增加，并持续至第 28 天。同时，紫杉醇化疗也使小鼠 DRG 和坐骨神经组织中 P-eIF2α 和 CHOP 的表达增加。

3. 体外细胞实验也表明，紫杉醇暴露 24 小时可引起原代 DRG 神经元出现明显的轴突退化损伤。TMRE 染色显示原代 DRG 神经元内线粒体膜电位在紫杉醇暴露 24 小时后出现明显降低。免疫荧光染色和蛋白质印迹检测显示整合应激分子—ATF4 和 P-eIF2α 在紫杉醇暴露后 12 小时表达明显增加并持续至 48 小时。

4. 使用过表达 ATF4 质粒慢病毒感染原代 DRG 神经元细胞 72 小时后，神经元中 ATF4 的 mRNA 转录和蛋白质翻译较空载病毒明显增加。与此同时，免疫荧光结果显示上调 ATF4 表达后的原代 DRG 神经元轴突出现明显退化变性。TMRE 染色、ATP 检测和 ROS 检测结果显示上调 ATF4 表达后，神经元内线粒体膜电位和 ATP 含量出现明显降低，胞内 ROS 含量明显增加。

5. 蛋白质印迹结果显示，用 P-eIF2α/ATF4 信号通路抑制剂—ISRIB 对原代 DRG 神经元预处理可以明显缓解因紫杉醇暴露所致 ATF4 表达增加。免疫荧光染色显示用 ISRIB 预处理可以明显减轻紫杉醇暴露引起的神经元轴突退化变性。同时，用 ISRIB 预处理可以明显改善紫杉醇暴露所导致的原代 DRG 神经元线粒体膜电位降低、胞内 ATP 含量减少以及 ROS 含量增加。

6. 疼痛阈值测量结果显示用 ISRIB 治疗可以明显缓解小鼠因紫杉醇化疗所致的冷、热和机械痛觉过敏。投射电子显微镜的结果显示 ISRIB 可以明显减少紫杉醇化疗所致的 DRG 神经元胞体内和坐骨

神经无髓鞘神经纤维内异常形态的线粒体增多。足底皮肤的免疫荧光染色提示 ISRIB 可以明显改善紫杉醇化疗所致表皮内神经末梢分布密度降低。

结论 紫杉醇可以激活 P-eIF2α/ATF4 信号通路并导致周围初级感觉神经元轴突和线粒体损伤。过表达 ATF4 可以引发原代 DRG 神经元轴突退化变性与线粒体功能障碍。抑制 P-eIF2α/ATF4 信号通路可缓解紫杉醇所致周围感觉神经元轴突和线粒体损伤。因此，紫杉醇可能是通过激活外周感觉神经元内 P-eIF2α/ATF4 信号通路，进而导致线粒体功能障碍与神经元轴突远端退化变性，最终引起周围神经的损伤。

PO-0019

BLA Glu-PrL 介导七氟烷缓解小鼠焦虑-抑郁样行为的神经环路研究

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目的 前期课题组发现七氟烷（Sevoflurane, Sevo）具有快速且显著地抗焦虑-抑郁作用。谷氨酸（Glu）是大脑中最主要的兴奋性神经递质，是抑郁症发病与治疗的关键。基底外侧杏仁核（BLA）富含 Glu 神经元，在负性情绪调控中发挥重要作用，但在 Sevo 抗焦虑-抑郁中作用仍未确定。因此，本研究旨在探讨 BLAGlu 及下游投射介导七氟烷发挥抗焦虑-抑郁作用的神经机制。

方法 选用 10 周龄 C57/BL6 雄性小鼠。抑郁模型采用慢性不可预知温和刺激（CUMS）模型。实验分为 3 组：空白对照组（O2, 2L/min, 30min）、阳性对照组（S-Ket, 5mg/kg, i.p.）和实验组(Sevo, 2.5%, 30min)。利用立体定位仪和微量注射泵进行腺相关病毒注射对神经元进行转染。应用钙成像及免疫荧光染色(cFos)技术探究 BLAGlu 在吸醚前后神经元活性变化。采用化学遗传学技术特异性调控 BLAGlu 神经元及 BLAGlu-PrL 神经投射。利用旷场、高架十字迷宫、新奇抑制摄食实验评估小鼠的焦虑状态；糖水偏好、悬尾及强迫游泳实验评估小鼠的抑郁状态。

结果 在正常小鼠及 CUMS 小鼠中吸入 2.5% Sevo 30min 后发现，穿越中心次数和中央区停留时间增加，开放臂停留时间增加，摄食潜伏期缩短；糖水偏好指数增加，悬尾和强迫游泳静止不动时间减少。Sevo 缓解小鼠焦虑-抑郁样行为的作用可持续至 48h，与 S-Ket 结果类似。钙成像及 cFos 结果发现，吸醚结束后 30min 钙信号的水平和幅度增加，BLA 区 c-Fos 蛋白表达升高。化学遗传学特异性调控小鼠 BLAGlu 神经元后发现，激活 BLAGlu 能够缓解焦虑-抑郁样行为，抑制 BLAGlu 神经元可加重焦虑-抑郁样行为，并且逆转 Sevo 缓解焦虑-抑郁样行为的作用。化学遗传学抑制 BLAGlu-PrL 投射后，加重了小鼠焦虑-抑郁样行为。在 CUMS 小鼠中同样发现，吸醚结束后 30min 钙信号水平和幅度增加，且 BLA 区 c-Fos 蛋白表达水平升高。化学遗传学特异性调控 CUMS 小鼠 BLAGlu 神经元后发现，激活 BLAGlu 能够缓解焦虑-抑郁样行为，抑制 BLAGlu 神经元会加重焦虑-抑郁样行为，且逆转 CUMS 小鼠 Sevo 抗焦虑-抑郁样行为的作用。化学遗传学抑制 BLAGlu-PrL 投射后会明显加重 CUMS 小鼠焦虑-抑郁样行为。

结论 2.5%30min 七氟烷明显改善正常和 CUMS 小鼠焦虑-抑郁样行为，作用持续至吸醚后 48h。激活 BLAGlu 后，Sevo 缓解焦虑-抑郁样行为的作用增强，抑制 BLAGlu 后缓解作用减弱；抑制 BLAGlu-PrL 后，Sevo 缓解焦虑-抑郁样行为作用明显减弱。本研究为七氟烷抗焦虑-抑郁作用提供神经理论基础，推进焦虑-抑郁症机制的神经环路研究，为缓解焦虑-抑郁症状提供新研究方向及干预靶点。

PO-0020

Cx43 表达增加介导的神经元周围网络形成减少可减弱老年小鼠围手术期神经认知障碍

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目的 术后认知功能障碍（Postoperative neurocognitive disorders，PND）是患者行手术麻醉后最常见的严重并发症之一，临床上主要表现为手术后急性谵妄或长期认知功能（记忆力、抽象思维以及定向力）障碍，常伴有社会活动能力的减退。已成为制约围术期安全和患者术后长期良好转归的重要临床问题。麻醉、手术和老龄是导致 PND 发生的三大主要因素，选取 18 月龄老年小鼠进行 PND 造模后发现，广泛表达于脑内的蛋白 Cx43 升高，而调控星形胶质细胞 Cx43 表达可以干预老年小鼠手术麻醉后认知行为，基于此，本研究进一步构建老年 18 月龄 $Gja1^{fl/fl}$ 转基因小鼠，转录组测序后发现，Cx43 通过影响神经元周围网络的形成影响老年小鼠手术麻醉后认知功能障碍，进一步验证了星形胶质细胞 Cx43 在 PND 中的重要作用，为干预老年患者术后认知功能障碍提供了新的的临床靶点。
方法 在 1.4%异氟醚麻醉下，对 18 月龄 C57BL/6 和 $Gja1^{fl/fl}$ 小鼠进行实验性剖腹探查手术。采用 Y 迷宫、巴恩斯迷宫和情境恐惧条件反射测试评估海马体依赖性工作记忆和学习记忆。分别通过 qRT-PCR、FISH、western blotting 和流式细胞术检测 Cx43 mRNA 和蛋白的表达水平，并杂交 cKO 小鼠，通过 Cx43 的 RNA 测序研究 Cx43 的下游。WFA 和 Aggrecan 染色检测神经元周围网络的形成。
结果 选取 18 月龄 C57BL/6 小鼠进行剖腹探查手术诱导 PND。与对照小鼠相比，PND 造模后小鼠表现出海马依赖性认知障碍，而认知功能相关关键脑区的 Gja1mRNA 水平升高，Cx43 蛋白表达增加。通过病毒调控和转基因小鼠的手段特异性敲低海马星形胶质细胞 Cx43 可改善 PND 后 18 月龄 C57BL/6 和 $Gja1^{fl/fl}$ 小鼠的工作记忆与学习记忆。进一步对转基因小鼠转录组测序发现，特异性敲低星形胶质细胞中 Cx43 可以影响海马神经元周围网络的形成。并通过进一步验证发现，Cx43 与 SOX2 转录因子结合影响 Dmp1 表达，进而影响海马神经元周围网络的形成。而条件性敲除海马 Dmp1，可以增加海马神经元周围网络的形成，逆转条件性敲除 Cx43 对剖腹探查手术诱导的认知衰退中神经元周围网络形成和认知功能的保护作用。因此，我们认为，剖腹探查手术通过增加 Cx43 的表达，减少神经元周围网的形成，导致海马依赖性认知能力下降。
结论 PND 增加老年小鼠海马星形胶质细胞 Cx43，Cx43 通过与转录因子 SOX2 相结合减少 Dmp1 表达，进而减少神经元周围网的形成，最终导致海马依赖性认知能力下降。

PO-0021

Cordycepin covalently binds NLRP3 and inhibits RIPK1/RIPK3 mediated necroptosis in sepsis-associated acute lung injury.

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Background Sepsis, which is deemed as a systemic inflammation reaction syndrome in the face of infectious stimuli, is the primary cause of death in ICUs. Sepsis-induced acute lung injury (ALI) is a common acute and critical illness in clinic. According to statistics, there are about 3 million patients with sepsis-induced acute lung injury in the world every year. The case fatality rate of sepsis-induced acute lung injury is as high as 35%-46%, and the case fatality rate of severe

ARDS in novel coronavirus pneumonia is as high as 59.3%. Due to the complex pathogenesis of sepsis, there is no specific method for western medicine to treat sepsis, the antibiotics and supportive treatment are still the main treatment.
Cordycepin is recognized by its beneficial roles in terms of the anti-inflammatory, antioxidant and anti-tumor activitie, regulating signaling pathways such as NF-κB, RIP2/Caspase-1, TGF-β/Smads and Nrf2/HO-1. Recent studies have shown that cordyceps can inhibit M1/M2 macrophage polarization through NF-κB/p65, and alleviate lung injury and immune deficiency in endotoxin mice. However, the treatment efficacy and potential causal links of cordycepin in sepsis-induced acute lung injury are still elusive.
Methods By virtue of the STITCH database, we identified the targets of cordycepin. Differentially expressed genes in sepsis-induced acute lung injury were acquired from the GEO database. The PPI network of intersected targets was established. GO and KEGG pathway enrichment analysis was completed. Hub genes were analyzed by cytoHubba plug-in. In the process of experimental validation, a mouse sepsis model was established by lipopolysaccharide (LPS), and the treated mice were intraperitoneally injected with cordycepin 60 min prior to LPS injections. Survival conditions, lung functions and antioxidant levels of the mice were assessed. The inflammation and injury were detected by HE and TUNEL. The levels of key genes and signal pathway expression were analyzed by RT-PCR and Western blot.
Results Through the network pharmacology molecular docking technology, using the "Multi-target-single ligand" docking mode according to space and energy matching, small molecular compounds and biological macromolecules are mutually recognized to form molecular complexes, and it is predicted that NLRP3 can directly bind with cordycepin, which is a potential target of cordycepin. RIPK1/RIPK3 mediated necroptosis were identified as the main regulatory pathway of cordycepin. In vivo researches unraveled that cordycepin can improve the survival rate and lung function of LPS-treated mice, inhibit inflammatory factors, and regulate the expression of key therapeutic targets and key pathway.
Conclusion Network pharmacological method offers a predicative strategy to explore the treatment efficacy and causal links of cordycepin in sepsis-associated acute lung injury. Through experimental verification, we discover that cordycepin can reduce sepsis-associated acute lung injury by covalently bindiing NLRP3 and RIPK1/RIPK3 mediated necroptosis. Our research might offer a novel treatment method for improving sepsis-induced acute lung injury.

PO-0022

Heme oxygenase-1 regulated mitochondrial quality control to endotoxin-induced acute lung injury via the SIRT3/UCP2 signaling pathway

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目的 The notable characteristics of endotoxin-induced acute lung injury (ALI) are higher morbidity and mortality. Owing to the extremely complex pathophysiological mechanisms of ALI, effective treatment remains obscure. Our previous study identified that heme oxygenase-1 (HO-1) regulated mitochondrial quality control (MQC) to sustain mitochondrial functionality in the mitigation of ALI provoked by endotoxins. This study aimed to explore whether SIRT3/UCP2 signaling pathway in HO-1 mediated MQC in the settings of endotoxin induced ALI.
方法 We utilized the C57BL/6 wild-type (WT), Sirt3 knockdown (Sirt3KD) and Sirt3 overexpression (Sirt3OE) mice to establish the model of endotoxin-induced ALI that subjected to lipopolysaccharide (LPS), which were pretreated with hemin (HO-1 inducer).
结果 Our findings revealed that Sirt3 was the key differentially expressed genes (DEGs) in the process of LPS induced ALI.Further studies proved that the expression of UCP2 changed

depending on the level of SIRT3, and HO-1 regulated SIRT3/UCP2 during LPS induced ALI. Sirt3KD mice treated with LPS exacerbated lung pathological damage, heightened the inflammatory responses, impaired mitochondrial structure and function, and decreased the expression of mitochondrial fusion markers as well as biogenesis-related markers. In contrast, it increased the expression of mitochondrial fission markers and mitophagy-related markers at the protein levels. Conversely, detrimental effects were improved by Sirt3OE and pretreated with hemin. But Sirt3KD pretreated with hemin attenuated the protective effect of HO-1 on lung injury, mitochondrial function, and decreased the regulation of mitochondrial quality control.
结论 HO-1 regulated mitochondrial quality control through the SIRT3/UCP2 signaling pathway, ensuring the dynamic balance between mitochondrial fusion/fission, mitochondrial biogenesis and mitophagy to improve mitochondrial morphology and function, effectively alleviated endotoxin induced ALI.

PO-0023

嗜粘液阿克曼菌外膜蛋白 Amuc_1100 通过调控 cGAS-STING 信号通路在肠缺血再灌注损伤中的作用

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目的 探讨嗜粘液阿克曼菌（Akkermansia muciniphila）源性的外膜蛋白 Amuc_1100 通过调控肠道菌群结构和 cGAS-STING 信号通路在小鼠肠缺血再灌注（IIR）损伤中的作用。
方法 将 18 只健康雄性成年 C57BL/6J 小鼠随机分成 3 组：对照组（S 组，n=6）、肠缺血再灌注组（IIR 组，n=6）、肠缺血再灌注＋Amuc_1100 蛋白灌胃组（IIR+Amuc_1100 组，n=6）。制备小鼠 IIR 损伤模型，留取小肠组织、肺组织、血清、肠道内容物，固定组织并按照标准 HE 染色程序染色，观察组织改变行 Chiu's 病理学损伤评分、肺组织学损伤评估，酶联免疫吸附法检测血清炎性因子水平，Western Blot 法检测小肠组织紧密连接蛋白表达情况，并检测小肠组织、肺组织 cGAS-STING 信号通路表达情况，16S rDNA 测序法用于分析和菌株鉴定。
结果 与 S 组相比，IIR 组 Chiu's 病理学损伤评分、肺组织学损伤评分显著增高，IL-6、IL-10、TNF-α 生成增加，cGAS-STING 信号通路显著激活，经口灌胃 Amuc_1100 蛋白后可显著减轻 Chiu's 病理学损伤评分、肺组织学损伤评估分，并可以显著抑制小鼠 IIR 引起的上述指标的变化。16S rDNA 测序结果显示，与 S 组相比，IIR 组小鼠部分肠道细菌丰度发射变化，口服 Amuc_1100 蛋白可显著增加小鼠体内部分肠道细菌丰度。此外，我们发现 Amuc_1100 的保护作用可能是恢复了肠道菌群结构，减轻了 IIR 导致的急性肺损伤。
结论 Amuc_1100 可能通过调控 cGAS-STING 通路减轻 IIR 导致的肠组织损伤和急性肺损伤，Amuc_1100 可能是通过调节肠道微生物群中益生菌和致病菌比例起到了保护性作用。

PO-0024

Inhibition of the formyl peptide receptor 1 alleviates sepsis-induced acute lung injury by regulating the pro-inflammatory macrophages with high expression of Ccl4

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Sepsis is defined as a life-threatening multiorgan dysfunction caused by a disordered host response to pathogens, of which the lung is the most vulnerable to attack. During sepsis-induced ALI, the acute inflammatory response is the initial stage and crucial pathophysiological process involved in pathogen elimination, immunoregulation, and damage of tissues, however, the alterations in cellular composition and corresponding molecular signaling pathways during the acute inflammation process are complicated and indeterminate so that the deficiency of target specificity is one of the reasons of unfavorable outcome of the sepsis-induced ALI. To illustrate the transcriptomic landscape and underlying cellular and molecular mechanisms for sepsis-induced ALI, we constructed Lipopolysaccharide-induced ALI murine models and conducted single-cell RNA sequencing (scRNA-seq) for fresh lung tissues. We observed that the proportion of the pulmonary epithelial and endothelial cells was significantly decreased, with more immune cell infiltration adversely. The immune cells predominantly consist of the myeloid, including the alveolar, interstitial macrophages, the Ccl4high, Ccl5high, Ccl6high macrophages, and neutrophils. The myeloid cells from the control group prominently consist of the Ccl6high macrophages whereas the Ccl4high macrophages were majority in the LPS group. Several canonical inflammatory factors such as Cxcl10, Il1β, and Cxcl2, were the top expression genes in the Ccl4high macrophages. Gene set variation analysis and the pro-inflammatory signature score increased in the Ccl4high macrophages, indicating that the Ccl4high were pro-inflammatory macrophages involved in the inflammation-related processes in sepsis acute lung injury. Pseudo-time analysis demonstrated the existence of developmental imbalance within the pro-inflammatory Ccl4high macrophages, and the expression of Ccl4 paralleled with the differentiation levels in macrophages. Subsequently, we noticed that Anxa1/Fpr1 ligand-receptor pair mediated cell-cell communication increased between the epitheliums and pro-inflammatory Ccl4high macrophages. The formyl peptide receptor 1 (FPR1) was evidently up-regulated in the Ccl4high macrophages. We identified the subclusters possessing high inflammatory properties in more precision within the Ccl4high macrophages. Tracing the developmental lineage revealed that Fpr1 was a potential indicator hinting at the direction of evolution into the pro-inflammatory cells. Moreover, the expression of Fpr1 was dramatically elevated both in the inflammatory macrophages model in vitro, and in lungs attacked by endotoxin in vivo verified by the immunofluorescent staining. Inhibition of Fpr1 by antagonist HCH6-1 administration could alleviate ALI in both manifestation and pathological features via reducing the Ccl4high macrophages infiltration. In conclusion, inhibition of the formyl peptide receptor 1 could alleviate sepsis-induced acute lung injury by regulating the pro-inflammatory macrophages.

PO-0025

Arg1 和 Mic10 互作驱动核-线粒体通讯介导线粒体嵴重塑诱发泛凋亡致缺血/缺氧血管功能障碍

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目的 缺血/缺氧损伤可显著损害血管功能，严重影响患者预后，线粒体结构和功能的变化与血管功能障碍密切相关，但具体机制不清楚。本研究重点探究线粒体超微结构线粒体内嵴重塑在缺血缺氧血管功能障碍中的作用，阐明相关机制，并寻找治疗措施。
方法 构建缺血大鼠和缺氧血管平滑肌细胞模型，构建 Arg1 血管平滑肌细胞条件敲除鼠，利用透射电镜、超分辨显微镜和细胞能量代谢分析仪，观察线粒体的结构和功能。采用 LC-MS/MS、分子动力学、流式细胞分析和 ChIP-qPCR 等方法研究线粒体嵴重塑在缺血/缺氧诱导的血管功能障碍中的作用及其分子机制。构建血小板膜仿生血管平滑肌细胞靶向纳米材料 PLGA-PEI-siRNA@PM-α-SMA 包裹 Arg1 siRNA，观察 Arg1 靶向抑制对缺血/缺氧诱导的血管功能损害的保护作用。
结果 缺血大鼠血管反应性显著降低，线粒体嵴结构发生重塑；在缺氧的血管平滑肌细胞中，线粒体嵴频率下降与线粒体功能障碍和线粒体 DNA(mtDNA)释放有关。休克患者转录组学和缺血大鼠血管组织单细胞测序发现缺血血管平滑肌细胞 Arg1 表达增加。Arg1 敲除可有效地保护血管和线粒体功能，改善了线粒体嵴，并限制了 mtDNA 的释放。机制研究发现 Arg1 与 Mic10 相互作用可能导致线粒体嵴重塑，并与缺氧诱导的线粒体外膜蛋白 VDAC1 乳酸化，共同导致线粒体通透性转换孔（MPTP）的开放和 mtDNA 释放出线粒体，而 Arg1 敲除则可以抑制乳酸生成。进一步研究发现，缺氧可通过激活 LDHA 刺激乳酸生成上调组蛋白 H3K18la 引起 Arg1 上调。而释放的 mtDNA 可通过激活 cGAS-STING 通路导致血管平滑肌细胞泛凋亡。最后，血小板膜仿生血管平滑肌细胞靶向纳米材料 PLGA-PEI-siRNA@PM-α-SMA 包裹 Arg1 siRNA 可有效抑制对缺血/缺氧诱导的血管功能障碍。
结论 本研究揭示了缺血/缺氧致血管功能障碍全新机制：由乳酸介导的损伤性正反馈回路调节细胞核和线粒体通讯，上调 Arg1，导致线粒体嵴重塑和 mtDNA 释放，最终导致血管平滑肌细胞泛凋亡。而靶向抑制 Arg1 可减轻缺血/缺氧诱导的血管损伤。

PO-0026

Contribution of mitochondrial impairment to tau hyperphosphorylation in neurobehavioral abnormalities in neonatal mice after repeated exposure to sevoflurane

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Background After exposure of fetuses and infants to inhaled anesthetics, several common abnormalities, including tau hyperphosphorylation and mitochondrial dysfunction, become apparent, leading to neurodegeneration in the immature brain. Therefore, understanding the link between volatile anesthetic-induced tau hyper-phosphorylation and mitochondrial impairment is crucial for developing treatments for cognitive disorders caused by inhaled anesthetics.
Methods Wild-type (WT), tau knockout (tau KO), and CypD knockout (CypD KO) neonatal mice (postnatal days 5, 7, and 9) were administered 3% sevoflurane for 2 hours. To evaluate the relationship between tau phosphorylation, mitochondrial CypD, and cognitive function in WT, tau

KO, and CypD KO neonatal mice after sevoflurane exposure, immunohistochemistry, Western blotting, and the Morris water maze (MWM) test were utilized.
Results Following multiple anesthesia sessions, WT neonatal mice exhibited significant increases in tau phosphorylation at Ser262 and Ser202/Thr205, along with increased levels of CypD, and ROS, and significant decreases in ATP, PSD-95 levels and cognitive function. Following tau gene deletion, repeated sevoflurane treatment did not alter the levels of CypD, ROS, ATP, PSD-95, or cognitive performance. Following CypD gene deletion, repeated sevoflurane anesthesia significantly increased tau phosphorylation at Ser262 without affecting phosphorylation at Ser202/Thr205, levels of ROS, ATP, PSD-95, or cognitive performance.
Conclusions Sevoflurane-induced tau phosphorylation impaired mitochondrial function, while damaged mitochondria could further enhance tau hyperphosphorylation. Our data suggest a pathological feedback loop between tau phosphorylation and mitochondrial function, leading to cognitive abnormalities. Consequently, interrupting this vicious cycle could prevent sevoflurane-induced neurodevelopmental disorders.

PO-0027

Ciprofol alleviates ferroptosis in LPS induced acute lung injury by activating the Nrf2 signaling pathway

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Backgroud Patients who suffered from sepsis-induced acute lung injury (ALI) always need sedation for mechanical ventilation in intensive care unit (ICU).Ciprofol(Cip),a novel intravenous anesthetic, was revealed to have anti-inflammatory and antioxidative properties.Ferroptosis, categorized as a type of newly non-apoptotic cell death, participates in the development of lung injury.This study aimed to identify the effect of ciprofol on sepsis-induced ALI and to determine whether ferroptosis is involved.
Methods and results To create ALI models， MLE12 alveolar epithelial Cells and lipopolysaccharide (LPS)-stimulated C57BL/6J mice were used. Our results displyed that Cip attenuated lung injury and ferroptosis. In the LPS-induced sepsis mice model, Cip pretreatment significantly attenuated respiratory system damage, as evaluated by HE, TUNEL and inflammatory factors. By raising GSH levels, ciprofol activated the Nrf2 antioxidative pathway, blocked ferroptosis, increased ferroptosis-related protein (GPX4 and SLC7A11) expressions, and reduced Fe2+ content, as well as MDA and 4-HNE levels. However, the protective effects of Cip on lung injury and ferroptosis diminished in Nrf2-KO mice. Additionally, Cip significantly activated the Nrf2 pathway and ameliorated cell death by preventing detrimental lipid peroxidation and ferroptosis in vitro. However, these effects were not observed in siNrf2-treated cells.
Conclusion Our study demonstrated that Cip may ameliorate septic lung injury by suppressing ferroptosis through the Nrf2 pathway.

PO-0028

STAT5A/TREM1 轴调控小胶质细胞极化在七氟烷相关神经毒性(SIN)中的作用研究

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目的 明确 STAT5A 上调 TREM1 表达，促进七氟烷诱导小胶质细胞 SIN 发生发展的相关机制。

方法 1. 慢病毒转染 BV2 细胞构建 STAT5A 敲减和 Trem1 敲减稳定细胞株。 2.将 BV2 小胶质细胞分为 5 组：Con 组、Sev 组、STAT5A-KD 组、TREM1-KD 组和 NC 组。Con 组：BV2 细胞放置在培养箱中进行正常培养，没有任何干预措施；其余四组均暴露于 3.2%七氟烷 6 小时后继续放回培养箱孵育 12h；STAT5A-KD 组在七氟烷暴露前使用慢病毒转染技术将带有敲减 STAT5A 基因的慢病毒载体导入 BV2 细胞中；TREM1-KD 组在七氟烷暴露前使用慢病毒转染技术将带有敲减 TREM1 基因的慢病毒载体导入 BV2 细胞中；NC 组在七氟烷暴露前给与 BV2 细胞转染了阴性对照慢病毒。于倒置显微镜观察各组细胞形态；采用 CCK-8 法检测细胞活力；qPCR 法、Western blot 法检测细胞 IL-1β、TNF-α、STAT5A、TREM1 表达量的变化；免疫荧光双染检测小胶质细胞 iNOS/Iba1、ARG1/Iba1 表达；TUNEL 法检测小胶质细胞凋亡改变。

结果

1、细胞形态：CON 组细胞形态舒展，突起较多较长，细胞贴壁状态；SEV 组、NC 组小胶质细胞形态明显圆钝，细胞胞体增大，细胞突起变短消失，部分细胞漂浮；STAT5A-KD 组、TREM1-KD 组少量细胞呈现圆钝形态，其余细胞保持舒展并贴壁状态。

2、细胞活性检测：与 CON 组相比，SEV 组及 NC 组细胞活性显著降低（P<0.05）；STAT5A-KD 组及 TREM1-KD 组细胞活性较 SEV 组、NC 组升高（P<0.05）。

3、神经炎症： Real-time PCR、Western Blot 结果显示，与 CON 组相比，SEV 组及 SEV-NC 组 TNF-α 蛋白、IL-1β 蛋白及 Tnf-α mRNA、IL-1β mRNA 相对表达量增加（P<0.05）；STAT5A-KD 组及 TREM1-KD 组 TNF-α 蛋白、IL-1β 蛋白及 Tnf-α mRNA、IL-1β mRNA 相对表量较 SEV 组、NC 组下调（P<0.05）。

4、STAT5A、TREM1 表达：Real-time PCR、Western Blot 结果显示，与 CON 组、STAT5A-KD 组相比，SEV 组、TREM1-KD 组及 NC 组 STAT5A 蛋白及 STAT5A mRNA 相对表达量增加（P<0.05）。与 CON 组相比，SEV 组及 NC 组 TREM1 蛋白及 TREM1 mRNA 相对表达量增加（P<0.05）；STAT5A-KD 组及 TREM1-KD 组 TREM1 蛋白及 TREM1 mRNA 相对表达量较 SEV 组、NC 组下调（P<0.05）。

5、小胶质细胞极化：免疫荧光双染结果显示，与 CON 组相比，SEV 组及 NC 组 iNOS/Iba1 阳性细胞量增加（P<0.05）；STAT5A-KD 组及 TREM1-KD 组 iNOS/Iba1 阳性细胞量较 SEV 组、NC 组减少（P<0.05）。与 CON 组相比，SEV 组及 NC 组 ARG1/Iba1 阳性细胞量减少（P<0.05）；STAT5A-KD 组及 TREM1-KD 组 ARG1/Iba1 阳性细胞量较 SEV 组、NC 组增加（P<0.05）。

6、细胞凋亡检测：与 CON 组相比，SEV 组及 NC 组凋亡细胞平均光密度升高（P<0.05）；STAT5A-KD 组及 TREM1-KD 组凋亡细胞平均光密度较 SEV 组、NC 组降低（P<0.05）。

结论 STAT5A 通过上调 TREM1 参与七氟烷诱导的小鼠小胶质细胞 SIN 发生。这一机制涉及小胶质细胞 M1/M2 表型不平衡极化。敲减 STAT5A 或 TREM1 能够改善七氟烷诱导的小鼠小胶质细胞 SIN。

PO-0029

电针通过 MAMs 调控线粒体功能 改善糖尿病小鼠术后认知功能障碍

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目的 探索电针干预对糖尿病小鼠术后认知功能的影响，阐明电针调控 MAMs 改善线粒体钙超载，改善线粒体功能，减轻神经元凋亡的作用机制。

方法 采用雄性 C57BL/6 小鼠高脂饮食联合腹腔注射链脲佐菌素，1 周后空腹血糖≥11.1 mmol/L，制造 2 型糖尿病（T2DM）实验动物，随后采用随机数表法将小鼠分为 3 组：对照组、模型组、电针组。行胫骨骨折髓内固定术建立 POCD 模型。电针组取神庭、百会、足三里和内关行电针干预，

每次 30min，每周 5 天，连续 2 周。于术后第 3 天进行旷场实验、条件恐惧实验评估小鼠术后认知功能；TUNEL 染色观察 CA1 区神经元凋亡水平；流式细胞术检测线粒体膜电位和线粒体钙离子水平；免疫印迹法检测小鼠海马组织 IP3R、GRP75、VDAC1、Drp1、p-Drp1(Ser616)、mito-Drp1 蛋白的表达。

结果 电针改善糖尿病小鼠术后认知功能，减轻海马 CA1 区神经元凋亡。电针增加线粒体膜电位水平，减少线粒体钙离子水平，上调 IP3R、GRP75、VDAC1、p-Drp1(Ser616)、mito-Drp1 蛋白的表达。

结论 选取神庭、百会、足三里和内关穴位对糖尿病小鼠进行电针预处理，可改善术后学习记忆与认知障碍，其可能是通过抑制 IP3R-GRP75-VDAC1 通路引发的钙超载，缓解线粒体过度分裂，恢复线粒体功能，进而减轻海马神经元凋亡，改善术后认知功能。

PO-0030

肌球蛋白重链 9 在脓毒症小鼠肠道血管屏障损伤中的作用

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目的 探究肌球蛋白重链 9 在脓毒症小鼠肠道-血管屏障损伤中的作用

方法 采用随机数字表法将 80 只 SPF 级 C57BL/6J 雄性小鼠分为 4 组（n=20）：假手术组（Sham 组）、假手术组+肌球蛋白重链 9（MYH9）抑制剂 Blebbistatin 组（Sham+Ble 组）、脓毒症组（CLP 组）、脓毒症+Blebbistatin 组（CLP+Ble 组）。采用盲肠结扎穿孔（CLP）法建立脓毒症小鼠模型。Sham+Ble 组和 CLP+Ble 组于 CLP 术前 1h 腹腔注射 Blebbistatin 溶液 5mg/kg ；Sham 组和 CLP 组小鼠腹腔注射等量磷酸盐缓冲液（PBS）。各组随机取 14 只小鼠观察 CLP 术后 24h 生存情况；各组其余 6 只小鼠于术后 24h 时心尖穿刺取血，采用酶联免疫吸附试验（ELISA）测定血浆中肿瘤坏死因子-α（TNF-α）、白细胞介素-β（IL-β）和白细胞介素-6（IL-6）浓度；光镜下观察小鼠肠组织病理学改变并进行 Chiu's 评分；采用免疫荧光法观察小鼠肠组织质膜膜泡关联蛋白（PLVAP)和肠道微血管内皮细胞（CD31）的共定位情况；分别采用蛋白质免疫印迹法（Western blot）和实时荧光定量聚合酶链反应（qPCR）法测定小鼠肠组织 MYH9、PLVAP、血管内皮钙粘蛋白（VE-cadherin）和 β-连环蛋白（β-catenin）的蛋白及其 mRNA 表达。

结果 与 Sham 组相比，CLP 组 24h 内生存率降低，血浆 IL-6、IL-β 和 TNF-α 浓度升高（P<0.05），肠黏膜绒毛脱落倒伏且 Chiu's 评分增加，提示 CLP 术后小鼠肠道损伤并出现全身炎症反应；与 CLP 组相比，CLP+Ble 组小鼠 24h 内生存率增加，血浆 IL-6、IL-β 和 TNF-α 浓度降低（P<0.05）、肠黏膜绒毛无明显断裂且 Chiu's 评分显著降低，说明抑制 MYH9 可减轻脓毒症小鼠肠道损伤及全身炎症反应。与 Sham 组相比，CLP 组小鼠肠组织 MYH9、PLVAP 和 β-catenin 的蛋白及其 mRNA 表达显著增加（P<0.05）、VE-cadherin 的蛋白及其 mRNA 表达显著降低（P<0.05），免疫荧光染色显示 PLVAP 与 CD31 共定位增加；与 CLP 组相比，CLP+Ble 组小鼠肠组织 PLVAP 和 β-catenin 的蛋白及其 mRNA 表达明显降低（P<0.05），VE-cadherin 蛋白及其 mRNA 表达量明显增加（P<0.05），免疫荧光染色显示 PLVAP 与 CD31 共定位减少，提示 MYH9 可能通过损伤肠道-血管屏障引发脓毒症小鼠全身炎症反应。Sham 组和 Sham+Ble 组上述指标无显著差异（P>0.05）。

结论 结论 MYH9 可能通过损伤肠道-血管屏障引发脓毒症小鼠全身炎症反应

PO-0031

Isoflurane Inhibition of Cystathionine-β-Synthase Leads to Social Cognitive Impairment in Adult Mice

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Background Anaesthesia has been reported to impair social cognition while the underlying mechanisms remain largely unknown. Volatile anaesthetic isoflurane is found to potentially disrupt methionine cycle and transsulphuration pathway, which may be associated with social deficits. Cystathionine-β-synthase (CBS) is known as a key enzyme in this pathway, but the impact of anaesthetics on CBS and the role of CBS in social cognition remain unclear.
Methods Adult male and female mice were anaesthetized by 2% isoflurane for 2 hours, and social cognition were examined 24 hours after the exposure. The alterations in neuronal activity were assessed by in vivo electrophysiological analysis. Pharmacological activator (S-adenosylmethionine, SAM) or inhibitor (aminooxyacetic acid, AOAA), and adeno-associated virus (AAV) were used to modulating CBS activity. The binding site of isoflurane on CBS was determined by X-ray crystallography. A novel transgenic model with point mutation knock-in was constructed to abolish CBS-isoflurane interaction in this study.
Results Isoflurane inhibits CBS activity (0.35-fold [0.07] vs 1.00-fold [0.05]; p<0.0001), leading to anterior cingulate cortex (ACC) neuronal hypoactivity and social cognitive impairments in adult mice. This causal link was evidenced by SAM, AOAA and AAV interventions. Structural and functional analysis identified the CBS key residue lysine273 (K273) in this isoflurane-induced inhibition. CBS K273A knock-in mice exhibited improved CBS activity compared with their wild type littermates after the same isoflurane exposure (2.17-fold [0.22] vs 1.00-fold [0.28]; p<0.001), with ACC neuronal hypoactivity and social cognitive dysfunctions successfully alleviated.
Conclusion These findings unveiled the crucial role of CBS inhibition by isoflurane in anaesthesia-induced social cognitive impairment.

PO-0032

Sepsis leads to impaired mitochondrial calcium uptake and skeletal muscle weakness by reducing the MICU1: MCU protein ratio

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目的 Intensive care unit-acquired weakness (ICUAW) is a severe neuromuscular complication that frequently occurs in patients with sepsis. The precise molecular pathophysiology of mitochondrial calcium uptake 1 (MICU1) and mitochondrial calcium uniporter (MCU) in ICUAW has not been fully elucidated. Here, we speculate that ICUAW is associated with MICU1: MCU protein ratio-mediated mitochondrial calcium ([Ca2+]m) uptake dysfunction.
方法 Cecal ligation and perforation (CLP) was performed on C57BL/6J mice to induce sepsis. Sham-operated animals were used as controls. Lipopolysaccharide (LPS) (5 μg/mL) was used to induce inflammation in differentiated C2C12 myoblasts. Compound muscle action potential (CMAP) was detected using a biological signal acquisition system. Grip strength was measured using a grip-strength meter. Skeletal muscle inflammatory factors were detected using ELISA kits. The cross-sectional area (CSA) of the tibialis anterior (TA) muscle was detected by hematoxylin

and eosin staining. Cytosolic calcium ([Ca2+]c) levels were measured using Fluo-4 AM. Adeno-associated virus (AAV) was injected into TA muscles for 4 weeks to overexpress MICU1 prophylactically. A lentivirus was used to infect C2C12 cells to increase MICU1 expression prophylactically.
结果 The results suggest that sepsis induces [Ca2+]m uptake disorder by reducing the MICU1: MCU protein ratio, resulting in skeletal muscle weakness and muscle fiber atrophy. However, MICU1 prophylactic overexpression reversed these effects by increasing the MICU1: MCU protein ratio.
结论 ICUAW is associated with impaired [Ca2+]m uptake caused by a decreased MICU1: MCU protein ratio. MICU1 overexpression improves sepsis-induced skeletal muscle weakness and atrophy by ameliorating the [Ca2+]m uptake disorder.

PO-0033

Activation of the hippocampal CA1 astrocyte Gq and Gi G protein-coupled receptors exerts a protective effect against attention deficit hyperactivity disorder

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Background Attention deficit hyperactivity disorder (ADHD) is characterized by symptoms such as inattention, hyperactivity and impulsiveness, which significantly impact the healthy development of children. Our prior research demonstrated that exposure to S-Ketamine during pregnancy can lead to the development of ADHD, and existing studies have established a close association between astrocytes and the onset and progression of ADHD. The activation and inhibition of astrocytes are closely linked to neuropsychiatric dysfunction, and astrocytic NOD-like receptor protein 3 (NLRP3) has been reported to contribute to alterations in mental state and cognitive deficits. Thus, this study aims to investigate the role of astrocytes in ADHD by selectively modulating astrocyte function through Gq and Gi G protein-coupled receptors (GPCRs) and by specifically targeting the knockout of NLRP3.
Methods Pregnant C57BL/6J mice or mice with a specific deletion of NLRP3 in astrocytes were administered intraperitoneal injections of 15 mg/kg of S-ketamine for 5 consecutive days from gestational day 14 to 18 to establish an ADHD model. To modulate astrocyte activity in the hippocampal CA1 region, we administered astrocyte-specific Gq-Adeno-associated virus (AAV) or Gi-AAV into the CA1 and maintained treatment with CNO. At 21 days postnatally, we conducted open field test (OFT), novel object recognition (NOR), elevated plus maze (EPM) and fear conditioning (FC) in the offspring mice. Additionally, on postnatal day 21, we implanted electrodes in the CA1 region of the offspring mice for neurophysiological monitoring and investigated local field potentials (LFP) during NOR on postnatal day 27. Lastly, pathological assessments were conducted after euthanasia.
Results Both the activation and inhibition of astrocytes in the hippocampal CA1 region improved impulsive-like behaviors and cognitive function in ADHD mice, reduced the power of theta (θ) oscillations during novel object exploration and decreased NLRP3-associated inflammatory factors, including cleaved caspase-1 and IL-18. Furthermore, compared to WT mice, astrocyte-specific NLRP3 conditional knockout mice demonstrated significantly reduced impulsive behavior and cognitive deficits, as well as a decrease in θ oscillation power and a reduction in NLRP3-associated inflammatory factors.

Conclusions Our data provide compelling evidence that the activation of astrocytic Gq or Gi pathways improves ADHD-like behaviors through NLRP3-dependent mechanisms.

PO-0034

Engineering Probiotics for Efficient Irisin Expression and Therapeutic Applications

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Objective Irisin, a myokine secreted during exercise, exhibits pleiotropic protective effects on various physiological functions [1-4]. The present study aimed to develop recombinant probiotics expressing Irisin using genetic engineering techniques and to evaluate their expression capacity and functionality, both in vitro and in vivo.
Methods In this study, we aimed to develop a novel system for the effective delivery of Irisin in vivo by utilizing probiotics engineered to continuously release Irisin. To achieve this, we obtained the commercially available E. coli Nissle 1917 probiotic strain as the source material for engineering [5]. The Irisin coding sequence was cloned into the pUC19 vector plasmid, incorporating an N-terminal NSP4 signal peptide for secretion and a C-terminal HA tag for detection. The recombinant pUC19-NSP4-Irisin-HA plasmid was transformed into the probiotic strain E. coli Nissle 1917 via electroporation [6]. The engineered probiotics were validated for Irisin expression in vitro using Western blotting. Subsequently, pseudo-germ-free mice were administered the recombinant probiotics via oral gavage, and Irisin expression in the intestines was assessed. Body weight, intestinal histology, and goblet cell organization were analyzed to evaluate the therapeutic effects.
Results: Genetic engineering, electroporation, and sequencing confirmed the successful construction of Irisin-expressing probiotics. In vitro experiments demonstrated high levels of Irisin expression by the engineered bacteria. Oral administration of the recombinant probiotics to pseudo-germ-free mice resulted in elevated Irisin and HA expression in the intestinal mucosa. Notably, mice receiving the Irisin-expressing probiotics exhibited a significant reduction in body weight, a characteristic attributed to the browning of white adipose tissue by Irisin. Immunohistochemical staining revealed increased and organized goblet cells in the colon, along with enhanced villus height and mucin thickness in the intestinal mucosa, suggesting improved gut barrier function and mucosal immunity.
Conclusion: This study successfully engineered probiotics with elevated Irisin expression and demonstrated their potential therapeutic effects in vivo. Oral supplementation with Irisin-expressing probiotics could serve as an effective strategy for elevating Irisin levels, conferring protective effects against metabolic disorders, and promoting gut health. Further investigations are warranted to explore the therapeutic potential of these engineered probiotics in various disease models.

PO-0035

SYNPO2 调节神经自噬损伤在 BMSCs 治疗新生儿缺氧缺血性脑损伤中的作用及机理研究

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目的 本研究旨在确定突触足蛋白-2（SYNPO2）在神经元自噬中的角色以及骨髓间充质干细胞（BMSCs）是否通过抑制 SYNPO2 调控神经自噬从而改善新生儿缺氧缺血性脑损伤（HIBD）功能障碍。

方法 在体外通过氧糖剥夺（OGD）1 h，体内通过缺血缺氧 1.5 h 构建 HIBD 模型诱导神经自噬性损伤。体外 OGD 后即刻用骨髓间充质干细胞的条件培养基（CM）干预，体内 HIBD 后 0.5 h 进行 BMSCs 移植治疗。利用 SYNPO2 干扰对照（shNC）和 SYNPO2 干扰（shSYNPO2）慢病毒感染体外培养到第 3 d 的皮质神经元以及第 3 d 的 SD 大鼠，并在第 7 d 构建体内外 HIBD 模型，用于探索 SYNPO2 是否参与神经元自噬性损伤。同样，利用 SYNPO2 过表达对照（SYNPO2 OE-NC）、SYNPO2 过表达（SYNPO2-OE）以及 SYNPO2 dPDZ 缺失突变体（SYNPO2-dPDZ）慢病毒体内外感染后构建 HIBD 模型并同时进行体外 CM 和体内 BMSCs 治疗。OGD 和 HIBD 建模后 24 h，通过实时荧光定量逆转录聚合酶链反应（RT-qPCR）、蛋白免疫印迹（WB）检测 SYNPO2 的表达。CCK8 试剂盒测定细胞活力，WB 和免疫荧光染色评估自噬损伤。在 HIBD 建模后 1d 进行透射电子显微镜检测大脑皮层自噬，7 d 进行前肢握力试验、复原试验、向地性试验和攀爬试验、22 d 进行转棒实验、26 d 进行旷场实验、29 d 进行 Y 迷宫以及 33 d 进行 Morris 水迷宫行为学检测及形态学染色评估慢病毒注射以及 BMSCs 移植对 HIBD 大鼠神经元自噬损伤以及运动和认知功能障碍的作用及其机制。

结果 体外 OGD 及体内 HIBD 模型构建后，原代皮质神经元和新生 HIBD 大鼠脑组织中 SYNPO2 基因及蛋白表达均升高。OGD 后神经元轴突损伤，凋亡率增加，自噬相关蛋白聚集。HIBD 大鼠出现神经元自噬性损伤，脑组织不完整，运动和认知功能障碍。而在 CM 干预和 BMSCs 移植治疗后 SYNPO2 表达下降，自噬相关蛋白减少、神经元损伤和 HIBD 大鼠运动和认知功能得到改善。感染了 shSYNPO2 慢病毒的 OGD 神经元及 HIBD 大鼠较 shNC 组相比，其 SYNPO2 的相对表达量下降；神经元自噬、HIBD 诱导的运动和认知功能障碍较 shNC 组显著改善。此外，进一步的结果发现与 SYNPO2 OE-NC 组相比，体内外感染 SYNPO2-OE 慢病毒的 OGD 神经元和 HIBD 大鼠在 BMSCs 治疗后出现神经自噬性损伤，SYNPO2 过表达导致 BMSCs 对 OGD 神经元和 HIBD 大鼠的改善作用被逆转。而体内外感染 SYNPO2-dPDZ 慢病毒的 OGD 神经元和 HIBD 大鼠在 BMSCs 治疗后神经元自噬性损伤和 HIBD 大鼠运动和认知功能障碍再次得到了改善。

结论 本研究表明 BMSCs 可抑制神经自噬减轻 OGD 和 HIBD 损伤，SYNPO2 调控神经自噬并参与 OGD 和 HIBD 后神经自噬性损伤和功能障碍，机制上，BMSCs 通过下调 SYNPO2 表达降低神经自噬性损伤从而在 HIBD 中发挥治疗作用。本研究将为 HIBD 治疗提供了新的靶点，为 BMSCs 治疗 HIBD 的临床应用提供了理论基础和实验依据。

PO-0036

UQCRC1 促进小鼠脑缺血后海马 CA1 区神经元轴突生长并改善其认知功能

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目的 探讨小鼠脑缺血损伤后泛醇-细胞色素 C 还原酶核心蛋白 1（ubiquinol cytochrome C reductase core protein 1，UQCRC1）对海马 CA1 区神经元轴突生长及小鼠认知功能的影响。
方法 构建小鼠全脑缺血（global cerebral ischemia，GCI）模型，采用蛋白免疫印迹法（western blot，WB）检测海马 CA1 区 UQCRC1 的表达，免疫荧光双标检测海马 CA1 区 UQCRC1 蛋白表达及海马原代神经元轴突生长情况，并通过慢病毒调控 UQCRC1 的表达，最后使用新物体识别、恐惧箱、Morris 水迷宫等行为学范式评估小鼠的认知功能。
结果 与 Sham 组相比，GCI 组小鼠的 UQCRC1 的表达降低，海马 CA1 区神经元轴突缩短，且其认知能力下降；过表达 UQCRC1 后，促进了 GCI 小鼠神经元轴突生长的恢复，GCI 小鼠的认知功能也得到显著改善。
结论 UQCRC1 能够促进小鼠脑缺血后神经元轴突生长从而改善认知功能。

PO-0037

Neural signature of consciousness in propofol general anesthesia

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General anesthesia (GA) involves reversible changes in consciousness states. Past studies reported a variety of changes in cortical activity and connectivity, yet the detailed functional connectomic changes in GA have not been fully elucidated. The present study utilized 128 channel-based high-density electroencephalograms with source localization analysis to conduct individual brain connectomes undergoing propofol GA. The results showed that at the network level, propofol GA induced enhancement in delta and theta frequency, with a reduction in alpha, beta, and gamma frequency. A classification model and dynamic analysis for loss of consciousness (LOC) indicated the alpha connectivity between parietal and subcortical (such as occipital cortex, thalamus, cingulate gyrus, and claustrum) areas are critical for consciousness recognition and found that the disruption of these connectivities represents a key transition in the process of LOC. Additionally, the prediction model for LOC also highlighted the significant value of resting-state alpha connectivity between parietal and subcortical areas in predicting the time from wakefulness to unconsciousness, thereby mitigating the risk of over-anesthesia or under-anesthesia. These results indicated the importance of the parietal cortex in the alpha band in maintaining conscious states, which support new biomarkers for brain states in GA.

PO-0038

Andrographolide exhibits antinociceptive effects in neuropathic rats via inhibiting class Ⅱ MHC associated response and regulating synaptic plasticity

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Background Neuropathic pain (NP) due to nerve injury, disrupts neural plasticity by triggering the release of inflammatory mediators. Alongside the hypothesis that neuro-inflammation contributes to this disruption, Andrographolide (Andro), a traditional bioactive compound derived from Andrographis paniculata, has garnered attention for its potent anti-inflammatory properties. However, whether Andro could ameliorate NP by regulating neuroinflammation remains unknown. Purpose: This study aimed to investigate whether and how Andro regulates neuroinflammation and alleviates NP.
Methods The analgesic effects of Andro on NP were evaluated using both the spinal nerve ligation (SNL) and formalin rat models. A combination of network pharmacology, RNA sequencing, and experimental validation was employed to elucidate the underlying mechanism behind Andro's analgesic effects. Additionally, various techniques such as functional ultrasound, immunohistochemistry, quantitative real-time polymerase chain reaction (qPCR), patch clamp, and electron microscopy were employed to investigate the specific neural cell types, neural functions, and changes in neural plasticity influenced by Andro.
Results Network pharmacology analysis unveiled the crucial roles played by shared targets of Andro and pain in regulating pain-related inflammation, including microglia activation, neuroinflammation, immune modulation, and synaptic transmission. Furthermore, we confirmed Andro's superior efficacy in pain relief compared to the traditional analgesic drug, Gabapentin. In these models, Andro was observed to modulate the haemodynamic response triggered by SNL. Transcriptome analysis and molecular docking studies indicated the involvement of major histocompatibility complex class II (MHCII) genes (Db1, Da, and Bb). Electron microscopy revealed improvements in synaptic ultrastructure, and electrophysiological investigations showed a selective reduction in glutamatergic transmission in neuropathic rats after following Andro treatment. The integration of systems pharmacology analysis and biological validation collectively demonstrated that the mechanism of pain relief involves immune modulation, enhancement of synaptic plasticity, and precise regulation of excitatory neurotransmission.
Conclusion In conclusion, this study has demonstrated that Andro, by targeting MHCII genes, Andro may serve as a promising therapeutic candidate for neuropathic pain.

PO-0039

肝细胞来源的肝前体样细胞通过诱导肝星状细胞凋亡治疗肝硬化

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目的 肝硬化是肝纤维化的晚期阶段，每年导致约一百万人死亡，占全球死亡率的 2.1%。失代偿性肝硬化是终末期肝病，肝移植是目前临床上唯一有效的治疗手段。然而，由于供体器官稀缺以及高昂的手术费用，目前移植率不到 10%。因此，亟需创新的医疗干预手段。细胞治疗作为一种前沿的生物医学技术，具有广阔的应用前景和巨大的发展潜力。对于一些难以治愈或无法逆转的疾病，细胞治疗提供了新的替代治疗选择，可以达到修复受损组织和器官的治疗作用。肝星状细胞（HSCs）虽然在肝细胞中占少数，但在肝硬化的发病和进展中起着至关重要的作用。在生理状态

中它们保持静息状态，然而在病理情况下，活化和增殖的 HSCs 转化为肌成纤维细胞，生成富含胶原的细胞外基质和炎症介质，从而加剧肝硬化的进展。阻断活化的肝星状细胞是治疗纤维化的关键靶点。本研究团队前期已经在国际上率先实现了肝细胞来源的肝前体样细胞（HepLPCs）在体外的扩增与鉴定。本研究的主要目标是将 HepLPCs 应用于肝硬化的治疗，明确其治疗效果，并以活化的肝星状细胞为具体治疗靶点，阐明其抗纤维化效果的潜在机制。

方法 本研究首先构建了大鼠及人类肝细胞来源的肝前体细胞（HepLPCs）。采用基因检测、荧光表达、流式分析、肝功能检测等鉴定了用于移植的细胞的特性。然后通过长期药物诱导损伤构建大鼠肝硬化模型，将大鼠或人类来源的 HepLPCs 经过脾脏注射用于大鼠肝硬化的治疗。经过两周的治疗后收集了大鼠的肝组织、血清等，通过 RNA 测序分析、免疫病理学分析、血清学指标等全面评估细胞移植治疗肝硬化的效果。尤其关注细胞治疗后对体内肝星状细胞（HSCs）的影响。之后通过细胞示踪与动物体内活体成像分析，确认细胞在体内的分布情况以及起作用的方式。在体外实验中，将 HepLPCs 分泌蛋白作用于肝星状细胞（HSCs），通过基因、蛋白表达分析、流式细胞分析等明确 HepLPCs 通过分泌蛋白诱导肝星状细胞凋亡的抗纤维化作用。最后结合细胞因子芯片与生信分析，进一步探究 HepLPCs 分泌蛋白诱导肝星状细胞凋亡的潜在分子机制。

结果 动物实验明确了大鼠及人类来源的 HepLPCs 移植均可有效治疗肝硬化。天狼星染色、肝脏内羟脯氨酸、纤维化评分等分析明确通过细胞移植可以显著减少纤维生成和总体纤维化水平，肝损伤生化指标也有所改善。并且经过 HepLPCs 处理后，免疫荧光显示大鼠肝脏内肝星状细胞（HSCs）的特异凋亡。通过细胞示踪，观察到 HepLPCs 在体内存活时间不超过 7 天。因此推测细胞通过旁分泌起到抗纤维化效果。在体外实验中，HepLPCs 分泌上清显著抑制了肝星状细胞活化相关的基因及纤维化相关通路 SMAD 蛋白的表达，并且效应呈现剂量依赖作用。随着作用时间的延长，LX2 表达凋亡蛋白 cleaved- caspase3 和 cleaved- PARP，明确了 HepLPCs 通过旁分泌作用诱导肝星状细胞的凋亡。进一步研究发现，经上清处理后，LX-2 的 STAT1 磷酸化水平显著上升，采用 JAK-STAT 通路化学抑制剂 P6 预处理以及采用 shRNA 降低 LX2 细胞中 STAT1 表达后，HepLPCs 上清诱导 LX-2 凋亡的细胞数目比例显著减少，由此推测 HepLPCs 上清通过激活 STAT1 通路诱导肝星状细胞的凋亡。

结论 肝细胞来源的肝前体细胞样细胞（HepLPCs）可以有效治疗肝硬化，改善肝纤维化及肝功能指标，其作用可能是通过分泌效应因子激活肝星状细胞的 JAK-STAT 通路进而诱导其凋亡而实现。

PO-0040

Transcriptional dynamics of the oligodendrocyte lineage and its regulation by the brain erythropoietin system

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Oligodendrocytes differentiate from oligodendrocyte precursor cells (OPC) in postnatal development but limited oligodendrogenesis is maintained throughout live. Oligodendrocyte lineage (OL) dynamics has been suggested to contribute to adult neuroplasticity, notably by adaptive myelination in response to sustained neuronal activity. However, mechanisms by which neuronal activity pushes oligodendrogenesis and/or myelination are unclear. Here, we explored novel aspects of OL dynamics, namely effects of recombinant human erythropoietin (rhEPO) and its receptor (EPOR) on OL in murine hippocampus. Using multiple stage-specific markers combined with single-nuclei-RNA-seq data, we found that rhEPO stimulates all OL cells and prompts oligodendroglial differentiation and maturation. Differential gene expression analysis reveals several EPO-regulated transcripts, including downregulation of GABA-A signaling, known to be associated with migration and OL progression. Importantly, analogous OL responses were seen when endogenous EPO expression in brain was stimulated by inspiratory (12%O2) or 'functional hypoxia' through motor-cognitive challenge. Interestingly, mice lacking EPOR in mature oligodendrocytes display mild working memory deficits, likely reflecting network

dysfunction. Our data support a working model in which brain EPO, induced by functional hypoxia through continual neuronal activity, drives adaptive myelination.

PO-0041

压后皮层小清蛋白阳性神经元在小鼠解离中的作用与机制研究

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目的 解离是一种持续的感知、意识、情绪与现实之间分离的状态，广泛存在于多种精神疾病中。既往研究已发现，压后皮层（retrosplenial cortex, RSC）脑区特异性的 delta（1~3 Hz）振荡与解离的产生存在因果关系。然而，与该脑区 delta 振荡产生及解离调控相关的特定神经元类型和分子机制目前尚不明确。本研究通过使用艾司氯胺酮（esketamine, ESK）建立稳定的小鼠解离样行为模型，旨在深入探索 RSC 中小清蛋白（parvalbumin, PV）阳性神经元的活性及其受体和离子通道在 ESK 诱导的神经振荡和小鼠解离样行为中的作用，以揭示解离样行为的分子机制，为解离治疗提供理论依据。

方法 本研究通过腹腔注射不同剂量的 ESK，并运用热板实验、悬尾实验、贴纸去除实验和旷场实验等行为学实验评估小鼠是否进入解离样状态，以此确定能诱导解离样行为的 ESK 给药剂量。随后，通过光纤钙信号记录及局部场电位（local field potential, LFP）记录技术，以及光遗传学技术特异性地抑制或激活 RSC 中的 PV 阳性神经元，探索这些神经元活性变化对 RSC 神经振荡和小鼠解离样行为的影响。最后，通过在 PV Cre 转基因小鼠的 RSC 脑区注射 Cre 依赖性的 Grin1 和 Hcn1 shRNA 腺相关病毒，实现特异性敲低 N-methyl-D-aspartate receptor 1（NMDAR1）和 hyperpolarization-activated cyclic nucleotide-gated channel 1（HCN1），探索这些分子在 ESK 诱导的神经振荡和解离样行为中的作用。

结果 实验结果显示，ESK 50 mg/kg 注射后，小鼠在热板实验中的舔爪频率显著下降（$p < 0.0001$），悬尾实验中的挣扎时间减少（$p = 0.0005$），贴纸去除实验中的接触和去除时间均显著延长（均 $p < 0.0001$），证实该剂量可有效诱导解离样行为。光纤钙信号记录显示，ESK 显著抑制 RSC 中的 PV 阳性神经元活性（$p < 0.001$），LFP 分析显示 ESK 增加 delta 频段功率（$p = 0.017$）和 gamma 频段功率（$p = 0.002$），并增强两者耦合（$p = 0.002$）。光遗传学抑制 PV 阳性神经元后，诱导了 delta 频段功率的增加（$p = 0.03$）及 delta 相位与 gamma 振幅的耦合增强（$p = 0.001$），并诱导解离样行为；激活这些神经元可减弱 ESK 诱导的解离效果。敲低 PV 阳性神经元特异性的 NMDAR1 和 HCN1 通道显著减弱 ESK 对 PV 阳性神经元的抑制效应（$p < 0.001$），并减轻解离样行为。

结论 ESK 50 mg/kg 能够可靠地诱导小鼠解离样行为的产生，并且 RSC 脑区的 PV 阳性神经元以及其 NMDAR1 和 HCN1 通道在 ESK 诱导的 delta 振荡和小鼠解离样行为中发挥着重要作用。

PO-0042

麻醉药物通过调控血管生发 改善新生大鼠缺氧缺血性脑损伤的作用研究

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目的 新生儿缺氧缺血性脑损伤（Hypoxic-ischemic brain injury，HIBI）是由于围产期缺氧窒息导致的一种严重疾病，是新生儿死亡的主要原因之一。在 HIBI 引发神经功能障碍的过程中，血管生发

相关的修复障碍是关键一环。大量研究表明，麻醉药物在新生鼠 HIBI 后发挥一定脑保护作用。在本研究中，我们建立新生大鼠 HIBI 模型，探究右美托咪定（Dexmedetomidine，DEX）和七氟烷是否通过调控脑血管生发发挥脑保护作用。

方法 1.DEX 保护作用的研究：7 日龄 Sprague-Dawley（SD）大鼠采用随机数字表法分为对照组（S 组）， HIBI 组（HI 组），低剂量 DEX 组（D10 组），中剂量 DEX 组（D50 组）和高剂量 DEX 组（D100 组），采用 Rice-Vannucci 法离断左侧颈总动脉+缺氧制备 HIBI 模型，建模 48h 采用 2，3，5-氯化三苯基四氮唑染色评估脑梗死面积，Western Blot 测定脑皮质 Notch，Hes1 以及 VEGFA 蛋白表达含量；建模 7d 采用炭黑灌注法观察 Willis 环及基底动脉直径；建模 35d 进行旷场实验评价大鼠运动功能；应用 Notch 信号通路抑制剂 DAPI，Western Blot 检测脑皮质 Notch，Hes1 以及 VEGFA 蛋白表达变化。

2.七氟烷保护作用的研究：7 日龄 SD 大鼠采用随机数字表法分为对照组（control 组），HIBI 组（HIBI 组），HIBI+七氟烷后处理组（HIBI+SEV 组），HIBI+notch 抑制剂组（HIBI+D 组），HIBI+七氟烷+抑制剂组（HIBI+SEV+D 组）。建模 7d 采用尼氏染色检测脑神经元损伤恢复情况；应用 Western Blot 检测 Notch 信号通路下游靶因子 Hes1 以及血管生发相关因子 CD31 和 VEGFA 表达水平；建模 28d 采用巴恩斯迷宫评价大鼠学习记忆能力。

结果 1. 与 S 组相比，HI 组大鼠的脑梗死体积明显增加，给予 DEX 后，大鼠脑梗死的体积减小；与 S 组相比，HIE 组大鼠在进入中心区域的时间和频次都有所减少，旷场活动总距离减少，DEX 后处理后，三者均有所提高；与 HI 组比，DEX 后处理组大鼠脑皮质中 VEGFA 蛋白表达水平均升高；HI 组与 S 组相比 Willis 环及基底动脉的直径无明显差异，而 DEX 后处理组与 HI 组相比 Willis 环及基底动脉的直径有所增加；各组间 Notch 和 Hes1 表达水平无明显差异。

2. 与 Control 组相比，HIBI 后各组海马区神经元数量减少，HIBI+D 组减少显著，给予七氟烷后处理，神经元数量增加；相比于 Control 组，HIBI 后大鼠各组血管生发相关蛋白 CD31,VEGFA 和 Notch 信号通路的下游转录因子 Hes1 表达量降低，使用七氟烷改善了这一结果；与 HIBI+SEV 组相比，HIBI+D 组大鼠在巴恩斯迷宫中探索潜伏期更长，找到错误洞穴的次数更多，HIBI+SEV+D 组逆转了这种变化。

结论 右美托咪定和七氟烷在新生大鼠 HIBI 后发挥一定程度的脑保护作用。其中右美托咪定通过增加 Willis 环直径；七氟烷通过 Notch 信号通路调控血管生发发挥脑保护作用。

PO-0043

支链氨基酸代谢障碍通过影响心脏巨噬细胞极化和功能加重心肌梗死结局

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目的 心肌梗死（MI）引起心肌细胞损伤和广泛的炎症反应。早期局部炎症有助于死细胞清除并启动心肌组织修复，但长期炎症会导致不良重塑和 MI 后心功能障碍。巨噬细胞在早期炎症和随后的修复阶段均发挥重要作用，经历从炎症型向修复型的转变，以促进急性炎症消退和随后的组织愈合。代谢状态对巨噬细胞表型转化非常重要，慢性缺血导致心脏过量支链氨基酸（BCAA）积累，但 BCAA 代谢是否影响心脏巨噬细胞表型尚不清楚。本研究旨在评估 BCAA 代谢如何调控巨噬细胞表型转化及其如何影响心肌梗死结局。

方法 本研究以 8 周龄雄性野生型（WT）和骨髓特异性 PP2Cm 缺失型 （mKO）小鼠为研究对象，通过永久性结扎小鼠冠状动脉左前降支，建立心肌梗死模型，四周后检测心功能及 MI 表型。通过心脏超声分析左室射血分数（LVEF%）、左室短轴缩短率（LVFS%）、左室收缩末期内径（LCESD）及舒张末期内径（LVEDD）评估小鼠心脏收缩功能及左室重构程度。利用 TUNEL 染

色观察心肌细胞凋亡以评估心肌损伤程度。另外，通过马松染色观察心肌组织纤维化，以免疫荧光观察成熟成纤维细胞活化情况。采用流式细胞术检测小鼠 MI 后外周血和心脏中炎症型和修复型单核巨噬细胞的数量及比例，同时免疫荧光观察心脏巨噬细胞分型。体外研究采用慢病毒感染 Raw264.7 构建 PP2Cm 敲低细胞。采用 Seahorse XF24 分析仪检测线粒体呼吸功能，评价其代谢状态改变。通过 qPCR 检测巨噬细胞炎症反应，另通过巨噬细胞与衰老红细胞共培养检测巨噬细胞的胞葬作用。

结果 与 WT 小鼠相比，PP2Cm-mKO 小鼠对 MI 损伤更加敏感。超声显示，PP2Cm-mKO 小鼠 LVEF%、LVFS%明显降低，同时伴随 LVESD 及 LVEDD 增加，提示 PP2Cm-mKO 小鼠心脏收缩功能受损且伴随左室重构。与心功能下降一致的是，PP2Cm-mKO 小鼠心肌细胞凋亡增加，但其心肌纤维化面积和成纤维细胞活化减少，提示 PP2Cm-mKO 小鼠可能存在心肌损伤加重但成纤维细胞活化受抑制。与此相关的是，心梗四周后 PP2Cm-mKO 小鼠外周血及心脏单核巨噬细胞比例增加，且心脏炎性巨噬细胞（$Ly6C^{hi}$）比例增加而修复型巨噬细胞（$CD206^{+}$）比例减少，提示 MI 四周后 PP2Cm-mKO 小鼠心脏仍以炎性巨噬细胞为主，过度到修复型巨噬细胞受阻。体外研究进一步表明，PP2Cm 缺失可抑制巨噬细胞线粒体呼吸功能，表现为炎性巨噬细胞代谢状态。同时，PP2Cm 敲低可促进巨噬细胞炎性细胞因子表达，抑制巨噬细胞胞葬作用，提示 PP2Cm 缺乏使巨噬细胞趋向于促炎表型，修复表型转变受阻。

结论 我们的研究结果揭示了 PP2Cm 缺乏引起的 BCAA 代谢障碍可能通过影响巨噬细胞代谢，介导炎症反应增强并阻碍其向修复表型转变而加剧心肌梗死后心肌损伤，其具体机制还需进一步探究。

PO-0044

Analysis of Volatile Organic Compounds in Exhaled Breath of Mice with Heart Failure with Reduced Ejection Fraction by Gas Chromatography-Tandem Time-of-Flight Mass Spectrometry

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Objective To detect and analyze the differences in exhaled breath volatile organic compounds between a mouse model of heart failure with reduced ejection fraction and normal mice using gas chromatography-tandem time-of-flight mass spectrometry.

Methods Trans-aortic constriction surgery was performed on 8-week-old wild-type male mice to establish a mouse model of heart failure with reduced ejection fraction caused by pressure overload (n=4-6). Sham group mice received no constriction surgery as control. After 2 months, echocardiography was performed to evaluate cardiac contractile function of mice in both groups, and myocardial tissues were fixed in 4% paraformaldehyde or frozen at -80℃. Cardiac hypertrophy was evaluated by heart weighing, HE staining, CD31 immunohistochemical staining, and WGA staining. Masson staining and myocardial fibrosis-related mRNA including Col1a2, Timp1, α-sma, Fn1, and Col1a1 were detected in myocardial tissue to assess fibrosis. The exhaled breath of mice in two groups was detected by gas chromatography-tandem time-of-flight mass spectrometry and data analysis was performed to screen for different volatile organic compounds between the groups.

Results Our study showed that mice that underwent trans-aortic constriction surgery showed cardiac systolic dysfunction 2 months later($P<0.05$), and heart weight/tibia length increased($P<0.05$), when compared to control mice. HE, CD31 and WGA staining showed cardiomyocyte hypertrophy and increased cross-sectional area($P<0.05$). Masson staining and fibrosis-related gene expression detection demonstrated increased myocardial fibrosis in mice($P<0.05$). Mass spectrometry detection showed that the exhaled breath volatiles of the two

groups of mice could well distinguish the mice in different groups. Database comparison and identification suggested that the differential volatiles of mice were mainly lipid peroxidation end products such as hydrocarbons.
Conclusion This study found that mice with heart failure with reduced ejection fraction had different exhaled breath compositions from normal mice, which may lay a preliminary foundation for the development of non-invasive heart failure diagnosis methods based on exhaled breath detection.

PO-0045

Heat Acclimation Defense against Exertional Heat Stroke by Improving the Function of Preoptic TRPV1 Neurons

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Background Record-breaking heatwaves caused by greenhouse effects lead to multiple hyperthermia disorders, the most serious of which is exertional heat stroke (EHS) with the mortality reaching 60%. Repeat exercise with heat exposure, termed heat acclimation (HA), protects against EHS by fine-tuning feedback control of body temperature (Tb), the mechanism of which is opaque. This study aimed to explore the molecular and neural circuit mechanisms of the HA training against EHS.
Methods Male C57BL/6 mice (6–8 weeks) and male TRPV1-Cre mice (6–8 weeks) were used in our experiments. The EHS model with or without HA training were established for this study. RNA-seq, qPCR, immunoblot, immunofluorescent assays, calcium imaging, optogenetic/ chemical genetic intervention, virus tracing, patch clamp, and other methods were employed to investigate the molecular mechanism and neural circuit by which HA training improves the function of POA neurons.
Results HA-related neurons in the medial preoptic area (mPOA) expressing transient receptor potential vanilloid-1 (TRPV1) were identified as a population whose activation reduces Tb; inversely, dysfunction of these neurons contributes to hyperthermia and EHS. mPOA TRPV1 neurons facilitate vasodilation and reduce adipose tissue thermogenesis, which is associated with their inhibitory projection to the raphe pallidus nucleus (RPa) and dorsal medial hypothalamus (DMH) neurons, respectively. Furthermore, HA improves the function of preoptic heat-sensitive neurons by enhancing TRPV1 expression, and Trpv1 ablation reverses the HA-induced heat tolerance.
Conclusions Preoptic TRPV1 neurons could be enhanced by HA, actively contributing to heat defense through the mPOA- DMH/RPa circuit during EHS, which results in the suppression of adipose tissue thermogenesis and facilitation of vasodilatation.

PO-0046

迷走神经电刺激对创伤性失血性休克大鼠肠粘膜屏障与远隔器官肺损伤的影响

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目的 探究电刺激迷走神经（VNS）对肠道屏障通透性的保护作用与远隔器官肺保护效应之间的关

联性及其机制。
方法 8 ~ 10 周龄雄性 SD 大鼠随机均分为 5 组： THS/R 组、VNS 组、VNS/C 组、VT 组和 Ctr 组。除 Ctr 组外，其余 4 组大鼠均经颈动脉放血制作 THS/R 模型，同时制作腹部贯通切口模拟创伤。容量复苏前 VNS 组和 VT 组用电流刺激右侧颈部迷走神经，其中 VT 组开始电刺激前离断腹腔迷走神经干；VNS/C 组刺激远离迷走神经的皮肤；刺激参数设置为 1.0mA、1Hz、0.1ms，时长 15min。容量复苏后 120min 向大鼠回肠注入荧光素标记的右旋糖酐(FD4)用于检测肠道通透性，30min 后处死大鼠获取标本，显微镜下观察肠道和肺组织损伤情况，测定血液 FD4、肺泡表面活性蛋白-D（SP-D）含量，以及肺组织 Caspase-3、Bcl-2、Bax 等凋亡蛋白和肠道、右心血与肺组织内 TNF-a、IL-6、NF-KB、HMGB1 等炎症因子的表达水平。
结果 THS/R 组、VNS 组、VNS/C 组和 VT 组肠道损伤评分增高、屏障通透性增加（P<0.05）。VNS 组损伤评分和屏障通透性明显低于 THS/R 组（P <0.05）；VNS/C 组和 VT 组评分明显大于 VNS 组（P <0.05），与 THS/R 组比较无显著性差异（P >0.05）；与 THS/R 组比较，VNS 组、VNS/C 组和 VT 组屏障通透性均明显降低（P <0.05），但 VNS/C 组和 VT 组通透性明显大于 VNS 组（P <0.05）。
THS/R 组、VNS 组、VNS/C 组和 VT 组肠道、右心血液和肺组织中 TNF-a、IL-6、NFκB 和 HMGB-1 等炎症因子的 mRNA 表达水平均显著增高（P <0.05）。VNS 组三个部位四种炎症因子的表达水平均明显低于 THS/R 组、VNS/C 组和 VT 组（P <0.05）。
THS/R 组、VNS 组、VNS/C 组和 VT 组肺组织内凋亡因子表达水平不同程度上调。VNS 组 Caspase 3 和 Bax 表达水平明显低于 THS 组、VNS/C 组和 VT 组（P <0.05），但 Bcl -2 表达水平显著大于 THS 组、VNS/C 组和 VT 组（P <0.05）。
THS/R 组、VNS 组、VNS/C 组和 VT 组肺损伤评分显著增高、循环内 SP-D 含量显著增加（P <0.05）。VNS 组、VNS/C 组和 VT 组损伤评分均显著低于 THS/R 组（P <0.05），但 VNS/C 组和 VT 组评分均明显高于 VNS 组（P <0.05）；循环内 SP-D 含量 VNS 组显著低于 THS/R 组、VNS/C 组和 VT 组（P <0.05），VNS/C 组和 VT 组含量与 THS/R 组比较无统计学差异（P >0.05）。
结论 电刺激迷走神经对创伤性失血性休克/容量复苏大鼠急性肺损伤的保护效应与肠道屏障通透性的降低有关，推测其关联机制为：迷走神经兴奋性增高降低肠道屏障的通透性，抑制肠源性炎症因子的生成和释放，降低肺内肠源性炎症物质水平，下调肺内 NF-κB 介导的炎症级联反应和促炎细胞因子的表达，从而抑制肺内细胞凋亡、减轻肺组织损伤。

PO-0047

Comparison of the estrogen withdrawal and chronic restraint stress and the maternal separation in mice postpartum depression modeling

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Background Postpartum depression (PPD) is a severe psychological and psychiatric disorder that affects women during the perinatal period. Animal models play a crucial role in studying the pathogenesis of PPD. However, a comprehensive comparison of the distinctive features of estrogen withdrawal (EW), chronic restraint stress (CRS), and maternal separation (MS) rodent models, which are commonly used in PPD research, is lacking.
Methods Three models of postpartum depression were developed in this study, and the success of modeling was judged by the Sucrose preference test (SPT) and the Tail suspension test (TST). SPT, Open field test (OFT), Elevated plus maze (EPM), Forced swim test (FST), and TST were performed sequentially at the end of the molding process. Reproductive hormone changes in the

peripheral blood, changes in GPR30 expression, and GPR30+ astrocytes in the hippocampus were also assessed.
Results The results showed no statistically significant difference in depressive-like behavioral changes in only MS mice compared to pre-modeling. Anxiety-like behavior was observed only in EW mice compared to their respective controls, and depression-like behavior was observed in all three models. In all three models, levels of E2 (Estradiol) showed a significant decrease, whereas levels of P (Progesterone) and PRL (Prolactin) showed statistically significant differences only in the CRS and MS mice, with a significant decrease in both levels of P, and PRL levels were significantly increased. WB results showed a significant decrease in GPR30 expression in hippocampal regions of EW and CRS mice, while MS mice did not show differences. The EW and CRS models expressed less GPR30+ astrocytes and the morphological complexity of astrocytes was significantly reduced in the hippocampal CA1 region.
Conclusion Our study shows for the first time that although all three models have been used to model postpartum depression. CRS mice may be a more suitable choice for studying PPD induced by socio-environmental factors.

PO-0048

Meox1 promotes cardiac fibrosis and pathological remodeling following myocardial infarction through Cthrc1/p-Smad2/3 signaling

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Background Myocardial infarction (MI) induces cardiac fibrosis and pathological remodeling, which seriously impairs cardiac function and results in heart failure. Mesenchyme homeobox 1 (Meox1) has been shown to be an essential transcriptional switch in fibroblast activation. However, whether and how Meox1 regulates cardiac fibrosis remains incompletely understood. The present study aims to evaluate its contribution and establish the corresponding mechanism in cardiac fibrosis and pathological remodeling following MI.
Methods and results: In this study, we identified Meox1 was highly expressed in activated fibroblasts in various heart diseases and validated the finding in MI mice model and in vitro primary cardiac fibroblasts (CFs) experiments. Deletion of Meox1 in CFs with specific adeno-associated viruses (AAV) remarkably attenuated cardiac fibrosis and adverse remodeling, and improved cardiac function in mice following MI. In vitro, Meox1 knockdown inhibited the activation, proliferation, migration and fibrosis-related molecules expression of primary CFs induced by transforming growth factor-β1 (TGF-β1), whereas overexpression of Meox1 resulted in the opposite effects. Mechanistically, Meox1 regulated collagen triple helix repeat containing 1 (Cthrc1) at transcriptional level and increased its expression, which promoted the downstream Smad2/3 phosphorylation, thereby leading to fibroblasts-to-myofibroblasts conversion. The overexpression of Cthrc1 mediated by AAV administration abolished the cardioprotective effects of Meox1 deletion. Moreover, Cthrc1 knockdown also suppressed the effects of Meox1 on facilitating the pro-fibrotic myofibroblast phenotypes and expression of p-Smad2/3 in primary CFs stimulation with TGF-β1.
Conclusion Our study revealed the regulatory role of Meox1 in promoting cardiac fibrosis and accelerating cardiac dysfunction by inducing the transdifferentiation of CFs to myofibroblasts through activating Cthrc1/p-Smad2/3 signaling pathway following MI. Meox1 might be a promising therapeutic target for cardiac fibrosis and remodeling in MI patients.

PO-0049

外侧隔核星形胶质细胞钙信号的增强 改善了失血性休克再复苏后小鼠的认知障碍

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目的 失血性休克是一种常见的临床急症，液体复苏常用于失血性休克患者的治疗。然而，患者在液体复苏后通常会出现不同程度的认知障碍，这不仅会对患者的生活质量产生负面影响，也会给患者的家庭和社会带来重大负担。认知障碍是一个复杂的医学问题，包括短期记忆障碍、空间定向障碍和学习能力下降。然而目前的治疗措施并没有取得令人满意的效果。星形胶质细胞是大脑中分布最广泛的细胞类型，对神经元的存活至关重要。本研究以星形胶质细胞为研究对象，探讨其在认知功能障碍中的作用，旨在揭示失血性休克再复苏（HSR）引起认知功能障碍的机制，从而提高患者的长期生活质量。

方法 我们以健康 C57BL/6 和 GFAP-cre 的雄性小鼠为研究对象，通过股动脉置管进行放血以及血液回输建立 HSR 模型，联合行为学和神经电生理学方法评估小鼠的认知功能。通过纤维光度法检测外侧隔核（LS）脑区星形胶质细胞钙信号变化。进一步，使用化学遗传方法激活 LS 脑区星形胶质细胞的 Gq 和 Gi 通路来对星形胶质细胞内钙离子进行调控，通过纤维光度法检测星形胶质细胞钙信号强度，以此来验证 Gq 和 Gi 通路激活对钙离子的调控。通过上述手段研究 HSR 后 LS 脑区星形胶质细胞钙信号的变化对小鼠认知功能的影响。

结果 HSR 后小鼠在新物体识别实验和简易社交实验中均表现出认知功能障碍。β、γ 振荡功率谱密度降低，θ 振荡相位与 γ 振荡幅值耦合异常，验证了 HSR 后小鼠认知功能受损。激活 LS 脑区星形胶质细胞 Gq、Gi 通路的小鼠分别表现出认知功能的改善和恶化，纤维光度法结果验证了激活 Gq、Gi 通路后胞内钙信号的变化，结果表明，增加 LS 脑区星形胶质细胞钙信号强度改善了 HSR 小鼠的认知障碍。

结论 本研究探讨了 LS 脑区星形胶质细胞在 HSR 后小鼠认知功能障碍中发挥的作用。特别地，我们研究了星形胶质细胞钙离子信号强度的变化对小鼠认知功能的影响。证实了增加 LS 脑区星形胶质细胞钙离子强度对于认知障碍的改善作用。本研究为如何改善 HSR 后认知功能障碍提供了有价值的见解。

PO-0050

Disruption of Circadian NRF2 Expression and Its Impact on Pain Sensitivity in Diabetes peripheral Neuropathy

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Objective Diabetic peripheral neuropathy (DN) is a common complication of diabetes, characterized by symptoms that are milder during the day and worsen at night. This study aims to uncover the mechanisms driving DN's diurnal pain patterns and potentially offer new insights into DN management and novel targets for chronotherapeutic interventions.

Method Male BKS Cg-m+/+Lepr db/J (db/db) type 2 diabetic mice (T2DM) were used as a model for DN. Body weight and glucose levels were monitored in both db/db and m/m mice from 3 to 16 weeks of age at Zeitgeber Time (ZT) 2 and ZT14. Diurnal pain sensitivity in the mice was evaluated by measuring mechanical withdrawal threshold (MWT) and thermal withdrawal latency (TWL) at ZT2 and ZT14 from 8 to 16 weeks of age. Peripheral nerve functions were assessed by

measuring sciatic nerve conduction velocity. Oxidative stress levels were quantified by measuring total reactive oxygen species (ROS) using 2',7'-dichlorodihydrofluorescein diacetate (DCFH-DA) staining in Dorsal Root Ganglia (DRG) tissue. Additionally, qPCR, western blotting, and immunofluorescent techniques were used to detect the expression and distribution of nuclear factor erythroid 2-related factor 2 (NRF2) in DRG.
Results A significant diurnal variation in neuropathic pain sensitivity was observed in db/db mice, with increased pain sensitivity at ZT2 compared to ZT14. Elevated levels of ROS were found in the DRG of db/db mice during the early light phase. In the DRG tissue of m/m mice, both NRF2 mRNA and protein exhibited diurnal rhythms, with higher expression at ZT2; however, this pattern was disrupted in db/db mice.
Conclusion The disruption of NRF2 rhythmicity and the consequent dysregulation of oxidative stress responses appear to contribute to the heightened pain sensitivity observed during the early light phase. These insights pave the way for the development of chronotherapeutic strategies targeting NRF2 pathways to more effectively manage DN pain.

PO-0051

心肌梗死心脏巨噬细胞 Trem2 参与调控溶酶体介导吞噬作用的机制

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目的 探索心肌梗塞后巨噬细胞 Trem2 高表达对溶酶体介导吞噬作用的具体机制
方法 结扎左前降支构建心肌梗死小鼠模型，通过 Western、PCR、免疫荧光、免疫组化等观察 Trem2 及吞噬相关分子在心梗后的变化；通过 Masson 染色、HE 染色、心超、cTNI、CK-MB 等评估心脏损害程度。提取原代骨髓源巨噬细胞（BMDMs）与老化红细胞共培养，构建吞噬作用的细胞模型，并使用 siRNA 及质粒干扰 Trem2 及溶酶体功能分子表达，通过 Western、免疫荧光、流式分析等评估 Trem2 及溶酶体功能分子对细胞吞噬作用的影响。
结果 1、心肌梗死后 1 周巨噬细胞 Trem2 高表达，并于吞噬功能增强一致
通过 HE 染色可发现心梗后第 5 天，心肌结构破坏最严重。通过 PCR、Western、免疫荧光、免疫组化确认了在心肌梗死后第 5 天，Trem2 表达水平最高。PCR、Western 也明确了 Mfge8 等吞噬标志物的增高同样在心肌梗死后第 5 天最显著。
2、Trem2 有利于巨噬细胞溶酶体功能及吞噬作用
（1）通过对比 WT 及 Trem2-/-心肌梗死小鼠，Western、免疫荧光均发现 Trem2-/-鼠 Mfge8 表达相对降低，同时伴随着溶酶体功能分子 Ctsd 的表达下降；F4/80 及 TNNI3 的免疫荧光在 Trem2-/-小鼠巨噬细胞中发现共标减少，即吞噬能力下降；透射电镜可见 Trem2-/-小鼠巨噬细胞吞噬体积累，可表明降解功能的减弱。
（2）通过对比 WT 及 Trem2-/-小鼠，Masson 染色、心超、cTNI、CK-MB 均显示了 Trem2-/-小鼠在心梗后第 5 天心肌损伤加重，Tunel 免疫荧光也显示 Trem2-/-小鼠局部炎症更明显。
3、Trem2 通过 Ctsd 影响溶酶体功能，调控吞噬作用
（1）提取 BMDMs，并使用流式分析鉴定纯度；将 BMDMs 与老化红细胞共培养，建立巨噬细胞吞噬作用模型。
（2）使用 siRNA 干扰 Trem2 表达，使用质粒影响 Ctsd 表达，Western 可见 Trem2 敲低后，Mfge8 表达下降；免疫荧光可见，Ctsd 表达下降，且 DQ-BSA 荧光减弱，说明溶酶体功能确实出现下降；同时，对影响溶酶体 PH 水平的关键性分子 PCR，说明了溶酶体功能变化并非源自 PH 的变化；此外，对溶酶体标志物 Lamp1 的 Western 和免疫荧光均未显示出差异。
（3）质粒增强 Ctsd 表达后，Western 可见 Mfge8 表达回升，免疫荧光见 DQ-BSA 也较 Trem2 敲低组增强，显示 Ctsd 可逆转溶酶体功能。

（4）使用流式分析 siRNA 和质粒干预对巨噬细胞吞噬功能的影响，在与红细胞共培养之前，先对原代巨噬细胞进行转染干预。当不与红细胞共培养，直接进行流式分析，可见 siRNA 干扰对巨噬细胞吞噬红细胞能力无影响；但在与红细胞共培养后，见 siRNA 干扰可减弱巨噬细胞吞噬红细胞的能力，且质粒增强 Ctsd 后，吞噬功能可部分恢复。

结论 心肌梗死后巨噬细胞 Trem2 高表达，促进溶酶体降解消化功能的实现，支持巨噬细胞吞噬作用，促进组织修复。

PO-0052

不同温度复温干预对大鼠慢性冷暴露致视觉损伤影响作用的研究

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目的 冷暴露所致低体温会对人体全身系统产生影响甚至损伤，如循环系统、神经系统等，神经系统中包括视觉、听觉、记忆和认知功能等。本研究通过探索在不同环境温度下进行复温治疗对冷暴露后大鼠初级视皮层（Primary visual cortex，V1）区脑电生理活动、行为学、组织学的影响，探究环境复温对于冷暴露低体温时视觉损伤的影响作用，并探索最佳复温温度。

方法 选用健康雄性 SD 大鼠 36 只，在排除视力障碍和眼部疾病后分为 6 组，每组 6 只。分别设为常温组、被动复温组、28℃复温组、31℃复温组、34℃复温组、37℃复温组，常温组不进行冷暴露处理，只进行脑电极置入手术，其余 5 组在脑电极置入手术 14 日后均进行-20℃环境温度的冷暴露，每日 6 小时持续 7 日，7 日后根据组别采取不同环境温度的复温干预。全部干预完成后进行黑白鼠箱系统行为学测试，测试完成后使用在体多通道记录技术（Multi-channel in vivo recording，MIVR）记录 V1 区自发电位及频闪刺激下的视觉诱发电位（Visual evoked potential，VEP），从而分析神经元群的电生理活动情况。采集完成后取血样本，离心得血清后进行酶联免疫吸附实验（Enzyme-linked Immunosorbent Assay，ELISA）检测血清 S100β 表达水平。取血后取脑组织，进行苏木精-伊红染色法（ hematoxylin-eosin staining，HE）观察 V1 区组织学改变，原位末端转移酶标记技术（TdT-mediated DUTP nick end labeling，TUNEL）观察 V1 区神经元凋亡情况，并进行荧光定量分析，蛋白免疫印迹法（Western Blot，WB）观察 V1 区 Bad 及 Bax 基因表达，判断脑组织细胞凋亡情况。

结果 被动复温组大鼠脑 V1 区自发 LFP 波形图曲线下面积明显小于常温组（P<0.001），接受闪光刺激后视觉诱发电位波峰平均幅值低于常温组（P<0.001），在经过 7 日每日 6 小时-20℃冷暴露后，大鼠脑 V1 区神经元细胞群节律性放电活动和对闪光刺激反应强度明显降低；黑白箱实验中大鼠在白箱活动及停留时间明显增加，其对光敏感度和视觉功能受到损伤；V1 区 TUNEL 染色平均荧光强度明显提高（P<0.001），HE 染色出现神经细胞水肿、细胞核固缩样、空泡样改变，血清中 S100β 浓度升高（P<0.001），促细胞凋亡基因 Bad 及 Bax 表达增多，脑 V1 区神经元细胞凋亡明显增加。

34℃复温组大鼠脑 V1 区自发 LFP 波形图曲线下面积大于其余复温组（P<0.01），接受闪光刺激后视觉诱发电位波峰平均幅值高于其余复温组（P<0.01），即经过 34℃复温治疗后脑 V1 区神经元细胞节律性放电活动和对闪光刺激反应强度均提高；黑白箱系统行为学测试中 34℃组大鼠光感度和视觉功能恢复良好，在白箱停留时间小于其他复温组（P<0.05）；34℃组脑 V1 区 TUNEL 染色平均荧光强度低于被动复温组、28℃组、31℃组（P<0.05），低于 37℃组但无统计学差异（P>0.05）；血清 S100β 水平 34℃组较其余复温组低（P<0.001）；主动复温各组 Bad 及 Bax 基因表达水平较被动复温组均有不同程度下降，证明 34℃组大鼠 V1 区组织及细胞损伤程度较其余复温组有所好转。

结论 冷暴露所致低体温会对大鼠脑初级视皮层造成损伤，并使其电生理活动受到影响，造成视觉功能下降。

复温干预对于冷暴露低体温大鼠初级视皮层损伤具有逆转损伤的作用，使其视觉功能有所提高，且最佳复温环境温度可能为 34℃。

PO-0053

Blockade of TRPV1 K710 site attenuates LPA-mediated myocardial injury during ischemia/reperfusion in isolated mouse hearts

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Background and Objectives: Lysophosphatidic acid (LPA) is a bioactive phospholipid known to exert biological functions not only through the classic LPA receptors but also via the capsaicin receptor (TRPV1). Prior research has highlighted the significant role of LPA/LPA receptor-mediated signaling in ischemic heart diseases. However, it remains unclear whether LPA can interact with the cardiac TRPV1 receptor in the context of myocardial ischemia. This study aims to investigate the impact of LPA on myocardial injury post-ischemia and the mechanisms involving the activation of the cardiac TRPV1 receptor at the lysine 710 (K710) site.
Methods Using CRISPR/Cas9 technology, a K710N mutation (lysine to asparagine) was introduced in a TRPV1K710N knock-in mouse model. Isolated hearts from TRPV1K710N and wild type (WT) mice underwent global ischemia/reperfusion (I/R) injury in a Langendorff perfusion system with or without LPA treatment. Infarct volume was assessed via TTC staining, and lactate dehydrogenase (LDH) levels in coronary effluents were measured. Myocardial mitochondria were examined using transmission electron microscopy. In vitro site-mutation of K710N was conducted based on the rat TRPV1 (rTRPV1) gene carried by a pCMV6-entry plasmid DNA. H9C2 cells were transfected with the rTRPV1-WT, rTRPV1-K710N, or control vector plasmid and cell viability was evaluated after LPA treatment. Mitochondrial calcium influx was assessed using fluorescence probes and observed under confocal microscopy. Furthermore, a sequence-specific peptide V1-Cal targeting the TRPV1 K710 region was applied to block the interaction of LPA with cardiac TRPV1 both in vivo and in vitro. All animal experiments were approved by the Experimental Animal Ethics Committee of Anhui Medical University (LLSC20221128).
Result: The TRPV1K710N mice exhibited resistance to I/R injury, as indicated by reduced myocardial infarction volume (WT: 38.1 ±1.51%, K710N: 25.16 ± 2.4%; P = 0.0189), lower LDH levels, and decreased mitochondrial swelling compared to WT mice. Exogenous LPA exacerbated I/R injury in WT mice, leading to increased myocardial infarction volume relative to the I/R + vehicle group (I/R + vehicle: 36.06 ± 3.09%, I/R + LPA: 57.8 ± 1.92%; P = 0.0002), along with severe mitochondrial swelling. Conversely, TRPV1K710N mice exhibited insensitivity to LPA treatment, with less increase in infarct volume compared to the WT mice LPA group (WT+ I/R + LPA: 57.8 ± 1.92%, K710N+ I/R + LPA: 33.8 ± 1.73%; P<0.0001). In H9c2 cells, cell viability significantly decreased in rTRPV1-WT cells compared to TRPV1-K710N cells following LPA treatment (rTRPV1-WT: 36.67 ± 2.91%, rTRPV1-K710N: 61.67 ± 2.19%, P = 0.0026). Moreover, mitochondrial calcium influx in rTRPV1-WT cells was higher than in rTRPV1-K710N cells post LPA treatment (rTRPV1-WT: 7.87 ± 0.59 AU, rTRPV1-K710N: 4.35 ± 0.27 AU, P < 0.0001). The V1-Cal peptide targeting the K710 region significantly alleviated LPA-induced I/R injury in WT mice. Cell viability reduction caused by LPA was also reversed by V1-Cal treatment (37 ± 2.89% in LPA group and 60.33 ± 4.41% in LPA + V1-Cal group; P = 0.0059).
Conclusions LPA exacerbates I/R injury in isolated mouse hearts through the activation of cardiac TRPV1 via the K710 site. The blockade of the TRPV1 K710 site by the K710N mutation or the sequence-specific V1-Cal peptide attenuated LPA-mediated myocardial injury, cell death, and mitochondrial dysfunction. These findings indicate that inhibiting the interaction of LPA with

cardiac TRPV1 by blocking the K710 region uncovers a novel strategy for preventing myocardial ischemic injury.

PO-0054

Dysfunction of astrocytic glycophagy exacerbates reperfusion injury in ischemic stroke

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Glycophagy has evolved from an alternative glycogen degradation pathway into a multifaceted pivot to regulate cellular metabolic hemostasis in peripheral tissues. However, the pattern of glycophagy in the brain and its potential therapeutic impact on ischemic stroke remain unknown. Here, we observed that the dysfunction of astrocytic glycophagy was caused by the downregulation of the GABA type A receptor-associated protein like 1 (GABARAPL1) during reperfusion in ischemic stroke patients and mice. PI3K-Akt pathway activation is involved in driving GABARAPL1 downregulation during cerebral reperfusion. Moreover, glycophagy dysfunction-induced glucosamine deficiency suppresses the nuclear translocation of specificity protein 1 and TATA binding protein, the transcription factors for GABARAPL1, by decreasing their O-GlcNAcylation levels, and accordingly feedback inhibits GABARAPL1 in astrocytes during reperfusion. Restoring astrocytic glycophagy by overexpressing GABARAPL1 decreases DNA damage and oxidative injury in astrocytes and improves the survival of surrounding neurons during reperfusion. In addition, a hypocaloric diet in the acute phase after cerebral reperfusion can enhance astrocytic glycophagic flux and accelerate neurological recovery. In summary, glycophagy in the brain links autophagy, metabolism, and epigenetics together, and glycophagy dysfunction exacerbates reperfusion injury after ischemic stroke.

PO-0055

The dynamic changes of PV neuronal plasticity mediated by perineuronal net in the retrosplenial cortex participate in memory regulation.

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The molecular, cellular, and network mechanisms that make up learning and memory have always been the main focus of modern neuroscience research. A special extracellular matrix structure called Perineuronal Nets (PNNS) exists around specific areas of neurons in the central nervous system, which dynamically remodels, regulates, and maintains synaptic plasticity changes induced by experience, thereby participating in the regulation of learning and memory processes. This study aims to explore the potential molecular mechanisms by which the PNNs of the retrosplenial cortex (RSC) mediates dynamic changes of parvalbumin (PV)-positive neuronal plasticity and participates in memory regulation, based on the structure or function of PNNs and PV neurons in RSC in contextual fear memory.
Methods The expression changes of PNNs, the PV-network configurations and the densities of synaptic puncta on PV-positive neurons in RSC were identified by immunofluorescence technology. The changes of calcium signals in RSC PV neurons at different phases of memory were measured by the fluorescence signal detected by Fiber Optometry System. The dynamic changes in the intrinsic electrophysiological properties of RSC PV neurons were analyzed by

patch clamp technology. The function of PNNs and PV neurons in fear memory regulation were validated by ChABC enzyme or viral strategies.
Results (1) The RSC is involved in conditional contextual fear memory. (2) Inhibition of RSC PV neuron activity mediates the formation and retrieval of fear memory. (3) The dynamic changes in synaptic structure on RSC PV neurons regulate the plasticity of PV neurons. (4) The dynamic remodeling of PNNs alters the synaptic composition and plasticity of PV neurons.
Conclusion The dynamic changes of PV neuronal plasticity mediated by perineuronal net in the retrosplenial cortex participate in memory formation, persistence, and retrieval.

PO-0056

PIEZO1 参与介导高血糖海马神经毒性：苯扎贝特的潜在治疗作用

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目的 高血糖应激可直接导致海马神经元损伤。机械敏感性离子通道 PIEZO1 可被高血糖活化，但其在高血糖神经毒性中的作用尚不清楚。
方法 通过构建高血糖小鼠模型和高糖 HT22 模型探讨了 PIEZO1 在高血糖神经毒性及糖尿病认知功能障碍中的作用。
结果 结果表明，PIEZO1 在高血糖中明显上调。体外实验表明，高糖应激诱导神经元细胞形态和膜张力变化，这是 PIEZO1 激活的关键机制。此外，高糖应激会上调血清/糖皮质激素调节激酶-1（SGK1）并通过钙库操作钙进入（SOCE）激活 PIEZO1 。PIEZO1 介导的 Ca2+流入进一步增强 SGK1 和 SOCE，诱导神经元细胞内 Ca2+高峰。PIEZO1 介导的细胞内 Ca2+升高导致钙/钙调蛋白酶 2α（CaMK2α）过度激活，通过 p-CaMK2α/ERK/CREB 和 ox-CaMK2α/MAPKp38/NFκB p65 通路促进氧化应激和细胞凋亡信号传导，随后引起突触损伤以及小鼠的认知障碍。泛酸激酶 1（PANK1）的内含子 miR-107 在大脑高度表达，并被发现靶向 PIEZO1 和 SGK1。PANK1 受体被过氧化物酶体增殖物激活受体 α（PPARα）激活，该激活剂已知可上调大脑中 miR-107 水平。临床上降脂药物苯扎贝特，一种已知的 PPARα 激活剂，可能通过神经元 PPARα/PANK1 通路上调 miR-107，从而抑制 PIEZO1 ，改善高血糖诱导的神经元细胞损伤。
结论 这项研究为高血糖神经毒性和糖尿病相关认知功能障碍的发病机制及药物治疗提供了新的思路。

PO-0057

Nicotinamide riboside attenuates myocardial ischemia‐reperfusion injury via regulating SIRT3/SOD2 signaling pathwa

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Ischemic heart disease invariably leads to devastating damage to human health in clinical settings. Nicotinamide ribose (NR), as one of the precursors of NAD+ synthesis, has been discovered to exert a protective role in various neurological and cardiovascular disorders. Our

findings demonstrated that pretreatment with 200 mg/kg NR for 3 h significantly reduced myocardial infarct area, decreased levels of CK-MB and LDH in serum, and improved cardiac function in the rats during myocardial ischemia-reperfusion (I/R) injury. Meanwhile, 0.5 mM NR also effectively increased the viability and decreased the LDH release of H9c2 cells during OGD/R. Mechanically, we had provided evidence that NR pretreatment could decrease mitochondrial reactive oxygen species (mtROS) production and MDA content, and enhance SOD activity, thereby mitigating mitochondrial damage and inhibiting apoptosis during myocardial I/R injury. Further investigations revealed that NR increased NAD+ content and upregulated SIRT3 protein expression in myocardium. Through using of SIRT3 small interfering RNA and the SIRT3 deacetylase activity inhibitor 3-TYP, we had confirmed that the cardioprotective effect of NR on cardiomyocytes was largely dependent on the inhibition of mitochondrial oxidative stress via SIRT3-SOD2 axis. Overall, our study suggested that exogenous supplementation with NR mitigated mitochondrial damage and inhibited apoptosis during myocardial I/R injury by reducing mitochondrial oxidative stress via SIRT3-SOD2-mtROS pathway.

PO-0058

Research on the Role and Mechanism of Human Neuroepithelial Stem Cells in Neonatal Bilirubin Encephalopathy

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Objective: This study aims to explore the therapeutic effects and potential mechanisms of human neuroepithelial stem cells (hNESCs) in neonatal bilirubin encephalopathy (NBE). NBE is a severe neuropathological condition in neonates caused by excessive accumulation of bilirubin in the brain, often leading to long-term neurodevelopmental disorders and motor dysfunctions. Current treatment methods are limited, highlighting the urgent need for effective therapies. Stem cell therapy offers a novel treatment possibility. This research investigates the neuroprotective and reparative functions of hNESCs, evaluating their application prospects in treating this type of brain injury.
Methods: The study was conducted using young crab-eating macaques and Sprague-Dawley (SD) rats. Bilirubin was injected into the striatum (CPU) area to successfully model NBE. Three days post-modeling, hNESCs treatment was administered. Behavioral tests such as motor activity and rotarod tests, motor evoked potentials (MEP), and functional magnetic resonance imaging (fMRI) were used to assess the impact of hNSCs treatment on motor, memory functions, and brain activity in NBE young monkeys. Immunofluorescence was employed to detect the survival, migration, and differentiation of transplanted cells in the rat brain, while electrophysiological analysis (patch-clamp technique) assessed their functional maturity.
Results: Experimental results indicated that after two months of hNESCs treatment, NBE monkeys exhibited significant improvements in motor activity ($P<0.001$) and memory function ($P<0.001$), with accuracy rates approaching pre-model levels. MEP values and brain activity in the upper and lower limbs showed significant recovery ($P<0.05$). Treated rats performed significantly better than controls in the rotarod, open field, and cylinder tests ($P<0.05$). Immunohistochemical analysis revealed that transplanted hNESCs survived up to six months in the rat brain and differentiated into neurons (CR, GABA, Brn2, Neun) and striatal-specific neurons (FOXP2, DARPP32), while releasing synaptic-related proteins (hsyn, PSD95). Moreover, the structure of astrocytes (GFAP) differentiated from hNESCs was more complex than native rat GFAP, indicating higher structural and functional maturity. Further patch-clamp testing showed that transplanted hNESCs gradually matured over time, with a significant increase in spike numbers induced by current at five months compared to three months ($P<0.01$). Additionally,

transplanted stem cells were capable of migrating to areas surrounding the CPU, the contralateral corpus callosum, piriform cortex, and sensory cortex, further confirming their integrative capacity in the brain.
Conclusion: This study demonstrates that hNESCs exhibit significant neuroprotective and reparative effects in treating NBE. They not only differentiate into various neural cells within the damaged brain regions but also gradually mature and integrate effectively with host brain tissue, thereby improving motor functions. These findings provide experimental evidence for NBE treatment and offer new therapeutic avenues for other types of neurological diseases. Future research will continue to explore the safety and efficacy of clinical applications to open new pathways for treating neurological diseases.

PO-0059

雌二醇介导的 db/db 小鼠心室重塑的性别差异

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目的 糖尿病心肌病作为糖尿病的严重并发症之一，是导致糖尿病患者死亡的主要原因之一。其中，心室重塑被认为是糖尿病心肌病的重要病理过程。雌二醇被认为有心血管保护作用，然而其在糖尿病心室重塑中的确切作用尚不清楚。本研究旨在探索雌二醇在 db/db 小鼠心室重塑作用，为糖尿病心肌病发病机制的性别差异，并为其治疗提供新的思路。
方法 我们选取 BKS Cg-m+/+Lepr db/J（db/db）小鼠作为 2 型糖尿病小鼠模型，以 db/m 小鼠作为对照。通过对小鼠心脏超声进行测量，评估心脏功能和结构，包括左室前壁厚度（LVAW）、左室后壁厚度（LVPW）、左室质量（LVmass）、射血分数（LVEF%）、短轴缩短率（FS%）。小鼠麻醉后通过眼球取血，测量血液雌二醇水平。取心脏组织，称取心脏重量（HW），测量胫骨长度（TL），计算心脏重量与体重比（HW/BW）和心脏重量与胫骨长度比（HW/TL）。我们利用 Masson 染色、HE 染色、WGA 染色测定心肌组织纤维化程度和心肌细胞横截面积。另外，通过实时荧光定量 PCR（qPCR）和 Western Blot（WB）检测 β 肌球蛋白重链（β-MHC）、A 型利钠肽（ANP）和一型胶原蛋白（Collagen I）的表达水平。最后，通过 RNA-Seq 分析雌性与雄性 db/db 小鼠心脏基因表达情况。
结果 在 22 周时，db/db 小鼠出现左心室肥厚，而雌性 db/db 小鼠相较于雄性表现出更为明显的心室肥厚（例如，雌性小鼠的 LVPWs、LVPWd、LVmass 分别为 1.74mm、1.04mm、145.56mg，而雄性小鼠为 1.43mm、0.91mm、118.68mg；$P<0.05$）。此外，雌性小鼠的心脏质量高于与同龄段雄性小鼠（例如，雌性 HW/BW、HW/TL 为 2.49、8.89，而雄性为 2.24、7.96，$P<0.05$）除此之外，β-MHC、ANP、Collagen I 在蛋白和 mRNA 表达水平均上调。22 周时，雌性小鼠体内雌激素水平明显下降。RNA-Seq 结果显示，雌性与雄性 db/db 小鼠心脏基因表达谱存在显著差异，特别是涉及与炎症反应、心肌肥大相关的基因表达，包括 Xist、Nppa、Serpina3n、Thbs4、Spp1 等，在雌性 db/db 小鼠中明显上调。
结论 22 周时，db/db 小鼠出现心肌重构的迹象。而在这一过程中，雌性小鼠的心室重塑更加明显，甚至可能比雄性更早出现心室重塑。这一结论体现在超声、心肌重量、组织学以及分子生物学水平。此外，22 周时，雌性小鼠体内的雌激素显著减少，这种雌二醇水平的下降可能与雌性小鼠更早表现出心室重塑有关。但仍需进一步的研究探索雌二醇在其中的作用机制。

PO-0060

IRF1 通过激活 NLRP3 炎症小体介导的焦亡促进脓毒症心肌病的心肌损伤的研究

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目的 大量证据表明炎症和焦亡参与脓毒症和脓毒症心肌病(SIC)的发生。干扰素调节因子 1(IRF1)是多种疾病中不可缺少的调节炎症和免疫反应的分子。然而，IRF1 在心血管疾病，特别是 SIC 中的作用尚不清楚。本研究旨在探讨 IRF1 在脂多糖(LPS)诱导的心脏损伤中的潜在分子机制。
方法 1.将雄性 C57BL/6 小鼠随机分为三组：对照组、LPS 组（腹腔注射 10mg/kg）和 LPS+NAC 组（LPS 注射后 4、8 及 16h 分别腹腔注射注射 100mg/kg IRF1 抑制剂 NAC），8 只/组。采用超声心动图评价小鼠心功能，HE 染色观察心肌组织病理变化，酶联免疫吸附试验检测小鼠血清中心肌损伤标志物肌钙蛋白（cTnI）和肌酸激酶（CK-MB）的含量，免疫组化检测白细胞和巨噬细胞标志分子 CD45、CD68 及焦亡相关分子 NLRP3、GSDMD 的表达情况，蛋白免疫印记法及实时荧光定量聚合酶链式反应检测小鼠心肌组织中焦亡相关分子 Caspase1 及 IRF1/NLRP3 信号通路分子的蛋白及 mRNA 表达水平。
2.用 LPS 处理 H9C2 心肌细胞体外构建 SIC 模型，将 H9C2 细胞分为四组：PBS-NC-siRNA 组、PBS-IRF1-siRNA 组、LPS-NC-siRNA 组和 LPS-IRF1-siRNA 组，采用 ELISA 检测炎症因子 IL-1β、IL-6 以及 TNF-α 的表达，蛋白免疫印记法及实时荧光定量聚合酶链式反应检测 H9C2 细胞中焦亡相关分子 Caspase1、GSDMD 及 IRF1/NLRP3 信号通路分子的蛋白及 mRNA 表达水平,免疫荧光检测 H9C2 的焦亡相关分子 Caspase1 和 GSDMD 表达。
结果 1.与对照组相比，LPS 组心肌病理损伤严重、心功能下降，有不同程度心肌纤维及排列结构的紊乱、炎性细胞的浸润，血清中的 cTnI 及 CK-MB 显著升高，心肌组织中 CD45、CD68、NLRP3 以及 GSDMD 的表达增高，Caspase-1、GSDMD、IRF1、NLRP3 的 mRNA 以及蛋白表达升高。与 LPS 组相比，LPS+NAC 组心肌病理损伤明显减轻，心功能好转，血清心肌损伤标志物及 CD45、CD68、NLRP3 及 GSDMD 表达降低，Caspase-1、GSDMD、IRF1、NLRP3 的 mRNA 以及蛋白表达下降。
2.与对照组 PBS-NC-siRNA 相比，LPS-NC-siRNA 组炎症因子表达增多，通路分子 IRF1/NLRP3、焦亡相关分子 Caspase1、GSDMD 表达增多，而 IRF1 沉默表达后的 H9C2 细胞，LPS-IRF1-siRNA 组较 LPS-NC-siRNA 组炎症因子表达下降、焦亡相关分子 Caspase1、GSDMD 及通路分子均表达下降。值得注意的是，PBS-IRF1-siRNA 组较 PBS-NC-siRNA 组的焦亡相关分子 mRNA 水平下降，但是蛋白水平无明显变化。
结论 LPS 诱导脓毒症发生后，IRF1 表达上升，心肌细胞出现焦亡诱导 SIC，IRF1 激活 NLRP3/Caspase1/GSDMD 信号通路诱导心肌细胞焦亡从而促进 SIC 的心肌损伤。

PO-0061

Astrocytic ALDH2 mediates alcohol metabolism and GABA synthesis in hippocampus

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Background The hippocampal GABAergic inhibitory transmission is involved in the acute and chronic effects of ethanol on the brain and behavior. However, little is known about the role of

alcohol metabolites in this brain area. The aim of this investigation is to explore the cell-type specific distribution and cellular effects of the key alcohol metabolizing enzyme, aldehyde dehydrogenase 2 (ALDH2), in the hippocampus.
Methods and Results: We generated astrocytic ALDH2 conditional knockout mice. We first observed that the levels of ALDH2 mRNA and protein were significantly reduced in hippocampal tissues from astrocytic ALDH2 deficient mice. ALDH2 mRNA was colocalized with GFAP, an astrocytic marker, in hippocampal slices, as revealed by RNAscope experiment. The signal of ALDH2 was abolished in astrocytic deficient slices. This suggests that brain ALDH2 is expressed in an astrocyte-specific manner. To examine the role of astrocytic ALDH2 in alcohol metabolism, we first examined serum and hippocampus EtOH and aldehyde in mice using gas chromatography-mass spectrometry. No significant difference was observed in hippocampal EtOH and aldehyde contents between mutant and WT mice. Next, we performed quantitative magnetic resonance spectroscopy (MRS) to exam brain acetate content and g-aminobutyric acid (GABA). We observed that astrocytic ALDH2 deficiency abolished ethanol-induced acetate production and enhancement of GABA content in hippocampus. Pretreatment of brain slices with ethanol at 50 mM and acetate at 1 mM for 50 min significantly enhanced both frequency of GABAergic mIPSCs and amplitude of tonic currents in hippocampal granule cells, respectively. In contrast, no such ethanol potentiation was observed in brain slices isolated from astrocytic deficient mice.
Conclusions These findings suggest that astrocytic ALDH2 mediates ethanol metabolism and GABA synthesis in hippocampus.

PO-0062

褪黑素通过 SIRT3 去乙酰化 TFAM 促进线粒体自噬改善脓毒症急性肾损伤

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目的 前言：脓毒症急性肾损伤（SAKI）是危重症病人常见的并发症之一，病死率高，预后差。目前认为，线粒体功能障碍是 SAKI 发生发展的中心环节，改善肾小管上皮细胞的线粒体损伤或许是治疗 SAKI 的关键靶点。线粒体自噬是线粒体质量控制的有效环节，可以清除损伤的线粒体以维持线粒体稳态。此外，线粒体蛋白的乙酰化水平与线粒体自噬和线粒体损伤密切相关。SIRT3 是线粒体主要的去乙酰化酶，具有激活线粒体自噬和改善线粒体损伤的作用。有文献报道敲除 TFAM 将导致溶酶体功能丧失，线粒体自噬流受到阻滞，从而导致线粒体质量控制无法有效完成。因此推测 TFAM 蛋白是线粒体自噬维持线粒体稳态的开关。有文献报道 SIRT3 可以去乙酰化 TFAM-K154 位点，激活 TFAM。褪黑素是 SIRT3 的有效激动剂，既可以改善 SAKI 也可以改善线粒体损伤。褪黑素已是上市药物，在临床上作为助眠剂应用广泛，安全性得到广泛的证实，具有很好的临床应用前景。结合文献回顾，我们提出研究假说：褪黑素促进线粒体自噬改善 SAKI 可能是通过 SIRT3 去乙酰化 TFAM-K154 位点实现的。
方法 构建盲肠结扎穿刺术（CLP）诱导的 SAKI 动物模型和 LPS 诱导的 SAKI 细胞模型，使用病理学染色、免疫荧光、免疫组化、透射电镜观察、免疫印迹、免疫沉淀、质粒和腺病毒的过表达等方法，观察褪黑素通过 SIRT3 去乙酰化 TFAM 增加线粒体自噬流通量改善 SAKI 的具体机制。
结果
1. SAKI 患者血浆褪黑素水平上调与肾脏线粒体损伤呈负相关
2. 褪黑素改善 SAKI 依赖于 SIRT3。褪黑素通过 SIRT3 改善 CLP 小鼠的肾功能，提高小鼠的生存率，减轻肾损伤；并改善 SAKI 细胞模型的线粒体损伤。

3. 完整的自噬流是褪黑素发挥保护作用的中心环节。褪黑素改善 CLP 小鼠的肾功能、提高小鼠的生存率、减轻肾损伤依赖于完整的自噬流；并且褪黑素改善 SAKI 细胞模型的线粒体损伤依赖于完整的自噬流。
4. 在动物和细胞模型中均证实，褪黑素促进线粒体自噬依赖于 SIRT3。
5. 褪黑素促进 SIRT3 去乙酰化 TFAM-K154 位点。在细胞和动物模型均证实，褪黑素促进 SIRT3 和 TFAM 物理相互作用，并且褪黑素减少 TFAM 乙酰化依赖于 SIRT3。在细胞模型中证实，褪黑素促进 SIRT3 去乙酰化 TFAM-K154 位点。
6. 在细胞模型中证实，TFAM-K154 位点是褪黑素通过 SIRT3 促进线粒体自噬流通量的关键位点。
结论
1、褪黑素改善 SAKI 依赖于 SIRT3 及自噬；
2、褪黑素促进线粒体自噬依赖于 SIRT3；
3、促进 SIRT3 去乙酰化 TFAM-K154 位点是褪黑素激活线粒体自噬的关键机制。
总之，我们发现了一种新的褪黑素治疗 SAKI 的信号通路，即通过上调 SIRT3 去乙酰化 TFAM 促进线粒体自噬从而改善 SAKI。本研究确定了褪黑素的分子靶点，并为褪黑素的临床应用提供了依据，为 SAKI 患者的治疗提供了希望。

PO-0063

过表达 miR-96 导致小鼠视网膜变性

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目的 视网膜高丰度微小 RNA-183 簇（miR-183C）已被报道为小鼠光感受器发育和功能的关键参与者。miR-183 和 miR-96 的双重敲除导致小鼠视网膜变性；我们前期研究发现，单独敲除 miR-96 会导致发育延迟，但过表达 miR-96 是否会影响视网膜发育或视网膜变性尚不清楚。
方法 本项目采用视网膜下腔注射的方法，注射 AAV-miR-96 以实现视网膜光感受器细胞的 miR-96 过表达。本项目采用视网膜电图（ERG）和光学相干断层扫描（OCT）评估过表达小鼠视网膜结构和功能的变化。本项目采用免疫染色评价视网膜细胞的定位和形态。本项目采用 RNA 测序技术分析视网膜转录改变。
结果 有趣的是，我们发现 miR-96 在安全剂量下的过度表达，也会导致小鼠视网膜的渐进性凋亡（图 1）。OCT 和 ERG 结果显示，视网膜下腔注射后一个月的冷冻切片所示，miR-96-过表达组的视网膜光感受器显著退化（图 1、2）。在 miR-96-过表达的视网膜中观察到视网膜变性特征，如 TUNEL 信号及反应性胶质增生（图 1）。RNA-seq 数据显示，免疫反应和小胶质细胞激活发生在过表达组视网膜上（图 3）。进一步 qRT-PCR 和免疫染色实验验证了小胶质细胞的激活（图 3）。此外，miR-96-过表达视网膜中的小胶质细胞数量显著增加（图 4）。
结论 结合先前的系列研究，本项目发现小鼠视网膜稳态需要准确的 miR-96 表达，过高或敲除均导致视网膜结构异常。

PO-0064

The role of baicalein in regulating the Nrf2-mediated ferroptosis pathway in acute Myocardial injury in rats with high-level spinal cord injury

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Objective To investigate the role of baicalein in regulating the Nrf2-mediated ferroptosis pathway in acute myocardial injury in rats with high-level spinal cord injury.
Methods Twenty-four clean-level healthy adult male SD rats weighing 250-300g for 8-10 weeks old were randomly divided into four groups (n=6): Sham group, high-level spinal cord injury (SCI) group, high-level SCI+baicalein group (SCI+Bai group), and high-level SCI+baicalein+Nrf2 inhibitor ML385 group (SCI+Bai+ML385 group) according to the random number table. The high-level spinal cord injury model was established by the modified Allen's weight-drop method, and the spinal cord was only exposed in the Sham group. The SCI+Bai+ML385 group received a preoperative intraperitoneal injection of 30 mg/kg ML385 one hour before surgery, while the SCI+Bai group and SCI+Bai+ML385 group received an immediate intraperitoneal injection of 50 mg/kg baicalein postoperatively. The postoperative performance and BBB score for limb movement were obserbed in each group, and myocardial tissue was collected 24 hours postoperatively. Histological changes in myocardial tissue were observed using HE staining, myocardial cell ultrastructure was observed using transmission electron microscopy, serum cTnI levels were measured using ELISA, myocardial tissue Fe^{2+} content was determined using a colorimetric method, and myocardial tissue malondialdehyde(MDA), glutathione(GSH) content, and superoxide dismutase(SOD) activity were measured using biochemical methods. RT-PCR and Western blot were used to detect mRNA and protein expression levels of glutathione peroxidase 4(GPX4), acyl-CoA synthetase long-chain family member 4(ACSL4), and nuclear factor rythroid-2-related factor 2(Nrf2) in myocardial tissue.
Results Mean BBB score was 21 points in Sham group, with normal limb motion after operation but with no significant change from the preoperation level.Rats in the other groups showed significantly reduced activity and feeding postoperatively, with both hind limbs exhibiting flaccid paralysis and a BBB score of 0, significantly different from the Sham group ($P<0.001$). HE staining revealed intact myocardial structure in the Sham group. Myocardial tissue pathology was more severe in the SCI group compared to the Sham group, but was alleviated in the SCI+Bai group compared to the SCI group. However, in the SCI+Bai+ML385 group, myocardial tissue pathology worsened compared to the SCI+Bai group. Transmission electron microscopy showed no obvious abnormalities in myocardial cell structure in the Sham group. Compared to the Sham group, myocardial cells in the SCI group exhibited significant damage and changes indicative of ferroptosis. In the SCI+Bai group, myocardial cell damage and ferroptosis changes were reduced compared to the SCI group. However, in the SCI+Bai+ML385 group, myocardial cell damage and ferroptosis changes worsened compared to the SCI+Bai group. Compared to the Sham group, the SCI group showed elevated serum cTnI levels, increased myocardial Fe^{2+} and MDA content, decreased GSH content, weakened SOD activity, decreased GPX4 and Nrf2 mRNA and protein expression in myocardial tissue, and increased ACSL4 mRNA and protein expression, all statistically significant ($P<0.05$). Compared to the SCI group, the SCI+Bai group showed decreased serum cTnI levels, reduced myocardial Fe^{2+} and MDA content, increased GSH content, enhanced SOD activity, increased GPX4 and Nrf2 mRNA and protein expression in myocardial tissue,and decreased ACSL4 mRNA and protein expression, all statistically significant ($P<0.05$). When compared to the SCI+Bai group, the SCI+Bai+ML385 group exhibited elevated serum cTnI levels, increased myocardial Fe^{2+} and MDA content, decreased GSH content, weakened SOD activity, decreased GPX4 and Nrf2 mRNA and protein expression in myocardial tissue, and increased ACSL4 mRNA and protein expression, all statistically significant ($P<0.05$).

Conclusion Rats with high-level spinal cord injury (SCI) exhibit acute myocardial injury. Ferroptosis is involved in the process of acute myocardial injury in rats with high-level SCI, and inhibiting ferroptosis can alleviate myocardial damage. Baicalein has a protective effect on acute myocardial injury in rats with high-level SCI, and its mechanism may be related to the regulation of the Nrf2-mediated ferroptosis pathway.

PO-0065

Demystifying the Nexus: Crosstalk Gene Signatures and Biological Mechanisms Underpinning H1N1-related ARDS

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Background H1N1 influenza and Acute Respiratory Distress Syndrome (ARDS) represent formidable public health challenges, shrouded in the complexity of their molecular underpinnings that have yet to be fully deciphered. Elucidating the intricate relationship between H1N1 influenza and ARDS, particularly in sepsis-induced ARDS, is of paramount importance for identifying potential therapeutic interventions to mitigate hospitalization and mortality risks.
Methods This study conducted an analysis of Differentially Expressed Genes (DEGs) by examining datasets from the GEO platform for H1N1 (GSE27131) and ARDS (GSE243066). A Protein-Protein Interaction (PPI) network was constructed for these DEGs, followed by Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) enrichment analyses. Utilizing expression quantitative trait loci (eQTL) analysis and the FinnGen database, instrumental variables (IVs) associated with ARDS were identified. Subsequently, a two-sample Mendelian Randomization (MR) analysis was employed to investigate the causal relationship between DEGs and ARDS. For hub genes demonstrating a causal link, further immune infiltration analysis was performed on peripheral blood from ARDS patients, and these findings were validated through the GSE243066 dataset and in vitro experiments to compare gene expression between ARDS patients and controls.
Results A total of 266 DEGs were identified as common between H1N1 and ARDS, with biological mechanisms primarily related to defense response to bacterium, T cell receptor signaling pathway, and Th17 cell differentiation. Immune infiltration analysis revealed consistent differences in plasma cells, CD8 T cells, memory resting CD4 T cells, and M0 macrophages between the two conditions. MR analysis indicated that CLEC5A, GLRX, IFI27, MMP9, SERPINB1, TDRD9, and VNN1 are DEGs with a causal relationship to ARDS. These hub genes showed a positive correlation with M0 macrophages and neutrophils, and a negative correlation with CD8 T cells and memory resting CD4 T cells in the immune infiltration analysis. PCR results confirmed the expression trends and significance for CLEC5A, GLRX, and MMP9 were consistent with the GSE243066 dataset, while other genes showed variability in expression.
Conclusions Our research has illuminated potential therapeutic targets and biomarkers, offering a deeper understanding of the immune responses in patients with ARDS. It has highlighted the intricate link between ARDS and H1N1 influenza, paving the way for innovative and prospective avenues of targeted therapeutic intervention.

PO-0066

Advancing cell-based therapy in sepsis: An anesthesia outlook

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Background and objectives: Sepsis is a global health problem with high morbidity and mortality. Although Bundle therapy has been proposed for morethan two decades, transient organ supportive therapy alone or clinical trials targeting signaling pathways have failed to eficienty reverse multi-organ falurein sepsis. Therefore, novel therapies aiming at resolving organ injuries are urgently required.
Methods Search approach: performed 1 October 2023; Clinicaltrials.gov: advanced search; Condition - Sepsis; Study Type -Interventional,Intervention/treatment - Cell; of 92 studies, exclude non-sepsis patients (n = 17) and non-cel therapy trials (n = 53); leaving 22 available studies.
Results Eveny cloud has a silver lining. Cel therapy as a therapeutic strategy shows a great potential for malionant cancers, ene diseases and neurologicadiseases, Considering immune cel responses are maior determinants in the pathogenesis of sepsis, stem ce-based therapies, modulating immuneresponses mainly by interacting with diverse immune cels, have entered the cinical trial stage. The advances in single-cell sequencing and gene-editingtechnoloay has accelerated the elucidation of the role of disease-specific immune responses in sepsis.chimeric antigen receptor (CAR)-immune cells therapyinspires us to investigate thei potential application in sepsis treatment. Our study briely introduce immune cel therapy, its current status and researchprogress in sepsis to provide potential rescue strategies for sepsis during perioperative stages.
Discussion and Conclusion: Sepsis is a great challenge for anesthesiologists. Bundled therapies including early fuid resuscitation, rapid antibiotics administration, hemodynamic stablization, and organ-supportive treatment, have greatly improved the survival of patients. However, no remedy can efficiently repair multi-organ failure caused by sepsis. But as an old saying goes, after dark clouds, there will always be sunny days. Taken together with the evidence, we believe that novel cell-based immunotherapy might be a promising new treatment for sepsis. MSCs-based therapy are thought to be apromising treatment for sepsis, and adipose derived-MSCs have already entered phase 2 clinical trial NCT05283317, future studies need to futher evaluate their infusion dosage, route of administration, storage method, etc. Macrophages are currently stilin pre-dinical stages in sepsis. In our research, Trem2hi macrophages were demonstrated to be able to clear the debris, repair the injured tissue, maintain the perfusion and thus prompt the outcome of surgicalsepsis. Due to thelr strong phagocytosis and bacteral defense ability, macrophages have become a very promising therapeutic strategy for future treatmentof sepsis. Other immune clls induding neutrophils, NK cells, DC cells, T clls and B cels also show their potential in treating sepsis patients perioperatively. Though great progresses have been made so far, presing challenges remain when planning reatments, induding the heterogeneity of sepsis patients, the different stages of the disease, and the diferences in the individual environment. It is pivotal and imperative to speed the bench, preclinical and clinicalstudies to benefit the sepsis outcome.

PO-0067

VTA DA-pBLA 神经环路参与奖赏促进恐惧记忆消退的机制研究

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目的 创伤后应激障碍是一种与创伤记忆特别是恐惧记忆相关的心理疾病。认知行为暴露疗法作为目前主要的治疗方法，其治疗效果受到创伤记忆的反复重现及其他相关因素的干扰，其有效性亟待提高。既往研究表明，奖赏性刺激可以缓解焦虑抑郁症状和促进恐惧记忆的消退，但其涉及的神经机制及具体的原理仍然不明。本研究中，我们采用性接受雌鼠的陪伴作为自然奖赏刺激，旨在探究奖赏刺激促进恐惧记忆消退的潜在机制。
方法 1.探究自然奖赏刺激对 pBLA 区域谷氨酸能神经元兴奋性的影响。（1）将恐惧记忆形成小鼠与性接受雌鼠共饲养 24 小时，以构建奖赏组，对照组与雄性雄小鼠共饲养；（2）利用免疫荧光技术观察 pBLA 区 c-Fos 和 CAMKII 的共标情况；（3）应用膜片钳电生理记录法检测 pBLA 区 CAMKII 神经元的诱发放电频率；（4）利用 RT-PCR 检测 pBLA 区 PPP1R1B 的 mRNA 表达变化；（5）利用 WB 检测 pBLA 区 PPP1R1B（多巴胺和 cAMP 调节磷蛋白）的总蛋白和磷酸化蛋白分子表达变化。2.探究自然奖赏刺激对 VTA 区多巴胺能神经元兴奋性的影响。（1）利用免疫组化法检测 VTA 区 c-Fos 蛋白的表达变化；（2）利用 WB 检测 VTA 区 TH 蛋白的表达变化；（3）利用免疫荧光观察 VTA 区 c-Fos 和 TH 的共标情况；（4）利用钙信号实时记录检测奖赏刺激时 VTA 区多巴胺能神经元钙信号的变化。3.探究 VTADA-pBLA 通路在奖赏促进恐惧记忆消退和奖赏实时位置偏好中的作用。（1）应用顺行病毒和逆行 retro 病毒荧光示踪剂验证环路的解剖联系；（2）光遗传激活和抑制 VTA-pBLA 环路的多巴胺能神经元，观察其对恐惧消退和实时位置偏好的影响。
结果 1.自然奖赏刺激可以降低 pBLA 区谷氨酸能神经元兴奋性。（1）性接受雌鼠可以促进实验小鼠的恐惧记忆消退；（2）免疫荧光和膜片钳电生理结果显示 pBLA 区的谷氨酸能神经元兴奋性降低；（3）RT-PCR 和 WB 结果显示 pBLA 区的 PPP1R1B 及其磷酸化蛋白均增加。2.自然奖赏刺激增加 VTA 区多巴胺能神经元兴奋性。（1）免疫荧光和 WB 结果显示 VTA 区的多巴胺能神经元兴奋性增加；（2）钙信号实时记录显示奖赏刺激时 VTA 多巴胺能神经元内钙信号增加；3.VTADA-pBLA 通路参与奖赏促进恐惧记忆消退。（1）病毒示踪结果显示 VTA 区多巴胺能神经元投射至 pBLA 区域；（2）光激活 VTADA-pBLA 通路可促进恐惧记忆的消退并显示出对奖赏的实时位置偏好；（3）光抑制 VTADA-pBLA 通路可减缓恐惧记忆的消退，并逆转对奖赏的实时位置偏好。
结论 结论 1.奖赏刺激可通过降低 pBLA 区谷氨酸能神经元兴奋性从而促进恐惧记忆的消退；2.奖赏刺激可增加 VTA 区多巴胺能神经元兴奋性从而增强 VTADA-pBLA 神经投射；3.VTADA-pBLA 通路参与奖赏刺激促进恐惧记忆消退和奖赏的实时位置偏好。

PO-0068

The mechanism of SIRT1/PGC-1α signaling pathway in regulating mitophagy mediated postoperative neurocognitive disorders

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Background Perioperative neurocognitive disorders (PND) is a central nervous system complication that occurs during the perioperative period in elderly patients. is Mitophagy plays an important role in maintaining the normal physiological functions of cells. In the central nervous system, SIRT1 is suggested to be involved in regulating synaptic plasticity and stress responses

and thus plays a protective role in aging and neurodegenerative diseases. Peroxisome proliferator-activated receptor gamma coactivator-1α (PGC-1α) is a highly conserved transcriptional coactivator described as a master regulator of mitochondrial biogenesis and function, including oxidative phosphorylation and reactive oxygen species detoxification. SIRT1/PGC-1α signaling pathway may play a pivotal role in mitophagy, and could be considered an endogenous neuroprotective mechanism counteracting stress-induced neuronal cell damage following surgery and anesthesia. These results provide new ideas for the prevention and treatment of PND, but more studies are needed.

Methods Adult male C57BL/6 (n=96) mice aged 15–17 months and weighing 30–40g were randomly divided into 8 groups: Control group (mice that did not receive any treatment served as control, n=12); Surgery group (mice that received orthopedic surgery, n=12); Surgery+CCCP group (surgical groups with autophagy agonist intervention, n=12); Surgery+ZLN005 group (surgical groups with PGC-1α agonist intervention, n=12); Surgery+Lv-NC group (surgical groups with stereotactic injection of negative control lentivirus, n=12); Surgery+Lv-SIRT1 group(surgical groups with stereotactic injection of SIRT1 overexpression lentivirus, n=12); Surgery+SR-18292 group(surgical groups with intraperitoneal injection of PGC-1α inhibitor, n=12); Surgery+SR-18292 group(surgical groups with stereotactic injection of SIRT1 overexpression lentivirus and intraperitoneal injection of PGC-1α inhibitor, n=12). 8 groups of mice were subjected to Morris water maze (MWM) tests for 4 consecutive days before operation and on the 3rd day after operation. One day before surgery and the third day after surgery, the mice in each group were subjected to Open field tests（OFT） and Novel object recognition (NOR) tests. The next day after training, mice underwent orthopedic surgery under 1.2%-1.5% isoflurane anesthesia. 5 days before orthopedic surgery, SIRT1 overexpression lentivirus and its negative control were used to perform stereotaxic in the CA1 area of the hippocampus of mice in the lentivirus injection group. For the drug intervention group, mice were injected intraperitoneally for the first time, and then intraperitoneally injected at the same time point on three consecutive days after surgery. On the 3rd day after the operation, the mice were sacrificed and the hippocampus tissue was taken after the behavioral testing experiment completed. Six mice were randomly selected from each group, and Western Blot was used to detect the protein expression levels of SIRT1, PGC-1α, LC3B Ⅱ/Ⅰ, Beclin-1, p62, PINK1 and Parkin of hippocampus. RT-PCR was used to detect the mRNA levels of SIRT1 and PGC-1α in the hippocampus. The expression levels of TNFα, IL-1β and IL-6 was detected using ELISA. DHE staining was used to determine the level of reactive oxygen species. The mitochondrial morphological changes of the mouse hippocampus were observed using transmission electron microscope.

Results The MED64 multi-electrode array method was used to successfully record the spontaneous discharge of mouse hippocampal slices can be used to establish a mouse PND model of hippocampal slice. The animal behavior tests including OFT, NOR and MWM were performed to evaluate the exploratory behavior and learning and memory abilities of elderly mice on the whole animal level. In MWM test, comparing with the control group, the proportion of time and the number of crossing times in the target quadrant were significantly reduced in the surgery group($P<0.001$). Firstly, use electrophysiological and behavioral experiments to verify the successful construction of PND animal models. Secondly, Mitophagy enhancement was verified to improve perioperative neurocognitive impairment of elderly mice using different experimental methods. Western blotting and statistical analysis showed the protein expression of PINK1, Parkin, LC3B Ⅱ/Ⅰ, Beclin-1 dramatically reduced in PND mice compared with control, while mitophagy agonist CCCP can upregulate the expression of PINK1, Parkin, LC3B Ⅱ/Ⅰ, Beclin-1. However, the level of p62 expression showed the opposite change. CCCP attenuated the impairment of cognitive function in PND mice. Surgery+CCCP group could promote the expression of mitophagy-related proteins ($P<0.001$, vs surgery). Mitophagy enhancement can reduce the expression of TNFα, IL-1β and IL-6 in the hippocampus of elderly mice with PND($P<0.01$ vs surgery). Mitophagy enhancement can rescue the damage caused by oxidative stress in the hippocampus of elderly mice with PND($P<0.001$ vs surgery). Mitophagy enhancement can improve learning and memory capacity of elderly mice using the Morris water maze test. CCCP rescued the decline in learning and memory abilities of elderly mice($P<0.001$,

vs control; P＜0.01, P＜0.001, vs surgery). At last, the molecular mechanism of SIRT1/PGC-1α signaling pathway in regulating perioperative neurocognitive disorders of elderly mice. SIRT1 overexpression could upregulate the expression of mitophagy-related proteins. However, PGC-1α inhibitor SR-18292 disrupted the role of the signaling pathway involed in PND(P<0.01; P<0.001, vs control. P＜0.05, P＜0.01, P＜0.001, vs surgery. P<0.001, vs Surgery+Lv-SIRT1). The concentration of TNFα, IL-1β and IL- 6 significantly increased in PND mice compared with control, while SIRT1 overexpression could downregulate the expression. SR-18292 disrupted the role of the signaling pathway involed in PND(P<0.001, versus vector control; P＜0.01, vs surgery; P<0.01, vs Surgery+Lv-SIRT1). SIRT1 overexpression rescued the level of ROS(P<0.001, vs control; P＜0.001, vs surgery), but after SR-18292 intervention, it showed the opposite change (P>0.05, vs Surgery+Lv-SIRT1). Behavioral experiments showed that SIRT1 overexpression rescued cognitive impairments in PND mice. In MWM test, SIRT1 overexpression mice traversed more frequently comparing with Surgery+Lv-SIRT1+SR-18292(P<0.001, vs control. P＜0.01; P＜0.001, vs surgery). All data represent mean±SEM (n=6).

Conclusions PND is often accompanied by changes in hippocampal neuronal apoptosis and decreased synaptic plasticity caused by central nervous system inflammation and oxidative stress. Abnormal mitochondrial autophagy may be one of the pathogenesis of PND. Maintaining the steady state of mitochondrial function can improve postoperative cognitive impairment caused by anesthesia and surgical trauma. This topic clarified that SIRT1/PGC-1α signal may play an important role in the mechanism of PND by regulating mitochondrial autophagy. It will provide new molecular targets for prevention and treatment of PND.

PO-0069

Inhibition of Dectin-1 protects against cognitive decline induced by surgical trauma by suppressing hippocampal neuroinflammation in mice

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Objective Postoperative cognitive dysfunction (POCD) is a common postoperative complication that is associated with increased morbidity and mortality. However, the neuropathogenesis of this complication remains largely unknown. Neuroinflammation, in particular hippocampal inflammation, contributes to POCD. Recently, increasing evidence has supported the involvement of Dectin-1 in the regulation of neuroinflammation in neurological disorders. In the present study, we investigated the role of Dectin-1, a key regulator of the innate immune response, in surgery-induced hippocampal inflammation and cognitive impairment.

Methods C57BL/6J (20-22 months) mice were used in this study. We established the mouse model of POCD through anesthesia and unilateral nephrectomy. The expression of Dectin-1was measured in BV2 microglial cells stimulated with lipopolysaccharide (LPS) and hippocampal tissues of mice with POCD. Loss of function and overexpression studies were performed via transfection with silencing Dectin-1 in BV2 cells and intrahippocampal injection of Dectin-1 agonist before surgery/anesthesia to identify the role of Dectin-1 in neuroinflammation and cognitive impairment. RT-PCR and Western blot were used to determine the expression levels of downstream adaptor proteins and proinflammatory cytokines. Immunofluorescence staining was applied to evaluate the activation of microglia. Modulation of Dectin-1 expression via transfection with siRNA or antagonist regulated the mRNA and protein expression levels of downstream targets of SYK as well as the release of proinflammatory cytokines (COX-2 and iNOS). A fear conditioning test (FCT) was performed 1, 3, and 7 days after surgery. The open-field test (OFT) was carried out 15 min before the training phase and each test phase of fear conditioning.

Chromatin immunoprecipitation (ChIP) was used to determine the role of Dectin-1 expression with POCD.
Results Increased expression of Dectin-1 was observed in BV2 microglial cells stimulated with LPS and hippocampal tissues of mice with POCD. In addition, inhibition of Dectin-1 alleviate hippocampus-dependent learning and memory impairment in mice with POCD, which was accompanied by decreased expression of the SYK/nuclear factor (NF)-κB pathway and downregulation of microglial activation in the hippocampus. The Dectin-1 antagonist LAM decreased the expression of Iba1-positive cells and iNOS and iNOS expression, decreased hippocampal inflammation in mice with POCD. In addition, the in vitro data revealed that Dectin-1and p-Syk expression was increased following LPS stimulation in BV2 microglial cells. LAM also decreased COX-2 and iNOS expression in BV2 cells following LPS stimulation. Chromatin immunoprecipitation (ChIP) assays showed a physical binding of NF-kB/p65 to Dectin-1 promoter, which further indicated the regulatory effect of NF-κB signaling pathway on Dectin-1 expression.
Conclusion our findings demonstrate the important role of Dectin-1 in the neuropathogenesis of POCD and suggest that Dectin-1 may be a potential therapeutic target for POCD.

PO-0070

线粒体移植对缺血性脑卒中后小鼠神经功能的改善作用依赖于 Parkin 介导的线粒体自噬

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目的 线粒体移植是缺血性脑卒中等缺血性损伤较有前景的治疗方法，最新的研究也证明了移植间充质干细胞来源的线粒体可以通过激活 PINK1/Parkin 通路介导的线粒体自噬来改善内皮细胞的功能，促进小鼠缺血肢体的功能改善（Nature, 2024）。我们前期研究证明了经尾静脉移植线粒体能通过降低缺血皮层和小胶质细胞内 ROS 水平和 NLRP3 介导的焦亡来改善缺血性脑卒中后小鼠的神经功能（Neural regeneration research, 2024），近期又发现线粒体移植可以通过上调小胶质细胞内 Parkin 蛋白，激活线粒体自噬来改善线粒体功能，降低细胞和皮层内焦亡和炎症水平，从而改善脑缺血小鼠的神经功能；并且过表达线粒体供体细胞内 Parkin 可显著增强线粒体移植的神经保护作用。
方法 在小鼠光-化学缺血性脑卒中模型中，移植分离后的肝脏来源的新鲜线粒体，在体观察小鼠在脑卒中后早期焦虑样行为、记忆力和社交能力，缺血皮层脑梗死面积，以及 Parkin 等线粒体自噬和 NLRP3 等焦亡蛋白表达的改变；利用 Parkin 全身敲除（KO）小鼠，观察线粒体移植的神经保护作用是否依赖于供体和受体小鼠内 Parkin 蛋白的表达；通过 RNA-seq 进一步观察敲除 Parkin 后，与 WT 小鼠相比，正常侧和缺血侧皮层 mRNA 的改变。建立体外小胶质细胞氧糖剥夺和炎症模型，移植细胞来源的新鲜线粒体，观察线粒体移植对小胶质细胞 Parkin 等线粒体自噬蛋白、NLRP3 等焦亡蛋白和极化亚型的改变；观察过表达 Parkin 蛋白分别对供体和受体细胞的焦亡、炎症和极化亚型的改变；观察 WT 鼠和 Parkin KO 鼠来源的线粒体分别对受体小胶质细胞（WT 鼠和 Parkin KO 鼠来源）焦亡、炎症和极化亚型的影响。
结果 在缺血性脑卒中模型中，线粒体移植可以通过上调 Parkin（携带外源性和激活内源性两种方法）介导的线粒体自噬来抑制焦亡和炎症，减少脑梗死面积，从而改善小鼠情绪、认知和社交能力；而线粒体移植的这些神经保护作用依赖于供体和受体小鼠内 Parkin 蛋白的表达，敲除 Parkin 会引起许多与线粒体功能相关的 mRNA 改变。在小胶质细胞的氧糖剥夺和炎症模型中，线粒体移植能显著升高 Parkin 等线粒体自噬蛋白表达，抑制 NLRP3 等焦亡蛋白表达，并促进其向 M2 亚型极化；而过表达 Parkin 也会产生与线粒体移植相似的神经保护作用，且过表达供体细胞内 Parkin 可以增强其线粒体移植的神经保护效应；线粒体移植对线粒体自噬的激活和对焦亡的抑制会因敲除供体和受体细胞内 Parkin 而减弱。

结论 线粒体移植对缺血性脑卒中后小鼠神经功能的改善作用依赖于 Parkin 介导的线粒体自噬，调控供体和受体细胞内 Parkin 可显著调节线粒体移植的神经保护效应。

PO-0071

RhoA/cend1 表达降低通过抑制海马神经发生导致糖尿病小鼠空间学习记忆功能障碍

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目的 拟利用糖尿病转基因模型鼠 db/db (BKS-Leprem2Cd479/Gpt, (-/-))及其对照鼠 db/m (BKS-Leprem2Cd479/Gpt, (wt/wt))，观察糖尿病小鼠空间学习记忆及海马神经发生的变化，探究 RhoA/cend1 在糖尿病小鼠海马神经发生及空间学习记忆功能变化中的作用机制。
方法 利用巴恩斯迷宫及免疫荧光标记实验分别检测糖尿病小鼠空间学习记忆功能及海马神经干细胞(Neural stem cell, NSC)增殖的变化；体外原代 NSC 中利用 CCK8 法检测细胞活力，明确高脂高糖培养(HHM)抑制 NSC 增殖的培养天数，并采用 HHM 或正常培养(RM)，Ki67 标记检测其对增殖、Tuj 标记检测对分化功能、神经球迁移面积及 Transwell 迁移实验检测其对 NSC 迁移能力的影响；利用 RNA-seq 测序发现 HHM 培养引起 NSC 中分化相关的重要受体(Grik1、Gabra4、Gabra2)及调控 NSC 增殖密切相关的 cend1 转录水平的变化，并利用免疫荧光标记及 WB 实验验证 HHM 培养引起 NSC 中 Grik1、Gabra4、Gabra2、cend1 蛋白水平的变化，及体外观察 cend1 表达分化的特异性及变化情况；利用 WB 及 CCK8 法筛选干预 Cend1 逆转 NSC 增殖的有效 siRNA；体外 NSC 中观察 cend1 上游 RhoA 变化及 RhoA 抑制剂 Rhosin 对 NSC 增殖及 cend1 表达的影响；最后在体观察 Rhosin 对糖尿病小鼠空间认知功能和海马神经发生的影响。
结果 糖尿病小鼠空间学习认知功能下降并伴随海马神经发生障碍；10 mmol/L 葡萄糖 + 25 μg/mL oxLDL 的 HHM 培养 48 h 引起 NSC 增殖下降，Ki67 标记验证增殖降低、Tuj 标记显示分化神经元比例降低、神经球迁移面积及 Transwell 迁移实验显示 NSC 迁移能力下降；RNA-seq 检测发现 HHM 培养引起 NSC 中分化相关的重要受体（Grik1、Gabra4、Gabra2）表达降低及调控 NSC 增殖密切相关的 cend1 转录水平升高，免疫荧光标记及 WB 实验验证了 HHM 培养引起 NSC 中 Grik1、Gabra4、Gabra2 水平的降低及 cend1 表达的升高，体外荧光标记显示 cend1 主要表达于 NSC 中，且糖尿病小鼠海马 NSC 中 cend1 表达显著升高；体外 NSC 中筛选出有效的 cend1 siRNA，可显著逆转 HHM 诱导的 NSC 增殖障碍；cend1 上游 RhoA 显著升高，RhoA 抑制剂 Rhosin 可有效逆转 HHM 导致的 NSC 增殖障碍及 cend1 表达升高；最后体腹腔连续注射 Rhosin（40μM）7 天可显著改善糖尿病小鼠空间认知功能和海马神经发生障碍。
结论 结论 糖尿病小鼠空间认知能力下降并伴随海马神经发生障碍；HHM 培养 48 h 引起 NSC 增殖、分化、迁移能力降低；其分化相关的重要受体（Grik1、Gabra4、Gabra2）表达降低，增殖相关 cend1 表达升高；抑制 cend1 可有效逆转 HHM 诱导的增殖障碍；cend1 上游 RhoA 表达显著升高，利用 RhoA 抑制剂 Rhosins 体外可显著逆转 HHM 诱导的 NSC 增殖障碍，在体可显著改善糖尿病小鼠空间认知及海马神经发生障碍。

PO-0072

MnPB nanoenzymes drive protection against ischaemic stroke by attenuating oxidative stress and ameliorating ecological dysregulation

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Background Ischaemic stroke is one of the leading causes of death and disability worldwide. Among them, both the onset of ischaemic stroke and reperfusion lead to a dramatic increase in reactive oxygen species (ROS) content[1]. The overproduced ROS can act as key signalling molecules triggering activation of microglia, inducing infiltration of peripheral blood leukocytes and stimulating cytokine secretion from inflammatory cells[2]. In recent years, further research has found that ischaemic stroke is closely related to gut flora dysbiosis and intestinal barrier function. Currently, to protect ischaemia-injured neurons, Prussian blue nanoparticles have been found to be an effective ROS scavenger, attributed to their catalase, superoxide dismutase and peroxidase-like activities[3]. Therefore, we propose an effective therapeutic strategy in which manganese-iron Prussian blue (MnPB) nanoenzymes with multi-enzymatic activity and porous structure promote neuroprotection against ischaemic stroke mainly by scavenging ROS and altering bacterial flora diversity.

Methods We established middle cerebral artery occlusion (MCAO) as a mouse model of ischaemia-reperfusion injury. The Zea-Longa neurobehavioral scale and morris water maze test, which were used to evaluate neurological function recovery after the treatment of MnPB nanoenzymes. MnPB nanoenzymes characterization was tested to demonstrate the synthetic properties of the materials. Fluorescent images and 2,3,5-Triphenyltetrazolium chloride (TTC) staining results of brain tissue to verify the therapeutic efficacy of MnPB nanoenzymes. Relevant metabolites and inflammatory factors were measured to validate the mechanism of action of MnPB nanoenzymes. Feces and brain tissue from each group of mice were collected and analyzed by 16s rDNA sequencing. Short chain fatty acids (SCFAs) was analyzed by GC. Protein blotting and quantitative reverse transcription PCR (qRT-PCR) were used to elucidate the underlying molecular mechanisms. Detection of oxidative stress and apoptosis in cells by flow cytometry.

Results Firstly, the successful doping of manganese with MnPB nanoenzymes was demonstrated by transmission electron microscopy (TEM) (Fig.A), Ultraviolet-visible (UV/vis) (Fig.B), X-ray photoelectron spectroscopy (XPS), and X-ray diffraction (XRD) tests. Secondly, we established an MCAO mouse model in which MnPB nanoenzymes significantly reduced Zea-Longa. Morris water maze test (Fig.C) showed that the MnPB nanoenzymes-treated group exhibited significant improvement in learning and memory. By examining the brain tissue of the animal model (Fig.H), it was found that MnPB nanoenzymes treatment resulted in the smallest infarct area. In addition to this, MnPB nanoenzymes suppressed the levels of IL-6, TNF-α and IL-1β in brain and intestinal tissues and increased α and β diversity in ischaemic stroke mice (Fig. D-F), as well as increasing the abundance of SCFAs producing flora. GC assay showed a significant increase in the content of SCFAs in the MnPB group. Ultimately, MnPB nanoenzymes decreased the protein and gene expression of TLR4 and NF-κB in brain tissues (Fig.I-L). Therefore, MnPB nanoenzymes supplementation attenuated the intestinal barrier disruption in MCAO mice and downregulated the expression of Toll-like receptor (TLR4), IκB kinase α(Ikkα), nuclear factor-κB (NF-κB p65) and other pro-inflammatory cytokines to normal levels. Notably, MnPB nanoenzymes treatment effectively upregulated the levels of SCFAs, and the abundance of probiotic taxa and microbiota (Akkermansia, Lactobacillus and Bacteroides) associated with SCFAs synthesis was consistently increased, while the abundance of harmful bacteria (Enterococcaceae) was suppressed. These data suggest that MnPB nanoenzymes ameliorated

damage in infarcted brain areas, increased SCFAs and inhibited the TLR4/Ikkα/NF-κB p65 pathway, and thus MnPB nanoenzymes supplementation may be a promising approach for brain protection.
Above is a graph of some of the results of the experiment: (A)TEM images. (B) Ultraviolet-visible (UV/vis). (C) Representative swimming track plots of Morris water maze test. (D) Shannon index. (E) Chao index. (F) Mean composition at the phylum. (G) Experimental design: Mice were provided MCAO model. Treatments were orally administered from the second day. All mice were sacrificed on the eighth day. (H) Representative images of brain sections from MCAO model mice embolised on day 7. (I) The expression of TLR4, IKKα and NF-κB p65 in brain tissues was detected by immunoblotting (n = 3/group) and graphs represented the density relative of control (J), (K), and (L). *p < 0.05, **p < 0.01, ***p < 0.001, compared with Control group; #p < 0.05, ##p < 0.01, ###p < 0.001, compared with MCAO group.
Conclusion We synthesised novel MnPB nanoenzymes with excellent properties by a simple one-pot method, which were able to ameliorate ischemic stroke injury by improving intestinal flora dysbiosis, increasing the content of SCFAs, and decreasing the release of inflammatory factors in the intestines and brain tissues, and ultimately ameliorating the damage in ischemic stroke.
References
1. Liu Y, Ai K, Ji X, et al. Comprehensive Insights into the Multi-Antioxidative Mechanisms of Melanin Nanoparticles and Their Application To Protect Brain from Injury in Ischemic Stroke [J]. J Am Chem Soc, 2017, 139(2): 856-862.
2. Mittal M, Siddiqui MR, Tran K, et al. Reactive Oxygen Species in Inflammation and Tissue Injury [J]. Antioxid Redox Signal, 2014, 20(7): 1126-1167.
3. Komkova MA, Karyakina EE, Karyakin AA. Catalytically Synthesized Prussian Blue Nanoparticles Defeating Natural Enzyme Peroxidase [J]. J Am Chem Soc, 2018, 140(36): 11302-11307.

PO-0073

骨髓间充质干细胞来源的外泌体通过 miRNA-335 调控线粒体功能减轻大鼠肺脏缺血再灌注损伤

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目的 骨髓间充质干细胞来源的外泌体（EXO derived from bone marrow mesenchymal stem cell, BMSC-EXOs）能够减轻大鼠多种器官 IRI，但是对于肺脏的影响报道较少。miRNA-335 是 BMSC-EXOs 中重要的 miRNA， 在疾病治疗过程中具备重要的作用。本研究拟建立大鼠肺脏 IRI 模型，观察 BMSC-EXOs 对肺脏 IRI 的影响；证实 miRNA-335 在 BMSC-EXOs 保护性作用中的重要性并探索其机制。
方法 SD 大鼠随机分成 4 组（n = 8）：假手术组（sham 组）、模型组（IRI 组）、空白对照组（PBS 组）、干预组（EXO 组）。通过夹闭左肺门 60 分钟、开放 180 分钟建立肺脏 IRI 模型。sham 组大鼠不建立肺脏 IRI 模型；IRI 组大鼠只建立肺脏 IRI 模型，但无任何其他处理；PBS 组大鼠建立肺脏 IRI 模型，于再灌注前给予气管内给予 PBS；EXO 组大鼠建立肺脏 IRI 模型，于再灌注前给予气管内给予 BMSC-EXOs。再灌注 180 分钟后处死大鼠，观察大鼠肺脏组织炎症反应、氧化应激损伤、细胞凋亡，肺脏静态顺应性，HE 染色观察肺脏组织病理学变化，电镜观察肺脏组织线粒体，RT-PCR 法检测 miRNA-335。随后我们干预 miRNA-335 在 BMSC-EXOs 中的表达，进一步观察 miRNA-335 在 BMSC-EXOs 保护性作用中的重要性。
结果 与 sham 组相比，IRI 组和 PBS 组中大鼠肺脏 W/D、IL-1β 浓度、TNF-α 浓度、MPO 含量、MDA 含量、TUNEL 阳性细胞数、细胞色素 c 含量以及 caspase-3、cleaved-caspase-3、caspase-9、cleaved-caspase-9、Bax 蛋白表达显著升高（P < 0.05），氧合能力、IL-10 浓度、

SOD 活性、T-AOC、肺脏静态顺应性、Bcl2 蛋白表达显著减低（P < 0.05），肺脏组织结构及线粒体结构紊乱；但上述指标在 IRI 组和 PBS 组中无显著差异。而 EXO 组中大鼠肺脏中上述各项指标较 PBS 组均显著改善（P < 0.05）。与 EXO 组相比，miRNA-335 inhibitor-EXO 组大鼠肺脏 W/D、IL-1β 浓度、TNF-α 浓度、MPO 含量、MDA 含量、TUNEL 阳性细胞数、细胞色素 c 含量以及 caspase-3、cleaved-caspase-3、caspase-9、cleaved-caspase-9、Bax 蛋白表达显著升高（P < 0.05），氧合能力、IL-10 浓度、SOD 活性、T-AOC、肺脏静态顺应性、Bcl2 蛋白表达显著降低（P < 0.05），肺脏组织结构及线粒体结构相对紊乱；但仍优于 IRI 组（P < 0.05）。与 EXO 组相比，miRNA-335 mimic-EXO 组中大鼠肺脏的保护性作用更强（P < 0.05）。

结论 BMSC-EXOs 能够内源性和或外源性上调 miRNA-335 表达，维持线粒体结构稳定、抑制线粒体凋亡，并通过抑制肺脏炎症反应、氧化应激损伤、细胞凋亡进而减轻大鼠肺脏 IRI，改善肺脏氧合能力及静态顺应性。这将为肺脏 IRI 的保护提供新的作用靶点，为临床应用提供依据。

PO-0074

Dimethyl itaconate mitigates cognitive impairment induced by lipopolysaccharide via reducing neuroinflammation and ferroptosis

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Backgrounds: Itaconic acid were produced by macrophages following stimulation by LPS. It is facilitated by the immune-responsive gene 1 (IRG1) protein, which converts cis-aconitate into itaconate through decarboxylation. Neuroinflammation is considered as a main intermediary in brain diseases, accompanied by a decrease in cognitive abilities. Ferroptosis, identified by its reliance on iron for lipid peroxidation, is involved in neuroinflammation and cognitive dysfunction. Studies have reported that itaconic acid can relieve organ injury and inflammatory reaction in mice with systemic inflammation such as sepsis. However, in the brain, the effect of itaconic acid on cognitive impairment caused by neuroinflammation and ferroptosis remains unexplored.
Aim of the study: To investigate the protective effect of itaconic acid derivative (Dimethyl itaconate, DMI) on LPS-induced inflammation and ferroptosis in mice brain and its mechanism.
Materials and methods: In this study, a cognitive impairment model was constructed through the intracerebroventricular administration of lipopolysaccharide (LPS). The mice were randomly divided into 4 groups: CON group (aCSF), LPS group (aCSF + LPS), DMI group (aCSF + DMI), and LPS + DMI group (LPS + DMI). To prepare the LPS solution (1mg/ml), LPS (Sigma, St. Louis, MO, USA) was dissolved in artificial cerebrospinal fluid (BIOFOUNT, China). DMI (Sigma-Aldrich, St. Louis, MO, USA; 20 mg in 0.5 ml saline per mouse) was diluted by LPS solution to configure the LPS+DMI solution, aiming to examine how DMI therapy might mitigate cognitive impairments caused by LPS. The protective effect of DMI against neuroinflammation was evaluated by Morris water maze (MWM), which was a behavioral test widely used to evaluate cognitive function in rodents. And Western blot analysis of hippocampi tissues to evaluate the anti-ferroptosis and anti-inflammatory effects of DMI were in LPS-induced neuroinflammation mice. The process of preparing samples was as follows: euthanize the mice by cervical decapitation. The procedure involved general anesthesia and transcardial perfusion with pre-cooled phosphate-buffered saline (PBS). Subsequently, the brains were extracted and cleansed using saline on ice. The hippocampi were carefully removed and preserved in liquid nitrogen. Hippocampi were gathered using sterile tubes and subsequently preserved at a temperature of -80 °C until the time of analysis. Besides, we performed Enzyme-linked immunosorbent assay (ELISA) to determine the pro-inflammatory cytokines levels and antioxidants levels in the hippocampi at 24 h after surgery.

Results:DMI treatment significantly attenuated LPS-induced cognitive impairment. In MWM tests, the mice in different groups showed similar escape latency times over 5 consecutive training days. There were no differences in the ability of mice to learn to locate the platform before LPS administration. Then 24 h after administration, the probe test was conducted. The representative swimming pathways of the 4 groups demonstrated that mice in CON group without the LPS injection attempted to locate the platform and swam mainly in the target quadrant while mice in LPS group swam in circles without direction. Additionally, platform location times and the time in the target quadrant were increased in the LPS + DMI group compared to the LPS group. The results indicate that the LPS injection induced a decline in cognitive function in the mice. And DMI supplementation could attenuated the effect of LPS. As above, LPS injected through the intracerebroventricular pathway decreased cognitive function without affecting motor performance and DMI supplementation significantly improved the cognitive deficit. The results of Western blot analysis showed that the expression levels of ferroptosis-related proteins (xCT, Gpx4) were differernt between LPS group and LPS+DMI group. The protective effect of DMI was related to the alleviation of iron deposition and the regulation of the ferroptosis-related protein family xCT,Gpx4.
Conclusions: The present study provides the main evidence that DMI improves cognition and brain function with significant beneficial effects via reducing neuroinflammation and ferroptosis, suggesting that DMI may serve as a novel drug for treating cognitive impairment and shed light on future preclinical medicines studies.

PO-0075

膜联蛋白 A3 调控内皮细胞的通透性和炎症在脓毒症中的作用及机制研究

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目的 本研究使用 Anxa3 基因敲除小鼠及原代人脐静脉内皮细胞（Human umbilical vein endothelial cells，HUVECs），探究 ANXA3 在脓毒症血管内皮细胞通透性和内皮细胞炎症激活中的作用及机制。
方法 （1）对野生型和 Anax3 敲除小鼠建立 LPS 诱导的内毒素血症和盲肠穿刺结扎两种脓毒症动物模型，观察 ANXA3 的缺失对小鼠脓毒症建模后 7 天生存率、体温、行为学评分的影响。进一步采用苏木素-伊红染色对内毒素血症后小鼠各个脏器组织的损伤情况进行分析。通过伊文斯蓝（Evans blue，EB）和异硫氰酸荧光素标记的 70 kDa 葡聚糖（FITC-dex）的渗漏情况检测肺组织血管内皮通透性的变化，利用实时定量聚合酶链式反应（qPCR）检测肺组织上内皮细胞炎症激活相关因子（CD62E，ICAM-1，VCAM-1，CCL2）的表达变化。
（2）通过 IF 检测 ANXA3 缺失对脓毒症肺组织上紧密连接蛋白（Zo-1 和 Claudin 5）、黏附连接蛋白（Ve-cadherin）表达水平的影响。采用慢病毒包装 shRNA 后瞬时感染 HUVECs 上 ANXA3，利 WB 检测 shRNA 敲低 ANXA3 的效率及细胞上 Zo-1，Ve-cadherin 和 Claudin 5 表达。使用含过表达 ANXA3 载体的慢病毒感染 HUVECs，通过 WB 和 IF 检测过表达 ANXA3 对 Zo-1，Ve-cadherin 和 Claudin 5 表达及定位的影响。通过检测 FITC-dex（40 kDa）自 Transwell 小室透过单层细胞到下室的荧光强度反映 ANXA3 表达变化对细胞通透性的影响。
（3）对敲低或过表达 ANXA3 的 HUVECs 使用 1 μg/ml 的 LPS 建模。通过 qRT-PCR、WB、IF 检测内皮细胞上黏附分子（ICAM-1 和 CD62E）的表达量，使用细胞膜红色探针 DiI 标记的人单核细胞白血病细胞（THP-1）评估 ANXA3 表达对 HUVECs 黏附 THP-1 数量的影响。使用 WB 和 IF 探索 ANXA3 表达变化对转录因子信号激活的影响。然后，使用药理学干预进行体外和动物体内回复实验。

结果 （1）ANXA3 的缺失增加雄性小鼠脓毒症建模后的死亡率，加重脓毒症行为评分，降低小鼠体温。组织 HE 染色和 MPO 免疫组化显示 ANXA3 的缺失明显加重 LPS 引起的肺组织损伤及白细胞浸润。通过 EB 和 FITC-dex 注射发现 ANXA3 缺失增加 LPS 引起的肺血管内皮 EB 染料及荧光物质渗出，qPCR 结果显示 ANXA3 缺失进一步增加脓毒症肺组织上血管内皮激活相关标志物（CD62E，ICAM-1，VCAM-1）的转录（Figure 1）。
（2）IF 显示 ANXA3 的缺失导致 LPS 建模后小鼠肺组织上 Zo-1，Ve-cadherin 和 Claudin 5 表达进一步下降。对体外 HUVECs 进行 3 种 shRNA 瞬时感染后，ANXA3 表达均减少，同时伴随 Zo-1，Ve-cadherin 和 Claudin 5 的表达降低，且随着 shRNA 敲低 ANXA3 效率增加，表达减少程度也增加。ANXA3 在单层细胞中的敲低导致 FITC-dex 自 Transwell 小室向下室渗透增多。虽然过表达 ANXA3 不增加 HUVECs 上 Zo-1，Ve-cadherin 和 Claudin 5 的表达，但能够减少单层细胞 FITC-dex 的渗漏。鬼笔环肽染色显示，ANXA3 的瞬时敲低会增加 HUVECs 上肌动蛋白细胞骨架应力纤维的形成，而过表达 ANXA3 则能增强细胞皮质肌动蛋白的组装。通过免疫共沉淀验证在过表达 ANXA3 内皮细胞中 ANXA3 与肌动蛋白存在相互作用（Figure 2）。
（3）ANXA3 的敲低显著增加 LPS 诱导的 HUVECs 上黏附分子 ICAM-1 和 CD62E 的表达，从而促进 HUVECs 对 THP-1 的黏附。进一步研究发现 ANXA3 的敲低不影响 LPS 对 HUVECs 上 NF-κB 的信号激活，但是显著影响 ATF2 的磷酸化和核内表达。ANXA3 的过表达明显地减少了 LPS 诱导的 ATF2 磷酸化及 CD62E 的表达，并减少 HUVECs 对 THP-1 细胞的黏附。（Figure 3）使用 SP600125 抑制 ATF2 磷酸化可以减轻 ANXA3 敲低引起的 CD62E 表达增加和 HUVECs 对 THP-1 细胞的黏附增多。在小鼠体内使用 SP600125 可以缓解 ANXA3 缺失引起的动物死亡率增加及肺损伤加重（Figure 4）。
结论 ANXA3 可通过稳定肌动蛋白细胞骨架调控细胞通透性及抑制 pATF2/CD62E 炎症信号传导在脓毒症内皮功能障碍中发挥内源性保护作用。

PO-0076

星状神经节阻滞表观调控 Per2 m6A 甲基化修饰改善睡眠剥夺大鼠记忆功能

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目的 睡眠障碍可导致注意力不集中、记忆力下降等认知行为问题。星状神经节阻滞可通过抑制交感神经活动，有效缓解睡眠问题所引发的学习记忆障碍。虽然星状神经节阻滞在临床应用具有显著疗效，但其作用机制仍未明确。本研究聚焦 Per2 在星状神经节阻滞改善睡眠剥夺后突触可塑性的生物学功能，进一步明确星状神经节阻滞调节海马 Per2 表达的具体机制，为星状神经节阻滞的临床应用提供实验依据和理论基础，具有重要的研究意义。
方法 1. 运用生物信息学分析探究睡眠剥夺所致海马损伤与 m6A 甲基化修饰的可能关系
（1）从 GEO 数据库下载数据集 GSE33302 和 GSE9442 进行差异基因分析结合 GO/KEGG/GSEA 功能富集分析初步探究睡眠剥夺所致海马损伤的潜在机制。
（2）为进一步探究睡眠剥夺后海马变化基因的功能，将与 m6A 甲基化修饰相关的差异基因进行功能富集分析和 ROC 分析，明确这些基因在睡眠剥夺所致海马损伤中的作用。
2. 睡眠剥夺所致记忆障碍可能与海马 m6A 甲基化修饰及突触可塑性改变有关
（1）验证生物信息学分析结果。利用睡眠剥夺模型，通过 Morris 水迷宫行为学观察、突触相关蛋白检测及高尔基染色，明确睡眠剥夺可致记忆损伤和海马突触可塑性改变。

（2）利用比色法和免疫组化检测睡眠剥夺后大鼠海马的 m6A 甲基化修饰水平，并将其与海马突触相关蛋白进行相关性分析。
（3）MeRIP-seq 联合 RNA-seq 筛选睡眠剥夺后 m6A 甲基化修饰调控的下游靶基因。
3. 星状神经节阻滞改善睡眠剥夺大鼠海马突触可塑性
构建睡眠剥夺模型并实施超声引导下星状神经节阻滞，通过突触相关蛋白、海马 CA1 区 Theta 震荡的电生理等检测及高尔基染色，观察星状神经节阻滞对改善睡眠剥夺后的海马突触可塑性的影响。
4. 星状神经节阻滞通过去甲基化酶 FTO 表观调控 Per2 的 m6A 甲基化修饰影响海马 Per2 的表达
（1）构建睡眠剥夺模型并实施超声引导下星状神经节阻滞，通过 Western blot 及免疫荧光检测 Fto 的表达，比色法检测海马 m6A 修饰水平，MeRIP-qPCR 检测 Per2 m6A 修饰水平，明确星状神经节阻滞可调控睡眠剥夺后的海马 Per2 m6A 修饰水平，去甲基化酶 FTO 可能参与其中。
（2）使用重组腺相关病毒过表达海马 CA1 区神经元 Fto，通过 RT-qPCR、Western blot 及免疫荧光验证 Fto 过表达效率，构建睡眠剥夺模型并实施超声引导下星状神经节阻滞，比色法检测海马 m6A 修饰水平，明确去甲基化酶 FTO 在星状神经节阻滞表观调控睡眠剥夺大鼠的海马 m6A 修饰中的作用。通过 RT-qPCR、Elisa 及免疫组化检测 Per2 的表达，MeRIP-qPCR 检测 Per2 m6A 修饰水平，明确星状神经节阻滞通过抑制 FTO 表观调控 Per2 的 m6A 甲基化修饰从而影响 Per2 的表达。通过 Western blot 及免疫荧光检测突触相关蛋白，高尔基染色观察海马 CA1 区树突棘形态及在体电生理检测海马 CA1 区 Theta 震荡，明确去甲基化酶 FTO 在星状神经节阻滞改善大鼠记忆功能和海马突触可塑性中的关键作用。
结果 （1）借助生物信息学手段获得的差异基因富集在神经元之间通过突触进行信息传递的过程、Schaffer 侧枝-CA1 突触、突触膜和长时程抑制，这些功能与突触可塑性有关，说明突触损伤可能是睡眠剥夺所致记忆障碍的主要原因，发现 m6A 修饰相关基因 Mettl16 和 Fto 可能参与其中。
（2）睡眠剥夺 7 天的大鼠出现明显的记忆损害，且海马 CA1 区突触可塑性损伤及 m6A 甲基化修饰水平下降，进一步通过 MeRIP-seq 联合 RNA-seq 筛选 m6A 甲基化修饰调控的下游靶基因，发现 Per2 可能作为 m6A 甲基化修饰调节海马突触可塑性过程的关键分子参与睡眠剥夺所致的记忆障碍。
（3）通过超声引导下对睡眠剥夺 7 天的大鼠进行右侧星状神经节阻滞发现，星状神经节阻滞可促进 Per2 m6A 修饰及表达，抑制去甲基化酶 FTO 表达，改善突触可塑性。
（4）通过重组腺相关病毒敲低海马 CA1 区的神经元 Per2 发现，星状神经节阻滞通过促进 Per2 表达改善睡眠剥夺大鼠记忆功能和海马突触可塑性。
（5）通过重组腺相关病毒过表达海马 CA1 区的神经元 Fto 发现，星状神经节阻滞通过抑制去甲基化酶 FTO 促进睡眠剥夺大鼠海马 Per2 的蛋白表达，该过程与 FTO 表观调控 Per2 的 m6A 甲基化修饰有关。
结论 星状神经节阻滞通过抑制去甲基化酶 FTO 促进海马 Per2 表达改善睡眠剥夺导致的突触可塑性损伤。该过程与 FTO 表观调控 Per2 的 m6A 甲基化修饰有关。未来，靶向调控昼夜节律基因 Per2 的甲基化修饰有望成为防治睡眠剥夺所致记忆损伤的有效手段。

PO-0077

去甲基化酶 ALKBH5 介导脓毒症脑病炎症反应的机制及临床研究

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目的 本研究的目的是探究去甲基化酶 ALKBH5 对脓毒症脑病的作用，并通过检测神经炎症相关通路初步探索其机制，为临床脓毒症脑病的防治提供新的策略。

方法 1.使用温州医科大学附属第一医院脓毒症临床数据库收集消化道穿孔脓毒症患者，根据住院期间是否发生谵妄分为谵妄组和非谵妄组。通过统计分析两组患者临床资料提示炎症介质在脓毒症脑病中的重要作用。
2.脂多糖 LPS（1μg/ml）刺激 BV2 细胞 24h 构建脓毒症脑病体外模型，随机分为对照（CON）组，脂多糖（LPS）组。通过斑点印记（dot blot）实验、细胞免疫荧光、蛋白免疫印迹（WB）实验明确由 LPS 引起的 m6A 甲基化修饰水平以及甲基化酶的变化。
3.通过 GEO 数据库单细胞测序分析确定 ALKBH5 蛋白在人类外周血单核细胞表达。通过 GEO 数据库筛选出基因芯片进行 GO 和 KEGG 富集分析明确炎症通路，同时检测 NF-κB 炎症通路相关蛋白水平。蛋白-蛋白互作网络（PPI）发现 NFKBIA 蛋白，并通过基于序列的 RNA 腺苷甲基化位点预测（SRAMP）发现了 NFKBIA mRNA 的潜在 m6A 甲基化修饰位点。通过蛋白免疫印迹和聚合酶链式反应（PCR）检测 NF-κB 通路关键蛋白和炎症介质水平。
4.通过慢病毒转染技术构建稳定过表达 ALKBH5 的 BV2 细胞。随机分为对照组（CON+OE-NC 组）、ALKBH5 过表达组（CON+OE-ALKBH5 组）、脂多糖组（LPS+OE-NC 组）和 ALKBH5 过表达+脂多糖组（LPS+OE-ALKBH5 组）。通过蛋白免疫印迹观察 ALKBH5、NFKBIA、p65 和 p-p65 蛋白水平的变化，证实 ALKBH5 会影响 NF-κB 炎症通路的活性。通过聚合酶链式反应（PCR）技术检测炎症因子 IL-6、IL-1β、TNF-α mRNA 反应神经炎症水平。通过细胞免疫荧光技术检测 P65 蛋白以及 p-P65 核易位的情况。
5.通过 RNA 免疫沉淀（RIP）技术验证 ALKBH5 与 NFKBIA mRNA 的结合。利用放线菌素 D 抑制 RNA 合成的作用,通过 PCR 技术检测 NFKBIA mRNA 相对含量随时间变化，直接反映出 NFKBIA mRNA 的降解速率，反映转录本稳定性。
6.通过腺相关病毒（AAV）转染 C57BL/6 小鼠随机分成 4 组，空白对照组、ALKBH5 过表达组、造模组和 ALKBH5 过表达+造模组，通过水迷宫评估小鼠的神经认知功能，通过蛋白免疫印迹检测 ALKBH5、NFKBIA 蛋白水平变化以明确 ALKBH5 对动物行为学以及 NF-κB 通路的影响，通过 PCR 技术检测海马内神经炎症水平。
7.通过采集临床脓毒症患者外周血液并提取血液中单核吞噬细胞，利用 PCR 技术测定 ALKBH5mRNA 含量，明确临床上去甲基化酶 ALKBH5 在脓毒症患者中的变化情况，并将 ALKBH5 与 IL-6、GCS、APACHEII 和 SOFA 评分进行相关性分析。
结果 1.消化道穿孔脓毒症患者中，与非谵妄组相比，谵妄组患者 IL-6 水平显著升高，P＜0.05 差异具有统计学意义。
2.与对照组相比，LPS 组 BV2 细胞内总 RNA 的 m6A 甲基化修饰水平显著升高，P＜0.05 差异具有统计学意义，同时去甲基化酶 ALKBH5 蛋白水平下降，P＜0.05 具有统计学意义，而 METTL3、METTL14、FTO 差异无统计学意义。
3.LPS 刺激 BV2 细胞后，NF-κB 信号通路激活，炎症介质显著增加，P＜0.05 差异具有统计学意义。
4.在细胞模型中，与 LPS+OE-NC 组相比，LPS+OE-ALKBH5 组 NFKBIA 蛋白水平显著增加而 PP65 入核减少，炎症介质 IL-6、IL-1β、TNF-α mRNA 水平减少，P＜0.05 差异具有统计学意义。
5.在细胞模型中，ALKBH5 蛋白与 NFKBIAmRNA 相结合。与其他 3 组相比，LPS+OE-ALKBH5 组 NFKBIA mRNA 降解速率显著减慢，P＜0.05 差异具有统计学意义。
6.在动物模型中，与 LPS+OE-NC 组相比，LPS+OE-ALKBH5 组小鼠水迷宫行为学表现得到改善。同时海马组织炎症介质 IL-6、IL-1β、TNF-α mRNA 水平减少，P＜0.05 差异具有统计学意义。
7.与健康志愿者相比，脓毒症患者外周血单核吞噬细胞内 ALKBH5mRNA 含量显著减少，差异具有统计学意义。脓毒症患者外周血单核吞噬细胞内 ALKBH5mRNA 含量和 GCS 评分和 IL-6 水平呈线性相关，P＜0.05。
结论 ALKBH5 可能通过 NFKBIA mRNA 的去 m6A 甲基化修饰，促进了 NFKBIA mRNA 的稳定性，胞浆中 NFKBIA 蛋白水平增加从而抑制 P65 磷酸化入核，抑制了 NF-κB 通路激活，减轻了小胶质细胞介导的神经炎症，最终改善了脓毒症脑病的认知功能障碍。ALKBH5 可能作为脓毒症脑病新的治疗靶点。

PO-0078

20-Hydroxyeicosatetraenoic acid via GPR75 regulates the Src/EGFR/NF-κB signaling pathway to activate microglia promoting traumatic brain injury

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Aim: 20-Hydroxyeicosatetraenoic acid (20-HETE) is associated with secondary damage in immature brain traumatic brain injury (TBI), where microglial activation is pivotal. However, the underlying mechanism of action remains unknown. While 20-HETE interacts with G protein-coupled receptor 75 (GPR75) in various pathological processes, their interaction in brain tissue is still uncertain. This study aimed to investigate whether 20-HETE activates microglia in immature brain TBI through binding to GPR75.
Methods The drug affinity responsive molecular target stability (DARTS), Cycloheximide (CHX) chase assay and Auto-dock assay were employed to analyze the interaction between 20-HETE and GPR75. The expression and co-localization of CYP4A and GPR75 in activated microglia in an immature brain TBI model were observed by western blot and double immunofluorescence. The effects of 20-HETE expression levels and the effect of lentivirus-mediated GPR75 gene silencing on 20-HETE-induced inflammatory factor release from BV-2 cells was observed by enzyme-linked immunoassay (ELISA), while the levels of phosphorylation of downstream Src, epidermal growth factor receptor (EGFR), and nuclear factor (NF)-κB were assessed using Western blot. Cell viability and apoptosis were detected by CCK8 and flow cytometry.
Results 20-HETE binds to and inhibits the degradation of GPR75 protein. GPR75 gene silencing can reverse the 20-HETE-induced inflammatory activation of BV-2 cells, effectively inhibiting the activation of the Src/EGFR/NF-κB pathway and the effects of 20-HETE on cell viability and apoptosis rate. In addition, after immature brain TBI, 20-HETE and GPR75 expression levels were upregulated in microglia with significant activation of the Src/EGFR/NF-κB pathway, and inhibition of 20-HETE synthesis with N-hydroxy-N'-(4-n-butyl-2-methylphenyl) formamidine (HET0016) caused the opposite effect.
Conclusions 20-HETE via GPR75 regulates the Src/EGFR/NF-κB signaling pathway to activate microglia promoting immature brain TBI. To identify a novel target for promoting the brain injury effect of 20-HETE.

PO-0079

The study investigates the impact of ozone therapy on atherosclerosis progression by modulating LCN2 expression in endothelial cells of ApoE-/- mice

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Objective As a leading cause of global mortality, cardiovascular disease (CVD) claims approximately one-third of yearly deaths, amounting to 17.9 million individuals. Atherosclerosis, the primary pathological process driving CVD, plays a pivotal role in conditions such as hypertension, coronary heart disease, and acute myocardial infarction. Thus, this study aims to elucidate the specific genes and signaling pathways affected by O3-RI therapy through RNA sequencing of aortic tissue obtained from an atherosclerosis mouse model. Through

transcriptomics and bioinformatics analysis, we seek to uncover potential targets and therapeutic avenues for atherosclerosis treatment. Subsequent validation in both in vivo and in vitro settings will provide insights into the underlying mechanisms by which O3-RI inhibits atherosclerosis development.

Method: Assessing the influence of ozone therapy on atherosclerosis and identifying target genes following 12 weeks of dietary intervention, establishing the atherosclerosis models, ozone treatment commenced for the O3 group, starting from the 5th week of the high-fat diet. After 8 weeks of treatment, mice were euthanized, and atherosclerotic lipid and plaque areas in the aortic sinus and thoracic aorta were quantified. Furthermore, serum lipid levels and related indexes were analyzed. Total RNA was isolated from aortic tissue samples obtained from the three groups, and RNA-seq technology was employed for transcriptomic sequencing to identify differential genes. we assessed the expression of target proteins in endothelial cells. To elucidate the mechanism of LCN2 in inhibiting atherosclerosis progression by ozone therapy, we established in vitro cell models with high and low LCN2 expression by transfecting HUVECs with lentivirus and siRNA. We conducted experiments to explore the effects of ozone therapy on target genes and the possible mechanism, including qPCR and WB to detect LCN2 and eNOS gene and protein expression levels. Additionally, we measured the cell proliferation rate using CCK8 to reflect cell proliferation and vitality, and observed the effects of OXLDL and LCN2 on HUVECs. ROS detection via fluorescent probes was performed to observe oxidative stress responses in each group. Furthermore, we determined the activity of mitochondrial respiratory chain complex IV, ATP synthase, and mitochondrial membrane potential to investigate the mechanism of LCN2 and mitochondrial dysfunction.

Results In the ApoE-/- mouse model of atherosclerosis, O3-RI effectively decreased serum levels of low-density lipoprotein cholesterol and oxidized low-density lipoprotein cholesterol, along with reducing lipid and plaque areas in atherosclerotic lesions, thereby impeding the progression of atherosclerosis. Through RNA-seq sequencing, differential gene screening revealed LCN2 as a target gene regulated by O3-RI during the development of atherosclerosis. Ozone intervention effectively downregulated LCN2 expression in endothelial cells, consequently inhibiting the progression of atherosclerosis. In vitro modeling of atherosclerosis with OXLDL incubation of HUVECs demonstrated increased LCN2 expression, following ozone intervention, LCN2 expression in endothelial cells was downregulated, leading to enhanced activity of mitochondrial respiratory chain complex IV, elevated mitochondrial membrane potential, mitigation of mitochondrial dysfunction, promotion of cell proliferation, attenuation of oxidative stress responses, and reduction of ROS production. The efficacy of ozone intervention was compromised with LCN2 overexpression, while it was enhanced with LCN2 downregulation. Thus, ozone intervention inhibited the development of atherosclerosis by directly downregulating LCN2 expression and ameliorating mitochondrial dysfunction. Conclusion:

Successful establishment of atherosclerosis models in ApoE-/- mice via high-fat diet feeding in vivo and in HUVECs through OXLDL incubation in vitro underscores the effectiveness of ozone therapy in inhibiting atherosclerosis progression.

Endothelial cell dysfunction plays a pivotal role in the development of atherosclerosis. Ozone therapy emerged as an effective intervention, ameliorating endothelial cell dysfunction and impeding atherosclerosis progression by downregulating LCN2 expression in endothelial cells.

Furthermore, ozone therapy exerted beneficial effects on mitochondrial function by enhancing mitochondrial complex IV activity and improving mitochondrial membrane potential via the downregulation of LCN2 expression in endothelial cells. These findings highlight the therapeutic potential of ozone therapy in mitigating mitochondrial dysfunction and halting the progression of atherosclerosis.

Conclusion Successful establishment of atherosclerosis models in ApoE-/- mice via high-fat diet feeding in vivo and in HUVECs through OXLDL incubation in vitro underscores the effectiveness of ozone therapy in inhibiting atherosclerosis progression. Endothelial cell dysfunction plays a pivotal role in the development of atherosclerosis. Ozone therapy emerged as an effective intervention, ameliorating endothelial cell dysfunction and impeding atherosclerosis progression by downregulating LCN2 expression in endothelial cells. Furthermore, ozone therapy exerted beneficial effects on mitochondrial function by enhancing mitochondrial complex IV activity and

improving mitochondrial membrane potential via the downregulation of LCN2 expression in endothelial cells.

PO-0080

The first report of the mouse CSF-contacting nucleus and the screening of differentially expressed genes for neuropathic pain

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目的 This study will demonstrate that mouse also has CSF-contacting nucleus and provide its fMOST imaging. Based on the genetic architecture of mouse CSF-contacting nucleus combined with previous studies, we further focused on differential expressed genes (DEGs) regulating neuropathic pain (NP) in mouse CSF-contacting nucleus.
方法 DEGs in NP mouse CSF-contacting nucleus were found By comparing with normal mouse .Shared-genes were idented in CSF-contacting nucleus of NP mice and dorsal root ganglion (DRG) by Venn analysis .Their interaction reletionship were showed by Protein-protein interaction (PPI) network analysis ,Finally, The highest score in the DEGs of CSF-contacting nucleus in NP mouse by MCODE score. A variety of molecular biology techniques were used to visually verify the above genetic analysis results.
结果 By comparing with normal mouse, 1631DEGs were found in NP mouse CSF-contacting nucleus. Venn analysis of CSF-contacting nucleus and dorsal root ganglion (DRG) of NP mice showed that they had 284 shared-genes; Protein-protein interaction (PPI) network analysis showed that 190 genes of them had interaction. Finally, CCR5 became the DEG with the highest score of CSF-contacting nucleus in NP mouse by MCODE score. A variety of molecular biology techniques were used to visually verify the above genetic analysis results, indicating the reliability of the genetic analysis results. When given CCR5 antagonist, some proinflammatory factors in CSF-contacting nucleus were reduced, and NP behavior of animals was alleviated.
结论 This study not only reported the existence of CSF-contacting nucleus in mouse for the first time, but also suggested a new perspective to reveal the mechanism of neuropathic pain from the brain-cerebrospinal fluid pathway.

PO-0081

海马小胶质细胞干扰素基因刺激因子激活在脓毒症相关性脑病中的作用

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目的 研究海马小胶质细胞干扰素基因刺激因子（STING）激活在脓毒症相关性脑病（SAE）中的作用。
方法 选择清洁级雄性 C57BL/6 小鼠 40 只，8~10 周龄，体重 25～30 g。采用随机数字表法将小鼠分为四组：对照组（C 组）、STING 抑制剂 C-176 组（CC 组）、脂多糖（LPS）组（L 组）、LPS+C-176 组（LC 组），每组 10 只。采用单次腹腔注射 LPS 4 mg/kg 建立小鼠 SAE 模型。C 组腹腔注射无菌生理盐水，CC 组单次腹腔注射 C-176 30 mg/kg，L 组建立小鼠 SAE 模型，LC 组建

立小鼠 SAE 模型后 30 min 单次腹腔注射 C-176 30 mg/kg。建模后 7 d 采用行为学检测小鼠运动及认知功能。行为学实验 24 h 后处死小鼠，采用 Western blot 法检测海马组织 STING 和突触后致密蛋白 95（PSD95）蛋白含量，免疫荧光法检测海马组织 CA1 区 Iba1 和 STING 共表达细胞数量、小胶质细胞活化数量并计算坚固性，采用高尔基染色检测海马组织 CA1 区锥体神经元树突棘数目。
结果 与 C 组比较，L 组自发交替率和辨别指数明显降低，海马组织 STING 蛋白含量明显升高，PSD95 蛋白含量明显降低，CA1 区 Iba1 和 STING 共定位细胞数量、小胶质细胞数量明显增加，坚固性明显升高，锥体神经元的树突棘数目明显减少（P<0.05）。与 L 组比较，LC 组自发交替率和辨别指数明显升高，海马组织 STING 蛋白含量明显降低，PSD95 蛋白含量明显升高，CA1 区 Iba1 和 STING 共定位细胞数量、小胶质细胞数量明显减少，坚固性明显降低，锥体神经元的树突棘数目明显增加（P<0.05）。
结论 STING 抑制剂 C-176 可以抑制小胶质细内 STING 过表达并降低小胶质细胞的过度活化，减少突触丢失，减轻 LPS 导致的小鼠认知功能损伤。

PO-0082

Rev-erbα 钟控节律失振荡负调控 SerpinB1 促进脓毒症急性肺损伤中性粒 细胞胞外诱捕网的形成

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目的 探讨中性粒细胞弹性蛋白酶抑制剂 B1（SerpinB1）在脓毒症诱导的急性肺损伤（ALI）中的作用及其与昼夜节律的关系和调控机制。
方法 使用 6-8 周龄雄性 C57BL/6J 野生型（WT）和 SerpinB1 敲除（KO）小鼠，构建脓毒症 ALI 模型。小鼠随机分为四组：PBS 对照组、LPS 模型组（低剂量 LPS 组、中剂量 LPS 组、高剂量 LPS 组），通过气管内注射不同剂量的脂多糖（LPS）诱导 ALI。通过 HE 染色和伊文思蓝染色评估肺组织病理变化和肺泡-毛细血管屏障渗透性，确保脓毒症 ALI 模型的构建成功。
为了研究昼夜节律对脓毒症 ALI 的影响，将 PBS 对照组和 LPS 模型组的小鼠置于三种不同的昼夜循环环境中：正常节律（12 小时光照+12 小时黑暗，12hL/D）、持续 24 小时光照（24hL）和持续 24 小时黑暗（24hD）。通过免疫印迹法（Western blot, WB）检测肺组织中生物钟蛋白 Rev-erbα 的表达水平。
进一步实验中，将 WT 和 KO 小鼠分为六组：WT-PBS 组、WT-LPS 组、WT-LPS+褪黑素（MT）组，KO-PBS 组、KO-LPS 组、KO-LPS+MT 组。观察肺组织病理变化，并通过免疫荧光染色检测炎症因子的表达情况和中性粒细胞胞外诱捕网（NETs）的形成。此外，通过密度梯度离心法提取人外周血中性粒细胞，使用 LPS 和 PMA 作为诱导剂体外刺激中性粒细胞释放 NETs，并用免疫荧光检测其形成。
结果 与 PBS 对照组相比，LPS 模型组小鼠的肺组织病理损伤、炎症细胞浸润和肺泡屏障破坏显著加重。生物信息学分析显示，LPS 模型组显著富集与生物节律相关的通路。昼夜节律异常（24 小时光照或黑暗）显著加重了 LPS 诱导的 ALI，并减少肺组织中 Rev-erbα 和 SerpinB1 的表达。在 WT 小鼠中，LPS 增加了肺损伤评分、TUNEL 阳性细胞数目、中性粒细胞浸润及促炎性细胞因子的释放，而这些变化在 KO 小鼠中更为显著。褪黑素激活 Rev-erbα 可增加 SerpinB1 的表达，并减少 WT 小鼠的 LPS 诱导的 ALI，但对 KO 小鼠无效。在中性粒细胞中，Rev-erbα 与 SerpinB1 共定位，并结合其启动子以增加 SerpinB1 的转录。LPS 刺激增加了 NETs 的形成，而褪黑素可减少这种形成，但在 KO 小鼠中无效。
结论 Rev-erbα 的下调通过促进 NETs 的形成加重了脓毒症诱导的 ALI。激活 Rev-erbα 可以通过 SerpinB1 在脓毒症中提供对 ALI 的保护作用。昼夜节律紊乱显著加重脓毒症 ALI，并减少肺组织中 Rev-erbα 和 SerpinB1 的表达。褪黑素通过激活 Rev-erbα 表达抑制 NETs 的形成，从而减轻小鼠

脓毒症 ALI。因此，Rev-erbα 和 SerpinB1 在脓毒症 ALI 中的保护作用及其调控机制提供了新的治疗思路。

PO-0083

一种多通道微流体装置，用于揭示低剂量长期恒定暴露下双酚 S 对脑类器官的神经毒性作用

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目的 双酚 S（BPS）是一种广泛用于制造日常用品的增塑剂，但人们对其对人类健康，特别是对胎儿大脑发育的不良影响知之甚少。由于大脑的复杂性和微妙性，揭示环境污染对人类胎儿大脑发育的有害影响仍然具有挑战性。利用干细胞应用的优势，由干细胞产生的大脑类器官正在成为理解大脑发育和药物毒性测试模型的有力工具。在这里，我们开发了一种用于大脑类器官培养的微流控芯片，以揭示低剂量长期恒定 BPS 暴露对大脑类器官的神经毒性。
方法 我们的微流体系统由四个平行的流道和 16 个脑类器官培养区，一个入口和四个出口构成。培养基从人口持续供应，促进培养基的及时供应和代谢产物的及时清除。微流控平台中的类器官可以连续培养 34 天，并用免疫荧光染色来判断是否表达大脑类器官的所有基本特性。从第 20 天开始分别暴露于两种浓度的 BPS（10 nM 和 100 nM），为期两周。通过免疫荧光染色和蛋白质组学评估其神经毒性作用，并通过实时定量 PCR 进行验证。
结果 大脑类器官表达了显著的神经元群体和神经元分化。免疫荧光结果还表明，微流控芯片对脑类器官的培养是有效的。此外，还分析了脑类器官中的细胞增殖标记物（Ki67）和细胞凋亡标记物（TUNEL）。结果表明，在微流控芯片中培养的脑类器官在第 34 天保持增殖能力，多通道微流控芯片对脑类器官的培养是有效的。用 BPS 刺激脑类器官 14 天后，免疫荧光染色结果显示与对照组相比，10nM（$P<0.05$）和 100nM（$P<0.001$）组的 $Ki67^{+}$细胞在整个类器官中的比例显著降低，此外 MAP2 ($P < 0.05$) and TUJ1 ($P < 0.01$)在 100 nM 处理组也显著见底，表面 BPS 的暴露会抑制神经分化。蛋白组学的结果进一步表明，BPS 暴露会抑制神经元分化，阻碍 Wnt 信号通路，并导致前脑区域异常，并且大多数差异蛋白呈现出浓度依赖性，并且 100 nM 浓度下的差异蛋白跟脂质代谢过程有关。即使持续暴露于低剂量的 BPS，也可能在胎儿大脑发育过程中引起神经毒性。
结论 多通道微流控芯片在培养大脑类器官方面是有效的，并将能够用于揭示不同麻醉药物、危险化学品的神经毒性。

PO-0084

活类器官微环境中自由分泌蛋白质组和外泌体包裹蛋白质组的延时获取

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目的 在早期器官发育过程中，邻近微环境中的蛋白质组通讯是一个不断重塑人类胚胎干细胞（hESCs）发育命运的动态过程。微环境中的这种动态蛋白质组改变由自由分泌的蛋白质组和外泌体包裹的蛋白质组组成。同时监测具有活类器官的两种蛋白质组的延时转移仍然具有技术挑战性。因此，我们研究了一种连续的类器官分泌/包封蛋白质组串联 LC-MS/MS（COSEP-LCM），它允

许对活类器官微环境中自由分泌形式和外泌体包封形式的蛋白质组变化进行延时监测，以期为活体类器官微环境中连续的内外外泌体蛋白质组学联合分析提供了一种平台技术。
方法 在本研究中，我们创新性地构建了连续类器官分泌/封装蛋白质组串联 LC-MS/MS（COSEP-LCM）。我们通过 COSEP-LCM 在四个不同时期（D0-4、D4-10、D10-14 和 D14-34）培养了 COs 并收集了用于自由分泌蛋白质组学分析和外泌体包裹蛋白质组学研究的培养基。我们通过超速离心分离外泌体，并通过透射电子显微镜（TEM）、纳米颗粒跟踪分析（NTA）和蛋白质印迹评估其特性。COSEP-LCM 能够在活 COs 的微环境中实时监测蛋白质组学修饰，包括自由分泌的蛋白质和包裹在外泌体中的蛋白质
结果 我们证明了人类大脑类器官（COs）的连续生长，并用 COSEP-LCM 获得了 34 天的自由分泌/外泌体包裹蛋白质组学。EFNB1 和 SERPINF1 最初在外泌体内部富集为包封排泄物，然后在外泌体内逐渐富集为自由分泌排泄物，而 C3 最初在外聘体外部富集为自由排泄物，在外泌体外逐渐富集为包埋排泄物。这种动态排泄模式范式的转变可能意味着人类大脑早期发育过程中的关键发育策略进化。
结论 在这项工作中，我们构建了 COSEP-LCM，它允许对 COs-Exos 分泌的自由分泌/外泌体包封蛋白进行 34 天的动态转化分析。我们的研究表明，早期的 COs-Exos（D0-14）被证明与免疫反应有关，而成熟的 COs-Exos（D14-34）被观察到对大脑发育有更大的影响。我们的研究结果将为选择最合适的外泌体来源提供有价值的见解，以提高研究和治疗效果。此外，通过 COSEP-LCM，我们发现在 COs 培养过程中，自由分泌的蛋白质组和外泌体包裹的蛋白质组中有四种蛋白质（EFNB1、GANAB、CLU、IGFBPL1）持续增加，而一种蛋白质（C3）持续减少。此外，EFNB1 和 SERPINF1 最初富集在蛋白质内部（外泌体），然后逐渐富集在蛋白质外部（自由分泌），而 C3 经历了相反的生物过程。总之，COSEP-LCM 为分析来源于 COs 的外泌体的蛋白质组成提供了一种全面的方法，包括不同阶段的蛋白质分布和活体类器官微环境中连续的内外外泌体蛋白质组学共同分析。

PO-0085

The role of GluN2B-containing NMDA receptors and death-associated protein kinase 1 in sevoflurane-induced neuroapoptosis

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Background In recent years, mounting evidence from animal studies has confirmed that general anesthetics can induce widespread neuroapoptosis in the developing brain and long-term neurobehavioral deficits. This is in accordance with the findings of clinical studies demonstrating that prolonged and multiple exposure to general anesthesia during childhood is associated with an increased risk for impaired neurodevelopment.
Our previous study suggested the potential role of glutamatergic inputs in sevoflurane-induced neuroapoptosis in the dentate gyrus (DG) of postnatal day 21 (P21) mice. Early glutamatergic inputs are predominantly based on NMDA receptors. The GluN2B-containing NMDA receptors are widely expressed in the developing brain and closely related to glutamate-induced neurotoxicity. Therefore, the primary aim of this study is to investigate the role of GluN2B-containing NMDA receptors in sevoflurane-induced neuroapoptosis in the developing DG.
Previous studies have shown that under pathological conditions, the interaction between death-associated protein kinase 1 (DAPK1) and GluN2B-containing NMDA receptors played an important role in neuronal death. Therefore, our secondary aim is to investigate the role of DAPK1 in sevoflurane neurotoxicity.

Methods P21 mice were exposed to 3% sevoflurane or carrier gas for 6h. Immunofluorescence was applied to measure the density of apoptotic neurons. To elucidate the role of GluN2B-containing NMDA receptors in sevoflurane-induced neuroapoptosis, pharmacological antagonism of GluN2B-containing NMDA receptors using ifenprodil or inducible knockout of Grin2b gene (encoding GluN2B subunit) was applied prior to exposure. Whole-cell patch clamp was used to investigate the electrophysiological changes of dentate immature neurons induced by sevoflurane, and whether GABAA receptors and GluN2B-containing NMDA receptors mediated these effects. Western blot (WB) was used to explore the relationships among GABAA receptors, GluN2B-containg NMDARs and DAPK1.
Results Sevoflurane exposure significantly increased the density of apoptotic immature neurons in the DG of P21 mice ($P = 0.005$). Intraperitoneal injection of ifenprodil, or inducible knockout of Grin2b gene, attenuated sevoflurane-induced increase in the density of apoptotic neurons ($P < 0.001$). In the electrophysiological experiments, sevoflurane bath application did not significantly affect the amplitude ($P = 0.224$) or the frequency ($P = 0.391$) of miniature excitatory postsynaptic currents of dentate immature neurons, but induced inward tonic currents acting through GABAA and GluN2B-containing NMDA receptors, as evidenced by the outward shift after bath application of ifenprodil ($P = 0.020$) or the co-application of ifenprodil and bicuculline ($P < 0.001$). WB analyses showed that sevoflurane induced an increase in the phosphorylation of GluN2B subunit at S1303 site ($P = 0.002$), which could be attenuated by intraperitoneal injection of bicuculline prior to anesthesia ($P = 0.001$).
Sevoflurane exposure significantly increased the expression ($P = 0.004$) and enhanced the function of DAPK1 ($P < 0.001$). Intraperitoneal injection of ifenprodil, or inducible knockout of Grin2b gene, mitigated sevoflurane-induced changes in DAPK1 expression ($P < 0.001$) and function ($P < 0.05$). Pretreatment with TC-DAPK6, a DAPK1 inhibitor, significantly inhibited the changes in DAPK1 expression ($P = 0.001$) and function ($P < 0.05$) induced by sevoflurane. TC-DAPK6 also attenuated sevoflurane-induced increase in the density of apoptotic neurons in the DG ($P = 0.011$) and sevoflurane-induced increase in GluN2B phosphorylation at S1303 ($P = 0.012$). Uncoupling DAPK1 from GluN2B subunits using a GluN2B subunit C-terminal (1292-1304)-derived peptide mitigated sevoflurane-induced neuroapoptosis in the DG ($P = 0.002$).
Conclusions The interaction between GluN2B-containing NMDA receptors and DAPK1 plays an important role in sevoflurane-induced neuroapoptosis of immature hippocampal granule cells in P21 mice. These findings are of great significance to provide mechanistic insight for the prevention and treatment of general anesthetic-induced neurotoxicity.

PO-0086

Ficolin-3（FCN3）通过下调 Yes 相关蛋白 O-GlcNAc 修饰抑制肝癌进展

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目的 原发性肝癌是常见的严重危害人类健康的恶性肿瘤，其发病率居全球恶性肿瘤的第 6 位，病死率居第 4 位。我国每年有大约 30 万人死于原发性肝癌，是继肺癌之后的我国第二大癌症相关死亡原因。肝癌的复发转移率特别高，一半以上的肝癌患者在初诊时已经出现了肿瘤的播散转移，肝癌根治术后五年复发率达到 60%。寻找有效的杀灭肝癌细胞或抑制其进展的靶点，一直是研究的热点。
方法 通过 GSE 和 TCGA 公共数据库分析，寻找在肝癌发生发展过程中普遍下调的基因，分析基因表达量与肝癌患者预后之间的关系，确定候选基因 FCN3。体外细胞实验，肝癌细胞系感染 FCN3 慢病毒过表达 FCN3，应用 cck-8、克隆形成、transwell、细胞划痕等实验检测人肝癌细胞过表达 FCN3 后检测细胞增殖、侵袭迁移能力等恶性生物学行为的改变。在体实验，通过不同品系

的小鼠皮下接种对照组肝癌细胞和过表达 FCN3 后的肝癌细胞，观察小鼠皮下生长情况和小鼠生存时间的改变。进一步探讨过表达 FCN3 后抑制肝癌进展的分子机制，全转录组测序差异基因表达分析和 GSEA-KEGG 通路分析提示 FCN3 可能通过调控 Hippo 通路下游关键效应分子 YAP 发挥抑癌效应。通过 Western blotting、qPCR、IF、CO-IP、质谱分析等方式验证 FCN3 抑制 YAP 助转录因子功能的分子机制。

结果 与癌旁组织相比，FCN3 的表达量在肝癌肿瘤灶中显著下降，并且与肝癌患者的不良预后显著相关。体外实验结果提示，人肝癌细胞过表达 FCN3 后细胞增殖、侵袭迁移能力被显著抑制，在体实验结果表明高水平的 FCN3 显著抑制肝癌皮下瘤生长，延长荷瘤小鼠生存时间。全转录组结果分析提示，过表达 FCN3 后，Hippo 信号通路被显著富集，Hippo 信号通路下游关键效应分子 YAP 下游靶基因表达显著下调。分子生物学实验表明 FCN3 可以与 OGT 相互作用，并显著抑制 YAP 与 OGT 结合，下调 YAP O-GlcNAc 修饰水平，增加 pYAP，缩短 YAP 半衰期，减少 YAP 入核，从而抑制 YAP 下游致癌靶基因的表达。

结论 肝癌细胞内高水平 FCN3 通过竞争性结合 OGT，下调 YAP 蛋白 O-GlcNAc 修饰，增加 YAP 在 Ser127 位点的磷酸化，减少 YAP 入核和诱导下游致癌靶基因转录的作用，从而抑制肝癌进展。

PO-0087

Activation of Parvalbumin neurons of the thalamic reticular nucleus Modulates States of Consciousness during Sevoflurane Anesthesia via Projections to the Mediodorsal thalamic nucleus in Mice

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Objective General anesthesia, encompassing both intravenous and inhaled agents, has been a mainstay of surgical procedures for nearly 180 years. Despite its widespread use, the precise mechanisms underlying the reversible state of unconsciousness induced by general anesthetics remain largely elusive. Furthermore, studies have highlighted the significant similarities between the electroencephalography (EEG) signatures of unconsciousness during general anesthesia and those observed during sleep. This convergence suggests that investigating the mechanisms of the sleep-wake cycle may offer valuable insights into general anesthesia. It is now understood that general anesthesia disrupts neuronal signal integration, particularly within the thalamocortical system. The thalamic reticular nucleus (TRN) is a shell-shaped structure composed entirely of GABAergic neurons. It encloses the thalamus along its entire anteroposterior extent. Notably, the principal neuronal pathways connecting the thalamus to the cerebral cortex traverse the thalamic reticular nucleus. The thalamic reticular nucleus neurons receive glutamatergic inputs from both the thalamus and the cortex and, in turn, exert topographic inhibitory control over thalamic relay cells, particularly those in the dorsal thalamus. Mounting evidence suggests that the thalamic reticular nucleus is critical in regulating corticothalamic and thalamocortical communication, which underpins various cognitive processes, including attention, sensation, sleep, consciousness, and even anesthesia. The thalamic reticular nucleus acts as a critical relay in this circuit, establishing specific connections with both cortical and thalamic regions. Given this strategic role, we hypothesized that the thalamic reticular nucleus is key in anesthetic-induced unconsciousness. We employed a combination of chemogenetic and optogenetic techniques to investigate the potential role of the thalamic reticular nucleus in general anesthesia.

Methods Adult male mice were employed in this study including Vgat-IRES-Cre， Vgat-ChR2-EYFP, Pvalb-IRES-Cre, and SST-IRES-Cre mice. Using optogenetic and chemogenetic techniques, we investigated the effects of selectively modulating the thalamic reticular nucleus and the two distinct neuronal populations (parvalbumin-positive and somatostatin-positive neurons) of the thalamic reticular nucleus during sevoflurane anesthesia. The loss of the righting reflex is utilized for monitoring the induction time and emergence time during general anesthetic procedures. Simultaneously, continuous electroencephalography (EEG) monitoring is applied to assess the degree of cortical arousal in mice. The synaptophysin virus was used to trace the downstream projections from the thalamic reticular nucleus.
Results 1. During sevoflurane anesthesia, activation of the thalamic reticular nucleus increased emergence time and decreased induction time. 2. Furthermore, stimulating TRN activity using chemogenetic and optogenetic approaches raised the slow-wave ratio. 3. However, inhibition of the thalamic reticular nucleus through chemogenetic or optogenetic methods does not affect the induction time, emergence time, or degree of cortical arousal in mice during sevoflurane anesthesia, suggesting that inhibition of the thalamic reticular nucleus does not appear to be involved in modulating sevoflurane anesthesia. 4. Activation of parvalbumin-positive (Pvalb) neurons in the thalamic reticular nucleus specifically increased the delta power ratio, prolonged the emergence time, and shortened the induction time, which indicates that parvalbumin-positive neurons in the thalamic reticular nucleus are implicated in the modulation of sevoflurane anesthesia and potentially contribute to its anesthetic effects. 5. Conversely, chemogenetic activation of somatostatin-positive neurons in the thalamic reticular nucleus did not alter the induction time, emergence time, or degree of cortical arousal in mice during sevoflurane anesthesia. 6. Injection of synaptophysin virus into the thalamic reticular nucleus revealed that the downstream axonal projections from the thalamic reticular nucleus include nuclei such as the MD (mediodorsal thalamic nucleus), VPM (ventral posteromedial thalamic nucleus), and LHb (lateral habenula), with the thalamic projections primarily targeting the mediodorsal thalamic nucleus nuclear group. 7. In addition, optogenetic stimulation of neurons TRN Pvalb-MD increased the slow-wave ratio, prolonged the emergence time, and shortened the induction time during sevoflurane anesthesia. 8. In contrast, chemogenetic activation of somatostatin-positive neurons in the thalamic reticular nucleus does not significantly affect the depth of sevoflurane anesthesia, including induction time, emergence time, and the degree of cortical arousal.
Conclusions Activation of parvalbumin-positive neurons in the thalamic reticular nucleus (TRN) and their projections to the mediodorsal thalamic nucleus enhances sevoflurane-induced general anesthesia, revealing a novel mechanism for the role of the thalamic reticular nucleus in anesthetic modulation. Inhibition of the thalamic reticular nucleus does not significantly affect the effects of sevoflurane anesthesia, and activation of somatostatin-positive neurons in the thalamic reticular nucleus similarly does not influence the efficacy of sevoflurane anesthesia. This suggests that within the thalamic reticular nucleus, it is primarily the parvalbumin-positive neurons that play a role in modulating sevoflurane anesthesia.

PO-0088

坏死蛋白 MLKL 通过调控自噬体形成来减轻脓毒症肺损伤的机制研究

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目的 脓毒症肺损伤（sepsis-induced ARDS）是围术期急危重症患者的常见器官损伤。肺微血管内皮细胞（PMVEC）死亡引起的肺内皮功能障碍是脓毒症肺损伤的重要病理基础。自噬流受阻介导脓毒症 PMVEC 死亡，然而调控 PMVEC 命运中自噬流的具体机制仍未阐明。本研究从调控细胞命

运的自噬机制为出发点，旨在明确促进 PMVEC 生存、维持 PMVEC 功能的自噬机制，为临床脓毒症肺损伤的防治提供有效的靶点。
方法 双荧光 GFP-RFP-LC3 示踪细胞自噬流运行状态，Halo-LC3 示踪自噬体形成情况，LC3B 和 p62 反映自噬体成熟和蛋白底物降解情况。小鼠腹腔注射 LPS 建立脓毒症肺损伤模型。免疫荧光、免疫共沉淀、蛋白纯化技术等明确 MLKL 上下游互作的分子机制。非还原沉淀技术检测 MLKL 的多聚体形成情况。
结果 本研究结果显示，脂多糖（LPS）刺激下 PMVEC 的自噬流呈现先促进后抑制的动态变化过程，调控不同阶段自噬流会明显影响 PMVEC 的功能和脓毒症肺损伤的病理进程。我们还首次发现了，经典细胞坏死通路中的核心蛋白混合激酶结构域类似假激酶（MLKL）具有维持细胞自噬流运行、保护细胞存活状态的作用，并证实了 MLKL 是调控细胞自噬流运行、保护 PMVEC 功能并减轻脓毒症肺损伤的重要分子。同时，进一步的自噬机制研究结果显示，胞浆内游离的 MLKL 形成多聚体，移位到自噬泡，与带电多囊体蛋白 2A（CHMP2A）互作，促进自噬泡的闭合和新生自噬体的形成，以加速脓毒症早期 PMVEC 内的自噬流运行。
结论 本研究创新性地发现，MLKL 除了在细胞坏死途径中扮演着细胞死亡执行者的角色外，还具备在脓毒症早期促进自噬体形成、加速自噬流运行来维持 PMVEC 存活、减轻脓毒症肺损伤的新功能。本研究从调控细胞自噬流运行的视角来解析减少脓毒症肺损伤中 PMVEC 死亡的具体机制，为认识与理解自噬流在血管内皮细胞中的生物学作用、维持 PMVEC 存活和保护 PMVEC 功能，从而防治脓毒症肺损伤提供了新思路。

PO-0089

脊髓损伤后的炎症及其外泌体调控机制研究

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目的 脊髓损伤是一种灾难性事件，致残率高，常导致截瘫四肢瘫痪、大小便失禁和感觉障碍。脊髓损伤后病理生理变化复杂，致病机制复杂，围绕治疗策略和机制研究是目前临床转化的前沿热点和难点。组织外泌体能更好地反应组织微环境的复杂性和真实性，因此，脊髓组织外泌体是深入理解脊髓损伤后相关分子生物学机制和寻找有效治疗策略的重要窗口。
方法 1. 提取假手术大鼠和脊髓损伤大鼠的脊髓组织外泌体，分别进行电镜、免疫蛋白印记和粒径分析进行鉴定。
2. 在体外实验中，使用 BV2 小胶质细胞与损伤脊髓组织外泌体进行共培养，检测小胶质细胞对外泌体的吞噬能力和 miR-155-5p 的表达水平，以明确最佳的共培养时间的浓度，并初步探索其潜在机制是否与 miR-155-5p 相关。同时，我们检测炎症指标，以明确与损伤脊髓组织外泌体直接相互作用的炎症细胞及其致炎效应。
3. 使用 SD 大鼠，对假手术大鼠和脊髓损伤大鼠分别给予 miR-155-5p 的激动剂和安慰剂，通过检测前期富集到的 FoxO3a/NF-κB 信号通路相关分子，及其下游的炎症因子，并检测其神经运动功能的改变，以明确 miR-155-5p 在脊髓中具有促炎效应，其机制与 FoxO3a/NF-κB 信号通路相关。
4. 在体外实验中，使用小胶质细胞与损伤脊髓组织外泌体共培养，并在此基础上分别加入 miR-155-5p 的抑制剂，检测 FoxO3a/NF-κB 信号通路相关分子及其相关的炎症因子，以明确损伤脊髓组织外泌体促炎效应是由 miR-155-5p 所介导，并通过靶向 FoxO3a/NF-κB 信号轴实现的。
结果 我们初步探索发现了损伤和未损伤脊髓组织提取到的外泌体在形态和浓度显示的差异。以此为基础，我们进一步通过体内外实验发现，损伤脊髓组织外泌体促进了小胶质细胞的 M1 样极化，增加了炎性细胞因子的释放，从而加剧了神经元损伤。然后，基于外泌体的 miRNA 深度测序结合实时荧光定量 PCR 技术，我们发现与正常组织衍生的外泌体相比，损伤脊髓组织外泌体中富含 miR-155-5p。我们进一步发现，外泌体作为 miR-155-5p 的载体，转运其进入小胶质细胞后通过抑制 FoxO3a 的磷酸化，进而激活 NF-κB 通路，促进 M1 小胶质细胞极化和炎性细胞因子的分泌，最

终加剧神经元损伤。因此，调节 miR-155-5p 的表达或外泌体的分泌可能是缓解炎症反应和减少脊髓损伤后继发性损伤的一种新策略。
结论 综上，本研究对脊髓损伤致病机制这一前沿问题，应用组织外泌体和细胞外泌体在模型大鼠和细胞等多种模型，独辟蹊径地从脊髓组织外泌体入手，系统性探讨脊髓组织外泌体的 miR-155-5p 介导的炎症反应在脊髓损伤致病机制，并基于此为脊髓损伤这一类神经退行性疾病的治疗策略提供理论依据。

PO-0090

七氟烷致老年小鼠认知功能障碍中海马谷氨酸能突触变化的作用

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目的 围术期神经认知功能障碍（PND），包括术后谵妄（POD）和术后认知功能障碍（POCD），作为老年患者麻醉和手术后常见的并发症，显著增加了老年患者术后发病率和死亡率。然而，PND 的潜在机制尚不清楚。本研究旨在分析兴奋性神经元中的差异表达基因，并探究七氟烷诱导老年小鼠认知功能障碍的潜在机制。
方法 18 月龄老年小鼠被随机分为对照（Ctrl）组和七氟烷麻醉（SEV）组，SEV 组老年小鼠接受 2%七氟烷麻醉 6 小时（60%O2，流速为 1 L/min），同龄老年作为 Ctrl 组（60%O2，流速为 1 L/min）。末次麻醉后采集老年小鼠大脑海马组织进行单细胞核测序（snRNA-seq），通过 UMAP 算法将测序结果可视化，探索七氟烷麻醉对老年小鼠海马中兴奋性神经元的基因表达的影响。利用基因本体（GO）和和 Kyoto 基因与基因组百科全书（KEGG）分析方法，探索海马兴奋性神经元差异表达基因及其生物学功能。最后，本研究利用免疫荧光染色技术检测七氟烷诱导的老年小鼠海马中谷氨酸能突触的变化。
结果 单细胞核测序结果显示，七氟烷麻醉可能并不会改变兴奋性神经元中各个亚型的神经元数量，而是导致其内基因表达差异。热图与火山图结果显示，基因 Fth1、Tmsb4x、Actb、Ubb、Fggy、Cox6c、Hspa8、Grin1、Calm1 和 Calm2 表现出上调趋势，而基因 Unc5d、Car10、Arpp21、Chsy3、Ntng1、Ctnna3、Ldb2、Chst9、Prr16 和 Lrrtm3 表现出下调趋势。GO 结果显示，在七氟烷麻醉后，兴奋性神经元中与突触相关的功能出现下降，包括突触组装、谷氨酸能突触传递和化学突触传递的下调。KEGG 结果显示，七氟烷麻醉可能导致包括阿尔茨海默病在内的各种神经退行性疾病的增加，并导致谷氨酸能突触功能的下降。免疫荧光染色验证结果提示，七氟烷麻醉后老年小鼠海马中谷氨酸能突触的密度显著减少。
结论 本研究证明了兴奋性神经元中的差异表达基因与谷氨酸能突触减少和认知功能障碍相关。通过免疫荧光染色验证，本研究发现七氟烷麻醉降低了老年小鼠海马中谷氨酸能突触的数量。这些结果表明了海马谷氨酸能突触变化在七氟烷诱导的老年小鼠认知功能障碍中可能发挥了关键作用。

PO-0091

Kupffer 细胞来源 miR-106b-5p 加重代谢相关脂肪性肝病的作用及机制

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目的 本研究旨在探讨肝脏 Kupffer 细胞(Kupffer cells, KCs)来源 miR-106-5p 对小鼠代谢相关脂肪

性肝病(Metabolic dysfunction-associated fatty liver disease, MAFLD)的影响及相关机制。
方法 试验选用 20 只 SPF 级健康雄性 C57BL/6J 小鼠 21-23 g，随机分为正常饮食组和高脂饮食组，每组 10 只。连续喂养 10 周后，HE 染色、油红 O 染色测定小鼠肝脏及白色脂肪病理学改变，肝脏和血清的生化指标，肝、心、脾、肺、肾、脑、骨骼肌、棕色脂肪、白色脂肪等器官及 KCs 中 miR-106b-5p 水平及小鼠每周体重。此外，取 21-23 g 雄性 miR-106b-5p 敲除(miR-106b-5p$^{-/-}$)小鼠及同窝野生型(wild type, WT)对照小鼠构建 MAFLD 模型，重复上述检测，同时采用冷冻透射电镜观察并分析肝细胞超微结构。进而体外构建原代肝细胞高脂模型：将 6-8 周龄雄性 miR-106b-5p$^{-/-}$小鼠来源的原代肝细胞分别与 6-8 周龄雄性 miR-106b-5p$^{-/-}$小鼠的骨髓来源的巨噬细胞(Bone marrow-derived macrophages，BMDMs)及 6-8 周龄雄性 WT 小鼠来源 BMDMs 共培养，经棕榈酸刺激 24 小时后，检测原代肝细胞中 miR-106b-5p 水平、脂质累积情况，同时结合 RNA-seq 结果，统计并分析差异基因。最后，取 21-23 g 雄性 miR-106b-5p KCs 特异性敲入(miR-106b-5p$^{KC\ KI}$)小鼠，同窝 miR-106b-5p$^{f/f}$小鼠作为 WT 对照组，并在 MAFLD 疾病模型中对 miR-106b-5p$^{KC\ KI}$及同窝对照 WT 小鼠进行上述相关实验检测。
结果 高脂喂养 10 周后，C57BL/6J 小鼠肝脏及白色脂肪出现病理学改变，肝脏及 KCs 中 miR-106b-5p 水平显著上调。此外，在 MAFLD 模型中，miR-106b-5p$^{-/-}$小鼠肝脏 NAS 评分、脂质累积、甘油三酯水平、线粒体损伤比例、肝脏中脂质生成基因水平及白色脂肪细胞面积均低于同窝对照 WT 小鼠。另外，在体外原代肝细胞高脂模型中，WT-BMDMs 棕榈酸刺激组中原代肝细胞 miR-106b-5p 显著高于 WT-BMDMs 对照组。棕榈酸刺激后，与 miR-106b-5p$^{-/-}$-BMDMs 组相比 WT-BMDMs 组原代肝细胞 miR-106b-5p 水平显著上调，脂质累积加重，同时 RNA-seq 提示：miR-106b-5p$^{-/-}$-BMDMs 组原代肝细胞中，线粒体代谢通路相关基因显著上调，细胞对脂质反应通路相关基因显著下调。最后，与同窝对照 WT 小鼠相比， miR-106b-5p$^{KC\ KI}$小鼠肝脏 NAS 评分、脂质累累积、甘油三酯累积显著加剧。
结论 在小鼠 MAFLD 疾病模型中，miR-106b-5p 在肝脏、KCs 中显著上调；miR-106b-5p 敲除可减轻小鼠 MAFLD 疾病模型中肝脏、白色脂肪的脂质累积及肝细胞线粒体损伤；高脂刺激会促进原代肝细胞摄取巨噬细胞来源的 miR-106b-5p，且巨噬细胞来源 miR-106b-5p 通过调节线粒体代谢及肝细胞对脂质反应影响肝细胞的脂质代谢；KCs 来源的 miR-106b-5p 加重 MAFLD 疾病模型中肝脏的脂质累积。

PO-0092

NETs 来源的 ox-mtDNA 和 HMGB1 协同诱导 Pyrin 介导的肺泡巨噬细胞 PANoptosis 导致脓毒症相关 ARDS 的机制

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目的 本研究聚焦于肺组织微环境中性粒细胞和肺泡巨噬细胞的细胞间作用机制，通过研究中性粒细胞 NETs 中 ox-mt DNA 和 HMGB1 协同诱导肺泡巨噬细胞 PANoptosis 的机制，及其对肺组织炎症反应的影响，有望进一步阐明肺组织微环境对 ARDS 病理过程的调控机制，为探索切实可行的肺保护策略提供理论依据。
方法 临床水平，利用 MPO-DNA PicoGreen 法检测脓毒症 ARDS 患者肺泡灌洗液中 NETs 水平，利用流式细胞术检测肺泡巨噬细胞 PANoptosis 情况，并分析其与 ARDS 严重程度的相关性。动物水平，构建小鼠行盲肠穿孔结扎(CLP)术脓毒症模型，经气管插管给予 DNA 消化酶 DNase Ⅰ或 NETs 溶液干预，利用流式细胞术检测中性粒细胞 NETosis 和巨噬细胞 PANoptosis 情况；利用 MPO-DNA PicoGreen 法检测肺泡灌洗液 N ETs 的含量；ELISA 法检测肺泡灌洗呀 IL-1B 和 IL-18；利用 HE 染色、肺泡灌洗液蛋白浓度、ALI 评分检测肺损伤情况。细胞水平，分离小鼠骨髓巨噬细胞（BMDMs），通过 PMA 诱导中性粒细胞 NETosis 模型，通过中性粒细胞来源的 NETs、

DNase Ⅰ清除 NETs 中 DNA、线粒体靶向超氧化物歧化酶 Mito-TEMPO 抑制 NETs 中 mtDNA 氧化、以及外源性 HMGB1、DNA、mtDNA、ox-mtDNA、ox-DNA 等干预手段,利用免疫荧光法明确 HMGB1 和 ox-mt DNA 在 NETs 中的表达；利用 CO-IP 法和 PLA 法检测 PANoptosome 的形成，包括配体 ox-mtDNA 与感知蛋白 AIM2/pyrin/ZBP1 结合；利用 HMGB1、Pyrin、AIM2 和 ZBP1 等基因敲除小鼠来源的中性粒细胞和巨噬细胞，WB 法检测巨噬细胞 PANoptosis 相关蛋白表达和不同基因敲除小鼠来源 BMDMs 检测巨噬细胞 PANoptosis 情况。

结果 （1）脓毒症 ARDS 小鼠肺泡巨噬细胞发生 PANoptosis；（2）NETs 可以诱导小鼠 PANoptosis 和 ARDS；（3）脓毒症时，中性粒细胞形成 NETs，且表达 ox-mtDNA 和 HMGB1；（4）NETs 诱导巨噬细胞 PANoptosis 依赖 ox-mtDNA 进入巨噬细胞胞浆；（6）NETs 诱导巨噬细胞 PANoptosis 依赖 HMGB1（7）经典的 mtDNA 感知通路 NLRP3、STING 和 TLR9 均不影响 NETs 诱导巨噬细胞 PANoptosis；（8）NETs 诱导巨噬细胞形成 PANoptosome，感知蛋白 Pyrin/AIM2/ZBP1 协同调控 NETs 诱导的巨噬细胞 PANoptosis，且依赖 Pyrin。

结论 中性粒细胞通过 ox-mtDNA 协同 HMGB1 诱导 Pyrin 介导的肺泡巨噬细胞 PANoptosis, 进而导致 ARDS。

PO-0093

蓝斑核-中央内侧丘脑通路调控丙泊酚麻醉苏醒的机制研究

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目的 蓝斑核（LC）参与调控全身麻醉苏醒过程，但其相关的神经通路至今未完全阐明，本课题组前期研究发现中央内侧丘脑（CMT）去甲肾上腺素能（NE）传输系统参与调节丙泊酚麻醉苏醒过程。基于此，本研究拟探究 LCNE-CMT 通路在丙泊酚全身麻醉中的作用及其潜在的分子机制。

方法 病毒示踪实验：16 只雄性 C57 小鼠被分为顺行和逆行示踪两组（n=8）。顺行示踪组在 LC 处注射具有顺行投射特性的非特异性病毒，而逆行示踪组在 CMT 处注射逆行投射病毒。3 周后进行脑组织灌注和切片，以从正反两个方向验证 LC 与 CMT 的解剖联系。通路钙信号实验：8 只雄性 C57 小鼠，在 LC 处注射钙信号病毒与酪氨酸羟化酶（TH）启动子混合液，同时在 CMT 处植入光纤，待病毒转染成功后，观察 LCNE -CMT 通路在丙泊酚麻醉过程中活性变化。化学遗传学实验：24 只雄性 C57 小鼠，随机分成化学遗传学激活组、抑制组、对照组 3 组，n=8。每组均在 CMT 处注射逆行 Cre 病毒，同时在 LC 注射相应的化学遗传学病毒，待病毒成功转染后，分别观察激活或抑制 LCNE -CMT 通路后小鼠在丙泊酚麻醉下行为学和 EEG 的改变。光遗传学实验：24 只雄性 C57 小鼠，随机分成光遗传学激活组、抑制组、对照组 3 组，n=8。每组均在 LC 处注射相应光遗传学病毒，同时在 CMT 处埋置光纤，待病毒成功转染后，观察光激活或抑制 LCNE -CMT 通路后小鼠在丙泊酚麻醉下行为学和 EEG 的改变。微注射实验：24 只雄性 C57 小鼠，随机分为酚妥拉明组、艾司洛尔组、生理盐水组，n=8。3 组均在 CMT 上方置入给药套管，1 周后利用微注射泵通过给药套管在 CMT 处分别给予 α 受体阻滞剂（酚妥拉明）、β 受体阻滞剂（艾司洛尔）和生理盐水，观察小鼠在丙泊酚麻醉下行为学及 EEG 的改变。离体膜片钳探明神经元麻醉前后神经元活性：使用 4-6 周龄 C57 小鼠，利用离体膜片钳记录分别检测 LC 神经元和 CMT 神经元电生理变化，并通过灌注丙泊酚后观察 LC 神经元和 CMT 神经元电生理变化。离体膜片钳与光激活实验：健康 4-6 周龄 TH-Cre 小鼠，于 LC 处注射光遗传激活病毒，待 3 周病毒稳定表达后，利用离体膜片钳在离体情况下特异性调控 LC-CMT 神经通路，观察其对 CMT 神经元正常电生理以及灌注丙泊酚时对 LC-CMT 神经通路的突触传递影响。离体膜片钳与灌注相关受体阻滞剂：采用 4-6 周龄 C57 小鼠，利用离体膜片钳记录去甲肾上腺素(NE)作用于 CMT 不同神经元的受体类型，从而进一步揭示 LC-CMT 通路在调控丙泊酚麻醉下的神经突触机制。

结果 病毒示踪实验：LC 对 CMT 有密集的纤维投射。通路钙信号实验：丙泊酚麻醉过程中对 CMT 有投射关系的 LC 神经元末梢的钙信号降低，苏醒时神经元钙信号较前恢复。化学遗传学和光遗传学实验：化学遗传学特异性激活 LCNE-CMT 通路，缩短了小鼠丙泊酚麻醉苏醒过程的翻正反射恢复(RORR)时间，同时皮层脑电 δ 波减少，β、γ 波增加；而抑制 LCNE-CMT 通路则延缓了小鼠丙泊酚麻醉的苏醒，表现为 RORR 时间延长，同时皮层脑电 δ 波增加，θ 波、α、β 和 γ 波减少。同时，光遗传学激活或抑制 LCNE-CMT 通路产生与化学遗传激活或抑制相似的行为学及脑电结果。微注射实验：CMT 处局部注射酚妥拉明和艾司洛尔行为学上均表现为延长了丙泊酚麻醉苏醒时间，皮层脑电结果则显示：与生理盐水组相比，酚妥拉明组 δ 波、θ 波增加，γ 波减少，α 波、β 波则无明显变化，艾司洛尔组 δ 波明显增加，γ 波减少，θ 波、α 波、β 波则无明显变化。离体膜片钳示 LC 神经元存在两种放电模式(自发性放电和非自发性放电)；灌注丙泊酚降低 LC 两种放电模式神经元膜电位降低。CMT 存在两种放电模式神经元，即强直爆发放电神经元（Tonic firing，TF）和单次低阈值爆发放电神经元（Single low-threshold bursting，SLB)，丙泊酚灌注使 CMT 两种放电模式神经元的膜电位降低：对于 CMTTF 来说，灌注丙泊酚时可降低 20pA 刺激产生的动作电位频率、动作电位半宽，而对动作电位振幅没有影响；灌注丙泊酚对 CMTSLB 神经元动作电位没有影响。离体膜片钳与光激活实验：特异性调控 LC-CMT 通路，可诱发 CMTTF 神经元和 CMTSLB 神经元动作电位发放；增加 CMTTF 和 CMTSLB 神经元灌注丙泊酚后的自发兴奋性突触后电流振幅。离体膜片钳与灌注相关受体阻滞剂：离体脑片经灌流不同类型的肾上腺素能受体拮抗剂（育亨宾，哌唑嗪和艾司洛尔），发现育亨宾可影响 CMTTF 神经元 NE 引起的自发兴奋性突触后电流；CMTSLB 神经元无明显变化。

结论 结论 特异性调控 LCNE-CMT 通路可影响小鼠丙泊酚麻醉苏醒过程和皮层脑电的觉醒；该通路发挥其促麻醉觉醒的潜在的分子机制可能是 LC 释放的 NE 通过作用于 CMT 中 TF 神经元上 α2 受体从而发挥促进丙泊酚麻醉觉醒。

PO-0094

Regulation on autophagy with Guanxinning to attenuate oxidative stress damage of pulmonary vascular smooth muscle cells under hypoxia environment through PI3K/AKT/mTOR pathway

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Background：Autophagy, a cellular self-protective mechanism, is crucial for maintaining homeostasis and plays a significant role in pulmonary vascular smooth muscle cells' (PVSMCs) survival under hypoxic conditions. This study investigates the protective effects of Guanxinning (GXN), a traditional Chinese medicine, on PVSMCs exposed to hypoxia-induced oxidative stress. We hypothesized that GXN could attenuate oxidative stress damage by regulating autophagy through the PI3K/AKT/mTOR pathway.

Methods：PVSMCs were cultured under anoxic conditions and treated them with GXN. Cell viability, reactive oxygen species (ROS) levels, and autophagic markers were assessed using CCK-8 assay, flow cytometry, and qRT-PCR. Western blotting and immunofluorescence were employed to evaluate protein expression levels.

Results：GXN significantly increased PVSMCs' proliferative activity and reduced ROS levels in a concentration-dependent manner. GXN treatment decreased the expression of autophagy markers, suggesting an inhibition of autophagy. Furthermore, GXN modulated the PI3K/AKT/mTOR pathway, indicating its role in regulating autophagy. In vivo studies in a pulmonary thromboembolism (PTE) mouse model showed GXN's protective effects on lung

tissues, reducing oxidative stress markers and inhibiting autophagy, comparable to rapamycin and superior to wortmannin.
Conclusion GXN ameliorates hypoxia-induced oxidative stress in PVSMCs by inhibiting autophagy through the PI3K/AKT/mTOR pathway, offering a potential therapeutic strategy for hypoxic pulmonary injuries.

PO-0095

Sphingosine-1-phosphate receptor 2 mediates sepsis-induced immunosuppression through exacerbating mitochondrial fragmentation in monocyte-macrophages

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Background Immunosuppression is a major contributing factor to sepsis mortality currently. Macrophages play critical roles in pathogen defense and regulation of inflammatory responses. Macrophage mitochondrial dysfunction is associated with immunosuppression and poor prognosis of septic patients. Mitochondrial fragmentation drives mitochondrial dysfunction. However, whether mitochondrial fission plays a role in sepsis-induced immune paralysis is unclear. Sphingosine-1-phosphate receptors 2 (S1PR2) is involved in immune regulation of macrophages, besides which it is reported to modulate mitochondrial morphology in endothelial cells. This study aimed to unveil the relationship between macrophage mitochondrial fragmentation and sepsis-induced immunosuppression, as well as the S1PR2-related molecular mechanisms thereof.
Methods We collected blood samples from 14 septic patients (SPs) who met the sepsis-3 diagnostic criteria, as well as 7 healthy controls (HCs) and 8 nonseptic critical controls (CCs). Human monocytes were isolated from peripheral blood. The mitochondrial ultrastructure, mitochondrial function, S1PR2 expression and immune function indicated by HLA-DR expression was evaluated in peripheral blood monocytes. And the relationships among mitochondrial parameters, S1PR2 expression, HLA-DR expression and clinical characteristics were further determined. In animal experiments, cecal ligation and puncture (CLP) was induced in wild-type (WT) or S1PR2 deficient (S1pr2-/-) mice, and peritoneal macrophages were harvested. The mitochondrial ultrastructure, mitochondrial function, immune function, and signaling molecules involved of S1PR2-Drp1 pathway were assessed in peritoneal macrophages in vivo and in vitro. Furthermore, S1PR2 inhibitor JTE-013 and Drp1 inhibitor Mdivi-1 were used to determine their impact on the prognosis of sepsis.
Results Compared with HCs and CCs, the SPs monocyte mitochondria exhibited swelling, cristae dilation, and membrane disintegration. Quantitative analysis indicates that the SPs monocyte mitochondria displayed a shorter length and a decreased surface area, along with an increased percentage of fragmented mitochondria (length＜0.5 μm) ($P<0.05$). What's more, SPs were characterized by upregulated S1PR2 expression, increased colocalization of Drp1 and mitochondria, decreased mitochondrial membrane potential (MMP) and low HLA-DR expression in peripheral blood monocytes compared with HCs and CCs ($P<0.05$). And mitochondrial fragmentation is associated with low HLA-DR expression ($r=-0.599$, $P=0.024$) and high SOFA score ($r=0.754$, $P=0.002$) of SPs. Meanwhile, S1PR2 expression positively correlated with mitochondrial fragmentation ($r=0.621$, $P=0.018$), and negatively correlated with HLA-DR expression ($r=-0.652$, $P=0.012$). In animal experiments, peritoneal macrophages of S1pr2-/- mice showed alleviated mitochondrial fragmentation, increased MMP and ATP level, which induced higher HLA-DR expression and TNF-α/IL-6 secretion in response to LPS restimulation compared with WT mice after CLP ($P<0.05$). Mechanistically, S1pr2 overexpression promoted while S1pr2 depletion inhibited Drp1 phosphorylation at Ser616 compared with WT macrophages detected by

western blot (P<0.05). Consistently, inhibition of Drp1 by Mdivi-1 alleviated mitochondrial fragmentation and improved immune function in S1PR2-overexpressing macrophages (P<0.05). Furthermore, the ROCK I inhibitor Y27632 reduced sepsis-induced Drp1 phosphorylation and mitochondrial fragmentation, suggesting that S1PR2 upregulates Drp1 phosphorylation through ROCK I activation. Finally, treatment of Mdivi-1 or JTE-013 reduced the number of bacteria in peritoneal lavage fluid, alleviated pathological damage in vital organs, and significantly improved the survival rate of mice after CLP (P<0.05).
Conclusions S1PR2 is associated with mitochondrial fragmentation and immunosuppression in peripheral blood monocytes from septic patients. Furthermore, S1PR2 contributed to mitochondrial fragmentation and immunosuppression through Drp1 phosphorylation at Ser616 in peritoneal macrophages from mice. The development of new drugs targeting S1PR2-Drp1 signaling pathway will contribute to the treatment of sepsis.

PO-0096

高氨血症通过小脑等脑区增高肝性脑病麻醉敏感性

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目的 肝功能严重损伤是肝性脑病患者高围术期风险的主要原因之一，精确麻醉有助于保障肝性脑病患者围手术期安全。然而肝性脑病的麻醉敏感性从未被真正探讨。高氨血症是肝性脑病中常见的病理生理变化，是否可根据血氨水平预警麻醉敏感性仍未可知。本研究旨在动物模型中确定急性肝性脑病的麻醉敏感性，并评估血氨水平在其中的影响，进一步通过静息态功能磁共振成像（rs-fMRI）讨论肝性脑病及高血氨时麻醉敏感性变化的机制。
方法 本研究通过硫代乙酰胺诱导大鼠急性肝性脑病，通过行为学、血生化指标和肝脏组织染色判断模型是否构建成功。以丙泊酚 ED50 值及 2 倍丙泊酚 ED50 单次注射、异氟烷麻醉后翻正反射消失、恢复时间作为指标检测急性肝性脑病大鼠麻醉敏感性。为排除肝性脑病中其他病理生理因素的影响，我们通过向大鼠注射乙酸铵模拟肝性脑病时异常高血氨水平以确定血氨对丙泊酚、异氟烷敏感性的影响。通过 rs-fMRI 计算低频振幅（ALFF）及区域一致性（ReHo）以探究高血氨及肝性脑病麻醉时显著变化的脑区。
结果 1、急性肝性脑病大鼠在异氟烷麻醉下翻正反射时间缩短约 49%，恢复时间延长了 100 倍以上，丙泊酚诱导麻醉的 ED50 降低了约 96%。且以 2 倍丙泊酚 ED50 值和相同异氟烷麻醉时，诱导时间均与血氨值呈负相关。2、高氨血症大鼠的异氟烷诱导时间缩短约 49%，苏醒时间延长约 85%，而丙泊酚诱导的 ED50 则减少了 15%，其麻醉敏感性变化与血氨水平相关，且具可逆性。3、急性肝性脑病模型与对照组相比，基底前脑和小脑的神经元兴奋性增高，丘脑、脑干、小脑局部连接增强，大脑皮层弥漫性抑制；仅血氨水平升高时小脑神经元兴奋性增高，中脑导水管周围灰质局部连接增强，仅部分皮层兴奋性减低。
结论 本研究通过动物行为实验和 rs-fMRI 证据表明：高氨血症是急性肝性脑病丙泊酚及异氟烷敏感性增高的原因之一，高氨血症对麻醉后以小脑为代表的脑区神经活动的影响可能导致了异氟烷麻醉下苏醒时间延长。本研究结果强调了降氨治疗对麻醉的重要作用。我们对高氨血症的探索对其他具高氨血症的疾病有借鉴意义。

PO-0097

长期稳定的运动通过脑肠轴改善小鼠衰老后的认知功能障碍

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目的 中国已进入老龄化社会，庞大的老龄化人口意味着庞大的认知功能障碍患者的数量。认知功能障碍为患者本人及其家人乃至整个社会带来挑战和巨大医疗成本。许多研究与生活常识都表明，运动能使机体功能包括认知功能更健康，但其具体作用机制暂未被研究透彻。代谢组学和微生物组学是生物医学领域重要的研究方式，被广泛应用于疾病发生机制、药物作用方式等方面。多组学联合研究能够覆盖多个层面，如蛋白组、基因组、代谢组等，具有全面和深入的优势。本研究将通过多组学分析，研究运动通过脑肠轴改善小鼠衰老后认知功能障碍的机制。
方法 将 20 只小鼠分为运动组和对照组，对运动组进行运动训练干预并对两组在第 1 周、第 7 周、第 14 周和第 21 周进行水迷宫测试以测试小鼠的认知和记忆功能。将小鼠大脑、血清和粪便取材，分别通过超高效液相色谱-质谱联用（UPLC-ESI-MS/MS）进行神经递质分析、通过气相色谱-质谱联用（GC-MS）进行代谢组学分析以及进行肠道微生物分析。最后将神经递质分析与肠道微生物分析结果、血清代谢物分析与肠道微生物分析结果分别进行联合分析以探究运动改善认知功能的途径。
结果 水迷宫结果显示运动使小鼠认知能力显著提升。UPLC-ESI-MS/MS 分析发现运动组与对照组之间神经递质表达存在差异，其中丘脑中差异性表达的神经递质包括 L-glutamine、L-Aspartic acid、L-tyrosine 等，并参与了与认知功能相关的通路如 Dopaminergic synapse。而伏隔核中差异性表达的神经递质包括 L-tyrosine、L-tryptophan、L-histidine 等，其参与的通路如 Tryptophan metabolism 在神经系统中起到重要的调节作用。血清代谢物分析发现运动组与对照组存在显著差异的血清代谢物有 313 个，在上调代谢物相关的通路中有参与了神经修复与认知功能的重要通路 Neuroactive ligand-receptor interaction。微生物分析发现运动组的肠道微生物丰富度更高且属水平的差异最明显，其中 Allobaculum，A2 和 Clostridium_sensu_stricto_1 差异最明显。通过联合分析发现属水平下肠道微生物变化与认知功能相关血清代谢物有相关性，其生物丰富度与血清代谢物水平的改善呈正相关。
结论 本研究揭示了运动对神经认知功能影响可能的路径，即运动通过改变肠道微生物结构从而使血清代谢物水平发生变化，最终改善认知功能。长期持续的运动干预可能通过脑肠轴改善衰老小鼠的认知功能和记忆力，这为未来神经退行性疾病的预防及治疗带来新的思路。

PO-0098

中国 15 家综合性医院非心脏手术老年患者术后抑郁症状的预测模型及队列研究

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目的 老年患者术后抑郁症状发病率高，且降低患者对治疗计划参与度，降低身体及生活质量，甚至增加再入院和死亡的风险。通过早期识别和干预术后抑郁，可提高精神健康资源的合理配置。然而，关于中国老年患者术后抑郁症状的研究尚未明确。本研究首先建立及验证中国 65 岁以上非心脏、非颅脑手术老年患者术后 7 天抑郁症状的预测模型，促进老年患者术后心理健康康复；其次，针对模型关键变量进行队列研究，为指导干预围术期抑郁症状提供临床参考依据。

方法 本研究为多中心、前瞻性、纵向观察研究。采用患者健康问卷-9（PHQ-9）量表评估患者术后 7 天是否出现抑郁症状。采用 Logistic 逐步分析和 4 种机器学习算法（随机森林、梯度增强机、极端梯度增强和分类树自适应增强法）拟合抑郁症状模型。采用 Nomogram 图、ROC 曲线、DCA 曲线、重要性排序和 SHAP 可解释化分析法评估模型效能、适用性及可推广性。对模型进行 1 次内部验证和 2 次外部验证（北、南部地区数据集）。利用多因素 Logistics、PSM、IPTW 和亚组分析法确定重要预测变量右美托咪定（DEX）对非心脏手术老年患者术后抑郁、焦虑、谵妄及睡眠障碍的影响。

结果 6354 名患者最终被纳入研究。内部数据集抑郁患病率为 19.1%，北、南方验证集患病率分别为 23.2%和 22.2%。逐步回归法最终确定 13 个预测因子，其中 7 个为围术期可干预变量（按重要性排序从高到低），包括术中使用右美托咪定、术后镇痛、术前衰弱、睡眠质量、血红蛋白、使用吸入麻醉药及麻醉方式。内部验证集、北及南部外部验证集均证实该模型具有良好的预测价值，曲线下面积(AUC)分别为 0.78、0.78 及 0.79。随机森林法预测该模型效能最佳，北、南部验证集 AUC 均为 0.80。建立 DEX 队列研究后发现，DEX 组术后 7 天抑郁、焦虑、谵妄及睡眠障碍的患病率均明显低于 Non-DEX 组(P<0.001)。多因素 Logistics、PSM 及 IPTW 分析结果均显示 DEX 是非心脏手术老年患者术后抑郁的独立保护因素(OR: 0.23, OR: 0.21, OR: 0.27; P 均<0.001)；也是术后焦虑、谵妄及睡眠障碍的独立保护因素。DEX 在 75 岁、男性、累积共病个数≥2、ASA1~3 级和手术 1~3 级的亚组人群中，具有更明显地缓解术后抑郁、焦虑、谵妄及睡眠障碍的作用。

结论 首篇重点关注中国 65 岁以上择期非心脏手术老年患者术后 7 天抑郁症状的预测模型研究，最终确定 7 个围术期可干预变量，包括术中使用 DEX、术后镇痛等。术中使用 DEX 能够明显减少老年患者术后 7 天抑郁症状的发生，同样也缓解老年手术患者术后焦虑、谵妄及睡眠障碍症状。本研究为重点突出了临床医生关注老年患者术后抑郁症状的必要性，为有效地识别及干预围术期老年患者抑郁症状，提供有效的临床参考依据和围术期干预措施。

PO-0099

Efficacy and safety of ciprofol compared to propofol during hysteroscopy: a single-centre, randomized, positive-controlled study

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Background Ciprofol is an isomer of propofol with the pharmacodynamic characteristics of a rapid rate of onset and recovery. This trial was conducted to confirm the efficacy and safety of ciprofol compared to propofol during hysteroscopy.

Methods Patients undergoing hysteroscopy were randomly assigned to two equally sized groups in which anesthesia induction was performed using either ciprofol or propofol. The primary endpoint was the anesthesia success rate of hysteroscopy. Secondary endpoints included the onset time of anesthesia, time to being fully alert, time out of the operating room, the total dose of ciprofol or propofol required to maintain adequate sedation or anesthesia, injection pain evaluation, body movemen, the satisfaction of sedation/anesthesia from surgeons and patients, the incidence of AEs, vital signs and postoperative complications.

Results A total of 94 women were included in the study. A 100% rate of successful of anaesthesia was achieved in both the ciprofol and propofol groups, with no signifcant diferences between these groups with respect to the onset time of anesthesia (40.0 ± 12.3 s vs 44.9 ± 12.1 s, P=0.056), the time to being fully alert (3.8 ± 1.8 min vs 4.6 ± 2.9 min, P=0.096), or the time out of the operating room (8.5 ± 2.6 min vs 9.5 ± 4.6 min, P=0.199). The total dose of ciprofol required to maintain adequate sedation or anesthesia was being 5-6 times lower than that of propofol (62.5 ± 26.7 mg vs. 380.6 ± 172.8 mg, P < 0.01). The satisfaction ratings of patients in

the ciprofol were higher than in the propofol groups (100% vs 57.4%, P < 0.001). Ciprofol was associated with reduced injection pain relative to propofol (0.0% vs 42.6%, P<0.001). The incidence of RAEs and CAEs in the propofol were higher than in the ciprofol.
Conclusions Ciprofol was non-inferior to propofol with regard to successful sedation for hysteroscopy. In comparison to propofol, ciprofol does not cause injection pain, results in less respiratory depression and less impact on hemodynamics.

PO-0100

围术期最舒适的正压通气方式托下颌支架的应用效果观察

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目的 目前的正压通气辅助设备包括气管插管和喉罩，两者都为有创通气设备，实施需要足够的麻醉深度，同时两者各有实施困难的情况，如喉头高，张口度小，牙齿异常，生命体征难以耐受麻醉深度等等，这也导致了传统观念，只有小手术，没有小麻醉的说法。伴随着人民生活水平的不断提高，舒适化医疗越来越受到重视。在围术期，临床急需一种操作简单有效舒适，并可衔接于从镇静深度，到短小手术全身麻醉深度之间的，无创辅助正压通气设备，来满足临床工作的需求。
研究目的，意义：

本研究发明了托下颌支架，可简单有效的托起患者下颌角，避免舌后坠，保障了气道通畅。临床工作中能够辅助实现无创通气和无创正压通气，适用于从镇静深度到短小手术麻醉等不同麻醉深度的工作需求，同时可保障气管插管全身麻醉诱导期间和苏醒期间的通气安全。避免了部分困难纠结的气管插管；避免了喉罩无法吸痰的弊端；避免了急救时，快速建立气道，对非插管专业医生的技术能力要求；同时拒绝了气管插管或喉罩带来的咽喉部不适感，提高了通气安全性，保障了患者权益。

方法 将生殖科不孕不育的宫腔镜手术患者随机分为两组，托下颌支架组 100 人和喉罩组 100 人，分别比较两组患者在新接触设备的医生和熟练应用的医生的操作下，有效操作时间，操作调整次数，实际通气量与设定通气量比值，血氧饱和度异常情况，术后咽喉疼痛，患者满意度评价，以及新接触设备的医生达到自信操作所需要的操作例数等数据。

结果 两组有效操作时间和调整次数无明显差异，实际通气与设置通气的占比分别为 90%和 93%，两组血氧饱和度均无异常。术后咽喉不适发生率分别为 0%和 5%。满意度都是 100%。首次接触喉罩和首次接触托下颌支架的医生，达到自信操作的例数分别为 3±0.2 和 9±0.5。

结论 托下颌支架和喉罩均能较好的满足供氧需求，对于应用熟练的医生，有效操作时间无明显差异，患者满意度均较高无明显差异。
差异之处：对于首次接触托下颌支架和喉罩的医生，两组差异明显。首次接触托下颌支架组的操作医生达到自信应用所需要的操作例数明显低于首次接触喉罩组。这在心肺复苏等急救需要快速建立气道时，降低了对非专业插管医生的技术能力要求，提高了急救通气的能力，保障了患者安全。但因新接触设备的医生数量有限，临床仍需继续观察。
两组有效操作时间有明显差异，新医生首次失败后，经自行调整，支架组成功概率明显高于新接触喉罩组。喉罩组首次插管失败后，新医生信心不足，往往需要上级医生辅助实现。
支架组的时间主要消耗在面罩和绷带的衔接过程，时间浪费有限且恒定。喉罩组的时间主要消耗在通过口腔，通过舌体和通气密闭不漏气三个环节，更加需要技术含量，失败后经新医生自己调整，成功率仍较低，需要上级医生帮忙指导。
研究受限：本研究所选患者排除牙齿异常，张口度异常、下颌角异常等情况，患者均在麻醉状态下实现通气，降低了插喉罩的困难程度。托下颌支架对麻醉深度要求以及对口腔条件要求更低，具备更加广泛的适用范围和舒适度，对急救复苏等非专业插管医生的插管技术要求更低，可以为临床患者提供舒适和保障。

PO-0101

基于 β-环糊精载 miR-223 纳米递送系统调控巨噬细胞极化治疗脓毒症的研究

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目的 本研究首先筛选 LPS 预处理的间充质干细胞源外泌体（LPS-Exo）调控巨噬细胞极化的关键 miRNA；其次，构建一种具有 pH 响应性、高递送效率、良好生物安全性、稳定性的 miRNA 纳米递送系统；对 NPs/miRNA 体内安全性、生物分布、抗炎效果及机制进行研究。
方法 (1) 提取 LPS 预处理的间充质干细胞源外泌体并进行表征；
(2) 观察 LPS-Exo 对巨噬细胞极化表型的影响及其调控巨噬细胞极化的关键 miRNA；
(3) 制备 β-CD-PDPA/DSPE-PEG3400 纳米粒子（NPs）、NPs/miRNA，并进行表征；
(4) 评估 NPs/miRNA 的体外生物安全性、核酸酶及血清稳定性及 NPs/miR-223 对巨噬细胞极化的影响；
(5) 评估 NPs/miRNA 的体内生物安全性、抗炎效果及在 CLP 小鼠体内的生物分布；
(6) 探究 NPs/miR-223 调控巨噬细胞极化的分子机制。
结果 (1) TEM、NTA、Western Blot 及 CLSM 结果示，外泌体提取成功且可被巨噬细胞大量摄取；
(2) LPS-Exo 较 un-Exo 可减少 CD86 的表达，增加 CD206 的表达；筛选出关键 miRNA 即 miR-223；过表达 miR-223 后，M1 标志物的 mRNA 及蛋白水平降低，M2 标志物的 mRNA 及蛋白水平升高，促炎因子分泌降低；敲减 miR-223 后，得到相反的结果；
(3) 1H NMR、GPC 及 DLS 结果表明 β-CD-PDPA 成功合成；
(4) TEM、DLS 示 NPs/miRNA 成功制备，且 NPs/miRNA 释放 miRNA 呈酸性依赖；
(5) NPs/miR-223 在高浓度核酸酶及血清存在时，仍可稳定递送 miR-223，且毒性可忽略不计；
(6) NPs/miR-223 较 Lipo/miR-223，M1 标志物的 mRNA 及蛋白水平降低，M2 标志物的 mRNA 及蛋白水平升高，促炎因子分泌降低；
(7) 大剂量 NPs/miRNA 注射未引起小鼠重要脏器生化指标、炎症因子及病理形态学的改变；
(8) NPs/miR-223 可降低 CLP 小鼠的重要脏器生化指标、炎症因子分泌及肺脏组织的病理评分，提高 CLP 小鼠生存率且主要蓄积并滞留在 CLP 小鼠的肺脏及盲肠；
(9) 过表达 miR-223 后，PKnox1、p-p65/p65、p-IKBα/IKBα 的 mRNA 及蛋白明显降低，敲减 miR-223 后，结果相反；抑制 NF-κB 信号通路，可逆转 miR-223-inhibitor 对巨噬细胞极化表型的调控。
结论 (1) miR-223 使 M1 型巨噬细胞向 M2 型巨噬细胞进行极化，为脓毒症治疗提供了新的靶点；
(2) NPs/miRNA 理化性质稳定，具有 pH 响应性及良好的体内外生物安全性，可以保护 miRNA 稳定，具有较高的递送效率；NPs/miRNA 在脓毒症小鼠体内具有炎症靶向蓄积及滞留效应；NPs/miR-223 具备出色的体内外抗炎效果，同时可改善脓毒症小鼠生存率；
(3) NPs/miR-223 通过靶向 PKnox1 抑制 NF-κB 信号通路使 M1 型巨噬细胞向 M2 型巨噬细胞进行极化。

PO-0102

超小铜基纳米颗粒通过清除活性氧和保护线粒体功能减轻败血症诱导的肺损伤

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目的 脓毒症肺损伤的发生机制与活性氧 (reactive oxygen species, ROS) 的过度产生有关，可导致细胞线粒体功能障碍，发生各种炎症性死亡(inflammatory death, panptosis)。近年来，生物医学领域中，新型纳米材料的应用是重要研究方向之一。一种由 Cu 和 Cu2O 混合物组成的超小铜基纳米粒子(Cu4.5O USNPs)，由于其自身材料特性或可稳定细胞内复杂的氧化环境，预防脓毒症相关组织损伤的发生。故本研究旨在验证 Cu4.5O USNPs 清除 ROS 功能。并明确 Cu4.5O USNPs 是否可以通过清除 ROS 维持细胞线粒体功能，从而发挥抗炎预防脓毒症肺损伤作用。

方法 研究人员通过 x 射线衍射图及 XPS 测量光谱分析所合成纳米材料的晶体结构、形态及表面化学组成。选取羟基自由基(·OH)，超氧阴离子(O2 -)和过氧化氢(H2O2) 作为评估指标，使用紫线分光光度计测量指标吸收峰。选用 RAW264.7 细胞系进行细胞毒性实验，并将细胞系随机分成对照组、Cu4.5O USNPs 组、LPS 组、LPS +Cu4.5O USNPs 组，观察各组细胞形态学改变及死亡情况（Calcein-AM/PI 染色）。使用显微镜观察荧光（DCFH-DA 染色）同时结合流式测量细胞线粒体内 ROS 及细胞超氧化物含量及线粒体功能。透射电镜下观察线粒体膜形态。通过流式检测各组细胞荧光（Annexin V/7-AAD 染色）判断凋亡情况。Elisa 测量炎性细胞因子浓度。参照细胞实验结果后，随机将 C57BL/6J 小鼠分为对照组、Cu4.5O USNPs 组、LPS 组、LPS +Cu4.5O USNPs 组记录描绘生存曲线。测量小鼠溶血率。HE 染色观察各组肺组织结构及炎症浸润情况。使用 Elisa 试剂盒判定各组肺组织和血浆中炎症因子浓度，并利用 Tunel 染色及 Western blot 技术评定肺组织中炎性死亡发生情况。

结果 研究制备的纳米材料具有均匀超细的颗粒结构，平均直径为 2.8 nm，晶体结构由 Cu 和 Cu2O 颗粒混合组成。Cu4.5O USNPs 抗氧化特性强表现为具有 ROS 清除活性和明显的过氧化氢酶和超氧化物歧化酶样活性。Cu4.5O USNPs 与试剂反应后，代表·OH、O2−、H2O2 及底物的吸收峰值较前相比明显下降，且峰值下降程度受 Cu4.5O USNPs 浓度影响。

安全性方面：治疗量的 Cu4.5O USNPs 不会影响 RAW264.7 细胞活性，细胞没有明显损伤。小鼠使用 Cu4.5O USNPs 后溶血率小于 5%。

生物活性方面：Cu4.5O USNPs 具有良好的 ROS 清除能力从而抑制细胞炎症。与 Cu4.5O USNPs 共孵育后 RAW264.7 细胞内 ROS 总体水平显著降低。Cu4.5O USNPs 处理过的 RAW264.7 受 LPS 刺激后未出现明显炎性形态变化。LPS +Cu4.5O USNPs 组与 LPS 组相比细胞损伤产生的红色荧光的比例显著降低。后续细胞经 O27 和 O76 荧光探针孵育后证实 Cu4.5O USNPs 对 RAW264.7 细胞中·OH 和 O2−具有显著的清除活性。LPS+Cu4.5O USNPs 组细胞产生凋亡的比例显著降低，TNF-α、IL-6 细胞因子水平明显降低。Cu4.5O USNPs 保护了细胞线粒体功能。LPS 刺激过的细胞产生了大量的线粒体超氧化物，这些超氧化物在 LPS+Cu4.5O USNPs 组被部分抑制。LPS+Cu4.5O USNPs 组细胞线粒体膜电位(MMP)及 ATP 含量得到明显改善，细胞线粒体嵴结构较完整。当 Cu4.5O USNPs 用量为 850 μg/kg 时，减轻了 LPS 引起的肺内炎症反应，小鼠 10 天生存率达 60%，肺组织和血清中 TNF-α 和 IL-6 的水平较低。LPS 组小鼠肺组织中存在焦亡、坏死性死亡相关标志物，然而 LPS+Cu4.5O USNPs 组小鼠焦亡、坏死性死亡相关标志物表达降低。

结论 Cu4.5O USNPs 具有抗氧化特性，可清除 ROS、发挥保护线粒体稳态和抑制炎症因子释放的作用。它具有良好的临床应用前景，为脓毒症肺损伤的治疗提供了新的思路。

PO-0103

MOFs 负载地塞米松协同二氧化铈偶联抗 ICAM-1 作为急性肺损伤治疗的靶向 DDS

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目的 针对目前治疗急性肺损伤和急性呼吸窘迫综合征缺乏安全有效治疗手段的局限，纳米医学提供了一种前景广阔的解决途径。本研究旨在设计一种负载地塞米松和 CeO_2 的具有 ROS 清除及 PH 响应的靶向纳米药物递送系统以调节氧化应激、减轻炎症反应，为治疗 ALI 提供了新的思路和临床意义。
方法 通过一系列实验合成并表征了 DCZPI 纳米载药系统，评估其对血管内皮细胞的靶向摄取能力以及其在体外的抗炎、抗氧化活性，进而挽救细胞免于凋亡。随后，通过动物模型进一步探讨纳米颗粒在体内的治疗效果，评估其治疗急性肺损伤的潜力和生物安全性。
结果 实验结果表明，通过 anti-ICAM-1 配体的修饰，实现了对肺部炎症部位的精准靶向。实验不仅凸显了纳米技术在治疗肺部疾病中的潜力，还进一步验证了纳米材料的生物安全性。相较于传统治疗方式，DCZPI 纳米颗粒展示出优秀的体内外治疗效果，有效缓解氧化应激和炎症反应，挽救内皮细胞免于凋亡。此外，治疗显著降低了炎症因子的水平及炎性细胞的浸润，改善了肺组织的病理生理损伤，降低了急性肺损伤小鼠的死亡率。
结论 本研究成功构建一项具有内皮靶向和 ROS 清除及 PH 响应性的 DDS 治疗 ALI/ARDS。DCZPI 通过精准靶向肺部炎症部位并在炎症部位迅速累积释放包裹的有效载荷，通过清除 ROS，减轻炎症因子分泌，调控氧化应激，挽救肺血管内皮细胞凋亡，进而减轻小鼠肺损伤和降低死亡率，不仅为炎症和氧化应激等相关的肺部疾病治疗开辟了新的路径，而且展示了纳米医学在推进肺部疾病治疗策略中的广泛应用前景。

PO-0104

经鼻给药进展与研究

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目的 本研究采用先进的数字仿真技术进行不同经鼻雾化模式及参数的数值模拟，根据研究数据研发改良经鼻雾化给药设备，通过健康志愿者和临床实验，观察鼻腔给药和嗅区靶向给药的效果，旨在为麻醉医生提供简便高效的专业雾化设备。
方法 采集 6 名健康成人的呼吸道 CT 数据导入 Mimics 21.0 软件进行呼吸道三维模型重建，后经 Creo parametric6.0/4.0 软件优化，并利用 ICEM CFD19.2 软件对三维模型进行网格划分，建立研究用三维有限元模型。采用 ANSYS Fluent 软件进行面罩、双鼻腔及单鼻腔双向三种不同雾化模式，不同颗粒大小、颗粒速度和喷雾角度参数变化的仿真模拟，并在 3D 打印呼吸道物理模型进行沉积率实测，验证仿真结果。
结果 面罩雾化模式下不同雾化粒径，速度及喷雾角度的仿真模拟鼻腔沉积率结果为 17.13 %-26.49 %，其中最高鼻腔沉积率 26.49 %是在中位粒径 9 um、速度为 1.1 m/s、与鼻腔水平面 35 ° C 夹角的雾化参数组合中获得；单鼻腔超声雾化模式不同雾化粒径及速度仿真的鼻腔沉积率波动在 31.08 %-85.49 %（图 1），但嗅区沉积率仅为 2.19 %-5.26 %；单鼻腔呼吸双向超声雾化较单鼻腔超声雾化嗅区沉积率提高一倍（12.36 % vs. 5.26 %，图 2）。

结论 运用 CFD 进行的气道沉积数字仿真结果与 3D 打印模型沉积实测结果具有良好的相关性；雾化颗粒大小和雾化颗粒速度及喷射角度与雾化沉积区域分布密切相关，其中中位粒径 9 um，中间角度及 1.1 m/s 喷雾速度可能为面罩经鼻雾化设备的最佳雾化参数；单鼻腔超声雾化可明显改善鼻腔沉积率；单鼻腔双向呼吸超声雾化对嗅区沉积率有明显改善作用

PO-0105

下腔静脉塌陷度与颈内静脉塌陷度在预测老年患者全麻诱导后低血压的效果对比

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目的 探究下腔静脉塌陷度与颈内静脉塌陷度在预测老年患者诱导后低血压方面的关系，以及两者在此方面的预测价值的对比。

方法 选择我院行择期胃肠手术的老年患者，术前 1 天筛选患者并评估患者各种信息基线情况，根据纳排标准是否入组。手术当天，于手术准备间对患者进行下腔静脉与颈内静脉塌陷度测量，患者取平卧位，测量下腔静脉以及颈内颈内静脉相关指标。在患者采取平卧位时，我们测量了下腔静脉在一个呼吸周期内的最大值(dIVCmax)和最小值(dIVCmin)，通过计算下腔静脉塌陷率(IVC-CI)，用公式 IVC-CI=(dIVCmax–dIVCmin)/dIVCmax×100％来评估。我们进行了 3 次测量，并取平均值作为该指标。同一呼吸周期内，测量颈内静脉的最大直径(dIJVmax)和最小直径(dIJVmin)。采用相同的公式计算颈内静脉的塌陷率(IJV-CI)=(dIJVmax-dIJVmin)/dJVCmax100％。进行三次测量，并取平均值作为该指标的计算结果。患者进入手术间后，予以患者接监护仪监测心电图，对患者进行常规动脉穿刺置管，连接一次性压力传感器，记录诱导前血压，作为麻醉后低血压判断的基线水平即麻醉诱导前基线血压(SBP)，常规颈内静脉穿刺置管，控制静脉滴速，予以全麻诱导，并记录麻醉诱导后 15min 内或从麻醉诱导开始至手术切皮前(未满 15 分钟)的血压及 BIS 值，每 1 分钟记录一次。观察全麻诱导后低血压发生情况。低血压发生的定义是在麻醉诱导后，收缩压下降幅度超过基线水平的 20%以上或收缩压的绝对值小于 90mmHg。记录诱导后 15 分钟内或手术切皮前（未满 15 分钟）的最低血压和 SBP，并据此将患者分为低血压组和血压正常组。对 IVC-CI、dIVCmax、dIVCmin、IJV-CI、dIJVmax 和 dIVCmin 这些超声测量参数与麻醉诱导后收缩压下降的相关性进行了比较。还利用了受试者工作特征曲线(ROC)来确定诊断阈值、灵敏度和特异度，以评估各超声测量参数在预测麻醉诱导后低血压方面的价值。

结果 1、在符合纳排标准的 94 例老年患者中，有 51%的患者发生了 PIH，与血压正常组比较，低血压组患者既往有高血压病史的人数高于血压正常组(P<0.05)；dIJVmin 小于血压正常组(P<0.05)；IVC-CI 明显大于血压正常组(P<0.001)；IJV-CI 明显大于血压正常组(P<0.001)。低血压组患者诱导后最低血压明显低于正常血压组（P＜0.001）。低血压组患者 SBP 下降率明显低于正常血压组（P＜0.001）。

2、患者的 IVC-CI、IJV-CI 与 SBP 下降率分别显示高度正相关（r＝0.50，r＝0.70，P＜0.05）。患者的 IVC-CI、IJV-CI 越大，SBP 下降率越大，发生 PIH 的概率越高。患者的 dIJVmin 相关性分析显示，dIJVmin 与 SBP 下降率呈低度负相关（r＝-0.348，P＜0.05）。表明当患者 dIJVmin 越小时，SBP 下降率越大，但两者关系不明显。而患者下腔静脉与颈内静脉指标中的 dIVCmax、dIVCmin、dIJVmax 与 SBP 下降率没有相关性（P＞0.05）。

3. 患者 IVC-CI 预测 PIH 的 ROC 曲线下面积（AUC）为 0.85（0.76-0.93），而患者 IVC-CI 预测 PIH 的 AUC 为 0.92（0.86-0.98）。IVC-CI 临界值为 23.31%，其敏感度为 97.9%，特异度为 69.6%。IJV-CI 临界值为 19.27%，其敏感度为 91.7%，特异度为 87.0%。同时我们也对 dIVCmax、dIVCmin、dIJVmax 进行 ROC 曲线分析，其结果没有统计学意义。

结论 下腔静脉塌陷度与颈内静脉塌陷度均能作为预测老年全麻诱导后低血压的工具。而颈内静脉塌陷度与下腔静脉塌陷度相比，在老年患者全麻诱导后低血压的预测能力上更具价值。当颈内静脉塌陷率临界值为 19.27%时，其敏感度为 91.7%，特异度为 87.0%。

PO-0106

谵妄患者类淋巴系统功能障碍的磁共振研究

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Background: Delirium is linked to structural and functional brain abnormalities, but the role of brain glymphatic function is still largely unexplored. This study aims to investigate the function of the glymphatic system in delirium by utilizing diffusion-tensor imaging (DTI) to analyze water diffusion along the perivascular space (ALPS), and to examine its correlation with clinical symptoms.
Methods: We examined a cohort of 15 patients with delirium and 15 healthy controls, quantifying water diffusion metrics across the x-, y-, and z-axes in both projection and association fibers to calculate the DTI-ALPS index, serving as an indicator of glymphatic function. We analyzed the differences in the ALPS index between groups using a general linear model that controlled for age and sex, and assessed the association between the ALPS index and clinical variables through partial correlations.
Results: Our findings revealed that patients with delirium exhibited a significantly reduced DTI-ALPS index across the whole brain and within both hemispheres, indicating potential glymphatic dysfunction (1.25 ± 0.15 vs 1.38 ± 0.10, t = 2.903, p = 0.007; 1.27 ± 0.16 vs 1.39 ± 0.08, 1.22 ± 0.16 vs 1.37 ± 0.14, t = 2.617, p = 0.014; t = 2.719, p = 0.011; respectively). However, there was no correlation between the DTI-ALPS index and clinical variables.
Conclusion: Our study highlights a lower ALPS index in patients with delirium, suggesting that glymphatic dysfunction may play a role in the pathophysiology of delirium. These findings offer new insights into the underlying mechanisms of delirium.

PO-0107

血清拉曼光谱与 D-二聚体检测联合应用于急性主动脉夹层的早期诊断研究

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目的 急性主动脉夹层(AAD)是一种危及生命的心血管疾病，具有起病急骤、病情进展迅速等特点。由于 AAD 首发症状多样，临床诊断较为困难，经常在早期被误诊，导致获得治疗的时间延迟。本研究旨在探讨与 AAD 的发生相关的预测因素，确定潜在的血清生物标志物，以帮助在早期快速识别、准确诊断 AAD，促进及时的干预治疗，并有效地将其与其他表现为急性严重胸痛的疾病，特别是急性心肌梗死(AMI)和肺栓塞(PE)区分开来，最终改善患者的预后。
方法 本研究共纳入 122 例 AAD 患者和 129 例其他急性严重胸痛患者。测定血清样品的拉曼光谱信号峰值强度。在每次测量中，拉曼光谱信号经过两次积分（每次采集时间为 3 秒）采集。联合利用拉曼信号峰值强度和血清 D-二聚体水平，建立 Logistic 回归和 nomogram 模型来预测 AAD 的发生。

通过受试者工作特征(ROC)曲线分析、净重分类改进(NRI)、综合判别改进(IDI)和决策曲线分析(DCA)，在训练和内部测试集中对这些模型的临床效力进行评估。

结果 与非 AAD 患者相比，AAD 患者的血清 D-二聚体水平显著升高，且在特定拉曼峰处信号强度更高，包括 505 cm^{-1}、842 cm^{-1}、947 cm^{-1}、1254 cm^{-1}、1448 cm^{-1} 和 1655 cm^{-1}。相反，AAD 患者在 750 cm^{-1}、1004 cm^{-1}、1153 cm^{-1}、1208 cm^{-1} 和 1514 cm^{-1} 等拉曼峰处的信号强度下降。训练集的最小绝对收缩和选择算法(LASSO)回归分析确定了 8 个潜在的预测因子：D-二聚体以及 505 cm^{-1}、750 cm^{-1}、1153 cm^{-1}、1208 cm^{-1}、1254 cm^{-1}、1448 cm^{-1} 和 1655 cm^{-1} 处的拉曼信号强度测量值。将这 8 个潜在的预测因子联合应用，显示出了良好的鉴别性能：在训练集中的曲线下面积（AUC）值为 0.928，在内部测试集中的曲线下面积（AUC）值为 0.936，优于单独使用 D-二聚体。而且，DCA 显示，这 8 个潜在预测因子的联合将为临床应用提供实质性的净收益。此外，这种联合应用显著增强了辨别能力，训练集的连续 NRI 为 39.8%，IDI 为 9.95%，内部测试集的连续 NRI 为 27.1%，IDI 为 9.95%。

结论 将 8 种潜在预测因素联合应用，能够有效地在更大程度上排除 AAD。本研究提出了一种利用光学诊断技术，如拉曼光谱，进行早期检测的富有潜力的诊断策略。

PO-0108

脑电波源的疼痛阈值指数监测与常规监测指导异丙酚-瑞芬太尼用于腹腔镜手术的比较：一项随机对照试验

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目的 疼痛阈值指数（PTI, pain threshold index），一种基于自发脑电波小波分析的新型镇痛指标，已被报道可靠地预测术后疼痛和血流动力学反应。本研究旨在探讨基于 PTI 的镇痛是否能减少术后恢复室中的疼痛程度和补救性镇痛的使用率。

方法 共 112 位接受选定腹腔镜手术的患者随机分为 PTI 导向镇痛组（PTI 组）和接受标准临床护理的对照组。PTI 组中瑞芬太尼的给药通过 PTI 指导，以保持值在 40 至 60 之间，而对照组则根据血流动力学变化来指导。主要结果指标为术后恢复室中的补救性镇痛率。此外，还比较了两组间术后疼痛评分、术中瑞芬太尼需求量及阿片类药物相关不良事件

结果 发现对照组中的 56 名患者中有 20 名（35.7%）需要补救性镇痛，而 PTI 组的 56 名患者中有 7 名（12.1%）需要。在对照组接受补救性镇痛的相对风险为 3.12（95%CI，1.65-4.08，P=0.003）。PTI 组在 PACU 中的舒芬太尼消耗量较对照组低（P=0.004）。两组之间的瑞芬太尼和异丙酚消耗量、阿片类药物相关不良事件相似。

结论 在腹腔镜手术中，PTI 指导的镇痛可减少补救性镇痛的需求。

PO-0109

艾司氯胺酮复合丙泊酚诱导全身麻醉对大脑中动脉血流速度的影响：一项随机对照临床试验

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目的 艾司氯胺酮近年来越来越多地用于临床麻醉。研究艾司氯 胺酮对大脑中动脉血流速度的影响

对其临床麻醉的进一步应用具有临 床意义。本研究旨在探讨艾司氯胺酮联合丙泊酚诱导全身麻醉下气管 插管对诱导期大脑中动脉血流速度及血流动力学的影响。

方法 该随机临床试验纳入 2022 年 3 月至 2023 年 3 月在我院全 麻下接受非颅内择期手术的 102 例患者，年龄在 20-65 岁之间。根据麻 醉药物将患者分为两组：舒芬太尼 0.5μg/kg（C 组）或艾司氯胺酮 1.5mg/kg（E 组）。主要结局是患者诱导前后平均大脑血流速度的变 化值。次要结局包括四个不同时间点的大脑血流速度（CBFV）、血压 （BP）和心率（HR）：全身麻醉诱导前（T0）、诱导药物注射后 1 分 钟（T1）、气管插管前（T2）和气管插管后 1 分钟（T3）。还记录了诱 导过程中不良反应发生情况。

结果 两组诱导前较气管插管前的大脑 血流速度变化（ΔVm1）及两组气管插管后 1 分钟较诱导前大脑血流速 度变化（ΔVm2）均无显著差异。C 组术中舒芬太尼的中位消耗量明显 低于 E 组。T1 时，E 组平均心率显著高于 C 组。T2、T3 时，E 组血压、 心率明显高于 C 组。在 T2 时，E 组的 CBFV 明显高于 C 组。与 C 组相 比，E 组低血压发生率显著降低。其他结局无差异。

结论 艾司氯胺酮联合丙泊酚诱导气管插管不会增加大脑中动脉 的血流速度。艾司氯胺酮有利于在诱导过程中保持血流动力学稳定性。 此外，艾司氯胺酮联合丙泊酚诱导气管插管全身麻醉不会增加诱导期 间不良反应的发生。

PO-0110

The association between perioperative serum transferrin trajectories and postoperative cognitive dysfunction in elderly patients

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Background Postoperative cognitive dysfunction (POCD) continues to be a critical concern for elderly patients post-surgery, with its etiology rooted in complex interactions among various physiological pathways. Despite extensive research, the mechanisms underlying POCD remain elusive, and there is a pressing need for novel biomarkers that can predict and potentially mitigate this condition. Serum transferrin (TF), a protein integral to iron homeostasis, has been implicated in inflammation and oxidative stress responses, yet its role in POCD has not been thoroughly investigated, especially concerning its dynamic changes throughout the perioperative period. The presence of TF receptors on the blood-brain barrier (BBB) suggests a direct interaction with the central nervous system (CNS), which could be exacerbated by the known disruption of the BBB during anesthesia and surgery. This study aimed to investigate the relationship between the dynamic changes in perioperative serum TF levels and the risk of POCD in elderly patients, while also exploring whether TF levels could serve as an independent risk factor rather than merely a reflection of inflammatory processes.

Methods Utilizing data from a previously conducted randomized controlled trial (RCT), we performed a secondary analysis on elderly patients (≥65 years) who underwent elective orthopedic or pancreatic surgery. Given the RCT design and the focus on the control group for this secondary analysis, the study population was ensured to have balanced and comparable baseline characteristics, enhancing the reliability of our findings. Serum TF levels and inflammatory markers were meticulously measured at three critical junctures: the morning before surgery, 1 hour post-skin incision during surgery, and the morning after surgery. Trained anesthesiologists, proficient in conducting cognitive function assessments, interviewed participants both pre-operatively, on the day prior to surgery, and post-operatively, on the third day following the procedure using the Chinese version of the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA). A decline of more than 2 points in either the MMSE or MoCA-B scores from the preoperative baseline serves as the diagnostic

criterion for identifying patients with POCD. Latent class mixed models (LCMM) were employed to identify distinct trajectories of TF levels during the perioperative period. Univariate and multivariate logistic regression analyses were performed to determine the association between TF trajectories and POCD risk. Receiver Operating Characteristic (ROC) curves were constructed to evaluate the predictive value of TF trajectories for POCD, both as a single factor and in a multifactorial context. Further, multivariate logistic regression models additionally adjusted for intraoperative inflammation levels and interaction analyses were employed to assess the independent association between TF trajectories and POCD. Mediation analysis was performed to explore whether TF levels mediated the relationship between inflammation and POCD.

Results In our study, we observed that 23 out of 64 elderly patients (35.9%) developed POCD following elective orthopedic or pancreatic surgery. To dissect the temporal patterns of serum TF levels during the perioperative period, we applied Latent Class Mixed Models (LCMM), which identified two distinct TF trajectory classes among the patients: a steady-rise class (42.2%) and a peaking-decline class (57.8%). Notably, patients exhibiting the peaking-decline trajectory were found to have a significantly higher risk of developing POCD. The odds ratio (OR) for this group was 4.17 (95% CI: 1.37-14.60, p value= 0.016) without adjustment and 6.59 (95% CI 1.67-35.90, p value= 0.013) after adjustment for confounding factors (age, BMI, ASA physical status, and surgery duration). Further analysis revealed that intraoperative TF levels also emerged as an independent risk factor for POCD. The unadjusted OR for intraoperative TF levels was 1.49 (95% CI: 1.03-2.24, p value= 0.042), which increased to 1.80 (95% CI 1.16-3.04, p value= 0.015) upon adjustment. To assess the predictive value of TF trajectories for POCD, we constructed Receiver Operating Characteristic (ROC) curves. The analysis showed that TF trajectories had a significant predictive value, with areas under the curve (AUC) indicating moderate to high accuracy. The AUC for single-factor models was 0.660 (95% CI: 0.554-0.775), while for multifactorial models, it was 0.805 (95% CI: 0.692-0.918). In multivariate analyses that adjusted for inflammation, the adjusted OR for TF trajectories associated with POCD was 7.18 (95% CI 1.78-40.29, p value= 0.011). Interaction analyses with TNF-α levels (p value for interaction =0.828) and IL-6 levels (p value for interaction =0.319) confirmed that TF trajectories were independently associated with POCD risk. Mediation analysis, however, indicated that TF levels did not mediate the relationship between inflammation and POCD.

Conclusions Our findings reveal that the dynamic patterns of perioperative serum TF levels, particularly the peaking-decline trajectory, are associated with an increased risk of POCD in elderly surgical patients. These results suggest that TF trajectories are not merely a reflection of inflammatory processes but may represent distinct physiological changes that are relevant to the pathogenesis of POCD. This study underscores the importance of considering TF dynamics as potential biomarkers for POCD risk assessment and therapeutic targeting. However, to further validate these findings and establish their clinical utility, a more standardized multicenter, large-sample study is warranted. Such a study would provide a robust foundation for future research and potential interventions aimed at mitigating the impact of POCD on elderly patients undergoing surgery.

PO-0111

The Relationship Between Surgical Approaches and Postoperative Delirium in Patients aged 65 and over Undergoing Major Abdominal Surgery: A Comparative Study of Laparotomy, Laparoscopic, and Robot-assisted Techniques

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Purpose Postoperative delirium (POD) is a common and serious complication in elderly patients following major surgery. It is characterized by acute episodes of confusion, altered levels of consciousness, and impaired cognitive function, which can lead to prolonged hospitalization, increased postoperative complications, higher mortality rates, and elevated medical costs. Understanding the factors that contribute to the development of POD is critical for improving surgical outcomes and patient quality of life.

This study aimed to investigate the relationship between different surgical approaches—laparotomy, laparoscopic, and robot-assisted techniques—and the incidence of POD in patients aged 65 and older undergoing major abdominal surgery. Specifically, the study sought to compare the incidence rates of POD among these three surgical methods and to examine whether the duration of surgery mediated the effects of these surgical approaches on the incidence of POD.

Methods This retrospective cohort study analyzed perioperative data from patients who underwent major abdominal surgery at the First Medical Center of Chinese PLA General Hospital between January 2014 and December 2021. The inclusion criteria were patients aged 65 years or older who underwent laparotomy, laparoscopic, or robot-assisted surgery for gastrointestinal or hepatobiliary pancreatic conditions. Patients were excluded if they had emergency operations, American Society of Anesthesiologists (ASA) classification V, relatively minor procedures such as cholecystectomy or gastrointestinal endoscopy, missing exposure or outcome data, preoperative dementia, or use of related medications.

The primary outcome of the study was the incidence of POD within 7 days postoperatively. POD was diagnosed based on medical record searches for keywords associated with delirium and postoperative medications used to treat delirium. An experienced neurologist reviewed the medical records to confirm the diagnosis according to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5).

Data collection included demographic variables (sex, age, BMI, smoking and drinking status), comorbidities (hypertension, diabetes, cardiovascular and cerebrovascular diseases, depression, anxiety, renal insufficiency, COPD), preoperative medications, laboratory test results, intraoperative data (duration of surgery, ASA classification, anesthesia methods, type of surgery, blood loss, blood transfusion, crystalloid and colloid use, urine output, intraoperative blood pressure, and medications used).

The data were analyzed using univariate and multivariable logistic regression models to assess the correlation between surgical approaches and POD. Propensity score matching (PSM) and inverse probability of treatment weighting (IPTW) were applied to reduce the effect of potential confounding factors. Mediation analysis using a structural equation model (SEM) was conducted to examine the mediating role of surgery duration in the relationship between surgical approaches and POD.

Results Out of the 18,185 patients initially considered for the study, 16,479 met the inclusion criteria and were analyzed. The overall incidence of POD in the cohort was 4.1% (679/16,479). When comparing the effects of different surgical methods on POD, laparoscopic surgery was associated with a significantly lower risk of POD compared to laparotomy, with odds ratios (ORs) ranging from 0.500 in the unadjusted model to 0.693 in the IPTW model, all statistically significant ($P < 0.001$). In contrast, robot-assisted surgery was associated with a higher risk of POD compared to laparotomy, with ORs ranging from 2.223 in the unadjusted model to 2.406 in the IPTW model, also demonstrating statistical significance ($P < 0.001$).

Detailed analysis showed that patients undergoing laparoscopic surgery were generally older, had a higher BMI, and had better laboratory results compared to those undergoing laparotomy. They also experienced shorter operative times, lower ASA classifications, and reduced blood loss and urine output. Robot-assisted surgery patients, compared to laparotomy, had similar age and BMI but higher rates of alcohol consumption, hypertension, diabetes, and cardiovascular diseases. Their laboratory tests showed higher levels of hemoglobin, serum albumin, and creatinine. Robot-assisted surgery involved longer operative times and higher rates of benzodiazepine use preoperatively and intraoperatively.

The propensity score matching (PSM) and inverse probability of treatment weighting (IPTW) analyses confirmed that different surgical approaches remained significantly associated with POD. In the PSM model, the odds of POD for the laparoscopic surgery group was 0.601 (95% CI: 0.450-0.798, P < 0.001), while for the robot-assisted surgery group, it was 2.404 (95% CI: 1.839-3.167, P < 0.001). Similar trends were observed in the IPTW-adjusted cohort, with the odds of POD for the laparoscopic surgery group being 0.693 (95% CI: 0.572-0.840, P < 0.001) and for the robot-assisted surgery group being 2.406 (95% CI: 1.952-2.963, P < 0.001).
The mediation analysis revealed that the duration of surgery played a significant role in mediating the relationship between the surgical approach and the incidence of POD. For laparoscopic surgery, the shorter duration partially mediated its protective effect against POD, with a mediation proportion of 26.59%. For robot-assisted surgery, the longer duration slightly mediated the increased risk of POD, with a mediation proportion of 1.34%.
The yearly distribution analysis showed that the proportion of laparoscopic surgeries increased steadily from 2014 to 2021, while the proportion of laparotomy decreased. The incidence of POD decreased over time for laparotomy and remained relatively stable for laparoscopic surgery. For robot-assisted surgery, the incidence of POD fluctuated, peaking in 2019 before declining.
Conclusion In major abdominal surgery, the incidence of POD is lowest with laparoscopic surgery and highest with robot-assisted surgery. Surgery duration partially mediates these effects. These insights underscore the importance of selecting appropriate surgical approaches and reducing surgery duration to minimize POD risks.

PO-0112

Inhibition of hypothalamic DEC2 in pro-opiomelanocortin neurons restores leptin sensitivity during obesity and promotes weight loss

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Obesity has emerged as a significant global health burden that affects approximately 1 billion adults worldwide, imposing considerable economic burdens and medical challenges to society. It is imperative to deepen our understanding of the underlying molecular mechanisms and develop novel effective pharmacotherapeutic targets for managing obesity and its metabolic co-morbidities. The endogenous leptin is considered to be a driving force for weight loss. Nonetheless, clinical trials of leptin-based treatments, such as recombinant human leptin and its mutants, fragments, and antibodies, have failed to effectively treat obesity, predominately owing to leptin resistance in most obese population. As the primary central target sensing endogenous leptin, pro-opiomelanocortin (POMC)-expressing neurons in the hypothalamic arcuate nucleus (ARC) predominantly regulate energy balance. Therefore, there is an ongoing need to deepen our understanding of leptin resistance that occurs in POMC neurons with the objective of devising effective leptin-based therapies.
In the present study, we firstly reported that high expression of differentiated embryo chondrocyte 2 (DEC2, gene Bhlhe41) promotes susceptibility to develop obesity, according to cell type-specific transcriptomics of hypothalamic neurons. Furthermore, we identified that the hypothalamic ARCPOMC neurons are the specific target of DEC2 that contributed to this obesity-prone phenotype, as indicated by feeding pattern, metabolic pattern, and Dixon analysis. On the contrary, POMCΔBhlhe41 mice showed significantly less weight gain and cumulative food intake, compared with their control littermates, when fed a HFD. Moreover, POMCΔBhlhe41 mice also showed significant weight loss compared with their HFD-induced obese controls. Collectively, these results strongly suggest that DEC2 in ARCPOMC neurons is specifically involved in the process of obesity.

Leptin and insulin resistance are closely implicated in the metabolic dysfunction during obesity. We further investigated whether DEC2 in ARCPOMC neurons plays a functionally significant role in leptin and insulin resistance during obesity. On a standard chow diet, the circulating leptin was significantly increased in mice with DEC2-OE in ARCPOMC neurons compared with their scramble controls, while both fasting and random plasma glucose, as well as circulating insulin level were comparable to control littermates. Notably, we further found that intraperitoneal (i.p.) administration of exogenous leptin significantly reduced food intake and body weight, accompanied by a significant activation of phospho-STAT3 in the ARCPOMC neurons of scramble controls but not in mice with DEC2-OE. However, both in glucose (GTT) or insulin (ITT) tolerance tests, blood glucose levels in mice with DEC2-OE in ARCPOMC neurons were comparable to their control littermates. Moreover, we also observed relatively comparable body weight and cumulative food intake upon knocking down Bhlhe41 in the hypothalamic ARC of db/db mice and their control littermates. Collectively, these data suggest that high expression of DEC2 in ARCPOMC neurons primarily impairs leptin sensitivity, instead of insulin signaling. Thus, we hypothesized that DEC2 is downstream of leptin action and gain of DEC2 in ARCPOMC neurons impairs leptin signaling pathway.

Supporting this hypothesis, single-cell RNA sequencing of hypothalamic ARC revealed that DEC2-OE dramatically inhibited Pomc expression in ARCPOMC neurons. When fed a HFD, mice displayed increased weight gain and adiposity, associated with less phospho-STAT3 and POMC expression compared to standard chow diet littermates, which recapitulated the phenotypes observed in mice with DEC2-OE in ARCPOMC neurons. Given that DEC2 is a transcription factor that recognizes the E-box sequence in the promoter region of target genes, we thus investigated whether DEC2 directly binds to the POMC E-box sequence and transcriptionally repressed its mRNA transcription. However, the results showed that there was little interaction between DEC2 and POMC or STAT3 promotor according the database of transcriptional factor binding profiles by using JASPAR. Then, we investigated the role of DEC2-OE on leptin-induced phospho-STAT3 and POMC promotor occupancy by using ChIP and qPCR. Our results suggested that DEC2-OE significantly decreased leptin-induced phospho-STAT3 and POMC promotor occupancy with a comparable baseline. Considering STAT3 signaling is a mediator of leptin’s effects that directly regulates POMC expression, we then verified that impaired STAT3 signaling contributed to DEC2-induced POMC reduction in mice with DEC2-OE in ARCPOMC neurons, compared with their scramble controls. In vitro, we further confirmed that the leptin-induced STAT3 phosphorylation was significantly suppressed by DEC2-OE, compared with scramble in the pre-synchronized GT1-7 cells. Further POMC-luciferase reporter assays showed that significantly decreased baseline and leptin-induced Pomc-luciferase reporter activity were observed in DEC2-OE cells, while cells with STAT3-OE rescued the inhibitory Pomc transcription activity induced by DEC2-OE. Together, these data support that DEC2 plays a crucial role on impairing leptin-activated STAT3 signaling and subsequently silencing POMC expression during obesity.

Given that DEC2 does not affect STAT3 and POMC expression through direct transcriptional regulation, we next explored the possibility of an interaction between DEC2 and STAT3 that could disrupt leptin-induced STAT3 phosphorylation. In vivo and in vitro co-immunoprecipitation results showed that the immunocomplex from cell and tissue lysates could be pulled down by an anti-STAT3 or anti-DEC2 antibody, reciprocally. Then GST-pull down assays verified that DEC2 interacted with STAT3 in a direct manner. For further identified the possible structural and functional sequences that contributes to DEC2-STAT3 interaction, their binding effects were predicted by molecular docking and deep-learning-based protein-protein interaction analysis. Our results showed that the binding effect might be contributed to DEC2 351 to 358 amino acids/STAT3 146 to 161 amino acids. Together, these data suggest that the sequences of STAT3 served as a primary structure for directly targeting DEC2, thus suppressing leptin-induced STAT3 phosphorylation and its nuclear translocalization that regulates POMC expression.

Based on our novel findings of the DEC2 and STAT3 binding sequences, we designed a novel peptide that modified with transcriptional transactivator (TAT) transmembrane functional domain (YGRKKRRQRRR, TAT-DEC2). This peptide could mimic the STAT3 146 to 161-amino acid sequences (QHLQDVRKRVQDLEQK) to competitively bind with DEC2 and restore leptin-activated STAT3-POMC signaling. In GT1-7 cells, TAT-DEC2 significantly rescued DEC2-OE-

induced inhibition of phosphor-STAT3 and POMC expression in a concentration-dependent and time-dependent manner. We further examined in diet-induced obesity (DIO) mice that a 200 μM i.c.v. administration of TAT-DEC2 for 1 week significantly restored leptin sensitivity, as indicated by rescued leptin-activated STAT3-POMC signaling. Moreover, daily i.c.v. administration of TAT-DEC2 90 minutes before the dark cycle for 4 weeks showed significant weight loss in a dose-dependent manner in DIO mice. Together, these results suggested that the novel peptide could effectively interrupt the abnormal interaction between DEC2 and STAT3 and thereby restore leptin sensitivity. The 146 to 161-amino acid sequences of STAT3 protein sequences is of high homology in rodents and human, which provides a potential for obesity treatment with TAT-DEC2 in the future.
Collectively, our findings represent the first report detailing a mechanistically validated and pharmaceutically tractable therapeutic target to restore central leptin sensitivity and energy homeostasis in ARCPOMC neurons. We uncover a pathophysiological mechanism that underlies the development of leptin resistance during obesity and identify a novel therapeutic peptide with potential for clinical translation for the treatment of obesity.

PO-0113

Prediction models of acute kidney injury following non-cardiac surgery in elderly patients with machine-learning algorithms and SHapley Additive exPlanations

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Background Postoperative acute kidney injury (PO-AKI) represents a critical post-surgical complication that significantly increases morbidity and mortality. Traditional risk assessment tools for PO-AKI are constrained by algorithmic limitations and the variability in diagnostic standards. In contrast, machine learning methods offer a data-driven approach that does not rely on preconceived notions of linear relationships, making them proficient in uncovering intricate patterns within extensive datasets. Despite these advantages, existing machine learning tools predominantly concentrate on predicting AKI in the context of cardiac surgeries, rendering them less effective for other surgical contexts. Additionally, conventional prediction models frequently neglect intraoperative variables, which are vital for comprehending the acute surgical stress response. A notable shortcoming of available models is their limited accuracy in elderly patients, a demographic particularly susceptible to renal impairment due to age-related declines in autoregulatory processes. This study seeks to bridge these gaps by employing sophisticated machine learning techniques to predict PO-AKI in non-cardiac surgical settings, utilizing a comprehensive database of elderly patients. By focusing on this underrepresented group and incorporating a broader range of relevant variables, the study aims to enhance the precision and applicability of PO-AKI risk assessment tools.
Methods Conducted at the Chinese PLA General Hospital's First Medical Center from January 2009 to August 2019, this study focused on elderly patients aged 65 years and older undergoing major non-cardiac surgeries. The endpoint was the development of PO-AKI within seven days post-surgery, diagnosed based on the Kidney Disease: Improving Global Outcomes (KDIGO) criteria. Specifically, PO-AKI was defined as an absolute increase in sCr levels within 48 h, that is, ≥ 26.5 μmol·l−1, or 1.5 times higher than the preoperative baseline within seven days after surgery. Variables for analysis included demographic characteristics, clinical condition, preoperative biochemistry data, preoperative medication, and intraoperative variables such as surgery type and duration. Data preprocessing included missing value imputation using random forest and handling class imbalance with synthetic minority over-sampling technique (SMOTE). The dataset was randomly split into 70% training and 30% testing sets. A total of 87 perioperative

variables were included, encompassing both preoperative and intraoperative factors. Machine learning methods utilized were logistic regression (LR), random forest (RF), extreme gradient boosting (XGBoost), gradient boosting machine (GBM), and adaptive boosting with classification trees (AdaBoost). Model performance was primarily evaluated using the area under the receiver operating characteristic curve (AUROC) and area under the precision-recall curve (AUPRC). SHapley Additive exPlanations (SHAP) values were also used to interpret the prediction model. We also used the SHAP dependence plot to explain how a single feature affects the output of the XGBoost prediction model. All analyses were developed in Python (version 3.5).
Results A total of 57,089 patients were enrolled, with 52,494 patients finally used for analyses. The study population consisted of 26,992 males (51.5%) and 25,502 females (48.5%), aged between 65 and 104 years. PO-AKI developed in 2,928 patients (5.6%) during the first postoperative week. Among the single models, XGBoost demonstrated the highest AUROC (0.862, 95% CI 0.846-0.878) and AUPRC (0.316). The XGBoost classifier demonstrated a commendable overall accuracy of 0.836. However, the model's precision was notably lower at 0.214, indicating a higher rate of false positives. The recall, which quantifies the model's ability to correctly identify positive instances, was 0.721, suggesting a relatively strong performance in capturing true positives. The F1 score, a harmonic mean of precision and recall, was calculated at 0.330, reflecting a moderate balance between the model's precision and recall. The sensitivity, equivalent to recall, was also 0.721, while the specificity, measuring the model's ability to correctly identify negative instances, was 0.843, indicating a robust performance in this aspect. Model evaluation also included calibration curves for goodness-of-fit and decision curve analysis (DCA) for clinical utility, both indicating XGBoost as the superior model. SHAP analysis highlighted the top ten predictors in the XGBoost model as surgery type (urological), postoperative intensive care unit (ICU) admission, surgery duration, preoperative serum creatinine levels, intraoperative blood loss per kilogram of body weight per hour, intraoperative urine output per kilogram of body weight per hour, perioperative non-steroidal anti-inflammatory drugs, history of malignant tumors, history of hypertension, and intraoperative colloid infusion per kilogram of body weight per hour.
Conclusions This research endeavor has adeptly crafted machine learning methodologies designed to forecast the onset of PO-AKI in patients undergoing non-cardiac surgical procedures. By meticulously analyzing a comprehensive dataset encompassing a substantial cohort of elderly individuals, the study not only underscores its robustness but also ensures the practicality of its findings for the geriatric demographic. The predictive accuracy of the developed models surpasses that of previous iterations, attributing significance to critical factors such as the nature of the surgery, the necessity for postoperative ICU admission, and the duration of the surgical intervention, among other influential variables. In an ongoing effort to enhance clinical utility, the research team is concurrently engaged in the refinement of software tools capable of dynamically recalibrating the risk assessment for PO-AKI in real-time, post non-cardiac surgery. This innovative approach is poised to revolutionize the way healthcare professionals manage and mitigate the risks associated with PO-AKI, thereby paving the way for more tailored and effective treatment strategies that could substantially improve patient outcomes.

PO-0114

呼气末 CO2 分压对机器人辅助前列腺癌根治术患者视神经鞘直径及脑氧饱和度的影响

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目的 应用经眶超声测量视神经鞘直径（Optic nerve sheath diameter, ONSD）和近红外光谱动态监测脑组织氧合指数（Tissue oxygenation index, TOI）来研究不同呼气末 CO_2 分压对全麻下行机

器人辅助前列腺癌根治术患者颅内压及脑组织氧合的影响，同时比较两组患者的苏醒时间和术后恶心呕吐评分。

方法 收集 2021 年 2 月至 2022 年 1 月于复旦大学附属华山医院泌尿外科择期行机器人辅助前列腺癌根治术并符合纳入标准的患者 82 例，按照随机数字表法分为实验组（n=41）和对照组（n=41）。入手术室后即行近红外光谱监测 TOI 直至手术结束。麻醉诱导完成后通过调整呼吸参数，实验组 $PETCO_2$ 维持在 26～35 mmHg，对照组 $PETCO_2$ 维持在 36～45 mmHg。分别在入室时（T0）、诱导完成后 5min（T1）、头低位联合气腹后 1h（T2）、头低位联合气腹后 2h（T3）、头低位及气腹结束后 5min（T4）行血气分析；于 T1、T2、T3、T4 进行超声下测量视神经鞘直径。记录患者的苏醒时间和术后 24h 恶心呕吐评分。

结果

1. 两组患者在年龄、身体质量指数（Body Mass Index，BMI）、ASA 分级、伴随疾病、麻醉时长、手术时长、气腹时长、补液量、出液量等方面无统计学差异（P>0.05）。

2.两组患者 T0 时的 $PaCO_2$ 及 T1 时的 $PaCO_2$ 、$PETCO_2$ 的差异无统计意义（P>0.05）。T2、T3、T4 三个时间点实验组患者 $PETCO_2$、$PaCO_2$ 显著低于对照组，差异有统计学意义（P<0.001）。

3.两组患者各个时间点的 PaO_2、ctHb 的差异均无统计学意义（P>0.05）。

4. T1 时两组患者 ONSD 测量值的差异没有统计学意义（T1: 0.487±0.02 cm vs. 0.484±0.03 cm; P=0.597）。T2、T3、T4 三个时间点实验组的 ONSD 测量值显著低于对照组，差异有统计学意义（T2: 0.504±0.04 cm vs. 0.523±0.05 cm; T3: 0.508±0.04 cm vs. 0.529±0.05 cm; T4: 0.504±0.04 cm vs. 0.525±0.05 cm; P<0.05）。

5. 实验组和对照组各时间段的脑氧饱和度变化趋势基本一致且都处于正常水平（>64%）。在头低位联合气腹的 2h 中，对照组患者脑氧饱和度先上升后呈现轻度波动，实验组患者先上升后呈现缓慢下降趋势，实验组脑氧饱和度均低于对照组，两组之间的差异随着时间增大。

6.头低位联合 CO_2 气腹后 30min 和 60min 的脑氧饱和度两组之间差异没有统计学意义（P>0.05），而头低位联合 CO_2 气腹后 90min 和 120min 实验组的脑氧饱和度均显著低于对照组，差异有统计学意义（P<0.05）。

7.实验组的苏醒时间为 18.51± 6.81min，对照组的苏醒时间为 17.12± 4.97min， 两组之间差异无统计学意义（P=0.267）。

8.实验组的 PONV 评分为 0.244± 0.582, 对照组的 PONV 评分为 0.244± 0.663,两组之间差异无统计学意义(P=0.804)。

结论 机器人辅助前列腺癌根治术患者术中极度头低脚高位和 CO_2 气腹会增加视神经鞘的直径，进行适当过度通气（$PETCO_2$ = 26～35 mmHg）可以降低视神经鞘的直径，提示可以一定程度缓解患者颅内压的增加。虽然施行过度通气的患者脑氧饱和度稍低于常规通气患者，但仍可维持在正常水平之上。适当过度通气对机器人辅助前列腺癌根治术患者的苏醒时间、术后恶心呕吐评分没有影响。

PO-0115

瑞马唑仑与传统镇静剂在结直肠镜检查应用的荟萃分析

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目的 采用 meta 分析方法评价瑞马唑仑与传统镇静剂在结直肠镜检查中的安全性和有效性。

方法 计算机检索 PubMed、Embase、Cochrane、Web of Science、中国知网、万方数据库、中国生物医学文献数据库、维普数据库等数据库，检索瑞马唑仑与传统镇静剂在结直肠镜检查中的安

全性和有效性的随机对照研究，检索时限为建库至 2024 年 3 月，采用 Revman 5.4 及 Stata 15.1 软件进行 Meta 分析。

结果 初检 267 篇文献，经过筛选最终纳入 21 篇符合标准的文献，Meta 分析结果显示，观察组麻醉诱导时间显著大于对照组，结果有统计学意义［MD=17.30，95%CI:（9.32,25.27），P＜0.0001］；观察组麻醉苏醒时间显著小于对照组，结果有统计学意义［MD=-0.96，95%CI:（-1.58,-0.34），P=0.002］；在患者及内镜医生满意度方面，两组差异无统计学意义（P＜0.05）。在麻醉诱导前后生命体征改变情况方面，观察组 HR、MAP、RR、SaO2 的差值显著小于对照组，结果有统计学意义［MD=4.53，95%CI:（1.59,7.47），P=0.003］、［MD=9.97，95%CI:（5.71,14.23），P＜0.00001］、［MD=2.07，95%CI:（0.43,3.70），P=0.01］、［MD=2.33，95%CI:（0.96,3.69），P=0.0008］。而在 BIS、SBP、DBP 差值方面，两组差异无统计学意义（P＜0.05）。在不良反应发生情况中，观察组的总不良反应、注射痛、呼吸抑制、低氧血症、心动过缓、低血压发生率显著小于对照组，结果有统计学意义［OR=0.39，95%CI:（0.31，0.51），P＜0.00001］、［OR=0.08，95%CI:（0.06，0.12），P＜0.00001］、［OR=0.20，95%CI:（0.11，0.37），P＜0.00001］、［OR=0.28，95%CI:（0.18，0.44），P＜0.00001］、［OR=0.43，95%CI:（0.31，0.60），P＜0.00001］、［OR=0.34，95%CI:（0.25，0.46），P＜0.00001］。在体动、头晕、心动过速、恶心呕吐、高血压发生率方面，两组差异无统计学意义（P＜0.05）。

结论 在结直肠镜检查中，与传统镇静剂相比，瑞马唑仑诱导时间长，恢复快、对呼吸及循环影响更小，安全性更高。

PO-0116

丙泊酚通过 miR-30b-5p 抑制 NSCLC 生长和转移作用及机制研究

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目的 使用不同浓度静脉麻醉药丙泊酚处理非小细胞肺癌（Non-small cell lung cancer，NSCLC）细胞，通过体外细胞和体内动物实验探讨丙泊酚抑制 NSCLC 细胞的增殖、侵袭和上皮细胞-间充质转化（epithelial-mesenchymal transition，EMT）潜在作用机制，为临床 NSCLC 肿瘤患者手术静脉麻醉药物选择提供参考依据。

方法 在体外细胞实验中，采用不同浓度丙泊酚（0、2、5、10μg/mL）处理 A549 和 H1703 细胞，采用 CCK-8 法、划痕实验、Transwell 实验检测丙泊酚对肿瘤细胞增殖、迁移和侵袭的影响。利用癌症基因组图谱(TCGA)对肺腺癌和鳞癌患者的 RNAseq 数据进行分析,探究 microRNA(miR)-30b-5p 表达差异及其与肿瘤患者生存期的相关性。采用实时荧光定量逆转录-聚合酶反应（quantitative real-time PCR，qRT-qPCR）技术检测丙泊酚处理对 A549 和 H1703 细胞中 miR-30b-5p 表达的调控作用。通过慢病毒敲低肿瘤细胞中 miR-30b-5p 表达，使用蛋白质免疫印迹实验（western blot，WB）检测 EMT 相关蛋白和转录因子叉头框 1(Forkhead Box D1，FOXD1)表达。通过 miRNA 靶基因预测工具 TargetScan/miRanda 预测 miR-30b-5p 和 FOXD1 之间的相互作用联系，并用双荧光素酶报告实验进行验证。通过转染沉默 FOXD1 表达的小干扰 RNA 分子，验证 FOXD1 在 NSCLC 中作用，进一步明确丙泊酚调控 NSCLC 机制。在体内动物实验中，利用裸鼠皮下成瘤实验探讨丙泊酚抑制肿瘤机制，通过定期测量肿瘤体积和重量大小评估肿瘤生长情况，最后通过免疫组织化学（Immunohistochemistry，IHC）实验检测皮下肿瘤组织内 FOXD1、Ki67 和 EMT 相关蛋白的表达。

结果 细胞实验结果显示，10ug/ml 浓度的丙泊酚处理可明显抑制 A549 和 H1703 细胞增殖、迁移和侵袭；与癌旁组织相比,miR-30b-5p 在 NSCLC 肿瘤组织表达中显著下调；丙泊酚对 A549 和

H1703 细胞中 miR-30b-5p 表达具有上调作用，慢病毒成功敲低了 miR-30b-5p 在肿瘤细胞中表达，并且恢复了部分丙泊酚对 NSCLC 肿瘤细胞的抑制作用；WB 结果显示丙泊酚抑制了 EMT 相关蛋白表达，敲低 miR-30b-5p 同样恢复了丙泊酚对肿瘤 EMT 抑制作用。通过生物信息学 TargetScan/miRanda 网站预测 FOXD1 是 miR-30b-5p 结合位点，双荧光素酶报告结果显示 FOXD1 是 miR-30b-5p 作用靶点，敲低 miR-30b-5p 明显上调 FOXD1 表达；在转染 siFOXD1 后可以明显抑制 NSCLC 肿瘤细胞增殖、迁移、侵袭和 EMT。动物实验结果显示，丙泊酚组裸鼠皮下肿瘤生长情况与空白对照组相比，丙泊酚组肿瘤组织体积和重量大小均减小； 慢病毒敲低 miR-30b-5p+丙泊酚组恢复部分了丙泊酚对肿瘤生长和转移的抑制作用，这与体外细胞实验结果一致。
结论 综上所述，丙泊酚在 NSCLC 肿瘤细胞系 A549 和 H1703 细胞中具有抗肿瘤活性，丙泊酚通过调控 miR-30b-5p/FOXD1 轴抑制 NSCLC 细胞的增殖、侵袭和 EMT。

PO-0117

Bromodomain-containing Protein 4 Regulates S-nitrosylation of Divalent Metal Transporter 1 with Iron-responsive Element to Mediate Remifentanil-induced Postoperative Hyperalgesia

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Background: Intraoperative analgesia with remifentanil is limited by the high incident of hyperalgesia. We recently found that divalent metal transporter 1 without iron-responsive element (DMT1-IRE)-mediated iron accumulation contributes to remifentanil-induced postoperative hyperalgesia; however, the role of the isoform DMT1 with IRE (DMT1+IRE) and its upstream molecules in hyperalgesia remain unclear. The epigenetic regulator bromodomain-containing protein 4 (Brd4) is responsible for neuropathic pain, while the potential role of Brd4 in the progression of remifentanil-induced hyperalgesia has not been investigated.
Methods Male Sprague-Dawley rats received incisional surgery and remifentanil to induce hyperalgesia. Nociceptive thresholds and locomotor activity were measured using behavior test. The dorsal root ganglia were collected to detect nitric oxide (NO) generation, S-nitrosylation of DMT1+IRE, iron accumulation and the expression of Brd4. Moreover, BET inhibitor JQ1 and specific Brd4 siRNA were applied for verifying the roles of Brd4 in hyperalgesia.
Results Remifentanil induced postoperative thermal and mechanical hyperalgesia as well as emotional pain. Compared with the control, the expression of neuronal nitric oxide synthase (mean ± SD, hyperalgesia vs control, 3.51 ± 0.56 vs 1.02 ± 0.20, n = 6), NO production (59.64 ± 6.18 vs 17.38 ± 2.76 μmol/g, n = 6), S-nitrosylation of DMT1+IRE (SNO-/total DMT1+IRE, 0.76 ± 0.16 vs 0.22 ± 0.05, n = 6) and iron content (15.23 ± 2.10 vs 4.62 ± 0.90 μg/g, n = 6) obviously increased in rats undergoing hyperalgesia, while S-nitrosylation of DMT1-IRE (SNO-/total DMT1-IRE, 0.50 ± 0.09 vs 0.45 ± 0.05, n = 6) had no change. Inhibiting NO release as well as S-nitrosylation of DMT1+IRE using L-NAME (30 mg/kg) relieved remifentanil-induced hyperalgesia. The expressions of Brd4 in the protein (hyperalgesia vs control, 3.88 ± 0.46 vs 1.00 ± 0.19, n = 6) and slices of the dorsal root ganglia both elevated in rats treated with incision and remifentanil. BET inhibitor JQ1 (100 μM) reduced neuronal nitric oxide synthase-dependent NO production, S-nitrosylation of DMT1+IRE and iron overload. Moreover, JQ1 and Brd4 knockdown with specific small interfering RNA both relieved remifentanil-associated postoperative hyperalgesia and synaptic plasticity.
Conclusions S-nitrosylation of DMT1+IRE triggered by Brd4 contributes to remifentanil-induced postoperative hyperalgesia through promoting NO release in the dorsal root ganglia. JQ1 attenuates the development of hyperalgesia providing a novel strategy for the therapy.

PO-0118

Etomidate-Induced Myoclonus in Sprague-Dawley Rats Involves Neocortical Glutamate Accumulation and N-Methyl-d-Aspartate Receptor Activity

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Objective: Etomidate is frequently used in clinical practice as a sedative-hypnotic agent for the attractive characteristics, such as stable haemodynamics and limited respiratory depression. Nevertheless, intravenous injection of etomidate usually results in myoclonus with a highly reported incidence of 50~85%. Etomidate-related myoclonus may develop into some serious complications, which has become an urgent clinical problem to be solved. At present, the mechanism of etomidate-induced myoclonus remains unclear, and the relevant studies have been limited to a few cells or clinical trials, the neuropharmacological mechanism of etomidate has not been deeply explored.

Materials and Methods: First, adult male Sprague-Dawley (SD) rats were injected with 2 median effective doses (ED50) of etomidate (1.5 mg/kg), 2ED50 of propofol (11.8 mg/kg), and lidocaine (4.0 mg/kg) plus etomidate (1.5 mg/kg) through the tail vein to establish the model of etomidate-induced myoclonus. Behavioral score of the rats were observed within 5 minutes after anesthesia at the same depth of anesthesia.Rats were injected with different doses of etomidate (2ED50, 5ED50, 8ED50) through the tail vein and behavioral score of the rats were observed within 5 minutes after anesthesia to observe the dose dependence.

Liquid chromatography coupled with tandem mass spectrometric(LC–MS/MS) was applied to determine the glutamate and γ-aminobutyric acid (GABA) contents fluorescence quantitative polymerase chain reaction (PCR) and western blot assays of excitatory amino acid transporter (EAATs) and glial fibrillary acidic protein (GFAP) messenger ribonucleic acid(mRNA) and protein expressions, immunofluorescence experiments in the neocortex and hippocampus were conducted to explore the relationship between etomidate induced myoclonus, variation of glutamate concentration and the dysfunction of glutamate transporters and astrocyte.

Local feild potentials (LFPs) at different bands (raw LFP, high gamma, ripple, fast ripple) in the neocortical motor cortex and hippocampal CA1 region and muscular tension experiments were conducted to explore the origination of etomidate-induced myoclonus in the brain of SD rats and the regulatory effect of N-methyl-D-aspartate receptors (NMDARs). Calcium imaging of brain slices perfused with different concentrations of etomidate in the neocortical motor cortex and hippocampal CA1 region, and the regulatory effect of NMDAR were conducted to verify the concentration-dependent and region-specific effect induced by etomidate.

Muscular tension, the in vivo and in vitro western blot analysis of NKCC1 and KCC2 proteins and the regulatory effect of NMDAR were conducted to find the potential target of etomidate-induced myoclonus or excitability. Additionally, muscular tension and KCC2 protein were analyzed in rats microinjected with calpain-2 inhibitor (MDL-28170) or MDL-28170+NMDA in the neocortical motor cortex during etomidate anesthesia. Finally, MDL-28170 or vitamin E was injected intravenously prior to etomidate, the muscular tension, KCC2 protein and duration of loss of righting reflex (LORR) of rats were evaluated to verify the calpain-2 inhibitor effect of vitamin E.

Results:

(1) Etomidate significantly increased the mean behavioral score at different time points compared with the propofol and lidocaine + etomidate groups within 5 minutes after the intravenous injection; the mean behavioral score decreased at different time points with the increased dose of etomidate.

(2) The results of glutamate and GABA concentration determination showed that etomidate significantly increased the neocortical concentration of glutamate ($p=0.0030$; $p=0.0002$) compared with the propofol and lidocaine+etomidate groups and the correlation

analysis revealed a strong correlation between the mean behavioral scores and neocortical glutamate levels (Spearman's r=0.7585, p<0.0001). Compared with the propofol and lidocaine+etomidate groups, etomidate did not affect the mRNA levels of EAAT1 (p=0.4453; p=0.1511), EAAT2 (p=0.7837; p=0.4030) and GFAP (p=0.9909; p=0.5452); however, etomidate decreased the protein expressions of EAAT1 (p=0.0416; p=0.0127) and EAAT2 (p=0.0363; p=0.0109), increased the protein expression of GFAP (p=0.0145; p=0.0149) in the neocortex. Immunofluorescence staining showed that etomidate inhibited EAAT1 and EAAT2 expression in the motor cortex compared with the other two groups.
(3) The results of LFP and muscular tension recordings showed that when the deep electrodes inserted into the neocortical motor cortex, etomidate significantly increased the peak ripple (80-250 Hz) power spectral density (p=0.0197; p<0.0001) and the peak amplitude (p<0.0001 for both) or frequency (p<0.0001 for both) of muscular tension compared with the propofol and lidocaine+etomidate groups. NMDA reversed the AP5 inhibited neocortical peak ripple power spectral density and the peak amplitude of muscle tension. However, when the deep electrodes inserted into the hippocampal CA1 region, neither NMDA nor AP5 affected the peak ripple power spectral density and muscular tension.
(4) Calcium imaging showed that in the neocortical motor cortex, 0.5 μM (p=0.0002) and 1 μM (p=0.0012) etomidate increased, 5 μM (p=0.0233) and 10 μM (p=0.0005) etomidate decreased the intracellular calcium level compared to the baseline. Additionally, NMDA enhanced AP5 inhibited the 0.5 μM and 1 μM etomidate activated the intracellular calcium level. In the hippocampal CA1 subfield, 0.5 μM etomidate (p=0.5661) did not affect the intracellular calcium level. In contrast, 1 μM (p=0.0006), 5 μM (p<0.0001) and 10 μM (p<0.0001) etomidate decreased the intracellular calcium levels compared to the baseline.
(5) The results of in vivo western blot analysis of chloride ion transporters (NKCC1 and KCC2) showed that etomidate not only significantly increased the peak amplitude of muscle tension (p<0.0001 for both) or frequency (p<0.0001 for both) but also promoted the cleavage of neocortical KCC2 protein (p=0.0021; p=0.0047), compared with the propofol and lidocaine+etomidate groups and etomidate-induced myoclonus correlated with the cleavage of KCC2 protein. AP5 blocked but NMDA activated the muscular tension and the cleavage of neocortical KCC2 protein. Neither AP5 nor NMDA affected the neocortical and hippocampal NKCC1 proteins.
(6) The calpain-2 inhibitor MDL-28170 or NMDA+MDL-28170 was injected into the neocortical motor cortex during etomidate anesthesia. MDL-28170 and NMDA+MDL-28170 blocked not only the cleavage of KCC2 protein, but also the etomidate and etomidate+NMDA induced muscular tension respectively. Intravenous injection of MDL-28170 or vitamin E prevented the etomidate-induced muscular tension and the cleavage of KCC2 protein, but neither of them affected the duration of LORR after etomidate anesthesia.

Conclusion:

(1) Etomidate-induced myoclonus was dose-dependent;
(2) Etomidate-induced myoclonus was associated with the neocortical glutamate accumulation, and the underlying mechanism involved the transient reactive hyperplasia of astrocytes in the neocortex and the downregulation of glutamate transporters (EAAT1 and EAAT2) in the motor cortex;
(3) Etomidate-induced myoclonus in SD rats originated in the neocortical motor cortex and correlated with the activity of the ionic glutamate receptor: NMDAR;
(4) Etomidate at the anesthetic and subanesthetic doses (1 μM and 0.5 μM) increased the motor cortical intracellular calcium level and induced cleavage of KCC2 protein and exerting the excitability of the GABA receptor via activiation of NMDAR;
(5) Calpain-2 was involved in the process of etomidate-induced myoclonus and the activity of NMDAR promoting the cleavage of KCC2 protein and exerting the excitability of the GABA receptor;
(6) Vitamin E, as a natural antioxidant, had an effect of calpain-2 inhibitor, which can effectively prevent etomidate-induced myoclonus.

PO-0119

Sodium Leak Channel in Central Amygdala Modulates Analgesic Potency of Volatile Anaesthetics in Mice

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Background Analgesia is an important effect of volatile anaesthetics, of which spinal cord is the critical neural target. However, how the supraspinal brain modulates analgesic potency of volatile anaesthetics is not clear. In this study, the contribution of the central amygdala (CeA) to analgesic effects of isoflurane and sevoflurane was investigated.
Methods Analgesic potencies of volatile anaesthetics were tested under optogenetic and/or chemogenetic inhibitions of CeA neurons. In vivo calcium imaging was used to measure neuronal activities of CeA neuronal subtypes under volatile anaesthesia. Contribution of sodium leak channel (NALCN) in CeAGABA neurons for analgesic effects of volatile anaesthetics were explored by specific NALCN knockdown. Electrophysiological recordings on acute brain slices were applied to measure how volatile anaesthetics modulate neuronal activities of CeA via NALCN.
Results Optogenetically or chemogenetically silencing CeA neurons weakened analgesic effects of isoflurane and/or sevoflurane in vivo. The calcium signals of CeAGABA neurons increased under exposure of isoflurane and/or sevoflurane at analgesic concentrations. Knockdown of NALCN in CeAGABA neurons attenuated antinociceptive effects of isoflurane and/or sevoflurane. For example, mean concentrations of isoflurane and/or sevoflurane that induced immobility to tail-flick stimuli were significantly increased (isoflurane: 1.17% ± 0.05% vs. 1.24% ± 0.04%, $P = 0.01$; sevoflurane: 2.65% ± 0.07% vs. 2.81% ± 0.07%; $P < 0.001$). In brain slices, isoflurane and/or sevoflurane at clinical concentrations increased NALCN-mediated holding currents and conductance in CeAGABA neurons, which increased excitability of CeAGABA neurons in a NALCN-dependent manner.
Conclusion Analgesic potencies of volatile anaesthetics maybe partly mediated by their modulations on CeAGABA neurons via NALCN.

PO-0120

Tetracaine Hydrochloride Induces Pyroptosis in Uveal Melanoma Cells through the Caspase-3/GSDME Pathway

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Objective: Evasion of programmed cell death, particularly pyroptosis, represents a key mechanism for cancer cells evade immune surveillance and resist cytotoxic therapies [1,2]. Pyroptosis, an inflammatory form of programmed cell death, is mediated by gasdermin proteins and plays a crucial role in anti-tumor immunity [3,4]. Exploring molecules that can specifically induce pyroptosis in cancer cells holds significant therapeutic potential for controlling tumor progression and enhancing immunotherapy responses [5,6].
Methods: Transcriptomic sequencing was performed on the uveal melanoma cell line treated with tetracaine hydrochloride (TTC). The effects of TTC were investigated across a panel of melanoma cell lines. The role of gasdermin E (GSDME), the executioner protein of pyroptosis, was explored using CRISPR-Cas13d knockdown and the caspase-3 inhibitor Z-DEVD-FMK. Differential gene expression and pathway enrichment analyses were conducted.

Immunohistochemistry on a melanoma tissue microarray was performed to evaluate GSDME protein levels across different anatomical sites.
Results:
(1) TTC treatment significantly induced pyroptosis, specifically in uveal melanoma cells expressing high levels of GSDME protein. (2) TTC-induced GSDME cleavage was suppressed by treatment with the caspase-3 inhibitor Z-DEVD-FMK. (3) Genetic knockout of GSDME or inhibition of caspase-3 inhibited TTC-induced pyroptosis. (4) Transcriptomic analysis revealed differentially expressed genes that were enriched in pathways related to pyroptosis, inflammation, antigen presentation, and cytokine signaling following TTC treatment.
Conclusions: Our findings demonstrate that the local anesthetic TTC effectively induces pyroptosis in uveal melanoma through the caspase-3/GSDME pathway， highlighting its potential application in immunotherapy. Notably, the local anesthetic TTC emerges as a promising approach for inducing pyroptosis and as an adjuvant therapy in uveal melanoma.

PO-0121

Esmolol ameliorates lipopolysaccharide-induced intestinal injuries by promoting autophagy via modulation of the AMPK/mTOR/ULK1 pathway

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Background Beta-1 receptor blockade is well characterized for its protective effects against septic symptoms, and esmolol (ES) is a selective β1-adrenoceptor antagonist.
Aim: The current study aims to assess the effects of ES on lipopolysaccharide (LPS)-induced septic intestinal damage and explore the associated mechanism by focusing on the AMP-activated protein kinase (AMPK)/mammalian target of rapamycin (mTOR)/UNC-51-like kinase 1 (ULK1) pathway.
Methods Sepsis was induced via an intraperitoneal injection of LPS in male Sprague-Dawley (SD) rats or LPS treatment in rat intestine epithelial cells. To assess their anti-sepsis effects, rats and cells were pretreated with ES, 3-methyladenine (3-MA), or rapamycin (RAPA) 30 min before LPS exposure. Then, intestinal damage, intestinal fatty acid-binding protein (I-FABP) and diamine oxidase (DAO) levels, cell viability, autophagic processes, and AMPK/mTOR-related signaling transduction were detected via a series of in vivo and in vitro assays.
Results LPS induced intestinal damage in a time-dependent manner and suppressed autophagy at 12 and 24 h. Pretreatment with ES or RAPA reduced I-FABP and DAO release; improved the damage score; and increased the expression of Beclin-1, LC3-II, p-AMPK, and p-ULK1 and numbers of autophagosomes at 12 and 24 h, indicating amelioration of intestinal injury and augmentation of autophagy in rats. The data of in vivo assays were consistent with those in the IEC-6 intestinal epithelial cell line.
Conclusion The current findings demonstrate that ES ameliorates LPS-induced septic intestinal damage by activating autophagy through modulation of the AMPK/mTOR/ULK1 pathway.

PO-0122

Dexmedetomidine: A real-world safety analysis base on FDA adverse event reporting system database

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Objective Using the FDA adverse event reporting system (FAERS) database to analyze the safety profile of Dexmedetomidine and provide guidance for clinical application.
Methods: Data from the FAERS database from the first quarter of 2004 to the third quarter of 2023 were collected. Reporting odds ratio (ROR), the proportional reporting ratio (PRR), and the Bayesian confidence propagation neural network (BCPNN) were employed to detect and assess adverse events associated with Dexmedetomidine.
Results: A total of 1910 reports of Dexmedetomidine as the primary suspect drug were obtained. Basic demographic data revealed a slight predominance of males (48.8%) over females (28.7%) experiencing adverse events, with gender unspecified in 22.4% of cases. The majority of patients fell within the weight range of 50–100 kg (17.1%), and adverse event (AE) prevalence was notably higher among individuals aged 18–64 years (31.2%) compared to those over 65 years (19.2%). Regarding the onset of adverse events (AEs), data showed that the median time was 2 days, with the majority of events occurring within 5 days of Dexmedetomidine administration (73% of cases). This rapid onset aligns with the drug's intravenous administration and its short-lived effects post-discontinuation, underscoring the importance of early AE detection. Dexmedetomidine-related AEs were reported in 26 organ systems, most frequently in cardiac disorders (n = 984, ROR 8.55). Other significant SOCs included endocrine (n = 79, ROR 6.33), vascular (n = 288, ROR 2.67), and respiratory disorders (n = 458, ROR 1.97). Congenital disorders and pregnancy-related conditions had lower signal strengths and lacked statistical significance. After screening, 892 preferred terms were obtained, including 52 new preferred terms (PTs) not mentioned in the drug insert. The common PTs of Dexmedetomidine include bradycardia, cardiac arrest, hypotension, diabetes insipidus, arteriospasm coronary and agitation. PTs with high RORs included Transcranial Electrical Motor Evoked Potential Monitoring Abnormal, Acute Motor, Axonal Neuropathy, Trigemino-Cardiac Reflex, Glossoptosis, Central Sleep and Apnoea Syndrome. Among the new PTs, the top 10 include Transcranial Electrical Motor Evoked Potential Monitoring Abnormal, Acute Motor Axonal Neuropathy, Trigemino-Cardiac Reflex, Glossoptosis, Floppy Iris Syndrome, Phaeochromocytoma Crisis, Postresuscitation Encephalopathy, Diabetes Insipidus, Recurrence Of Neuromuscular Blockade and Intestinal Pseudo-Obstruction.
Conclusion: This study mined and evaluated adverse events associated with Dexmedetomidine and also identified new adverse events. This could help alert clinicians to new adverse events not mentioned in the drug inserts, reducing the risk of drug.

PO-0123

环泊酚在不同体重指数患者行结肠镜麻醉诱导中的应用

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目的 观察环泊酚在不同体重指数患者行结肠镜麻醉诱导中的安全性并探讨体重指数与其诱导剂量的相关性。
方法 这项研究于 2024 年 1 月至 2024 年 5 月在江西省人民医院进行，共 198 例患者，年龄 18-80 岁，体重指数（BMI）≥18.5kg/m2，ASAI-III 级。根据 BMI 将患者分成三组：正常体重（BMI

18.5-23.9kg/m2）组（A 组，n＝75）、超重（BMI 24-27.9kg/m2）组（B 组，n＝77）、肥胖（BMI ≥28kg/m2）组（C 组，n＝46）。所有患者在入室后监测生命体征，连接鼻导管吸氧装置，氧流量常规设置为 6Ｌ/min,待患者行左侧卧位，呈双腿屈膝状后缓慢推注环泊酚注射液（3s/ml），待患者改良警觉/镇静（MOAA/S）评分达到≤1 分时停止给药随即开始入镜检查，术中根据患者体动反应间断追加环泊酚，维持 MOAA/S 评分在 1 分。记录环泊酚诱导剂量，首次追加间隔时间及总追加次数；患者入检查室时（T0）、 入镜检查开始时（T1）、回盲部检查时（T2）、操作结束时（T3）时刻 MAP、HR、SPO2；统计结肠镜操作时间、患者苏醒时间及围术期不良事件发生率（低氧血症、低血压、高血压、心动过速、心动过缓、恶心、呕吐、头昏、躁动、嗜睡）。

结果 C 组环泊酚诱导总剂量大于 A、B 两组，差异有统计学意义（P<0.05）；B、C 组每公斤总体重环泊酚诱导剂量小于 A 组，且 C 组小于 B 组差异有统计学意义（P<0.05）；B、C 组每公斤瘦体重环泊酚诱导剂量小于 A 组，差异有统计学意义（P<0.05）；C 组每公斤理想体重环泊酚诱导剂量大于 A 组，差异有统计学意义（P<0.05）；三组患者每公斤校正体重环泊酚诱导剂量差异无统计学意义（P＞0.05）；三组患者环泊酚首次追加间隔时间、总追加次数、各时间段生命体征变化幅度、结肠镜操作时间、苏醒时间及围术期不良事件发生情况比较差异均无统计学意义（P＞0.05）。

结论 环泊酚在不同体重指数患者行结肠镜麻醉诱导是安全有效的且超重或肥胖患者以校正体重为给药标量可同正常体重指数患者一样以每公斤体重相同剂量给药，具有一定临床指导意义，值得推广。

PO-0124

Different injection rate might affect the incidence of hiccups of Remimazolam-A prospective cohort study

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Background Remimazolam is an ultra-short-acting agonist of the GABAA receptor that is considered to promote GABA binding to the receptor through the benzodiazepine binding region of the receptor, resulting in a sedative/anesthetic action. In adults undergoing general anesthesia, remimazolam is administered at a rate of 12 mg/kg/h until the patient achieves the required level of unconsciousness (i.e. induction of anesthesia). For maintenance of anesthesia, an initial continuous infusion rate of 1 mg/kg/h is recommended, with the dose rate adjusted to maintain an appropriate depth of anesthesia, but not exceeding 2 mg/kg/h. Remimazolam at a dose of up to 0.2 mg/kg is possible if arousal symptoms are present. In China, 0.2-0.3 mg/kg had the optimum sedative effect, taking 3 minutes to decrease the Bispectral Index (BIS) value to 50-60. Previous studies reported that fast injection of Remimazolam may increase the hiccups effect during induction of anesthesia but few had deep investigated. The infusion rate should be reduced appropriately depending on the patient's age and condition but didn't have the infusion rate recommendation and guideline. Through clinical practice, we recognize a phenomenon that the higher the bolus speed, the higher the incidence of hiccups. Our aim was to study whether fast injection rate of Remimazolam is associated with a higher incidence of hiccups.

Methods This is a prospective cohort study. The study was approved by IRB before the enrollment in Guangzhou Women and Children's Medical Center (GWCM), Guangzhou Medical University. Inclusion criteria was patients at American Society of Anesthesiologist (ASA) stage I-II, age 18 to 60 years old, and were planned to required general anesthesia. Exclusion criteria was patients with cardiovascular and/or cerebrovascular diseases, phrenic nerve injury, full stomach, and circulatory instability. After getting written informed consent, patients were randomly assigned to two groups. Prior to the procedures, all patients fasted from food for 8h. Clear liquids were permitted up to 2h prior to anesthesia. Upon entering the room, routine monitoring procedures, including electrocardiogram, heart rate (HR), oxygen saturation (SpO2),

and mean arterial pressure (MAP) was conducted. Anesthesia was induced by intravenous injection of Remimazolam (0.2mg/kg, 2mg/ml). Group R20 received Remimazolam by manually injected over a period of 20 seconds and Group R40 was 40 seconds. BIS was used to measure the hypnotic effect. The primary outcome was the incidence of hiccups within 4 minutes. As secondary outcomes, Bispectral Index (BIS) and SpO2 were recorded during observing period. In addition, HR and BP were recorded at every minute. Oxygen supply equipment was ready. The incidence of hiccups was statistically assessed using a chi-square test to compare occurrence times between two groups. Differences in BIS and SpO2 levels were compared using the Wilcoxon rank sum test and Student's t-test with Bonferroni correction, respectively. Subsequently, multivariate logistic regression analysis was employed to identify independent factors associated with the event. A significance level of $p<0.05$ was applied to all comparisons to determine statistical significance.

Results A total of 80 patients aged 18 to 60 years were randomly assigned to group R20 (n=40) and group R40 (n=40). Any significant differences for demographic data (age, BMI, HR, MAP, BIS before sedative) could not be observed difference between both groups (shown in Table 1). The incidence rates of hiccups were observed to be 35% (14 cases) and 22.5% (9 cases) in the respective groups. However, statistical analysis using the chi-square method revealed that the difference in percentage between the two groups was not deemed statistically significant (R20:14(35), R40:9(22.5), p=0.217), but the occurrence time of hiccups was significant different (R20: 55.3±25.0sec, R40: 101.9±53.4sec, p=0.008) (shown in Table 2). Both groups had similar sedative effect and half of the lowest values of BIS were achieved at first two minutes. The incidence of oxygen desaturation under 95% need to be highly concerned, the rate of R20 was 50% while R40 was 30%. To explore the independent factors associated with hiccups, logistic regression analysis was performed. The findings revealed that variables such as the injection rate (R20, R40), BIS (lowest value), and SpO2 value below 95% were not identified as independent factors contributing to the occurrence of hiccups (shown in Table 3). No significant differences were observed between groups in the occurrence of hypertension, hypotension, and changes in heart rates. No fatal or serious adverse events were reported during the study in groups.

Conclusions The present study demonstrated that administration of Remimazolam slowly could reduce the incidence of hiccups even though there was no significant differences between the two groups. We found that the slower the bolus rate, the delayed onset of hiccups. 0.2mg/kg of Remimazolam had a good sedative effect but the decrease of SpO2 should be concerned. According to these results, it can be speculated that slow injection rate of Remimazolam might potentially regulate the incidence of hiccups and oxygen desaturation. Further study is warranted to specifically the injection rate of Remimazolam as well as guarantee patients' oxygen saturation.

PO-0125

环泊酚复合舒芬太尼抑制青年和老年患者喉罩置入反应的半数有效剂量

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目的 环泊酚作为一种新型静脉麻醉剂，具有潜力替代目前广泛使用的丙泊酚。尽管环泊酚的镇静机制和药代动力学特性与丙泊酚相似，但其在麻醉效能和减少不良反应方面表现出显著优势。鉴于不同年龄段患者对麻醉药物的敏感性存在显著差异，制定差异化的麻醉用药策略尤为重要。本研究旨在系统评估环泊酚联合舒芬太尼在青年和老年患者中抑制喉罩气道（Laryngeal Mask Airway, LMA）置入反应的半数有效剂量（ED50）。因此本研究将确定不同年龄段患者对环泊酚与舒芬太尼组合的最小有效剂量；比较该组合在不同年龄段患者中的药效差异；并详细记录和分析可能引发的不良反应。我们期望提供详细且可靠的数据，为临床精准麻醉提供科学依据，优化麻醉药物的选

择和剂量调整，从而提高麻醉效果的安全性和有效性，特别是在老年患者中，这对于减少围手术期并发症和改善术后恢复具有重要意义。
方法 在这项研究中，招募了 46 名计划接受喉罩气道（Laryngeal Mask Airway, LMA）置入全身麻醉手术的患者。进入手术室后静脉注射环泊酚和舒芬太尼（0.3ug·kg−1）3min 后置入 LMA。同时使用 Dixon 上下法和 probit 回归来计算环泊酚抑制 LMA 置入反应 ED50 和 ED95
结果 青年组患者的环泊酚抑制喉罩置入反应的 ED50 与 ED95 分别为 0.384mg·kg−1（95%CI,0.340-0.429）和 0.456mg·kg−1（95%CI,0.418-0.745）。老年组患者的环泊酚抑制喉罩置入反应的 ED50 与 ED95 分别为 0.292mg·kg−1（95%CI,0.245-0.331）和 0.371mg·kg−1（95%CI, 0.331-0.604）。在不良反应方面，虽然青年组与老年组在注射痛、低血压和心动过缓的发生率上有所差异，但两组间在统计学上未显示显著差异。
结论 本研究明确显示，青年患者与老年患者在使用环泊酚抑制喉罩气道（LMA）置入反应的半数有效剂量（ED50）方面存在显著差异。具体而言，青年患者的环泊酚抑制喉罩置入反应的 ED50 为 0.384 mg·kg−1，95%置信区间为 0.340-0.429 mg·kg−1；老年患者的 ED50 则为 0.292 mg·kg−1，95%置信区间为 0.245-0.331 mg·kg−1。这两个置信区间之间没有重叠，表明两者之间的差异具有统计学显著性。本研究结果揭示了不同年龄段患者对环泊酚的药效存在显著的个体差异，具体表现为老年患者对环泊酚的敏感性较高，所需的有效剂量较低。这对临床麻醉实践具有重要指导意义，这提示在使用环泊酚进行麻醉时应根据患者年龄进行个体化的剂量调整，以确保最佳的麻醉效果同时确保安全性。未来的研究应进一步探讨影响麻醉药物敏感性的其他因素，以完善临床麻醉用药的个体化策略，进而提高围术期管理的精确性和有效性。

PO-0126

右美托咪定对小鼠 FeCl3 诱导的慢性应激性血栓形成的影响及其机制

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目的 探究右美托咪定治疗对小鼠慢性应激性血栓形成倾向的影响及其作用机制。
方法 选用 6 周龄 SPF 级健康雄性 C57 小鼠，体重 22-25g，按随机数字表法分为四组：对照组(C 组)，对照给药组(DC 组)，慢性应激＋生理盐水组(S 组)，慢性应激＋右美托咪定组(DS 组)。C 组与 DC 组不做应激处理，DC 组每日腹腔注射右美托咪定 20 μg/Kg，S 组与 DS 组每天固定时间给予慢性束缚应激 4 小时，共持续 14 天；S 组，DS 组分别于束缚应激开始前 20 分钟腹腔注射右美托咪定 20 μg/Kg 或相同体积的生理盐水。14 天后进行手术，麻醉下于左侧颈动脉使用 2mm 宽 FeCl3 滤纸诱导血栓形成，15min 后结扎双侧剪取颈动脉，测量血栓长度、重量；HE 染色观察颈动脉血栓形成面积，CD31+免疫荧光染色计数损伤后血管内皮细胞数量；Western blot 实验检测小鼠颈动脉组织中 Bcl-2、c-caspase-3、cytochrome c、gp91phox、超氧化物歧化酶 2(SOD-2)的蛋白表达水平；RT-PCR 检测 ICAM-1、VCAM-1、TLR-4、MCP-1、TNF-α 和 MMP-2 的 mRNA 转录水平。
结果 C 组与 DC 组各项数据均无统计学意义。与 C 组相比，S 组在慢性束缚应激 14 天后，小鼠颈动脉 FeCl3 诱导的血栓形成长度与重量明显增加，HE 染色显示血栓面积显著增加;c-caspase-3、cytochrome c、gp91phox 蛋白表达水平明显升高，Bcl-2、SOD-2 的蛋白表达水平降低；炎症相关因子 ICAM-1、VCAM-1、TLR-4、MCP-1、TNF-α 和 MMP-2 的 mRNA 转录水平升高。相较于 S 组，DS 组 Fecl3 诱导血栓的重量和长度均有所减少，HE 染色显示血栓面积减少，CD31+荧光染色计数表明血管内皮细胞存活数量增加，颈动脉中氧化应激相关 gp91phox 的蛋白表达水平降低，而抗氧化相关 SOD-2 的蛋白表达水平升高，促凋亡相关 c-caspase-3、cytochrome c 的蛋白表达

水平明显降低，抗凋亡蛋白 Bcl-2 的表达水平升高；炎症相关因子 ICAM-1、VCAM-1、TLR-4、MCP-1、TNF-α 和 MMP-2 的 mRNA 转录水平降低。
结论 右美托咪定治疗可以减少 FeCl3 诱导的慢性束缚应激小鼠的颈动脉血栓形成，降低了血管内皮细胞损伤，减轻慢性应激小鼠颈动脉受到的氧化应激损伤，抑制炎症因子释放，并且可以通过调控 Bcl-2/cyt-c/caspase-3 通路抑制慢性应激诱导的细胞凋亡，发挥血管保护作用。

PO-0127

地氟烷和七氟烷全身麻醉作用靶点的筛选及其作用机制研究

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目的 全身麻醉在临床上的应用已有上百年的历史，其在现代医疗过程中起着至关重要的作用。全身麻醉通过全身麻醉药物诱导患者产生一种以无意识、无痛觉和无体动但保留必要的生理功能为主要特征的可逆性的全麻状态。尽管对全身麻醉作用机制经过了多年的科学研究，但其产生上述麻醉效应的确切机制尚未完全阐明。
目前普遍认为全身麻醉药物主要是对中枢神经系统产生广泛性的抑制作用来发挥麻醉效应，但近年来有研究发现全身麻醉药物可通过激活某些脑区神经元从而参与全身麻醉，并将其称为麻醉激活神经元(Anesthesia-activated neurons, AANS)。因此，本研究假设临床上常用的两种吸入麻醉药物，地氟烷和七氟烷是否存在某种共同的以兴奋性效应为主的神经靶点及其可能作用的受体。
方法 首先采用 c-Fos 染色、活性集群靶向重组(Targeted recombination in active populations, TRAP)、荧光原位杂交(Fluorescence in situ hybridization, FISH)以及基于 Autodock-vina 的分子对接技术用以鉴定地氟烷和七氟烷可能共同激活的小鼠核团神经元以及细胞类型并进一步鉴定激活神经元上可能的作用受体。其次，结合脑电和肌电(Electroencephalogram/Electromyogram, EEG/EMG)记录实验，采用 Fos-TRAP 联合化学遗传学抑制技术和受体敲低技术分别探讨目标神经元群和目标受体在全身麻醉中的作用。
结果 地氟烷和七氟烷麻醉均可明显增加小鼠动眼神经副核(Edinger-Westphal nucleus, EW)的 c-Fos$^+$细胞数量并且两种吸入麻醉药物在 EW 核团中激活的是同一群表达 UCN1 的肽能神经元。化学遗传学特异性抑制七氟烷激活的 EW UCN1$^+$神经元可明显缩短小鼠地氟烷全身麻醉的苏醒时间($\bar{x} \pm s$, 对照组 vs. CNO 组, 384.7 ± 114.6 vs. 258.2 ± 103.4 s, P = 0.0014, n = 12)，但对诱导时间无明显改变(120.4 ± 54.5 vs. 143.1 ± 51.8 s, P = 0.0972, n = 12)。此外，在 EW 核团中存在高丰度表达的生长激素促分泌素受体(Growth hormone secretagogue receptor, GHSR)，该受体与地氟烷和七氟烷分别激活的 EW 神经元存在高度共标；局部敲低 EW GHSR 的表达可分别缩短小鼠地氟烷($x \pm$, 对照组 vs. 敲低组, 282.3 ± 65.9 vs.159.0 ± 41.5 s, P < 0.0001, n = 12)和七氟烷($\bar{x} \pm s$, 对照组 vs. 敲低组, 353.8 ± 81.0 vs.154.1 ± 41.8 s, P < 0.0001, n = 12)全身麻醉的苏醒时间。
结论 该项研究揭示了 EW UCN1$^+$神经元在地氟烷和七氟烷麻醉苏醒阶段的重要作用。抑制 EW UCN1$^+$神经元可加快地氟烷和七氟烷全身麻醉的苏醒，并且这种效应可能是由 GHSR 介导的。因此，该项研究主要为临床上常用的两种吸入麻醉药物——地氟烷、七氟烷，提供了全新的并且相同的细胞和分子机制，这有利于加深我们对全身麻醉作用机制的认识，并且有助于改良和研发具有更快苏醒特点的新型吸入麻醉药物，也为开发吸入麻醉药物的逆转剂提供了新的靶点。

PO-0128

Developing a PK-PD Model for Fospropofol Disodium Based on the Concentration of Metabolized Propofol in Exhaled Air and the BIS in Beagles

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Background. Fospropofol disodium, a derivative of propofol phosphate, exhibits sedative effects through its metabolism into propofol by alkaline phosphatase. The water solubility of fospropofol disodium greatly reduces the side effects associated with lipid emulsions, such as injection pain and infection risks. However, adverse reactions resulting from excessive concentrations, including intraoperative hypotension, remain comparable to those of propofol, necessitating close monitoring of vital signs and adjustment of doses based on individual responses. Building a pharmacokinetic and pharmacodynamic (PK-PD) model based on its metabolite propofol will facilitate adjustments in the dosing offospropofol disodium, optimizing therapeutic efficacy and reducing adverse effects caused by drug overdose, which is also essential for implementing target-controlled infusion and potentially closed-loop drug delivery. This study aimed to develop a PK-PD model that correlates the exhaled air concentration (Ce) of propofol with its anesthetic effects, as measured by the bispectral index (BIS) in beagles.

Methods. Six beagles aged between 1 and 1.5 years and weighing 9 to 14 kg were allowed free access to food and water before starting the experiments, following a one-week period of environmental adaptation. The drug washout period was 7 days. The study was approved by the Animal Ethics Committee of West China Hospital, Sichuan University (20220420001), and all procedures were conducted in accordance with animal welfare regulations. The beagles that received single intravenous injections of propofol or fospropofol at different doses were divided into six groups (n = 6): the DBL-pro group (3 mg/kg), the DBM-pro group (5 mg/kg), and the DBH-pro group (10 mg/kg) for propofol; and the DBL-fospro group (15 mg/kg), the DBM-fospro group (30 mg/kg), and the DBH-fospro group (60 mg/kg) for fospropofol. Propofol was monitored using VUV-TOF MS from preadministration to recovery. Correlations between Ce and blood concentration as well as between Ce and the BIS were explored. Additionally, the PK, PD, and PK-PD models between Ce and BIS were analyzed.

Results.

1.1 PK parameters and correlations between Ce-pro and Ce-pro-f

The PK models for Ce-pro and Ce-pro-f can be well fitted using the NCA model. Following intravenous administration of low, medium, and high doses of propofol, the peak time for Ce-pro was delayed compared to the peak time for Cp-pro. The peak concentrations were linearly related to dosage (P = 0.01). The area under the curve (AUC0-∞) also showed a linear relationship with dosage (P = 0.02), and the elimination half-life was not dependent on dosage (P = 0.12), suggesting the linear PK characteristics. After intravenous administration of low, medium, or high doses of fospropofol disodium, Cblood-fospro quickly peaked (1 min). The peak time for Cblood-pro was later. The peak time for Ce-pro-f was delayed compared to that for Cblood-pro. The Ce-pro-f peak was linearly related to the dosage administered (P = 0.04), the AUC0-∞ also showed a linear relationship with dosage (P = 0.02), and the elimination half-life was independent of the dosage (P = 0.24), indicating linear PK characteristics.

1.2 PD models of Ce-pro, Ce-pro-f and BIS

In the propofol groups, the PD models based on Ce-pro and BIS were well described by the inhibitory Sigmoid Emaxmodel at low and medium dosages or by the linear model at high dosages. Most of the CV values are less than 20%, and most of the data points fall within ± 2 in the IWRES to IPRED plot, with relatively straight simulation lines. These findings suggest good fits for the PD models. However, in the fospropofol groups, the change in the BIS value was

significantly delayed compared with that in the Ce-pro-f group, making it necessary to introduce the effect-site concentration to establish a PK-PD model with BIS.
1.3 PK-PD models of Ce-pro or Ce-pro-f with BIS
Following a single intravenous injection of low, medium and high doses of propofol, although the peak time of Ce-pro was delayed, the BIS value was not significantly delayed compared with that of Ce-pro. Therefore, the direct connection model was selected as the link part of the PK-PD model. The one-compartment model of extravascular drug administration was used to fit the PK data, and the inhibitory Sigmoid Emax model (low and medium dosages) and linear model (high dosages) were used to fit the PD data. After a single intravenous injection of low, medium and high doses of fospropofol disodium, although there was a delay in the Ce-pro-f compared with Cblood-pro, the BIS values were still significantly delayed compared with those of Ce-pro-f. Therefore, the indirect connection model was used for the link part of the PK-PD model; the PK part in the low-dose group was fitted by the extravascular administration of one-compartment model, while the PK part in the medium- and high-dose groups was fitted by the extravascular administration of two-compartment model. For PD part, the inhibitory sigmoid Emax model was used to explain the trend of the data in all groups.
Conclusions.VUV-TOF MS allows real-time monitoring of trace levels of propofol in exhaled air. The establishment of a PK-PD model based on the concentration of propofol in exhaled air and the BIS indicates that the PK model can be fitted using an extravascular administration one- or two-compartment model, while the PD model can be fitted using an inhibitory sigmoid Emax model or a linear model. Additionally, direct connection models are used for the intravenous injection of propofol, whereas indirect connection models are used for the intravenous injection of fospropofol disodium. This study provides valuable insights into new strategies and animal experimental data to support the precise administration and monitoring of anesthetics in clinical practice.

PO-0129

静脉输注利多卡因对腹腔镜结直肠切除术患者术后恢复质量的影响：一项随机对照试验

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目的 观察术中持续静脉输注利多卡因能否改善腹腔镜结直肠切除术患者术后早期恢复质量。
方法 126 名患者随机分为 2 组：利多卡因组（n=63）与生理盐水组（n=63）。利多卡因组患者在麻醉诱导前静脉输注 1.5mg/kg 利多卡因（稀释至 20mL，给药时间为 10 分钟），术中以 2mg/kg/h 的速率静脉输注至手术结束；生理盐水组患者静脉输注等容积的生理盐水，两组患者接受统一的全麻及镇痛方案。主要观察指标为术后 24 小时恢复质量，采用 15 项恢复质量问卷（quality of recovery-15 questionnaire，QoR-15）进行评估。次要观察指标包括：术后 48 小时恢复质量、术后疼痛评分、术后 48 小时吗啡消耗量、患者镇痛满意度、首次排气时间、首次下床活动时间，以及不良反应发生率（包括头晕、恶心、呕吐、皮肤瘙痒等）。
结果 利多卡因组患者的术后 24 小时 QoR-15 总分高于生理盐水组（120 [111，124]比 115 [109，120]，P=0.014），中位数差值为 4（95% CI: 1~6）。两组患者术后 48 小时 QoR-15 总分相似，差异无统计学意义（124 [120，129]比 123 [119，128]，P=0.504）。在术后 24 小时疼痛、自理能力方面评分的组间差异具有统计学意义（P<0.05）。与生理盐水组比较，利多卡因组患者术中瑞芬太尼的消耗量减少（1080 [800，1320] μg 比 1960 [1500，2330] μg，P<0.001）；术后 48 小时的吗啡消耗量减少（50 [33，70] mg 比 60 [44，84] mg，P=0.025）；术后 48 小时的静息及运动时的 NRS 疼痛评分的曲线下面积减少（分别为 72.1 [60.1，87.2]比 94.3 [72，114.8]，P<0.001

和 150.8 [137.8，172.1]比 164.5 [146.3，180.5]，P=0.012）；术后 0.5、1、2、4、8 小时的静息 NRS 疼痛评分以及 0.5、1、2、4 小时的运动 NRS 疼痛评分降低（P<0.05）。利多卡因组患者术后首次排气时间较生理盐水组患者缩短（30 比 37 小时），相对危险度为 2.01（95% CI：1.37~2.95，log-rank P<0.001）；两组患者术后首次下床活动时间的差异不具有统计学意义（36 比 41 小时），相对危险度 HR 为 1.34（95% CI：0.92~1.94，log-rank P=0.11）。两组患者术后恶心呕吐、头晕、皮肤瘙痒发生率差异均无统计学意义（P 值分别为 0.556、0.479、0.563）。
结论 术中静脉输注利多卡因减少腹腔镜结直肠切除手术患者术中瑞芬太尼用量，缩短肠道排气时间，但不能改善术后 24 小时的恢复质量。

PO-0130

Cx43 在血管紧张素 II 和丙泊酚诱导的动脉平滑肌细胞收缩和舒张中的作用研究

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目的 麻醉诱导期血压的剧烈波动对患者重要脏器的功能以及手术预后产生重要的影响，值得麻醉医生高度重视。导致麻醉诱导期血压剧烈波动的因素主要有两方面：（1）手术室内患者容易因焦虑等条件反射因素出现一过性高血压；（2）麻醉药物，比如丙泊酚的使用等会导致血压的显著降低。因此，手术患者在麻醉诱导期血压波动增大，严重将有可能威胁患者的生命安全。在这一过程中，血管平滑肌细胞（VSMCs）的收缩和舒张是患者血管张力和血压短暂剧烈波动的重要机制。缝隙连接蛋白 43（Cx43）在 VSMCs 中丰富表达，其组成的缝隙连接（Cx43-GJs）可允许 Ca2+在相邻 VSMCs 之间快速流动，这构成了血管平滑肌同步收缩和舒张的生物学基础。因此，在本研究中，我们重点探讨了 Cx43-GJs 功能的改变在麻醉诱导期对 VSMCs 收缩和舒张的影响，以期麻醉诱导期患者血压波动的内在机制。
方法 血管紧张素 II（Ang II，1 μM，30 min）和丙泊酚（30 μM，10 min）预处理人脐动脉平滑肌细胞（HUASMCs），以模拟麻醉诱导期间 VSMCs 的收缩和舒张。F-肌动蛋白（F-actin）聚合是 HUASMCs 收缩的重要指标，通过免疫荧光染色测定其含量。通过不同的靶向抑制剂和 siRNA，探索 Cx43-GJs 在 HUASMCs 收缩和舒张过程中的功能和表达，及其对下游 Ca2+/RhoA/LIMK2/Cofilin 信号通路的潜在调控，其中应用降落伞染料偶联实验检测 GJs 功能，免疫印迹法和免疫荧光染色检测蛋白表达水平以及流式细胞学检测细胞内 Ca2+含量。
结果 丙泊酚预处理 HUASMCs 后，显著抑制 Ang Ⅱ诱导的 F-actin 聚合增加，提示丙泊酚可以诱导 HUASMCs 显著舒张。同时，丙泊酚显著抑制细胞间 GJs 的功能但不影响 Cx43 蛋白表达。进一步应用 Gap26（Cx43-GJs 的特异性抑制剂）以及 Cx43-siRNA 预处理 HUASMCs，发现两种处理均可显著抑制 Ang Ⅱ诱导的 Cx43-GJs 功能增强，最终显著抑制 Ang Ⅱ诱导的 F-actin 聚合增加。此外，我们还发现 Gap26、Cx43-siRNA 或者丙泊酚预处理 HUASMCs，均可显著抑制 Ang Ⅱ诱导的[Ca2+]i 增加以及 RhoA/LIMK2/Cofilin 信号通路的激活。进一步应用 Rhosin（RhoA 抑制剂）和 T56-LIMKi（LIMK2 抑制剂）分别预处理 HUASMCs，发现均可显著抑制 Ang Ⅱ诱导的 RhoA/LIMK2/Cofilin 信号通路激活，最终抑制 Ang Ⅱ诱导的 F-actin 聚合增加。
结论 首次发现 Cx43-GJs 功能在 Ang Ⅱ和丙泊酚收缩和舒张血管平滑肌细胞的重要作用，为麻醉诱导初期由 Ang Ⅱ和丙泊酚引起的血压波动提供了新的解释。同时探讨了 Cx43-GJs 功能变化引起的细胞间钙离子流动变化以及 RhoA/LIMK2/Cofilin 信号通路的变化是内在机制。

PO-0131

环泊酚致不同 BMI 患者意识消失的量效关系

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目的 在临床麻醉中不同体重患者按实际体重给予麻醉药后，其起效和代谢时间存在比较显著的个体差异，且剂量不易把握。BMI 是目前国际常用的衡量人胖瘦的一个标准，根据体重与身高的比值可大致将人群分为三种，分别为标准体型、超重体型和肥胖体型。肥胖病人大多在生理功能方面和机体组织构成也发生改变，这些改变对药物的药代动力学和药效动力学都会产生影响。环泊酚作为中国自主研发的新型麻醉药物，是在丙泊酚的侧链上加入环丙基，降低其亲脂性，增强其与 γ-氨基丁酸 A 型受体的亲和力。目前环泊酚已广泛应用于全麻诱导、内镜检查、ICU 镇静等方面。但仍缺乏用于不同 BMI 患者麻醉诱导时的研究。故本研究旨在探讨麻醉诱导期间环泊酚致不同体重患者意识消失的剂量，并为临床麻醉提供参考。
方法 选取择期于全身麻醉下行手术的患者，性别不限，年龄 18-75 岁，ASAⅠ或Ⅱ级，无严重代谢性疾病，无神经系统疾病病史及药物过敏史，术前评估无困难气道的患者。根据 BMI 分为 3 组，标准组（19 ~24 kg/m2），超重组（24~28 kg/m2），肥胖组（≥28 kg/m2）。每组患者术前常规禁食水。入室后开放上肢液路，进行无创血压、心电图、脉搏血氧饱和度及呼吸频率监测。吸氧去氮，氧流量 2L/min。采用 Dixon 序贯法测定环泊酚麻醉诱导的给药剂量，相邻间隔剂量升降比例为 1：1.2。初始剂量为推荐的最佳剂量 0.4mg/kg，30s 内缓慢静脉注射完成给药。患者给药完成后每 30s 进行一 OAA/S 评分。阳性指标的评判标准：3min 内 OAA/S 评分≤1 分并且脑电双频指数（Bispectral index，BIS）＜60。在给药完成后 3min 内，如果患者出现阳性指标则下一位患者递减一个剂量，出现阴性指标则下一个患者递增一个剂量。以首次出现阳性指标患者的前一例为正式试验开始的第一例，重复此过程，直至出现 8 个阴性和阳性交替波形成的拐点后终止试验。
若患者给药后 3min 内无意识消失，则酌量追加环泊酚 0.1-0.2mg/kg 致患者意识消失。记录麻醉诱导期间的不良反应如注射痛等,给药过程中观察患者有无不良反应，若出现不良反应则对症处理。
结果 本研究共 96 例完成本实验，其中标准组 30，超重组 32 例，肥胖组 34 例。环泊酚致标准体重患者意识消失的 ED50 及其 95%CI 为 0.243（0.190~0.287）mg/kg。环泊酚致超重体重患者意识消失的 ED50 及其 95%CI 为 0.269（-0.138~0.382）mg/kg，ED95 及其 95%CI 为 0.468（0.367~5.013）mg/kg，ED95 及其 95%CI 为 0.346（0.297~0.679）mg/kg。环泊酚致肥胖体重患者意识消失的 ED50 及其 95%CI 为 0.279（0.190~0.287）mg/kg，ED95 及其 95%CI 为 0.532（0.297~0.679）mg/kg。
结论 相比于普通患者，环泊酚应用于肥胖患者的麻醉诱导过程中应当视情况增加剂量。

PO-0132

肥胖患者手术室外麻醉/镇静规范探讨

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目的 随着肥胖发生率的上升，肥胖患者在手术室外进行麻醉/镇静的需求增加。然而，肥胖患者的特殊生理特点使其在麻醉期间及术后更易发生并发症。本文旨在探讨肥胖患者在手术室外进行麻醉/镇静的规范和策略，以提高麻醉的安全性和效果。

方法 本文通过文献综述，分析了肥胖的定义及其病理生理学，探讨了肥胖患者手术室外麻醉/镇静的种类和特点，评估了相关设备和人员配置，并对麻醉前评估、麻醉实施及监护、常见并发症及其处理方法进行了详细说明。
结果 1. 肥胖定义及病理生理学：肥胖通过 BMI 判定，BMI≥30 kg/m²为肥胖。肥胖患者常见代谢综合征，呼吸系统和心血管系统易受影响。
2. 手术室外麻醉/镇静的特点：肥胖患者手术室外麻醉/镇静风险较高，场所通常远离手术室，缺乏齐全的设备和专业人员。
3. 人员和设备配置：至少 1 名高年资麻醉医师和 1 名住院医师负责，设备包括高流量给氧呼吸机、多功能生命体征监护仪、体温监测设备等。
4. 麻醉前评估：全面评估患者的呼吸系统、气道及心血管系统，识别和筛查 OSA（阻塞性睡眠呼吸暂停）。
5. 麻醉实施及监护：选择镇静效果好、呼吸抑制少的药物，如瑞马唑仑。实施全身麻醉/镇静时应常规监测心电图、心率、血压、脉搏血氧饱和度和麻醉深度。
6. 常见并发症及处理：低氧血症和误吸风险高，需充分预吸氧并准备应急气道管理工具。低血压需提前补液并准备急救药物。
结论 肥胖患者在手术室外进行麻醉/镇静的风险高于非肥胖患者，需充分的准备和个性化的麻醉管理策略。通过加强麻醉前评估、合理配置人员和设备、选择合适的麻醉药物和监护措施，可以有效降低围术期并发症的发生，提高手术安全性。本研究为麻醉医师提供了处理肥胖患者手术室外麻醉/镇静的有价值指导。

PO-0133

The Mechanisms of General Anesthesia in Facilitating Fear Memory Forgetting

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BACKGROUND Fear memory is crucial for adaptive responses to threats, but the ability to forget fear memories is essential to prevent the development of pathological conditions such as post-traumatic stress disorder (PTSD). General anesthesia, beyond its primary function of inducing unconsciousness, has been found to have diverse effects on the brain, including memory formation and consolidation. This study investigates the effects of general anesthetics on the process of fear memory forgetting. By examining the mechanisms through which anesthetics interact with memory pathways, we aim to elucidate potential therapeutic interventions for PTSD and fear-related disorders.
METHODS We utilized contextual fear conditioning to assess fear memory retention and forgetting in mice. Mass spectrometry-based proteomics was used to screen the molecular targets affected by isoflurane. Whole-cell recordings was employed for quantifying effects of isoflurane on synaptic transmission. Additionally, optogenetic techniques were employed to selectively activate specific neuronal populations to elucidate the neural circuits involved in fear memory modulation by isoflurane. A non-invasive sleep tracking system was utilized to monitor sleep and wake cycles in mice. Isoflurane exposure was timed to coincide with either sleep-dense or wake-dense periods to investigate the interaction between sleep architecture and anesthetic effects on fear memory forgetting.
RESULTS Our study revealed that repeated exposure to isoflurane anesthesia significantly promoted the forgetting of fear memories in mice. Further investigation into the molecular mechanisms showed that isoflurane enhanced the expression and activity of $GABA_A$ receptors containing the α5 subunit (α5-$GABA_AR$), leading to increased synaptic inhibition and plasticity at parvalbumin synapses in hippocampal CA1 region. Importantly, pharmacological and genetic blockage of α5-$GABA_AR$ prevented fear memory forgetting induced by anesthesia. Furthermore,

we observed that the promotion of memory forgetting by isoflurane was dependent on the sleep state of the mice.
CONCLUSIONS Our study provides compelling evidence that general anesthesia, particularly with isoflurane, plays a significant role in the regulation of fear memory processing. By modulating the activity of α5-$GABA_AR$, isoflurane enhances synaptic inhibition, which in turn facilitates the forgetting of fear memories. This regulatory mechanism is contingent on the sleep state, underscoring the intricate relationship between sleep and memory consolidation. These findings have significant implications for the development of novel treatments for pathological fear memories associated with conditions such as PTSD.

PO-0134

肠道菌群通过调节海马 VGLUT2 神经元突触囊泡蛋白介导艾司氯胺酮抗抑郁作用

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目的 探讨肠道菌群通过调节海马 VGLUT2 神经元突触囊泡蛋白介导艾司氯胺酮改善慢性束缚应激(Chronic Restraint Stress, CRS)小鼠抑郁样行为的机制。
方法 A. 雄性 C57/BL/6 小鼠随机分为对照组（CON）、慢性束缚应激（CRS）组、艾司氯胺酮治疗（CRS+ES）组。以旷场实验和糖水偏好实验评估对照组、CRS 组、CRS+ES 组小鼠行为学改变；以免疫印迹 (Western blotting, WB)检测小鼠海马 N-甲基-D-天冬氨酸受体(N-Methyl-D-Aspartate Receptor, NMDAR)亚基 NMDAR 1、NMDAR 2A 的表达水平；以 TMT (Tandem Mass Tag)标记定量蛋白质组学技术筛选 CRS 组、CRS+ES 组小鼠海马中存在差异表达的蛋白。随后以 WB、免疫荧光 (Immunofluorescence, IF)检测海马 VGLUT2、SNARE 复合物以及 CLTC(筛选出的差异蛋白)的表达。16S rRNA 测序检测 CON 组、CRS 组、CRS+ES 组小鼠粪便样本中菌群的组成变化。B.利用伪无菌小鼠进一步探讨肠道菌群是否影响艾司氯胺酮的抗抑郁作用。连续 14 天将 CRS 组和 CRS+ES 组小鼠的粪便菌群以灌胃的方式移植到伪无菌小鼠体内。评估接受粪便菌群移植的伪无菌小鼠的行为学变化，并以 WB 检测各组小鼠海马组织 VGLUT2、SNARE 复合物、CLTC 的蛋白表达水平。
结果 雄性 C57/BL6 小鼠 CRS 后表现痛觉敏化和抑郁行为（P＜0.05）。腹腔注射艾司氯胺酮显著缓解 CRS 小鼠的抑郁样行为，并抑制 CRS 小鼠海马 NMDAR 亚基的激活 (P<0.05)。 TMT 标记定量蛋白质组学结果显示: 相较于 CRS 组，艾司氯胺酮处理上调 6 种小鼠海马蛋白，下调 8 种海马蛋白；在 CRS+ES 组蛋白表达水平上调的分子中，CLTC 作为网格蛋白重链参与神经元突触前膜神经递质的再摄取过程。WB 结果显示：与对照组相比，CRS 小鼠海马组织参与谷氨酸释放的分子 VGLUT2、SNAP25、VAMP-2、Syntaxin-1 表达上调，参与谷氨酸再摄取的分子 CLTC 表达下调；腹腔注射艾司氯胺酮（10mg/kg，i.p.）可逆转上述蛋白的改变（P＜0.05）。16S rRNA 测序显示: CRS 诱导小鼠粪便菌群相对丰度发生改变，艾司氯胺酮可重塑 CRS 小鼠粪便菌群，其丰度差异具有统计学意义(P < 0.05)。此外，与伪无菌对照小鼠相比，接受 CRS 组小鼠粪便悬液灌胃处理的小鼠表现出更显著的抑郁样行为，而 CRS+ ES 组小鼠粪便菌群移植显著改善伪无菌小鼠的抑郁样行为(P < 0.05)。WB 结果显示: 接受粪菌移植小鼠海马组织中参与突触囊泡循环关键蛋白的变化，与供体变化趋势相同 (P<0.05)。
结论 肠道菌群紊乱参与慢性束缚应激诱导的抑郁样行为。肠道菌群可通过调节海马 VGLUT2 神经元突触囊泡循环相关蛋白促进艾司氯胺酮改善 CRS 小鼠抑郁样行为。

PO-0135

Investigation into the Mechanism of GluN2B-Containing NMDA Receptors in the Anesthetic Effects of S(+)-Ketamine

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Background S(+)-ketamine is a widely used intravenous anesthetic in clinical practice, known for its anesthetic, analgesic, and antidepressant properties, with a high safety profile but also a relatively high incidence of psychotomimetic adverse reactions. Although it was developed as a non-competitive antagonist of the N-methyl-D-aspartate (NMDA) receptor, the specific molecular targets and the neural circuit mechanisms through which it exerts its anesthetic and analgesic effects remain unclear. Previous studies have suggested that mice with complete knockout of GluN2A exhibit tolerance to the sedative-hypnotic effects of ketamine, but current research on GluN2B has been primarily focused on its role in the rapid antidepressant actions of ketamine/esketamine, with no reports yet on its relevance to the anesthetic effects of ketamine/S(+)-ketamine. Given its significant application in anesthesia, exploring the specific brain regions, molecular targets, and neural circuits involved in its anesthetic action, and identifying the differences in mechanisms between its anesthetic effects and adverse reactions, are crucial for developing more effective and safer anesthetic drugs, carrying significant clinical importance.
Objective To investigate the mechanisms by which GluN2B-containing NMDA receptors and related neural circuits contribute to the anesthetic effects of S(+)-ketamine.
Methods Utilizing tamoxifen-induced whole-brain conditional knockout (cKO) mice of the NMDA receptor GluN2B subunit, the role of GluN2B-containing NMDA receptors in the anesthetic mechanism of S(+)-ketamine will be clarified through the righting reflex test. By knocking out GluN2B in various brain regions, the specificity of brain areas through which S(+)-ketamine exerts its anesthetic effects via the GluN2B subunit will be further delineated. Additionally, by knocking out GluN2B in specific neurons, the neuron-specific effects of S(+)-ketamine blockade of the GluN2B subunit will be assessed. Finally, re-expression of GluN2B in a single brain region of GluN2B cKO mice will be evaluated to determine if it can rescue the anesthetic effects of S(+)-ketamine.
Results Compared to wild-type mice, S(+)-ketamine-induced disappearance of the righting reflex was diminished in GluN2B cKO mice, suggesting a significant role of GluN2B in excitatory neurons. After knocking out the GluN2B subunit in brain area A, B, C, and D, there was no noticeable change in the effect of S(+)-ketamine on the disappearance of the righting reflex. Knocking out GluN2B in brain area E weakened the disappearance of the righting reflex caused by S(+)-ketamine, and re-expression of GluN2B in the E brain area of mice with complete GluN2B knockout was sufficient to restore the anesthetic effect of S(+)-ketamine. The deletion of GluN2B in both excitatory and inhibitory neurons within the E area led to a reduction in the anesthetic effect of S(+)-ketamine. Re-expressing GluN2B only in the E brain area of GluN2B cKO mice could rescue the anesthetic effects of S(+)-ketamine.
Conclusion The GluN2B-containing NMDA receptor is a primary target of the anesthetic action of S(+)-ketamine, with the E brain area being crucial for the anesthetic effect of S(+)-ketamine through the inhibition of GluN2B-containing NMDA receptors. S(+)-ketamine can exert its anesthetic effects through GluN2B in both excitatory and inhibitory neurons.

PO-0136

右旋氯胺酮治疗创伤后应激障碍作用及机制研究

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目的 创伤后应激障碍（post-traumatic stress disorder, PTSD）是一种严重的慢性精神疾病，主要症状包括创伤再体验、持续性回避、对情景记忆的过度反应等。目前关于 PTSD 的病理生理机制尚不明确，用于治疗的药物较少且疗效有限。因此有关于 PTSD 的研究属于当前研究难点和热点。右旋氯胺酮（S-ketamine, SK）是非竞争性的 N-甲基-D-天冬氨酸受体（N-methyl-D-aspartate receptors, NMDARs）拮抗剂，其对 NMDA 受体亲和力比消旋氯胺酮强，具有抗焦虑、抗抑郁的作用。SK 被美国食品药品监督管理局授予治疗伴有紧迫自杀风险的重度抑郁症的资格，有望成为新的 PTSD 治疗药物。在此基础上，本研究旨在通过动物行为学、突触形态学及分子生物学探索 SK 对 PTSD 的作用及机制，为 PTSD 的防治提供新的研究思路和方向。
方法 将 40 只雄性 C57BL/6J 小鼠 25g-30g，随机分为 4 组：对照盐水组（CON+NS 组），对照给药组（CON+SK 组），PTSD 盐水组（PTSD+NS 组），PTSD 给药组（PTSD+SK 组）。使用不可逃避足底电击（inescapable foot shock, IFS）程序来建立小鼠的 PTSD 模型。CON+SK 组和 PTSD+SK 组于造模当天起，连续 14 天腹腔注射 3mg/kg 的 SK，CON+NS 组和 PTSD+NS 组给予同体积生理盐水。于造模后第 13 天进行情景恐惧（fear condition test, FCT）实验、第 14 天进行旷场实验（open-field test, OFT）和高架十字迷宫实验（elevated plus maze test, EPMT）检测小鼠的恐惧记忆以及焦虑样行为；14 天后取海马进行蛋白印迹（Western blot, WB）检测 P-CREB、TrkB、P-TrkB、BDNF、GluR1、GluR2、GluN2A、GluN2B 的蛋白表达水平。通过免疫荧光染色检测海马区域的 BDNF 的水平。采用透射电镜观察海马中突触超微结构的变化。
结果 1.行为学结果显示：PTSD+NS 组小鼠在 FCT 中僵直时间增加，自发运动能力下降，粪便排泄量也显著增加；在 OFT 中进入中央区次数减少；在 EPMT 中停留在开臂的时间以及进入开臂的次数均减少。经治疗后，PTSD+SK 组小鼠行为学表现有所改善。2.WB 结果显示：PTSD+NS 组海马的 P-CREB、BDNF、P-TrkB 蛋白水平都明显降低，GluN2B 和 GluR1 亚基的蛋白表达水平增高。经 SK 治疗后，PTSD+SK 组海马的 P-CREB、BDNF、P-TrkB 蛋白水平增高，GluN2B 亚基的蛋白水平降低，GluR1 亚基则无明显差异。GluR2 和 GluN2A 受体亚基在四组中均无明显差异。3.免疫荧光结果显示：PTSD+NS 组海马 BDNF 蛋白表达水平明显降低。经 SK 治疗后，PTSD+SK 组海马 BDNF 蛋白表达水平增高。4.透射电镜结果显示：PTSD+NS 组小鼠海马突触后膜致密物厚度变薄，突触活性区长度降低，突触间隙宽度明显增宽。经过治疗后，PTSD+SK 组小鼠海马突触后膜致密物厚度增厚，活性区长度增加，突触间隙宽度变窄。
结论 使用 IFS 造模的 PTSD 小鼠存在恐惧记忆的增强及焦虑样行为。给予 SK 后改善了 PTSD 小鼠的恐惧记忆及焦虑样行为，这可能与 GluN2B/CREB/BDNF 信号通路的变化以及突触形态和功能的改变有关。

PO-0137

青春期双酚 A 暴露降低成年大鼠血清促卵泡激素浓度的机制研究

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目的 双酚 A（2，2-双（4-羟基苯基）丙烷，BPA）作为聚碳酸酯塑料合成的原材料，广泛应用于各种消费品。BPA 除了可以通过水、空气、泥土，还可以通过被污染的食品直接进入人体。BPA 被认为是一种内分泌干扰物，其作用与雌激素类似，可以干扰雄激素的合成和作用。睾丸间质细胞

对男性生殖系统的发育和维持男性生殖功能至关重要。大鼠出生后第 21-35 天是睾丸间质祖细胞（PLCs）向不成熟的睾丸间质细胞（ILCs）发育的时期，同时也是 BPA 暴露的高度敏感期。目前，这一阶段 BPA 暴露的短期影响尚不清楚。本实验的目的是研究大鼠出生后第 21-35 天低剂量 BPA 暴露对成年睾丸间质细胞形成的影响以及其机制。

方法 将 21 日龄的 Sprague Dawley（SD）大鼠随机分成 2 组：对照组（0 mg/kg BW BPA）、BPA 组（10 mg/kg BW BPA），每组 8 只。从出生第 21 天开始，分别灌胃 0 mg/kg、10 mg/kg 剂量的 BPA，每天称量体重并根据体重计算灌胃体积（2 μL/g），连续 14 天。后正常喂养 21 天后，称量体重后处死所有大鼠。取血清测睾酮（T）、双氢睾酮（DHT）。取出并分离睾丸及垂体，放入-80℃冰箱冻存，用实时荧光定量 PCR（RT-qPCR）测量垂体-性腺通路细胞及睾丸细胞基因表达。用上述基因表达水平评估 BPA 暴露对成年后垂体及睾丸间质细胞的影响。

结果 BPA 暴露对大鼠睾丸重量无明显改变。与对照组相比，10 mg/kg 的 BPA 不影响血清 T 水平，但显著降低 FSH 水平，而 LH 不受影响。 RT-qPCR 结果表明 10 mg/kg 的 BPA 暴露特异性上调了垂体促性腺激素释放激素受体（Gnrhr）、促黄体生成素 beta（LH-beta）的基因表达水平。而生长激素（Gh）、促肾上腺皮质激素（Acth）、促卵泡激素（Fsh）的基因表达无明显改变。

结论 青春期发育的特定时期（青春期前半段），10 mg/kgBPA 暴露通过重置垂体稳态，降低血清 FSH 浓度。BPA 可能通过上调垂体 Gnrhr、LH-beta 的表达，激活垂体-性腺轴，进而降低血清 FSH 浓度。

PO-0138

复合阿芬太尼时环泊酚抑制老年患者胃镜检查进镜反应 的半数有效剂量

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目的 探讨复合阿芬太尼时环泊酚抑制老年患者胃镜检查进镜反应的半数有效剂量，并比较是否存在性别差异。

方法 选择择期无痛胃镜检查患者 115 例，年龄 65-85 岁，美国麻醉医师协会分级 I 或 II 级，临床衰弱评分量表评分≤3 级，体重指数 18-28kg/m2 的患者。将符合纳入标准的患者按照年龄和性别分为四组：65-74 岁男性（A 组）、65-74 岁女性（B 组）、75-85 岁男性（C 组）、75-85 岁女性（D 组）。所有患者入室后开放静脉通路，监测心电图、氧饱和度和无创血压，鼻导管吸氧 2-4L/min。静脉注射阿芬太尼 4ug/kg，后予环泊酚，初始剂量为 0.3mg/kg，推注时间大于 30s。依据改良 Dixon 序贯试验法，相邻患者浓度差设为 0.03 mg/kg。注药后待患者意识消失，改良警觉镇静评分（MOAA/S）≤1 分时开始进镜。若 2min 患者 MOAA/S 评分仍>1 分，或者胃镜进入咽部时出现咳嗽反射，恶心呕吐，体动或明显皱眉等影响操作，则定义为进镜反应阳性。若进镜反应阴性，则下一例患者降低 1 个浓度梯度；若进镜反应阳性，则下一例患者升高 1 个浓度梯度。从第 1 例阳性的病例开始计入观察单位数，阳性-阴性反应出现 8 个交换点后即可认为试验结束，停止纳入病例。采用 Probit 概率回归分析法计算四组老年患者进镜反应的半数有效剂量（ED50）、95%有效剂量（ED95）及其 95%置信区间并记录各组生命体征，并进行统计分析。

结果 本研究纳入 115 例老年患者，实际 113 例老年患者进行分析。通过计算的出四组老年患者的环泊酚用量的 ED50 及其 95%CI 分别为：65-74 岁男性 0.189（0.168-0.207）mg/kg、65-74 岁女性 0.202（0.177-0.224）mg/kg、75-85 岁男性 0.152（0.116-0.176）mg/kg、75-85 岁女性 0.168（0.146-0.187）mg/kg；ED95 及其 95%CI 分别为：65-74 岁男性 0.227（0.09-0.318）mg/kg、65-74 岁女性 0.251（0.231-0.301）mg/kg、75-85 岁男性 0.201（0.177-0.376）mg/kg、75-85 岁女性 0.205（0.186-0.313）mg/kg。同年龄段不同性别老年患者的环泊酚 ED50 差异无统计学意义

（P >0.05），同性别的 75-85 岁患者环泊酚 ED50 小于 65-74 岁患者，差异有统计学意义（P <0.05）。

结论 环泊酚复合 4ug/kg 阿芬太尼抑制老年患者无痛胃镜检查时进镜反应的 ED50 及其 95%CI 分别为：65-74 岁男性 0.189（0.168-0.207）mg/kg、65-74 岁女性 0.202（0.177-0.224）mg/kg、75-85 岁男性 0.152（0.116-0.176）mg/kg、75-85 岁女性 0.168（0.146-0.187）mg/kg，同性别的 75-85 岁患者环泊酚 ED50 小于 65-74 岁患者，并且不存在性别差异。

PO-0139

A study on the pharmacokinetics and pharmacodynamics of remimazolam for general anesthesia in patients undergoing thoracic surgery

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Background Remimazolam is a new benzodiazepine sedative that has been widely used for procedural sedation and general anesthesia. It features rapid onset, short duration of action, and minimal impact on hemodynamics, making it particularly suitable for elderly patients undergoing thoracic surgery. Thoracic surgery may affect the absorption and distribution of the drug, and postoperative patients may also experience renal insufficiency that could affect drug excretion. However, to date, there is limited understanding of the population pharmacokinetics (PK) and pharmacodynamics (PD) of remimazolam in patients undergoing general anesthesia for thoracic surgery. Therefore, it is necessary to conduct in-depth studies on the absorption, distribution, and metabolism of remimazolam in thoracic surgery patients to optimize dosing regimens for the use of remimazolam in this patient population.

Objective The study aims to establish a PK/PD model for remimazolam in patients undergoing thoracic surgery.

Methods A total of 20 patients who underwent general anesthesia for lung cancer surgery were included in the study. Remimazolam was administered intravenously (IV). For 10 patients with lung cancer, only the induction dose of remimazolam (0.2mg/kg) was given, and arterial blood samples were collected at 1, 2, 5, 7, 10, 25, 40, 50, 60, 120, and 240 minutes after administration. For another 10 patients with lung cancer, both the intravenous induction dose (0.25mg/kg) and the maintenance dose (1.2mg/kg/h) of remimazolam were administered, and the arterial blood samples were collected at 1, 8, 30, 60, 90, 120, 150, and 240 minutes after the start of administration. The concentrations of remimazolam in the arterial plasma samples were determined using validated high performance liquid chromatography with tandem mass spectrometry detection (LC/MS/MS). The Bispectral Index (BIS) value was continuously monitored through electroencephalogram (EEG) as a PD index. A population PK/PD model was subsequently established and evaluated through goodness-of-fit (GOF) plots and visual predictive checks (VPC) plots. Changes in mean arterial pressure, heart rate, and blood pressure during surgery were observed and recorded. Follow-up was conducted to record the incidence of adverse events within 24 hours postoperatively. The postoperative adverse events included respiratory and circulatory depression, as well as postoperative agitation.

Results A three-compartment model with first-order elimination was identified as best structural model for remimazolam. The BSVs were incorporated into the CL, central volume (V1), peripheral volume (V3), and intercompartmental clearance (Q3). The PK parameters were normalised to weight via allometric scaling. The relationship between exposure and the BIS was best described using an effect compartment model with an inhibitory sigmoid model. The GOF plots and VPC plots demonstrated that the established population PK/PD model had the appropriateness of model fitting and predicting. In clinical settings, hemodynamics remains relatively stable during the administration of remimazolam. No clinical adverse events such as respiratory and circulatory

depression or postoperative agitation were observed during the 24-hour postoperative follow-up period.
Conclusions Remimazolam exhibits a relatively minimal impact on hemodynamics. The PK/PD model of remimazolam in patients undergoing thoracic surgery is similar to that previously studied in healthy individuals. The PK/PD model of remimazolam established in this study can be further utilized to optimize dosing regimens for patients undergoing thoracic surgery.

PO-0140

The plasticity of neuropeptide Y-Y1 receptor system on Grpr neurons contributes to mechanical hyperknesis during chronic itch

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Background In the physiological state, the act of scratching removes potentially harmful substances from the skin and provides a protective effect on the animals. In the chronic itch state caused by atopic dermatitis, psoriasis, dry dermatitis, eczema, uremia or cholestasis, the patient will suffer from continuous and intense scratches, which not only severely damage the skin, but also cause a variety of mental disorders, such as sleep disorders, anxiety and depression, greatly reducing the patient's life quality. Chronic itch patients are extremely sensitive to mechanical stimuli. Therefore, alleviating mechanical itch abnormalities is crucial for the treatment of chronic itch. Given that spinal inhibitory interneurons can be classified into 4 distinct non-overlapping populations by neurochemical markers, namely, galanin, neuronal nitric oxide synthase (nNOS), parvalbumin (PV), and neuropeptide Y (NPY), it's important to figure out whether these inhibitory populations gate itch signaling pathway. Spinal gastrin-releasing peptide receptor (Grpr) neurons are specific itch-transmitting neurons. It has been reported that the spinal Galanin and nNOS neurons directly project to Grpr neurons and are involved in gating itch transmission while PV neurons scarcely modulate itch processing. The neuropeptide Y and Y1 receptor (NPY-Y1R) system regulates mechanical itch under physiological conditions. However, whether Npy neurons form inhibitory synapses with Grpr neurons and further gate mechanical itch remains elusive. Meanwhile, we still do not know if and how NPY-Y1R system and Grpr neurons are altered during chronic itch.
Objective The objective of this study is to investigate the relationship between NPY-Y1R system and Grpr neurons and unveil the alteration of both NPY-Y1R system and Grpr neurons during chronic itch in terms of excitability and synaptic transmission efficacy. We also aim to figure out the changes in the regulatory role of Npy neurons in gating mechanical itch during chronic itch.
Methods Our study employed Ai9, Npy^{flpo} and $Grpr^{icre}$ transgenic mice, chemogenetic technology DREADD (designer receptors exclusively activated by designer drugs), allergic contact dermatitis model (diphenylcyclopropenone, DCP model), immunofluorescence staining, rabies virus retrograde tracing, and whole cell patch clamp recording.
Results We found that during chronic itch, increased mechanical itch was perceived in response to normally itch-evoking stimuli (0.04 g and 0.07 g). Meanwhile 0.04 g von Frey filament taking the place of the 0.07 g filament exerts the most scratch episodes and the excitability of Grpr neurons increases. By rabies virus retrograde tracing, we determined that Grpr neurons receive direct monosynaptic inputs from Npy neurons. By chemogenetic manipulation of Npy neurons and immunofluorescence staining, we found that innocuous mechanical stimuli (0.04 and 0.07 g) induced more scratches in the hM4Di group than the control group (0.04 g: control 0.5 ± 0.2 scratches, hM4Di 1.7 ± 0.2 scratches, $p = 0.0038$, 0.07 g: control 1.8 ± 0.3 scratches, hM4Di 3.2 ± 0.3 scratches, $p = 0.0008$). While there is no difference in the numbers of scratch episodes between control group and hM4Di group in response to noxious mechanical stimuli (0.6 and 1.0 g)

that typically elicit pain (0.6 g: control 0.3 ± 0.2 scratches, hM4Di 0.3 ± 0.2 scratches, p ＞ 0.9999, 1.0 g: control 0.2 ± 0.2 scratches, hM4Di 0.2 ± 0.2 scratches, p ＞ 0.9999). And silence of Npy neurons gave rise to more c-Fos expression in Grpr neurons. We also found that innocuous mechanical stimuli (0.04 and 0.07 g) induced fewer scratches in the hM3Dq group than the DCP group (0.04 g: control 3.5 ± 0.4 scratches, hM3Dq 0.7 ± 0.3 scratches, p ＜ 0.0001, 0.07 g: control 3.0 ± 0.3 scratches, hM3Dq 1.5 ± 0.4 scratches, p = 0.0046). Similarly, there is no difference in the numbers of scratch episodes between DCP group and hM3Dq group in response to noxious mechanical stimuli (0.6 and 1.0 g) (0.6 g: control 0.8 ± 0.2 scratches, hM3Dq 1.0 ± 0.3 scratches, p = 0.9918; 1.0 g: control 0.3 ± 0.2 scratches, hM3Dq 0.5 ± 0.2 scratches, p = 0.9918). And activation of Npy neurons elicited less c-Fos expression in Grpr neurons during chronic itch. By allergic contact dermatitis model construction and immunofluorescence staining, we detected a reduction of Y1Rs expression on Grpr neurons during chronic itch. By whole cell patch clamp recording, we recorded the rheobases, resting membrane potential (RMP), outward currents, mEPSCs and mIPSCs with bath application of Y1R agonists, and found that the regulation of synaptic transmission efficacy of Grpr neurons by Y1R agonists was also diminished during chronic itch.

Conclusions Our study verified that Npy neurons form inhibitory synapses with Grpr neurons and the excitability of Grpr neurons increases during chronic itch. We also found that inhibition of spinal Npy neurons induces mechanical hyperknesis and activation of Grpr neurons while activation of spinal Npy neurons during chronic itch reduces mechanical itch and activation of Grpr neurons. Further investigation reveals the changes of both NPY-Y1R system and Grpr neurons during chronic itch and highlights the mechanism by which the NPY-Y1R system regulates mechanical itch via Grpr neurons. Y1Rs are a promising target for the treatment of chronic itch.

PO-0141

Increased LAMP2A induces hyperactivity of ACC-IC circuits and contributes to depression-induced hyperalgesia by targeting NKAβ1

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Painful physical symptoms in major depressive disorder (MDD) patients often lead to poor remission rate and high recurrence rate, significantly worsening the quality of life in MDD patients. However, the molecular mechanisms of painful physical symptoms induced by depression remain elusive. Here, we report that decreased Na+/K+-ATPase β1 subunit (NKAβ1) expression in anterior cingulate cortex glutamatergic (ACCGlu) neurons promotes ion dyshomeostasis and then drives hyperactivity of ACCGlu-insular cortex circuits in chronic stress mice, which eventually primes hyperalgesia in depression-like states. Importantly, NKAβ1 overexpression in ACCGlu neurons protects against chronic stress-induced neuronal hyperexcitability and hyperalgesia. Mechanistically, we reveal that chronic stress led to a reduction in p-Akt levels, whose signaling strengthens LAMP2A-driven chaperone-mediated autophagy (CMA) and subsequently promotes the degradation of NKAβ1. We further identify NKAβ1 as a novel CMA substrate. Accordingly, genetically LAMP2A loss in ACCGlu neurons reverses chronic stress-induced NKAβ1 reduction, ion dyshomeostasis, neuronal hyperexcitability and subsequently ameliorates depression-induced hyperalgesia, whereas activation of CMA elicits hyperalgesia. Additionally, we develop a TAT-LAMP2A peptide that significantly alleviates depression-induced hyperalgesia. Our results reveal

a previously unappreciated mechanistic connection between CMA and neuronal excitability, underlying the pathophysiology of depression-induced hyperalgesia.

PO-0142

RVMGPER+→NTSTac1+神经环路介导急性疼痛对恶心呕吐的抑制作用

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目的 急性疼痛与恶心呕吐是手术患者术后最常见的两大类并发症，目前尚无两者间关系的研究，前期临床研究发现，发生术后急性疼痛的患者极少出现恶心呕吐。急性疼痛与恶心呕吐是生物体适应外界环境挑战的重要适应性行为，为生存所必需。生物体同时遭遇多重生存威胁时，适应性行为之间相互影响，表现为优先相应对其生存最大的威胁。由此推测术后急性疼痛的患者极少出现恶心呕吐，可能是适应性行为的竞争介导了急性疼痛对恶心呕吐的抑制。
方法 利用小鼠腹腔注射金黄色葡萄球菌肠毒素 A（SEA）或化疗药物阿霉素（DOX）诱发恶心呕吐，采用足底切口或足烧伤诱导急性疼痛。利用小动物精细动作视频分析系统记录腹腔注射 SEA 或 DOX 后 3h 内出现的“大张口”次数评估呕吐，利用条件性味觉回避（CFA）评估恶心。利用病毒示踪、免疫荧光、荧光原位杂交等分子生物学技术以及药理学手段探索急性疼痛对恶心呕吐的抑制作用以及相应的神经生物学机制。
结果 SEA 或 DOX 腹腔注射可诱导小鼠的恶心呕吐行为，而足底切口或足烧伤诱发的急性疼痛能够显著抑制小鼠的恶心呕吐，免疫荧光染色以及荧光原位杂交发现，腹腔注射 SEA 或 DOX 后，孤束核（NTS）中 c-Fos 表达显著增多，并且 c-Fos 信号主要与速激肽 1（Tac1+）神经元共定位，抑制 NTSTac1+神经元可缓解 SEA 或 DOX 腹腔注射所诱发的恶心呕吐。病毒示踪发现，NTS 与延髓吻端腹内侧区（RVM）的 G 蛋白耦联雌激素受体（GPER+）神经元之间存在兴奋性功能连接，急性疼痛增强 RVMGPER+神经元活动，激活 RVM GPER+神经元能够抑制 NTSTac1+神经元活动，同时显著缓解小鼠的恶心呕吐行为。
结论 本研究从动物模型证实了急性疼痛对恶心呕吐的抑制作用，解析了 RVMGPER+→NTSTac1+神经环路介导急性疼痛对恶心呕吐的抑制作用。NTSTac1+神经元激活导致恶心呕吐的发生，而急性疼痛状态下，RVM GPER+神经元活动增强，通过抑制 NTSTac1+神经元兴奋性，对恶心呕吐发挥抑制作用。

PO-0143

Anwulignan alleviates bone cancer pain by inhibiting the PPARα/CXCR2 pathway and reducing tumor burden

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Background Advanced cancer patients frequently suffer from severe pain due to bone metastasis and destruction, with limited effective treatment. Anwulignan, a naturally occurring lignan, is recognized for its potential antioxidant, anti-inflammatory, and anti-tumor capabilities. However, the specific efficacy of Anwulignan in alleviating cancer-induced bone pain (BCP) and reducing tumor burden in BCP models remains to be fully elucidated.
Methods Establishment and validation of a BCP model using behavioral and imaging techniques. Immunoblotting was employed to assess the expression levels of peroxisome proliferation-

activated receptor (PPARα) and CXC-type chemokine receptor (CXCR2). In the dorsal horn of the spinal cord and cell samples. X-ray and Micro-CT used to detect bone destruction in rats. The activity of osteoclasts and osteoblasts at the proximal portion of the tibia was monitored by staining techniques against tartrate phosphatase (TRAP) and alkaline phosphatase (ALP). Cell activity assay kit-8 (CCK-8), cell colony formation assay, and in vivo imaging techniques were used to assess tumor growth. Immunofluorescence was used to detect protein expression and spatial location in the spinal dorsal horn. RNA sequencing analysis was conducted to identify differentially expressed genes, followed by comprehensive transcriptome analysis. In addition, examining the binding interaction between PPARα and the CXCR2 promoter region via CHIP assay.

Results Induction of BCP in SD rats via intra-tibial injection of MRMT-1 tumor cells, and the analgesic effects of Anwulignan. Following the induction of bone cancer pain in SD rats through intra-tibial injection of MRMT-1 tumor cells, hyperalgesia and osteolytic damage were observed in the operated limb. Anwulignan demonstrated dose-dependent and administration route-dependent analgesic effects without tolerance development. Imaging results indicated that Anwulignan alleviated bone destruction caused by bone cancer pain. Immunohistochemistry revealed that Anwulignan promoted osteoblast differentiation and increased the percentage of the area occupied by osteoblasts. Cell cloning, proliferation assays, and in vivo imaging showed that Anwulignan inhibited tumor cell growth and reduced tumor burden at the injection site. Molecular docking, thermal shift assays, and Western blotting suggested a close relationship between Anwulignan and PPARα. Immunofluorescence results indicated that PPARα was localized in neurons, but not in microglia or astrocytes. Intrathecal administration of the PPARα agonist Pirinixic acid in rats with bone cancer pain reduced pain, while intrathecal administration of PPARα siRNA in normal rats induced pain by knocking down PPARα in the dorsal horn of the spinal cord. The analgesic effect of Anwulignan could be reversed by PPARα siRNA. RNA-seq revealed that knockdown of PPARα in PC12 cells increased CXCR2 expression, which was validated by Western blotting. Immunofluorescence showed co-localization of PPARα and CXCR2. CHIP assay results demonstrated that PPARα bound to the CXCR2 promoter region, and Anwulignan could reverse the reduced binding of PPARα to CXCR2 caused by bone cancer pain.

Conclusion Our results indicate that Anwulignan alleviates BCP through a unique synergistic effect involving the modulation of the PPARα/CXCR2 signaling pathway, reduction of tumor burden, and promotion of osteoblast synthesis.

Purpose：

The aim of this study is to investigate the comprehensive effects of Anwulignan on pain, bone destruction, and tumor burden induced by bone cancer pain. Through a series of related experiments, we aim to:

1. Examine the analgesic effects of Anwulignan in rats with bone cancer pain.
2. Evaluate the impact of Anwulignan on tumor burden in rats with bone cancer pain.
3. Investigate the effects of Anwulignan on bone destruction in rats with bone cancer pain.

PO-0144

团聚核调控神经病理性疼痛的环路和细胞机制

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目的 疼痛是诸多疾病的常见或主要症状，目前临床上使用各种不同的方式来治疗和缓解疼痛，但涉及中枢敏化的神经病理性疼痛仍难以得到有效的治疗。因此，确定新的潜在药物靶点以及开发新型药物至关重要。位于中线丘脑的团聚核（Reuniens thalamic nucleus，RE）是皮质-丘脑-皮质之间通信的关键核团，RE 向内侧前额叶皮质（Medial prefrontal cortex，mPFC）发送大量的谷氨酸

能突触输入，但该输入是否参与疼痛调节尚不清楚。在本研究中，我们阐述 RE 谷氨酸能神经元在调控疼痛、抑郁情绪和记忆认知中的作用以及探究 RE 至 mPFC 的投射关系和突触特性，阐明该通路在慢性疼痛、抑郁情绪和记忆认知中的调控作用。
方法 1、通过坐骨神经分支选择性结扎离断术（Spared nerve injury，SNI）建立慢性神经病理性疼痛模型小鼠，术后检测小鼠痛阈、抑郁样行为和认知记忆的变化。
2、在体光纤成像技术检测生理性和神经病理性疼痛及负性情绪下 RE 神经元兴奋性。
3、通过脑片膜片钳等技术探究 RE-mPFC 的投射关系和细胞类型。
4、采用光遗传学技术分别调控 RE 谷氨酸能神经元和 RE-mPFC 投射，检测其对正常和 SNI 小鼠的痛阈、抑郁样行为和社交记忆的调控作用。
5、在体光纤成像与光遗传学技术相结合检测 RE-mPFC 投射对 vlPAG 神经元兴奋性的影响。
6、化学遗传学与药理学方法相结合检测 RE-mPFC 投射与吗啡共同作用对疼痛阈值的影响以及检测该投射对吗啡耐受的 SNI 小鼠疼痛阈值的作用。
结果 1、SNI 小鼠术后痛觉过敏持续存在并伴随明显的抑郁样行为和社交记忆缺陷。
2、在体光纤成像记录显示：疼痛刺激、负性情绪和社交认知记忆均能诱导正常和 SNI 小鼠 RE 谷氨酸能神经元活动增强。
3、脑片膜片钳等技术表明神经病理性疼痛导致 RE 对 mPFC 兴奋性投射失调。
4、光遗传学激活 RE 谷氨酸能神经元和 RE-mPFC 投射可降低正常小鼠的疼痛阈值并导致抑郁样行为和社交记忆缺陷；而抑制 RE 谷氨酸能神经元和 RE-mPFC 投射可提高 SNI 小鼠的疼痛阈值并减少抑郁样行为和社交记忆缺陷的发生。
5、在体光纤成像记录显示：光遗传学抑制 RE-mPFC 投射可进一步增强 SNI 小鼠 vlPAG 兴奋性谷氨酸能神经元活动。
6、化学遗传学抑制 RE-mPFC 投射可提高 SNI 小鼠的疼痛阈值并进一步增强吗啡镇痛作用，且对已产生吗啡耐受的 SNI 小鼠产生镇痛作用。
结论 我们的研究证明 RE 谷氨酸能神经元以及 RE-mPFC 投射参与外周疼痛信号的传递、抑郁情绪和社交记忆的编码；RE-mPFC 投射参与 vlPAG 谷氨酸能神经元对疼痛感知。这些结果可为临床上疼痛、抑郁及记忆认知障碍的治疗提供新的理论指导和支持。

PO-0145

Causal Associations between frailty and low back pain: a bidirectional two-sample Mendelian randomization study

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Background：Previous observational studies have revealed a potentially robust reciprocal bidirectional relationship between frailty and low back pain (LBP). However, the precise causal relationship remains unclear.
Objective The aim of this study was to assess the potential bidirectional causal relationship between frailty index (FI) and LBP using a two-sample Mendelian randomization approach.
Methods：To examine the potential causal association between frailty and low back pain, we conducted bidirectional two-sample Mendelian randomization analysis (MR) study. Genetic data on FI and LBP were acquired from publicly available genome-wide association studies (GWAS). Various MR methodologies were utilized, such as random effects inverse variance weighting (IVW), weighted median, and MR-Egger, to evaluate causality. Additionally, sensitivity analyses were conducted to evaluate the robustness of the findings.
Results：Genetically predicted higher frailty index (IVW, odds ratio [OR] = 1.66, 95% CI 1.17-2.36, p = 4.92E-03) was associated with a higher risk of low back pain. As for the reverse direction, genetic liability to low back pain showed consistent associations with a higher frailty

index (IVW, OR = 1.13, 95% CI 1.07-1.19, p = 2.68E-05) . The outcomes from various MR techniques and sensitivity analyses indicate the robustness of our findings.
Conclusion： Our research findings provide additional evidence bolstering the bidirectional causal relationship between frailty and LBP.

PO-0146

HUC-MSCs-Exo mediated Immunoinflammatory Regulation in BV2 Microglial Cells via miR-223-3p

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Objective: To investigating the potential role of the miR-223-3p/NLRP3 axis in the regulation of microglial cells neuroinflammatory processes by Human Umbilical Cord Mesenchymal Stem Cells derived exosomes.
Methods:
(1) HUC-MSCs were cultured and passaged in vitro, and surface markers were detected by flow cytometry. Human umbilical cord mesenchymal stem cell-derived exosomes (HUC-MSCs-Exo) were extracted by ultracentrifugation and characterized by transmission electron microscopy (TEM) morphology, nanoparticle tracer analysis (NTA) and nanoflow surface protein assay were standardized methods for identification. BV2 microglial were cultured and passaged, and co-incubated with different concentrations of HUC-MSCs-Exo (0, 5, 10, 20, 50 μg/mL) for 48 hours, cell viability was measured using CCK-8 assay.
(2) M1-type BV2 microglial cells were induced using LPS combined with INF-γ stimulation and verified by flow cytometry. 20 μg/mL HUC-MSCs-Exo was co-cultured with M1-type BV2 cells for 48 h, and the protein expression levels of NLRP3 inflammasome components were determined using WB in the Control group (BV2 cells cultured normally), Model group (M1-type BV2 cells), and Exo group (co-treated with exosomes).
(3) HUC-MSCs were transfected with miR-223-3p mimics, miR-223-3p inhibitor, and their corresponding negative controls, and the cell supernatants were collected to obtain the corresponding HUC-MSCs-Exo, and the levels of miR-223-3p were detected by RT-qPCR in each group, then co-incubation with M1-type BV2 cells for 48 hours, the expression of NLRP3 inflammasome components in M1-type BV2 cells in Control group (co-cultured with HUC-MSCs-derived exosomes extracted using lipofectamine 3000), Mimics NC group (mimics negative control group), Mimics group (mimics group), Inhibitor NC group (inhibitor negative control group), and Inhibitor group (inhibitor group). were determined using WB. Flow cytometry was used to measure the percentage of $CD11b^{+}CD86^{+}$ (M1) BV2 cells and $CD11b^{+}CD206^{+}$ (M2) BV2 cells in each group, and the expression levels of inflammatory factor IL-1β and TNF-α in different groups of cells were determined by ELISA.
Results:
(1) The cultured HUC-MSCs and the extracted HUC-MSCs-Exo met the relevant standards. The viability of BV2 cells increased gradually with increasing exosome concentration, and 20 μg/mL of HUC-MSCs-Exo was found to be the most suitable concentration for action.
(2) The proportion of M1-type BV2 cells was significantly increased after combined stimulation with LPS+IFN-γ compared to the control group ($P<0.05$), while the expression of NLRP3, ASC, Pro-Caspase-1, and Cleaved-Caspase-1 proteins in BV2 cells significantly increased ($P<0.05$). 20 μg/mL of HUC-MSCs-Exo post-treatment significantly inhibited the expression of each protein of NLRP3 inflammasome ($P<0.05$).
(3) HUC-MSCs transfected with miR-223-3p mimics showed elevated level of miR-223-3p in their exosomes (Mimics vs Mimics NC, $P<0.05$). Compared to the Control group and Mimics NC group,

Mimics group significantly inhibited the expression of NLRP3, ASC, Pro-Caspase-1, Cleaved-Caspase-1 proteins, as well as the inflammatory cytokines IL-1β and TNF-α (P<0.05). Additionally, the proportion of $CD11b^{+}CD86^{+}$ (M1) cells decreased (P<0.05), while the proportion of $CD11b^{+}CD206^{+}$ (M2) cells increased (P<0.05). After transfection of HUC-MSCs with miR-223-3p inhibitor, the level of miR-223-3p in their exosomes significantly decreased (Inhibitor vs Inhibitor NC, P<0.05). Compared with Control group and Inhibitor NC group, the Inhibitor group showed a significant increase in the expression levels of NLRP3, ASC, Pro-Caspase-1, Cleaved-Caspase-1 proteins, and inflammatory factors IL-1β and TNF-α expression levels were significantly increased (P<0.05). Furthermore, there was an increase in the proportion of M1 cells (P<0.05) and a decrease in the proportion of M2 cells (P<0.05). There were no statistically significant differences in the levels of miR-223-3p, NLRP3 inflammasome proteins, IL-1β and TNF-α expression, or the M1/M2 ratio between the Control, Mimics NC, and Inhibitor NC groups.
Conclusions:HUC-MSCs-Exo treatment resulted in a significant downregulation of the protein expression levels of the NLRP3 inflammasome in LPS+IFN-γ-induced M1 phenotype BV2 microglial cells. Additionally, HUC-MSCs-Exo promoted the polarization of M1 microglia towards an M2 anti-inflammatory phenotype and suppressed the secretion of inflammatory cytokines IL-1β and TNF-α. This effect was mediated through the action of miR-223-3p carried by HUC-MSCs-Exo.

PO-0147

初级感觉神经元中锌指蛋白 ZFP612 借助染色质三维空间构象抑制 Il1rl1 白介素信号通路调控神经病理性疼痛

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目的 神经损伤引起的背根神经节（DRG）基因表达变化是神经病理性疼痛发生的关键。然而，这些变化的发生机制仍不明确。在本研究中我们发现锌指蛋白 612（ZFP612）在外周神经损伤引起的神经病理性疼痛模型（SNL）小鼠 DRG 神经元中特异性减少。逆转 DRG 中 ZFP612 的下调可以缓解 SNL 小鼠痛觉过敏症状；DRG 条件性敲除 ZFP612 的小鼠会出现明显的神经病理性疼痛症状。多组学测序发现敲降 DRG 中 ZFP612 会显著促进白介素 1 样受体 1（Il1rl1）等白介素通路基因的表达，并且 Il1rl1 敲除小鼠中 ZFP612 下调引起的痛觉过敏症状会显著缓解。
方法 机制上，我们发现 DRG 中 Il1rl1 存在三个转录起始位点 TSS-1、TSS-2 和 TSS-3，它们编码相同的蛋白产物 IL1RL1。ZFP612 与 TSS-1 下游的顺式作用元件沉默子结合，对 Il1rl1 三个转录起始位点所对应的转录产物产生明显的抑制作用。阻止 ZFP612 与沉默子结合或者敲除沉默子元件可以部分逆转 ZFP612 对 Il1rl1 的转录抑制作用，并削弱 SNL 小鼠中 ZFP612 过表达所产生的镇痛效果。
结果 具体地，我们发现 SNL 条件下 ZFP612 招募 HDAC1/2 和 SETDB1 形成表观沉默复合体减少，使沉默子区域的组蛋白乙酰化水平提高、甲基化水平降低，促进沉默子区域 RNA 聚合酶Ⅱ转录延伸，TSS-1 对应转录产物增加。高通量染色质构象捕获测序(Hi-C)和染色质构象捕获实验（3C）发现沉默子可与 TSS-3 所在的启动子区域形成环状结构。ZFP612 可以利用该环状结构对 TSS-3 所在启动子区域的组蛋白乙酰化和甲基化水平造成影响，使 RNA 聚合酶Ⅱ转录起始水平提高，TSS-3 对应转录产物增加。与此同时，TSS-2 下游内含子区域组蛋白乙酰化和甲基化水平发生变化，局部 RNA 聚合酶Ⅱ转录延伸加快，TSS-2 对应转录产物增加，最终造成 IL1RL1 蛋白大量表达，小鼠出现痛觉过敏症状。
结论 因此，本研究发现外周神经损伤后 DRG 神经元中 ZFP612 表达减少引起的白介素信号通路激活是神经病理性疼痛发生的重要原因，并进一步发现 ZFP612 介导的 HDAC1/HDAC2/SETDB1 表

观沉默复合体与沉默子结合、并依赖染色质三维空间结构对 Il1rl1 多个转录起始位点的转录产物同时造成影响的全新表观调控机制，为今后神经病理性疼痛的精准治疗提供一个全新的方向和突破点。

PO-0148

A neural circuit from thalamic paraventricular nucleus via zona incerta to periaqueductal gray for the facilitation of neuropathic pain

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Top-down projections transmit a series of signals encoding pain sensation to the ventrolateral periaqueductal gray (vlPAG), where they converge with various incoming projections to regulate pain. Clarifying the upstream regulatory hierarchy of vlPAG can enhance our understanding of the neural circuitry involved in pain modulation. Here, we show that a in a mouse model of spared nerve injury (SNI), activation of a circuit arising from posterior paraventricular thalamic nucleus glutamatergic neurons (PVPGlu) projects to gamma-aminobutyric acid neurons in the rostral zona incerta (ZIrGABA) to facilitate the development of pain hypersensitivity behaviors. In turn, these ZIrGABA neurons project to glutamatergic neurons in the vlPAG (vlPAGGlu), a well-known neuronal population involved in pain descending modulation. In vivo calcium signal recording and whole-cell electrophysiological recordings reveal that the PVPGlu → ZIrGABA → vlPAGGlu circuit is activated in SNI models of persistent pain. Inhibition of this circuit using chemogenetics or optogenetics can alleviate the mechanical pain behaviors. Our study indicates that the PVPGlu → ZIrGABA → vlPAGGlu circuit is involved in the facilitation of neuropathic pain. This previously unrecognized circuit could be explored as a potential target for neuropathic pain treatment.

PO-0149

丘脑室旁核谷氨酸能神经元-终纹床核通路参与小鼠疼痛及其相关焦虑样行为的调控

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目的 慢性疼痛和焦虑共病在临床上发病率高，治疗效果欠佳，对其潜在的发生机制尚未完全了解。丘脑是感觉传导的中继站，各种感觉（除嗅觉外）的传导通路均在丘脑内更换神经元，而后投射至大脑皮层。丘脑室旁核（Paraventricular nucleus of thalamus，PVT）作为丘脑中线核群的一员，其在疼痛和情绪调控中的作用日益引发关注，而终纹床核（the bed nucleus of the stria terminalis，BNST）被认为是边缘系统情绪调控的重要核团。本实验旨在探究 PVT^{Glu}-BNST 通路在慢性炎性痛模型所致疼痛及其相关焦虑样行为中的作用及其可能机制。

方法 通过使用完全弗氏佐剂（Complete Freund's adjuvant，CFA）诱导建立慢性炎性痛模型，将小鼠随机分为对照组（saline）和 CFA 组。采用 von Frey 实验和 Hargreaves 实验评估小鼠痛阈值，旷场实验与高架十字迷宫实验观察小鼠焦虑样行为表现；采用免疫荧光 c-Fos 染色以及在体光纤记录钙信号反映 PVT 神经元的活性变化情况；采用光遗传、化学遗传技术调控神经元活性后，观察其对小鼠疼痛及相关焦虑样行为的影响；采用药理学方法，观察在 BNST 给予催产素后对小鼠疼痛

及相关焦虑行为的影响；采用在体光纤成像技术观察疼痛刺激以及焦虑样情绪状态下小鼠 BNST 区催产素的浓度变化情况。

结果 1.免疫荧光和在体钙成像结果提示，慢性疼痛引起 PVT 谷氨酸能神经元兴奋性升高。

2.化学遗传学抑制 PVT 谷氨酸能神经元，可缓解 CFA 小鼠痛觉过敏和焦虑样行为；而化学遗传学兴奋 PVT 谷氨酸能神经元，使正常小鼠出现痛觉过敏和焦虑样行为。

3.光遗传、化学遗传抑制 PVT^{Glu}-BNST 神经通路可有效缓解 CFA 小鼠的痛觉过敏和焦虑样行为；而光遗传、化学遗传兴奋 PVT^{Glu}-BNST 通路后，正常小鼠的痛阈值下降及产生焦虑样行为。

4.在体光纤成像实验结果显示，在疼痛刺激和焦虑样情绪状态下 BNST 催产素浓度升高；BNST 脑区微量注射催产素后，小鼠痛阈值下降并出现焦虑样行为。

结论 慢性疼痛导致 PVT 谷氨酸能神经元兴奋，PVT 谷氨酸能神经元通过支配 BNST 神经元参与慢性炎性痛及其相关焦虑的调控，BNST 脑区中的催产素可能参与了疼痛及其相关焦虑样行为的调控。

PO-0150

下丘脑室旁核星形胶质细胞谷氨酸摄取功能障碍参与慢性胰腺炎的疼痛和共病性焦虑

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目的 慢性胰腺炎是一种复杂的纤维炎性综合征，涉及胰腺炎症的反复发生，导致显著的纤维化组织形成。大约 80%-90%的慢性胰腺炎患者的主要症状是上腹痛。这种疼痛通常被归类为中度至重度内脏疼痛，通常伴有焦虑症状。剧烈疼痛影响 CP 患者的生活质量，是入院的主要原因，造成了巨大的经济负担。然而，临床药物和侵入性治疗方法对慢性胰腺炎疼痛的治疗效果仍然有限，有一部分原因归结为 CP 疼痛的潜在机制尚不清楚。本研究旨在确定下丘脑室旁核（PVH）星形胶质细胞（星胶）在慢性胰腺炎疼痛中的作用，为减轻慢性胰腺炎疼痛提供新的治疗靶点。

方法 本研究通过反复腹腔给药雨蛙素诱导腹腔内脏疼痛，建立小鼠 CP 模型。通过腹部机械刺激、旷场和高架迷宫等行为学实验评估慢性胰腺炎小鼠内脏疼痛和焦虑。通过在体光纤钙成像，脑片钙成像、电生理和免疫荧光染色等实验研究 CP 疼痛潜在的机制。

结果 1. 慢性胰腺炎小鼠表现出长期的腹部机械异常性疼痛和共病性焦虑，并伴有 PVH 星胶增生，表现为星胶 GFAP 表达增多、Ca^{2+}升高。

2.PVH 中星胶异常的 Ca^{2+}信号与慢性胰腺炎小鼠腹部疼痛、焦虑以及 PVH 中谷氨酸能神经元（VGLUT2PVH）异常兴奋有关。具体来说，抑制 PVH 星胶 Ca^{2+}信号可以缓解慢性胰腺炎小鼠疼痛和焦虑并逆转 VGLUT2PVH 异常兴奋。

3.星胶介导的慢性胰腺炎诱导疼痛的关键分子机制涉及星胶谷氨酸转运蛋白-1（GLT-1）。慢性胰腺炎小鼠 PVH 中的 GLT-1 较正常小鼠表现出明显的缺陷。激活 GLT-1 可减少慢性胰腺炎小鼠的腹部异常性疼痛和焦虑，逆转 VGLUT2PVH 异常兴奋，并且抑制 PVH 星胶 Ca2+

结论 本研究表明，PVH 中星胶谷氨酸摄取功能失调导致慢性胰腺炎小鼠内脏疼痛和焦虑样行为。并且我们强调了，GLT-1 可能作为慢性胰腺炎患者慢性疼痛的潜在治疗靶点。

PO-0151

基于 LC-MS/MS 技术和电子舌技术分析蒙药烘草乌-诃子药对中发挥抗炎镇痛作用的成分

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目的 目前全球人口逐渐步入老龄化，神经病理性疼痛(neuropathic pain, NP)的发病率也逐年增加，患者表现为剧烈难忍的疼痛且经常伴随有焦虑、抑郁、睡眠障碍等症状。而该病发病机制复杂，现有的治疗手段疗效不稳定且难以长期维持。因此，目前 NP 治疗关注重点已转向兼顾有效性和安全性的天然植物源性镇痛药物。蒙药草乌具有镇痛、抗炎、抗氧化等作用。生草乌中含有剧毒，所以需炮制后才能入药。诃子中的鞣酸类成分可以发挥减毒作用。所以我们先对生草乌进行烘制解毒，再把诃子与烘草乌配伍制成烘草乌-诃子药对。我们的前期研究显示其可以有效改善大鼠神经病理性疼痛，然而其中发挥抗炎镇痛作用的成分尚不明确，所以我们对蒙药烘草乌-诃子药对进行 LC-MS/MS 分析，探索其发挥抗炎镇痛作用的成分。并用水煮法和超声法对药物经行处理，用电子舌分析两种处理方法的差别。

方法 LC-MS/MS 分析：取适量药粉置于离心管（1.5 mL）中，加入 1 mL 甲醇水溶液，涡旋混合，水浴超声 30 min，16000 g 4℃离心 10 min，取上清液真空冻干，在冻干样品中加入 40%甲醇水溶液，涡旋混合，16000 g 4℃离心 15 min，取上清液，即得烘草乌-诃子药对样品。精密吸取样品 2 μL，LC-MS 进样分析，烘草乌-诃子药对样品重复进样 5 次。

电子舌分析：样品分组：超声法处理组：CY 组和水煮法处理组： SY 组

超声法处理组：精密称取 5.00 g 药粉置于锥形瓶中加 100 mL 去离子水，超声浸提 30 min，过滤得 50 mg/mL 样品液。

水煮法处理组：精密称取 5.00 g 药粉置于锥形瓶中加 100 mL 去离子水，回流提取 30 min，过滤得 50 mg/mL 样品液。

电子舌测定：每份样品检测 120 s，重复检测 3 次，测试结果取均值

结果 在烘草乌-诃子药对样品正、负离子基峰色谱图（Base peak chromatogram，BPC）中，共标记出 42 个色谱峰，其对应的化合物包括草乌中发挥镇痛抗炎作用的乌头原碱、苯甲酰新乌头原碱、苯甲酰乌头原碱、苯甲酰次乌头碱和诃子中发挥减毒作用的鞣花酸、没食子儿茶素没食子酸酯。在对 CY 组和 SY 组进行电子舌分析后，发现两种方法处理后的样品溶液没有苦味、鲜味、涩味、回味、酸味上的差异。

结论 烘草乌-诃子药对中没有检测出剧毒性的双酯型乌头碱，检测出了发挥镇痛抗炎作用的弱毒性的乌头原碱、苯甲酰新乌头原碱、苯甲酰乌头原碱、苯甲酰次乌头碱。为 NP 的治疗提供新的途径。用超声法和水煮法处理药物无差别，为后续实验中药粉的加工处理提供理论基础。

PO-0152

The role and mechanism of estrogen receptor GPR30 in opening the spinal Gly-PKCγ allodynia gate

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Pain is an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage. Among all kinds of chronic pain, neuropathic pain is characterized by severe symptoms with few effective therapeutic treatments. Allodynia, which refers to pain induced by non-nociceptive stimuli is a typical symptom of

neuropathic pain that allows the exploration of the mechanisms of pathological pain. The spinal cord, as a relay station for pain transmission, plays a crucial role in the regulation of pain. Based on the Gate control theory of pain，Lu Yan et al. found that there is an “allodynia gate” in the spinal dorsal horn, in which the PKCγ positive neurons were innervated by both excitatory Aβ fiber inputs and inhibitory interneuron inputs, and formed a glycinergic feed-forward inhibitory circuit that functions as a gate control to separate the innocuous mechanoreceptive pathway and the nociceptive pathway. Under the condition of peripheral nerve injury, disruption of this circuit has the potential to elicit mechanical allodynia. However, the molecular mechanism of neuropathic allodynia has been a mystery.

Estrogen receptors are widely distributed in the central nervous system. As an important neuromodulator throughout the body, the effect of estrogen on synaptic plasticity in the brain has been extensively studied in the cognitive domain, and synaptic plasticity also serves as a key element of pathophysiological alterations that contributes to chronic pain formation. Estrogen has been proven to play an important role in pain regulation, but its exact role remains elusive yet. Effects of estrogen in spinal cord has been reported to depend on their immediate local production by the enzyme aromatase. Zhang Yuqiu et al. found that spinal administration of 17β-estradiol (E2), the most potent natural estrogen, evoke remarkable allodynia and thermal hyperalgesia without significant sex difference. They also confirmed that E2 can change synaptic transmission through the non-genomic action in the spinal dorsal horn to modulate pain perception. Evidence has shown that GPR30 is the key receptor to exert a rapid effect on the development of pain in different ways. However, the specific circuit associated with its pain modulation function in the spinal cord has not been elucidated.

In the present study, we utilized multiple techniques to explore the role and mechanism of GPR30 in the formation of allodynia after nerve injury and reveal how the “allodynia gate” opens, which contributes to comprehensively understanding neuropathic pain. It also provides the structural and functional foundation for developing new drugs targeting chronic pain management.

Objective To detect the changes of estrogen and its receptor GPR30 after injury and investigate the function of GPR30 in pain modulation within the spinal cord. Then clarify the role of GPR30 on different types of neurons in the development of allodynia and elucidate the mechanism of GPR30-induced allodynia in the spinal dorsal horn.

Methods

1. To detect the changes of estrogen and its receptor GPR30 after successfully establishing SNI model, ELISA, western blot and immunofluorescence were performed. Besides, to explore the function of GPR30 in the spinal cord, behavioral pain measurement was conducted after activating or inhibiting GPR30 by intrathecal injection of agonist G1 or antagonist G15.
2. To clarify the role of GPR30 on different types of neurons in the development of allodynia, series of transgenic mice combined with Cre-dependent virus were used to specifically knock down GPR30 receptors on different types of neurons followed by pain-related behavior measurement.
3. To elucidate the mechanism of GPR30-induced allodynia in the spinal dorsal horn, electrophysiology was used to analyze the changes of sIPSC in PKCγ neurons after activation or inhibition of GPR30 on inhibitory neurons. To reveal the downstream molecular mechanism of GPR30-induced allodynia, K+ and Ca2+ channels were regulated and its effect on the function of GPR30 was estimated.

Results

1. SNI model was successfully established, which mice developed stable punctate and dynamic allodynia after SNI. Immunofluorescence image showed that aromatase in neurons of spinal dorsal horn increased significantly from 3 days after injury and ELISA results showed that E2 increased after nerve injury and maintained for more than 14 days; All the immunofluorescence, ELISA and western blot results showed that GPR30 increased in the spinal dorsal cord after nerve injury. After intrathecal injection of G1, the PWMT of mice was significantly decreased around 30 min; After intrathecal injection of G15, the PWMT was significantly increased from 5 to 25 min compared with the control group, and the effect lasted for about 30 min, too.
2. GPR30s are largely expressed on glycinergic, GABAergic and glutamatergic neurons in the spinal dorsal horn with similar proportions and largely increased after nerve injury. Knocking

down GPR30 on GABAergic neurons relieved mechanical allodynia, while knocking down GPR30 on glycinergic neurons alleviated both mechanical allodynia and thermal hyperalgesia. Interference GPR30 on Glutamatergic neurons have no effect on pain.
3. The frequency of Gly-sIPSC recorded on PKCγ neurons was decreased significantly after perfusion of G1 without amplitude change, and the effect was reversed by G15. Perfusion of 4-AP significantly increased the frequency of Gly-sIPSC on PKCγ neurons and reversed the effect of G1. No significant change was detected in Gly-sIPSC on PKCγ neurons after blocking the L-type Ca2+ channel, however weaken the effect of 4-AP on Gly-sIPSC.
Conclusion After nerve injury, the synthesis of E2 in the spinal dorsal horn was increased, activating the GPR30 on inhibitory neurons, followed by activation of Ca2+ channel, and then the calcium dependent K+ channel. The process resulted in hyperpolarization of Gly neuron and decreased Glycine release. Finally, PKCγ neurons were disinhibited, and allodynia was formed.

PO-0153

星形胶质细胞形态调节在慢性疼痛中的作用研究

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目的 揭示 NFAT5 介导的细胞肿胀机制在调控星形胶质细胞形态变化和神经病理性疼痛中的作用，进一步探讨星形胶质细胞形态复杂性对于类淋巴功能障碍以及慢性疼痛继发抑郁的影响。
方法 （1）通过共聚焦三维重建和透射电镜检测外周神经损伤后脊髓背角中星形胶质细胞的肿胀变化。随后通过基因敲减或药理学抑制脊髓中的 NFAT5 信号传导，明确 NFAT5 在神经病理性疼痛和星形胶质细胞肿胀中的调控作用。（2）结合 RNA-seq 和 ChIP-seq 分析，探索并验证了 NFAT5 调控星形胶质细胞肿胀的下游靶基因。随后通过蛋白质体外磷酸化实验以及蛋白降解实验，明确上游蛋白激酶 AURKB 对于 NFAT5 的翻译后修饰调控过程。（3）通过共聚焦三维重建、透射电镜、荧光示踪等方法明确外周神经损伤后大脑中星形胶质细胞的形态复杂性变化以及类淋巴功能受损情况。（4）通过代谢组学测序、体外尿素补充、原代细胞培养等方法探索类淋巴功能障碍所导致的尿素蓄积对于慢性疼痛继发抑郁的影响以及 A2aR 信号通路对于星形胶质细胞的形态复杂性以及类淋巴功能的调控作用。
结果 （1）外周神经损伤会诱导脊髓背角中星形胶质细胞肿胀变化，抑制脊髓中的 NFAT5 信号传导可特异性缓解星形胶质细胞肿胀以及慢性疼痛症状。(2)NFAT5 正向调节其下游靶标 AQP4 的转录。抑制 NFAT5-AQP4 信号通路可缓解星形胶质细胞肿胀以及慢性疼痛症状。蛋白激酶 AURKB 介导 NFAT5 磷酸化，促进其蛋白稳定性和核表达，正向调节 NFAT5 以及其下游靶蛋白 AQP4 的表达。（3）外周神经损伤诱导小鼠大脑中星形胶质细胞形态复杂性降低，导致大脑类淋巴功能显著受损，进一步促进尿素在大脑中蓄积，引发小鼠焦虑抑郁样行为的发生发展。（4）抑制原代星形胶质细胞 A2aR 信号通路可恢复星形胶质细胞的形态复杂性。
结论 形态重塑是慢性疼痛中星形胶质细胞的一个重要病理现象。周围神经损伤导致脊髓背角星形胶质细胞肿胀，这一过程受 NFAT5-AQP4 信号通路调控，最终导致神经病理性疼痛。由星形胶质细胞 A2aR 介导的星形胶质细胞形态复杂性的降低可能会导致大脑类淋巴系统功能障碍，继而导致慢性疼痛继发抑郁的发生发展。

PO-0154

The Role and mechanism of Cannabinoid 1 Receptors in the Ventrolateral Periaqueductal Gray in Mediating Sex-specific Analgesia in Mice

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Aim: The prevalence of chronic pain is rapidly increasing, which seriously endangers the physical and mental health of people. Although many drugs have been developed to treat pain, the clinical efficacy was still not satisfactory and gender has become an unavoidable factor. Sex difference in analgesic effects has gradually attracted public attention in clinical and pre-clinical studies. At all times and in all over the world, cannabinoid has made breakthrough progress in the treatment of pain. Among them, chronic pain is the most common indication for the application of cannabis in states with medical cannabinoid projects in the United States. Females are more sensitive to cannabinoid antinociception than males in both animals and humans. However, the mechanism of sex-specific analgesia of cannabinoid is still unknown. Cannabinoid 1 receptor (CB_1R) is the most important receptor of exogenous and endogenous cannabinoid, which is widely distributed in the central nervous system. Periaqueductal gray (PAG), its descending projection to RVM and spinal dorsal horn (PAG-RVM-SDH) circuit constitutes the most classic descending pain regulation system and is the key pathway of endogenous analgesia system. As the key node of this descending inhibitory integration, ventrolateral periaqueductal gray (vlPAG) plays a vital role in the endogenous analgesia of cannabinoid through activating CB_1R. In addition, vlPAG is also regulated by the important brain regions such as upstream medial prefrontal cortex (mPFC). Although the function of the endocannabinoid system has been explored in central nervous system in both male and female mice. The CB_1R in the vlPAG and mPFC has been demonstrated to participate in antinociceptive effect. However, it is still unclear whether there are sex differences of cannabinoid analgesia and cell type- and sex-specific patterns of vlPAG and mPFC CB_1R expression which affect analgesia.
Methods: In the current study, we firstly used pain behavior test, pharmacology, immunohistochemistry and fluorescence in situ hybridization (FISH) to detect whether there exists sex difference of pain behavior after CCI, there is sex difference in regulating CB_1R in vlPAG and there are cell type- and sex-specific patterns of vlPAG CB_1R expressions. Secondly, we used transgenic mice combined with virus injection and chemogenetic techniques to verify the cell type- and sex-specific patterns of vlPAG CB_1R expression from behavioral aspect. Then, we used the virus tracing combined with optogenetics to detect the sex difference of CB_1R expression from the synapse aspect. Finally, we used the similar method to detect whether there is sex difference of CB_1R on mPFC-vlPAG pathway.
Results: These results suggest that there were no significant differences between male and female mice in normal and neuropathic pain condition in WT mice and that CB_1R in vlPAG are likely to be involved in sex differences in cannabinoid-induced analgesia; Specific knockout of CB_1R on GABAergic neuron not glutamatergic CB_1R in vlPAG produced more severe mechanical allodynia in female mice and ruled out the possibility that GABAergic neurons themselves in female and male mice mediating cannabinoid-induced sex difference in analgesia. These findings suggest that sex specific GABAergic CB_1R expression may play a key role in mediating cannabinoid-induced sex difference in analgesia; Activation of CB_1R in the GABA-vGlut2 inhibitory circuit within vlPAG resulted in vGlut2-positive neurons receiving less GABAergic inhibitory components and being relatively more excitable. Hence, the sex-specific CB_1R expression on GABAergic neuron within vlPAG did produce more pronounced presynaptic inhibition in females, resulting in vGlut2+ output neurons within vlPAG more excitable and thus producing a more potent analgesic effect; The retrograde projection of $GABA^{vlPAG}$ into the mPFC

is predominantly CaMKIIα^{+} excitatory neurons and abundant CB_1Rs were distributed in the CaMKIIα^{mPFC}-GABA^{vlPAG} circuit. Activation of CB_1R on this circuit reduced excitatory synaptic responses to the GABAergic neurons in vlPAG. Finally, CaMKIIα^{mPFC}-GABA^{vlPAG} and GABA^{vlPAG}-vGlut2^{vlPAG} inhibitory circuit synergistically promote the analgesia effects of cannabinoids.
Conclusions: Revealing sex differences in cannabinoid-mediated analgesia can provide a structural and functional basis for exploring more specific therapeutic approaches for chronic pain in females.

PO-0155

中国老年患者术后谵妄的流行病学特征及危险因素分析

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目的 术后谵妄（postoperative delirium，POD）是老年患者最常见的术后并发症，严重影响患者的预后。随着老龄化进程的加剧，术后谵妄已带来一系列经济学和社会学问题，对医疗卫生系统构成了重大挑战。我国人口基数大，临床数据庞杂，相关的流行病学研究较少，结论仍需完善。本研究基于中国老年患者围手术期临床大数据平台前瞻性数据库，对老年患者术后谵妄的临床流行病学特征及危险因素展开分析，以期为临床医生提供更多关于老年患者术后谵妄的信息，为国内后续开展老年患者术后谵妄的临床研究提供可靠的流行病学依据。
方法 在这项多中心观察性横断面研究中，分析了 2020 年 4 月至 2022 年 4 月来自中国大陆 10 个省/地区的 19 个研究中心前瞻性收集的数据。使用意识模糊评估法（Confusion Assessment Method，CAM）诊断术后谵妄，普通病房患者使用 3D-CAM 量表，重症监护室（Intensive Care Unit，ICU）患者使用 CAM-ICU 量表。入组的老年患者需在术后第 1-5 天及第 7 天共完成 6 次谵妄评估，完整记录术后谵妄的发作时间及发作情况。该研究共提取 4 类 27 个与老年患者术后谵妄可能相关的变量，分类变量以个数（百分数）表示，组间比较采用卡方检验或 Fisher 精确检验。连续变量以均数（标准差）和中位数（四分位数间距）表示，组间比较采用 t 检验或 Mann-Whitney U 检验。$P < 0.05$ 被认为差异具有统计学意义。
结果 本研究共纳入 9225 例患者，其中 1139 例患者发生术后谵妄，总体发病率为 12.35%。术后谵妄在中国不同地区的发病率差异明显，北部地区术后谵妄发病率最高为 13.96%，东部地区术后谵妄发病率最低仅为 4.24%。谵妄人群与非谵妄人群间在年龄、性别、文化程度、美国麻醉医师协会（American Society of Anesthesilogists，ASA）分级、手术等级、手术时长、术中出血量以及手术科室变量间存在统计学差异，$P < 0.05$。肝胆外科患者术后谵妄的发生率最高，为 20.28%，接受胰十二指肠切除术、肝切除术、结肠切除术、部分或全胃切除术的老年患者，谵妄的发生率均高于 15%，属于术后谵妄的高风险人群。术后谵妄在术后三天内发作的比例占到了 88.76%，3 天后每日的发病率已低于 2%，超过 30%的患者会出现 2 次以上的谵妄。在谵妄人群中术后疼痛、术后肺部并发症、非心脏手术后心肌损伤、急性肾损伤、术后感染、术后卒中、以及术后 30 天内死亡的发生率均高于非谵妄人群。目前，临床中仅有不到 1%的谵妄患者接受了治疗。
结论 我国老年患者术后谵妄的总体发病率为 12.35%，在不同地区间存在明显的差异，整体呈现出北部地区高于南部地区，西部地区高于东部地区的趋势。术后谵妄的发生可能与年龄、性别、文化程度、ASA 分级、手术等级、手术时长、术中出血量以及手术科室等因素有关。接受胰十二指肠切除术、肝切除术、结肠切除术、部分或全胃切除术的老年患者是术后谵妄的高危人群。绝大比例的谵妄出现在术后 3 日内，接近 1/3 的患者可出现多次谵妄发作。老年患者术后谵妄与多种术后不良结局相关，但实际仅有极少患者接受了治疗。因此，老年患者术后谵妄应引起医务人员更多的重视。

PO-0156

Effect of the menstrual cycle on postoperative nausea and vomiting following gynecologic laparoscopy

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Background Postoperative nausea and vomiting (PONV) commonly occurs after laparoscopy and may be associated with adverse patient outcomes. Female sex is widely recognized as the most reliable predictor of PONV.
Methods This single-blind, prospective, cohort study examined whether menstrual cycle phase affected PONV in fertile women with regular menstrual cycles who underwent elective gynecologic laparoscopy. Patients were categorized into 3 groups based on the menstrual cycle phase at surgery: Group F: follicular phase (days 1-8); Group O: ovulatory phase (days 9-15); and Group L: luteal phase (day 16 to end of cycle). Visual analog scale (VAS) scores for PONV, the use of rescue antiemetics, and patient-reported VAS pain scores at 6, 12, 24, and 48 hours after surgery were recorded.
Results 255 patients were enrolled in the study. In all patients, PONV scores were highest in the first 6 hours after surgery. Mean PONV scores were significantly lower in Group L compared to Group F and Group O at each time point ($P<0.001$). Maximum PONV score ($P<0.001$), incidence of PONV ($P<0.001$), and antiemetic requirements during the 48-hour postoperative period ($P<0.05$) were significantly lower in Group L compared to Group O and Group F.
Conclusions This study showed that women in the luteal phase who underwent elective gynecologic laparoscopy under general anesthesia experienced lower severity and incidence of PONV compared to women in the follicular and ovulatory phases.

PO-0157

Relationship between neutrophil-to-lymphocyte ratio and postoperative pulmonary complications

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Background Postoperative pulmonary complications (PPCs) are a frequent occurrence following endotracheal intubation surgery under general anesthesia. The estimated incidence ranges from 2.0% to 5.6% in the general surgical population but can be as high as 20% to 70% in upper abdominal and thoracic surgeries. These complications are considered significant as they contribute to a poor prognosis. General anesthesia is the most commonly used method of anesthesia in all types of surgeries and tracheal intubation is often used in conjunction with it. Relevant studies have shown that PPCs are an important component of the risks associated with surgery and anesthesia as well as a cause of postoperative morbidity, mortality, and prolonged hospital stay. therefore, it is significant to investigate the risk factors and the measurable biomarkers of postoperative pulmonary complications in patients who underwent endotracheal intubation for non-pulmonary surgery under general anesthesia.
The mechanisms of PPCs are complex and related to the patients, surgery, anesthesia, and postoperative period, which are often rooted in immune dysfunction leading to inflammation. In recent years, more attention has been paid to NLR as a potential novel index to study inflammation.NLR is the ratio of the neutrophils absolute value to the lymphocytes absolute value. since its proposal, NLR has been increasingly studied and is considered to be more reliable and

accurate than neutrophil or lymphocyte counts alone, as it combines intrinsic and adaptive immunity marker. NLR is also easily accessible, inexpensive, and harmless, making it widely used in the study of inflammation, sepsis, immunity, and infection, among other diseases.
The relationship between NLR and PPCs is currently unclear. This study aims to explore the relationship between NLR and PPCs risk in patients undergoing tracheal intubation under general anesthesia. Additionally, the utility of NLR in predicting PPCs risk will be investigated.
Methods A total of 565 non-pulmonary surgery patients who underwent general anesthesia tracheal intubation from March to April 2023 at the Second Affiliated Hospital of Nanchang University were included in this cross-sectional study. Continuous variables are expressed as mean ± standard deviation (SD) for normally distributed data, median of interquartile range for continuous variables for non-normally distributed data, and frequency percentages for categorical data. Independent two-sample t-tests for continuous variables and chi-square tests for categorical variables are chosen to assess the characteristics of PPCs.
Binary logistic regression analysis to determine the ratio (OR) and 95% confidence interval (CI) for NLR is used. Potential confounding variables included: Age, Gender, BMI, HB, FBS, eGFR, HF, HTN, Smoking, and Drinking。 The dose response of PPCs to NLR was assessed by RCS curves.
Subgroup analyses to detect the effect of each subgroup on the modification between NLR and PPCs are used, and a forest plot is applied to depict the adjusted OR and 95% CI. Subgroup analyses are based on the following variables: age (≤60 vs >60), Gender, BMI (<18.5, ≥18.5 and <25, ≥25 kg/m2), HB(≤90 vs >90g/L), FBS,(<7.0 vs ≥7.0 mmol/L), eGFR(<90 vs ≥90mL/min/1.73m2), HF(NO vs YES), HTN(NO vs YES), Smoking(NO vs YES), Drinking(NO vs YES). Based on previous studies, NLR is categorized into 3 groups: Group 1 (NLR ≤ 2), Group 2 (NLR > 2, ≤ 3), and Group 3 (NLR > 3). Subgroup analyses are compared with the combination of Group 1 and Group 3 in the NLR group to enhance statistical efficacy. The predictive performance of NLR for PPCs was determined by the receiver operating characteristic (ROC) curve and Area Under Curve (AUC). In this study, a two-sided p-value < 0.05 is considered statistically significant.
Results The incidence of PPCs in this study was 22.7%. In the fully adjusted model, there was a statistically significant association between NLR and PPCs (per 1 unit increment; odds ratios (ORs): 3.8; 95% confidence interval (CI) 2.6, 5.8). Compared with the lowest NLR group (G1: NLR ≤ 2), the highest NLR group (G3: NLR > 3) had an OR of 9.2 with a 95% CI of (4.1, 20.8). The RCS curves showed that the OR between NLR and PPCs was close to nonlinear (P nonlinear = 0.010), and the OR of NFLD doubled at TyG index levels around 5.211. In the predefined subgroups, all interactions were not significant (p interactions were all > 0.1).In the ROC curve, The area under the curve (AUC) of NLR wac5% CI 0.788, 0.873), sensitivity was 0.711, and specificity was 0.842. The optimal cut-off point of NLR was 5.211.
Conclusions In this study, NLR is found to be significantly and positively correlated with PPCs in non-pulmonary surgery patients intubated under general anesthesia.NLR may be a novel marker to predict PPCs in non-pulmonary surgery patients intubated under general anesthesia.

PO-0158

全身麻醉中不同瑞芬太尼停药方式对拔管期呛咳反应及苏醒质量的影响

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目的 比较全身麻醉中不同瑞芬太尼停药方式对拔管期呛咳反应及苏醒质量的影响。
方法 选择全身麻醉下行择期胃肠手术患者 120 例，年龄 18-65 岁，18.5≤BMI≤28kg/m^2，随机分为 A、B、C、D 组（n=30)。全部患者采用相同的全麻诱导及静吸复合麻醉维持方法，术中瑞芬太尼

维持在 0.05-0.1ug/kg/min。排除手术时间＜2h 或＞4h 患者。A 组患者手术结束时同时停止吸入七氟醚、停止输注右美托咪定和瑞芬太尼；B 组患者手术结束前 30min 停止吸入七氟醚、停止输注右美托咪定，手术结束时停止输注瑞芬太尼；C 组患者手术结束前 30min 停止输注瑞芬太尼，手术结束时停止吸入七氟醚、停止输注右美托咪定；D 组患者手术结束前 30min 停止吸入七氟醚、停止输注右美托咪定，并同时将瑞芬太尼调整至 0.2-0.25ug/kg/min,手术结束时停止瑞芬太尼输注；若患者手术结束前发生血压、心率异常、BIS 值＞60 或身体躁动，则分别给予相应血管活性药物或丙泊酚 50mg。记录所有患者手术结束前 30min 各组每 3min 的 BIS 值、手术结束后意识恢复时间、拔管时间、患者拔管期呛咳反应评分、躁动评分(RS)和拔管后 Ramsay 镇静评分(RSS)，手术结束前 30min 至拔除气管导管时阿托品、乌拉地尔和丙泊酚的总用量，以及在 PACU 的恶心呕吐发生率。
结果 B 组患者手术结束前 30min 每 3min BIS 值高于其他各组（P＜0.05）；D 组患者手术结束后意识恢复时间、拔管时间短于其他各组（P＜0.05）；D 组拔管期呛咳反应评分、躁动评分(RS)小于其他各组（P＜0.05）；D 组拔管后 Ramsay 镇静评分(RSS)大于其他各组（P＜0.05）；B 组手术结束前 30min 至拔除气管导管时丙泊酚用量大于其他各组（P＜0.05）；D 组手术结束前 30min 至气管导管拔除时乌拉地尔使用量少于 B 组（P＜0.05）；各组手术结束前 30min 至气管导管拔除时阿托品用量及在 PACU 的恶心呕吐发生率相似（P＞0.05）。
结论 手术结束前 30min，将瑞芬太尼调整至 0.2-0.25ug/kg/min，并停止其它全麻药物，与其他瑞芬太尼停药方式相比，可缩短患者苏醒及拔除气管导管时间，减少拔管期呛咳反应，维持苏醒期循环稳定，改善全麻苏醒质量。

PO-0159

The Effect of Inferior Vena Cava Collapsibility Index in Predicting Hypotension After Subarachnoid Anesthesia in Aged Patients: A Prospective Observational Case-Control Study

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Background Post subarachnoid anesthesia hypotension (PSAH) may cause severe complications in geriatric patients. Inferior vena cava collapsibility index (IVC-CI) serves as a dependable measure of volume status and fluid responsiveness and has been validated to predict hypotension following general anesthesia. However, its predictive value for PSAH in elderly patients remains uncertain.
Objective To discussed whether IVC-CI and IVC diameter can predict PSAH in geriatric patients.
Methods We performed a single-center, case-control study among 94 geriatrics ≥ 65 years old with ASA status of I~III underwent elective lower extremities arthroplasty under subarachnoid anesthesia. Heart rate (HR) and mean arterial pressure (MAP), as well as minimum and maximum IVC diameters (IVCmin and IVCmax), were measured before and 30 minutes after anesthesia. Patients experiencing a decrease in MAP ≥ 20% were categorized into the PSAH group, whereas those with smaller decreases were placed in the non-PSAH group.
Results PSAH appeared in 44.7% of the patients. IVCmin before anesthesia in PSAH group was significantly lower than that in non-PSAH group (P=0.002) whereas IVC-CI was significantly higher (P<0.001). IVC-CI was a risk factor of PSAH (OR=12.11, 95% CI: 3.69~39.74, P<0.001). Receiver operating characteristic curve (ROC) analysis showed that IVC-CI had sensitivity of 59.9% and specificity of 94.2% to predict PSAH at a cut-off point of 53.4%. The area under curve (AUC) was 0.769±0.053 (95% CI 0.665-0.874, P<0.001).

Conclusions IVC-CI can predict PSAH in geriatric patients, but the efficacy remains discussing. IVC-CI ≥ 53.4% is a risk factor of PSAH among patients ≥ 65 years old.

PO-0160

GLP-1 受体激动剂对 2 型糖尿病患者胃排空的影响：一项前瞻性队列研究

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目的 GLP-1 受体激动剂（GLP-1RAs）可以导致胃排空延迟，这可能在需要麻醉的手术患者中增加术中误吸的风险。有研究表明，GLP-1RAs 可能导致胃内残留物或胃食管反流。然而，关于 GLP-1RAs 对糖尿病患者在隔夜禁食后胃排空影响的证据仍然不足。
方法 我们在内分泌科进行了一项前瞻性队列研究，纳入 18-80 岁的 2 型糖尿病（T2DM）住院患者。根据是否使用 GLP-1RAs 将参与者分为两组：GLP1RA 组和非 GLP1RA 组。所有参与者均被要求隔夜禁食，至少禁食 2 小时清液和 8 小时固体食物。然后进行胃部超声检查，定性和定量评估胃内容物。主要结果是饱胃的发生率，定义为固体内容物或胃体积/体重（GV/kg）>1.5 mL/kg 的液体内容物。次要结果包括与饱胃相关的风险因素。
结果 共纳入 194 例 T2DM 患者。采用最近邻匹配方法配对分析了 53 对（106 例）。隔夜禁食后，GLP1RA 组的饱胃发生率为 62.26%，显著高于非 GLP1RA 组的 24.53%（P < 0.001）。胃部超声显示，GLP1RA 组中 60.38%的患者有固体胃内容物，而对照组则为 20.76%（P < 0.001）。在比较 Perlas 分级时，两组之间没有显著差异（P > 0.05）。多变量 logistic 回归分析显示，使用 GLP-1RAs 是唯一的饱胃风险因素，风险比为 7.18（CI：2.82 至 20.19，P < 0.001）。
结论 与未使用 GLP-1RAs 的患者相比，使用 GLP-1RAs 的 T2DM 患者在隔夜禁食后表现出更高的饱胃发生率。GLP-1RAs 主要影响固体食物的胃排空。

PO-0161

术中右美托咪定对老年患者胃肠道手术后神经系统并发症的影响：重度疼痛的中介效应分析

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目的 术后神经系统并发症的发生与不良预后相关，比如会延长住院时间、增加长期认知功能障碍，降低患者生活质量。疼痛是术后神经系统并发症的已知危险因素。围手术期镇痛不足或者过度使用阿片类药物都与术后神经系统并发症的发生高度相关。右美托咪定被广泛应用于手术患者的辅助镇静和镇痛。此外，先前的研究表明右美托咪定有神经保护作用，对减少神经系统并发症的发生有积极影响。然而，右美托咪定在胃肠道手术老年患者中的应用以及术后急性疼痛和术后神经并发症之间的关联尚不清楚。本研究的目的是评估术后严重疼痛在术中右美托咪定与老年患者胃肠道手术后神经并发症发生之间的中介效应。
方法 本研究数据来源于中国老年患者围手术期数据库，该数据库前瞻性纳入 19 个中心择期非心脏手术老年患者。本研究纳入标准为 1）行择期胃肠道手术；2）年龄≥65 岁；3）实施全身麻醉。排除标准为 1）手术期间仅接受椎管内麻醉；2）手术取消；3）术后结局指标缺失。根据手术期间是否使用右美托咪定分为右美托咪定组和非右美托咪定组。术后急性疼痛评估采用 0 至 10 的数字评

分量表（NRS）评估，术后重度疼痛定义为术后 7 天内疼痛严重程度 NRS 评分≥7 分。主要结局是术后 30 天内发生的神经系统并发症的发生率。次要结局是术后 30 天内发生的其他系统并发症。采用中介分析法研究术中右美托咪定、术后重度疼痛和神经系统并发症之间的关联。

结果 符合分析条件的患者共 1388 例，其中 333 例（24.0%）在手术期间接受了右美托咪定治疗。运用倾向评分匹配法均衡两组患者基线变量，匹配后每组各 333 例患者。术中右美托咪定对神经系统并发症的总效应具有统计学意义，系数为-0.067（95% 置信区间[CI]：-0.114 - -0.021，P ＜ 0.001）。重度疼痛中介的间接效应也具有统计学意义，系数为-0.009（95% CI：-0.015 - -0.002，P ＜ 0.001）。在考虑重度疼痛中介作用后，术中右美托咪定对神经系统并发症的直接效应仍具有统计学意义，系数为-0.059（95% CI：-0.109 - -0.014，P = 0.004）。重度疼痛中介的总效应比例为 13.0%（95% CI：3.0% - 42.3%）。

结论 术中给予右美托咪定与胃肠道手术老年患者的预后相关，包括减少术后神经系统并发症以及降低术后急性疼痛。术后重度疼痛可能在右美托咪定与神经系统并发症的关系中起到中介作用。有必要进一步研究这种中介作用的潜在机制，以指导临床干预措施，减少老年患者的术后神经系统并发症的发生。

PO-0162

基于 ePM/eP pod 的活动反馈对结直肠癌患者术后并发症的影响

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目的 探讨基于可穿戴设备(ePM/ep pod)反馈的活动激励能否降低结直肠癌（colorectal cancer，CRC）术后 30 天综合并发症指数 （Comprehensive Complications Index ,CCI ）。

方法 采用结局评估者盲的随机对照研究，纳入 216 名 CRC 手术患者，以 1:1 随机分为对照组及反馈组，所有受试者佩戴 ePM/ep pod 进行活动监测，并且活动时间被上传至中央站直到术后第四天或出院（以先到者为准）。制定如下目标活动时间：返回病房后，手术当天尝试坐起 5-6 分钟，术后 3 日依次活动 2、 4、6 小时。研究者每日分别于上午 9：00-11：00，下午 3：00-5：00 进行 2 次活动督促。试验组患者通过仪器的显示器接收当日运动时间的实时视觉反馈，医护人员在常规照护基础上结合 ePM/ep pod 反馈提醒患者进行活动。对照组患者设置其仪器的显示器（隐藏运动时间），未给出反馈，医护人员仅按照护常规鼓励患者进行活动。主要结局为术后 30 天的并发症，次要结局为术后前 3 日活动时间、数字等级评定量表(Numeric rating scale， NRS)评分，两组患者达到预定动员目标的百分比，术后住院时长，术后 30 天死亡率， 首次排气、排便时间。

结果 反馈组和对照组患者的基线变量分布均衡。对照组与反馈组术后 30 天 CCI 分别是 0(0-20.90)和 0(0- 12.20), P=0.655，敏感性分析结果一致。反馈组或对照组对 30 天 CCI 的影响与所有亚组变量之间无显著交互作用。次要结局方面：对照组与反馈组术后前 3 日活动时长依次为 105 (74-133) 与 114(65-131)分钟、174(117-225)与 183(134.5-229.5)分钟、201(132-248)与 195(125.8-260.5)分钟；术后住院时长为 4(3-5) 与 4(4-5)天；首次排气时间为 37.13(22.73-58.77) 与 38.29(22.15-57.49)小时；首次排便时间为 44.50(24.04-68.88) 与 45.13(25.81-67.44)小时，P 值均大于 0.05，两组每日活动达标百分比、不同时间点疼痛评分也没有统计学差异。 针对 CCI 与术后活动时长的探索性分析显示：术后活动是术后恢复的保护性因素，活动时间增加与 CCI 降低相关，215 分钟前运动时间越长，CCI 降低得越多； 215 分钟以后伴随活动时间延长，CCI 降低幅度下降。

结论 在 ERAS 背景下，基于可穿戴设备(ePM/ep pod)反馈的活动激励与对照组相比未能降低结直肠癌手术患者术后 30 天综合并发症指数。但是 ePM/eP pod 可准确记录活动时长，术后第 3 天活动时长与 CCI 负相关，在 215 分钟内活动时间增加可明显降低 CCI。

PO-0163

Effect of multidimensional carbohydrate drinks on postoperative thirst in patients with colonic submucosal dissection

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Objective To investigate the effect of multidimensional carbohydrate drinks (ability; size: 335ml) on postoperative thirst in patients with submucosal dissection (ESD) under general anesthesia.
Methods 120 patients underwent colon ESD under elective general anesthesia from September 2023 to May 2024, without gender limitation, age 18 to 75 years, BMI:18.0 to 30.0 kg / m^2, ASA grade I or Ⅱ grade, preoperative pathological diagnosis of colon cancer stage T 1 and without invasion. It was divided into 2 groups (n =60): postoperative drinking energy group (group O) and control group (Group C). All 2 groups were fasted for 8h before surgery and withheld for 2h. After colon ESD, the laryngeal mask was removed, the recovery score (Steward score) reached 6 points and the swallowing capacity recovered, group O could take 5 ml/kg orally, and Group C used a saline cotton swab to wet the mouth. The st score, static saliva flow rate, the incidence of saliva, saliva pH, lip mucosal moisture, oral comfort, and postoperative adverse effects were measured 10min (T0) before anesthesia, laryngeal mask (T1), postoperatively 30min (T2) and 3 days (T3).
Results Compared with group C, there was lower thirst rate, higher static saliva flow rate and higher oral comfort score in group O during T2 (P <0.05).
Conclusion It can safely and effectively relieve the postoperative thirst symptoms in patients with transcolonoscopy colon submucosal dissection (ESD) under general anesthesia.

PO-0164

围术期 β 受体阻滞剂对结直肠癌患者术后并发症的影响：一项倾向评分匹配研究

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目的 采用倾向评分匹配研究方法，回顾性分析围术期使用 β 受体阻滞剂对结直肠癌患者术后 30 天内并发症发生率的影响。
方法 选取福建医科大学附属协和医院 2019 年 9 月 1 日至 2021 年 9 月 30 日 18 岁或以上接受结直肠癌根治术的患者。排除以下患者：良性肿瘤、非根治性手术、术前入住 ICU、临床资料不完整、TNM 分期未确定。按照围术期是否使用 β 受体阻滞剂分为: β 受体阻滞剂组 121（6.3%）例和非 β 受体阻滞剂组 1769（93.6%）例。使用 β 受体阻滞剂患者采用最近邻匹配法与非 β 受体阻滞剂患者按 1：3 的比例进行倾向评分匹配（PSM），卡钳值等于 0.2，比较匹配后组间在总并发症的发生率和各并发症的发生率。
结果 在匹配前，我们发现围术期使用 β 受体阻滞剂患者年龄较大，总体健康状况较差（ASA 分类、TNM 分期较高），合并基础疾病几率较高，β 受体阻滞剂组的 BMI 高于非 β 受体阻滞剂组。此外，使用 β 受体阻滞剂患者更有可能经历剖腹手术和更多的输液量。经过匹配后，两组间的所有变量均达到平衡状态（SMD<0.1）。在匹配前队列中，使用 β 受体阻滞剂组患者的总并发症发病率风险增加（45.5% vs. 35%，OR 1.548,95%CI 1.068–2.243，P=0.02）。次要结果中，术后死亡（4/1770 vs. 0/121）和非计划外二次手术（12/1770 vs. 1/121）由于其发生率低失去组间比较的

可能性。同时，β 受体阻滞剂组的术后转 ICU 比例比非 β 受体阻滞剂组更高（ 12.4% vs. 5.4%，OR 2.579,95%CI 1.444–4.607，P<0.001）。两组间其他并发症的发生率差异无统计学意义。在匹配后人群中，β 受体阻滞剂组与非 β 受体阻滞剂组之间的主要发病率无统计学差异（OR 1.145,95% CI 0.747–1.753，P=0.535）。同样，在次要结局中，各短期并发症和术后转 ICU（OR 0.792，95%CI 0.411-1.527，P=0.485）没有统计学意义，术后死亡和非计划外的二次手术的发生率仍然无法比拟（表 3）。敏感性分析中，匹配前队列单因素回归分析围术期使用 β 受体阻滞剂与术后短期总并发症独立相关，然而经过年龄、性别、ASA、BMI、手术时长、手术方式、肺部合并疾病、糖尿病和高血压调整后，围术期使用 β 受体阻滞剂与术后短期总并发症并不独立相关（OR 1.163,95% CI 0.776–1.743，P=0.464），这与之前的 PSM 分析一致，表明了我们研究的稳健性（表 4）。

结论 接受结直肠癌根治手术的患者围术期使用 β 受体阻滞剂对术后第 30 天内并发症发生率没有影响，鉴于回顾性研究的缺陷，针对此类患者大样本随机对照研究有必要进一步实施。

PO-0165

Effect of Modified Endotracheal Intubation Protocol Combined with Early Oral Intake on Postoperative Recovery Quality in Thyroid Surgery at A Tertiary Hospital in China: A Randomized Controlled Trial.

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Background To investigate the effect of modified intubation protocol of nerve monitoring endotracheal tube (ETT) combined with early oral intake (EOI) on postoperative recovery quality in thyroid surgery through a randomized controlled study.
Materials and methods: This study was a prospective, single-center, 2×2 factorial, randomized controlled trial. We recruited patients who received thyroid surgery under intraoperative nerve monitoring at Peking Union Medical College Hospital. Eligible patients were randomly divided into two groups, which received either the modified intubation protocol of nerve monitoring ETT (M group), or conventional intubation protocol of nerve monitoring ETT (C group). After patients entered postanesthetic care unit and Steward scores ≥ 4, they were randomly divided into two groups again, which received EOI (E group) or 6-hour oral intake (D group). Patients were followed up during hospitalization, and Quality of Recovery−15 (QoR-15) scores, patient satisfaction, the postoperative pain (including incisional pain and sore throat, assessed by visual analogue scale), the postoperative discomfort (including thirst, hunger, assessed by numeric rating scale), intubation time and endotracheal intubation readjustment rate, gastrointestinal recovery time, drainage volume, postoperative hospital stay length, adverse events were collected and analyzed. The mean QoR-15 scores on the first day after surgery (T1) were regarded as primary outcome.
Results 200 patients were enrolled totally. Compared with Group C, there was no significant difference in QoR-15 scores on T1 in Group M (Mean difference: 1.4; 95% CI: -2.5~5.3), but the time for intubation was shorter (Median difference: -13.0s; 95% CI: -24.0~-3.0) and the incision pain and sore throat before oral intake were milder (Median difference:-0.8; 95% CI: -1.1~-0.1; Median difference: -0.9, 95% CI: -1.2~-0.2). Compared with group D, there was no significant difference in QoR-15 scores on T1 for patients in group E (Mean difference: 0.0; 95% CI: -3.9~3.9), who had more severe sore throat (Median difference: 0.6; 95% CI: 0.0~1.1) but less thirst and hunger before oral intake (Median difference: -1.0; 95% CI: -1.0~0.0; Median difference: -1.0, 95% CI: -2.0~-1.0). There was no significant interaction effect between intubation protocol and postoperative oral intake strategy on primary outcome (F=0.119, p=0.730).

Conclusion In this randomized controlled study, the modified intubation protocol of nerve monitoring ETT, EOI, and the combined use of them did not show a significant impact on the postoperative recovery quality of thyroid surgery patients. However, the modified intubation protocol of nerve monitoring ETT might have a positive effect on shortening the intubation time and alleviating early postoperative pain, and early oral intake could alleviate the discomfort of long-term fasting after surgery.

PO-0166

神经外科患者术后肺部感染病原菌及影响因素

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目的 探讨气管插管全身麻醉的神经外科患者术后肺部感染病原菌、耐药性以及相关因素，了解此类患者术后肺部感染的发生现状，以提出合理的防控措施，并为围术期管理提供参考。
方法 回顾性分析 2023 年 1 月-2023 年 11 月行气管插管全身麻醉的神经外科手术患者的临床资料，对存在肺部感染临床症状的患者按照临床微生物学检验标本采集和转运行业标准（WS/T640-2018）留取痰培养标本，统计术后肺部感染发生情况。采用 SPSS26.0 软件进行统计学分析。WHONET5.6 软件对药敏试验结果进行分析。通过单因素及多因素 Logistic 回归分析神经外科手术患者术后肺部感染的影响因素。
结果 2094 例神经外科手术患者中术后肺部感染患者共 216 例，感染率为 10.32%。颅脑损伤和脑血管疾病患者 PPI 发生率最高，分别为 24.05%和 20.33%。感染患者共培养分离病原菌 420 株，革兰阴性菌 376 株（89.52%），以肺炎克雷伯菌、鲍曼不动杆菌、铜绿假单胞菌为主。革兰阳性菌 44 株（10.48%），以金黄色葡萄球菌和肺炎链球菌为主。主要革兰阴性菌肺炎克雷伯菌、鲍曼不动杆菌、铜绿假单胞菌对亚胺培南/美罗培南的耐药率分别为 11.33%、91.87%、20.51%，对头孢哌酮/舒巴坦的耐药率分别为 13.21%、49.44%、16.13%。耐甲氧西林金黄色葡萄球菌（Methicillin Resistant Staphylococcus aureus,MRSA）检出率为 15.0%，未检出对万古霉素耐药的菌株。单因素分析结果表明，性别、年龄、高血压、脑卒中、ASA 分级、急诊手术、手术时间、术中输血、多次神外手术、术毕保留气管导管、气管切开、留置胃管贫血、低蛋白血症、肝功能异常、电解质紊乱、下肢静脉血栓等 17 个因素与神经外科全麻手术患者发生肺部感染显著相关（P<0.01）。糖尿病与神经外科全麻手术患者发生肺部感染无关（P>0.05）。多因素 Logistic 回归分析结果显示气管切开、留置胃管、低蛋白血症是神经外科手术患者术后肺部感染的独立危险因素（P<0.05）。
结论 神经外科术后肺部感染病原菌以革兰阴性菌为主，其发生与气管切开、留置胃管、低蛋白血症密切相关，临床医师应重视该类患者，预防和控制术后肺部感染。

PO-0167

Enhanced Postoperative Outcomes with Innovative Open-Lung Anesthesia: A Randomized Trial on Laparoscopic Colorectal Surgery

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Importance: Postoperative pulmonary complications (PPCs) constitute a significant concern in the perioperative scenario, ranking as the second most frequent type of complications. Colorectal cancer (CRC) ranks the third in incidence and second in mortality on a global scale among all cancers. Laparoscopic surgery has emerged to be the primary surgical approach of CRC and made PPCs especially common in patients after operations. Though the risk factors are still not completely revealed, PPCs can potentially be mitigated with specific anesthesia approaches. The efforts on finding efficient individualized lung-protective ventilation techniques in preventing PPCs in abdominal surgery have yet to converge on a consensus.
Objective We evaluated an innovative anesthesia protocol, the Open-lung approach with Deep neuromuscular blockade (NMB) and Low pneumoperitoneum pressure (PnP) (ODL), versus traditional protective ventilation in preventing PPCs post laparoscopic colorectal surgery.
Design: This randomized, controlled, parallel-group study ran from January to May 2023, with a 30-day postoperative follow-up.
Setting: The study was conducted at a single-center, the National Cancer Center/National Clinical Research Center for Cancer/Cancer Hospital of the Chinese Academy of Medical Sciences, Beijing, China.
Participants: The study initially included 152 adult colorectal cancer (CRC) patients, aged 18-80, scheduled for laparoscopic surgery and exhibiting intermediate to high PPC risk as determined by the Assess Respiratory Risk in Surgical Patients in Catalonia (ARISCAT) model. However, after excluding 32 patients due to ineligibility, the final cohort comprised 120 participants. The follow-up was completed on May 31, 2023.
Interventions: General endotracheal anesthesia was induced using a combination of intravenous propofol, sufentanil, and rocuronium. Anesthesia maintenance was achieved with the administration of sevoflurane, remifentanil and/or sufentanil, and rocuronium. Participants were randomly assigned to either the ODL Group (open-lung approach [tidal volume of 6 ml/kg of predicted body weight] + deep NMB + low PnP [10 mmHg]) or the Conventional Mechanical Ventilation (CMV) Group (conventional pulmonary ventilation [8 ml/kg for tidal volume] + moderate NMB + standard PnP [15 mmHg]).
Main Outcomes and Measures: The primary outcome was the incidence of PPCs. Secondary outcomes encompassed evaluations of serological biomarkers indicative of lung injury, systemic inflammatory indexes, postoperative analgesia, surgical conditions, and postoperative recovery.
Results The ODL group demonstrated a significantly lower PPC incidence (15.0%) compared to the CMV group (31.7%; RR, 0.426; 95% CI, 0.193-0.942; P=0.035). Secondary outcomes indicated lower postoperative sRAGE levels (a lung injury biomarker) in the ODL group, particularly in patients with an anesthetic duration exceeding 3 hours (P=0.035). The ODL approach also led to improved one-hour postoperative analgesia (RR, 0.853; 95% CI, 0.750-0.970; P=0.016) and decreased IL-6 levels on postoperative day 3 (RR, 0.722; 95% CI, 0.552-0.944; P=0.017), without impacting other measures. A PPC-predicting nomogram, incorporating five parameters, showcased strong discriminative performance, suggesting potential clinical value, as supported by decision curve analysis.
Conclusions and Relevance: Our study indicates that the innovative ODL approach, integrating deep NMB and minimal PnP, may enhance outcomes in intermediate to high-risk patients undergoing laparoscopic surgeries, lowering the incidence of PPCs and postoperative pain

without compromising surgical conditions or recovery, compared to traditional strategies. Its broader applicability and long-term effects necessitate further research.

PO-0168

Intrathecal ED95 dose of hydromorphone for analgesia after gastrectomy

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Background Approximately 300 million surgeries are performed worldwide each year. However, postoperative pain, as a major surgical complication, poses a great challenge to healthcare systems due to poor prognosis, lengthy hospitalization and financial burden. There is tremendous interest in including intrathecal opioids into the multimodal pain management strategy. Our team has previously found intrathecal hydromorphone 100 mcg reduced the incidence of moderate to severe pain during movement within 24 hours in partial hepatectomy. However, the analgesic effect appears to be limited given that the reduction of NRS pain score was < 1. Therefore, this study was designed to test the effect of intrathecal hydromorphone ED95 doses on postoperative analgesia after gastrectomy.

Methods Firstly, we conducted a double-blind sequential allocation trial with a biased-coin up-down design to obtain the effective interval 95% for intrathecal hydromorphone. The inclusion criteria were patients who underwent elective upper abdominal surgery under general anesthesia with American Society of Anesthesiologists (ASA) classification of I-III. The starting dose is 50 mcg. The primary outcome was effective analgesia at 24 hours postoperatively, defined as NRS score≤3 points during movement.

Secondly, 96 adult patients with ASA I-III for gastrectomy under general anesthesia were randomly allocated to received intrathecal hydromorphone (IT group) or transverse abdominis plane (TAP) block (15ml of 0.2% Ropivacaine each side). The primary outcome was the area under curve (AUC) of NRS over time during movement within 24 hours after surgery. Secondary outcomes included the AUC of NRS over time during rest or movement at different time points (30min, 2 h, 6 h, 12 h, 24 h, 48 h, 72 h) within 72 hours, pain scores during rest or movement within 72 hours after surgery, analgesic use, adverse events, and postoperative recovery outcomes.

Results We studied 51 patients and found the estimated effective interval 95% was 131.67 mcg (95% confidence interval 113.19 to 150) using the Isotonic Regression analysis (Figure 1). Then, we assessed 158 patients for eligibility, and 96 of whom were randomly assigned to receive either intrathecal hydromorphone (150 mcg) or transverse abdominis plane block (Figure 2). Data from 88 patients were finally analyzed. The AUC of NRS over time within 24 hours was lower in the IT group compared with TAP group (movement 64.00 vs 91.50, P = 0.001; rest 30 vs 48.5, P < 0.001). While, there was no significant difference on the AUC of NRS over time during movement within 72 hours between two groups (Figure 3).

Conclusion In gastrectomy, a single preoperative intrathecal ED95 dose of hydromorphone reduced the AUC of NRS over time within 48 hours after surgery compared to TAP block. Therefore, we recommend the use of intrathecal hydromorphone 150mcg as one of the modalities for multimodal analgesia in gastrectomy.

Reference

[1] Meara JG, Leather AJ, Hagander L, et al. Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. Lancet 2015; 386: 569-624.

[2] Armstrong RA, Fayaz A, Manning GLP, Moonesinghe SR, Oliver CM. Predicting severe pain after major surgery: a secondary analysis of the Peri-operative Quality Improvement Programme (PQIP) dataset. Anaesthesia 2023; 78: 840-52.

[3] Ding L, Chen D, Chen Y, et al. Intrathecal hydromorphone for analgesia after partial hepatectomy: a randomized controlled trial. Regional Anesthesia & Pain Medicine 2022; 47:664-671.

PO-0169

GDF-15: a potential genetic factor predisposing patients with a history of severe nausea and vomiting during pregnancy to postoperative nausea and vomiting

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Aims: A history of severe nausea and vomiting during pregnancy (SNVP) is a risk factor for postoperative nausea and vomiting (PONV). Growth differentiation factor 15 (GDF-15) was identified as a genetic factor influencing SNVP and a major influence on its severity. Therefore, we hypothesized that GDF-15 might be a potential genetic factor that predisposes patients with a history of SNVP to PONV. This study aimed to evaluated serum levels to determine whether GDF-15 is a genetic factor that increases the development of PONV in SNVP-risk patients.
Methods A total of 140 female patients undergoing breast cancer surgery were assigned to either the study group (70 with SNVP) or the control group (70 with mild to moderate nausea and vomiting during pregnancy (MNVP)). Blood samples for GDF-15 detection were collected from the patients and stored in heparinized tubes before induction (D0) and 24 h (D1) after surgery in the ward. Plasma GDF-15 concentrations were measured using ELISA (Human GDF-15 ELISA Kit, Multisciences China) with a linear range from 15 to 1,000 pg ml-1. The primary outcome was the serum GDF-15 level. The secondary outcome was the incidence of PONV within 36h.
Results The postoperative mean serum levels of GDF-15 on Day 1 were significantly higher than those on day 0 in all the patients (Fig. 1, $P < 0.001$). The preoperative GDF-15 serum levels in patients with SNVP were significantly higher than those in patients with MNVP (Fig. 2a, $P = 0.004$). At the same time, a higher preoperative GDF-15 serum level was also associated with a higher incidence of PONV (Fig. 2b, $P = 0.043$). The incidence of PONV in the SNVP group was significantly higher than that in the MNVP group at 2, 6, 12, and 24 hours, with no significant differences at 36 hours after the operation (Table 1).
Conclusions A higher circulating level of GDF-15 was associated with SNVP history and a higher risk of PONV, establishing GDF-15 as a genetic factor that might predispose patients with a history of SNVP to PONV. However, we had insufficient evidence to confirm the causal relationship between GDF-15 and SNVP or PONV. Further explorations are needed to clarify the causal role of GDF-15 in the development of PONV in SNVP-risk patients.

PO-0170

Effects of esketamine combined with dexmedetomidine on early postoperative cognitive function in elderly patients undergoing lumbar spinal surgery: a double-blind randomized controlled clinical trial

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Purpose: Postoperative cognitive dysfunction (POCD) is a prevalent complication among elderly

patients following surgical interventions. This study mainly evaluates the combined effects of esketamine and dexmedetomidine on the incidence of POCD in elderly patients undergoing lumbar spine surgery and explores the underlying mechanisms.
Methods A total of 162 elderly patients undergoing lumbar spine surgery were randomized into three groups: esketamine combined with dexmedetomidine group (ED group), esketamine group (E group), and dexmedetomidine group (D group). In the ED group, patients received 0.4 μg/kg dexmedetomidine intravenously before anesthesia induction, 0.6 μg/kg during tracheal intubation, and 0.5 mg/kg esketamine intravenously post-intubation. The D group received the same dosage of dexmedetomidine without esketamine, and the E group just received 0.5 mg/kg esketamine post-intubation. Primary outcome measures included the incidence of POCD on the first postoperative day. Secondary outcomes included the incidence of POCD on the third postoperative day, first postoperative day serum levels of neuron-specific enolase (NSE) and calcium-binding protein β (S100β), patient visual analog scale (VAS) scores at 2, 24, and 48 hours postoperatively, and the incidence of adverse events.
Results The incidence of POCD on the first postoperative day was significantly lower in the ED group compared to the E group ($P < 0.05$), with no significant differences when compared to the D group ($P > 0.05$). No significant differences were observed in POCD incidence on the third postoperative day across all groups ($P > 0.05$). Serum NSE and S100β levels were lower in the ED group compared to the E and D groups on the first postoperative day ($P < 0.05$). VAS scores were significantly lower in the ED group at 2 and 24 hours postoperatively ($P < 0.05$), with no differences at 48 hours ($P > 0.05$). The incidence of bradycardia was lower in the ED and E groups compared to the D group ($P < 0.05$). And annoyance was less in ED and D groups compared with E group ($P < 0.05$). MAP in the E group was significantly higher than those in ED and D groups at tracheal intubation, but it in the D group was significantly lower than those in ED and E groups at 10 minutes post-intubation ($P < 0.05$). In addition, HR in the E group was significantly higher than those in ED and D groups from tracheal intubation completed to the endotracheal tube removed ($P < 0.05$).
Conclusion The combination of esketamine and dexmedetomidine effectively reduces the incidence of POCD on the first postoperative day in elderly patients undergoing lumbar spine surgery. Elevated serum levels of NSE and S100β on the first postoperative day may indicate a neuroprotective mechanism linked to reduced neuroinflammation facilitated by the drug regimen.

PO-0171

右美托咪定缓解经皮肾镜取石术后导管相关膀胱不适和术后炎症反应的疗效。

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目的 导管相关膀胱不适（CRBD）会给患者带来巨大的痛苦，需要非常注意镇痛，并增加术后的发病率。本研究评估了肌肉注射右美托咪定缓解经皮肾镜取石术（PCNL）后 CRBD 和术后炎症反应的疗效。
方法 2019 年 12 月至 2020 年 3 月在一家三级医院进行了一项前瞻性随机双盲研究。80 例计划择期 PCNL 的 ASA I 和 II 级患者被随机分配，I 组在麻醉诱导前 30 分钟肌肉注射 1 μ g/kg 右美托咪定，II 组生理盐水作为对照。遵循标准麻醉方案，麻醉诱导后对患者进行 16 Fr Foleys 导管插入术。如果评分为中度，抢救镇痛为扑热息痛。术后 CRBD 评分和炎症标志物；观察 3 天的白细胞总数、红细胞沉降率和体温。
结果 I 组的 CRBD 评分显著较低。I 组的 Ramsay 镇静评分为 2 分，p 为 0.00，所需的抢救镇痛非常低，p 为 0.00。社会科学统计软件包第 20 版用于分析。采用 Student t 检验、方差分析和卡方检验分别进行定量和定性分析。

结论 单剂量肌肉注射右美托咪定在预防 CRBD 和减少 PCNL 术后镇痛需求方面有效、简单且安全，且无任何不良反应。然而，除了血沉外，它没有影响炎症反应，原因在很大程度上仍然未知。

PO-0172

新型简易呼吸器在麻醉苏醒室中纠正全麻患者术后低氧血症的安全性和有效性分析

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目的 探究新型简易呼吸器在麻醉苏醒室中纠正全麻患者术后低氧血症的安全性和有效性。
方法 选取 2023 年 11 月至 2024 年 5 月期间在南昌大学第二附属医院全麻下行择期手术后入 PACU 的患者 110 例（术中使用气管插管控制通气），患者有自主呼吸后带气管导管入苏醒室后常规氧管吸氧 5L/min 时无法维持 SpO2 ≥95%，年龄≥18 岁， ASA 麻醉分级 I~III 级。本研究采用自身前后对照试验设计，患者入苏醒室后常规一次性氧管吸氧（2L/min），若无法维持 SpO2 ≥95%，则调整氧流量至 5L/min，,若患者吸氧 5L/min 时仍无法维持 SpO2 ≥95%，则给予患者新型简易呼吸器气管导管给氧（5L/min ，氧气直接注入贮氧气囊内，贮氧气囊饱满后将其弯头连接于气管导管，在吸氧过程中使贮氧气囊保持充满状态），观察并记录使用新型简易呼吸器后患者 SPO2 是否恢复至 95%并记录所需的时间，和 SPO2 恢复至 97%~100%所需的时间，同时记录患者使用新型简易呼吸器前后的生理参数： BP、SPO2、HR、RR，动脉血气指标：记录患者入苏醒室后即刻（Ｔ１）、入苏醒室３０ｍｉｎ（Ｔ２）２个时间点的二氧化碳分压（ＰａＣＯ２）、氧分压（ＰａＯ２）、ｐＨ值、ＳａＯ２。此外记录是否因病情变化使用呼吸机、术后恢复时间、住院时间、住院费用、术后肺部并发症发生情况。最后整理、统计并分析实验数据。
结果 使用新型简易呼吸器后，麻醉苏醒期间低氧患者血氧饱和度显著迅速提高，呼吸频率和心率等生理参数会趋于正常范围，所有患者 SPO2 可恢复至 95%，99%患者 SPO2 可恢复至 97%~100%，在使用过程中不会出现严重的副作用或并发症，如氧中毒、呼吸抑制、二氧化碳蓄积等，同时可减少肺部并发症的发生率，从而减少患者住院时间、减少患者治疗费用以及提高患者术后舒适度。统计分析显示，新型简易呼吸器在纠正术后低氧血症方面效果显著优于传统方法。
结论 新型简易呼吸器在麻醉苏醒室中应用具有较好的安全性和有效性，可作为改善全麻患者术后低氧血症处理的新选择。这项研究为临床实践提供了科学依据，促进了患者术后恢复的质量提升。

PO-0173

Latent Class Analysis and Phenotypes Identification of Surgical Site Infection in Elderly Patients After Non-cardiac Surgery---Based on A Prediction Model Established by Two Centers Large Sample

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Backgrounds: With the widespread use of prophylactic antibiotics during perioperative period and the continuous promotion of minimally invasive non-cardiac surgery type such as laparoscopic and thoracoscopic surgery, the incidence of superficial Surgical Site Infection (SSI)

has been significantly reduced. Organ/deep SSI has become the dominant type of SSI. Currently, the classification of SSI is limited to the above location from shallow to deep, the epidemiological and clinical characteristics of SSI after non-cardiac surgery in elderly patients are still inadequately defined.

Objectives: We aimed to determine main risk factors for SSI after non-cardiac surgery among elderly patients in China and to further reveal the clinical attributes of those elderly patients afflicted with SSI.

Methods: Potential risk factors for developing SSI were selected based on published data, clinical expertise, pathophysiological reasoning, and convenient considerations for future clinical applications. These SSI outcomes were rigorously calibrated by researchers complying with back-to-back principles following uniform diagnostic standards--European Perioperative Clinical Outcome (EPCO) definitions. According to the definitions, SSI in this study consists of three sites: superficial incision, deep incision, and organ/deep. We define the occurrence of any of the above sites as SSI infection. Multivariable logistic regression analysis was used to identify risk factors for SSI. Data from 2 population-based cohorts of elderly patients undergoing non-cardiac and non-neurology surgery were used to derive and external validate the models. The risk prediction model was derived from the First Medical Center of the Chinese PLA General Hospital (January 2014 - April 2019) and was externally validated with data from Henan Provincial People's Hospital (November 2014 to May 2022). We performed a nomogram, a complanation model based on the regression model with the graduated line segments as the main body. The discrimination was compared based on the AUC. The calibration was assessed by the calibration intercept and the slope. Decision curve analysis (DCA) was adopted to determine the nomogram's clinical usefulness and net benefit. Latent class analysis (LCA) was further used to explore the population features of SSI. LCA combines the latent variable theory with classified variables to explore the category latent variables behind statistically related classified explicit variables. Utilizing LCA, we classified patients into distinct cluster classifications, with each cluster's traits explained based on clinical factors. All continuous variables in the prediction model were treated as categorical variables before the LCA analysis. The number of categories was ascertained via the Bayesian information criterion (BIC). The lower BIC was also the elbow point which indicates better model fit. When determining the number of latent classes, clinical interpretations were taken into account. To demonstrate the combination of different risk factors in the prediction model, a chord chart and a characteristic data distribution map of subphenotypes were devised.

Results:A total of 42532 participants were included in the derivation and internal validation cohorts (29774 in the derivation cohort and 12758 in the internal validation cohort) and 39055 in the external validation cohort. The SSI incidence rates of the 2 centers were respectively 2.6% and 5.3%. Multivariable logistic regression indicated that the independent risk factors for SSI after non-cardiac surgery in elderly patients were older age, hyperlipidemia, lower value of the last examination of monocyte and albumin before surgery, with intraoperative use of muscle relaxants, without prophylactic antibiotics during the operation, emergency surgery, longer operation time and gastrointestinal -related abdominal and pelvic surgery. The AUC (area under the curve) of the derivation, internal validation and external validation cohorts were 0.791, 0.762, 0.753 respectively. Besides, according to the Hosmer- Lemeshow test result, the calibration curve also performed well. LCA was separately conducted by escalating the categories numbers from 1 to 10 using the data of the First Medical Center of the Chinese PLA General Hospital. At a relatively lower BIC, an elbow point appeared across 4 categories, signifying the optimal number for LCA. It revealed 4 subphenotypes in elderly patients undergoing non-cardiac surgery. Class 1 was mild subclass with a lower SSI incidence (0.9%); whereas Class 4 was the critical subclass with a higher SSI incidence (5.2%), but their clinical features were different. According to the characteristic data distribution map and the different incidence rates of 4 subphenotypes, in the chord plot, more and thicker directional lines indicated more banded connections between the subphenotypes and risk factors. Moreover, these 4 subphenotypes had their own prominent clinical features and the higher the incidence, the more complex and diverse combination of risk factors in the corresponding categories.

Conclusions: Based on the two centers large sample, this study demonstrated the latest data on SSI and revealed the risk factors for SSI after non-cardiac surgery among the elderly patients in

China. LCA identified 4 subphenotypes, and Class 4 was the critical subgroups with a higher SSI incidence. LCA was conducted to demonstrate the clinical features of the older patients undergoing non-cardiac surgery and to explore the relation between SSI and the risk factors, which provides more profound understanding of SSI prevention for the patients with multiple specific combined risk factors after non-cardiac surgery.

PO-0174

NE 持续输注联合 GDHT 对脑肿瘤切除术患者术中和术后结局指标的影响及其意义

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目的 加速康复外科（Enhanced Recovery After Surgery, ERAS）理念下液体治疗来自精确的血流动力学参数监测和血管活性药物使用。国外研究表明，连续给予去甲肾上腺素（Norepinephrine，NE）可增加肝切除期间的液体反应性，即显著增加每搏量变异度（Stroke Volume Variation，SVV）对于液体反应性预测的敏感性，通过降低非压力性静脉容量，并将输注的液体引导至压力性静脉容量，从而增加平均循环充盈压、静脉回流。持续泵注 NE 与间断推注比能更好纠正麻醉诱导后低血压。

本研究设想在神经外科手术中通过持续泵注 NE 与间断推注对比，在 SVV 指导下的目标导向液体治疗（Goal-Directed Fluid Therapy，GDFT）能否降低术后由于器官灌注减少造成的并发症。

方法 本研究是一项单中心、随机、前瞻性的临床对照试验，选择 2023 年 7 月到 2024 年 6 月在中山大学附属第一医院接受全麻下择期行仰卧位、侧卧位脑肿瘤切除术的患者为研究对象，通过简单随机法将受试者分为两组，一组接受间断推注 NE，另一组持续泵注 NE。主要观察指标为术后 7 天内出现系统性炎症反应综合征（systemic inflammatory response syndrome，SIRS）和至少一个主要器官系统功能障碍的复合指标，次要观察指标包括术中出入量差值、术中血气分析参数、术中血乳酸水平、术中脑肿胀评分、术后血常规、肌酐水平、肝酶水平、心肌标志物、术后最大 NT-proBNP 、术后 ICU 住院时长、术后住院总时长、死亡率等。

结果 持续泵注组术后 7 天内出现 SIRS 少于间断推注组，且持续时间更短，分数更低。但术后出现至少一个主要器官系统功能障碍的指标未见明显差异。术中出入量差值上的差异具有统计学意义（$P < 0.01$），持续泵注组明显更低，且心电图 ST 段术中波动的差值也较间断推注组低。术中血气分析参数麻醉开始后 30 分钟和手术结束前 30 分钟两个时间点差值比较、术后检验结果、术后 ICU 住院时长、术后总住院时长、术后死亡率上两组没有显著差异。

结论 神经外科手术中在 SVV 指导下的 GDHT 下通过持续泵注 NE 比间断推注能减少术后 7 天内 SIRS 的发生率及显著减少术中补液，但并未降低术后由于器官灌注减少造成的并发症、缩短术后住院时长等。 因此，在 SVV 指导 GDHT 下持续泵注 NE 在神外手术对改善预后是有帮助的。

PO-0175

HPI 指导下的血流动力学管理对老年患者行腹部大手术低血压事件的影响

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目的 低血压预测指数(Hypotension Prediction Index，HPI)是基于动脉波形特征的新算法，可预测

低血压事件的发生(定义为平均动脉压低于 65 mmHg 至少 1 分钟)。比较 HPI 指导的血流动力学管理与传统的血流动力学管理，对行腹部大手术的老年患者术中低血压事件持续时间和严重程度的影响。

方法 我们纳入了 50 例全身麻醉下行腹部大手术的老年患者，男 25 例，女 25 例，年龄 61~86 岁，BMI 15.43~ 28.89kg/m2，ASA Ⅱ或Ⅲ级。采用随机数字表将患者分为 HPI 组和对照组，每组 25 例。HPI 组：当 HPI 指数超过 85(范围 0 ~ 100)时，HemoSphere 监护仪发出警报，麻醉医师基于高级血流动力学参数的治疗流程给予血管加压药、补液、正性肌力药或观察；对照组：当 MAP≤65 mmHg 时麻醉医师根据常规临床经验进行血流动力学管理。观察记录两组患者术中低血压事件发生情况、术中液体出入量、术后机械通气时间、PACU 停留时间、ICU 停留时间、住院时间、术后并发症等结果。

结果 最终分析了 47 例患者的数据，HPI 组每例患者的低血压时间加权平均值（TWA，mmHg）是 0（0，0.08），对照组是 0.145（0，0.46），中位数差值为- 0.08 (95% CI，-0.26~0；P=0.017)；HPI 组每例患者的低血压曲线下面积（AUT，mmHg·min）是 0（0，20.67），对照组是 27.33（0~108.33），中位数差值为-19.67(95% CI，-58~0 ；P=0.016)；HPI 组每例患者的低血压累计时间（min）是 0（0，4.33），对照组是 5.84（0，17.00），中位数差值是-5.17（95% CI，-9.67~0；P=0.011）；HPI 组每例患者的低血压事件数是 0（0，2），对照组是 1.5（0，3.75），中位数差值是-1（95% CI，-2~0；P=0.028）。相比对照组，HPI 组患者术中胶体输注量、液体总入量降低（P=0.01；P=0.016），术后机械通气时间缩短（P=0.001）。两组患者术后总并发症发生率差异无统计学意义（P=0.312）。

结论 与传统的血流动力学管理方法相比，HPI 指导的血流动力学管理可以减轻行腹部大手术老年患者术中低血压事件的持续时间和严重程度，减少术中胶体输注量和液体总入量，缩短术后机械通气时间。

PO-0176

无阿片麻醉在日间腔镜疝气手术中的应用

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目的 无阿片麻醉（Opioid-free anesthesia，OFA）是指在手术中及手术后，不通过任何途径、给患者应用任何阿片类药物的麻醉和镇痛，从而达到规避阿片类药物带来的副作用。OFA 的观点是通过避免使用阿片类药物从而达到更好的预后效果，减少不良反应的发生。OFA 主要使用 NMDA 拮抗剂（氯胺酮、硫酸镁）、钠通道阻滞剂（局部麻醉药、利多卡因）、抗炎药（非甾体类抗炎药、地塞米松）和 α-2 激动剂（右美托咪定、可乐定）等代替阿片类药物；联合多种麻醉方式（椎管内麻醉、神经阻滞）达到满意的麻醉效果。

方法 将符合要求的患者随机分为无阿片类药物全麻组（A 组）和一般全麻组（B 组）。麻醉诱导前 10 分钟两组均给予 1ug/kg 右美托咪定匀速泵注，诱导时 A 组给予 50mg 氟比洛芬酯注射液一支，利多卡因 1mg/kg，2-3mg/kg 丙泊酚，0.2mg/kg 苯磺酸顺阿曲库铵，B 组给予 2-3mg/kg 丙泊酚，0.2mg/kg 苯磺酸顺阿曲库铵，2-3ug/kg 芬太尼。待患者意识消失，自主呼吸减弱后加压扣住面罩辅助同气，约 3 分钟麻醉完全显效后，使用喉镜暴露插管视野，用 2%利多卡因 3ml 行咽喉部及气管表面麻醉，继续辅助通气 1 分钟再行气管插管。手术过程中使用七氟烷 1-3%，丙泊酚 3-5mg/kg/h,右美托咪定 0.3-0.7ug/kg/h 维持麻醉。两组术前常规使用昂丹司琼 4mg 防止术后恶心呕吐，术后均给予 50mg 氟比洛芬酯注射液一支作为术后镇痛用。两组均记录患者诱导前 10 分钟（T0），插管前（T1），插管后即刻（T2），手术开始时（T3），手术结束时（T4），拔出气管导管后即刻（T5）六个时间点的心率（HR）、平均动脉压（MAP），血氧饱和度（SP02）和丙泊酚的用量。记录术中及术后至出手术间前使用血管活性药物的情况。记录患者出复苏室的视觉模

拟疼痛评分（VAS 评分）。记录术后不良反应发生情况（呼吸抑制、恶心呕吐、皮肤瘙痒等）及术后追加镇痛药物的使用情况。
结果 两组患者的术后呼吸抑制、恶心呕吐，差异有统计学意义（P<0.05），A 组患者术后恶心、呕吐发生率较 B 组下降。血流动力学方面，两组患者组内比较，T2 的 MAP 和 HR 与 T0 比较，差异无统计学意义（P>0.05）。丙泊酚用量差异有统计学意义（P<0.05），A 组丙泊酚用量高于 B 组。出复苏室 VAS 评分差异无统计学意义（P>005）。术中及术后出手术室间使用血管活性药物差异无统计学意义（P>0.05）。两组患者术后追加镇痛药物，差异无统计学意义。（P>0.05）。
结论 无阿片类药物麻醉应用日间腔镜疝气手术安全可行，可减少术后不良反应，有利于患者的快速康复。

PO-0177

肥胖患者胃减容手术弱阿片化麻醉管理下的临床观察

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目的 观察艾司氯胺酮用于行腹腔镜胃袖状切除术（laparoscopic sleeve gastrectomy，LSG）肥胖患者的弱阿片化麻醉管理，对该患者群呼吸、循环功能及围术期镇痛效果的影响，及术后恶心、呕吐等不良反应发生和抑郁情绪改善情况
方法 选取本院 2022 年 2 月~2023 年 11 月行腹腔镜胃袖状切除术的肥胖患者 72 例，年龄 18~40 岁，体重指数(body mass index, BMI) 32~50kg/m2，美国麻醉医师协会（merican society of anesthesiologists，ASA）分级Ⅰ~Ⅲ级，分为艾司氯胺酮组(E 组)和舒芬太尼组(S 组)，每组 36 例。术前应用抑郁自评量表（Self-rating depression scale，SDS）评估抑郁情况。手术当日入室后常规监测，麻醉用药及用量依据肥胖患者体重参数[1]。诱导期：S 组静注舒芬太尼，E 组艾司氯胺酮，其余用药相同：静脉注射丙泊酚及罗库溴铵。维持期：吸入七氟烷，静脉泵注瑞芬太尼，根据手术应激指数（surgical pleth index，SPI）和熵指数 RE（reactionentropy，RE）调整给药剂量。术后患者静脉自控镇痛(Patient-Controlled Intravenous Analgesia, PCIA)，用药同分组。记录两组患者，入室（T0)、诱导后 RE 小于 60 时（T1）、插管后 1min（T2)、建立气腹（T3)、术中（T4）、术毕（T5)、拔管（T6）的平均动脉压(mean arterial pressure，MAP)、心率(heart rate,HR)、血氧饱和度（SpO2）、SPI、RE 等，统计手术、麻醉医生及患者满意度，记录术后疼痛视觉模拟评分（visual analogue scale，VAS），统计恶心、呕吐等不良事件发生率和术前有抑郁倾向患者的 SDS 评分情况。
结果 两组患者性别、年龄、身高、体重、BMI 以及 ASA 分级差异均无统计学意义，外科医生、麻醉医生及患者满意度间无差异 。血流动力学指标：组内比较，S 组在 T1 时间点 MAP、HR 值降低，差异有统计学意义， E 组在 T3、T4、T6 时间点，MAP、HR 值升高，差异有统计学意义；组间比较，两组 MAP 在 T5 时间点差异有统计学意义，E 组 HR 在 T1、T2、T3、T4、T6 时间点均升高，差异有统计学意义；SpO2 指标在 T1 时间点，两组差异有统计学意义。不良事件中恶心、呕吐发生率两组间差异有统计学意义。VAS 评分 E 组术后第一天较 S 组低，差异有统计学意义。SDS 标准分≥53 的患者，术前评分无差异，术后 E 组较 S 组低，差异有统计学意义。
结论 艾司氯胺酮用于肥胖患者 LSG 的弱阿片化麻醉管理安全且有效，诱导期血压更加平稳，术后镇痛效果更优，恶心、呕吐发生率更低，对有抑郁倾向肥胖患者抑郁评分有改善作用。

PO-0178

择期剖宫产术后早期进饮对产妇满意度和胃排空的影响

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目的 探讨对于腰硬联合麻醉下行择期剖宫产术产妇，术后早期饮水对产妇满意度、口渴感、饥饿感、体温、寒战、热舒适度、术后首次肛门排气时间、乳汁分泌时间等影响，并明确尚未消退的椎管内麻醉是否影响产妇饮水后胃排空，为剖宫产术后加速康复（enhanced recovery after cesarean delivery，ERAC）提供依据。
方法 本研究为前瞻性随机对照临床试验。选择 2024 年 1 月至 2024 年 3 月在复旦大学附属妇产科医院于腰硬联合麻醉下行择期剖宫产术产妇 90 例，随机分为 2 组：饮水组（W 组）在术后约 10 min 饮温水 100 mL，对照组（C 组）仅饮水 10 mL。主要结果为产妇对剖宫产术后早期饮水的满意度视觉模拟量表（visual analogue scale，VAS）评分，次要结果包括产妇口渴程度数字评分法（numerical rating scale，NRS）评分、饥饿程度 NRS 评分、体温、寒战程度≥2 级的例数、热舒适度评分、术后首次肛门排气时间及乳汁分泌时间，并利用超声监测产妇胃排空。
结果 产妇满意度 VAS 评分 C 组与 W 组分别为 46.7 ± 19.8 mm 与 76.8 ± 16.9 mm（P＜0.001）。在进饮后各时间点，产妇口渴 NRS 评分 W 组均低于 C 组（P＜0.01）。在进饮前与进饮后 30 min、60 min、120 min，两组产妇饥饿 NRS 评分的差异均无统计学意义；在进饮后 90 min，W 组产妇饥饿 NRS 评分低于 C 组（P＜0.05）。在进饮后 90 min，W 组产妇胃窦横截面积（cross-sectional area，CSA）恢复至基线水平；在进饮后 120 min，2 组产妇胃窦 CSA 的差异无统计学意义。在进饮后 60 min，W 组胃窦 CSA＞10.3 cm2 例数为 7（15.6%），显著高于 C 组例数 0（0%）（P=0.012）；在进饮后 90 min 和 120 min，W 组产妇胃窦 CSA＞10.3 cm2 例数分别为 3（6.7%）和 2（4.4%），与 C 组间差异无统计学意义。产妇残余胃容量的变化与 CSA 是一致的。2 组产妇术后 MAP、心率、体温、寒战程度≥2 级的例数、热舒适度评分、术后首次排气时间及乳汁分泌时间在各时间点的差异均无统计学意义。2 组产妇进饮后至术后 24 小时均未发生恶心、呕吐及腹胀。
结论 在确保产妇完全清醒的情况下，剖宫产术后早期饮水 100 mL 可增加产妇满意度，并且减少产妇术后口渴感。此外，剖宫产术后早期饮水后，产妇胃排空没有延迟。

PO-0179

无阿片类药物全身麻醉对甲状腺手术患者术后恶心呕吐的影响

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目的 探究无阿片类药物全身麻醉对甲状腺手术患者术后恶心呕吐（PONV）以及其他不良反应的影响，为减少这类患者术后并发症，促进术后康复提供临床依据。
方法 本课题是一项随机对照研究，选取我院在全身麻醉下行甲状腺择期手术的患者 176 例，年龄 18 至 65 岁，ASA（American Society of Anesthesiologists，美国麻醉医师协会）Ⅰ~Ⅱ级。使用随机数字表法分成无阿片类药物组（OFA 组）和阿片类药物组（OA 组），每组 88 例。OFA 组诱导前 10 min 予静脉滴注右美托咪定 0.5 μg/kg，诱导时予静脉注射艾司氯胺酮 0.3 mg/kg，利多卡因 1.5 mg/kg，丙泊酚 1.0~2.5 mg/kg，顺式阿曲库铵 0.15 mg/kg；麻醉维持为：静脉持续输注利多卡因 1.5 mg/(kg·h），间断追加艾司氯胺酮 0.1 mg/kg。OA 组诱导前 10 min 予静脉滴注等量生理盐水，诱导时静脉注射芬太尼 3 μg/kg，丙泊酚 1.0~2.5 mg/kg，顺式阿曲库铵 0.15 mg/kg。术中间断追加芬太尼 1 μg/kg。两组患者术中均持续吸入 2.5~3.5%七氟烷维持最低肺泡有效浓度在

1.0~1.5。术中追加药物主要依据患者血流动力学以及手术体积描计指数。主要指标为术后 48 小时 PONV 的发生率以及严重程度。其他次要指标包括抢救性止吐药的使用、诱导过程中的血流动力学指标、术中不良心血管事件、术后镇痛（疼痛评分、镇痛药的使用）、相关的围术期不良反应（呛咳、术中知晓、头晕、头痛、幻觉、噩梦、术后认知功能、术后躁动）、术后恢复情况（拔管时间、麻醉后恢复时间、镇静时间）以及患者满意度等。

结果 两组患者一般资料未见明显差异。在 PONV 的发生方面，OFA 组中术后 48 小时 PONV 的发生率相比于 OA 组降低，差异有统计学意义（P<0.05）。OFA 组相比于 OA 组 PONV 严重程度显著减轻（P<0.05）。在血流动力学方面，与 OA 组相比较，OFA 组患者诱导时血流动力学更加平稳，术中低血压的发生率显著减少（P<0.05）。在术后疼痛方面，OFA 组相比于 OA 组术后疼痛评分及镇痛药的需求方面未见明显差异（P>0.05）。在呛咳发生率方面，与 OA 组相比，OFA 组呛咳发生率显著减少（P<0.05）。在术后恢复方面，OFA 组拔管时间相较于 OA 组显著缩短（P<0.05），但镇静时间及恢复室停留的时间显著延长（P<0.05）。在相关不良反应方面，两组术后躁动评分、认知评分、疼痛评分、头晕、幻觉、噩梦、呼吸抑制、术中知晓的发生率均未见明显差异（P>0.05）。在术后满意度评分方面，OFA 组满意度评分显著高于 OA 组（P<0.05）。

结论 无阿片类药物麻醉能降低甲状腺手术患者 PONV 的发生率以及减轻 PONV 的严重程度，而未见明显不良反应，能为 PONV 高危患者提供一种更优化的麻醉方案。同时，也为阿片类药物成瘾患者戒毒期间的手术提供更多麻醉方法的选择。

PO-0180

Effect of ultrasound-guided stellate ganglion block on inflammatory cytokines and postoperative recovery after partial hepatectomy: a randomised clinical trial

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Background Stellate ganglion block (SGB) has been shown to reduce perioperative complications in various surgeries. Because laparoscopic techniques and instruments have advanced during the past two decades, laparoscopic liver resection is being increasingly adopted worldwide. Lesser blood loss, fewer postoperative complications, and shorter postoperative hospital stays are the advantages of laparoscopic liver resection, as compared to conventional open surgery. There is an urgent need for an effective intervention to reduce perioperative complications and accelerate postoperative recovery. This study investigated the effect of ultrasound-guided SGB on enhanced recovery after laparoscopic partial hepatectomy.

Methods We compared patients who received SGB with 0.5% ropivacaine (group S) with those who received SGB with 0.9% saline (group N). A total of 58 patients with partial hepatectomy were enrolled (30 S) and (28 N). Before induction of anesthesia, SGB was performed with 0.5% ropivacaine in group S and 0.9% saline in group N. Main outcome: Comparison of serum inflammatory cytokines concentration at each time point.

Results Main outcome: When comparing IL-6 and IL-10 concentrations among groups, group S showed less variation over time compared to group N. For comparison between groups, the serum IL-6 concentration in group S was lower than that in group N at 6 and 24 h after operation ($P < 0.01$), and there was a significant linear relationship between serum IL-6 concentration at 24 h after operation and hospitalization situation.

Conclusions Ultrasound-guided SGB can stabilize perioperative inflammatory cytokines plays a positive role in the enhanced recovery of patients after laparoscopic partial hepatectomy. The serum IL-6 level within 24 h after surgery may be used as a predictor of hospitalization.

PO-0181

Effect of ultrasound-guided thoracic paravertebral nerve block on pulmonary complications after thoracoscopic lung surgery: a Multicentre Randomized Clinical Trial

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Background As a minimally invasive operation, video-assisted thoracoscopic surgery (VATS) has significantly reduced surgical trauma and systemic inflammation, and has become the standard treatment method for lung cancer. Following VATS lung surgery, postoperative pulmonary complications (PPCs) are a common complication that increase perioperative mortality and lengthen the hospital stay of the patient. The incidence of pain at 24 hours after VAT surgery was 38%, and the incidence of chronic pain at 6 months was 25%. Effective management of early pain following VATS is crucial because poor postoperative analgesia might hinder postoperative recovery and raise the risk of pulmonary problems due to insufficient respiratory function and weak expectoration. A popular regional block technique in thoracoscopic surgery is the thoracic paravertebral block (TPVB) technique, which successfully blocks the afferent signal of nociceptive stimuli on the operative side, giving patients good postoperative pain relief, enhancing respiratory function, and lowering complications. However, its effect on the incidence of PPCs is unclear. This study intends to investigate whether the anesthetic strategy of ultrasound-guided TPVB in combination with general anesthesia can reduce the incidence of PPCs within 7 days after VATS lung surgery compared to general anesthesia alone in VATS lung surgery.
Methods Patients receiving elective VATS lobectomy / segmentectomy were randomly assigned to one of two groups in this randomised controlled trial: the PV group (n = 151), which received general anaesthesia together with TPVB, or the C group (n = 151), which received general anaesthesia alone. Before general anaesthesia is induced, patients in the PV group will receive TPVB, which is an ultrasound-guided injection of 15 ml of 0.5% ropivacaine into the T4 and T7 thoracic paravertebral spaces. Before being put into anaesthesia, Group C patients did not undergo nerve block manipulation. After operation, the patient-controlled intravenous analgesia device was formulated as sufentanil 1.5 μg / kg + ondansetron 24 mg diluted to 100 ml, the background dose was 1 ml/h, the single dose was 2 ml, and the locking time was 15 min. The primary outcome was the frequency of post-operative complications (PPCs) within 7 days of the procedure; patients who experienced one or more of the following complications were deemed to have PPCs: pneumonia, aspiration pneumonia, atelectasis, respiratory failure, bronchospasm, pulmonary congestion, pleural effusion, and pneumothorax.
Results A total of 302 patients were included in the intention-to-treat analysis. A total of 57 patients (37.7%) developed PPCs in the PV group and 74 patients (49.0%) in the C group (P = 0.048, risk ratio, 1.585; 95% CI, 1.002 to 2.506) within 7 days after surgery. The overall incidence of postoperative pulmonary complications was 43.4%. There was a statistically significant difference in the incidence of pulmonary infection between the two groups (7.3% vs. 23.3%, P < 0.001, risk ratio, 3.84; 95% CI, 1.868 to 7.895) and pneumothorax (17.9% vs. 29.8%, P = 0.015, risk ratio, 1.950; 95% CI, 1.133 to 3.356).
Conclusion In the 7 days following pulmonary surgery for VATS, general anaesthesia in conjunction with TPVB can lessen the incidence of PPCs, lessen stress response, and improve perioperative discomfort when compared to general anaesthesia alone. Using this strategy helps patients recover from surgery more quickly.

PO-0182

超声可视化技术在老年髋部骨折患者椎管内麻醉中的应用

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目的 1、探讨超声可视化技术在老年髋部骨折患者椎管内麻醉中的应用效果
方法 2.1 一般资料
选择 2020 年-2021 年我院收治的 90 例老年髋部骨折患者，年龄 65-95 岁，ASAⅡ～Ⅲ级，拟在腰硬联合麻醉下实施手术。随机分为传统解剖定位穿刺组（J 组）、超声辅助定位穿刺组（F 组）、超声实时引导穿刺组（S 组）， 每组 30 例。
2.2 麻醉方法
患者入室后常规监护吸氧，等待间行超声引导髂筋膜神经阻滞术前镇痛。体位摆放相同：取左侧或右侧卧位（患侧朝上），弓背屈膝。选择在 L2～S1 间隙作为穿刺点。
J 组：通过传统定位方法，髂嵴连线对应 L3/4 间隙或 L4 棘突，选择在 L3/4 或 L2/3 间隙最明显者作为穿刺点。穿刺方法选用正中或旁正中入路，硬膜外穿刺成功后，置入腰麻针至蛛网膜下腔，拔出针芯有脑脊液流出便可注入局麻药。
F 组：使用频率 2～5 MHz 超声凸阵探头，先沿脊柱旁正中长轴椎板斜切面由尾侧向头侧纵向扫描，依次确定 S1～L2 间隙，调整超声角度显示椎板，关节突，前、后复合体（图 1）。定位间隙后行短轴棘突横断面扫描。选择前后复合体图像和路径更优的间隙作为穿刺点，测量硬膜外腔深度和扫描角度，并将间隙中点标记于皮肤，然后按扫描角度深度穿刺（图 2）。
（图 1） （图 2）
S 组：体位摆放完成后，消毒铺巾，穿无菌手术衣，探头套一次性无菌超声探头保护套。扫描穿刺间隙方法同 F 组，左侧卧位患者选择旁正中长轴椎板斜切面实时引导穿刺(如图 3)，右侧卧位患者选用旁正中短轴棘突斜切面实时引导穿刺(如图 4)。
（图 3） （图 4）
2.3 观察指标
比较 J、F 组患者定位时间、穿刺时间（消毒开始至腰麻注药结束）；三组患者穿刺总耗时（定位时间+穿刺时间之和，即定位开始到腰麻注药完毕的时间）、穿刺次数、调整穿刺针方向次数、一次穿刺成功率，并发症等。
结果 J 组定位时间少于 F 组，但穿刺时间大于 F 组，差异有统计学意义；F，S 组所有患者均穿刺成功；穿刺总耗时 F 组最少，与 J 组/S 组相比差异有统计学意义；J 组/S 组穿刺总耗时差异无统计学意义。J 组 3 例患者更换穿刺点后穿刺成功，2 例穿刺失败；F 组 3 例患者调整穿刺角度后穿刺成功，S 组均一次穿刺成功。J 组 5 例患者穿刺时出现异感，调整穿刺间隙或角度后好转；三组患者术后均未出现神经损伤相关并发症。
结论 利用超声技术，我们可以准确定位脊柱节段，选择最清晰的穿刺间隙，引导合理的穿刺路径，明显提升老年髋部骨折患者椎管内麻醉穿刺成功率，且未出现穿刺相关并发症。对老年、肥胖、脊柱术后、脊柱畸形等以往认为相对禁忌的患者也可以成功开展。

PO-0183

超声引导经棘突间平面内穿刺用于肥胖孕产妇腰麻的研究：与旁矢状位椎板间入路的比较

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目的 统定位腰麻穿刺点是通过触诊法定位椎间隙，肥胖孕产妇背部脂肪增厚或水肿会增加触诊定位的难度。多次尝试穿刺增加患者不适、焦虑、神经损伤甚至意外穿刺硬脊膜及麻醉失败的风险。超声辅助椎管内麻醉是麻醉领域较新的发展，可分为超声定位标记下椎管内麻醉和超声引导下椎管内麻醉。超声定位标记穿刺点可描绘相关解剖结构，从而有助于穿刺成功，但肥胖孕产妇往往体位配合度差，若出现体动或首次标记偏差仍可导致穿刺失败，再次穿刺依然面临触诊定位的困难。以往有研究表明，对于肥胖患者而言，超声实时引导较术前超声定位腰麻穿刺成功率增加，尝试次数更少，成功腰椎穿刺所需的时间也更少。对肥胖孕产妇而言，触诊棘突定位困难是最棘手的问题，超声引导下椎管内麻醉似乎是一个更好的选择，因为在实时引导下实现椎管可视化，排除了穿刺操作过程中解剖结构和穿刺针可能出现的所有盲点超声辅助下椎管内麻醉技术在肥胖患者穿刺麻醉中具有一定的优势。以往，超声辅助技术在患者椎管内麻醉的实施往往通过超声定位或超声引导下旁矢状位引导实现。本研究拟通过使用一种创新入路，超声引导下经正中棘突间平面内入路对肥胖孕产妇实施超声引导下腰麻，与传统旁矢状位椎板间平面内入路相比较，评价其在肥胖患孕产妇患者中应用的临床效果，分析其价值，为临床提供参考。
方法 拟行择期剖宫产的肥胖孕产妇 80 例，BMI＞30，随机分为 2 组，每组 40 例。T 组：椎板间入路组，采用超声引导下旁矢状位椎板入路行腰麻，U 组：棘突间入路组，采用超声引导下矢状位正中棘突间入路腰麻。穿刺成功后两组均注射 0.5％罗哌卡因 15mg。观察记录超声下目标结构的总可见性评分、穿刺首次成功率、穿刺成功率、尝试次数及超声引导麻醉的操作时间。
结果 与 T 组相比，U 组首次穿刺成功率升高、穿刺成功率升高、尝试次数减少、穿刺操作时间短，差异具有统计学意义(P<0.05)。
结论 与传统平面内旁矢状位椎板间入路相比，通过正中棘突间平面内入路超声引导下腰麻对肥胖孕产妇是一种更有优势的选择。

PO-0184

The effects of modified deep serratus anterior plane block on surgical stress and perioperative neurocognitive disorders in elderly patients undergoing thoracic surgery: a randomized clinical study

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Background This study aimed to evaluate and compare the effects of a modified deep serratus anterior plane block (DSPB) combined with general anesthesia on surgical stress and perioperative neurocognitive disorder (PND) in elderly patients undergoing thoracic surgery.
Methods Sixty-six patients undergoing thoracic surgery were randomly assigned to receive either single-shot DSPB or local block after tracheal intubation using ropivacaine 0.5% 20 mL. The primary outcomes were the visual analog scale (VAS) score at each time point. Secondary outcomes included the Montreal cognitive assessment (MoCA) score before surgery and after

discharge from the hospital (or seventh day postoperative), malondialdehyde, superoxide dismutase, serum cortisol levels, CRP, drug consumption, vital signs, and blood gas analysis.
Results Sixty patients were eventually enrolled in this study. The VAS scores were significantly lower in the DSPB group than in the local block group (all $P < 0.05$). The difference in blood gas analysis index TCO2 (27.71 ± 3.49 vs. 29.31 ± 2.26) in the two groups was statistically significant ($P < 0.05$). The length of hospitalization in the DSPB group was shorter than that in the local block group (6.03 ± 1.35 vs. 7.20 ± 1.49), and the difference was statistically significant ($P < 0.05$). There were no statistically significant differences in MoCA scores before surgery and after hospitalization (or the seventh day postoperative), stress indices, CRP, vital signs, bispectral index value, blood gas analysis (except TCO2), and drug addiction during extubation at each time point (all $P > 0.05$).
Conclusions Compared with local block, DSPB provided a superior analgesic effect with a lower VAS score and shorter length of hospitalization in elderly patients undergoing thoracic surgery. It does not require ultrasound equipment, making it simpler and easier to operate, and is especially suitable for widespread implementation in grassroots hospitals.

PO-0185

Comparison of anterior quadratus lumborum block via the subfascial approach versus the extrafascial approach in total hip arthroplasty: A prospective, double-blind, randomized controlled tria

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Study objective: The analgesic effect of the anterior quadratus lumborum block (AQLB) in total hip arthroplasty (THA) has been reported in many studies, but the results are inconsistent. Most studies did not specifically elucidate whether the anterior layer of the thoracolumbar fascia was punctured by the needle tip during blockade.This study aimed to compare the analgesic effect of the AQLB via subfascial approach to that via extrafascial approach after THA.
Design: This was a single-center, prospective, double-blind, randomized controlled trial.
Setting: The study was conducted at the Affiliated Hospital of Jiangsu University, Zhenjiang, China.
Patients: We included 60 patients aged 60-80 years who underwent THA.
Interventions: Patients were randomized to undergo ultrasound-guided unilateral AQLB via the subfascial (subfascial group) or extrafascial (extrafascial group) approach using 20 mL of 0.375% ropivacaine. The injection point for the subfascial group was located between the quadratus lumbar muscle and the anterior layer of the thoracolumbar fascia at the L4 level, while the injection point for the extrafascial group was located underneath the fascia of the psoas major muscle at the L4 level. (Figure.1)
Measurements: The primary outcome was postoperative 24 h cumulative sufentanil consumption.
Main results: A total of 58 patients completed the trial. The postoperative 24 h cumulative sufentanil consumption was lower in the subfascial group than that in the extrafascial group ($P < 0.001$, 0.24 [0.24-0.32] μg/kg vs. 0.44 [0.32-0.52] μg/kg). The intraoperative remifentanil consumption was lower in the subfascial group than that in the extrafascial group ($P < 0.001$, 0.02 [0.02-0.03] μg/kg/min vs. 0.05 [0.04-0.07] μg/kg/min). At the time of exiting the post-anesthesia care unit and 6, 24, and 48 h after surgery, the numerical rating scale scores at rest and during movement were lower in the subfascial group. Postoperative quadriceps strength was higher, and the time to first ambulation was shorter in the subfascial group. No other serious adverse clinical events were observed.

Conclusion Subfascial AQLB had a better analgesic effect with less impact on lower limbs strength after THA than extrafascial AQLB.

PO-0186

A Horizontal and Perpendicular Interlaminar Approach for Intrathecal Nusinersen Injection in Patients with Spinal Muscular Atrophy and Scoliosis: An Observational Study

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Background Spinal muscular atrophy (SMA) is a genetic motor neuron disease resulting in progressive muscular atrophy and weakness. Nusinersen, an antisense-oligonucleotide approved for the treatment of SMA, cannot cross the blood-brain barrie and must be administered into the cerebrospinal fluid (CSF) repeatedly by lumbar punctures. However, SMA patients, generally develop neuromyopathic scoliosis associated with the axial rotation of the spine and ossification of the interspinous ligament, posing a great technical challenge in performing lumbar punctures. Previous ultrasound-assisted techniques for lumbar puncture used the angle of the probe as the needle trajectory; however, reproducing the angle is difficult and increases the number of needle manipulations. Therefore, we developed a technique that eliminated both the craniocaudal and lateromedial angulation of the needle trajectory to overall improve this technique. In this study, we describe our novel ultrasound-assisted technique for lumbar puncture in SMA patients with scoliosis with our primary objective to assess the feasibility and safety of this approach.
Methods From January 2022 to July 2023, SMA patients with scoliosis who were referred to the anesthesia department for intrathecal nusinersen administrations (six injections in the first year and three injections per year thereafter) were included. Patients were placed in a standard left lateral decubitus position, with the shoulders and hips vertically aligned with the edge of the bed (Fig. 1a-b). A preprocedural ultrasound scan was performed using a low-frequency (5−2 MHz) curvilinear transducer. Firstly, the probe was placed parallel to the spinous process (SP) line and the interlaminar space was identified and marked on the skin by counting upwards from the sacrum in the paramedian sagittal oblique (PSO) view. The intervertebral level with the clearest and longest anterior complex (AC) was identified as the target interspace and was noted (Fig. 1b-c). Secondly, by adjusting the relative position of the shoulders and hips to align the posterior aspect of the target vertebra with the edge of the bed, patients were positioned on the bed to maintain visualization of the AC and at the same time ensure the probe was perpendicular to the bed edge (Fig. 1d-f). The transverse median (TM) scan was then conducted by positioning the probe perpendicular to the long axis of the spine (Fig. 1g-i). To obtain a normalized transverse view, a rocking maneuver was required which indicates an angled median approach (Fig. 2a-c). To make the angle of needle insertion easier to grasp, we introduced a LP’s triangle model to convert this angled approach to a horizontal path right to the center of the thecal sac. The right triangle’s hypotenuse was the angled median approach, its base was the horizontal paramedian approach, and its height was the lateral offset from the midline (Fig. 2b & 2e). To locate the needle insertion point, the probe was held perpendicular to the edge of the bed at the marked interspace and kept horizontal as verified by a spirit level attached to the probe, with the dural sac centered on the ultrasound screen; note that the thecal sac was at the lateral side of the interspinous ligament (Fig. 2d-f). Finally, the needle insertion point was noted and marked by the intersection of the midpoint of the probe’s long edge and short edge. Through the marked insertion point, a A 25 G or 22 G needle needle was inserted horizontally and perpendicular to the edge of the bed to access the subarachnoid space. The needle position was confirmed by successfully aspirating 5 ml of CSF and then nusinersen (5ml, 12 mg) was intrathecally injected. Success rates, performance times and adverse events were recorded. The primary outcome was

the first-pass success rate, defined as the needle achieving successful dural puncture through a single skin puncture and no needle redirection. Secondary outcome measures included the overall success rate, first-attempt success (defined as the needle achieving successful dural puncture through a single skin puncture), needling time (defined as the time from first needle contact with the skin to visualization of the outflow of CSF), and locating time (time from when the probe was placed on the skin until the skin marking was completed). Adverse events during the procedure and within three post-dural puncture days were recorded.
Results 44 patients were included, with ages ranging from 4 to 34 years old and a median Cobb's angle of 39.9° [IQR, 20.8-78.1°; range: 11.0° to 132°]. A total of 260 lumbar puncture procedures were performed, with an overall success rate of 100%. The first-pass rate was 70% (183/260). In 87% (226/260) of procedures, success was achieved at the first attempt. The median needling time required to achieve successful dural puncture was 1.3 min [IQR, 1.0-2.1 min; range, 0.4 to 30 min]. Using ultrasound to mark the needle insertion point took a median of 8.5 min [IQR, 7.0-11 min; range, 2.5 to 90 min]. Adverse events were infrequent and benign.
Conclusions In conclusion, this novel ultrasound-assisted horizontal and perpendicular interlaminar needle trajectory approach is an efficient and safe method for lumbar puncture in patients with scoliosis secondary to SMA. Given its simplicity, low cost, and safety profile, it could be generalized to other settings for both spinal anesthesia and diagnostic lumbar punctures in challenging patients, such as those with abnormal spinal anatomy, obese, and elderly populations.

PO-0187

嗜铬细胞瘤/副神经节瘤患者术前下腔静脉宽度和呼吸变异度与围术期并发症相关性的研究

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目的 拟行嗜铬细胞瘤/副神经节瘤切除术的患者需在术前服用 α 肾上腺素能受体阻滞剂以控制血压、改善高代谢状态并扩充血容量。术前血容量扩充满意常用一些间接指标评估，如立位收缩压不低于 90 mmHg、没有体位性低血压的症状、红细胞压积降低、体重增加、有鼻塞。实际上，较多研究发现下腔静脉宽度和呼吸变异度与有效循环血容量存在良好的正相关。本研究拟纳入需行 α 肾上腺素能受体阻滞剂准备的接受嗜铬细胞瘤/副神经节瘤切除术的成人患者，探讨下腔静脉宽度和呼吸变异度是否比间接指标更为精确的反应容量状态，从而减少术后并发症。
方法 本研究为单中心前瞻性观察性队列研究。纳入患者为接受嗜铬细胞瘤/副神经节瘤手术,且需要 α 肾上腺素能受体阻滞剂准备的成人患者。于术前 1 天行剑突下纵切面测量下腔静脉直径及呼吸变异度。根据测量结果患者进入容量合适或容量不合适队列（容量不足或容量过量）。患者接受标准的、统一的麻醉、手术和术后照护。主要结局指标为围术期并发症发生率，该指标为复合终点，包括术中持续高血压、术中持续低血压、围术期（术后 30 天内）肺功能障碍、肝肾功能损伤、心脑血管事件和手术切口感染的发生率的总和。次要结局指标为术后机械通气时长、ICU 住院天数、总住院天数。采用 SPSS 22. 0 统计学软件处理数据。分别绘制多个容量指标与围术期并发症的 ROC 曲线，并比较曲线下面积的差异。应用 COX 回归模型探讨术前容量状态与机械通气时长、ICU 入院天数和总住院天数的相关性。$p<0.05$ 认为差异有统计学意义。
结果 最终 80 例患者进入研究队列。超声评估的容量状态与间接指标评估的容量状态（立位血压低于 90mmHg 或体位性低血压症状）一致性微弱：超声评估容量合适的 27 例中，传统指标认为有 8 例容量不足，超声评估容量不合适的 53 例中，传统指标认为有 32 例容量合适，kappa 值=0.082。超声评估容量状态、体位性低血压症状、立位血压低于 90mmHg、体重增加、HCT 增加、鼻塞、上述传统指标总和、上述传统指标加超声与围术期并发症的 ROC 曲线下面积分别为 0.530、0.511、

0.503、0.598、0.520、0.519、0.613、0.642，两两比较均没有统计学差异。探讨容量指标（包括超声与传统指标）与机械通气时长、ICU 住院天数及总住院天数的相关性时，术前无体位性低血压患者的机械通气时长显著长于有体位性低血压患者(4 (2, 5) vs. 2 (0, 3), p=0.016)，其余均没有统计学差异。

结论 依据术前超声测量的下腔静脉宽度与呼吸变异度判定的容量状态与传统指标判定的容量状态一致性微弱。单独的超声指标与传统指标对于围术期并发症的预测能力均较弱。当结合超声指标与五项传统指标时，对于围术期并发症的预测能力能所提升，虽然并没有统计学上的显著性。

PO-0188

鼻部刺激用于预防无痛胃镜患者丙泊酚引起的低氧血症：一项随机对照试验

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目的 无痛胃镜检查中常见由于麻醉镇静导致呼吸抑制出现的低氧血症。本研究观察鼻咽部刺激是否可以诱发呼吸运动，用于预防低氧血症发生，为临床治疗方案提供更多参考。

方法 本研究为一项随机对照试验，筛选中山大学附属第三医院内镜中心行无痛胃镜检查的 160 名患者，随机分为 2 组，每组 80 例：C 组（对照组）、E 组（鼻部刺激组），待患者给药意识消失后、胃镜检查实施前，E 组给予鼻部刺激：研究者将沿下鼻道底部向后置入，根据患者的反应旋转。比较各组出现血氧下降低氧状态（SpO2＜95%）以及低氧血症（SpO2＜90%）的发生率；并对比安全性、舒适性指标。各组采取托下颌等干预低氧治疗措施使用率及红外热成像下患者呼吸频率变化情况。

结果 两组间低氧血症发生率、最低血氧饱和度、低氧持续时间及辅助开放气道措施（例如托下颌）使用率均有统计学差异（P＜0.05）；在红外热成像下，E 组呼吸频率在鼻咽部刺激后有明显的增加。

结论 鼻部刺激能降低无痛胃镜中丙泊酚引起呼吸抑制的发生率，原理可能为加快呼吸频率，增加潮气量。

PO-0189

双水平气道正压通气用于有低氧血症风险患者无痛胃镜检查：一项前瞻性随机临床试验

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目的 低氧血症是镇静期间最常见的不良反应。高龄（年龄大于 60 岁）、衰弱、阻塞性睡眠呼吸暂停低通气综合征、肥胖、高血压、糖尿病、心脏病、美国麻醉医师协会（American Society of Anesthesiologists，ASA）分级较高，是无痛内镜检查过程中的独立风险因素。严重低氧血症或长时间低氧血症可导致冠状动脉缺血和永久性神经系统损伤，甚至导致死亡。在前期研究基础上，拟开展一项前瞻性、随机对照研究，验证 BPAP 通气策略在无痛胃镜检查期间预防低氧血症风险人群的疗效和安全性。我们假设与标准鼻导管组对比，针对低氧血症风险人群，BPAP 通气策略会降低无痛胃镜检查期间低氧血症的发生率。

方法 我们我开展了一项单中心、前瞻性、随机对照试验，在获得书面知情同意书后，将入组 426 例计划接受上消化道内镜检查的高危患者，以 1：1 的比例随机分配至 BPAP 组（B 组）或鼻导管组（N 组），入组患者由内镜医师、护士及经验丰富的麻醉医师组成的医护团队进行检查，并使用专业的复苏设备处理任何紧急情况。记录所有入组患者的人口学和临床基线特征，记录程序化镇静特征、诊疗期间的缺氧和呼吸暂停事件，本研究主要分析集为校正意向性分析集，符合方案分析作为本研究的敏感性分析。低氧血症（75%＜SpO2＜90%，5s＜持续时间＜60s) 发生率作为本研究的主要结局指标。采用 χ^2 检验或 Fisher 精确检验，效应量使用绝对风险差及 95%置信区间评估干预措施的真实效应。根据低氧血症危险因素（年龄＞60 岁、衰弱、BMI＞25kg/m^2、STOP-Bang 评分≥3 分、存在侵入性操作、肺部疾病、心脏疾病、糖尿病）进行亚组分析。
结果 与鼻导管组相比，BPAP 通气显著降低低氧血症（29.2% vs. 5.1%, P <0.05)、亚临床呼吸抑制(41.5% vs.10.3%, P <0.05)的发生率。BPAP 通气策略还减少了低氧血症和亚临床呼吸抑制、严重低氧血症的持续时间，并减少了托下颌、面罩通气、鼻咽通气道的等气道干预措施的次数。
结论 BPAP 通气策略显著降低了行无痛胃镜期间低氧血症高风险患者低氧血症的发生率。

PO-0190

比较聚氯乙烯管和钢丝加强型管用于新型 SaCoVLMTM 视频插管喉罩气管插管的效果

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目的 SaCoVLMTM 是一种新型的视频插管喉罩(video intubating laryngeal mask airway, ILMA)，也是第一个实现连续可视监测的喉罩。目前缺乏使用 SaCoVLMTM 进行气管插管的研究。比较 SaCoVLMTM 下聚氯乙烯(polyvinyl chloride, PVC)管和钢丝增强(wire-reinforced, WR)管的插管成功率。
方法 材料与方法:本研究为前瞻性、单中心、随机对照试验，将择期行腹腔镜手术的患者随机分为 PVC 组和 WR 组。主要结局指标为插管总成功率。次要观察指标为首次插管成功率、气管插管时间、首次接触部位、气管插管调整动作、血流动力学波动、术后不良事件发生率。
结果 结果:共纳入 108 例患者，其中女性 68 例(63.0%);平均年龄 51[9]岁)。PVC 组(n=54)与 WR 组(n=54)的气管插管总成功率差异无统计学意义(98.1%对 96.3%;差异，1.8%，95%置信区间[CI]，-6.5 ~ 10.8;P = 0.558)。PVC 组首次气管插管成功率显著高于 WR 组(83.3%对 64.8%;差异，18.5%，95% CI, 1.9 ~ 33.9;P = 0.028)。PVC 组术后 24 h 咽痛发生率显著高于 WR 组(33.3%对 13.0%;差值:-20.4%，95% CI: -35.2 ~ 4.4;P = 0.041)。
结论 PVC 管和 WR 管均可用于 SaCoVLMTM 安全、有效的气管插管。有初步证据支持使用 SaCoVLMTM 视频 ILMA 时，使用 WR 管进行插管的益处优于使用 PVC 管。需要进一步的研究来验证和扩展这些发现。

PO-0191

Predictive value of a lung ultrasound score for postoperative hypoxemia in patients with blunt chest trauma: A single-center, observational study

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目的：本研究旨在确定肺超声是否可以预测胸部钝挫伤患者术后低氧血症。
设计：前瞻性观察性研究。
地点：三级骨科医院。
参与者：这项观察性研究包括 399 名在 2019 年 11 月 1 日至 2024 年 2 月 2 日期间接受骨折手术的胸部钝挫伤患者。
干预措施：术前进行肺部超声检查，并监测术后氧合指数（PaO2/FiO2）。根据术后 24 h 是否发生低氧血症，将患者分为低氧血症组和非低氧血症组。采用单因素和多因素 logistic 回归分析，确定术后低氧血症的危险因素。采用受试者工作特征曲线评估肺超声评分对术后低氧血症的预测价值。采用线性回归分析肺部超声评分与低氧血症严重程度和持续时间的可能相关性。
结果：术后低氧血症发生率为 37.59%。组间年龄、体重指数、损伤严重程度评分、ASA 分级、慢性阻塞性肺疾病存在、术前低氧血症和胸腔积水、肺部超声评分、术中输注量等差异有统计学意义（P < 0.05）。术后低氧血症的独立危险因素为体重指数≥28.0 kg/m2、肺部超声评分更高、术中输注量更大。肺部超声评分可有效预测术后结局（曲线下面积 0.809，临界点=9），并与低氧血症的严重程度和持续时间相关。
结论： 肺超声评分是预测胸部钝挫伤患者术后低氧血症的可靠指标。体重指数和术中输注量是影响术后低氧血症的重要因素。

PO-0192

不同头位下 THRIVE 对患者气道压的影响：一项自身对照研究

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目的 经鼻湿化快速充气交换通气技术（THRIVE）是一种新型的无创氧疗方式。目前 THRIVE 已应用于声带手术麻醉、紧急插管、纤支镜引导插管等领域。THRIVE 可不插管完成声带手术，减少阿片类药物使用，促进患者快速康复，但术中部分患者出现低氧，具体原因尚未明确。本研究旨在探究张口且无自主呼吸时使用 THRIVE，气道压随头后仰角度变化的趋势，找到最佳头后仰角度，为临床上 THRIVE 通气的体位提供一定参考。
方法 本研究是一项单中心，自身对照研究。纳入择期行非腹腔镜手术的非肥胖患者 31 名。诱导后 THRIVE 予 60L/min 给氧，用量角器测量患者头后仰角度，并用 BevelBox 数显倾角仪精确校准，予个体化枕头固定体位，持续托举下颌维持气道通畅，可视喉镜下在气管内置入测压管至隆突上 4cm（纤支镜定位），记录气道压，按 0°-15°-30°-45°-50°-55°-60°顺序依次改变头后仰角度。诱导后 20min 结束研究。主要结局：各个角度气道压。次要结局：低氧发生率，亚临床呼吸抑制发生率，术前术中的血氧饱和度、血压、心率等，研究过程中转机械通气的发生率，THRIVE 氧疗后不良反应发生状况（鼻腔疼痛、干燥出血）。
结果 本研究共纳入 31 名患者,2 名患者在研究过程中出现亚临床呼吸抑制，SPO2 降至 95%以下，后自行恢复至 95%以上，故不剔除，最终纳入 31 例进行分析。

1. 各个角度气道压力值：气道压随着头后仰角度的逐渐增加呈先增加后减少的趋势。这种关系是非线性的，转折点在 50°左右。
2.安全性：有 2 例超重患者出现了亚临床呼吸抑制，后自行恢复至 95%以上。没有患者发生低氧血症,没有患者转机械通气。研究结束后所有患者的生命体征均平稳。
3.不良事件：本研究中未出现鼻粘膜干燥疼痛、鼻腔出血等不良事件。
结论 患者张口使用 THRIVE，仰头角度以 50°为分界点，气道压随头后仰角度先上升后下降，建议 THRIVE 辅助通气时，患者可适当头后仰在 50°左右，保证最大的气流进入气道。

PO-0193

术中急性等容血液稀释对心脏手术患者术后输血及凝血的影响

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目的 探究术中急性等容血液稀释（acute normovolemic hemodilution, ANH）对心脏手术患者术后 7d 内血制品的输注率、输注量以及术后血常规、凝血和引流量的影响。
方法 回顾性筛选本院 2018 年 1 月-2022 年 3 月行开胸心脏手术的成年患者共 1844 例，根据是否行术中 ANH 分为观察组和对照组。使用倾向性评分匹配方法进行 1:1 匹配，比较两组间术后输注红细胞、血浆、血小板、纤维蛋白原、凝血酶原复合物的差异，并比较术后不同时间点（术后首次、1d、2-3d、4-7d）最低血红蛋白（hemoglobin, Hb）对应的血常规指标、最高凝血酶原时间（prothrombin time, PT）对应的凝血指标以及术后引流量的差异。使用 Logistic 回归分析采集自体全血体积/体重与术后是否输注红细胞的关系。
结果 共 1450 例患者被纳入分析，其中观察组 444 例，对照组 1006 例，共 239 对完成匹配。观察组术后 4-7d 的 Hb（104.5±13.5g/L vs 99.8±13.6g/L, P<0.001）、红细胞压积（30.9±3.9% vs 29.6±4.0%, P=0.001）、血小板（175.2±72.3×109/L vs 161.8±71.0×109/L, P=0.043）显著高于对照组，术后 2-3d 的 PT 与对照组相比有显著差异（13.6[13.0,14.5]s vs 13.6[13.2,15.1]s, P=0.013）。其他时间点和相应指标两组无统计学差异。术后 7d 内观察组输注红细胞率(45(18.8)% vs 84(35.1)%, P<0.001)和总量(0[0,0]U vs 0[0,2]U, P<0.001)均显著低于对照组，术后血小板输注率(8(3.3)% vs 21(8.8)%, P=0.013)和总量(0[0,0]U vs 0[0,0]U, P=0.021)与对照组相比有显著差异，观察组的凝血酶原复合物输注率更低（2(0.8)% vs 9(3.8)%, P=0.033）。其他血制品输注情况以及术后引流量两组间无统计学差异。Logistic 回归分析发现自体全血体积/体重的增加与术后输注红细胞率减少相关（OR=0.910, 95%CI 0.853-0.971, P=0.005）。
结论 术中急性等容血液稀释的使用与术后红细胞及血小板输注率和输注量的减少有关。更高的自体全血体积/体重可能对降低术后红细胞输注率有保护作用。

PO-0194

心脏手术异体输血预测模型的开发和内部验证

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目的 体外循环（Cardiopulmonary Bypass，CPB）下心脏外科手术是治疗心血管疾病的主要手段，全球范围内每年约有数百万例患者接受体外循环下心脏手术，如冠状动脉旁路移植术（CABG）和瓣膜置换术。由于存在合并症和术中出血等因素，这类患者围手术期输血率高达 30%—60%。围术期异体血输注与术后不良事件、死亡率增加及住院时间延长显著相关。因此，适当的输血需求预

测和术前贫血管理对于减少术后并发症、缩短住院时间、提高患者满意度和降低医疗成本至关重要。通过预测输血需求，可以帮助减少与输血相关的风险和并发症，如传染性疾病、免疫反应、输血相关的急性肺损伤等，从而提升患者的安全性。并且能够帮助医疗机构更有效地规划和分配宝贵的血液资源。

方法 回顾性收集 2017 年 09 月 01 至 2022 年 06 月 30 期间在浙江大学医学院附属第二医院接受体外循环下心脏瓣膜置换术、冠脉搭桥手术或二者联合手术，且年龄≥18 岁患者的临床资料。排除急诊手术、术中大量输血、结局信息缺失等患者。使用本中心数据构建模型，并进行内部验证。采用 LASSO 回归分析筛选预测变量，根据变量筛选结果构建 Logistic 回归模型，并利用列线图将模型可视化展示。采用受试者操作特征曲线、校准曲线和临床决策曲线分析来评估模型性能。

结果 本研究一共纳入了 1607 名患者，其中 1125 例患者作为建模组，482 例患者作为内部验证组。建模组术中输血的发生率为 41.9% (n=471)，验证组术中输血的发生率为 44.6% (n=215)。LASSO 回归分析筛选出 5 个变量（包括性别，年龄，BMI，术前是否存在贫血以及术前白蛋白水平）进行模型构建。在此基础上该模型在建模组和内部验证组均表现良好，AUC 值在建模组和内部验证组分别为 0.753 和 0.750，灵敏度为 0.695，特异度为 0.730，约登指数为 0.194。校准曲线及临床决策曲线分析也显示模型在两组中均具有较好的校准度和临床应用价值。

结论 开发并内部验证的心脏手术异体输血预测模型，基于五个易于获取的临床变量，有效预测了术中异体红细胞输注的风险。该模型的成功开发为医疗团队提供了一个实用工具，以识别高风险患者并采取预防措施，从而优化患者的围术期血液管理。

PO-0195

Effect of acute hypervolemic hemodilution versus restrictive fluid infusion on intraoperative bleeding in hepatectomy: a retrospective cohort study

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BACKGROUND AND OBJECTIVE: Partial hepatectomy is the main treatment for benign and malignant liver diseases. The liver is a blood-rich organ, and the most common complication in hepatectomy is bleeding during dissection of the liver parenchyma. Postoperative morbidity and mortality are associated with excessive bleeding, and transfusion of blood carries latent risks and increases the economic burden on patients. Nowadays, the LCVP (low central venous pressure) technique is advocated to reduce intraoperative bleeding in hepatectomy, which refers to controlling CVP (central venous pressure) between 3-5 cmH_2O. One of the methods to achieve LCVP is to restrict fluid infusion before complete dissection of the liver parenchyma. Superimposed on factors such as preoperative fasting and no drinking, the vasodilatory effect of anesthetic drugs, intraoperative bleeding, reverse Trendelenburg position, and combined application of nitroglycerin, the fluid restriction will result in a significant lack of effective blood volume of patients, and there are risks of hemodynamic instability, poor microcirculatory perfusion, and renal injury. The effectiveness and safety of restrictive fluid infusion strategies to reduce intraoperative bleeding in hepatectomy are still controversial. In the context of LCVP becoming the basic fluid management strategy in hepatectomy, a medical group of the Department of Liver Surgery, West China Hospital, Sichuan University, considers that the application of AHH (acute hypervolemic hemodilution) in hepatectomy, which refers to the rapid infusion of crystalloid fluid to reduce the HCT (hematocrit) and increase blood volume before the dissociation of liver parenchyma after anesthesia induction, not only doesn’t increase intraoperative bleeding but also stabilizes the circulation. It is beneficial to the patient's intraoperative safety and outcome. AHH is a simple and effective strategy of blood conservation, which involves the infusion of crystalloid or colloidal solutions before the operation, thus

increasing blood volume while decreasing HCT, decreasing blood viscosity, and improving the oxygen supply of tissues. It is applied in major surgeries to reduce intraoperative bleeding and transfusion rates and increase urine output . Perhaps influenced by the concept of LCVP, there is no literature on the use of AHH in hepatectomy. This method is contrary to the traditional LCVP-guided fluid restriction strategy, so this study aims to investigate the effect of LCVP guided restrictive infusion and AHH on intraoperative bleeding in hepatectomy.

Methods This retrospective cohort study collected data from 358 patients who underwent hepatectomy at West China Hospital of Sichuan University from July 2017 to November 2022. Patients were routinely monitored for electrocardiogram, pulse oxygen saturation, and noninvasive blood pressure after admission, radial artery catheterization for invasive blood pressure, and urethral catheterization for monitoring urine output after anesthesia induction. At the process of hepatic resection, surgeons were using Pringle's maneuver. The patients were divided into the fluid restriction group (Group L) and the acute hypervolemic hemodilution group (Group A) according to different fluid management protocols. Group L: Intraoperative fluid management was divided into two stages. The first stage was from the induction of anesthesia to the completion of hepatic parenchyma dissociation: limiting the fluid intake, with 2-4 mL/kg/h crystalloid as the base volume; the second stage was from the completion of hepatic parenchyma dissociation to the end of the operation: volume resuscitation at a rate of 6-10 mL/kg/h fluid infusion. Group A: Intraoperative fluid management was divided into two stages. The first stage was the anesthesia induction to the start of dissociation of hepatic parenchyma: rapid infusion of crystalloid at a rate greater than 10 mL/kg/h. The second stage was the start of dissociation of hepatic parenchyma to the end of the operation: rehydration volume was determined by the anesthesiologist based on the individual patient's condition. To determine if the two groups differed in intraoperative bleeding, postoperative alterations of biochemical indicators, and the occurrence of pulmonary complications.

Results 358 patients were enrolled according to inclusive and exclusive criteria, including 143 patients in group L and 215 in group A. Intraoperative urine decreased by 22.2 mL/h in group L compared to group A (P=0.003, 95% CI [-38.0,-4.5]), the norepinephrine use rate was 21.0% in group L and 8.8% in group A (P=0.001, 95%CI[0.04,0.20]), the albumin loss decreased by 1.4 g/L in group L compared to group A (P=0.012, 95% CI [-2.5, -0.3]), and there was no significant statistically difference between the two groups in bleeding, intraoperative blood transfusion rate, postoperative hospital stay, intraoperative infusion, the incidence of postoperative pleural effusion and pulmonary infection, coagulation indicator, liver and kidney function-related indicators.

Conclusion There was no significant difference between the effect of AHH and LCVP-guided restrictive infusion strategy on intraoperative bleeding in hepatectomy, and the use of AHH was associated with an increase in intraoperative urinary output and a decrease in norepinephrine use rate.

PO-0196

Development and validation of a nomogram for predicting perioperative red blood cell transfusion in children undergoing cardiac surgery with cardiopulmonary bypass

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目的 Timely recognition for perioperative red blood cell transfusion (PRT) risk is essential for tailoring personalized blood management strategies in pediatric patients. Herein, we sought to construct a prediction model tailored for PRT in pediatric patients undergoing cardiac surgery utilizing cardiopulmonary bypass (CPB).

方法 In this retrospective analysis spanning September 2014 to December 2021, 23,884 pediatric subjects under 14 years of age underwent random allocation into training and testing cohorts at a 7:3 ratio. Univariate logistic regression and least absolute shrinkage and selection operator (LASSO) regression enabled variable selection. Multivariate logistic regression was conducted to identify predictors, and a nomogram was created for PRT risk prediction. Discrimination, calibration, and clinical utility were assessed in both cohorts. And we also stratify the PRT risk.
结果 Following multiple rounds of variable selection, age, weight, preoperative hemoglobin, cyanotic congenital heart disease, CPB time, the minimum rectal temperature during CPB, priming volume of CPB and small incision emerged as predictors of PRT risk in the pediatric patients. The prognostic model incorporating these eight variables yielded an area under the curve (AUC) of 0.886 (95% CI: 0.880-0.891) and 0.883 (95% CI: 0.875-0.892) in the training and testing groups, respectively. The calibration plot of the nomogram closely approximated the ideal diagonal line. The decision curve was positioned above the extreme line, indicating that the model brings a net clinical benefit.The risk stratification results show that the predicted risk is consistent with the actual risk.
结论 Our predictive model based on preoperative parameters exhibits good performance in identifying for PRT risk in children undergoing cardiac surgery with CPB, providing clinicians with a convenient tool to optimize individualized perioperative blood management strategies for this particular patient population.

PO-0197

高原患者术中输注红细胞发生术后缺血事件的危险因素

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目的 久居高原人群因长期在高海拔、低气压、低氧环境下生存，对缺氧产生代偿反应，可引起单位容积循环血中红细胞（RBC）数和血红蛋白（Hb）值增高，甚至出现高原红细胞增多症（HAPC）。过度增生的 RBC 导致血液粘滞度显著增加，血液呈高凝状态，组织因子暴露，进一步加重组织缺氧，输血后可能诱发心肌梗死、卒中及急性肾功能衰竭等缺血事件。本研究拟评估久居高原患者到平原行手术治疗，术中输注红细胞悬液与术后发生缺血事件（IE）之间的相关性。
方法 本研究为回顾性、病例对照研究，获得医院伦理委员会批准及患者的知情同意书赦免，并在中国临床试验注册中心进行了临床注册（ChiCTR2300074941）。纳入标准：①2020 年 1 月-2023 年 12 月在西藏自治区人民政府驻成都办事处医院行手术，并在术中接受异体红细胞悬液输注；②年龄 18-80 岁；③患者来自高海拔地区（≥2500m），世居或居住史≥20 年。排除标准：①急诊手术；②心脏手术；③ASA 分级Ⅳ级及以上；④于手术台上死亡；⑤发生输血过敏反应；⑥无法获取主要结局指标。根据术后是否发生 IE 分为 IE 组和非 IE 组，采用多因素 Logistic 回归分析（向前逐步回归法）确定久居高原患者术中输注红细胞悬液后发生缺血事件的相关危险因素。
结果 研究纳入择期行插管全麻并在术中输注异体红细胞悬液的久居高原患者 327 例（图 1），男 125 例，女 202 例，年龄 22~80 岁，BMI 18.4~39.1 kg/m2，ASA Ⅰ-Ⅲ级。术后住院期间，发 IE 的患者 95 例（29.1%）。与非 IE 组比较，IE 组年龄、ASA 分级、居住海拔高度更高，IE 组患者术前存在高血压、脑梗死、冠心病和 HAPC 病史的比例明显升高（P<0.05）（表 1）。术后发生 IE 的患者，行腹部手术和颅脑手术的比例更高（P=0.014），术中输血前最后一次 Hb 更低，Hb 值下降更多，出血量和输注红细胞悬液量更多，麻醉时间更长（P<0.001）。与非 IE 组相比，IE 组患者术后住院时间明显延长（P=0.003），术后非计划入 ICU 率和术后再插管率均明显增加（P<0.001）（表 2）。校正混杂因素结果后显示（图 2）：年龄增大、常居海拔高度高、脑梗死病史、HAPC 病史、术中输血前 Hb 值低、Hb 下降值高、术中出血量多、麻醉时间长，是术后发生缺血相关并发症的危险因素。

结论 年龄增大、常居海拔高度高、脑梗死病史、HAPC 病史、术中输血前 Hb 值低、Hb 下降值高、术中出血量多和麻醉时间长是高原患者术中输注红细胞悬液发生术后缺血相关并发症的危险因素。

PO-0198

系统评价输血策略对急性心肌梗死患者预后的影响

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目的 采用系统评价及 Meta 分析的方法评价限制性输血与自由输血策略对急性心肌梗死患者预后的影响。
方法 计算机检索 PubMed、Embase 、Web of Science、中国生物医学文献服务系统（SinoMed）、维普（VIP）、中国知网（CNKI）及万方数据知识服务平台（Wanfang Data）中有关急性心肌梗死患者接受输血治疗的随机对照试验（RCT），检索时间均从建库至 2024 年 6 月。由 2 名研究者按照纳入排除标准筛选文献、提取资料，2 名评价员独立对纳入文献的质量进行评价，采用 RevMan5.3 进行 Meta 分析，比较限制性输血与自由输血策略对急性心肌梗死患者住院期间全因病亡率，总死亡率，随访再梗塞及心血管不良事件的影响差异。
结果 最终纳入 8 项研究共 9056 例患者。Meta 分析结果显示，与开放性输血策略相比，限制性输血组院内死亡风险较高，差异有统计学意义〔相对危险度（RR）RR＝1.38，95%CI 为 1.16～1.65，P＝0.0003〕；限制性输血与开放性输血策略在总体死亡率（RR＝0.93，95%CI 为 0.68～1.26，P＝0.63）、随访再梗塞（RR＝1.10，95%CI 为 0.65～1.89，P＝0.72）、主要不良心血管事件方面风险（RR＝0.88，95%CI 为 0.55～1.39，P＝0.57）等差异均无统计学意义。
结论 与限制性输血相比，开放性输血可降低 AMI 患者院内死亡风险，但二者在随访死亡率、复发心肌梗死和主要心血管不良事件方面的发生率未见明显差异，由于纳入研究异质性较高，需更多 RCT 进一步证实，临床应谨慎对待本研究的结论。

PO-0199

Efficacy and safety of four-factor prothrombin complex concentrate in patients with massive intraoperative bleeding during noncardiac surgery: a retrospective cohort study

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Purpose Massive bleeding during surgery often leads to coagulopathy, exacerbating bleeding severity and increasing transfusion requirements. Four-factor prothrombin complex concentrate (4F-PCC) has been shown to improve coagulation status in cardiac surgery, but its efficacy and safety in noncardiac surgery are unclear. We investigated the associations of 4F-PCC with postoperative red blood cell (RBC) transfusion and adverse events in noncardiac surgery patients with massive intraoperative bleeding.
Patients and methods This single-center retrospective cohort study included adult patients who experienced massive intraoperative bleeding during noncardiac surgery at Peking Union Medical College Hospital between 2014 and 2020. Massive bleeding was defined as requiring ≥10 units of RBC transfusion. Administration of 4F-PCC was categorized into dose groups based on quartiles (0, 2.8–6.7, 6.7–11.5, 11.5–19.4, and 19.4–87.5 IU/kg). The outcomes included postoperative

RBC transfusion, major thromboembolic events, severe acute kidney injury, and lengths of intensive care unit and hospital stay. Outcomes were analyzed using multivariate regression models and restricted cubic splines adjusted for potential confounders.
Results A total of 137 noncardiac surgery patients with massive intraoperative bleeding were included, of whom 89 (65.0%) received 4F-PCC. The findings revealed that 4F-PCC doses ranging from 6.7–11.5 IU/kg were significantly associated with reduced postoperative RBC transfusion (adjusted mean difference, -1.29 units; 95%CI, -2.55 to -0.04 units, P = 0.044). Such findings were not observed in other dose groups. Notably, the benefits of 4F-PCC were particularly significant in patients with relatively intact baseline coagulation status, specifically those with preoperative platelet count ≥150 ×109/l (P = 0.031), and fibrinogen level ≥3 g/l (P = 0.025). Patients who received 4F-PCC within the 6.7–11.5 IU/kg dose range exhibited comparable incidences of major thromboembolic events (13.0% versus 10.4%) and severe acute kidney injury (8.7% versus 8.3%) compared to those who did not receive 4F-PCC. Furthermore, the lengths of intensive care unit and hospital stay did not differ significantly between the groups.
Conclusion ur study suggests that 4F-PCC at optimal doses is associated with decreased postoperative RBC transfusion in noncardiac surgery patients experiencing massive intraoperative bleeding, without a significant increase in the risk of major thromboembolic events. Further randomized controlled trials are needed to validate these findings and establish optimal dosing protocols.

PO-0200

ECPR 患者的最佳温度控制策略：一项网状 Meta 分析

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目的 体外心肺复苏（ECPR）患者最佳温度控制策略尚不清楚，本研究目的是进行系统评价和网络荟萃分析（NMA）来评估 ECPR 患者温度控制的疗效。
方法 在 MEDLINE、EMBASE、Scopus 和 Cochrane 中检索 ECPR 过程中温度控制策略的相关研究。所有在 2024 年 3 月 1 日之前发表的随机对照试验和观察性研究均被纳入。预先定义的主要结局为 ECPR 后生存率及良好的神经系统功能结局。对中低温组（32-34°C）、亚低温组（35-36°C）和常温组（>36C）的研究结果进行两两荟萃分析和贝叶斯 NMA 分析。
结果 文献检索确定了 34163 项研究，最终纳入 20 项研究（ 1 项前瞻性研究和 19 项回顾性研究，共 5622 例患者）。直接分析显示，中低温组生存率有升高趋势（优势比[OR]， 1.43;95%可信区间[CI]: 0.86-2.31）和亚低温组（OR, 1.26;95% CI 0.68-2.27）；然而，这些差异在直接和 NMA 结果中都没有统计学意义。直接证据比较显示，中低温相较于亚低温组（OR, 1.73;95% CI: 1.07-2.81）及常温（OR, 2.14;95% CI: 1.24-3.67）具有更好良好的神经预后。经直接或间接分析，三组出血并发症发生率无差异。
结论 中低温可改善 ECPR 患者的神经预后。与常温相比，中度和轻度低温可能与生存率的提高或出血并发症的增加无关。

PO-0201

目标导向灌注体外循环在心脏瓣膜置换术后急性肾损伤的研究

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目的 急性肾损伤(AKI)是心脏手术后常见并发症，可影响患者的整体愈合，增加医疗费用，氧供指

数（DO_2I)的目标导向灌注（goal-directed-perfusion,GDP）策略可减少体外循环后急性肾损伤的发生，因而减少医疗费用，具有重要临床应用意义。
方法 选择择期体外循环下行心脏瓣膜置换术患者 216 例，按照改善全球肾脏疾病的结局（KDIGO）标准确定在术后 72h 内急性肾损伤，纳入 110 例患者按照 2019 年美国体外循环技术杂志速查表为目标导向灌注（GDP）组,目标导向灌注（GDP）组依据氧供、氧耗、氧供指数设定氧供目标值为 DO_2I>280ml/(㎡.min), 氧分压为 200mmHg,低于目标值时通过调整超滤器量 和/或增加灌注流量维持组织氧供 ；对照组 106 例，采取常规灌注技术，灌注流量为 2.0-2.4L/(㎡.min), 氧分压为 200mmHg，记录术后 72h 内 AKI 的发生率；记录 AKI 分期和肾脏替代治疗（RRT）发生情况；机械通气时间、ICU 停留时间、术后住院时间；术前、术后 24h、48h、72h 血清肌酐（Scr）、尿素氮（BUN）、估算肾小球滤过率（eGFR）。对相关指标进行比较。
结果 GDP 组 DO_2I 为 280ml/(㎡.min)，对照组最低 DO_2I 为 236ml/(㎡.min) （P<0.05）； GDP 组 AKI 发生率为 10.71%（12 例），对照组 AKI 发生率为 25.86%（30 例）（P<0.05）；GDP 组诊断 AKI 1 期 7 例；2 期 4 例，3 期 1 例，没有接受 RRT 治疗；对照组诊断 AKI 1 期 18 例,2 期 8 例，3 期 4 例，接受 RRT 治疗 3 例；对照组机械通气时间，ICU 停留时间，术后住院时间均延长（P<0.05）,两组术后不同时点 Scr，BUN 均升高，对照组比 GDP 组升高显著（P<0.05）;两组术后 eGFR 均降低，对照组比 GDP 组下降显著（P<0.05）
结论 目标导向灌注体外循环管理可及时调整超滤和灌注流量，维持血红蛋白水平，可降低急性肾损伤的发生，GDP 可以优化体外循环管理,氧供指数改善灌注策略对预防 ECC-AKI 的作用具有重要临床应用价值。

PO-0202

Veno-arterial extracorporeal membrane oxygenation alleviates acute kidney injury after septic shock by inhibiting iron overload and ferroptosis via HIF-1α signaling pathway

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Purpose: Acute kidney injury (AKI) is the most common complication of septic shock, with a high mortality rate and a lack of effective clinical interventions. Whether veno-arterial extracorporeal membrane oxygenation (VA-ECMO) prevents AKI when providing circulatory support to patients with septic shock is controversial.
Method: We investigated the role of VA-ECMO in alleviating acute kidney injury after septic shock in vivo using a rat model. In the kidney tissue, RNA and metabolome sequencing, kidney injury, and cytokine expression were evaluated to explore the underlying mechanisms of VA-ECMO in preventing renal injury after septic shock.
Results VA-ECMO treatment could effectively reinstate circulation, ensure adequate tissue oxygenation and attenuated tissue injury and inflammatory response of kidney in rats with septic shock. Furthermore, we noticed that the VA-ECMO inhibited ferroptosis, shown as the prevention of the higher total iron, Fe2+, MDA, and ROS levels in septic shock rat model. According to RNA and metabolome sequencing analysis, the inhibition of renal ferroptosis during VA-ECMO was associated with hypoxia-inducible factor-1α
(HIF-1α) signaling inhibition. In addition, we discovered transferrin receptor 1 (TFR1) and divalent metal transporter 1 (DMT1), which were the key factors of ferroptosis and down-stream proteins of HIF-1α, were significantly downregulated. Additional animal experiments confirmed that the loss of the oxygenator during VA-ECMO reversed the HIF-1α signaling inhibition and led to iron overload and subsequent ferroptosis in kidney.

Conclusion These findings suggest that VA-ECMO protects against kidney injury after septic shock by inhibiting iron overload and ferroptosis via HIF-1α signaling pathway. Strategies aimed at preventing ferroptosis and stabilizing HIF-1α pathway could enhance renal protection, thereby facilitating the use of VA-ECMO for providing circulatory support to patients experiencing septic shock.

PO-0203

ECMO 辅助在心脏外科中的应用

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目的 背景：体外膜肺氧合（Extracorporeal Membrane Oxygenation，ECMO）技术通过体外设备模拟心肺功能，为患者提供氧气和营养物质的输送，同时清除二氧化碳和其他代谢废物。它主要由血管通路、血泵、氧合器以及监控系统等部分组成，能够根据患者的需要调整支持强度，实现个性化治疗。随着医疗技术的不断进步，ECMO 作为一种重要的生命支持手段，在心脏外科领域的应用越来越广泛。ECMO 能够为心脏外科患者提供有效的循环和呼吸支持，尤其在心脏手术后心功能恢复不佳或需要长期支持的情况下，发挥着至关重要的作用。我们旨在报告几例围手术期应用 ECMO 辅助的心脏外科手术患者的救治及转归情况。
方法 我们收集了中山市人民医院心脏外科手术患者在围手术期应用了 ECMO 辅助治疗的患者的诊疗数据。数据来源于医院 HIS 系统及手术麻醉系统，包括：人口统计特征、原发疾病及手术信息、麻醉信息、检验检查结果、ECMO 诊疗数据、病程重要图片、患者转归等。
结果 我们报告了 6 例在围手术期应用了 ECMO 辅助治疗的患者的诊疗信息。其中在术前应用 ECMO 辅助的患者 3 例：1 例为在心脏移植等待期因恶性心律失常行 ECMO 辅助，1 例为心脏外伤导致循环衰竭紧急行 ECMO 辅助，1 例为乳头肌断裂导致的二尖瓣重度反流，患者迅速出现多脏器功能不全表现，行 ECMO 辅助；在术中应用 ECMO 辅助的患者 2 例：1 例为冠状动脉搭桥术中 IABP 辅助下反复室颤，行 IABP+ECMO，1 例为心脏移植术中心脏自行复跳后停体外循环转股动静脉插管 ECMO 辅助；在术后应用 ECMO 辅助的患者 1 例，为二尖瓣置换术+三尖瓣整形术+房颤射频消融术术后低心排，行 ECMO 辅助。6 例患者在短期 ECMO 辅助后，均成功撤机，转归良好。
结论 ECMO 作为一种重要的生命支持手段，在心脏外科领域的应用具有广阔的前景和重要的价值。通过不断的研究和实践，我们可以进一步提高 ECMO 在心脏外科中的治疗效果和安全性，为更多患者带来福音。

PO-0204

Enhancing Surgical Safety and Outcomes with ECMO in Airway Tumor Resection

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麻醉科

Background Extracorporeal Membrane Oxygenation (ECMO) is increasingly recognized as a vital support tool in complex thoracic surgeries, especially for airway tumor resections where traditional ventilation methods may be inadequate. ECMO provides critical respiratory and circulatory support during surgical procedures that involve significant airway manipulation, such as those necessitated by the presence of large or strategically located tumors that cause airway

obstruction. This article presents a comprehensive analysis of ECMO's role in enhancing surgical safety and outcomes in airway tumor resection surgeries.
Methods Between September 2015 and May 2024, we conducted a focused review of case studies and clinical interventions where ECMO was utilized during airway tumor resections. The review encompassed a variety of clinical settings and tumor types, assessing the impact of ECMO on patient outcomes and surgical complications. Data were collected on the type of ECMO used (veno-venous or veno-arterial), duration of support, intraoperative data, and postoperative recovery metrics.
Results Our analysis included 37 cases where ECMO was implemented during airway tumor resection surgeries. Among them, 5 patients used veno-arterial (VA) ECMO and 32 used veno-venous (VV) ECMO. All patients were successfully weaned off ECMO. The median support duration was 12.5 hours. Postoperative outcomes showed a high survival rate, with 91.9% of patients discharged in stable conditions. Complications related to ECMO, primarily hemorrhage (68.2%, 15/22), variably affected the surgeons' ability to operate. Since the adoption of heparin-free ECMO, patients have achieved better outcomes (6.7%, 1/15).
Conclusion The integration of ECMO into surgical protocols for airway tumor resections represents a significant advancement in thoracic surgery. By providing vital life support capabilities during critical phases of these complex surgeries, ECMO not only enhances the safety of the procedures but also improves patient outcomes.

PO-0205

无肝素 V-V ECMO 支持下支气管镜介入治疗严重气管狭窄的效果评价

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目的 探究无肝素体外膜肺氧合（extracorporeal membrane oxygenation，ECMO）支持下支气管镜介入治疗严重气管狭窄患者的效果。
方法 回顾性分析 2016 年 1 月—2024 年 6 月在徐州市中心医院收治的在 ECMO 支持下行支气管镜手术治疗的严重气道狭窄患者 8 例，其中 5 例采用低肝素化抗凝，3 例采用无肝素化，并结合检索到的相关文献总结无肝素 V-V ECMO 在此类患者中的应用体会，包括治疗经过、疗效以及 ECMO 相关并发症等。对 ECMO 出凝血的监测指标进行对比分析。
结果 8 例严重气道狭窄患者均在 ECMO 支持下顺利完成支气管镜介入治疗手术，术中氧合满意，未发生 ECMO 相关并发症，其中 1 例低肝素化患者因术野渗血严重使手术难度增加，治疗时间延长。3 例无肝素化手术视野清晰且未发生血栓形成事件。7 例为预防性安置 ECMO，1 例为紧急安置 ECMO，手术结束即刻均顺利撤机。经支气管镜介入治疗后，7 例患者气促指数和 mMRC 评分得到明显改善，均顺利出院。1 例患者因术后 3 天突发气道大出血死亡。低肝素抗凝组 ACT 和 APTT 稍高于无肝素化组。检索到的无肝素 ECMO 辅助下的创伤患者、器官移植患者以及非创伤患者均取得了满意的效果，且未发生血栓形成事件。但我们的实践和以往文献报道显示，使用免肝素化策略最长 8 天没有明显的并发症，对于免肝素化最长安全期限尚无确切建议。
结论 无肝素化 V-V ECMO 短期可安全用于支气管镜介入治疗严重气道狭窄，并为术者提供清晰的术野，降低抗凝相关并发症的发生率。

PO-0206

体外循环在介入主动脉瓣置换术中的应用

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目的 回顾本中心经导管主动脉瓣植入（TAVI）和经心尖主动脉瓣置换（TAVR）术中接受心肺转流（CPB）的情况，以期为患者的救治提供经验。
方法 回顾性分析我院 2017 年 7 月至 2023 年 5 月 93 例行经导管主动脉瓣置换术(transcatheter aortic valve implantation,TAVI)或心尖主动脉瓣置换（Surgicalaortic valve replacement，TAVR）的高龄老年退行性主动脉瓣病变患者的临床资料,其中有 9 例在体外循环(cardiopulmonary bypass,CPB)辅助下完成手术,男性 7 例,女性 2 例,年龄 71 ~ 87 岁,平均(75.89 ± 5.27)岁；均为极重度主动脉瓣狭窄；心功能 NYHA 分级Ⅱ ~ Ⅳ级；中转开胸外科主动脉瓣置换(SAVR)1 例。
结果 TAVI 手术中应用体外循环 9 例,应用比例为 9.68% ,9 例为挽救性应用,其中死亡 2 例(22.22%)。93 例患者围术期共死亡 5 例,总体死亡率为 5.37% ,其中转正中开胸外科主动脉瓣置换 1 例。
结论 TAVI 紧急中转体外循环死亡率较高。体外循环作为机械循环支持的重要组成部分,在维持血流动力学稳定方面起重要作用,对于极高危患者体外循环辅助下 TAVI 是安全可行的,一旦术中出现突发情况,建议尽早启动 CPB。

PO-0207

我国麻醉医师对麻醉相关法律风险的认知现状
——基于四川省 6 家三甲医院的调研

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目的 随着我国逐步进入法制社会，公民法律意识的提高，维权意识的增强，医疗纠纷及相关诉讼逐年增加，麻醉医师所面临的法律风险呈上升趋势，但目前关于麻醉医生对麻醉相关法律风险认知的研究却明显缺乏。为了更好的了解我国麻醉医师对执业工作、毒麻药品、紧急救治措施等方面法律风险的认识，我们进行了一项横断面的调查。
方法 本研究通过问卷星调研问卷向四川省 6 家大型三甲医院麻醉科的麻醉医生发送一份匿名的调研问卷，问卷内容涵盖了上述麻醉相关法律风险问题的各方面。调研数据收集时间为 2023 年 2 月 1 日至 2023 年 4 月 1 日。
结果 本研究共纳入 224 份反馈问卷。研究结果发现：1) 我国麻醉医生的医疗赔偿的发生率为 5.8%；我国麻醉医生对执业工作相关法律方面的认知水平较低:平均正确率仅为 63.4%，85.3%的受访者不知道麻醉医师伪造、变造、买卖、出租、出借医师执业证书的处罚措施；2)对毒麻药品相关问题的认知率更低：平均正确率仅为 48.1%，大多数（75%）的受访者不知道麻醉医生犯非法提供麻醉药品罪将受到的处罚措施。71.4%的受访者不知道未取得麻醉药品和第一类精神药品处方资格的麻醉医师违规开具上述药品，造成不良后果甚至构成犯罪，需要承担的法律责任；3)对紧急施救相关

问题的正确率仅为 56.0%，绝大多数（86.6%）的反馈者不知道麻醉医师在执业活动中对需要紧急救治的患者拒绝急救处置或者由于不负责任延误救治需要承担的法律后果。
结论 本研究结果表明我国麻醉医师对麻醉相关法律风险的整体认知率较低。这一问题值得医疗机构及科室管理者高度重视，可能增加医疗事故发生率、麻醉医师的心理负担甚至潜在影响卫生法律的制定。

PO-0208

PDCA 循环管理在降低头颈肿瘤游离皮瓣术后气管拔管反应及拔管并发症发生率中的效果

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目的 运用 PDCA（plan-do-check-action）循环管理法分析头颈肿瘤游离皮瓣术后气管拔管反应及拔管并发症的原因，针对要因制定和实施改进措施，探索 PDCA 循环应用降低头颈肿瘤游离皮瓣术后气管插管拔管反应及拔管并发症发生率中的效果。
方法 收集空军军医大学第三附属医院麻醉 ICU2023 年 1 月至 2023 年 4 月实施 PDCA 循环管理前的 80 例头颈肿瘤游离皮瓣移植术后气管插管需拔管患者作为对照组；2023 年 5 月至 2023 年 8 月实施 PDCA 循环管理后的 90 例头颈肿瘤游离皮瓣移植术后气管插管需拔管患者作为实验组。比较 PDCA 循环管理法实施前后 2 组拔管反应及拔管并发症的差异。
结果 拔管反应指标有心血管反应阳性率、疼痛 VAS 评分≥4 分占比、躁动发生率、拔管后咽痛发生率。心血管反应定义为拔管后 1 分钟心率或收缩压、舒张压、平均动脉压较拔管前 5 分钟改变幅度＞50%。躁动定义为四肢或头有摆动。拔管并发症指标有拔管后颈部血肿发生率。运用 PDCA 循环管理法，通过完善规章制度流程、加强督导和反馈、强化全员培训，使头颈肿瘤皮瓣术后气管拔管心血管反应阳性率从实施前的 28%下降至实施后 10.7%，拔管时 VAS 评分≥4 分占比从实施前的 56%下降至实施后的 14.2%，拔管时躁动发生率从实施前的 32%下降至实施后的 7.14%，拔管后咽痛发生比例从实施前的 100%下降至实施后的 42.86%，拔管后颈部血肿发生率从实施前的 2.5%下降至实施后的 0%，差异均有统计学意义（P ＜ 0.05）。
结论 PDCA 循环管理法在降低头颈肿瘤游离皮瓣术后气管拔管反应及拔管并发症发生率的应用效果确切，能够降低拔管反应，减低拔管并发症，是医疗质量管理的一种科学的管理方法。

PO-0209

基于 PDCA 循环管理模式的粉蓝标签法对规范麻醉药品处方管理的影响

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目的 有序严谨的麻醉药品管理，对保障临床安全工作至关重要，探究基于 PDCA 循环管理模式的粉蓝标签法在麻醉药品使用过程中的效果，为科学有效管理麻醉药品，提高麻醉药品使用的有序性、高效性和精准性提供参考。
方法
2.1 资料来源

随机抽取医院麻醉科药品间 2022 年 1 月-8 月份常规管理的 500 份麻醉药品作为对照组，抽取 2023 年 1 月-2023 年 8 月份采用粉蓝标签法管理的 500 份麻醉药品作为实验组。
2.2 方法简述
采用基于 PDCA 循环管理模式的粉蓝标签法简述：（1）计划。成立麻醉药品管理小组，围绕麻醉药品管理效果，分析存在问题的原因，从而针对性总结影响麻醉药品管理的三类因素：药品管理、使用管理和人员管理。（2）实施。小组在 2023 年 1 月份实施粉蓝标签法。（3）检查。管理小组成员建立周检、月检制度，对麻醉药品处方进行点评，及时发现问题并讨论和制定改进措施。（4）行动。管理小组每两周开一次组内会议，对出现的问题进行总结解决。但对于本循环中未解决的问题，将之放置在下一循环中，并充分利用文献查阅和专家咨询等方法，从而保证问题及时解决。
结果 如表 1 所示，麻醉药品管理达标率从双人双锁、交接登记、使用登记、有效期管理 4 方面进行评估，实验组在药品管理方面好于对照组；（2）如表 2 所示，麻醉药品达标率从定量管理、定人管理、定期核查、定位存放和有效期管理方面进行评估，实验组在药品使用方面好于对照组；（3）如表 3 所示，研究组手术室麻醉药物使用满意度 90%，对照组满意度 75% ；（4）如表 4 所示，研究组手术室麻醉药差错率 1%，对照组 8%，上述指标情况均是研究组更理想（P ＜ 0.05）
结论 基于 PDCA 循环管理模式的粉蓝标签法应用于医院手术室麻醉药品间管理中，可显著降低麻醉药品使用不合格的情况，提高药房对于麻醉药品间药品的管理效果，改善药品使用及登记的规范性，相较于常规管理模式具有更高临床应用价值，值得在各个科室毒麻药物使用管理中推广使用。

PO-0210

Association of Opioid Use with Cardiovascular Diseases and All-Cause Mortality in USA Adults: Results from NHANES 2001–2008 and Mendelian Randomization

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目的 Opioids are widely used in clinical therapy, yet few studies have investigated the association between opioid use and all-cause as well as cardiovascular disease (CVD) mortality. Our study aims to explore the specific impact of opioid use on CVD and overall mortality.
方法 This prospective cohort study involved 18,129 adult participants from the National Health and Nutrition Examination Survey (NHANES, 2001-2008). Linking mortality records to the Mobile Examination Center (MEC) data enabled mortality and cause-of-death evaluations. Cox proportional hazards regression models, along with propensity score matching (PSM), were utilized to assess the association between prescription opioid use and mortality risks. Mendelian randomization (MR) analysis was employed to investigate potential genetic associations.
结果 The study revealed that individuals using prescription opioids faced significantly higher risks of both all-cause mortality (HR, 1.42; 95% CI, 1.22-1.66, P < 0.001) and CVD mortality (HR = 1.5, 95% CI: 1.14-1.98, P = 0.004) compared to non-users. Subgroup analyses highlighted specific associations between opioid use and increased CVD mortality risk among males, those aged 40-60, alcohol users, former smokers, individuals with diabetes, and those without hypertension. MR analysis demonstrated a significant genetic association between predicted opioid use and heightened CVD risk, with an inverse-variance weighted odds ratio (IVW OR) of 1.011 (95% CI: 1.005-1.017, P < 0.001).
结论 Prescription opioid use is associated with elevated all-cause and CVD mortality risks, supported by MR analysis. These findings emphasize the need for caution in opioid prescription and the exploration of alternative pain management strategies.

PO-0211

腹部手术术后感染的 ICD-10 编码准确性验证及危险因素分析

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目的 术后感染是医院内感染管理的重要挑战，直接影响着医疗质量和患者康复。第十版国际疾病分类（International Classification of Diseases-10th Revision, ICD-10）编码是医疗系统的标准编码工具。然而 ICD-10 对术后感染诊断的准确性尚缺乏深入验证。本研究旨在以美国疾病控制与预防中心（Centers for Disease Control and Prevention, CDC）发布的感染诊断指南为金标准，验证 ICD-10 在术后感染诊断中的准确性，并基于 ICD-10 代码数据分析术后感染的动态趋势与危险因素。
方法 本研究于 2020 年 7 月至 2023 年 12 月期间，在四川大学华西医院建立腹部手术患者队列。研究纳入 40-65 岁、择期接受腹部全麻手术的患者，且患者住院时间不少于 3 天，美国麻醉医师学会分级为 I-III 级。研究以 CDC 诊断为金标准，对 ICD-10 代码在诊断术后感染的准确性进行验证。运用线性回归模型描述了术后感染发生率的动态趋势，并通过单因素和多因素 logistic 回归计算不同变量的比值比（Odds Ratio, OR）及 95%置信区间（Confidence Interval, CI），以探究术后感染的潜在危险因素。
结果 本研究对 12,580 名患者进行严格的纳入及排除，共纳入 4361 名患者。参照 CDC 感染诊断标准，共 341 名患者（7.82%）发生术后感染，而 351 名患者（8.05%）被 ICD-10 代码标记为术后感染。其中，306 名患者同时符合 CDC 和 ICD-10 的诊断标准。验证分析提示，ICD-10 对总体术后感染（AUC=0.94）及各亚型术后感染的诊断与 CDC 诊断结果高度一致，尤其是手术区域感染（AUC=0.98）、腹腔内感染（AUC=0.96）和血源性感染（AUC =0.92）。ICD-10 及 CDC 诊断标准下术后感染发生率的动态趋势在过去四年保持一致且稳定。线性分析发现术后感染发生率呈现出略微下降的势态。进一步 logistic 回归提示，围术期输血（OR: 2.14, 95% CI: 1.57-2.88）、转入重症监护病房（OR: 2.02, 95% CI: 1.20-3.33）、年龄调整的查尔森合并症指数（OR: 1.28, 95% CI: 1.16-1.41）和住院时长（OR: 2.22, 95% CI: 1.72-2.88）是术后感染的独立危险因素。
结论 本研究确立了 ICD-10 在评定腹部手术患者术后感染的准确性，并进一步识别了术后感染的关键风险因素。该研究为医院感染防控提供了精确的数据支持和实践操作参考。这些成果不仅有助于指导医院制定精确的术后感染管理及预防策略，而且对提升医疗服务质量、加强围术期质控具有重要意义。

PO-0212

术前血浆 Tau 及其磷酸化蛋白浓度与术后谵妄的关系

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目的 筛选高特异性术后谵妄生物标志物，验证术前血浆浓度 p-tau181、p-tau231、p-tau217 和 T-tau 蛋白是否能够识别和预测术后谵妄（POD）的发生和其严重程度。
方法 前瞻性队列研究，选取 2023 年 4 月至 2024 年 4 月在无锡江南大学附属医院接受腹腔镜胃肠道肿瘤手术老年患者，所有患者均采用静吸复合全身麻醉，所有患者均在麻醉前采集静脉血液 3 ml，置于肝素化试管中，离心后分装保存于-80 ℃。采用酶联免疫测定术前血浆 p-tau181、p-tau231、p-tau217 和 T-tau 蛋白浓度，采用盲法测量，所有样品随机分配到不同批次，检测均重复 2 次，取其平均数。术后三天内采用 3D-CAM 量表及 Delirium Rating Scale-revised-98(DRS.R-98)量表评估是否发生谵妄和谵妄的严重程度。采用 t 检验、Kruskal Wallis 秩和检验（对于非正态连续型数据）、卡方或 Fisher 精确检验比较发生谵妄者与未发生谵妄者基线特征的差异。采用二元 Logistic

回归和多元线性回归模型分析校正年龄、BMI、受教育程度后 TAU 及其磷酸化蛋白与谵妄发生以及严重程度之间的关系。采用约登指数（Youden's Index）评估最能预测谵妄存在的生物标志物临界值。结果表示为术前血浆 p-tau181、p-tau217、p-tau231 和 Tau 的截止值、灵敏度和特异性的受试者工作特征曲线 （AUC）下面积。

结果 在 172 名患者（72±6 岁，34.9% 为女性）中，20 名 （12%） 出现术后谵妄。发生术后谵妄的受试者术前血浆 p-tau181、p-tau231、p-tau217 和 T-tau 浓度显著高于未发生谵妄的受试者。在调整年龄、BMI 和受教育程度后，术前血浆 p-tau181（OR 1.05, 95 % CI : 1.02~1.07, P< 0.001）、p-tau217（OR 1.02, 95 % CI : 1.01~1.03, P < 0.001）、p-tau231（OR 1.09, 95 % CI : 1.04~1.13, P < 0.001）和 Tau （OR 1.01, 95 % CI : 1.00~1.02, P< 0.001）与 POD 发生独立相关。在校正后的多元线性回归模型中，术前血浆 p-tau181（β: 0.065, 95% CI: 0.049 - 0.0823, P < 0.001）、 p-tau217（β: 0.035, 95% CI: 0.019 - 0.05, P < 0.001）、p-tau231（β: 0.070, 95% CI: 0.063 - 0.086, P < 0.001）和 Tau（β: 0.014, 95% CI: 0.006 - 0.023, P< 0.001）与 POD 发生的严重程度独立相关。术前 p-tau181、p-tau231 和 p-tau217 血浆浓度对预测术后谵妄均具有高敏感性（0.90）和可变特异性（0.770 、0.572、0.967）。p-tau181、p-tau231、p-tau217 和 T-tau 的 AUC 分别为（ 0.775、0.766、0.803 和 0.750）。

结论 术前血浆 p-tau181、 p-tau217 和 p-tau231 在接受腹腔镜胃肠道肿瘤手术的老年患者中显著升高，能够预测术后谵妄的发生和其严重程度，且 p-tau231 的预测价值更高。

PO-0213

麻醉学专业住院医师纤维支气管镜关键技术分段培训模式探索

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目的 探索纤维支气管镜操作技术培训模式及其关键操作技术培训先后次序对培训效果的影响。

方法 学习纤维支气管镜操作的关键技术包括纤支镜基本操作、纤支镜真实操作手感、纤支镜操作灵敏度和纤支镜过喉等。使用多种不同模拟器可分别对以上各种关键技术进行专门培训。为检验不同关键技术学习顺序对教学效果的影响，本研究选择 2022 年 11 月至 2023 年 3 月期间在上海交通大学医学院附属瑞金医院参加纤支镜模拟培训的麻醉学专业住院医师 40 人，用数字表法随机分为两组（S 组和 M 组），S 组采用基础操作技能培训-真实手感培训-灵敏度及过喉培训的培训次序，M 组采用基础操作技能培训-灵敏度及过喉培训-真实手感培训的培训次序，记录两组学员培训后的操作用时、操作质量评分和理论知识掌握评分，以比较不同关键技术学习顺序对于纤支镜技能掌握效果的影响。采用 SPSS 27.0 统计软件对数据进行分析。符合正态分布的计量资料数据以均数±标准差表示，采用独立样本 t 检验或 Fisher’s 精确检验进行组间比较；计数资料比较采用卡方检验。检验水准设置为 0.05。

结果 两组所有学员在经过关键技术分段培训后均能减少该项关键技术的操作用时和碰壁次数。与 M 组相比，S 组学员先培训的单项关键技术操作用时更短[S 组：（108.65±20.57）s vs. M 组（132.25±14.69）s，P<0.05]、碰壁次数更少[S 组：（3.35±0.93）次 vs. M 组（5.90±1.29）次，P<0.05]。在一周后的关键技能重测中，两组操作用时均较上次培训后有所延长、碰壁次数有所增多。两组学员在完成所有培训内容后，纤支镜引导气管插管和肺段定位能力无差异[流程得分 S 组（92.50±5.97）分 vs. M 组（91.75±5.45）；肺段定位时间 S 组（23.15±4.39）s，（21.40±4.84）s，（22.85±4.42）s vs. M 组（22.75±5.11）s，（21.00±5.40）s，（21.50±5.10）s，P<0.05]。

结论 纤支镜关键技术分段培训是可行且有效的麻醉专业住院医师纤支镜培训模式，关键技术的培训顺序不影响培训效果。

PO-0214

“看-评-调-定”理念：引领医疗领域的新质生产力

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目的 本研究旨在深入分析“看-评-调-定”理念在医疗领域的应用及其对新质生产力的贡献。特别关注该理念如何通过标准化流程改革，促进医疗技术的进步和提升医疗服务质量。研究的目的是验证“看-评-调-定”理念在提高麻醉术前评估的效率和准确性方面的作用，并探讨其在多学科整合、信息化、智能化以及老年医学领域的实践效果。
方法 本文采用了多方法论的研究设计，包括文献综述、定性案例分析和定量数据分析。首先，通过文献综述收集了“看-评-调-定”理念的理论基础和相关研究，确保研究的理论深度和广度。其次，通过定性案例分析方法，选取了具体医疗机构中实施该理念的实例，深入分析了其流程和效果。最后，通过定量数据分析，评估了 AI 技术在提高术前评估准确性和效率方面的作用，以及信息化和智能化技术在医疗流程中的应用效果。
结果 研究结果表明，“看-评-调-定”理念通过系统整合多学科资源，显著提升了术前评估的质量和手术安全性。AI 技术的应用，尤其在医学影像识别和大数据分析方面，为医生提供了快速准确的诊断支持，同时为患者个性化治疗方案的制定提供了科学依据。信息化和智能化的应用，不仅提高了医疗服务效率，还减轻了医护人员的工作负担。在老年医学领域，该理念的应用有效应对了老龄化带来的挑战，为老年患者提供了更加精准和个性化的医疗服务。
结论 “看-评-调-定”理念是医学领域新质生产力的重要体现，其以患者为中心的服务模式，不仅推动了医学技术的发展，也提升了医疗服务的质量和效率。本研究认为，该理念在实际医疗流程中的应用，特别是在麻醉术前评估、多学科整合、信息化和智能化方面，具有显著的实践效果和推广价值。因此，本研究推荐在更广泛的临床领域内应用“看-评-调-定”理念，以实现医疗服务的持续创新和优化。随着医学进步，这一理念将继续促进医学技术的发展，提升患者治疗效果与满意度，值得临床不断推广与应用。

PO-0215

MDT 模式下麻醉医生在突发公共卫生事件中的作用与思考

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目的 研究在突发公共卫生事件中，MDT 模式下麻醉医生组建的综合加强监护病房（GICU）与 ICU 病区的差异性。
方法 回顾性收集 2022 年 12 月 17 日-2023 年 1 月 31 日入住 GICU 与 ICU 全部患者的一般资料、无创呼吸机使用、有创呼吸机使用、气管切开人数、出院情况、住院天数、住院日均费用、住院总费用等进行分析比较。
结果 与 ICU 组比较，GICU 患者一般资料的性别、年龄、接种疫苗情况、既往史无统计学意义（P＞0.05）；GICU 组患者有创呼吸机使用与气管切开人数较少，住院天数、住院日均费用、住院总费用均较低，差异有统计学意义（P＜0.05）；GICU 组患者整体好转率 71.1%(106/149)较高，死亡率 28.2%(42/149)较低，差异有统计学意义（P＜0.05）；GICU 组患者以重症肺炎为入院诊断的数量较多，其中重症肺炎好转率高于 ICU 组患者，而死亡率低于 ICU 组患者，差异有统计学意义（P＜0.05）。

结论 在突发公共卫生事件中，MDT 模式下麻醉医生组建的综合加强监护病房可以快速缓解病人激增、ICU 床位不足的问题，为重症感染患者提供及时的就医平台。

PO-0216

形成性评价在麻醉基地住院医师颈内静脉穿刺技能培训中的应用

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目的 探讨形成性评价在麻醉基地住院医师颈内静脉穿刺技能培训中的应用效果。
方法 选择上海交通大学医学院附属瑞金医院 2020 级和 2021 级的麻醉基地住院医师共 28 名进行右颈内静脉穿刺技能培训和考核，其中 2020 级 14 名住院医师为对照组，对照组采用传统操作技能培训模式，培训前先对所有学员进行摸底考核，而后统一进行 1 学时的理论培训以及 1 学时的模拟技能练习，之后学员以每周一次的频率进行自主模拟技能练习，每次时长为 1 学时，总计理论授课 1 学时，模拟实践 5 学时；2021 级 14 名住院医师为研究组，在接受传统操作技能培训的基础之上，引入形成性评价，在每周的模拟练习后即刻进行形成性评价。所有学员在一个月后接受终结性考核，培训和考核标准均参考《右颈内静脉穿刺置管术操作准入表》，每位学员的考核均由 2 位临床和教学经验丰富的教师共同参与，操作考核得分取平均值；研究组同时进行操作考核和形成性评价，得分均取平均值。此外，两组教师在考核完成后还会对学员的临床实践能力进行评价，采取 9 分制：1-3 分为“暂不适合进行临床操作，还需要更多模拟训练“，4-6 分为” 可能遇到困难，需要在指导下完成临床操作“，7-9 分为” 可以在无指导状态下执行临床操作“。两组学员均在考核后进行自我满意度评价，采取 9 分制：1-3 分为不满意，4-6 分为满意，7-9 分为非常满意。通过比较两组间培训后行为表现以及学员自我满意度等，探讨形成性评价在麻醉基地住院医师颈内静脉穿刺技能培训中的应用效果。
结果 所有学员在培训后均通过了终结性考核，研究组学员培训后的操作考核成绩、临床实践能力评价及学员满意度明显高于培训前（P＜0.01），且研究组学员培训后的操作考核成绩及临床实践能力评价均高于对照组学员（92.57±3.18 比 89.21±4.85，P=0.032），但学员自我满意度无统计学差异（8.64±0.49 比 8.29±0.73，P=0.136）。
结论 在颈内静脉穿刺技能培训中引入形成性评价有助于提高麻醉基地住院医师的颈内静脉穿刺技能水平。

PO-0217

基于米特-霍恩模型的麻醉学科高质量发展分析

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目的 基于米特-霍恩模型框架对麻醉学科运行管理现状进行分析，探讨其潜在问题并制定相应的发展策略。
方法 根据米特-霍恩模型的六大因素分析郑州某医院麻醉学科的发展现状及存在的问题，通过对不同因素与麻醉学科高质量发展的关系和其相关影响的探讨，提出麻醉学科高质量发展管理策略。
结果 1.学科发展标准与目标问题包括各种标准过于宽泛或不够精细、缺乏量化指标和评估体系、执行和监督不够深入。需要明晰学科发展标准与目标、建立具有可操作性和可执行性的科学合理评估体系以及有效的执行监督机制。2. 政策资源方面，先进设备、技术培训、科研项目等资金支持是支撑学科高质量发展的基本保障。资金不足、设备更新不及时、人才培养支持力度不足等是主要问题。

需要增加对学科的资金投入、更新设备、加强人才培养、引进和留住人才。3.执行方式包括麻醉手术流程、各种操作规范、管理规范等内容。关系到整体的效率和安全性。包括流程不够规范、沟通不畅、执行效率低下等问题。需要对流程进行分析优化，建立高效的信息系统和流程，明确各环节的操作规范和标准，多方共同努力，提高执行效率。4.执行机构的特性包括学科规模、人员配置、管理水平等方面，存在业务地点分散、手术量大、人员不足等问题，特别是人员配置不足、专业水平和技术能力参差不齐会导致质量不高、运作效率低下、安全风险增加。需要提高管理水平，优化人员配置、建立科学的管理制度和流程、加强团队协作。5. 麻醉医师需要具备良好专业素养、责任感和团队精神，态度不够专业、缺乏责任感、团队合作意识不强等将影响麻醉手术的质量和学科发展。需要进一步加强培训，提高专业素养、技术水平、科研水平，树立正确的职业态度和价值观。建立激励、奖惩机制，激发责任感和工作热情，提高积极性。建立和谐的工作氛围，促进交流和合作有助于培养团队合作精神。6.医院政策、氛围、学科影响力等系统环境方面需要争取政策支持和保障、提高各方对麻醉学科的认知、提升学科氛围。其中政策资源支撑、执行管理效率、团队价值取向是麻醉学科高质量发展的关键因素。

结论 促进麻醉学科高质量发展需要优化标准与目标，细化执行管理，提质增效，加强团队培训激励，重塑学科价值体系。

PO-0218

Application of situational simulation teaching combined with case-based learning in the occupational protection training for anesthesiology residents

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Objective To study the application effect of situational simulation teaching (SST) combined with case-based learning (CBL) in the occupational protection training for anesthesiology residents. Methods A total of 30 first grade resident physicians in the Department of Anesthesiology, the First Medical Center of Chinese PLA General Hospital from September 2022 to August 2023 were selected for training. According to the random number table method, the students were divided into two groups, with 15 students in each group. They were trained by the traditional teaching method and the SST combined with CBL method respectively, namely the control group and the trial group. Two weeks after the training, theoretical knowledge and operational skills were assessed; 6 months later, occupational exposure rates and post exposure management were surveyed. The main outcome index were the comparisons of scores, occupational exposure rates and post exposure management after training. The secondary outcome indicator was the degree of satisfaction in different training methods. Results Compared with the scores before training, the test scores of the two groups increased after training, and the trial group was higher than the control group, the differences were statistically significant ($P < 0.05$). Needlestick injuries and exposure of patient body fluid in the trial group were decreased than the control group, the differences were statistically significant ($P < 0.05$). Compliance of post exposure management procedure in the trial group was increased than the control group, the difference was statistically significant ($P<0.05$). Conclusion SST combined with CBL can improve the learning of occupational protection knowledge, and increased the capacity of occupational protection in clinical situation for anesthesiology residents.

PO-0219

HMGB1 促进血管平滑肌细胞迁移调控血管重构介导大鼠肺动脉高压的转录组分析及验证

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目的 高迁移率族蛋白 B1（HMGB1）是一种关键损伤相关分子模式（DAMP）分子，可从凋亡或坏死细胞以及细胞因子激活的细胞中释放出来，研究表明其参与介导了肺动脉高压（PAH）的发生发展。肺动脉血管重构是 PAH 的发生的主要病理基础，肺动脉平滑肌细胞（PASMCs）过度增殖和迁移又是血管重构的主要特征。近年来研究显示，HMGB1 促进 PASMCs 的增殖、肥大和迁移，药理上抑制 HMGB1 可减轻 PAH 大鼠模型中的肺血管重构。然而，HMGB1 调控 PASMCs 参与肺动脉血管重构的机制仍有待阐明，本研究旨在探索和证明 HMGB1 参与 PAH 形成过程中，促进肺血管重构发挥其生物学作用参与的靶基因及信号通路。

方法 酶解消化法培养大鼠原代 PASMCs；使用重组 HMGB1 处理 PASMCs，CCK8 和 EdU 检测 PASMCs 增殖，细胞划痕和 Transwell 实验检测 PASMCs 迁移，确定重组 HMGB1 最佳处理浓度对于 PASMCs 增殖迁移的影响；利用 RNA 测序技术研究重组 HMGB1 处理 PASMCs 后的转录组发生的改变，并确定 HMGB1 在 PASMCs 发挥其生物学作用的靶基因和信号通路；qRT-PCR、Western Blot 检测并验证转录组中筛选出的差异基因的 mRNA 和蛋白表达水平；最后临床通过收集 PAH 患者肺动脉血管，免疫组化分析患者组织相关差异基因的蛋白表达水平。

结果 不同浓度 HMGB1 处理 PASMCs 增殖程度不同，其中 100ug/ml HMGB1 处理 PASMCs 培养 24h 后，细胞增殖活力最高（P＜0.05）；划痕实验和 Transwell 实验结果显示，与对照组相比，100ug/ml HMGB1 处理组细胞迁移程度明显增加（P＜0.05），最终选定 100ug/ml HMGB1 处理细胞作为最佳处理浓度。根据 100ug/ml HMGB1 处理 PASMCs 培养 24h，利用 RNA 测序技术获得 RNA-Seq 转录组数据，结果发现 HMGB1 vs Control 有 66 个基因具有显著差异，其中，与对照组相比表达升高的基因 31 个，表达降低的基因 35 个；通过对这些基因生物学功能分析及结合文献资料，重新筛选出了上调的基因 6 个，分别包括：Abcb7、Alg6、Asb5、Cacna1b、MAP2K3、Vdr 和下调的基因 6 个，分别包括：Cetn4、PHB、Gpr173、Trim58、Tert、Ubd，其中涉及到的信号通过路主要包括 AMPK、PI3K、mTOR 和 AKT 等信号通路。根据以上获得得目的基因利用 qRT-PCR 实验方法再次体外验证，结果发现 Cacna1b、MAP2K3、PHB、Gpr173 和 Trim58 与转录组结果一致，Western blotting 和免疫组化结果也证明 PAH 患者肺动脉血管中 Cacna1b 和 MAP2K3 表达明显增加，PHB 和 Trim58 表达显著降低，根据对 Cacna1b、MAP2K3、PHB 和 Trim58 基因功能分析，发现 HMGB1 可能通过调控细胞钙离子转运、迁移蛋白、影响细胞糖基化水平等机制参与平滑肌细胞的收缩与舒张以及迁移及增殖。

结论 本研究揭示了 HMGB1 调控 PASMCs 参与血管重构相关的关键基因和信号通路，从而为 HMGB1 促 PASMCs 的增殖、迁移的发生机制提供了理论依据，也为 HMGB1 促 PAH 的发生发展及机制探索提供了参考依据和指导方向。

PO-0220

新医科”背景下基于成果导向教育理念的五维度课程思政在麻醉学人才培养中的实践

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目的 探论在成果导向教育（OBE）理念指导下，五维度课程思政教学模式在麻醉学人才培养中的应用及教学效果

方法 根据“新医科”内涵，确定价值、认知、技能、清高、行动等五个维度的学习成果，在此基础上构建课程思政案例库并行教学实践。选取 2021 年、2022 年进入北京大学第三医院麻醉科进行实习的本科生为研究对象。试验组采用基于 OBE 模式的五维度课程思政联合麻醉专业课程教学，对照组采用传统教学。教学完成后对两组学生的理论知识及操作技能进行考核，并通过问卷调查两组学生对五维度能力提升的自我评分及满意度。

结果 试验组学生的理论考核成绩平均分明显高于对照组（65.2±2.07 vs 61.5±2.57，P＜0.05）。试验组学生临床技能考核的操作流程、操作熟练度及团队协作得分分别为（8.4±0.59）、（8.7±0.66）、（8.6±0.69），明显高于对照组学生得分（7.5±0.84）、（7.5±0.70）、（7.5±0.84），差异具有统计学意义（P＜0.05）。试验组学生在价值维度、认知维度、技能维度、清高维度、行动维度的个人能力提升的自我评分分别为（18.4±1.04）、（18.4±1.05）、（18.9±0.94）、（18.9±0.72）、（18.8±0.79），也明显高于对照组[（16.0±1.10）、（16.7±1.11）、（17.0±1.15）、（16.6±0.90）、（16.6±0.96），P＜0.05]。试验组学生在教学设计、教学手段、教学内容、课堂气氛、学生参与度及学习效果的满意度均高于对照组（P＜0.05）

结论 OBE 理念与课程思政融合结合临床麻醉知识的教学模式，有助于构建麻醉学课程的思政案例库，能在五维度达到预期学习成果，提高学生的学习成绩及教学满意度。

PO-0221

基于格罗 SSDL 模型的麻醉学研究生哲学思辨能力提升

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目的 麻醉学研究生不仅需要掌握专业知识、实践技能、科研方法，还需具备高水平的哲学思辨能力。本研究旨在探讨基于格罗 SSDL（Staged Self-Directed Learning）模型的教学改革在提升麻醉学研究生哲学思辨能力方面的作用。

方法 哲学思辨能力教学主要通过批判性思维和逻辑推理的训练提升研究生的系统性分析和哲学思辨能力：

1.阶段性目标及任务设定：设计麻醉学研究生的学习阶段，从初级到高级，每个阶段设定特定的哲学思辨目标和学习任务。

2.自我指导学习实践：引导学生在每个阶段内通过自我反思、资源查找和指导教育，提升其自我学习能力和哲学思辨能力。

3.案例分析与讨论：使用医疗及科研案例，结合小组讨论和个人写作，促进学生在实际情境中的哲学思考能力。

4.评估和反馈：采用形成性评价方法，评估学生在哲学思辨能力上的进展，并提供持续反馈以调整学习策略。

结果 结合格罗 SSDL 模型设计并实施一系列的教育干预措施，丰富了教学内容和方法，激发了研究生的学习兴趣和主动性。学生哲学思维思辨能力逐步提升，通过自主学习和反思，提升了对临床问题、科学问题多维度思考的能力，增强了临床思维的逻辑和学术论证的能力。通过案例分析和讨论促进了团队中合作思考的能力，增强了实际医疗环境和科研设计及实施的哲学决策能力，哲学思辨可以引导学生从更广泛的文化和人文角度审视医疗实践的意义和影响，有助于麻醉学实践中的临床及科研问题的全面解决。通过形成性评价对研究生哲学思辨能力评估和反馈，有助于研究生调整学习策略并持续改进。
结论 格罗 SSDL 模型是提升麻醉学研究生哲学思辨能力的有效教育模式。通过其阶段性设定、自我指导学习、案例分析与讨论以及形成性评价评估反馈的组合应用，学生的哲学思维能力得到了系统性和全面性的培养，帮助研究生更好地适应复杂多变的医疗环境，培养出具备批判性思维、人文关怀和责任担当的优秀麻醉人才。麻醉学人才教育提升借鉴格罗 SSDL 模型，有助于培养更多具备高水平哲学思辨能力的麻醉专业人才，全面提升综合素养和教育质量。

PO-0222

短视频结合 3D 打印模型在超声引导椎管内麻醉教学的研究

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目的 为提高麻醉科住院医师的教学质量，促进学员理论与实践相结合的能力，将短视频教学模式和 3D 打印超声教学模型融入麻醉科理论和实践教学，开展新媒体时代的麻醉教学改革研究。在麻醉科高年资医师带领下，住院医师参与拍摄和制作超声引导椎管内麻醉理论和实践短视频，并且在理论学习基础上结合自制 3D 打印超声教学模型进行模拟穿刺操作练习。本研究的目的是介绍短视频结合 3D 打印模型在超声引导椎管内麻醉教学的探索，及其在麻醉住院医师培训中的应用效果。
方法 招募 52 名麻醉科 2023 年级住院医师，随机分为两组，分别为对照组和实验组，每组 26 人。实验组每三名学员分为一个小组，由一名麻醉科高年资医师带领，负责制作 5 条短视频教学内容，并利用 3D 打印模型进行超声引导椎管内穿刺模拟练习。每小组制作短视频的具体内容由带教医师和学员讨论决定，每个短视频时长限定为 180 秒，制作方式采用手机拍摄和软件编辑。3D 打印模型利用了同济医院麻醉科 3D 打印实验平台，自制了一系列低成本的解剖和麻醉超声操作教学模具。对照组学员，仅接受传统理论和临床实践教学模式。试验结束后，对两组学员进行统一的理论和实践考核，并邀请临床带教的老师对学员进行评价打分。
结果 理论考试得分，对照组 84±8.2 分和短视频组 89±10.1 分；实践考试得分，对照组 67±5.7 分和短视频组 78±7.4 分；带教老师评价，对照组 70.5±4.2 分和短视频组 82±3.5 分。组间差异均有统计学意义。
结论 超声引导椎管内麻醉的操作非常精细，一旦出现差错将会给病人带来不可估量的伤害，因此传统教学过程中必须经过大量临床经验和操作练习。本研究发现，短视频作为以一种崭新的视频媒介，深受年轻医生喜爱。年轻医生亲自参与短视频制作，不仅提高了自主学习理论知识的积极性，还能够自主利用碎片时间反复学习短视频。同时，本研究组早在 2018 年就建立了麻醉科 3D 打印实验平台，建立了包括超声引导椎管内麻醉模型在内的一系列麻醉教具。与传统教学模式相比，自制低成本 3D 打印脊柱模型在超声引导椎管内麻醉教学取得了良好效果，不仅有利于提高学员的学习积极性、降低学习难度、增加成功率，还降低传统教学的风险。最终，实验组在理论和实践考核的得分和带教老师评价上均优于采用传统教学模式的对照组。
与传统教学模式相比，短视频结合 3D 打印模型在超声引导椎管内麻醉教学中取得了良好效果，改变以往固有的教学模式，提高学员自主学习的兴趣和实践能力。

PO-0223

USP22 通过上调 calponin-1 的表达 进而抑制 ERK/CXCL1/2 通路改善糖尿病加重的 心肌缺血再灌注损伤及右美托咪定的干预研究

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目的 缺血性心脏病是糖尿病患者的严重并发症之一，对全球人类健康构成严重威胁，在糖尿病人群中预防和治疗心肌缺血/再灌注损伤（MI/RI）仍然具有很强的挑战性。泛素特异性蛋白酶 22（USP22）通过调节炎症反应、细胞存活、氧化应激和脂质代谢在心血管疾病中发挥重要作用。然而，其在糖尿病加重的 MI/RI 中的作用尚未明确。右美托咪定（DEX）作为术中常用的高选择性 α-肾上腺素能受体激动剂，可以通过多种信号通路保护心肌细胞。本研究旨在探讨 USP22 在糖尿病相关的心肌细胞损伤中的作用、机制及右美托咪定的干预。
方法 通过注射链脲佐菌素（STZ）诱导小鼠糖尿病，随后通过冠状动脉结扎和再灌注诱导 MI/RI。将心脏源性 H9c2 细胞暴露于高葡萄糖（HG）24 小时，然后进行缺氧/复氧（H/R）处理 6 小时/2 小时。
结果 研究发现，在 MI/RI 小鼠和 H/R 诱导的心肌细胞中，USP22 蛋白和 mRNA 水平下调，但在糖尿病 MI/RI 小鼠和 HG+H/R 的 H9c2 细胞中反而代偿性升高。心脏特异性 USP22 缺失加剧了心功能障碍，增加了缺血后梗死面积，促进了线粒体损伤，加速了糖尿病小鼠心肌细胞炎症、氧化应激和凋亡。相反，心脏特异性 USP22 过表达改善了这些病理损伤。蛋白质组学和一系列实验验证表明，USP22 稳定并上调了 Calponin-1 蛋白表达以发挥心脏保护作用。心脏特异性敲降 Calponin-1 阻碍了 USP22 在糖尿病加重的 MI/RI 中的保护作用。通过 RNA 测序和实验研究进一步分析显示，USP22 介导的去泛素化和 Calponin-1 上调通过抑制 ERK1/2 通路的激活，从而进一步抑制了 CXCL1 和 CXCL2 的释放，并发挥了改善心功能和心肌细胞损伤的作用。最终，使用外源性中和抗体中和了 CXCL1 和 CXCL2，产生了类似于 USP22 过表达类似的心肌保护作用。接着我们通过在术前给予 DEX 干预，发现 DEX 具有很好的心肌细胞保护作用，改善了糖尿病小鼠的心肌缺血再灌注损伤，但在将进行 USP22 心脏特异性敲降后，DEX 的这种心肌保护作用被明显地抑制了。
结论 我们的实验结果表明，右美托咪定可能通过调控 USP22 的表达，进而调节 Calponin-1/ERK/CXCL1/2，从而发挥改善糖尿病加重的 MI/RI 的作用，这丰富了右美托咪定的心脏保护机制，并为糖尿病加重的 MI/RI 的提供了新的潜在治疗靶点。

PO-0224

Application of point-of-care ultrasound in anesthesia department

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The application of point-of-care ultrasound (POCUS) within the anesthesia department represents a transformative development in medical practice, offering anesthesiologists a versatile and effective tool for diagnosis, monitoring, and guiding interventions across a broad spectrum of clinical settings. As a portable, real-time imaging modality, POCUS has significantly enhanced patient care, improving the safety and efficiency of anesthesia procedures through direct visualization of anatomical structures and physiological functions. This evolution reflects the

broader technological advances in ultrasound technology, including miniaturization and enhanced image quality, coupled with a growing body
of evidence supporting its utility in clinical practice. The history of POCUS in anesthesia is marked by its initial use for vascular access and nerve blocks, subsequently expanding to include applications such as airway management, cardiac evaluation, and assessment of lung and gastric contents, among others. The proliferation of handheld devices has further facilitated its integration into perioperative care, making ultrasound technology an indispensable part of the anesthesiologist's toolkit. This expansion is supported by comprehensive training and certification programs aimed at ensuring proficiency among practitioners, addressing one of the primary challenges to its broader adoption. Despite its numerous benefits, including enhanced patient safety, operational efficiency, and the provision of educational and training opportunities, the application of POCUS in anesthesia is not without challenges. These include technological and educational barrier , the need for quality assurance, institutional support, and resource allocation, as well as interdisciplinary collaboration and navigating regulatory and credentialing issues. Addressing these challenges is crucial for maximizing the potential of POCUS in improving patient outcomes. As POCUS continues to evolve, future directions include technological advancements aimed at increasing portability and accessibility, the development of structured educational pathways and credentialing processes, and the integration of POCUS into routine clinical practice. The ongoing innovation in POCUS applications and training promises to further solidify its role in anesthesia, enhancing the quality of care and patient safety in perioperative settings.

PO-0225

应用德尔菲构建以胜任力为导向的麻醉专科医师置信职业行为指标

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目的 构建适用于麻醉学专科医师的以胜任力为导向的置信职业行为指标。
方法 采用德尔菲法对来自北京、河北、广东、湖北、陕西、海南等 6 个省市的 25 名专家进行三轮咨询。
结果 三轮咨询专家积极系统分别为 100%、100%和 96%，权威系数分别为 0.93，0.94，0.95；第一轮咨询的专家意见的变异度小于 0.24。最终构建包括 37 个条目的置信职业行为指标以及信任级别。
结论 专家积极程度和协调程度较高，结果可信，初步构建了较高质量的以胜任力为导向的麻醉专科医师置信执业行为指标及在不同时间节点的预期置信级别，为麻醉专科医师胜任力导向的培训及评价提供参考。

PO-0226

“三环协同”的麻醉学教学体系的构建和探索

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目的 2019 年国家卫健委 265 号文件《关于印发深入落实进一步改善医疗服务行动计划重点工作方

案》明确指出加强和完善麻醉医疗服务，改革和深化麻醉学教育是健康中国建设和卫生事业发展的重要内容，对于满足人民群众对医疗服务舒适化的新需求，适应不断增长的医疗服务需求以及应对全球突发公共卫生事件的挑战意义重大。在临床医学专业的本科教育中，“麻醉与复苏”通常安排在《外科学》总论中讲授，教学时数 10 学时左右，课时紧张，教学内容繁多。随着舒适化医疗、围术期医学、快速康复外科（ERAS）等概念的提出，麻醉学的理论教学内容也更为丰富，为适应国家对麻醉学教育的新需求，我科教研室进行了深入的教学改革探索，经过反复构建与优化，最终构建了“三环协同”教学体系，即以理论联系实际，以麻醉联系多学科，以课堂联系情景教学基地，三环协同贯穿理论授课全程的新型教学模式。

方法 本教学改革是教学团队以新时代医学教育新要求为指导，以学生为中心，以培养临床医师岗位胜任力为导向，以培养白求恩式的卓越医生为目标的“三环协同”教学体系，从教学内容、课程结构、教学模式及考评体系四大方面进行改革创新。一是建立多学科课题组，根据教学目标、教学内容和学情分析，以麻醉方法为核心以病例为载体重构教学内容优化课程结构，丰富麻醉学理论教学内容。二是理论联合实践，在授课全程采用线上+线下混合教学模式，辅以翻转课堂、研讨式教学、CBL 教学、情境教学基地教学等不同组合的多元教学模式，强化麻醉学实践教学内容，充分激发学生的学习积极性；三是形成开课全程的学生评教与反馈机制，采用更合理的考评方式，强调形成性评价。创建临床医学创新体系，从而满足新医科背景下国家对高素质医学人才的培养需求。

结果 1. 学生评价与成绩：学生调查问卷显示对课程满意度较高，与教学改革前相比，课堂活跃度较改革前明显提高，互动次数、学生提问对比均明显提高。多重教学反馈评估学生对理论知识的掌握情况较改革前有明显提高。

2. 专家评价：医学部专家多次进行理论课堂督导和检查实践教学过程，评价教学模式有特色，有亮点，多学科合作，实践过程融入基础医学及其他临床科室，CBL 教学模式融入得当，反馈模式多元，值得推广借鉴。

结论 三环协同体系，以构建系统的麻醉学知识体系为指导，引导多学科合作，层层深化理论内容，丰富理论教学内容，打破重塑，以案例为切入点，让枯燥的理论知识学习更加生动有趣，将理论知识融入实践，在实践中强化对理论知识的理解，真正实现三维目标落地，对于教学效果的提升大有裨益。

PO-0227

A Cross-Sectional Survey of Current status and continuing medical education needs for anesthesiologists in Tibet, China

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Background The Tibet Autonomous Region faces a shortage of anesthesiologists, necessitating further training and staffing. This study aims to understand the current clinical competence condition and demand for anesthesiologist training in Tibet, providing a reference for promoting their education and training.

Methods We conducted a cross-sectional online survey among 133 full-time anesthesiologists from the Anesthesiology Branch of the Tibet Medical Association. Our meticulously developed questionnaire, which underwent rigorous development and refinement processes, aimed to capture a wide array of data encompassing basic demographics, clinical skills, and specific training needs of anesthesiologists in Tibet. Descriptive statistics were used to present the characteristics and current training needs, chi-square tests were utilized to examine

discrepancies in training needs across various demographic groups, such as job positions and involvement in daily teaching work.
Results The response rate was 72.2%, with 96 anesthesiologists providing valuable insights. Of these, 65.6% were male. 81.2% had never participated in national or provincial teacher training. 22.92% of anesthesiologists had not participated in continuing medical education activities since practice. The average age of full-time anesthesiologists in Tibet is 37.01±6.94 years. Among them, the average age of attending physicians and above is 40.42±6.18 years, with 70.2% being male. In senior positions, the proportion of males is higher, reaching 80%. The lowest qualification rates for clinical anesthesia skills were peripheral nerve block (34.4%) and invasive blood pressure monitoring (35.4%).
Discrepancies in qualification rates for clinical skills and subspecialty anesthesia management among anesthesiologists were found across different work units. Anesthesiologists working in non-tertiary 3A hospitals have more training needs in peripheral nerve block, Invasive Blood Pressure, Monitored Anesthesia Care, Central Venous Pressure, Double-Lumen Endobronchial Intubation, General Anaesthesia, Laryngeal Mask Airway, Fiberoptic intubation.
Anesthesiologists who participate less in teaching work have more training needs than Anesthesiologists who participate more in teaching work, especially in Pain Medicine Basics, Chronic & Cancer Pain Management, Critical Care Medicine Basics, Anesthetic Management&Assessment of Critical Illness patients, Preservation of Essential Organ Functions of Critical Illness patients, Postoperative Pain management.
Conclusion This study suggests the need for targeted continuing medical education activities. Course developers must consider the needs of anesthesiologists, as well as the job positions and teaching enthusiasm of anesthesiologists practicing in the Tibetan Plateau region.

PO-0228

Clinical observation of dexmedetomidine nasal spray in the treatment of sleep disorders on the first night after undergoing maxillofacial surgery: A single-center double-blind randomized controlled study

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Purpose:
Dexmedetomidine exerts a sedative effect by promoting the sleep pathway endogenously and producing a state similar to N2 sleep. This study aimed to study the efficacy and safety of dexmedetomidine nasal spray in the treatment of postoperative sleep disturbance.
Methods:
This study enrolled 120 participants [men and women; age, 18–40 years; American Society of Anesthesiologists grade, I or II] who underwent maxillofacial surgery under general anesthesia through nasotracheal intubation. The participants were randomly divided into three groups: blank control group (BC group), 1.0-μg/kg dexmedetomidine group (1.0 Dex group), and 1.5-μg/kg dexmedetomidine group (1.5 Dex group), with 40 patients allocated to each group. At 21:30 on the night after the operation, the intervention groups were administered their corresponding doses of dexmedetomidine nasal spray. The Pittsburgh Sleep Quality Index (PSQI) scale was used to evaluate the baseline sleep status of participants 1 month preoperatively and on the night after the operation. Polysomnography (PSG) was used to record the sleep status on the night after the operation. We recorded the rescue times of sedative and analgesic drugs on the first night after surgery, adverse reactions, total hospital stay duration, and total costs.
Results:

Compared with patients in the BC group, those in 1.0 Dex and 1.5 Dex groups had longer N2 sleep duration, were awake for a shorter time after dose administration, woke up less often, and had significantly improved sleep efficiency (P < 0.05). Compared with the BC group, the PSQI scores of 1.0 Dex and 1.5 Dex groups were significantly lower on the night after operation, and the proportion of PSQI > 5 was significantly lower (P < 0.05). Compared with patients in the BC group and the 1.0 Dex group, those in the 1.5 Dex group had significantly prolonged N3 sleep, reduced frequency of requiring sufentanil rescue, lower incidence of sore throat after surgery, and shorter average length of hospital stay (all, P < 0.05).
Conclusion:
The sleep quality of participants on the night after having undergone maxillofacial surgery was safely and effectively improved by 1.0-μg/kg and 1.5-μg/kg dexmedetomidine atomized nasal sprays. Notably, only the latter could prolong N3 sleep.

PO-0229

温热型电极片经皮穴位电刺激 对妇科腹腔镜手术患者术前睡眠质量的影响

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目的 妇科择期手术中 30.65%患者因对全麻及大手术的恐惧感导致焦虑不安，严重影响术前睡眠质量。提高患者术前的睡眠质量可以减轻术后疼痛和住院天数，促进患者早日康复。围术期针灸医学主张通过围术期针灸治疗改善患者术前焦虑状态，从而加速患者快速康复。本研究拟探讨温热电极片 TEAS 双侧神门穴、内关穴及大椎穴对改善妇科腹腔镜手术患者术前睡眠质量的效果。
方法 全部患者住单间病房，纳入标准：(1)年龄 39~70 岁，BMI＜30kg/m2，(2) ASAⅡ-Ⅲ级。采用随机数字表法分为 TEAS 穴位刺激组和对照组(n＝35)。穴位位置根据中华人民共和国第二版标准针刺命名法确定。温热电极片为医用石墨外附医用脉冲凝胶，规格 5cm×5cm（深圳，普鸿科技有限公司），模块温度为 38-40℃，治疗频率 10/50 Hz，于手术前天下午访视病人，穴位处用酒精清洁皮肤后 TEAS，治疗 30min。刺激强渡逐渐增加后引起明显的震颤感，以患者可以耐受为宜。对照组仅在穴位上贴温热电极片开启温度为 38-40℃，但不给予电刺激，但告诉受试者可能感受不到刺激。客观睡眠质量评估采用睡眠手环监测记录睡眠质量（浅睡眠时间、深睡眠时间、总睡眠时间，觉醒次数、觉醒时间），主观睡眠质量评估采用匹兹堡睡眠质量指数（PSQI），总分 0～21 分，分值高低与睡眠质量呈负相关。数据采集评估人员不知分组情况。
结果 两组患者治疗前 PSQI 评分差异无统计学意义（P>0.05），TEAS 组治疗后 PSQI 评分 7.73±2.46 低于对照组 10.39±3.99，对照组与治疗前 PSQI6.82±1.36 比较评分增加，差异有统计学意义（P＜0.05）。TEAS 组总睡时间（393.39±66.03）及深睡时间（94.15±28.57）长于对照组（334.33±78.65，66.82±20.97），睡眠苏醒次数（1.82±0.68）及苏醒时间（33.70±19.41）短于对照组（3.88±0.89，95.52±43.33），差异有统计学意义(P＜0.05)。
结论 术前采用 TEAS 神门穴、内关穴配以大椎穴位，可以减轻患者的术前焦虑和紧张，改善患者术前睡眠质量，主要是使总睡时间和深睡时间增加，减少了苏醒时间和苏醒次数。睡眠监测采用主观睡眠质量评估（匹兹堡睡眠质量指数）与客观睡眠质量评估（睡眠监测体动记录仪）相结合综合可以更准确评估患者睡眠-觉醒的节律，监测睡眠质量。简便实用，副作用少，效果良好。在穴位局部加热能温通经络阳气，促进穴区局部血液循环，触发穴位局部皮肤和全身 HPA 轴的明显反应，从而启动皮-脑轴为核心的神经内分泌的广泛调控功能。

PO-0230

Potential Molecular Mechanisms of Electroacupuncture With sleep Induced by Chronic Pain on a rat model

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Objective To investigate the effects and possible mechanisms of electroacupuncture (EA) on sleep in rats with a neuropathic pain model.
Methods Male Sprague-Dawley rats were implanted with electroencephalogram (EEG) and electromyogram (EMG) electrodes for recordings. After electrode implantation, the rats underwent left sciatic nerve ligation to establish a chronic constriction injury (CCI) model. In the CCI group, the left sciatic nerve was ligated with 4-0 sterile silk suture to ensure the blood supply to the sciatic nerve. In the control group, the sciatic nerve was only exposed and isolated without ligation. Mechanical pain threshold and thermal pain threshold were measured 1 day before surgery and 3, 5, 7, 10, and 14 days after surgery. SD rats were randomly divided into four groups (n=8): sham surgery + non-EA group (Sham + Sham EA), sham surgery + EA group (Sham + EA), CCI + non-EA group (CCI + Sham EA), and CCI + EA group (CCI + EA). From 7 to 14 days post-CCI surgery, EA was administered to the Shenmen (HT7) and Zhaohai (KI6) acupoints in the EA groups, while non-acupoint EA was applied to the non-EA groups between 8:00-11:00 AM. On the 14th day after surgery, one sleep cycle (07:00-07:00) was monitored, mechanical and thermal pain thresholds were measured, and spontaneous activity was recorded. Rats were then sacrificed to determine the expression of LKB1 protein in the hippocampus.
Results Seven days post-surgery, CCI rats showed significantly reduced mechanical and thermal pain thresholds, decreased spontaneous activity, reduced nighttime sleep, and decreased hippocampal LKB1 protein expression ($P < 0.05$). Compared to the Sham group, the EA group showed significantly increased mechanical and thermal pain thresholds, increased spontaneous activity, increased nighttime sleep, and upregulated hippocampal LKB1 protein expression ($P < 0.05$).
Conclusion Electroacupuncture can improve mechanical and thermal pain thresholds, increase spontaneous activity, and improve sleep in CCI rats. LKB1 may be a potential target for EA in regulating sleep in rats with chronic neuropathic pain.

PO-0231

Dopamine D2 Receptor Modulating mPFC-BLA Circuitry Contributes to Chronic Sleep Deprivation-Induced Memory Impairment in Mice

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Insufficient sleep significantly affects the orchestration of neural networks, leading to cognitive impairment. However, the molecular and neural circuitry gating cognitive deficits induced by sleep deprivation remain largely unexplored. Here, we reported that a chronic sleep deprivation (CSD) model, characterized by disrupting rapid eye movement (REM) sleep and disinhibiting REM-specific dopaminergic input to the medial prefrontal cortex (mPFC), markedly impaired spatial memory assessed using the Y maze in mice. Transcriptome and immunofluorescent analysis revealed a significant increase of dopamine D2 receptor (Drd2) expression, specifically in layers II and III of the mPFC after CSD. Infusion of a Drd2 agonist into the mPFC reduced spatial memory in mice without sleep deprivation, while the Drd2 antagonist reversed the deficits caused by CSD. Furthermore, we found that Drd2 co-localized with Ca2+/calmodulin-dependent protein kinase II (CaMKII) positive neurons, which projected widely to various brains including the basolateral amygdala (BLA). During novel arm exploration, a significant increase in calcium influx was observed in these CaMKIIa+ neurons, indicating their involvement in processing spatial memory. Optogenetic activation of CaMKIIa+ neurons during the task rescued memory impairment induced by CSD through enhancing output to the BLA. Additionally, stimulating these BLA-projecting neurons in the mPFC reversed memory defects induced by the Drd2 agonist. Our findings clearly demonstrated that excessive Drd2 signaling after CSD suppresses mPFC-BLA neurotransmission during spatial memory tasks and thus leads to working memory impairment. Our work suggests a possible therapeutic value of dopamine D2 receptor antagonists relieving CSD-induced cognitive decline.

PO-0232

小鼠下丘脑单细胞整合分析揭示睡眠剥夺恢复期甘丙肽神经元特征和细胞通迅改变

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目的 睡眠是维持机体正常的新陈代谢、免疫反应和认知功能的重要生物行为。而调节睡眠稳态的神经免疫学机制还还不完全清楚。下丘脑是睡眠调控的重要中枢之一，其中甘丙肽神经元在维持睡眠稳态中发挥重要调控作用。不同甘丙肽神经元在睡眠剥夺恢复期分子特征改变以及不同甘丙肽神经元之间以及与其他细胞之间的通讯尚未完全揭示。本项目旨在单细胞水平探究下丘脑不同甘丙肽神经元在睡眠剥夺恢复期分子特征以及不同甘丙肽神经元之间以及与小胶质细胞/巨噬细胞之间的通讯改变。

方法 我们从公共数据库（https://www.ncbi.nlm.nih.gov/gds/）中整合了不同强度睡眠剥夺恢复期小鼠下丘脑区域单细胞测序数据（GSE137665）和单细胞核测序数据（GSE243489）。所有细胞根据变异前 2000 个基因进行 PCA 分析并使用适宜分辨率进行聚类。根据目前公开的神经元和免疫细胞标记物明确聚类的细胞类型。应用 FindAllMarker 函数计算细胞亚群和不同样本组间差异基因并通过基因功能分析（GO）分析差异基因所聚集的信号通路。应用 CellChat 分析来评估不同甘丙肽神经元之间以及与小胶质细胞/巨噬细胞之间信号分子和作用强度差异。

结果 92994 个细胞分别来自 12 个正常睡眠和睡眠剥夺恢复期的下丘脑单细胞核测序样本或单细胞测序样本。根据细胞类型分子标记物将所有细胞分为 10 种不同分子表达特征的细胞类型，甘

丙肽兴奋性神经元和甘丙肽抑制性神经元的数量占据最大比例，但是所有细胞类型在睡眠恢复期比例没有差异。而提取甘丙肽神经元中差异基因并进行基因功能分析，结果发现甘丙肽兴奋性神经元的差异基因主要富集在胶质细胞分化、中枢神经系统发育、多巴胺分泌和趋化因子负性调节等通路上调，甘丙肽抑制性神经元则主要富集在突触信号传递、钙离子细胞反应和离子跨膜转运等信号通路。与正常睡眠相比，睡眠剥夺恢复期甘丙肽神经元的差异基因主要与细胞信号交流相关。小胶质细胞/巨噬细胞中多效蛋白 PTN 分泌增加，在睡眠剥夺恢复期 PTN 信号通路作用于甘丙肽神经元强度明显增加，PTN 和受体 Ptprz1 可能是参与甘丙肽神经元在维持睡眠稳态的重要信号分子。

结论 下丘脑中甘丙肽神经元的数量占据较大比例，甘丙肽神经元可以分为兴奋性和抑制性神经元，具有不同基因表达特征。睡眠剥夺后小胶质细胞/巨噬细胞分泌 PTN 促进与甘丙肽神经元之间信号交流，提示了甘丙肽神经元促进睡眠稳态的可能分子机制。

PO-0233

伏隔核多巴胺 D1、D2 受体的神经元可调节小鼠七氟烷麻醉

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目的 尽管全身麻醉已广泛应用于临床，但其具体的神经机制仍不清楚，近年来多项研究表明其作用机制与睡眠-觉醒通路密切相关。伏隔核（nucleus accumbens ，NAc)，位于腹侧纹状体，由包绕前联合的核心区域及其外周的壳区域组成，是基底神经节的重要结构，中型多棘的 GABA 能神经元是其主要的神经元类型，根据神经元表达多巴胺受体的不同，进一步将其分为表达多巴胺 D1R（NAc^{D1R}）及 D2R（NAc^{D2R}）的神经元亚型。研究发现 NAc 直接参与睡眠-觉醒及全身麻醉的调控，但 NAc^{D1R}、NAc^{D2R} 在其中是否发挥作用以及作用的具体机制，仍需进一步研究。

方法 本实验以健康成年雄性 D1R-Cre、D2R-Cre 小鼠作为实验动物模型，通过光纤钙信号、光遗传学、免疫荧光、电生理技术，以皮层脑电（EEG）、翻正反射消失（LORR）时间、翻正反射恢复（RORR）时间为实验指标，探究伏隔核（NAc）中 NAc^{D1R} 及 NAc^{D2R} 神经元在小鼠七氟烷麻醉过程中的作用。

结果 光纤钙信号结果显示，在七氟烷麻醉过程中，NAc^{D1R} 神经元钙信号在麻醉诱导至 LORR 前开始缓慢下降，LORR 后继续下降并维持在较低水平，而麻醉苏醒期钙信号逐渐恢复，RORR 后显著增加。而 NAc^{D2R} 神经元活性也在七氟烷麻醉诱导后下降，在麻醉苏醒后恢复。为了进一步明确 NAc^{D1R}、NAc^{D2R} 神经元在七氟烷麻醉致意识改变中的作用，我们采用光遗传学特异性激活 NAc^{D1R} 神经元，与对照组相比，激活 NAc^{D1R} 神经元小鼠七氟烷麻醉 LORR 时间延长（132.7±9.9 vs 107.25±4.2, $P<0.05$），RORR 时间缩短(87.4±14.2 vs 127.8±9.5, $P<0.05$），脑电 δ 波比率减少，γ 波比率增加。特异性激活 NAc^{D2R} 神经元，与对照组相比， LORR 时间缩短（79.38±2.6s vs 99.50±2.3s，$p<0.0001$），RORR 时间延长（130.0±4.6s vs 100.5±3.5s，$p<0.001$），脑电 δ 波比率增加，γ 波比率减少；光抑制 NAc^{D2R} 神经元，与对照组相比，LORR 时间延长（106.80±2.8s vs 95.75±2.0s，$p<0.01$），RORR 时间缩短（84.38±3.9s vs 103.0±7.0s，$p<0.05$），脑电 δ 波比率减少，γ 波比率增加。

结论 1、NAc^{D1R}、NAc^{D2R} 神经元活性与全身麻醉密切相关；2、NAc^{D1R} 神经元在全身麻醉过程中发挥促觉醒作用；3、NAc^{D2R} 神经元在全身麻醉过程中发挥促麻醉效应。

PO-0234

Association between Blood Ethylene Oxide Levels and Trouble Sleeping in U.S. Adults: Data from NHANES 2013–2018

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目的 To investigate the relationship between ethylene oxide (EO) exposure and self-reported trouble sleeping among U.S. adults.
方法 This study utilized data from the National Health and Nutrition Examination Survey (NHANES) from 2013 to 2018, analyzing 4310 participants with histories of EO exposure. Participants were categorized into three groups based on log2-transformed levels of hemoglobin adducts of EO (HbEO). The risk of trouble sleeping was assessed using logistic regression, restricted cubic spline regression modeling, and subgroup analysis.
结果 The prevalence of trouble sleeping increased across the tertiles of HbEO levels: 28% in the first tertile, 29% in the second tertile, and 35% in the third tertile. After adjusting for all covariates, log2-transformed HbEO levels were significantly associated with an increased risk of trouble sleeping (Tertile 3 vs. Tertile 1 in model 4: OR = 1.41, 95% CI: 1.07–1.85, P = 0.016, P for trend = 0.027). A nonlinear J-shaped relationship was observed between HbEO levels and trouble sleeping. Additionally, a distinct positive correlation between HbEO levels and trouble sleeping was found in the 40-60 age group (OR = 1.19, 95% CI: 1.09-1.3, P = 0.0013).
结论 Higher levels of blood HbEO are strongly linked to an increased likelihood of sleep disturbances among U.S. adults, particularly in those aged 40 to 60. This study highlights the potential impact of EO exposure on sleep health, emphasizing the need for further research and potential public health interventions.

PO-0235

Effect of general anesthesia on sleep outcomes after minimally invasive urological surgery in patients with chronic insomnia: a randomized controlled study

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Objective With the acceleration of the global economic rhythm, people's physical and mental stress has increased dramatically, and chronic insomnia has become a very serious social problem. After experiencing sleep deprivation, the urge to sleep will be even stronger. General anaesthesia can make patients fall asleep, thereby making up for sleep debt and achieving a "critical state" of the brain's nerves. However, there is still considerable controversy about whether general anaesthesia can affect the progression of chronic insomnia, and its effect on the postoperative sleep outcome of patients with chronic insomnia has not yet been clarified. This prospective randomised controlled study aims to observe the effect of general anaesthesia on the sleep outcome of chronic insomnia patients after minimally invasive urological surgery through subjective and objective sleep assessment methods.

Methods Patients were visited before surgery and were selected according to ISI>7, PQSI>7, SRSS >30 points and SDS<8 points, SAS<50 points were randomly assigned to the general

anaesthesia deep sedation group (n=55), general anaesthesia light sedation group (n=55) and spinal anaesthesia group (n=55) in a 1:1:1 ratio. the first and third night after surgery, and recorded the scores. The patients were followed up by telephone on the evening of the seventh day after surgery. The electronic bracelet recorded the data of the first and third night after surgery, and the total sleep time and the proportion of REM sleep time were analysed. The patients' pain scores were assessed after surgery, and the adverse events and length of hospital stay were recorded.

Results An 8-point decrease in ISI score is considered a clinically significant change. Within 7 days after surgery, the incidence of an 8-point decrease in ISI score was 27.5% (11/40) in the deep sedation group, 15.0% (6/40) in the light sedation group, and 2.5% (1/40) in the spinal anaesthesia group. Compared with the spinal anaesthesia group, the incidence of an 8-point decrease in ISI was significantly higher in the general anaesthesia group; in particular, the incidence of an 8-point decrease in the general anaesthesia deep sedation group was significantly higher than that in the spinal anaesthesia group (P=0.001), and the incidence of an 8-point decrease in the general anaesthesia light sedation group was significantly higher than that in the spinal anaesthesia group (P=0.013).

Conclusion This prospective randomised controlled study found that general anaesthesia has a positive effect on sleep in patients with chronic insomnia on the first day after minimally invasive urological surgery, but the effect is not obvious after the third day.

PO-0236

一种智能麻醉座舱的构建

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目的 智能麻醉座舱的研究目的是通过构建一个集成化的智能系统，实时监控患者的生命体征和麻醉深度，并提供智能化的决策支持和预警。具体目标包括：提升麻醉过程的安全性和有效性，优化麻醉用药方案，减轻麻醉医生的工作负担，提高手术室的整体效率，及支持个性化麻醉方案的制定，确保患者在手术过程中的安全和舒适。通过智能麻醉座舱的应用，可以实现麻醉操作的自动化和智能化，从而推动麻醉学领域的发展和进步。

方法 采用脑电指数血压、心率、呼吸、体温等数据实时评估患者麻醉深度；采用基于视觉模拟评分（VAS）、数字疼痛评分（NRS） 语言评分系统（VRS）面部表情评分（FPS）的人机交互系统评估镇痛深度，自动完成镇静药及镇痛药的靶控输注；将麻醉设备、监护仪、舒适化套件、多功能病床、气体循环系统、光源系统整合在履带式可移动座舱内。在座舱内采用更多的信息输入和输出系统，以及具有更高算力的芯片，打造一个可以进行智能化人机交互的 AI 助手，让麻醉座舱更多的满足患者对诊疗空间、舒适化医疗的愉悦要求，以及医患交互的需求。同时智能麻醉座舱也能将所采集到的患者信息储存、传输给与之相关联的责任医务人员，增加诊疗效率并赋予远程医疗更强的实践性。并且其基于智能麻醉电子电气架构（IA-EEA 架构）：自动麻醉维持域 AMA，智能麻醉座舱域 ACA，麻醉座舱控制域 CCA 通过智能麻醉座舱域控制器 IA-CDC 对整个座舱智能化提供算力平台支持。

结果 该系统能够有效实时监控患者的生命体征和麻醉深度，并提供准确的决策支持和预警功能。通过集成多种传感器和数据分析算法，智能麻醉座舱实现了对麻醉过程的全面监控和优化，显著提高了麻醉的安全性和有效性。此外，系统的智能化功能减轻了麻醉医生的工作负担，提升了手术室的整体效率。智能麻醉座舱具有广阔的应用前景，可以显著推动麻醉学领域的技术进步和临床实践。

结论 当前麻醉行业正处于跨界融合与集成发展的竞争格局中。如果不能跟上科技与新经济的发展，传统麻醉技术有被颠覆的危险。为应对这一变局，我们必须重新审视麻醉行业的现状与未来，认识到其需与其他医疗与技术领域融合，形成综合的医疗服务体系。积极拥抱新技术与应用，推动智能麻醉座舱等新型医疗设备的发展，提升医疗服务的便捷性、高效性与安全性。只有这样，才能在科技与新经济的发展浪潮中立于不败之地，为健康事业做出更大贡献。

PO-0237

Intraoperative Fluid Recommendation in Major Abdominal Surgery Patients

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Background The aim of this study was to develop and validate a preoperative model that can provide clinically useful recommendations for intraoperative fluid volume in patients undergoing elective major abdominal surgery.
Methods A retrospective development cohort consisting of 1,361 adult patients who underwent single elective major abdominal surgery at the 3rd Xiangya Hospital was included in this study. We developed a machine-learning algorithm that integrates preoperative characteristics to predict intraoperative appropriate fluid therapy (AFT), and provides individualized recommendations for intraoperative fluid volume requirements. Additionally, we prospectively validated the clinical application of these model recommendations in a separate cohort (n=111).
Results Our model accurately predicts personalized AFT response to intraoperative fluid therapy. The area under the receiver-operating characteristic curve (AUC) for both the internal testing set and prospective validation set were 0.94 and 0.85, respectively. It was observed that most patients received higher volumes of fluids than recommended by our model. In the prospective validation cohort, exceeding the recommended fluid volume by over 500 mL significantly increased the risk of prolonged recovery from general anesthesia (adjusted odds ratio [OR] 6.06, 95% confidence interval [CI] 1.28-28.66, $p<0.05$).
Conclusion This personally tailored intraoperative fluid decision model based on preoperative characteristics can effectively recommend appropriate fluid therapy for patients undergoing elective abdominal surgery and could enhance early recovery from general anesthesia.

PO-0238

机器学习预测神经外科术后呼吸衰竭：模型构建及多中心验证

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目的 在既往研究中，我们成功建立了神经外科术后肺部并发症（postoperative pulmonary complications，PPCs）的预测模型。然而，PPCs 轻重不一，轻者可能无症状，重者则最终表现为呼吸衰竭（respiratory failure，RF）。神经外科术后还可能发现神经系统相关呼吸衰竭，需要再次插管或气管切开来维持氧合。术后 RF 是神经外科最关注的 PPCs。本研究目的是拟构建预测神经外科术后 RF 的机器学习模型，并对模型进行多中心验证和评估。同时对其危险因素进行鉴别和分析。
方法 从电子麻醉记录系统中自动提取神经外科手术病例数据，建立三个数据集：建模集（2018～2020 年数据）、内部验证集（2021 年数据）和外部验证集（其他三家医院数据）。在建模集中，

分别用全部 35 项特征和 Lasso 回归筛选的 7 项特征训练模型，算法包括贝叶斯，LR，AVM，随机森林，XGBoost 和 DNN。对模型进行多中心验证以评估其预测性能。评估指标包括 ROC 曲线及 AUC，精确率-召回率曲线，校准曲线及 Brier 指数。基于 LR 建立 7 参列线图，对列线图进行性能评估，并与已有的预测模型比较。前瞻性评估最佳模型的预测性能，评价指标包括敏感度、特异度、准确率等。采用多因素 logistic 回归鉴别神经外科术后 RF 的独立危险因素，并对最佳模型进行特征重要性分析。

结果 建模集、内部验证集和外部验证集最终分别纳入 7533 例、2824 例和 1383 例神经外科手术患者，RF 发生率为 4.7%～4.8%。预测性能最佳的全参模型为 DNN 和 LR，在内部验证中 AUC 分别为 0.818（95%CI：0.783～0.853)和 0.813（95%CI：0.774～0.850）（p=0.03）,并均显著高于其他模型（p<0.01）。对 Lasso 选参模型，在内部验证中，DNN 的区分度表现最佳（AUC 为 0.795，95%CI：0.759～0.826），其次为 LR（AUC 为 0.789，95%CI：0.757～0.825）（p<0.01）,且均显著高于其他模型（p<0.01）；在外部验证中，最佳模型仍为 DNN（AUC 为 0.905，95%CI：0.866～0.945）和 LR（AUC 为 0.907，95%CI：0.875～0.935）（p=0.255）,且均显著高于其他模型（p<0.01）。建立的 7 参预测神经外科术后 RF 的列线图，其性能优于现有预测量表，且在决策曲线分析中表明具有临床获益。对全参 DNN 模型进行前瞻性评估，显示其具有高敏感性和特异性，预测准确率为 79.1%。神经外科术后 RF 的 9 项独立危险因素基本与 Lasso 选参重叠，但与 LR 机器学习模型根据 SHAP 值排序的重要特征缺乏一致性。

结论 本研究成功构建了预测神经外科术后 RF 的最佳 DNN 模型。机器学习预测模型的建立和危险因素的识别，有助于患者分层和临床决策支持，从而改善手术预后。

PO-0239

围术期多模式镇痛应用现状调查：一项全国性横断面研究

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目的 调查我国麻醉医师对多模式镇痛的实施现状，分析多模式镇痛实施障碍的影响因素，并探索改善多模式镇痛依从性的路径，为围术期疼痛管理、多模式镇痛指南的完善及推广提供依据和参考。

方法 采用横断面、现况调查的研究方法，基于健康传播理论，即知信行理论框架，通过指南检索和条目筛选，经问卷的逻辑性测试和可行性测试形成多模式镇痛现况调查问卷。使用“问卷星”编制电子问卷，从 2023 年 2 月 9 日开始进行了为期 2 月的问卷调查，并通过中国麻醉医师协会向全国扩散，调查了我国麻醉医师对多模式镇痛的知识、信念态度及实施障碍的客观因素（包括指南因素、外部因素及患者因素）。

结果 本研究共回收问卷 4860 份，覆盖了全国 92.1%的省份（n=31）、94.5%的地级市（n=268）的 1022 家医院，问卷有效率为 87.5%。

研究发现多模式镇痛的总体依从性偏低，其比例约为 58.6%。对所调查 14 条多模式镇痛推荐意见，阿片类药物的知晓率最高（97.6%），加巴喷丁普瑞巴林的知晓率最低为 41.1%。在镇痛药物和镇痛技术的使用方面，阿片类药物的依从性最高，非阿片类镇痛药物的依从性偏低，其中 NSAIDs 药物依从性仅为 61.3%，神经阻滞的依从性较高（79.2%）。

麻醉医师的知识、信念态度以及多模式镇痛的实施条件都在一定程度上影响多模式镇痛的实施。研究发现多模式镇痛的知晓程度更高，多模式镇痛的依从性也更高，此外，指南学习的深度和广度正向影响多模式镇痛的依从性。积极的信念态度也正向麻醉医师对多模式镇痛的依从性。实施条件影响多模式镇痛的实施中，指南因素中占比最高的是不同指南的推荐意见不一致，外部因素中设备获取困难和操作时间有效占比最高，患者因素中占比最高的是患者的镇痛认知问题。经探索性的中介分析发现，建立 APS 组织组织可能是改善多模式镇痛依从性的重要中介。

结论 本研究从麻醉医师角度调研出发，发现多模式镇痛的依从性为 58.6%，麻醉医师的知识、信念态度及多模式镇痛的实施条件（指南因素、外部因素和患者因素）都在不同程度上影响了多模式

镇痛的依从性。非阿片类药物、局麻药物的技术推广和应用仍有待提高，建立 APS 组织可能有利于提高多模式镇痛的依从性。

PO-0240

The analgesic efficacy of bupivacaine liposome in Adductor canal block following knee arthroplasty: A single-center, prospective, randomized, double-blind, and controlled clinical trial

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Objective:
Knee arthroplasty is a major surgical procedure associated with significant pain,.The optimal analgesic strategy remains controversial but could play a significant role in reducing the risk of perioperative adverse events and in facilitating enhanced recovery, thereby accelerating hospital discharge and functional recovery.Peripheral nerve blocks are increasingly used to provide opioid-sparing analgesia, reduce complications, and improve patient satisfaction.
Ultrasound-guided adductor canal block（ACB） can provides adequate postoperative analgesia for patients after knee arthroplasty and has less impact on postoperative rehabilitation exercises. However， a single dose does not effectively cover the critical pain window following knee arthroplasty.
Bupivacaine liposomes are the first approved ultra-long-acting local anesthetic. The role of ultrasound-guided ACB using liposomal bupivacaine for analgesia after knee arthroplasty is not well defined.
We hypothesized that these two drugs would reduce opioid use with out worsening intraoperative pain control. Furthermore, we believed that the analgesic effect would persist after the operation，though the duration might differ between the two drugs.This randomized trial assessed the analgesic effectiveness of the treatment, specifically examining the prolonged postoperative pain relief to mitigate the potential risks of catheterization.

Methods:
This prospective, randomized, double-blinded, clinical trial was implemented in the The First Affiliated Hospital of USTC.
All patients visited one day before the surgery and routine preoperative assessment was performed. They were explained about the study protocol, the potential benefits and side effects of nerve block techniques,as well as the Visual analogy score(VAS) ranging from 0 to 10(that corresponds to “no pain,smile” to “worst pain,cannot sleep”).
Consenting participants scheduled for elective knee arthroplasty under general anaesthesia were randomly allocated to receive ultrasound-guided ACB with Ropivacaine(20ml 0.375%) or Bupivacaine liposome(20 ml 133mg). The both local anesthetics was diluted with normal saline.
The primary outcome included pain scores at the immediate postoperative awakening (T0), 2 hours after awakening (T1), 24 hours postoperative (T2), 48 hours postoperative (T3), and 72 hours postoperative (T4) , Additional outcomes included opioid-related side-effects (nausea, vomiting, pruritis), ability to perform physiotherapy on the first postoperative day(The 10-meter walking distance was recorded).
All surgical operations were performed by the same group of joint surgeons through a standard medial parapatellar approach with a conventional tourniquet. The surgical surgeons used a cocktail combination combination for periarticular infiltration. The cocktail formulation was morphine (5mg) , dexamethasone (5mg), ropivacaine (10mg) and epinephrine (0.3mg).

Patients,in both groups, also received routine patient-controlled analgesia pumps (PCIA) for 48 hours postoperatively, formulated as sufentanil （ 100ug ） ,flurbiprofenate (100mg) and ondansetron 16mg. Postoperative follow-up was completed by only one research doctor who was not participate in anesthesia management .Pain for which analgesia was ineffective required remedial analgesia, which was performed by the patient's chief complainant, the ward surgeon, and a single remedial regimen of intravenous morphine or oral nonsteroidal drug (celecoxib) therapy.

Results:
Among 365 eligible patients approached, 245 had one or more exclusion criteria, and 120 were enrolled and consented between Nov. 2023 and April. 2024. Among those providing consent, one withdrew from the study after randomisation. Of the remaining 119 participants, 60 were randomised to the group R and 59 to the group B .
The patient demographics did not differ across the two groups . There were no discernible disparities in the underlying conditions, encompassing the underlying disease, type of operation, and duration of operation, between the two groups.
There were no statistically significant differences observed in the Visual Analog Scale（VAS） at time points T0 to T3 between the groups receiving a nerve block with Ropivacaine versus those receiving a nerve block with Bupivacaine liposome, whether during exercise or at rest. The VAS at 72 hours postoperatively was found to be significantly lower in group B compared to group R ,Mean VAS at 72 h was 3 (2 TO 5 in the group R and 2 (2 TO 3) in the group B($p<0.05$).
Additionally, there were no significant differences between the two groups in terms of time spent out of bed and 10-second walk distance during postoperative follow-up. Similarly, there were no significant variations observed in adverse effects and the need for postoperative remedial analgesia between the two groups. Furthermore, patient satisfaction with analgesia did not show any significant differences between the groups.

Conclusions:
This study demonstrates that multimodal analgesia, including ACB, effectively achieves acceptable pain scores at all time intervals regardless of the type of pain medication administered. Furthermore, bupivacaine liposomes exhibit superior analgesic effects compared to ropivacaine after 48 hours, possibly due to the prolonged duration of analgesic action and improved tissue penetration associated with bupivacaine liposomes.

Despite the purported advantages of extended post-operative analgesia utilizing bupivacaine liposomal in individuals undergoing knee arthroplasty, ultrasound-guided ACB with bupivacaine liposomal did not demonstrate a notable reduction in opioid consumption or early post-operative pain levels compared to ropivacaine. Additionally, there were no discernible variances in secondary outcomes such as opioid-related adverse effects or the capacity to engage in physiotherapy on the initial day following surgery.
This provides a new option for clinical analgesia after knee arthroplasty and helps to improve the quality of life of patients.

PO-0241

Analysis of the efficacy of temporary supraorbital nerve stimulation in the treatment of herpes zoster ophthalmicus combined with breakthrough pain: a retrospective study

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目的 To evaluate the efficacy and safety of temporary supraorbital nerve stimulation for the treatment of patients with herpes zoster ophthalmicus (HZO) combined with breakthrough pain (BTP).
方法 Clinical data of patients diagnosed with HZO combined with BTP and treated with a temporary supraorbital nerve electrical stimulation from January 2020 to July 2023 in our department were retrospectively analyzed. At baseline, 1 day, 1 week, 4 weeks, and 12 weeks postoperative follow-up, patients were assessed for numerical rating scale (NRS), frequency and intensity of BTP, brief pain score (BPI), short-form McGill pain questionnaire (SF-MPQ), pain disorder index (PDI), touch-induced pain (TIP) classification, localized pruritus, and pirsburgh sleepquality index (PSQI). Adverse effects during electrical stimulation treatment were also recorded.
结果 A total of 22 patients were included in this study. The median age of the patients was 72 years (range 26-84 years). NRS score were significantly reduced at different time points after temporary supraorbital nerve stimulation treatment compared to baseline ($p < 0.001$). The probability of patients with ≥ 50% pain relief at 1 day, 1 week, 4 weeks, and 12 weeks after treatment was 50%, 77.2%, 85%, and 88.9%, respectively. Episodes of BTP (frequency, intensity and duration) were significantly reduced after temporary supraorbital nerve stimulation treatment ($p = 0.003$). BPI, overall SF-MPQ Score, PDI and PSQI score were significantly lower at the last follow-up ($p < 0.001$). TIP classification were significantly improved at postoperative different time points compared to baseline ($p < 0.01$). No significant adverse reactions were observed.
结论 Temporary supraorbital nerve stimulation is an effective and safe treatment for patients with HZO combined with BTP, which can effectively relieve pain, alleviate BTP, improve sleep quality, and enhance quality of life.

PO-0242

在条件恐惧小鼠中经皮耳迷走神经刺激可通过抗神经炎症机制降低恐惧记忆

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目的 创伤后应激障碍（posttraumatic stress disorder，PTSD）和抑郁症共患病率高。经皮耳迷走神经刺激（transcutaneous auricular vagus nerve stimulationta，VNS）是一种关键的非侵入性神经调控来治疗抑郁症的方法，可能通过抗神经炎症机制产生其效果。神经炎症的失调与 PTSD 的发病机制直接相关。然而，目前关于 taVNS 治疗 PTSD 是否有效，尚无确切证据。在这项研究中，我们研究了 taVNS 是否通过抗神经炎症效应来减少条件恐惧模型小鼠的恐惧记忆。
方法 通过条件恐惧建立 PTSD 小鼠模型。所有经历过条件恐惧的小鼠分别接受 taVNS 治疗（实验组）或假 taVNS 治疗（对照组）。通过场景或听觉刺激诱发的僵住时间百分比来评估恐惧记忆。在造模后第 3 天，使用旷场试验评估了条件恐惧模型小鼠的抑郁样行为。第 3、5 和 7 天分别进行

了恐惧记忆测试，之后小鼠被安乐死，采集血清、海马和下丘脑组织。为了评估抗神经炎症在 taVNS 对恐惧记忆影响中的作用，使用酶联免疫吸附法（ELISA）测量了血清、下丘脑和海马中炎症因子 IL-1β、IL-10 和皮质酮的水平。
结果 在第 3 天，与对照组相比，taVNS（2 次 taVNS 治疗）增加了在旷场试验中中央区域的总移动距离和总行走时间，并减少了第 3 天的场景恐惧记忆恐惧反应。在第 5 天（4 次 taVNS 治疗）和第 7 天（6 次 taVNS 治疗）时，与对照治疗相比，taVNS 治疗减少了听觉刺激引起的恐惧记忆。与对照组相比，taVNS 增加了血清中的皮质酮和抗炎因子 IL-10，并降低了促炎因子 IL-1β。此外，taVNS 在下丘脑和海马中也增加了抗炎因子 IL-10，并降低了促炎因子 IL-1β。
结论 这项研究表明，至少在一定程度上，taVNS 可能通过抗神经炎症机制降低了条件恐惧模型小鼠的恐惧记忆。

PO-0243

颊针疗法对止血带缺血再灌注损伤及术后镇痛的影响

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目的 探讨颊针疗法对止血带缺血再灌注损伤及术后镇痛的影响
方法 在黔南州人民医院麻醉科 2022 年 1 月至 2023 年 12 月收治的所有损伤手术患者中选取 120 例为研究对象,采用随机数字表法分为对照组(n=60)与观察组(n=60)两组,观察组采用颊针疗法进行，术前半小时对患者进行颊针治疗，在脸部颊针标准穴位进行双侧治疗：双侧颈穴、背穴、腰穴、下腰穴、髋穴、膝穴、踝穴、下焦穴.留针 30 分钟；对照组患者不进行提供任何面部颊针穴位刺激。分别对比两组患者上止血带前(TO)、止血带充气 10 min(T)、止血带充气 30 min(T2)止血带充气 60 min(T3)、止血带充气 90 min(T4)、松止血带后 10 min(T5)、松止血带后 30 min(T6)、松止血带后 60 min(T7)心率(HR)情况、丙二醇(MDA)、超氧化物歧化酶(SOD)以及炎性因子肿瘤坏死因子(TNF-a)- 和白细胞介素 8(IL-8)表达水平、术后镇痛情况以及术后并发症(术后出血、术后发热)发生率。
结果 两组患者 T0、T6、T7 时刻 HR 相比差异无统计学意义(P>0.05),T1~T5 时刻,观察组的 HR 明显低于对照组,差异有统计学意义(P<0. 05),;两组患者 T0 时刻 MDA、SOD、TNF-a 和Ⅱ-8 相比差异无统计学意义(P>0.05),T7 时刻观察组 SOD 明显高于对照组,MDA、TNF-α 和 IL-8 均低于对照组,差异均有统计学意义(P<0.05):观察组患者的首次镇痛药物服用时间长于对照组患者,48h 镇痛泵使用次数少于对照组患者,差异有统计学意义(P<0.05);观察组患者并发症发生率(4.13%)低于对照组(25.32%),差异有统计学意义(P<0.05)。
结论 在对于止血带缺血再灌注损伤患者的治疗中运用颊针疗法能有效减轻止血带为患者所带来的疼痛,避免脏器损伤,减轻缺血再灌注损伤出现的可能,提高疾病的预后效果，运用效果显著。

PO-0244

电针通过调节 TREM2-DAP12 信号通路改善老年大鼠术后认知功能的机制研究

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目的 本研究旨在探讨电针调节髓样细胞触发受体 2（TREM2）-酪氨酸激酶结合蛋白（DAP12）信号通路改善老年大鼠胫骨骨折术后认知功能的机制。
方法 选择 18 月龄老年雄性 SD 大鼠 12 只，用随机数字表法分为对照组和针刺组，每组各 6 只。针刺组行百会、神庭电针刺激，对照组未行电针。采用旷场试验评价大鼠认知功能；采用 HE 染色法观察海马组织细胞形态；采用 TUNEL 染色法观察海马组织细胞凋亡情况；采用 ELISA 法测定血浆 β 淀粉样蛋白（Aβ）1-40、白细胞介素（IL）-1β、IL-6、肿瘤坏死因子（TNF）-α 浓度；采用 Western blot 法检测海马组织神经元特异性烯醇化酶（NSE）、S-100β 蛋白、TREM2、DAP12 蛋白表达。
结果 ①认知功能：与对照组比较，电针组大鼠的活动时间、总路程、伸展时间均明显延长，平均速度显著提高（P＜0.05）；②海马组织细胞形态和凋亡情况：对照组 CA3 区神经细胞核固缩、胞质深染，可见小胶质细胞吞噬神经元；电针组 CA3 区仅部分细胞胞质深染。与对照组相比，电针组神经元细胞凋亡数量明显减少（P＜0.05）。③血浆 Aβ1-40、IL-1β、IL-6、TNF-α 浓度：与对照组相比，电针组大鼠血浆中 Aβ1-40、IL-1β、IL-6、TNF-α 表达水平明显降低（P＜0.05)。④海马组织 NSE、S-100β、TREM2、DAP12 的表达水平：与对照组比较，针刺组 NSE、S-100β 蛋白表达水平明显下降（P＜0.05），TREM2、DAP12 的表达水平明显升高（P＜0.05）。
结论 百会、神庭电针刺激可减轻老年大鼠胫骨骨折术后海马神经细胞损伤和凋亡，从而改善认知功能，这可能与电针激活 TREM2-DAP12 通路，促进小胶质细胞由 M1 型向 M2 型转变，减轻小胶质细胞炎症反应有关。

PO-0245

电针抑制 Drp1 介导的线粒体分裂改善糖尿病小鼠术后认知功能障碍

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目的 明确高糖诱导线粒体过度分裂引起功能障碍，导致神经元凋亡的作用靶点。探索电针干预对糖尿病小鼠术后认知功能的影响，阐明电针调控线粒体分裂改善线粒体功能，抑制神经元凋亡的机制。
方法 高糖培养 HT-22 细胞，MTT 检测细胞活力，流式细胞术检测细胞凋亡和线粒体膜电位（MMP），MitoTracker 探针观察线粒体，免疫印迹法检测 mito-Drp1 表达。54 只雄性 C57BL/6 小鼠高脂饮食联合 STZ，1 周后空腹血糖≥11.1 mmol/L，即为 2 型糖尿病（T2DM）实验动物，随机数表法将小鼠分为对照组、模型组、电针组。行胫骨骨折髓内固定术建立 POCD 模型；电针组术前 2 周取神庭、百会、足三里和内关行电针干预，每次 30 分钟，每周 5 天。术后 1 天行旷场实验、条件恐惧实验评估认知功能；TUNEL 染色观察神经元凋亡；流式细胞术检测 MMP；免疫印迹法检测海马 Caspase-3、p-Drp1(Ser616)、mito-Drp1 表达。

结果 高糖培养 HT-22 细胞致细胞凋亡增加，MMP 降低，线粒体过度分裂伴分裂蛋白表达增加。电针改善糖尿病小鼠术后认知功能，减轻海马 CA1 区神经元凋亡，恢复 MMP 水平，下调 Caspase-3、p-Drp1(Ser616)、mito-Drp1 蛋白。
结论 糖尿病存在线粒体功能异常及神经元损伤。电针神庭、百会、足三里和内关改善糖尿病小鼠在术后出现的认知障碍，其可能通过抑制线粒体过度分裂，恢复线粒体功能，减轻海马神经元凋亡，进而改善术后认知功能。

PO-0246

电针对全麻气管插管患者术后肺部并发症影响的临床观察

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目的 探讨电针对全麻气管插管患者术后肺部并发症的影响。
方法 择期行气管插管全麻手术的患者 72 例，随机分为电针组（n=36）、对照组（n=36），电针组麻醉诱导前电针组选择双侧列缺、尺泽、三阴交、足三里以及膻中和天突穴进行电刺激，对照组不做任何干预，记录 3 天内 PPCs 的发生率、术后 3 天内谵妄发生率、再插管例数以及 30 天内死亡率、记录入室后（T1）、气管插管后 30min（T2）、气管插管后 3h（T3）、气管插管拔除后脱氧 5min（T4）时刻的 PaO2 和 PaCO2、T1 及 T4 时刻血清中 IL-1β、SOD 的表达，记录 T2 及 T3 的气道压、动态顺应性、气道阻力、术毕带管时长、拔管后 5min 内低氧血症的发生率、术毕返回病房后（T5）不吸氧状态下的即刻指脉氧饱和度。
结果 内低氧血症的发生率、术毕返回病房后（T5）不吸氧状态下的即刻指脉氧饱和度。结果：与对照组相比，电针组 PPCs 发生率降低，谵妄发生率降低，差异具有统计学意义（P＜0.05），两组再插管发生率、30 天内死亡率无统计学差异；电针组 T2、T3 以及 T4 时刻 PaO2 均升高，T4 时刻 PaCO2 升高，电针组 T4 时刻 IL-1β 表达水平降低，SOD 表达水平升高，差异具有统计学意义（P＜0.05）；两组患者 T2 时刻气道峰压、动态顺应性、气道阻力差异均不具有统计学意义（P＞0.05）；电针组 T3 时刻气道峰压降低，动态顺应性提高，气道阻力降低，电针组术毕带管时间缩短，拔管后 5min 内低氧血症发生率降低，T5 指脉氧饱和度升高，差异具有统计学意义（P＜0.05）。
结论 电针可以降低全麻气管插管患者术后肺部并发症的发生率，减轻炎症反应，降低患者术中气道阻力、提高肺脏动态顺应性。

PO-0247

Transcutaneous auricular vagus nerve stimulation reduces fear memory in fear-conditioned mice through an anti-neuroinflammatory mechanism

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目 的 Posttraumatic stress disorder (PTSD) and depression frequently co-occur, and transcutaneous auricular vagus nerve stimulation (taVNS) has emerged as a promising noninvasive treatment for depression, potentially via anti-neuroinflammatory pathways. Given the role of neuroinflammation in PTSD, taVNS could be a potential treatment, but its efficacy in PTSD remains unclear.

方法 This study aimed to evaluate the effects of taVNS on fear memory in a mouse model of PTSD. Mice underwent fear conditioning to establish the PTSD model and were then assigned to receive either taVNS or sham treatment. Fear memory was measured by freezing behavior in response to contextual and auditory cues. Additionally, an open field test (OFT) assessed depression-like behaviors. After testing, serum and tissue samples from the hippocampus and hypothalamus were collected for analysis of inflammatory markers using enzyme-linked immunosorbent assays (ELISAs).
结果 TaVNS significantly improved OFT performance and reduced contextual fear memory on the 3rd day. Furthermore, taVNS treatment diminished auditory-cued fear memory on the 5th and 7th days. ELISA results indicated that taVNS increased levels of corticosterone and IL-10 while decreasing IL-1β in the serum, and similar patterns were observed in the hypothalamus and hippocampus.
结论 he findings suggest that taVNS may reduce fear memory in mice through anti-neuroinflammatory mechanisms, offering a potential therapeutic approach for PTSD. However, further research is needed to confirm these preliminary findings and explore the clinical applicability of taVNS in treating PTSD.

PO-0248

Baicalin ameliorates cognitive impairment in cerebral ischemia-reperfusion mice by inhibiting PGE2

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Baicalin ameliorates cognitive impairment in cerebral ischemia-reperfusion mice by inhibiting PGE2
Objective
The purpose of this study was to investigate the effects of baicalin on neuroinflammation and cognitive impairment in mice with cerebral ischemia-reperfusion injury (CIRI).
Method
Experimental protocols: in the first part, the effects of baicalin on neurocognition, hippocampal meridian inflammation and ferroptosis in mice with cerebral ischemia-reperfusion were studied. They were divided into control group (Con), baicalin (Bai) group, CIRI group and Bai+CIRI group. The model of CIRI was established by transient bilateral common carotid artery occlusion (tBCCAO). The second part was to study the regulatory effect of baicalin on hippocampal nerve inflammation and ferroptosis in mice up-regulated by PGE2. Mice were divided into control group, Bai group, PGE2 group and Bai+PGE2 group. PGE2 group was upregulated by bilateral intracerebroventricular injection of PGE2. The third part was to study the effect of PGE2 on the cognitive function of CIRI mice. Mice were divided into Con group, CIRI group, PGE2+CIRI group and Bai+CIRI+PGE2 group.
Index detection: the cognitive function of mice was detected by Morris water maze. The expression of lipid peroxidation MDA and neuroinflammation PGE2, TNF- α, IL-1 β and IL-6 in hippocampus were measured by ELISA. The pathological changes of brain tissue were observed by HE staining, and the expressions of GPX4, DMT1 and PTGS2 in hippocampus were detected by Western blot.
Results
1. Effect of baicalin on cognitive function of CIRI mice
Compared with Con group and Bai+CIRI group, swimming speed in CIRI group was no significant difference ($P > 0.05$). The escape latency of CIRI group was significantly longer than Con group on day 3 (T5) and day 4 (T6) ($P < 0.05$), but Bai+CIRI group was significantly shorter than CIRI group at T3 and T4 time points. The cross-platform times of CIRI group was significantly reduced

compared with Con group, and Bai+CIRI group was significantly increased compared with CIRI group (P < 0.01)（Figure 1 ）.

Fig. 1 Effect of baicalin on cognitive function of CIRI mice

2. Effect of baicalin on hippocampal inflammation in CIRI mice.
The levels of pro-inflammatory factors IL-6, IL-1β, TNF-α and PGE2 in hippocampal tissue of mice in CIRI group were significantly increased compared with those in Con group (P < 0.05). The levels of PGE2, IL-6, IL-1β and TNF-α in hippocampus of mice in Bai+CIRI group were significantly decreased compared with those in CIRI group (P < 0.05).
3. Role of baicalin in abnormal expression of lipid peroxidation and ferroptosis related proteins in hippocampus induced by CIRI
Compared with Con group, GPX4 and PTGS2 protein in hippocampal tissue of CIRI group were significantly increased, DMT1 was significantly decreased, and lipid peroxidation MDA level was significantly increased (P < 0.01). Compared with CIRI group, DMT1 in hippocampus of mice in Bai+CIRI group was increased, while GPX4, PTGS2 and MDA were significantly decreased (P < 0.05)（Figure 2）.

**P＜0.01 vs Con group； #P＜0.05 vs CIRI group
Fig. 2 Change of hippocampus ferroptosis after CIRI

4. Effects of baicalin on hippocampal neurons in CIRI mice
The hippocampal morphology and structure of Con group and Bai group were complete at 400 times, and the cell structure and morphology were not abnormal. Compared with Con group, a large number of inflammatory cells were observed in hippocampal CA1 region in CIRI group, neuronal cells were edema and degeneration, and the nuclei showed a state of contraction, dissolution and necrosis. The purity of inflammatory cell infiltration, cell edema, degeneration and necrosis of nerve cells in hippocampus of mice in Bai+CIRI group was significantly reduced compared with that in CIRI group（Figure 3）.

Fig 3 Changes of H&E staining in hippocampal tissue of mice (× 400)

5. Role of baicalin in hippocampal inflammation, lipid peroxidation and ferroptosis related protein expression induced by PGE2 up-regulation
Compared with Con group, PGE2 and pro-inflammatory factors IL-1β, IL-6 and TNF-α in hippocampus of PGE2 group were significantly increased. The ferroptosis related GPX4, PTGS2 and MDA were significantly increased, and DMT1 were decreased (P < 0.01). Compared with PGE2 group, hippocampal pro-inflammatory factors IL-1β, IL-6 and TNF-α were significantly decreased. The ferroptosis related GPX4, PTGS2 and MDA were significantly decreased, but DMT1 were increased (P < 0.05)(Figure 4).

*P＜0.05 vs Con group； $P＜0.05 vs PGE2 group
Fig 4 Changes of ferroptosis and lipid peroxidation level of hippocampus after injection of PGE2 into lateral ventricle

6. The role of PGE2 in baicalin improving cognitive impairment
The escape latency of PGE2+CIRI group was significantly longer than CIRI group on the second day of testing (P<0.05),and Bai+PGE2+CIRI group was significantly shorter than PGE2+CIRI group (P<0.05). The cross-platform times of PGE2+CIRI group was significantly decreased compared with CIRI group (P<0.05). The Bai+PGE2+CIRI group was significantly higher than that of PGE2+CIRI group (P<0.05) (Figure 5).

**P< 0.01 vs Con group；@P< 0.05 vs CIRI group； &&P < 0.01 vs PGE2+CIRI group
Fig5. The effect of PGE2 on baicalin in improving cognitive impairment

Conclusion

Baicalin improve the cognitive impairment induced by CIRI through inhibiting PGE2-related neuroinflammation, lipid peroxidation and ferroptosis related protein abnormal expression. This study has certain theoretical basic research value and provides a new idea for the treatment of CIRI. We plan to further explore the role of PGE2 in cognitive function impairment caused by CIRI and carry out functional verification.

PO-0249

Aucubin administration alleviates attention deficit hyperactivity disorder (ADHD)-like behaviors in mice via anti-inflammatory

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ABSTRACT

Background Attention deficit hyperactivity disorder (ADHD) is a common psychological disorder in childhood. Studies have shown that increased inflammation may contribute to ADHD. Aucubin, an anti-inflammatory extract, has been reported to exhibit neuroprotective effects. The aim of this study was to explore the role of aucubin in ADHD.

Methods SPF C57BL/6 pregnant mice were administered 15 mg/kg of S-ketamine via intraperitoneal injection for 5 days from gestational day 14–18 to establish ADHD model. The offspring mice were given intraperitoneally 40 mg/kg of aucubin for 7 days from 14 to 20 days. At 21 days after birth, ADHD-like behavior was assessed by open field test (OFT), new object recognition test (NOR), elevated plus-maze test (EPM), and fear conditioning (FC). Additionally, offspring mice for neurophysiological monitoring were implanted with electrodes in the brain on postnatal day 21, and local field potentials (LFP) during NOR was investigated on postnatal day 27. The astrocytes in cornu ammonis (CA1), dentate gyrus (DG), and amygdala were measured by immunofluorescence staining. Then the cell experiment was carried out in vitro. Primary astrocytes were extracted and co-cultured with S-ketamine (final concentration 200 μM) for 7 days and treated with aucubin. The expression of interleukin18(IL-18), cleaved caspase-1, and interleukin 1β (IL-1β) was detected by immunofluorescence, and pyroptosis was evaluated. RNA sequencing explores differentially expressed genes (DEGs) to study gene expression during the onset and progression of ADHD. The expression of AVPR1a was verified in brain tissue samples from mice with ADHD using quantitative real-time PCR(Q-PCR). The expression of AVPR1a in tissues and cells was detected by immunofluorescence assay.

Results Aucubin administration significantly reversed S-ketamine induced ADHD-like behaviors including decreased total distance in the OFT, increased recognition index in the NOR, shortened the proportion of open arm time, and increased context-related freezing time in the FC, as well as reduced glial fibrillary acidic protein (GFAP) intensity.Aucubin decreased theta (θ) oscillation power during novel objective exploration. At the same time, the expressions of GFAP in CA1, DG and amygdala were decreased.Besides, neuroprotective effects induced by aucubin administration were found in vitro. Expression of pyroptosis related factor IL-18, cleaved caspase-1, and IL-1β decreased after aucubin treatment.

The results of RNA sequencing showed abnormal AVP metabolic pathway in ADHD mice. By applying Q-PCR, we found that the expression of AVPR1a was significantly decreased in the aucubin group. Immunofluorescence results showed that aucubin decreased the expression of AVPR1a in the tissues and cells of ADHD mice.

Conclusions：Aucubin significantly improved ADHD-like behavior in mice via anti-inflammatory.

PO-0250

经皮穴位电刺激对女性减重手术患者 PONV 的治疗作用：随机、双盲、对照研究

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目的 术后恶心呕吐（PONV）是女性减重手术后最常见的并发症，可影响术后康复和导致出院延迟，即使使用多模式预防策略，其发生率依然高达 60%。经皮穴位电刺激（TEAS）作为一种安全且无创的非药物疗法，已成功用于手术患者术后镇痛和术后胃肠功能调节，然而，尚不清楚该方式对女性减重手术患者 PONV 的治疗作用。因此本研究旨在评价 TEAS 用于治疗女性减重手术患者 PONV 的临床效果。

方法 纳入 2020 年 2 月至 2023 年 2 月在本单位接受减重手术后发生了 PONV 且未使用药物治疗的女性患者，随机分为 TEAS 组和对照组。TEAS 组患者出现恶心、呕吐、干呕症状的 24 小时内给与足三里和内关穴电刺激持续 6 小时，对照组在所在穴位处粘贴电极，连接刺激仪，不给予刺激。若两组患者经上述治疗后 2h 仍不见好转，且要求进一步处理时，随即给予药物治疗（胃复安 10 mg 肌注和昂丹司琼 4mg 静注）。记录两组患者恶心呕吐缓解情况。主要终点为完全反应（Complete response, CR），定义为在处理后 30 分钟-24 小时内无恶心呕吐发生，且未使用补救性止吐药。使用卡方检验比较两组减重手术患者 PONV 的 CR 率。

结果 在研究期间共筛选了 210 例女性患者，2 例患者经历了非计划性二次手术被排除，141 例患者经历了 PONV，其中 TEAS 组 71 例，对照组 70 例。两组患者的年龄、BMI 无统计学差异（33.3 ± 9.01 VS 33.2 ± 7.04，P=0.970；39.3 ± 7.1 vs 39.1 ± 6.6，P=0.956）。TEAS 中，有 54 例患者（76.1%）经历了 CR，其中 TEAS 后和药物使用后经历了 CR 的患者分别为 30 例（42.3%）、24 例（33.8%），而对照组中经历 CR 的患者有 31 例（44.3%）（P=0.002），其中假刺穴位刺激后和药物使用后经历 CR 的患者分别为 13 例（18.6%）（P=0.014）和 18 例（25.7%）（P=0.367）。药物使用次数在在各组之间的差异显著，刺激组有 31 例患者（43.7%）和对照组有 49 例患者（70.0%）使用了药物治疗（P=0.012）。此外，刺激组和对照组中合并晕动病患者分为有 17 例（23.8%）和 13 例（18.5%），经历 CR 的患者分别有 4 例（5.6%）和 2 例（2.9%）。

结论 经皮穴位电刺激对女性减重手术患者 PONV 的治疗效果确切，减少了止吐药的使用。经皮穴位电刺激与止吐药联合应用治疗女性减重手术患者 PONV 的效果明显优于单用止吐药，但对有晕动病的女性减重手术患者的 PONV 治疗效果较差。

PO-0251

The effect of transcutaneous electrical acupoint stimulation on postoperative nausea and vomiting in patients with breast cancer: a randomised controlled trial

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Aims: A history of severe nausea and vomiting during pregnancy (SNVP) is a risk factor for postoperative nausea and vomiting (PONV). Routine PONV treatment methods worked poorly in patients with a SNVP risk. Transcutaneous electrical acupoint stimulation (TEAS) is a non-pharmacological and non-invasive treatment method that has been used in perioperative anesthesia management to improve patient recovery, including PONV prevention. Therefore, this study aimed to explore TEAS's effect on SNVP risk-related PONV in breast cancer patients.

Methods A total of 140 female patients undergoing breast cancer surgery were assigned to either the study group (70 with SNVP) or the control group (70 with mild to moderate nausea and vomiting during pregnancy (MNVP)). Patients in each group were randomly assigned to two different treatment subgroups and received either ondansetron plus dexamethasone (OD) or OD + TEAS (ODT). Before anesthetic induction, a HANS-200A Acupoint Stimulator (Nanjing Jisheng Company, China) was used to stimulate the bilateral Neiguan (PC6) and Hegu (LI4) acupoints for 30 minutes. The primary outcome was the incidence of PONV within 36h. Episodes of vomiting and severity of nausea were recorded at 2h, 6, 12, 24, and 36 h after the operation. The degree of nausea was measured using a visual analog scale (VAS; 0 = no nausea to 10 = most severe nausea). A score of < 5 was considered mild nausea and ≥ 5 was considered severe nausea. Vomiting episodes ≥ 2 were considered severe and those < 2 were considered mild.

Results The incidence of PONV in the SNVP group was significantly higher than that in the MNVP group at 2, 6, 12, and 24 hours, with no significant differences at 36 hours after the operation (Table 1). Overall, the incidence of PONV was lower in the MNVP group than in the SNVP group (Table 1). Severe PONV (nausea score ≥5 and/or vomiting episode ≥2) occurred more often in the SNVP group than in the MNVP group (25/68 vs. 3/70, P<0.001). In the subgroup analysis, ODT-treated patients in the SNVP group (SNVP-ODT group) had less PONV than the patients in the SNVP-OD group during the 6-12 h (P = 0.033) and 12-24 h (P = 0.008) intervals after the operation (Table 2), whereas less PONV occurred in the patients in the MNVP-ODT group than in the MNVP-OD group during the 0-2 h (P = 0.022) and 2-6 h (P = 0.04) intervals after the operation (Table 2). Although no significant difference in PONV incidence was observed during 0-6h intervals between the OD- and ODT-treated groups in the SNVP group, there were fewer vomiting cases in the SNVP-ODT group than in the SNVP-OD group (SNVP-ODT vs. SNVP-OD, 7/33 vs. 19/35, P=0.005).

Conclusions Consistent with our previous study, this study reconfirmed that a history of SNVP in patients led to a higher incidence of severe PONV. In-depth exploration of treatment methods revealed that TEAS significantly improved the therapeutic effect within 24h after the operation in patients with SNVP risk, in which the incidence of PONV was significantly reduced during 6-24h, and the vomiting symptom was effectively controlled during 0-6h by the ODT.

PO-0252

人参皂苷 Rg1 通过保护小鼠血脑屏障改善术后认知功能障碍

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目的 本实验通过建立术后认知功能障碍（POCD）小鼠模型，观察 POCD 模型小鼠体内炎症、血脑屏障通透性的变化，初步探索人参皂苷 Rg1 预处理后改善 POCD 的作用，为后续人参皂苷 Rg1 为依托的 POCD 临床治疗及进一步研究提供新的思路和基础实验证据。
方法 选择 45 只健康 15-18 月龄雄性 C57BL/6 小鼠(25-35g/只)，随机分成空白对照组(S 组)、POCD 模型组(M 组)以及人参皂苷 Rg1 组(R 组)，每组 15 只。其中 S 组为空白对照组，不做任何处理，M 组在吸入麻醉下行胫骨骨折内固定术，R 组连续腹腔注射人参皂苷 Rg1 14 天(40mg/kg)后行吸入麻醉下胫骨骨折内固定术。术后第三天使用 Morris 水迷宫实验对三组小鼠的学习认知功能进行行为学测定。术后第七天行为学检测结束后立即深度麻醉下处死取血清、脑组织。使用伊文思蓝染色评估血脑屏障通透性的改变，ELISA 检测海马、皮质和血清中的 IL-1β、TNF-α 含量，WB 检测海马组织中的 Wnt/β-catenin 信号通路相关蛋白 Wnt1、β-catenin、cyclinD1，以及 ZO-1 的含量，qPCR 检测 β-catenin、cyclinD1 的基因表达。

结果 水迷宫结果显示在术后第 7 天时，与 M 组相比，S 组和 R 组的逃避潜伏期均降低 (P<0.05)。而在游泳速度上三个组之间没有明显差异(P>0.05)。与 M 组相比，S 组和 R 组的目标象限百分比明显增多(P<0.05)，穿台次数也明显增多(P<0.05)。通过尾静脉注射伊文思蓝观察血脑屏障通透性的改变，统计结果显示与 M 组相比，S 组和 R 组小鼠脑中伊文思蓝含量明显减少(P<0.05)，M 组小鼠血脑屏障紧密连接蛋白 ZO-1 的表达水平较 S 组明显减低(P<0.05)，而在使用人参皂苷 Rg1 预处理后，ZO-1 的表达较 M 组无统计学差异(P>0.05)。ELISA 结果显示在外周血以及海马和皮质中，与 M 组相比，S 组和 R 组的促炎症因子(IL-1β、TNF-α)表达水平显著降低（P<0.05)。对于 Wnt/β-catenin 信号通路的改变，在 M 组小鼠中，Wnt/β-catenin 信号通路活性下降，表现为 β-catenin 及 Cyclin-D1 的 mRNA 表达含量较 S 组小鼠明显降低(P<0.05)，Wnt/β-catenin 信号通路蛋白 Wnt1、β-catenin 以及 Cyclin-D1 的蛋白表达水平较 S 组明显减低(P<0.05);在经过人参皂苷 Rg1 预处理后，β-catenin、Cyclin-D1 的基因表达在 M 组和 R 组中没有明显差异，但 Wnt1、β-catenin 的表达较 M 组明显增高(P<0.05)，Cyclin-D1 表达变化无统计学差异(P>0.05)。

结论 吸入麻醉下胫骨骨折内固定术可引起小鼠出现认知功能障碍； POCD 模型小鼠产生外周和中枢炎症，使 Wnt/β-catenin 信号通路活性下降，从而增加血脑屏障的通透性；使用人参皂苷 Rg1 预处理后，可以显著改善 POCD 小鼠认知功能，减轻外周和中枢炎症，改善 Wnt/β-catenin 信号通路活性，保护血脑屏障功能。

PO-0253

颊针对胃癌手术患者术后睡眠质量的影响

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目的 本研究旨在探讨颊针对腹腔镜胃癌手术患者术后睡眠质量的影响。

方法 将符合研究标准的 60 例择期行腹腔镜下胃癌根治术的患者,随机分为对照组和试验组,每组各 30 例。两组均按胃癌临床路径常规治疗。试验组在胃癌常规治疗之上,加上颊针处理:在术前 1 天、手术当天及术后 1～3 天,予患者双侧颈、背穴和三焦穴施以颊针平刺 5 分钟，留针 20 分钟。对照组未进行颊针处理。分析对比两组患者术前（T0）、术后第 1 天（T1）、术后第 3 天（T2）,术后 2 周（T3）的匹兹堡睡眠质量指数（PSQI）、阿森斯失眠量表（AIS）评分。

结果 结果:1.一般资料:两组的性别、ASA 分级、年龄、身高、体重等组间差异无统计学意义（P＞0.05）。2.PSD 的评价指标:（1）PSQI 评分:T0 时,PSQI 评分组间差异无统计学意义（P＞0.05）;颊针处理后,两组 T1、T2 时的 PSQI 评分均较 T0 升高（P＜0.05）,T1、T2 时试验组 PSQI 评分明显低于对照组,差异有统计学意义（P＜0.05）;T3 时,组间差异无统计学意义（P＞0.05）。（2）AIS 评分:T0 时,AIS 评分组间差异无统计学意义（P＞0.05）。颊针处理后,两组 T1、T2 的 AIS 评分均较 T0 升高（P＜0.05）,T1、T2 试验组的 AIS 评分明显低于对照组,差异有统计学意义（P＜0.05）;T3 时,组间差异无统计学意义（P＞0.05）。3.影响因素:（1）疼痛 VAS 评分:T1 时,VAS 评分组间差异无统计学意义（P＞0.05）,T2 时,试验组 VAS 评分低于对照组,差异有统计学意义（P＜0.05）。（2）其他影响因素:手术时长、术中麻醉药用量、出血量、补液量、恶心呕吐的例数组间差异无统计学意义（P＞0.05）。

结论 围术期颊针处理可以降低患者术后 PSQI、AIS 评分，改善患者睡眠质量;围术期颊针能改善胃癌手术患者 PSD。

PO-0254

五味子甲素作为 COPD 小鼠麻醉及围手术期前用药调节 Nrf2 信号通路并抑制 NLRP3 激活减轻细胞凋亡

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目的 慢性阻塞性肺病（COPD）是一种严重的慢性肺病，其特征是持续的气道炎症和氧化应激，增加了麻醉及围手术期的相关风险。五味子甲素（SchA）是五味子中最重要的活性成分之一，在一些国家已被用于治疗许多肺部疾病。

方法 我们研究了 SchA 对香烟烟雾（CS）暴露诱导的气道炎症的药理作用，主要通过肺功能测定、HE 染色、免疫组化、肺泡灌洗液染色实验、WB 实验、免疫荧光实验等，研究并探讨了 SchA 治疗 COPD 小鼠的机制。

结果 我们的研究结果表明，SchA 治疗显著改善了 CS 诱导的 COPD 小鼠的肺功能，并减少了 BALF 中白细胞的募集和白细胞介素-6（IL-6）、白细胞介蛋白-1β（IL-1β）和肿瘤坏死因子 α（TNFα）的过度分泌。SchA 能有效改善气道胶原沉积和肺气肿。此外，SchA 治疗显著降低了 COPD 小鼠氧化应激相关蛋白的表达。在机制上，SchA 通过激活核因子-红细胞 2 型相关因子（Nrf2）途径，提高 CS 暴露小鼠肺部血红素加氧酶-1（HO-1）、超氧化物歧化酶（SOD）、丙二醛（MDA）、二氢乙锭（DHE）等保护因子的表达，从而减少 NLRP3 的产生，抑制细胞凋亡。此外，SchA 抑制 NLRP3 下游焦下垂相关蛋白和分子的产生，并对氧化应激损伤具有抑制作用，对 COPD 具有抗炎作用。

结论 综上所述，我们的研究表明，SchA 主要通过影响 Nrf2/NLRP3 通路来显著减轻 CS 诱导的 COPD 小鼠的炎症反应。更重要的是，SchA 在 COPD 中表现出与 Dex 相似的抗炎作用，我们没有观察到 SchA 的显著副作用。SchA 的高安全性可能使其成为治疗 COPD 的潜在候选药物。

PO-0255

围手术期不同时间经皮穴位电刺激对腹腔镜下子宫肌瘤剔除术后胃肠功能恢复的比较

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目的 目的比较不同时间经皮穴位电刺激应用于腹腔镜下子宫肌瘤术后胃肠功能的恢复,以期得出更利于术后恢复的经皮穴位电刺激的刺激时间。

方法 方法选出 120 例需要择期行腹腔镜下子宫肌瘤剔除术的患者,美国麻醉医师协会分级 I~Ⅱ级,年龄(58.2±8.8)岁(50~70 岁),将其随机分为三组,分别为对照组(C-TEAS 组)、短刺激时间经皮穴位电刺激组(S-TEAS 组)、长刺激时间经皮穴位电刺激组(L-TEAS 组),其中每组均为 40 例。所有患者手术前均进行常规的全身麻醉，予丙泊酚、瑞芬太尼、罗库溴铵，常规诱导，可视喉镜下气管插管，术中给予七氟烷、丙泊酚、瑞芬太尼复合全身麻醉。S-TEAS 组从手术开始进行经皮穴位电刺激至手术结束,刺激穴位为双侧足三里(ST36)和内关(PC6)。电刺激仪刺激参数设置为 2/100 Hz 的疏密波,脉冲宽度 0.2~0.6 ms,选取患者能耐受的最大电流强度,一般在 8-12 mA 之间。L-TEAS 组患者从术前 0.5 h 开始经皮穴位电刺激至手术结束后 0.5 h,刺激穴位同前,并于术后 2 d 内,早中晚各一次每次刺激 0.5 h。C-TEAS 组患者也在相应穴位连接刺激仪但不打开。记录并比较患者术后首次肠鸣音出现的时间、术后首次肛门排气时间、排便时间。记录并比较患者术后恶心呕吐发生率和对麻醉的满意度。

结果 结果 1、一般情况各组患者的基线资料如:性别、平均年龄、平均体重指数、平均手术时间、手术方式、子宫肌瘤大小差异无统计学意义。2、胃肠功能恢复 L-TEAS 组和 STEAS 组的首次肠鸣音时间显著短于 C-TEAS 组(P<0.05);L-TEAS 组的首次排气时间显著短于 C-TEAS 组(P<0.05);L-TEAS 组的首次排便时间显著短于 S-TEAS 组和 C-TEAS 组。3、术后恶心呕吐发生率和患者满意度 L-TEAS 组的术后恶心呕吐发生率显著低于 C-TEAS 组(P<0.05);L-TEAS 组和 S-TEAS 组患者满意度均高于 C-TEAS 组(P<0.05);L-TEAS 组的患者满意度高于 S-TEAS 组(P<0.05)。
结论 结论 1、 TEAS 应用于腹腔镜子宫肌瘤剔除术中,可加快胃肠功能的恢复,增加患者满意度;2、与术中 TEAS 相比,术前和术后各延长 0.5 h 电刺激且术后 2 d 内每天三次每次 0.5 h 持续电刺激能更有效地减少 PONV 的发生;3、围术期加用 TEAS 相对于单纯术中 TEAS 可缩短术后首次排气排便的时间,更有效促进胃肠功能的恢复,提高患者的满意度。是一种安全有效的方法, 值得临床应用和推广。

PO-0256

电针促进肝部分切除术后小鼠肝再生

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目的 探讨电针对肝部分切除术后小鼠肝功能恢复及肝脏再生情况的影响
方法 24 只雄性 C57BL/6 小鼠，随机分为 4 组，假手术组、肝切模型组、非穴位电针组、穴位电针组，每组 6 只。除假手术组以外，其余小鼠均接受肝部分切除术，穴位电针组小鼠术后即刻开始电针双侧“足三里”穴，连续波，频率 2 Hz，强度 1 mA，以后肢出现轻微颤动为度，每次 15 min，1 次/d，连续 3 d。术后第 2 天时麻醉小鼠，眼球取血样，采用全自动生化分析仪测定血清 ALT 和 AST 浓度，ELISA 法测定表皮生长因子（EGF）和肝细胞生长因子（HGF）浓度。随后处死小鼠取肝组织，计算肝质量/体质量比，HE 染色法观察肝脏损伤情况；免疫组织化学染色法检测肝脏 Ki-67 表达；Western blot 法检测增殖细胞核抗原（PCNA）、CCND1 蛋白表达。
结果 与假手术组相比，肝切模型组和非穴位电针组小鼠血清 EGF 和 HGF 浓度升高，血清 ALT 和 AST 浓度升高，肝脏 Ki-67、PCNA、CCND1 蛋白表达上调（P＜0.05 或 0.01）；与肝切模型组相比，穴位电针组小鼠肝质量/体质量比增加，血清 EGF 和 HGF 浓度升高，血清 ALT 和 AST 浓度降低，肝脏 Ki-67、PCNA、CCND1 蛋白表达上调（P＜0.05 或 0.01）；肝切模型组和非穴位电针组差异没有统计学意义（P＞0.05）。假手术组肝实质细胞结构正常；肝切模型组和非穴位电针组小鼠肝脏有较多脂肪沉积、肝细胞点状坏死、门管区炎细胞浸润；穴位电针组小鼠肝细胞结构完整，脂肪沉积明显减少，少见肝细胞点状坏死。
结论 电针足三里穴促进肝部分切除术后小鼠肝功能恢复，减轻肝损失，促进肝脏再生。

PO-0257

电针对术后认知功能障碍大鼠肠道菌群及炎症反应的影响

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目的 探讨电针预处理对术后认知功能障碍（Postoperative cognitive dysfunction, POCD）大鼠肠道菌群和炎症反应的作用。
方法 将 24 只健康老龄雄性 SD 大鼠随机分为对照组、模型组和电针组，每组 8 只。模型组和电针组均采用在七氟醚麻醉下剖腹探查术制备 POCD 模型，电针组在造模前 5 d 每天用电针刺激大鼠

双侧上巨虚和足三里穴。采用 Morris 水迷宫实验评估大鼠的术后认知功能，测试结束后处死大鼠，取粪便、结肠、海马和血清，采用 16S rDNA 测序法分析粪便菌群，采用免疫组织化学法观察结肠黏膜白细胞介素（interleukin, IL）-17A、IL-23 以及海马 CA1 区离子钙衔接分子 1（ionized calcium binding adaptor molecule-1, Iba1）的表达，采用 ELISA 法检测血清和海马 IL-17A 和 IL-23 的含量。

结果 与对照组相比，模型组的术后逃避潜伏期明显延长，穿越平台次数和原平台象限停留时间明显减少（P < 0.05）；肠道菌群的 Chao1 和 Shannon 指数明显下降（P < 0.05）；结肠 IL-17A、IL-23 以及海马 CA1 区 Iba1 表达均明显增加（P < 0.05）；海马和血清 IL-17A、IL-23 含量均明显上调（P < 0.05）。与模型组相比，电针组的逃避潜伏期明显缩短，穿越平台次数和原平台象限停留时间明显增加（P < 0.05）；肠道菌群的 Chao1 和 Shannon 指数明显上升（P < 0.05）；结肠 IL-17A、IL-23 以及海马 CA1 区 Iba1 表达均明显下降（P < 0.05）；海马和血清 IL-17A、IL-23 明显下调（P < 0.05）。

结论 电针能够改善 POCD，其机制可能与调控肠道菌群多样性和组成结构，减轻肠道相关炎症反应，进而抑制中枢小胶质细胞活化有关。

PO-0258

经皮穴位电刺激对肾移植全麻术后苏醒期躁动的应用

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目的 评价经皮穴位电刺激对肾移植患者全身麻醉术后苏醒期躁动的影响。

方法 选取全身麻醉下行同种异体肾移植手术的患者 96 例，采用随机数字表法分为两组（n=48）：经皮穴位电刺激组（T 组）和对照组（C 组）。T 组于麻醉诱导前 30min 开始至术毕刺激合谷穴/内关穴、足三里穴/三阴交穴，频率 2/100Hz，疏密波，刺激强度以患者所能接受的最大电流为宜；C 组在上述四处相应穴位贴电极片，但不给予穴位刺激。记录患者苏醒期 CRBD 导尿管相关膀胱刺激症状及疼痛评分、Ramsay 镇静评分、RASS 躁动评分、视觉模拟 VAS 疼痛评分，ELISA 法测定麻醉开始前（T1）、气管拔管即刻（T2）和离室前（T3）血清肿瘤坏死因子-a（TNF-a）、白细胞介素-6（IL-6）、白细胞介素-8（IL-8）的浓度。记录术中舒芬太尼用量、尿量及术毕气管拔管-恢复时间、术后不良反应的发生情况。

结果 与 C 组相比，T 组术中舒芬太尼用量减少（P＜0.001）、尿量增加（P＝0.022）、术毕气管拔管-恢复时间缩短（P＝0.004），T2-3 时刻 TNF-a、IL-6、IL-8 浓度均降低 P＜0.05），RASS 躁动评分（P=0.033）及 VAS 疼痛评分（P=0.035）降低，CRBD 导尿管相关膀胱刺激症状及疼痛评分降低（P＜0.001），差异有统计学意义；但 Ramsay 镇静评分（P=0.219）及术后不良反应并发症（P＞0.05）比较差异无统计学意义。

结论 经皮穴位电刺激可降低肾移植患者全身麻醉术后苏醒期躁动，可能与降低导尿管刺激程度、抑制炎症反应相关。

PO-0259

经皮穴位电刺激联合右美托咪定对结肠癌患者术后全身免疫炎症指数及胃肠功能障碍的影响

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目的 近年来，麻醉的目的除了传统的保障患者安全之外，促进患者快速舒适地恢复以及改善患者的远期预后等围术期医学新理念越来越受到重视。术后胃肠功能障碍（postoperative gastrointestinal dysfunction，POGD）以及肿瘤复发与肠道免疫功能失调关系密切，是肿瘤患者常见的术后并发症，而手术麻醉可通过多种方式影响机体免疫功能。尽管手术麻醉技术得到了快速发展，但其对机体免疫功能的影响仍不可忽视。因此，通过优化围术期管理促进术后快速康复并改善远期预后具有重要临床意义。研究表明，穴位刺激具有神经抗炎以及促进胃肠功能恢复的作用，而我们前期发现右美托咪定可改善结肠癌患者术后肠麻痹，但两者联合应用对 POGD 的影响尚未见报道。本研究拟通过观察全身免疫炎症指数(systemic immune-inflammation index，SII)的变化进一步评价其是否与调节肠道免疫功能相关。
方法 选择拟全麻下行腹腔镜结肠癌根治术患者 72 例，采用计算机随机数字表法，将其随机分为三组：对照组（C 组）、右美托咪定组（D 组）和电刺激联合右美托咪定组（ED 组），每组 24 例。C 组患者不做处理，D 组及 ED 组在全麻诱导前 10 min 内予以静脉输注右美托咪定 1ug·kg-1，术中以 0.5 ug·kg-1·h-1 的速率输注至术毕前 30 min，ED 组患者在术后行经皮穴位电刺激疗法。测量术前（T0）、术后 1d、2d、3d 及 4d（T1-4）时静脉血 IL-6 及 TNF-α 浓度；计算 T0-4 时全身免疫炎症指数(systemic immune-inflammation index，SII)；记录术中丙泊酚和瑞芬太尼用量减少及术后镇痛泵按压次数；记录术后第一次排气以及进食时间。
结果 与 C 组比较，D 组和 ED 组术中丙泊酚和瑞芬太尼用量减少及镇痛泵按压次数减少，D 组在 T1-3 时点及 ED 组在 T1-4 时点 IL-6、TNF-α 浓度下降，D 组和 ED 组在 T1-4 时点 SII 下降，术后第一次排气缩短(P<0.05)；与 D 组比较，ED 组术后镇痛泵按压次数减少，在 T2-4 时点 IL-6 及 TNF-α 浓度以及 SII 下降，术后第一次排气以及进食时间缩短(P<0.05)。
结论 比围术期单独应用右美托咪定，TEAS 联合右美托咪定可进一步改善结肠癌患者术后胃肠功能障碍并减少围术期全身免疫炎症指数(SII)变化程度，从而促进患者术后康复，可能与改善肠道免疫功能相关。

PO-0260

经皮穴位电刺激对肝脏术后恶心呕吐的作用

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目的 乙肝病毒在中国感染率约为 60%-70%，乙肝表面抗原携带率约占总人口的 7.18%。若这些患者未得到适当治疗，20%-30%的慢性乙肝会进展为肝硬化和（或）肝癌。肝癌主要的治疗方式为肝癌切除术，而术后恶心呕吐为肝癌患者术后最常见的并发症之一。目前多项研究表明经皮穴位电刺激内关穴可以有效降低术后恶心呕吐的发生，加快患者术后康复。因此，我们计划对择期进行肝脏切除术的患者在麻醉诱导后至手术结束时进行经皮穴位电刺激内关穴，观察是否可以降低患者术后恶心呕吐的发生。
方法 本研究为多中心、前瞻性、双盲、随机对照临床试验。共纳入 161 例患者，按照 1:1 比例随机分配至 TEAS 组和对照组。刺激穴位为内关穴（PC6），给予 2/10Hz 疏密波进行刺激，刺激强度为患者可耐受的最大强度。TEAS 组在麻醉诱导后到手术结束时持续进行经皮穴位电刺激内关穴，

对照组则不予刺激。所有患者均使用地塞米松和帕洛诺司琼来预防患者术后恶心呕吐的发生。主要结局指标为术后 24h 内恶心呕吐发生率，次要结局指标包括 PACU 内术恶心呕吐和疼痛评分，术后 24h、48h 最高疼痛 VAS 评分，术后 24h 和 48h PCIA 次数和有效次数、术后恢复量表以及患者术后下床活动时间、排气时间和住院时长。

结果 主要结局指标：在改良性意向性分析中，TEAS 组术后 24h 恶心呕吐发生率为 47.5%，对照组为 52.5%，两组差异无统计学显著性（P=0.749）。

次要结局指标：PACU 内、术后 24h 和术后 48h 术后恶心、呕吐评分以及术后 48h 术后恶心呕吐的发生率均无差异，术后 PACU 内、术后 24h、48h 疼痛 VAS 评分均无差异。但 TEAS 组术后 24h 内 PCIA 有效次数为 2.62±3.267，对照组为 3.50±6.023，两组有显著差异（P<0.05），TEAS 组术后 PCIA 总次数为 2.7±3.267，而对照组为 3.54±6.107（P<0.05），TEAS 组显著低于对照组（P<0.05）。两组术后 48h PCIA 有效次数与总次数与对照组并无差异。患者术后恢复量表、下床活动时间、进食水时间以及住院时长两组均无差异。

结论 在麻醉诱导后至手术结束时进行内关穴经皮穴位电刺激可减少肝脏切除患者术后镇痛泵按压次数，但术后 24 小时恶心呕吐发生率与常规药物预防无差别。

PO-0261

经皮穴位电刺激对急进高原后睡眠质量的影响研究

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目的 本课题拟将经皮穴位电刺激（transcutaneous electrical acupoint stimulation，TEAS）用于急进高原健康志愿者，以探究其是否具有改善急进高原状态下睡眠质量及认知功能的作用，以期为急进高原人群的睡眠障碍防治提供参考。

方法 研究共计纳入 50 例急进高原（海拔＞4200 m）青壮年，随机将受试者分为两组，对照组不采取任何干预措施采用自我习服的方式，TEAS 组通过神门（HT7）和内关（PC6）给予 TEAS，自进入指定海拔高度开始，每天 3 次，每次 30min，连续 5d。通过腕表式睡眠体动记录仪（Actigraph wGT3X-BT）采集睡眠相关参数：总睡眠时长（TST）、睡眠效率（SE）、睡眠潜伏期（SL）、睡眠觉醒时间（WASO）和觉醒次数（NA）。通过听觉语言测试（RAVLT）、数字广度测试（DST）、连线测试（TMT）量表评估认知功能评分，并记录脉搏血氧饱和度。主要研究指标为干预结束时（急进高原后第 5 天）总睡眠时长（TST）变化；次要指标包括干预期间每日睡眠相关参数变化、干预前后认知评分变化，及脉搏氧饱和度变化。数据分析在改良意向性分析集进行。

结果 1) 从 2022 年 7 月 1 日至 2023 年 9 月 1 日期间，研究共随机分配 50 名受试者，其中 48 名完成了研究。两组受试者的基线数据中除年龄之外的其他指标分布均衡可比。

2) 主要结局指标：混合效应模型分析结果显示，两组之间无显著组间效应、时间效应和交互效应。事后多重比较结果显示，TEAS 组干预前后 TST 无统计学差异（P＞0.05），但干预期间第 4 天和第 5 天 TST 较对照组显著增加（分别为 MD=-36.88 min, 95%CI [-78.84,5.09]和 MD=-36.88 min，95%CI[−78.84,5.09]），具有临床意义（差值＞30min）。

3) 次要结局指标：SE 和 WASO 均存在显著的组间效应，且在干预期间（第 2、4、5 天）TEAS 组的 SE 和 WASO 显著优于对照组（P＜0.05），而 SL 和 NA 的组间差异无统计学显著性（P＞0.05），两组干预期间脉搏血氧饱和度与无显著统计学差异（P＞0.05）；认知功能方面，各测试评分均在两者之间无显著统计学差异（P＞0.05）。

结论 TEAS 对急进高原所致的睡眠障碍可产生有益影响，不仅可以增加睡眠时长和睡眠效率，还可降低睡眠觉醒时间和次数，未来 TEAS 有望成为治疗高海拔地区睡眠障碍的有效防治措施。

PO-0262

颊针疗法用于产科椎管内麻醉后神经损伤 15 例效果观察

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目的 研究颊针疗法用于产科椎管内麻醉后神经损伤患者的治疗效果。
方法 收集 2021 年 7 月至 2024 年 6 月期间接受椎管内麻醉后出现神经损伤症状的产科患者进行颊针治疗。根据患者症状和体检结果，选取相应穴位施针，根据症状缓解情况调整进针深度和角度，待患者症状、体征改善后，留针 30min 后拔除。记录患者治疗结束后 10min 症状改善情况，按照加重、无效（症状改善≤30%）、可效（症状改善>30%且≤70%）、良效（症状改善>70%且≤90%）、优效（症状改善>90%）5 个等级进行记录。3 天后随访，发现症状改善≤70%的患者继续安排颊针治疗，每次颊针治疗间隔 5-7 天。有效率=（优效+良效+可效）例数/患者例数×100%。记录治疗期间的不良反应及治疗次数。
结果 本研究共收治椎管内麻醉后出现神经损伤症状的产科患者 15 例（0.6%, 15/2580)。所有患者均为产科相关的外周神经损伤，其中 12 例患者为腰丛分支神经损伤（8 例股外侧皮神经损伤，4 例股神经损伤），3 例患者为骶丛分支神经损伤。体格检查发现 15 例患者症状相关神经走行区域压痛明显。选取相应穴位，经过施针、调针、留针后，患者症状均明显缓解。14 例患者治疗 1 次，1 例股神经损伤患者治疗 2 次（该患者第 2 次治疗主要目的为解决下背痛）。治疗结束随访患者，有效率达 100%。所有患者均未出现明显不良反应。
结论 颊针疗法对于产科患者椎管内麻醉后神经损伤有良好的治疗效果。颊针疗法作为一种安全、有效的治疗措施，在神经损伤后早期应用，可能有助于改善患者症状，加速康复，值得推广。

PO-0263

经皮穴位电刺激对术前焦虑女性患者异丙酚镇静期间缺氧的影响

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目的 观察经皮穴位电刺激对术前焦虑女性患者在异丙酚镇静期间缺氧影响。
方法 采用随机对照研究方法，将 283 例接受宫腔镜检查的术前焦虑患者分为两组，经皮穴位电刺激（TEAS）组 141 例和假 TEAS 组 142 例。入室前分别接受 TEAS 治疗和假 TEAS 治疗 30min，穴位为百会与印堂。入室后接受同样的麻醉管理及手术操作。分别于治疗前和入室后（T0）进行围手术期焦虑量表-7（PSA-7）评分，记录治疗前、T0 及麻醉诱导后 5min（T1）的平均动脉压（MAP）、心率（HR）及脑电双频谱指数（BIS），记录两组患者术中缺氧事件发生情况，体动次数，异丙酚消耗总量和异丙酚追加次数。
结果 T 组患者 T0 时的 PAS-7 评分和 BIS 值低于治疗前和同时刻 S 组患者（P＜0.05），与 S 组患者相比，T 组术中缺氧事件发生率降低，异丙酚输注总量减少，异丙酚追加次数降低具有统计学差异（P＜0.05），两组患者术中体动发生率并无明显的统计学差异（P＞0.05）。
结论 TEAS 百会和印堂可降低宫腔镜检查焦虑患者的术前焦虑水平，降低其在异丙酚镇静期间的药物用量和缺氧事件的发生率。
结论 TEAS 百会和印堂可降低宫腔镜检查焦虑患者的术前焦虑水平，降低其在异丙酚镇静期间的药物用量和缺氧事件的发生率。

PO-0264

经皮穴位电刺激对术后恶心呕吐预防失败的补救作用

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目的 术后恶心和呕吐（PONV）高危的手术患者在预防性药物治疗失败后的早期重复使用同类止吐药难以获得令人满意的疗效。本研究旨在评估非药物治疗方法经皮穴位电刺激（TEAS）对预防性用药后仍出现的 PONV 的疗效，为指导临床应用提供依据。
方法 选取符合纳入标准的 PONV 高危患者进行术中地塞米松和帕洛诺司琼的联合预防，将其中药物预防后出现 PONV 的 107 例患者随机分至 TEAS 组（n=53）和 Sham 组（n=54）。TEAS 组患者在术后出现恶心或呕吐时于双侧内关穴和合谷穴粘贴电极片，连接经皮穴位电刺激仪（HANS200E）进行为时 30 分钟的刺激，频率为 2/100 Hz，电流为 1-12mA（刺激强度根据个人需要调整，以获得对局部肌肉轻微抽搐的最大耐受）；Sham 组患者于相同穴位粘贴电极片、连接仪器，但不给予刺激。两组患者在干预前均被告知可能会也可能不会感受到治疗刺激。主要结局为治疗结束 24h 内的完全缓解率（完全缓解定义为治疗结束后未再次出现 PONV 且未使用止吐药）。
结果 TEAS 组的完全缓解率显著高于 Sham 组（47.2% vs.20.4%, P=0.003），达到完全缓解所需时间明显短于 Sham 组（P=0.037）。与 Sham 组相比，TEAS 组患者术后恶心发生率更低，最高恶心评分更低，需要补救止吐药的患者更少，且从开始治疗到需要补救止吐药的缓解时间更长，差异均有统计学意义（P<0.05）。TEAS 组术后 1-2h、2-6h 的 NRS 评分显著低于 Sham 组（P<0.05）。然而，两组患者在呕吐发生率、并发症、患者满意度和其他预后方面均无明显差异。
结论 本研究表明，TEAS 可有效治疗地塞米松、帕洛诺司琼双联预防失败后出现的术后恶心呕吐。

PO-0265

Wearable transcutaneous electrical acupoint stimulation bracelet to prevent carboprost tromethamine-induced nausea and vomiting during cesarean delivery: A randomized controlled trial

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Background：Stimulating the Neiguan Point is known to reduce the incidence of carboprost tromethamine-induced nausea and vomiting. Therefore, we investigated whether a bracelet (EmeTerm) that supplied transcutaneous electrical acupoint stimulation (TEAS) could prevent nausea and vomiting induced by carboprost tromethamine during cesarean delivery.
Methods This study was conducted between May and July 2023 in a tertiary maternity hospital in China, Shanghai. We randomly allocated 100 patients who received carboprost tromethamine during elective cesarean section under combined spinal-epidural anesthesia (CSEA) to two groups (n = 50 each). Patients in both groups wore an EmeTerm bracelet with electrodes at the Neiguan (P6) point when entering the operating room, the bracelet was functional only in the EmeTerm group. The primary outcome was the incidence of intraoperative nausea and vomiting after carboprost tromethamineadministration. Secondary outcomes comprised the degree of maternal nausea after carboprost tromethamineadministration, patient comfort and surgeon satisfaction scores, and the incidence of adverse reactions to the bracelet.

Results The incidence of vomiting was significantly lower in the EmeTerm group than in the control group (14% vs.42%, p = 0.004), the incidence of nausea did not significantly differ between groups but the degree of nausea was reduced in the EmeTerm group (42% vs. 24%, p = 0.33).
Conclusions The EmeTerm bracelet prevented vomiting after carboprost tromethamine administration during cesarean delivery, and reduced the degree of nausea without inducing adverse reactions.

PO-0266

Development and validation of a nomogram to assess the occurrence of liver dysfunction in patients with COVID-19 pneumonia in the ICU

Zhiwei Wang
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Abstract
The global pandemic of novel coronavirus pneumonia (COVID-19) has resulted in millions of deaths over the past three years. As one of the most commonly affected extra-pulmonary organs, numerous studies have reported varying degrees of liver injury in a significant proportion of patients with COVID-19, particularly in severe and critically ill patients. Early prediction of liver dysfunction in hospitalized patients would facilitate the clinical management of COVID-19 and improve clinical prognosis, but reliable and valid predictive models are still lacking.

Methods
We collected 286 cases of COVID-19 with positive RT-PCR confirmation of SARS-CoV-2 admitted to various ICUs from the case system. These patients were randomly divided into a training cohort (50%) and a validation cohort (50%). In the training cohort, we first used ROC curves to measure the predictive efficiency of each of the variables for the development of liver damage during hospitalization in patients with COVID-19, followed by LASSO regression analysis to screen the variables for predictive models and logistic regression analysis to identify relevant risk factors. A nomogram based on these variables was created following the above model. Finally, the efficiency of the prediction models in the training and validation cohorts was assessed using AUC, consistency index (C index), and calibration curves.
Results
Out of a total of 79 parameters for COVID-19 patients admitted to the ICUs, 8 were determined to be significantly associated with the occurrence of liver dysfunction during hospitalization. Based on these predictors, further prediction models were used to construct and develop a nomogram that was offered for practical clinical application. The C-index of the column line graphs for the training and validation cohorts was 0.901 and 0.892 respectively. in addition, the calibration curves for the model showed a high degree of agreement between the predicted and actual incidence of liver dysfunction in patients with COVID-19.
Conclusion
By developing a predictive model and associated nomogram, we predicted the incidence of liver dysfunction during hospitalization in patients with COVID-19 in the ICU. The model’s predictive performance was determined in both the training and validation cohorts, contributing to the clinical management of COVID-19.

PO-0267

Diagnostic value of Lp-PLA2, H-FABP and ST2 in patients with septic cardiomyopathy: A retrospective case-control study

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Abstract
Objective Septic cardiomyopathy (SCM) is one of the main factors of mortality in the intensive care unit (ICU), and directly affects the development and prognosis of sepsis patients. This study evaluated the levels of serum lipoprotein-associated phospholipase A2 (Lp-PLA2), heart-type fatty acid-binding protein (H-FABP), and growth stimulation expressed gene 2 (ST2) in patients with sepsis and explored their diagnostic value for SCM.
Methods The sepsis patients were divided into the septic cardiomyopathy group (n=139) and septic non-cardiomyopathy group (n=138). The multivariate Logistics regression analysis and receiver operating characteristic curve (ROC) were carried out to test the diagnostic value of indexes Lp-PLA2, H-FABP and ST2 in SCM. DeLong test was used to compare ROC curve areas of different indexes.
Results The data showed that Lp-PLA2 (P=0.011), H-FABP (P=0.031), and ST2 (P=0.039) were independent risk factors for myocardial injury in sepsis patients. Moreover, Lp-PLA2 (AUC:0.884, P<0.001), H-FABP (AUC:0.824, P<0.001), and ST2 (AUC:0.869, P<0.001) had diagnostic capability and were positively correlated with myocardial injury indexes. Compared with CK-MB and BNP, Lp-PLA2 (P<0.01), H-FABP (P<0.05) and ST2 (P<0.01) had better diagnostic efficiency. Subsequently, cTnT combined with Lp-PLA2, H-FABP, and ST2 was determined to have the best diagnostic effect for SCM.
Conclusion Lp-PLA2, H-FABP and ST2 were independent risk factors for SCM, and they had better diagnostic value than CK-MB and BNP. cTnT combined with Lp-PLA2, H-FABP and ST2 had the best diagnostic effect on SCM.

PO-0268

Prognostic accuracy of the serum lactate level, lactate/albumin ratio, the SOFA score and the SAPS II score for ICU mortality among patients with septic shock

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Background Septic shock is the subset of sepsis, which is characterized by persisting hypotension requiring vasopressors to maintain mean arterial pressure ≥65 mmHg and having an increased serum lactate level >2 mmol/L despite adequate volume resuscitation. The in-hospital mortality rate of sepsis is recorded as over 10% worldwide, whereas that of septic shock is greater than 40% . It is of great significance to figure out the independent risk factors related to mortality, which can further offer a therapeutic strategy for ICU physician, so as to achieve the purpose of reducing the risk of mortality especially in the intensive care unit (ICU).this research aimed to evaluate and compare the prognostic accuracy of the lactate/albumin (L/A) ratio, lactate level, SOFA score and SAPS II between short- and long-term mortality in a larger collective of critically ill patients with septic shock admitted to an intensive care unit.

Methods A retrospective single-center study using data from the Multiparameter Intelligent Monitoring Intensive Care III (MIMIC-III) database collected between 2001 and 2012. The baseline data, L/A ratio measured on the first day of ICU stay and in-hospital prognosis of intensive care patients (age ≥18) with septic shock were recruited. Survival was showed by the Kaplan-Meier curve. Univariate and multivariate analysis was performed to identify predictors of prognosis. Receiver operating characteristic curve (ROC) analysis was conducted to compare lactate/albumin ratio with SOFA and SAPS II.
Results A total of 1563 patients with septic shock were screened. The lactate/albumin ratio, the 24-h average lactate levels and the worst scores during the first 24 h of ICU admission were collected. Patients in the higher L/A ratio group had higher 28-day, 90-day, 1-year mortality than those in the lower L/A ratio group. L/A ratio was an independent predictor of septic shock prognosis. The AUROC of SAPS II score (AUROC, 0.702 [95% CI, 0.676-0.728]) was significantly higher than that of L/A ratio (AUROC, 0.610 [95% CI, 0.582-0.639]), lactate (AUROC, 0.602 [95% CI, 0.574-0.631]), SOFA score (AUROC, 0.655 [95% CI, 0.627-0.682]), and the AUROC of L/A ratio was similar to the AUROC of lactate.
Conclusion:In addition to its simplicity and accuracy, L/A ratio is a better prognostic factor in adult patients with sepsis. The SAPS II has superior predictive power to L/A ratio, lactate and SOFA for short- and long-term mortality in patients with septic shock, and the L/A ratio shows predictive ability similar to that of lactate. However, these findings were based on a single-center cohort and will need to be validated in future studies involving multiple centers.

PO-0269

Association between dexmedetomidine use and 30-day mortality in septic patients with acute kidney injury

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Purpose: The purpose of this study was to explore the relationship between dexmedetomidine use and the clinical outcome in septic patients with acute kidney injury (AKI).

Materials and Methods: This retrospective cohort study was based on the Medical Information Mart in Intensive Care-IV (MIMIC-IV) database. Septic patients with AKI in the intensive care unit (ICU) were included in the analysis. The primary outcome was 30-day mortality. We used multivariable Cox proportional hazards regression, propensity score analysis, pairwise algorithmic (PA), and an inverse probability-weighting (IPW) model to ensure the robustness of our findings.

Results We included 9558 septic patients with AKI. The 30-day mortality was 23.1% (1987/8595) and 10.4% (100/963) for non-dexmedetomidine and dexmedetomidine users, respectively. After adjusting for potential confounders by propensity-score matching (PSM) and adjusting for propensity score, PA, and IPW, the results were still stable. The HRs were 0.66–0.81, all $p < 0.05$. After matching, dexmedetomidine use was associated with 31% lower 30-day mortality (HR=0.69, 95%CI: 0.54-0.9, p=0.005). E-value analysis suggested robustness to unmeasured confounding.

Conclusions Dexmedetomidine use may be associated with reduced risk-adjusted mortality in septic patients with AKI. Further randomized controlled trials are needed to clarify this association.

PO-0270

外周灌注指数预测全麻手术过程中微循环水平的准确性

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目的 毛细管再充血时间(CRT)是评价周围组织脏器灌注的金标准;但由于术中 CRT 测量因不能连续进行，且全身麻醉时难以进行，故其应用收到一定的限制。外周灌注指数(PI)是评估外周灌注的另一种无创方法。PI 可以方便和连续地评估外周灌注，可以替代 CRT 在全身麻醉时使用。本研究探讨全身麻醉下 PI 与 CRT、MAP（平均动脉压）、乳酸及 ScvO2%(混合静脉血氧饱和度)在评价微循环水平的一致性。
方法 本中心前瞻性研究经山西省人民医院伦理委员会批准，我们选择 117 例经腹部手术的患者，纳入标准为年龄＞20 岁、计划择期手术或紧急手术。排除标准为四肢坏死、感染性休克或臂丛神经阻滞手术。我们采用了包括标准的 3 导联或
5 导联的心电图，有创血压监测，爱德华心排量监测，脉搏血氧仪。麻醉诱导用丙泊酚、舒芬太尼和顺式阿曲库铵。麻醉维持使用丙泊酚、七氟烷和瑞芬太尼；术中使用液体管理或间断性或连续性血管加压药(甲氧明或去甲肾上腺素)维持平均动脉压高于 65mmHg。在手术过程中，所有手指都使用了覆盖手指的强制空气加热装置。在麻醉诱导和全身麻醉结束期间，在血流动力学稳定状态(定义为平均动脉压变化＜10%超过 5 分钟，收缩压低于 180 mmHg)进行测量。在测量 HR、MAP、SV 、SVR、Lac、ScvO2% 及 PI 后，我们用记录 PI 的同一只手上的中指测量 CRT。
结果 根据数据分布的正态性，采用 Mann-Whitney U 检验和 Student 's t 检验对有无低灌注患者进行比较，12%的患者低灌注的情况下，低 PI 值可以预测低灌注。采用 Spearman 秩相关评价 PI 与 Lac、CRT 的关系，结果发现程负相关。而 PI 与 MAP 成正相关。
结论 PI ＜1.4 可以准确预测手术室全麻时低灌注状态。且 PI 与 MAP、Lac 及具有一致性能更好的反应患者的微循环的水平。

PO-0271

TBC1D15 通过调节线粒体-溶酶体相互作用及线粒体自噬缓解脓毒症诱导的急性肺损伤

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目的 线粒体对脓毒症诱导的急性肺损伤（ALI）至关重要。TBC domain family member 15 (TBC1D15)参与线粒体稳态的调节，然而其在 ALI 中的作用尚不清楚。
方法 使用 GEO 数据库检索临床脓毒症患者较非脓毒症对照组血液中，TBC1D15 相对表达量的变化。在体内和体外建立了脂多糖（LPS）处理的 ALI 和小鼠肺上皮细胞（MLE-12）模型。使用透射电镜和活细胞延迟成像技术评估线粒体-溶酶体相互作用，通过蛋白印记实验和免疫荧光检测线粒体自噬水平。通过转染 mRFP-GFP-LC3 和 mito-Keima 入细胞，对其共定位评估各组线粒体自噬流的改变。同时使用共聚焦显微镜对 TOMM20 与 LC3B 共定位程度来反映线粒体自噬水平的变化。我们分别使用 AAV-TBC1D15、TBC1D15 过表达慢病毒用于 C57BL/6J 小鼠、MLE-12 细胞系，从组织和细胞、细胞层面评估 TBC1D15 在肺中发挥的作用。
结果 结果显示在临床脓毒症患者较对照组相比，血液中的 TBC1D15 表达量降低。随后构建 ALI 的 24h 后出现 TBC1D15 水平降低、肺组织和线粒体损伤、炎症因子（IL-1β、IL-6、TNF-α）升高；而过表达 TBC1D15 可以减轻上述症状。细胞实验用来揭示其中可能的机制：过表达 TBC1D15 可以挽救 LPS 导致细胞内线粒体-溶酶体接触解链时间延长的异常现象并且增强了线粒体自噬

TOMM20 与 LC3B 共定位，促进了线粒体自噬流，从而减轻 LPS 对线粒体的损伤，恢复了线粒体稳态，减轻细胞凋亡。
结论 脓毒症诱导的急性肺损伤中存在线粒体-溶酶体接触时间延长和线粒体自噬受阻现象，过表达 TBC1D15 可以改善上述现象并保护肺损伤。

PO-0272

Mesenchymal Stem Cell Extracellular Vesicles Delivered LncRNA Alleviate Endothelial Leakage Via Targeting Mitochondria

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Backgroud：
SEPSIS 3.0 clearly defines that SEPSIS is a life-threatening organ dysfunction caused by the dysregulation of the host's inflammatory response to the infection. Current pathogenesis studies indicate that SEPSIS is an extreme systemic inflammatory response leading to microcirculatory dysfunction, impaired vascular barrier function and impaired parenchymal cell function, with clinical manifestations of tissue hypoperfusion and multi-system organ dysfunction. Endothelial vascular leakage (EVL) is a hallmark of a variety of life-threatening diseases, including sepsis, acute respiratory distress syndrome (ARDS), and capillary leakage syndrome, and contributes to morbidity and mortality in critically ill patients.

Methods：
Leakage was observed in a sepsis (CLP model) -induced mouse pulmonary vascular endothelial leakage model and in a lipopolysaccharide (LPS) -stimulated human umbilical vein endothelial cells (HUVECs) model. Extracellular vesicles (EVs) were extracted from BMSCs and their whole transcriptome was analyzed, including the microRNA, lncRNA, and circRNA profiles. EV and its non-coding RNA were inhibited during treatment to determine its function. Mitochondrial morphology and function are altered in HUVECs to validate its role as a therapeutic target for the endothelial barrier.

Results：
BMSCs-EV treatment could alleviate sepsis induced endothelial leakage in vivo and in vitro. LPS down-regulated the expression of lncRNA while upregulated endothelial mitochondrial proteins expression in HUVECs and induced EG degradation and leakage. bMSC-EVs uptaken by HUVECs could deliver lncRNA targeting endothelial mitochondrial proteins, which improve the mitochondrial morphology and function in HUVECs, and thus reversed sepsis-induced endothelial leakage.

Conclusion：
BMSCs alleviate sepsis endothelial leakage through EV delivery of lncRNA targeting endothelial mitochondrial morphology and function.

PO-0273

Electroacupuncture Pretreatment Maintains Mitochondrial Quality Control via HO-1/MIC60 Signaling Pathway to Alleviate Endotoxin-Induced Acute Lung Injury

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Electroacupuncture has been demonstrated to mitigate endotoxin-induced acute lung injury by enhancing mitochondrial function. This study investigates whether electroacupuncture confers lung protection through the regulation of mitochondrial quality control mediated by heme oxygenase-1 (HO-1) and the mitochondrial inner membrane protein MIC60. HO-1, an inducible stress protein, is crucial for maintaining mitochondrial homeostasis and protecting against lung injury. MIC60, a key component of the mitochondrial contact site and cristae organizing system, supports mitochondrial integrity.
We employed genetic knockout/silencing and cell transfection techniques to model lipopolysaccharide (LPS)-induced lung injury, assessing changes in mitochondrial structure, reactive oxygen species (ROS) production, mitochondrial membrane potential (MMP), and the expression of proteins essential for mitochondrial quality control. Our findings reveal that electroacupuncture alleviates endotoxin-induced acute lung injury and associated mitochondrial dysfunction, as evidenced by reductions in lung injury scores, decreased ROS production, and suppressed expression of proteins involved in mitochondrial fission and mitophagy. Additionally, electroacupuncture enhanced MMP and upregulated proteins that facilitate mitochondrial fusion and biogenesis. Importantly, the protective effects of electroacupuncture were reduced in models with Hmox1 knockout or Mic60 silencing, and in macrophages transfected with Hmox1-siRNA or Mic60-siRNA. Moreover, HO-1 was found to influence MIC60 expression during electroacupuncture preconditioning and LPS challenge, demonstrating that these proteins not only co-localize but also interact directly.
In conclusion, electroacupuncture effectively modulates mitochondrial quality control through the HO-1/MIC60 signaling pathway, offering an adjunctive therapeutic strategy to ameliorate endotoxin-induced acute lung injury in both in vivo and in vitro settings.

PO-0274

ICU 脓毒症幸存者静息态脑网络拓扑属性变化与认知损伤和炎症的关系

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目的 脓毒症患者的生存率随着医学的进步显著提高但长期认知功能障碍等并发症的危害日益显现，目前其认知损害的脑功能网络机制尚不明确。本研究基于静息态功能磁共振(rs-fMRI)，采用图论和格兰杰因果分析（GCA）方法研究 ICU 脓毒症幸存者脑功能网络拓扑属性参数和有效连接（EC）变化，并分析其与认知损伤和外周炎症的关系。

方法 选取江阴市人民医院 ICU 收治并康复出院的 16 例脓毒症幸存患者（SS 组）及从社区招募的 19 例性别、年龄、受教育程度相匹配的健康对照者（HC 组）进行神经心理学量表测试及磁共振成像扫描，SS 组入 ICU 当日检测血清 C 反应蛋白(CRP)和降钙素原(PCT)水平。基于图论方法构建静息态脑网络，计算并分析两组间拓扑属性差异；选取组间度中心度（DC)及节点效率（NE）有统计学差异的脑区作为种子点进行 GCA 分析，研究拓扑结构改变脑区与其它脑区间的有效连接变化。使用 Pearson 相关分析进一步探寻异常变化的神经影像学参数与认知评分和炎症水平的相关性。
结果 与 HC 组相比，脓毒症患者表现出一系列认知损伤，其中复杂图形测验(CFT)评分与 CRP 水平呈负相关。脓毒症患者的标准化聚类系数(γ)和小世界指数(σ)显著降低，并且与 PCT 水平均呈正相关。脓毒症患者 DC 值在右侧眶部额下回降低，右侧小脑 Crus2 区升高，其中右侧小脑 Crus2 区 DC 值与简易精神状态检查（MMSE）和蒙特利尔认知评估（MoCA）量表评分均呈负相关；NE 值在右侧眶部额下回和左侧颞极（颞上回）降低，在右侧小脑 Crus2 区升高，其中左侧颞极（颞上回）NE 值与 PCT 水平呈正相关，右侧小脑 Crus2 区的 NE 值与 MoCA 评分呈负相关。GCA 结果显示，左侧小脑 6 区至右侧眶部额下回以及左侧颞极（颞上回）至右侧小脑 Crus1 区的 EC 值显著降低，而右侧舌回至左侧颞极（颞上回）的 EC 值显著增高，其中左侧小脑 6 区至右侧眶部额下回的 EC 值与 PCT 水平呈负相关。
结论 脓毒症幸存者早期即表现出显著的认知功能障碍。其脑网络拓扑结构在全局水平上，小世界属性保留但倾向于随机网络；在局部层面，大脑中某些节点的信息处理和传输受损，而小脑的信息处理和传输增强。脓毒症患者连接大脑和小脑的多个脑区之间的有效连接异常，且脓毒症后脑功能网络异常、认知障碍和外周炎症之间存在相关性。

PO-0275

Dynamic SOFA score based deep learning model for short to long term mortality prediction in discharged sepsis survivors

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Background and objective: Sepsis survivors are still in a high mortality risk for a long period after discharge and should be paid more attention to improve the prognosis of those survivors outside hospital. Sequential organ failure assessment (SOFA) score, one of the indicators used for sepsis diagnosis, consists of six subsystems (cardiovascular, central nervous, coagulation, liver, renal, and respiratory system), and can also reflect the disease severity. This current study seeks to develop a deep learning algorithm for predicting the short to long term mortality in discharged sepsis survivors, based on the dynamic subsystem SOFA scores combined with static features at ICU admission.
Methods In this retrospective study, intensive care unit (ICU) adult patients with sepsis on ICU admission (Sepsis-3), length of ICU stay longer than four days and discharged alive from ICU were screened. Static features including the patient characteristics, co-morbid conditions, laboratory tests at ICU admission and dynamic subsystem SOFA scores within the first four days after ICU admission were collected, respectively. Finally, 7532 sepsis patients at a single medical center were identified in the study and followed up to one year after ICU discharge. The dataset was randomly split into training, validation, and test cohort in 8:1:1 ratio. A deep learning-based combined model with multidimension and time series (DL-CMT) was constructed and trained for the dynamic post-discharge short to long term mortality prediction. The area under the receiver operating characteristic curve (AUROC) was used as primary criteria to evaluate the differentiation accuracy and performance of the prediction model in the independent test dataset. Other metrics included the area under the precision-recall curve (AUPRC), accuracy, precision, F1-score. The proposed model was also compared with a deep learning model

(multilayer perceptron) and two machine learning models (random forest and XGBoost). To validate the functionality of each subsystem of SOFA, we conducted ablation experiments.
Results At the assigned follow-up timepoints, 30.7%, 33.6% and 39.4% of the included 7532 patients died within 28 days, 90 days and one year after ICU discharge. Our proposed DL-CMT model, based on dynamic subsystem SOFA scores combing with static features, achieved all the best performance for 28-day, 90-day and one-year mortality prediction, with AUROC of 0.95 (95% confidence interval [CI]: 0.93-0.96), 0.92 (95% CI: 0.90-0.94), and 0.90 (95% CI: 0.87-0.92), respectively. This was higher than that for the multilayer perceptron (28-day AUROC=0.91, 95% CI: 0.89-0.93; 90-day AUROC=0.89, 95% CI: 0.87-0.91; one-year AUROC=0.85, 95% CI:0.83-0.88), random forest (28-day AUROC=0.90, 95% CI: 0.88-0.92; 90-day AUROC=0.89, 95% CI: 0.87-0.91; one-year AUROC= 0.85, 95% CI: 0.83-0.88), and XGBoost (28-day AUROC=0.93, 95% CI: 0.91-0.95; 90-day AUROC=0.90, 95% CI: 0.89-0.93; one-year AUROC= 0.82, 95% CI: 0.78-0.85). DL-CMT also outperformed the comparison models in terms of AUPRC, accuracy, precision, or F1-score. Besides, the ablation experiment results indicated that even with the absence of information from specific physiological subsystems, the model can still maintain a relatively stable performance level overall, demonstrating a certain level of robustness and generalization ability.
Conclusions Short to long term mortality risk remains high in sepsis survivors after discharging. Using the time series subsystem SOFA data combined with static temporal features, our proposed DL-CMT model exhibited the best performance in predicting short to long term mortality for discharged sepsis survivors and may have the potential to aid clinicians in optimizing clinical decision-making in management and make the family paying more attention to the survivors.

PO-0276

麻醉恢复期患者护理安全预警模式的改进与应用

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目的 构建麻醉恢复期患者护理安全预警模式，降低麻醉手术后患者的并发症与死亡风险。
方法 （1）组建 PACU 患者护理安全预警管理小组，收集全方位、多层次观察、收集存在的护理安全隐患的现状，集中在多参数监护仪与麻醉机警报值与警报提示音设置、老年手术患者麻醉恢复期循环与呼吸管理、婴幼儿的气道管理、手术部位引流液与活动性出血的评估、亚专科手术患者容易忽略护理问题如颅内手术患者的低体温与高热的护理、肾结石患者尿源性感染性休克的观察、TURP 术后膀胱持续冲洗与术后低钠血症等，总结、分析护理安全事件潜在的影响因素，确定安全预警项目：（2）制定护理安全预警模式：①仪器设备的安全预警：规范多参数监护仪与麻醉机警报值与警报提示音设置的标准范围、实施流程、监管流程及相应管理制度；②制作病情提示警示牌：70 岁以上老年患者安全预警信息提示牌、重症患者提示牌等，悬挂于输液架上给与提示；③手术部位引流量的安全预警：查阅相关书籍及国家规范与指南，咨询亚专科手术专家，设置各专科手术患者术后短时间内（术后 1-2h）手术部位引流情况评估量表；④完善交接班的内容，优化交接流程：修改完善麻醉前、手术中及手术后患者病情交接内容并合理设置交接卡，构建规范的交接流程（SOP）；编辑“麻醉后监测治疗室标准护理工作流程图”专著及重点流程操作视频；采取集中解读与考试、随机督查与指导的方式进行科室内全员培训；（3）科室内护理安全质控小组定期督查（每周 1 次），促进工作落实；（5）月质量分析，评价效果；
结果 2023 年 1-12 月每周 1 次督查结果：监护仪与呼吸机警报设置符合患者病情的正确率从 98%升为 100%，责任护士针对患者的个性化警报值设置正确率为 100%、及时性为 98.00%，手术部位引流管护理正确率（引流管的固定、引流装置位置、引流液的观察）为 98.21%，护士的临床综合能力考核（每半年一次）合格率 100%，优秀率达 80.13%、PACU 医生对护士工作的满意度（每月一次）从 89.45%升为 97.58%

结论 完善的护理安全预警模式使 PACU 护理人员有章可循，将患者在麻醉恢复期的安全问题防患于未然，能有效降低患者麻醉手术后并发症。

PO-0277

MMP9 通过降解纤维蛋白原减轻脓毒症引起的小鼠多器官损伤

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目的 脓毒症是由于宿主对感染反应失调而引起的多器官功能障碍，甚至是死亡。脓毒症期间，巨噬细胞具有清除细菌、产生炎症介质和调节免疫反应等多种作用。正常情况下，机体表达少量的 MMP9，具有降解细胞外基质中的各种蛋白成分的作用。但是在感染情况下，巨噬细胞等细胞可以分泌大量 MMP9。目前 MMP9 在脓毒症中的作用存在争议。Fib 是肝细胞合成和分泌的蛋白质，属于细胞外基质的一部分，广泛分布于血浆中。Fib 不仅在凝血过程中具有重要作用，对炎症的发展也有一定影响。本研究拟采用 MMP9 敲除小鼠研究 MMP9 在 CLP 脓毒症小鼠中的作用，以及是否通过降解 Fib，减轻炎症损伤的机制。
方法 本研究采用 MMP9-/-小鼠和 C57B/L 小鼠进行 CLP 术来构建脓毒症模型。通过观察生存率、检测炎症反应和肺、肝、肾等组织损伤来研究 MMP9 的作用，同时检测小鼠肝组织 Fib 的表达。使用重组 MMP9 蛋白与 Fib 共同孵育后使用考马斯蓝染色等技术研究 MMP9 对 Fib 结构的影响。体外实验采用 Fib 和 LPS 共同刺激 MH-S 小鼠肺泡巨噬细胞，或 MMP9 与 Fib 共同孵育后再与 LPS 同时刺激巨噬细胞，检测炎症因子表达以及炎症相关信号通路 MAPK 通路蛋白磷酸化水平的变化从而评估 MMP9 起到保护作用的可能机制。
结果 MMP9-/-小鼠 CLP 术后生存率明显下降，CLP 导致的组织损伤及炎症反应都明显加重（Fig1）。对比野生型小鼠，MMP9-/-小鼠 CLP 术后肝组织中 Fib 水平进一步加重（Fig2）。在体外实验中，随着 MMP9 浓度增高，Fib 的 α 链逐渐被降解（Fig3）。单独使用 Fib 刺激巨噬细胞，炎症因子分泌无明显变化。但是在 LPS 的刺激下，Fib 可以通过放大 JNK、ERK、p38 信号通路磷酸化，促进 LPS 导致的炎症因子释放（Fig4）。MMP9 与 Fib 共同孵育后再使用 LPS 刺激，可以减轻 Fib 和 LPS 协同促炎作用和降低 JNK、ERK、p38 的磷酸化水平（Fig5）。
结论 我们在体内实验发现 MMP9-/-加重 CLP 诱导的炎症反应、各器官组织损伤以及上调 Fib 的表达。在体外实验验证了 Fib 可以放大 LPS 导致的 JNK、ERK、p38 信号通路的磷酸化水平，进而发挥协同促炎作用。而 MMP9 具备纤溶酶的特性，抑制了 Fib 和 LPS 的协同促炎作用，最终起到保护作用。总的来说，本研究初步证明 MMP9 可能通过降解 Fib，抑制 Fib 放大 LPS 诱导巨噬细胞炎症因子分泌作用，从而发挥在脓毒症中的保护作用。

PO-0278

颈静脉的扩张性预示着液体的流动 脓毒症患者的反应性

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2. 战无无无

目的 本研究的目的是验证使用颈内静脉（IJV）的大小和扩张性作为机械通气合并脓毒症患者液体反应性的可靠指标的有效性。
方法 通过连续血流动力学监测系统（Masttarte®）收集脓毒症患者的血流动力学数据，包括心脏指数（C

I）(L/min/M2)、心率（心跳/分钟）、平均动脉压（MAP）（mmHg）、中心静脉压（CVP）（mmHg）和动脉
脉压变化（PPV），以及超声评估 IJV 扩张性（%），定义为吸气时 IJV 最大前后直径和最小呼气直径与最小
呼气直径 x100 之间的差异。回顾性将患者分为两组；液体反应者(R)，如果 7ml/kg 晶体输注后 CI 增加大于
或等于 15%，如果 CI 增加大于 15%，无反应者（NR）。我们比较了 R 组和 NR 组之间测量变量的差异，并计算了
最佳 IJV 膨胀性和 PPV 敏感性和特异性的受试者-操作者-特征（ROC）曲线。我们还计算了一个联合的下腔静
脉扩张-ppvROC 曲线来预测 R。
结果 我们纳入了 50 例患者，其中 30 例为 R。应答者之前表现出较高的 IJV 扩张性和 PPV
液体挑战大于 NR（P<0.05）。在体积挑战前，IJV 的膨胀率超过 18%，其对预测 R 的敏感性为 80%，特异性为
85%。IJV 膨胀度与 PPVROC 曲线的两两比较显示，曲线下的 ROC 面积相似。有趣的是，结合 IJV 的膨胀率和
PPV 超过 9.7%
超过 12%的患者预测了液体反应性，敏感性为 100%，特异性为 95%。
结论 机械通气脓毒症患者的 IJV 扩张性是一种准确、容易获得的无创液体反应性参数。IJV 扩张性与
左侧液体反应性指标的联合使用提高了其预测价值

PO-0279

硫酸镁输注对 ARDS 患者死亡率的影响

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目的 Trials have demonstrated abnormal magnesium levels (hypomagnesemia and hypermagnesemia) increase mortality and poor prognosis in severely ill patients. However, there are few reports on mortality in patients with acute respiratory distress syndrome (ARDS) receiving magnesium supplementation.

方法
This study employed a retrospective cohort analysis approach, utilizing the MIMIC-IV (Medical Information Mart for Intensive Care-IV) database. The analysis focused specifically on adult critically ill patients with ARDS. The exposure was the administration of magnesium sulfate during intensive care unit (ICU) stay. The primary outcome was in-hospital mortality. Propensity score matching (PSM) was performed at a 1:1 ratio. Multivariable analyses were used to account for potential confounders.
结果 The cohorts comprised 5499 patients before matching and 1282 patients after PSM, respectively. In the PSM analysis, in-hospital mortality rate was 32.29% (207/641) in the magnesium sulfate use group and 37.44% (240/641) in the no use group. The use of magnesium sulfate was linked to lower in-hospital mortality (hazard ratio [HR], 0.71; 95% CI, 0.59-0.85; P<0.001). Magnesium sulfate use was also associated with lower ICU 30-day mortality (HR, 0.75; 95% CI, 0.62-0.90; P=0.002). A sensitivity analysis encompassing the entire cohort revealed

lower in-hospital mortality in both the multivariable analysis (HR, 0.67; 95% CI, 0.57-0.78; P<0.001) and the univariable analysis (HR, 0.41; 95% CI, 0.36-0.47; P<0.001).
结论 In summary, magnesium sulfate use was associated with lower in-hospital mortality among patients with ARDS, though this finding requires further validation through additional prospective studies.

PO-0280

机器学习算法预测 ICU 老年脓毒症患者 28 天生存率：基于 MIMIC-IV、eICU 数据库的回顾性研究

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目的 探讨 ICU 内老年脓毒症患者 28 天生存率的主要影响因素及预测指标，构建机器学习算法（machine learning，ML）模型，用于预测该类脓毒症患者临床结局，开发可视化模型网站，辅助医务人员进行医疗决策。
方法 回顾性分析 MIMIC-IV 数据库中 2008~2019 年 14269 例在 ICU 内的老年脓毒症患者的一般资料、进入 ICU 24 小时内生命体征、血气分析、并存病、临床评分、治疗措施等指标，将患者进入 ICU 后 28 天的结局分为生存组和死亡组，随机抽取 80%的病例作为训练集用于建立模型，其余 20%的数据用作验证集。应用七种 ML 算法构建预测模型：逻辑回归（logistic regression, LR）、决策树（decision tree, DT）、朴素贝叶斯（naive bayes, NB）、随机森林（random forest, RF）、K 最邻近（k nearest neighbor, KNN）、梯度提升（Gradient Boosting Machine,GBM）、极端梯度提升（eXtreme Gradient Boosting,XGBoost）。从准确率、受试者工作特征（receiver operating characteristic, ROC）曲线下面积（area under the curve，AUC）、精准率、召回率、F1 分数多维度评估、比较不同 ML 模型的预测能力，基于最佳模型解释变量与结局之间的关系。并利用 eICU 数据库收集 13494 例入住 ICU 老年脓毒症患者的相同的变量进行外部验证，并基于最佳模型开发可视化网站服务于临床。
结果 最终队列中包括 MIMIC-IV 数据库中 14269 名在 ICU 内的老年脓毒症患者，共有 2101 名（14.72%）患者在入 ICU 28 天内死亡。上述七种 ML 预测模型均具有较好的 28 天生存结局预测能力，尤其是梯度提升（GBM）算法的预测性能最好，其 AUC 为 0.84，准确率为 88.19%，精准率为 0.901，召回率为 0.971，F1 分数为 0.935。外部验证数据包括 eICU 数据库中 13494 名在 ICU 内的老年脓毒症患者，共有 2371 名（17.57%）患者在入 ICU 28 天内死亡。基于最佳的梯度提升模型绘制 ROC 曲线，外部验证的 AUC 为 0.89。
结论 GBM 算法能准确预测在 ICU 的老年脓毒症患者 28 天生存结局，在七个 ML 模型中，GBM 模型在预测该类患者 28 天生存率方面表现最佳，据此开发模型可视化网站，辅助医务人员及时采取有效防治措施，可以提高该类患者的生存率，提高医疗质量和服务效率，具有重要的临床指导意义。

PO-0281

脓毒症相关性脑病中 γδ T 细胞与星形胶质细胞互作

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目的 脓毒症相关性脑病（SAE）是脓毒症常见且最严重的并发症，能造成急性和长期的认知功能

障碍。代谢紊乱是 SAE 认知功能障碍重要的病理基础。γδ T 细胞是一类先天性 T 淋巴细胞，连接天然免疫和适应性免疫，在免疫应答中发挥重要作用，然而 γδ T 细胞代谢状态改变是否参与 SAE 尚不明确。本文旨在探讨 γδ T 细胞在 SAE 发病过程中是否发挥一定作用，以及 γδ T 细胞免疫代谢产物的表达变化，并进一步探讨 γδ T 细胞代谢紊乱参与 SAE 的分子机制。
方法 采用盲肠结扎穿孔（CLP）法构建 SAE 小鼠模型，Barnes 迷宫和新物品识别实验评估小鼠的认知功能。通过流式细胞术检测外周、中枢 γδ T 细胞及其他免疫细胞的表达变化。采用非靶向代谢组学检测 SAE 小鼠 γδ T 细胞的代谢变化。通过靶向代谢途径的小分子抑制剂和腺相关病毒观察 γδ T 细胞免疫代谢产物对 SAE 的影响。
结果 CLP 手术可导致脓毒症小鼠出现神经认知功能障碍，表现为小鼠对新物品的辨别指数降低、寻找到目标洞口前犯错误次数和潜伏期时间均明显增加。SAE 小鼠 γδ T 细胞活化明显增加，通过白喉毒素选择性消融 $\gamma\delta^{DTR\text{-}EGFP}$ 转基因小鼠 γδ T 细胞，我们发现 SAE 小鼠生存率增加、认知功能明显改善。通过代谢组学分析发现 SAE 小鼠 γδ T 细胞嘌呤代谢紊乱，进一步检测发现 SAE 小鼠 γδ T 细胞黄嘌呤浓度显著增加。接下来给予嘌呤代谢阻断剂 Pnp2，发现黄嘌呤生成被阻断后，可以减轻 SAE 小鼠认知功能损伤。通过免疫磁珠分选神经元、星形胶质细胞、小胶质细胞并检测脂质代谢变化，发现星形胶质细胞长链饱和脂肪酸和酰基肉碱显著升高。通过嘌呤代谢阻断剂 Pnp2 或星形胶质细胞嘌呤能受体 A2B 腺相关病毒，发现 SAE 小鼠神经元凋亡减少，星形胶质细胞活化减少，星形胶质细胞长链饱和脂肪酸和酰基肉碱生成显著下降，认知功能改善。
结论 脓毒症小鼠 γδ T 细胞嘌呤代谢活跃并产生大量黄嘌呤，黄嘌呤作用于星形胶质细胞嘌呤能受体，促进星形胶质细胞脂质代谢产物长链饱和脂肪酸和酰基肉碱分泌，导致神经元凋亡，继而加重认知功能损伤。

PO-0282

艾司氯胺酮通过 BDNF-TrkB 通路调节小胶质细胞极化，改善脓毒症相关性脑病认知功能障碍

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目的 在脓毒症相关性脑病(sepsis-associated encephalopathy，SAE)的发病机制中，小胶质细胞极化介导神经炎症发挥着重要作用。确定抑制小胶质细胞促炎极化的关键因素有望成为预防和治疗 SAE 的潜在靶点。艾司氯胺酮是一种非竞争性 N-甲基-D-天冬氨酸(N-methyl-D-aspartate，NMDA)受体拮抗剂，被认为对神经炎性疾病具有保护和治疗作用。本研究旨在探索艾司氯胺酮在 SAE 中的作用及其可能机制。
方法 在体实验采用盲肠结扎穿孔法(cecal ligation puncture，CLP)建立 C57BL6/J 小鼠 SAE 模型。术后 30min 腹腔注射艾司氯胺酮 10mg/kg 和/或 BDNF-TrkB 通路抑制剂 K252a 25μg/kg。采用 Morris 水迷宫和 Y 迷宫测定小鼠空间学习和记忆功能。术后 24h 收集小鼠全脑、海马及外周血标本。高尔基银染检测海马区域神经元复杂性及树突棘密度；ELISA 法检测外周血及海马组织匀浆中炎症因子水平；Western blot 及免疫荧光法检测海马区域小胶质细胞激活、极化和内稳态相关蛋白表达。离体实验以小鼠的小胶质细胞系 BV2 细胞为研究对象，予以脂多糖、艾司氯胺酮及 K252a 处理，通过 MTT 实验和乳酸脱氢酶检测各组细胞活性及毒性作用；ELISA 法检测细胞培养液中炎症因子水平；Western blot 法及免疫荧光法检测小胶质细胞极化相关蛋白表达。
结果 动物实验中，艾司氯胺酮改善了 SAE 小鼠空间学习和认知功能障碍，增加了海马神经元复杂性及树突棘密度，增加了 SAE 小鼠海马匀浆中抗炎细胞因子水平，降低了促炎细胞因子水平，但该作用可被 K252a 逆转；通过对小胶质细胞相关标记物进行检测，发现艾司氯胺酮降低了 SAE 小鼠海马 Iba-1 和 CD32 的表达，增加了 ARG-1 的表达，同时增加 P2Y12R 和 Tmem119 荧光面积，但 K252a 有效地抵消了艾司氯胺酮对小胶质细胞激活、极化和内稳态的调节作用。细胞实验中，

艾司氯胺酮增加脂多糖处理后细胞活性，降低乳酸脱氢酶的释放，降低 BV2 细胞培养基中促炎细胞因子水平，增加抗炎细胞因子水平，除此之外，通过 western blot 和免疫荧光验证艾氯胺酮可以上调 LPS 炎性模型中 Arg-1 的表达，抑制 CD32 的表达。但艾司氯胺酮的上述作用在应用了 K252a 后被逆转。

结论 艾司氯胺酮通过抑制小胶质细胞过度激活和促炎极化，并增加小胶质细胞内稳态从而缓解神经炎症，减轻与 SAE 小鼠的神经损伤和认知功能障碍，而上调 BDNF-TrkB 通路可能是艾司氯胺酮在 SAE 中发挥神经保护作用的重要机制之一。

PO-0283

基于表面等离子体共振传感器技术检测阿米卡星血药浓度

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目的 阿米卡星是一种半合成抗生素，用于治疗革兰氏阴性菌的感染，但是它的治疗窗比较窄，一旦过量就会产生耳毒性与肾毒性。如果剂量不够，则会导致耐药菌的产生。重症监护室的患者的药物代谢动力学具有复杂性。所以，治疗性药物监测（TDM）指导下的阿米卡星个体化治疗对于减少毒性的发生和提高临床疗效非常重要。目前，针对阿米卡星的 TDM 技术，包括基于色谱技术和免疫学等的测定方法。这些技术要有些价格昂贵，有些则需要在中心实验室专门的设备来进行的，有些需要复杂的前处理。所以，其所需的大量时间和成本阻碍了阿米卡星 TDM 检测在医疗实践中的应用。所以，需要开发一种快速、简单、经济的药物浓度检测方法来作为有效补充。

方法 本研究首先构建了一种新型表面等离子共振生物传感器，用于检测人体血液样本中的阿米卡星药物浓度。接着优化检测条件，并验证了其检测限、日内日间精密度和准确度。最后使用其检测实际的临床样本，并通过与高效液相色谱的一致性评估来验证该传感器与金标准的一致性。

结果 该 SPR 方法检测限为 0.035±0.004 ng/ml。日内准确度为 98%～105%，日间准确度为 97%～110%，符合药物浓度监测分析的要求。使用 pass-bablok 分析来验证其临床样本与 HPLC 结果，具有一致性。

结论 这项工作为开发一种无标记，实时准确，低成本和简单的药物浓度监测方法奠定了基础。该药物浓度监测传感器的开发将有助于临床医生及时优化给药方案，从而最大限度的提高临床疗效，减少药物的副作用。

PO-0284

我国分娩镇痛互联网相关患者教育资料现状分析

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目的 对我国“分娩镇痛”相关患者教育资料现状进行评估。

方法 根据我国搜索引擎用户习惯，检索并筛选分娩镇痛相关资料。由三位麻醉专科医师对内容覆盖率、准确率进行评价，利用中文版患者教育资料印刷品评估工具（C-PEMAT-P）从医学文本角度对可理解性及可操作性进行主观评估，并对评价结果进行一致性分析。采用机器学习的方法建立中文可读性分级模型，从中文文本角度对纳入资料的阅读难易程度进行客观评估。

结果 共检索到 97 篇网页资料，共 21 篇有效资料纳入研究。其中，提及分娩镇痛禁忌症的内容覆盖率仅有 60.3%，准确率在 90%以上的资料为 71.4%，易于理解的资料为 81.0%，具有指导意义的资料仅为 4.8%（1/21）。对于内容覆盖率、准确率、C-PEMAT-P 的一致性评价为 0.975、0.833、0.758 和 0.773（P 值均＜0.001）。适合义务教育水平的资料仅为 4.8%（1/21），适合高中及以上教育水平的资料为 42.9%。
结论 我国分娩镇痛相关互联网患者教育资料数量繁多，但质量有待提高。未来应开展“麻醉学+语言学”合作模式，为患者提供内容更全面、准确更高、更适合孕妇理解的患者教育资料。

PO-0285

Study of factors influencing maternal fever associated with epidural analgesia

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Objective The aim of this study was to analyze the potential factors of maternal fever and their preventive strategies after the implementation of epidural analgesia in the perinatal period.
Methods This study was a composite study combining a retrospective cohort study with animal experiments. For the human part of the study, the subjects were women who underwent painless delivery between January 2022 and December 2023 in our hospital. All women undergoing painless delivery were included in the study. The women were categorized into febrile and non-febrile groups based on the presence or absence of fever during delivery, including 53 febrile and 304 non-febrile women. Non-parametric tests were applied to compare the differences in baseline factors between the two groups, while multivariate logistic regression was used to analyze the potential influencing factors of maternal fever. For the animal experiment part, the study subjects were 28 female New Zealand rabbits, which were randomly divided into two groups: one group with epidural placement and continuous temperature detection was implemented (14 rabbits), and the other group with epidural placement but temperature monitoring was performed only before and at 4, 8 and 12 hours after placement (14 rabbits). In both groups, the rabbits were subjected to cooling measures as soon as fever developed during temperature monitoring. In this study, we recorded the fever rate and body temperature data of the two groups of rabbits and compared the inflammatory factor indexes of the two groups to assess the effects of different temperature monitoring frequencies on the incidence of fever and inflammatory response.
Results There was no statistical difference between the two groups in terms of both age and baseline body temperature (P>0.05). The number of pregnancies and deliveries were higher in the non-febrile group than in the febrile group (P<0.05). In contrast, the duration of the first stage of labor and the use of analgesic pumps were longer in the febrile group than in the non-febrile group (P<0.05), and the use of routine doses of ropivacaine, manual rupture of membranes, uterotonics, and contamination of the amniotic fluid were also more common (P<0.05), in addition to stronger perinatally monitored contraction intensity in the febrile group than in the non-febrile group. In the outcome regression of whether or not to convert to dissection, the rate of conversion was higher in the febrile group than in the non-febrile group (P<0.05). In addition, interleukin 6 and calcitonin levels were higher in the febrile group than in the nonfebrile group. Logistic regression was performed with the variable of whether or not to be febrile as the dependent variable and the variable of the number of days of hospitalization as the independent variable, and the Hawes test issued a good fit for the logistic regression model (p=0.829). The results of logistic regression found that all four factors, body temperature t1°C before delivery (p=0.002), t2°C before painless implementation (p=0.000), t4°C at the end of painlessness (p=0.003), and the amount of analgesic medication used (p=0.026), had an effect on whether or not the subjects were febrile. In the animal experiments, the temperature in the discontinuous temperature monitoring group was significantly higher than that in the continuous monitoring group (p<0.05),

although the difference in the fever rate between the two groups was not statistically significant (p>0.05), the fever rate was lower in the continuous monitoring group. After removing the epidural catheter, the inflammatory indexes in the serum of rabbits in the two groups were analyzed. The results showed that the levels of interleukin-6 and C-reactive protein were significantly higher in the continuous monitoring group than in the non-continuous monitoring group (P<0.05), whereas the levels of leukocyte count and calcitonin did not differ significantly between the two groups (P>0.05). These findings suggest that continuous temperature monitoring, while it may help to reduce the rate of fever, may also be associated with higher levels of certain inflammatory responses.

Conclusion Maternal maternal history of pregnancy and labor, intensity of contractions, and number of vaginal examinations before the implementation of painless delivery may be associated with maternal fever, but the duration of the first stage of labor, epidural anesthesia medication use, uterotonin use, pre-delivery temperature, and pre-partum temperature before the implementation of painless delivery are independent risk factors for fever. In contrast, animal experiments suggest that the implementation of continuous temperature monitoring in the management of nulliparous labor is able to identify febrile individuals at an early stage and intervene with cooling measures at an early stage. Therefore, in clinical practice, perinatal continuous temperature monitoring should be adopted for mothers with relevant risk factors, and the use of epidural anesthesia drugs should be adjusted, and the use of contractions should be reduced as much as possible, so as to effectively prevent maternal fever associated with perinatal epidural analgesia.

PO-0286

麻醉前停药可改善长时间硬膜外分娩镇痛转硬膜外麻醉的效果：一项前瞻性队列研究

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目的 背景：影响硬膜外分娩镇痛(ELA)转硬膜外麻醉(ESA)失败的因素很多。我们假设麻醉前停药可以改善长时间 ELA 转 ESA 的效果。

方法 本研究前瞻性观察长时间 ELA 转 ESA 的产妇（ELA 持续时长 8 小时以上）。根据麻醉前是否停用 ELA 分为两组。S 组：ELA 在麻醉前停药 30 min 以上，NS 组：ELA 在麻醉前不停药。两组均直接经 ELA 导管行硬膜外麻醉。主要观察指标为硬膜外麻醉失败率。次要观察指标为术中肌肉松弛效果、内脏疼痛、切口疼痛、术中麻醉效果和产妇满意度。同时记录术中麻醉相关数据、硬膜外分娩镇痛相关数据以及母婴数据。

结果 本次前瞻性队列研究共纳入 167 例产妇：S 组 77 例，NS 组 88 例。与 NS 组比较，S 组硬膜外麻醉失败率低(13%比 29.5%)，肌肉松弛优良率高(90.3%比 78.2%)，内脏痛发生率低(9.7%比 32.1%)，切口痛发生率低(9.7%比 15.9%)，内脏疼痛(0 (0,0)vs. 0(0,3))和切口疼痛(0 (0,0)vs. 0(0,0))的视觉模拟评分(VAS)低。S 组麻醉效果优良率(77.9%比 56.8%)和麻醉满意度(96.1%比 83%)较高。

结论 麻醉前停药可显著降低硬膜外麻醉失败率，提高长时间 ELA 转 ESA 的麻醉效果和麻醉满意度。

PO-0287

右美托咪定复合罗哌卡因与舒芬太尼复合罗哌卡因用于硬膜外分娩镇痛对新生儿结局的影响比较

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目的 本研究的目的是探索右美托咪定复合罗哌卡因相较于舒芬太尼复合罗哌卡因用于硬膜外分娩镇痛对新生儿结局的影响，评估本方案用于大样本随机对照研究的可行性；并通过两组新生儿院内不良结局的发生率，估算未来大样本研究的样本量。
方法 本临床研究采用随机、双盲对照的探索性研究设计。选择在白天工作时间临产进入产房的单胎、足月、头位、计划阴道分娩、要求硬膜外分娩镇痛的产妇，随机接受右美托咪定复合低浓度罗哌卡因分娩镇痛（干预组 0.4ug/ml 右美托咪定+0.08%罗哌卡因）或舒芬太尼复合低浓度罗哌卡因分娩镇痛（对照组 0.4ug/ml 舒芬太尼+0.08%罗哌卡因），每组各 100 例，统计新生儿院内不良结局的发生率，分析右美托咪定复合低浓度罗哌卡因硬膜外分娩镇痛是否能降低新生儿院内不良结局的发生率。
结果 本研究共纳入 200 例产妇，每组纳入 100 例，院内新生儿不良结局发生率两组未见明显差异（14%比 17%，P=0.558）。右美托咪定组产程中硬膜外镇痛药量明显高于舒芬太尼组（77ml 比 55ml，p=0.007），但每小时的镇痛药量二组间未见明显差异（p=0.197）。安全结局方面，右美托咪定组患者发生运动阻滞的发生率明显高于舒芬太尼组（13%比 1%，P＜0.001），但运动阻滞较轻微，无严重不良事件。
结论 右美托咪定复合低浓度罗哌卡因硬膜外分娩镇痛未能降低新生儿院内不良结局的发生率，但增加了轻度运动阻滞的发生率。

PO-0288

第 56 届北美产科麻醉和围产医学年会（SOAP）International Symposium: China 特别报道

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目的 向国内麻醉科医师介绍：第 56 届北美产科麻醉和围产医学年会（SOAP）International Symposium: China
方法 重点介绍 International Symposium: China 版块的研究内容
结果 多项研究内容的重点结果的汇报
结论 中国产科麻醉的文章发表在 SCI 亦具有一定的影响力

PO-0289

产后恢复质量调查量表的汉化和信效度检验

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目的 对产后恢复质量调查量表（Obstetric Quality of Recovery 10，ObsQoR-10）进行汉化和信效

度检验。

方法 经过翻译、专家校正、文化调适和预调查，形成中文版 ObsQoR-10 量表。选取 2024 年 5 月至 2025 年 5 月在首都医科大学附属北京妇产医院分娩的 600 例产妇作为研究对象，采用一般资料调查表、中文版 ObsQoR-10 量表、全球健康视觉模拟评分量表（GHVAS）在产后 24h±4h 对产妇进行调查。采用方便抽样法，选取不低于总样本量 15%的产妇，在完成量表后的 30-60min 重复完成一次量表。采用决断值法及相关系数法对量表项目进行统计分析，采用折半系数（Spearman-Brown 系数）、Cronbach's α 系数、组内相关系数（Intraclass Correlation Coefficient）评估量表信度，采用因子分析、KMO 检验、Bartlett's 球形检验、与 GHVAS 评分相关系数评估量表效度。

结果 产后恢复质量调查量表中文版包含 10 项条目（具体条目内容见上传附件），量表采用视觉模拟评分法（VAS），每一项条目由研究对象自主评分，由研究者进行分数汇总。本研究目前共发放 106 份问卷量表，回收有效问卷量表 106 份，有效回收率 100%。产妇的平均年龄为 33.18±4.32 岁，高龄产妇占 33.96%，55 （51.89%）例为初次妊娠。入组产妇中包括 51 例（48.11%）择期剖宫产和 55 例（51.89%）经阴道顺产，其中 18 例（16.98%）产妇完成了重复调查。每一位接受调查的产妇均能完全明白中文版量表中各问题的含义，完成问卷的时间范围为 2-9min，中位完成时间 4min。量表共有 10 个条目，其中有 7 个条目的鉴别度 CR 值>3（P<0.001），各条目得分与总分的相关系数有 7 条>0.3（P<0.001）。量表的折半系数（Spearman-Brown 系数）为 0.558；Cronbach's α 系数为 0.810，P<0.001；重测量表组内相关系数（Intraclass Correlation Coefficient）为 0.865（0.674-0.947），P<0.001。索性因子分析共提取出 3 个公因子，解释总方差的 67.55%，量表的 KMO 值为 0.733，Bartlett's 球形检验结果显示卡方值为 496.416，自由度为 45，P<0.001。该量表总分与 GHVAS 评分相关系数为 r=0.505，P<0.001。

结论 初步判定中文版 ObsQoR-10 量表具有较好的信效度和临床可行性，可用于择期剖宫产和经阴道顺产产妇产后恢复情况的评估。但部分条目的鉴别度仍需要更大样本量进行进一步验证。

PO-0290

感染性休克孕妇剖宫取胎手术一例

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目的

孕妇，31 岁，身高 160cm ，体重 49.9kg，因“发热伴腹泻 1 天余”入院。孕妇凌晨 3：00 出现畏寒,自测体温 37℃左右,未用药，在家卧床休息， 约 17：00 感觉全身无力、体温升高，腹痛加重，测体温 38℃，进食少量米粥后出现呕吐、腹泻一次，呕吐为胃内容物，腹泻为水样便，于我院急诊就诊，入院查体：T39.6℃ P127 次/分 R23 次/分 BP103/78mmHg，产科改良版快速序贯器官衰竭的 (quick sequential organ failure assessment qSOFA）评分 2 分，考虑脓毒症可能性大。

方法

查体：一般情况:神志清，精神差，营养中等，面色潮红，被动体位，双肺听诊未闻及异常，腹部膨隆，压痛明显。产科情况:子宫张力大呈板状，压痛明显，未闻及胎心，外阴少量血迹。辅助检查：门诊急诊超声：死胎，未见胎盘早剥征象。血 常规示：白细胞(WBC)7. 51× 109/L, 中性粒细胞比值(NEUT):91.6%, 红细胞(RBC)3. 82× 1012/L, 血小板(PLT) 54× 109/L, Hb 130g/L。

结果

凝血常规：凝血酶原时间(PT)24. 6 s ，国际标准化比值(INR)2. 04 ，活化部分凝血活酶时间（APTT）：50.1 S，纤维蛋白原(Fg) 0.489 g/L, D 二聚体(D-D) 611. 8μg/ml，降钙素原（PCT）：34.92ng/ml。入院诊断：1、胎盘早剥？2、死胎 3、发热原因待查 4、366 周妊娠 G3P1L1 LOA 5、

DIC。行阴道分泌物、血培养加药敏，予头孢哌酮钠舒巴坦钠 3g 静滴经验性抗感染治疗。病情凶险，拟在全身麻醉下紧急行“剖宫取胎术”。

结论

入手术室后面罩吸氧，监测生命体征：P 133 次/分 R 23 次/分 BP 100/58mmHg，SPO2 95%,立即开通三条外周静脉通道快速补液。麻醉诱导：依托咪酯 10mg，舒芬太尼 10ug，罗库溴铵 30mg，喉镜下可见孕妇口腔粘膜，牙龈广泛渗血，充分吸引后经口插入 7.0 号气管插管，深度 21cm。麻醉机设置：VT 6ml/Kg，RR 12 次/分，吸呼比 1:2，PEEP 5cmH2O，

PO-0291

连续硬膜外分娩镇痛后中转剖宫产致异常广泛阻滞一例

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目的 通过本病例讨论，提示临床上进行连续硬膜外分娩镇痛或剖宫产术时，操作者在硬膜外穿刺时应做到动作轻柔，切忌用力过猛、穿刺过深，避免反复注气或注液，以免增大意外造成硬膜下间隙阻滞可能，置入导管后应注意反复回抽，确认无血液及脑脊液后再给予试验剂量，密切观察患者生命体征变化，及时测试感觉及运动神经阻滞平面，由于妊娠期硬膜外腔变窄、腰椎前凸加大，给药剂量应适当减少，当出现硬膜下间隙阻滞或异常广泛阻滞时，应及时判断并作出相应处理，必要时进行全麻气管插管，力求维持患者生命体征平稳。

方法 患者女，37 岁，身高 166cm，体重 66kg，孕 39 周，孕 2 产 0。进入产程后患者宫缩强烈，要求行分娩镇痛。评估患者无椎管内麻醉的禁忌症，签署知情同意书后行连续硬膜外分娩镇痛。开放外周静脉，连接乳酸钠林格注射液 500ml，监测无创袖带血压、脉搏、血氧饱和度，测得血压 120/90mmHg,脉搏 80 次/分，血氧饱和度 98%。患者取右侧卧位，于 L2-3 间隙行硬膜外穿刺，穿刺过程顺利，突破黄韧带时落空感明显，负压试验阳性，见无血液及脑脊液流出，通过硬膜外穿刺针向头侧置入硬膜外导管 5cm，回抽无血液及脑脊液，注入 1%利多卡因 3ml 试验剂量，固定导管。患者平卧，5 分钟后测试麻醉平面位于 T12，连接镇痛泵，泵液配比：舒芬太尼 35ug，罗哌卡因 85mg，生理盐水 70.8ml，共 80ml。设置参数：首次剂量 9ml，背景剂量 3ml/h，脉冲剂量 6ml/次，锁定时间 15min。给予初次剂量 9ml 泵液后 10min 再次测得麻醉平面位于 T8，双侧下肢 Bromage 评分 0 分，患者主诉疼痛明显缓解，双下肢自觉稍有发热感，无麻木感，余无明显不适，生命体征平稳。

结果 约 3h 后患者因胎动减少接受紧急剖宫产，入室后连接无创袖带血压、心电监护，监测脉搏血氧饱和度，吸氧 5L/min，此时双侧下肢 Bromage 评分 0 分，患者自诉双下肢无麻木感，回抽无血液及脑脊液后于硬膜外导管推注 2%利多卡因 5ml，3min 后血压降至 84/46mmHg，立即复测血压为 78/57mmHg，测试麻醉平面提示痛觉减退平面位于 T2，此时患者双下肢仍可直腿抬高离开床面。紧急联系产科医生行剖宫产术，同时以 10ml/h 泵注去氧肾上腺素（100ug/ml）维持血压，患者主诉无任何不适。推注试验剂量 10min 后再次测试麻醉平面位于 T2，无双下肢运动阻滞。手术全程顺利进行，期间反复回抽硬膜外导管均无血液或脑脊液流出，患者主诉无疼痛、牵拉感或胸闷等不适症状。入室 28min 后娩出一女婴，1min、5min 及 10min Apgar 评分均为 10 分，术毕前 10min 停止泵入升压药物，血压维持于 110/70mmHg 水平，吸空气血氧饱和度为 99%，患者主诉无呼吸困难等不适，术毕给予静脉镇痛泵，保留硬膜外导管，安返病房。

术后 3h 患者于病房测得血压 98/60mmHg,心率 70 次/分，血氧饱和度 98%，此时主诉剖宫产切口疼痛，NRS 评分 6 分，双侧下肢无麻木感且能自主活动。腰椎 CT 平扫显示此时导管位于 L2-3 硬膜外间隙，遂拔出硬膜外导管，术后 48h 随访患者无任何异常情况。

结论 本例患者由连续硬膜外分娩镇痛转为剖宫产硬膜外给药，仅在给予 2%利多卡因 5ml 试验剂量后 3min 即出现血压骤降，感觉阻滞平面高至 T2 水平，而运动神经未受到明显阻滞，分析其原因最初考虑硬膜外导管可能位于硬膜下间隙。

传统观念认为，硬膜下间隙是硬脊膜与蛛网膜之间的潜在腔隙，然而有研究证实[1, 2]，在未受到外伤破坏的完整硬脊膜标本当中未发现硬膜下间隙的存在，仅在受到机械力破坏、注入空气或液体时，硬膜-蛛网膜界面因受到压力产生裂隙，从而形成所谓的硬膜下间隙。Reina 等[2]也证实尸检下硬脊膜和蛛网膜易因受到压力作用而产生机械性分离，形成潜在的硬膜下间隙。当通过导管向此间隙内注入局麻药时容易产生广泛脊神经阻滞。目前硬膜下间隙阻滞尚无统一诊断标准，Lubenow 等[3]提出主要标准：①.回抽试验阴性；②.注入局麻药后出现广泛的神经阻滞。次要标准：①.注药 10min 后才出现延迟性的感觉和运动神经阻滞；②.小剂量局麻药也能产生程度不同的运动神经阻滞；③.交感神经阻滞范围与局麻药用量不成比例。根据主要标准和至少一项次要标准即可作出诊断，确诊则需通过影像学确定导管位置。本例患者待产至分娩全过程均无运动神经阻滞，在给予 2%利多卡因 5ml 后出现异常广泛感觉神经阻滞、血压明显降低，但通过补液及泵入血管活性药后血压维持平稳，且后续经影像学检查证实导管位于硬膜外间隙，因此可以初步排除此种可能性。

PO-0292

不同硬膜外导管留置深度在 DPE 技术联合 PIEB 模式行分娩镇痛时效果的观察：一项单中心，前瞻性，随机对照研究

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目的 观察 DPE 联合 PIEB 模式下行分娩镇痛时的适宜硬膜外导管留置深度，进而缩短分娩镇痛起效时间，降低导管相关不良结局的发生

方法 选择 2023 年 6 月至 2024 年 12 月，于宁夏医科大学总医院使用 DPE 技术联合 PIEB 模式下行分娩镇痛的产妇 102 例。纳入年龄 18-45 岁、ASAⅠ-Ⅱ、BMI≤40kg/㎡、妊娠 37 -42 周、宫颈扩张＞3.0 cm、希望采用硬膜外分娩镇痛的单胎健康孕妇。排除有椎管内麻醉禁忌、有局麻药物及阿片类药物过敏史、妊娠疾病(如妊娠高血压、先兆子痫或妊娠糖尿病等)、已知胎儿异常或存在与剖宫产风险增加相关的情况及在硬膜外镇痛前 4 h 服用阿片类药物或镇静剂的产妇。操作前按随机数字表法，根据硬膜外导管置入深度的不同，将患者分为 3 组：3cm 组，5cm 组，7cm 组。所有患者采用统一分娩镇痛方案，产妇取右侧卧位，穿刺间隙选择 L2-3，确定间隙后使用 17G 硬膜外穿刺针进行穿刺，采用生理盐水阻力丧失技术确定进入硬膜外间隙。随后使用 25 号 Whitacre 针刺破硬膜，确定有脑脊液返流后拔出。按随机分组的长度置入抗弯折多孔硬膜外导管。血液和脑脊液回抽阴性后，给予 0.15%利多卡因 3ml 作为试验剂量，确保安全后，硬膜外导管连接电子泵并启动 PIEB 模式给予首次负荷量 0.08%罗哌卡因和 0.4μg/mL 舒芬太尼 10ml，设置间歇时间 45min，单次丸剂量 10ml 进行输注，患者 PCEA 单次丸剂量为 5ml。程控初始剂量给药后，记录 NRS 评分＜3/10 的时间；镇痛开始后到产程结束时，计算单位时间内罗哌卡因消耗量；同时记录导管及药物相关不良反应（导管脱出、瘙痒、恶心呕吐、低血压、单侧阻滞）的发生情况

结果 在 DPE 技术联合 PIEB 模式下，与 5cm 组及 7cm 组相比，3cm 组有着更快的镇痛起效时间（P<0.01）；三组间单位时间内罗哌卡因消耗量无统计学差异（P＞0.05）且导管及药物相关不良反应的发生无统计学差异（P＞0.05）

结论 选择 DPE 技术联合 PIEB 模式行分娩镇痛时，硬膜外导管留置深度在 3cm 左右可获得较快的镇痛起效时间，并且不伴有导管及药物相关不良反应的增加。可能与注药端距离刺破孔较近时，PIEB 模式所产生的局部压力使更多药液进入蛛网膜下腔有关

PO-0293

The impact of repeat cesarean section on postpartum depression: An observational cohort study in Shanghai, China

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Background Although cesarean section (CS) has been reported as one of the potential risk factors for postpartum depression (PPD), there is uncertainty about the impact of repeat CS on the risk of developing PPD. We sought to explore whether repeat CS will further increase the risk of PPD compared to primary CS.
Patients and Methods: In this observational cohort study, full-term parturients with singleton scheduled for elective primary or repeat CS were enrolled between December 2020 and September 2021. PPD was defined as the total scores of the Edinburgh Postnatal Depression Scale (EPDS) ≥11. The primary outcome was the incidence of PPD at 6 weeks postpartum. Secondary outcomes included the incidence of postpartum depressive symptoms at 48h after CS, pain situation at 48h after CS and 6 weeks postpartum.
Results Among the 571 women included in the final analyses, PPD at 6 weeks postpartum occurred in 41 women (24.0%) in the repeat CS group (n=171) vs 93 (23.3%) in the primary CS group (n=400). After adjusting for the confounders, repeat CS was not associated with higher odds of PPD at 6 weeks postpartum (adjusted relative risk [aRR], 1.04; 95% confidence intervals [CI], 0.73-1.45; P=0.84). Compared to primary CS, women with repeat CS were more likely to report significant uterine contraction pain (NRS≥4) at 48h after CS (aRR, 1.51; 95% CI, 1.23-2.03; P<0.01). There were no significant differences between the two groups for incidence of postpartum depressive symptoms at 48h after CS (aRR, 1.13; 95% CI, 0.42-3.09; P=0.81), and pain at 6 weeks postpartum.
Conclusions Repeat CS was not associated with the increased risk of PPD at 6 weeks postpartum in comparison to primary CS. But women undergoing elective repeat CS were more likely to suffer significant uterine contraction pain in early postoperative stage.

PO-0294

Effects of prenatal exposure to esketamine on Early Childhood Neurodevelopmental Outcomes-a follow-up study of a multicenter, prospective, double-blind randomized clinical trial

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Esketamine has strong analgesic effect, rapid effect and little impact on neonates. It is widely used in obstetric anesthesia and analgesic management, such as supplemental analgesia of inadequate intrathecal block, induction of general anesthesia, and labor analgesia, etc. Recent studies have proved that esketamine can reduce the incidence and severity of postpartum depression, which is undoubtedly a further positive evidence for its application in obstetrics.To prospectively assess the impact of maternal use of esketamine before delivery on offspring neurodevelopmental outcomes，We leveraged data available from a multicenter, prospective, double-blind randomized clinical trial, which evaluated the sedation and analgesic effects of

intravenous esketamine given before delivery in patients undergoing caesarean section under epidural anesthesia.

PO-0295

硬膜外应用右美托咪定对产妇剖宫产术后睡眠障碍的影响：一项双盲、随机临床试验

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目的 To investigate the effect of epidurally administered dexmedetomidine on the occurrence of postpartum sleep disturbance in patients who were scheduled for elective cesarean delivery under epidural anesthesia.
方法 120 parturients scheduled for elective cesarean delivery with epidural anesthesia were randomized to receive either 1μg·mL-1 dexmedetomidine or placebo, followed with patient-controlled epidural analgesia with either 0.5μg·mL-1 dexmedetomidine or placebo, combined with ropivacaine, for up to 2 days. The primary outcome was the incidence of postpartum sleep disturbance on postoperative days 3 defined as numeric rating scale (NRS) score of subjective sleep quality of 6 or higher.
结果 120 parturients were randomized to the dexmedetomidine group and the control group. The incidence of postpartum sleep disturbance in the dexmedetomidine group was significantly lower than in the control group on postoperative days 3 (30.0% vs 61.7%; odds ratio [OR], 0.49 [95% CI, 0.32-0.75]; P<0.001), and 7(25.9% vs 52.5%; OR, 0.49 [95% CI, 0.30-0.81]; P=0.003). The NRS score of subjective sleep quality was lower in the dexmedetomidine group than in the control group on postoperative days 3 and 7 . The NRS score of subjective sleep quality and the incidence of postpartum sleep disturbance on postoperative days 14 did not differ between the two groups. The PSQI score, the ISI, the SAS, and the EPDS on postoperative days 42 did not differ between the two groups. On multivariable logistic regression, prepartum PSQI score and NRS of pain at 1d after surgery were identified as risk factors associated with PSD.
结论 Intraoperative and postoperative continuous epidural infusion of dexmedetomidine significantly improved postpartum sleep quality, reduced the incidence of postpartum sleep disturbance, which may be associated with optimized analgesia effect and decreased postoperative ropivacaine consumption in parturients undergoing elective cesarean delivery.

PO-0296

高流量鼻氧与标准面罩氧合对肥胖产妇剖宫产手术全麻诱导期间预充氧和窒息氧合有效性的比较：一项两中心、前瞻性、随机对照研究

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目的 肥胖产妇在全身麻醉诱导期间往往会出现严重的低氧血症，高流量鼻导管吸氧可有效改善氧合、延长安全窒息氧合时间。本研究旨在比较高流量鼻氧与标准面罩氧合对肥胖产妇剖宫产手术全麻诱导期间预充氧和窒息氧合的影响。

方法 采用两中心、开放标签、评价者设盲的前瞻性、随机对照研究方法。收集上海市第一妇婴保健院和泉州市妇幼保健院两家三甲医院于 2023 年 9 月至 2024 年 5 月期间全麻下行择期剖宫产手术的足月妊娠肥胖产妇（体重指数≥30kg.m-2）。产妇被随机分为高流量鼻氧组（n=27）和标准面罩组(n=27)。高流量鼻氧组氧流量为 50L.min-1，标准面罩组氧流量为 10L.min-1。在快速序贯诱导预充氧及气管插管阶段，高流量鼻导管保持在原位持续供氧；而面罩在气管插管时被移除。主要观察指标是气管插管后的动脉血氧分压值（PaO2）。次要观察指标包括：3 分钟预充氧后的 PaO2；气管插管通气后的首个呼吸末氧分数（EtO2）；气管插管后的动脉血气 PaCO2 和 pH 值；整个插管过程中最低脉搏氧饱和度（SpO2）；胎儿脐血气分析、Apgar 评分以及气管插管相关的不良事件。

结果 共 54 名产妇完成了研究。高流量鼻氧组气管插管后的 PaO2 明显高于标准面罩组（312.4±69.22 mmHg vs 212.7±68.63 mmHg，P<0.001）。高流量鼻氧组预充氧 3min 后的 PaO2 明显高于标准面罩组（403.2±72.61 mmHg vs 300.6±67.37 mmHg，P<0.001）。高流量鼻氧组开始通气后的首个 EtO2 显著高于标准面罩组（86.15 ± 5.10 vs 78.30 ± 5.38，P<0.0001）。高流量鼻氧组气管插管期间最低 SpO2 显著高于标准面罩组（100[100, 100] vs98[97, 100], P=0.0003）。与基线值相比，两组患者插管后的 PaCO2 均明显升高（高流量鼻氧组：30.13 ± 2.60 mmHg vs 38.78 ± 3.27 mmHg; 标准面罩组：30.21± 2.48mmHg vs 39.28± 3.57 mmHg，P <0.0001），但同一时间点两组之间 PaCO2 没有差异。与基线相比，两组患者插管后的 PH 均明显降低（高流量鼻氧组：7.43 ± 0.02 vs：7.35 ± 0.03; 标准面罩组：7.44 ±0.02 vs 7.36± 0.03，P <0.0001），但同一时间点两组之间的 PH 没有显著差异。此外，两组在呼吸暂停时间、胎儿脐血气分析和 Apgar 评分等方面均无明显差异。

结论 与标准面罩吸氧相比，高流量鼻导管吸氧在肥胖产妇全身麻醉诱导期间可提供更高的 PaO2 和 EtO2，可降低 SpO2 下降风险。这对于降低肥胖产妇全麻诱导期间氧合不良的风险具有重要意义。

PO-0297

全麻下剖宫产麻醉诱导中使用瑞芬太尼对新生儿结局的影响——基于两家医院的回顾性数据分析

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目的 研究证实剖宫产全身麻醉诱导时复合瑞芬太尼有助于减少插管带来的应激反应，稳定母体血流动力学，但瑞芬太尼容易透过胎盘，新生儿出生后存在胸壁僵直和呼吸抑制的潜在风险，目前瑞芬太尼在产科全麻应用中对新生儿的安全性，研究结论不一。本研究旨在探讨产科全麻诱导中胎儿娩出前给予瑞芬太尼对新生儿结局的影响。

方法 回顾性分析两家医院全身麻醉下接受剖宫产的患者共 161 例，排除胎死宫内、妊娠不足 28 周、双胎或多胎妊娠、产前胎儿诊断有严重器质性病变者。其中首都医科大学附属北京妇产医院（2022 年 1 月-12 月）共 70 例，产科全麻诱导时常规使用瑞芬太尼，为研究组；北京协和医院（2022 年 5 月-2024 年 4 月）共 91 例，胎儿娩出前不使用阿片类药物，为对照组。采集产妇基线资料、围术期临床资料、新生儿 Apgar 评分、脐血气、新生儿插管、新生儿转 NICU、新生儿纳洛酮拮抗情况。

结果 北京妇产医院纳入患者中，瑞芬太尼使用剂量为 1.42 ± 0.34ug/kg（0.9~2ug/kg）。两组年龄、身高、体重、BMI、孕周、初产妇所占比例、急诊或择期所占比例、新生儿体重等人口基线学资料无显著差异，但患者术前诊断合并胎儿窘迫的比例在研究组更高（51.4% vs. 29.7%, P = 0.005）。

麻醉诱导到胎儿娩出时长两组无显著差异（研究组 3.67 ±2.08 vs. 对照组 4.02 ±2.29 min, P = 0.313）。两组在 1、5、10 分钟新生儿 Apgar 评分≤7、新生儿血气 pH≤7.2、新生儿气管插管以及新生儿转 NICU 的发生率上无显著差异。研究组有 2 例采用纳洛酮拮抗，但两组无显著差异（表 1）。
同时，本研究进一步将纳入患者按是否足月和急诊因素共分为 4 个亚组（急诊未足月，急诊足月，择期未足月，择期足月）进行了亚组分析，但均未显示出两组新生儿结局指标存在显著差异。
结论 本研究回顾性分析了两家医院剖宫产全麻诱导时瑞芬太尼使用情况，与对照组相比，使用瑞芬太尼组在新生儿结局指标等方面无显著差异。目前针对全麻剖宫产诱导时复合瑞芬太尼对新生儿不良事件的影响，无论前瞻性和回顾性研究，均样本量偏小，研究结论不一。本研究也存在样本量偏小的局限性；另一方面，现有研究中瑞芬太尼使用剂量多为 0.5~1ug/kg，略低于本研究中使用剂量（1.42 ± 0.34ug/kg）。后续仍需更多研究（大样本量，不同剂量瑞芬太尼等）完善相关证据，我们的研究也将进一步补充完善。

PO-0298

北美产科麻醉与围产医学会第 56 届年会 “What’s New in Obstetric Anesthesia”精髓介绍

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目的 介绍目前产科麻醉研究热点。
方法 对北美产科麻醉与围产医学会（the Society of Obstetric Anesthesia and Perinatology, SOAP）第 56 届年会会议资料和参会心得的总结汇报。
结果 2024 年“What’s New in Obstetric Anesthesia”版块邀请的讲者来自杜克大学麻醉学系和人口健康科学专业，Melissa E. Bauer 教授。Melissa E. Bauer 教授回顾了过去一年 5263 篇研究摘要，从对临床实践的指导性、新的理念、对未来研究的启发性、科研工作的完整性等角度进行评价，最终筛选出了 25 篇研究在会议上作了细致汇报。

本次汇报主要包含 5 个方面的研究进展：“母体死亡率和并发症发病率”、“指南和专家共识”、“卫生公平性”、“麻醉与镇痛”以及“团队培养”。在“母体死亡率和并发症发病率”版块中，主要汇报内容包括：与安慰剂对照，预防性使用氨甲环酸并不能降低剖宫产中的母体死亡率和血制品输注；与安慰剂对照，阿奇霉素可以降低计划阴道分娩中的母体感染和死亡事件，但对新生儿不良事件（死产、新生儿死亡、败血症）无明显影响；同时还汇报了在美国孕产妇群体中，阿片类物质使用障碍和因自杀、药物滥用导致的母体死亡事件情况。“指南和专家共识”版块的汇报内容包括：国际化工作小组针对硬脊膜穿破后头痛的基于循证医学的临床实践指南；孕产妇保健创新联盟——孕产妇心脏状态评估的专家共识；美国心脏协会针对合并心脏疾病的孕产妇的麻醉管理推荐意见；母胎医学会针对母体败血症的推荐意见；麻醉和睡眠医学会联合 SOAP 关于孕期阻塞性睡眠呼吸暂停的监测、诊断和治疗的指南共识。在“卫生公平性”版块中，Melissa E. Bauer 教授汇报了数项讨论美国不同种族妇女在参与妇产科医学研究、面临医疗差错事件和接受产科临床实践中的伦理和卫生公平性，以及如何促进各种族女性群体患者在医疗卫生服务中获得平等对待。而“麻醉与镇痛”版块的主要讨论内容则包括：基于伦理原则，并不支持麻醉前进行强制性的妊娠筛查试验的综述讨论；孕期非产科手术中使用舒更葡糖钠拮抗肌松残余的使用情况；在择期剖宫产中，硬脊膜刺破的硬膜外麻醉与单纯硬膜外麻醉的效果对比；不同医疗保险模式下，产后永久性绝育请求的实现情况。而在最后一个版块，“团队培养”中，主要讨论了美国产科麻醉医师对产科麻醉专科规范化培训价值认知的调查，以及教学医院中医生的离职倾向、职业倦怠和专业成就感的横断面调查。

结论 2024 年“What’s New in Obstetric Anesthesia”版块提纲挈领地总结了过去一年中，全球产科麻醉领域里面值得关注的研究，为我们后续的临床实践完善和研究方向的确定，提供了很好的借鉴思路。

PO-0299

The Effect of Enhanced Recovery after Surgery (ERAS) in Elderly Transvaginal Pelvic Floor Reconstruction Surgery: A Randomized Controlled Trial

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Background Prospective trial evidence is lacking regarding the application of enhanced recovery after surgery (ERAS) in transvaginal pelvic floor reconstruction surgery among elderly patients. Our study aimed to investigate whether implementing the ERAS protocol could enhance postoperative recovery in this patient population.
Methods Elderly patients undergoing elective transvaginal pelvic floor reconstruction surgery were randomly assigned to either the ERAS group or the conventional group. The primary outcome was length of postoperative hospital stay. The secondary outcomes encompassed other postoperative recovery metrics, postoperative pain within 30 days, the occurrence of complications, the perioperative blood test and cognitive function.
Results A cohort of 100 participants was enrolled. Implementation of the ERAS protocol significantly reduced the duration of postoperative hospital stay (65.00 (59.00, 78.25) vs. 74.00 (69.00, 96.00) hours, P = 0.001). Additionally, the ERAS protocol significantly reduced the time to first drink postoperatively (3.00 (2.00, 4.00) vs. 5.00 (2.50, 7.00) hours, P = 0.010), and reduced rest and movement-related pain within 48 hours postoperatively, effects that persisted through the 7-day follow-up period. It also shortened the duration of postoperative laryngeal mask airway support and promoted opioid sparing. Moreover, the incidence and severity of postoperative nausea and vomiting (PONV) were significantly lower in the ERAS group compared to the conventional group at 2 and 12 hours postoperatively.
Conclusions Implementation of the ERAS protocol can expedite postoperative recovery in elderly patients undergoing transvaginal pelvic floor reconstruction surgery, achieve opioid sparing, alleviate pain postoperatively, and decrease the incidence of complications.
Trial Registration: This study was retrospectively registered with the Chinese Clinical Trial Registry (The URL of registration is https://www.chictr.org.cn/showproj.html?proj=225220; registration number: ChiCTR2400084608). The date of first registration was 21/05/2024.

PO-0300

妇产专科医院硬膜外分娩镇痛使用现状调查：一项前瞻性双中心病例对照研究

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目的 作为分娩时最有效的镇痛方式，硬膜外分娩镇痛被广泛应用。中国一些发达城市的妇产专科医院中，产妇硬膜外镇痛使用率已经超过 70%，达到了西方发达国家地水平。此外，这些妇产专

科医院每年承担当地近 60%分娩量和 90%以上的分娩镇痛量。然而，在这些医院中仍有许多产妇由于各种原因最终未接受分娩镇痛。为了让更多女性在分娩过程中体验到疼痛的减轻或者无痛，以此改善产妇分娩体验及分娩后的健康状况，进一步提高分娩镇痛率至关重要。本研究试图通过对上海国际和平妇幼保健院及山东临沂市妇幼保健院两个中心的顺产产妇为期 3 个月的问卷调查，确定产妇使用硬膜外分娩镇痛的相关因素，为进一步提高妇产专科医院的分娩镇痛率提供依据。

方法 本前瞻性双中心病例对照问卷调查研究。入选标准：孕 32-42 周，单胎头位，早上 8 点至下午 5 点，经阴道分娩的产妇。排除严重产后出血、产后 2 小时内需要紧急处理的产妇、不会使用移动电子设备的产妇，同时产妇拒绝以及最终问卷填写不全的病例同样被排除。最终收集 2022 年 7 月至 9 月期间分娩后产妇共 640 人，其中 374 人待产时接受硬膜外镇痛，266 人未接受硬膜外分娩镇痛。首先使用多元 logistic 回归分析筛选接受硬膜外分娩镇痛的相关因素，再通过二元 logistic 回归分析进一步明确其危险和保护因素。

结果 二元 logistic 回归分析显示经产妇（odds ratio =2.805，95%可信区间 1.792–4.393, P<0.001)，麻醉医生无法即刻实施镇痛 （odds ratio=2.728, 95% 可信区间 1.180–6.306, P=0.019）以及第一产程进展迅速 (odds ratio =11.709, 95% 可信区间 7.449–18.404, P<0.001) 是产妇最终接受硬膜外分娩镇痛的危险因素，而产妇产前的分娩镇痛意愿（odds ratio =0.035, 95%可信区间 0.013–0.097, P<0.001）以及家属同意硬膜外分娩镇痛（odds ratio = 0.091, 95%可信区间 0.016–0.551, P=0.006）为产妇最终接受硬膜外分娩镇痛的保护因素。

结论 妇产专科医院在孕期及早发现产妇第一产程进展迅速的危险因素并提供潜伏期镇痛。如果麻醉医生无法即刻实施镇痛或者产妇有椎管内镇痛禁忌症，则应该使用笑气镇痛或者瑞芬太尼静脉镇痛替代硬膜外镇痛。此外，医院需要对产妇及其家属提供专业、全面的、甚至免费的硬膜外分娩镇痛相关的产前教育。

PO-0301

分步给药法在儿科无痛胃镜检查中的应用

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目的 探讨分步给药法在儿科无痛胃镜检查中的麻醉效果、安全性与不良反应发生率。

方法 纳入我院 2022 年 1 月至 2023 年 1 月择期行无痛胃镜检查的患儿共 300 例。所有患儿均采用小剂量舒芬太尼复合依托咪酯+丙泊酚 1：2 混合液的麻醉方法，并按随机数字表法分为两组，每组各 150 例。所有患儿在胃镜检查前 2min 均给予舒芬太尼 0.1μg/kg 静注，A 组（实验组）采用先快速推注(速度为 2ml/s)5ml 混合液，30s 后再缓慢推注(速度为 0.4ml/s)混合液直至达到合适的麻醉深度的给药方法，B 组（对照组）采用缓慢推注(速度为 0.4ml/s)混合液直至达到合适的麻醉深度的给药方法。监测并记录两组患儿麻醉前(T0)、麻醉后（T1）和定向能力恢复时刻(T2)的血氧饱和度（SpO2）、心率(HR)、平均动脉压（MAP）；分别记录两组患儿依托咪酯与丙泊酚用量；分别记录两组患儿意识消失时间、胃镜检查操作时间、苏醒时间、定向能力恢复时间；分别记录两组患儿肌颤、注射痛、低血压、低氧血症、心动过缓、呛咳与恶心呕吐发生率；分别检测两组患儿检查前 10min 与检查后 2h 时刻静脉血皮质醇(Cor)、血管紧张素Ⅱ(AT-Ⅱ)、IL-6 水平。

结果 两组患儿 SpO2、MAP 和 HP 与 T0、T2 时刻比较，T1 时刻均明显降低，差异有统计学意义（P＜0.05），T1 时刻两两比较 B 组明显低于 A 组，差异有统计学意义（P＜0.05），T2 时刻两两比较差异无统计学意义(P＞0.05)；A 组患儿的丙泊酚与依托咪酯用量均明显低于 B 组，差异有统计学意义（P＜0.05）。A 组患儿意识消失时间、苏醒时间以及定向能力恢复时间均明显低于 B 组，差异有统计学意义（P＜0.05）；两组患儿肌颤、注射痛、心动过缓、呛咳与恶心呕吐发生率比较差异无统计学意义(P＞0.05)；A 组患儿低血压、低氧血症的发生率明显低于 B 组，差异有统计学意义（P＜0.05）；两组患儿术前皮质醇(Cor)、血管紧张素Ⅱ(AT-Ⅱ)、IL-6 水平比较差异无统计学意义(P＞0.05)；与检查前相比，两组患儿检查后血液应激反应因子水平均明显升高，差异有

统计学意义（P＜0.05）；A 组患儿检查后应激反应因子水平均低于 B 组患儿，差异有统计学意义（P＜0.05）。
结论 分步给药法比持续给药法在儿科无痛胃镜检查中具有更好的麻醉效果、更高的安全性与更低的不良反应发生率。

PO-0302

An innovative method to prevent guidewire access to the ipsilateral internal jugular vein during pediatric subclavian vein cannulation

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Objectives: Catheter misplacement into the internal jugular vein (IJV) often occurs during pediatric subclavian vein (SCV) catheter placement. This study investigated whether an innovative method of occluding the internal jugular vein by applying temporary pressure at the junction of the internal jugular vein and the subclavian vein could help prevent its occurrence.
Design: This is a randomized controlled trial.
Settings: This study was conducted in a single medical center.
Participants: One hundred and seventy-eight children undergoing SCV catheterization were recruited.
Interventions: Children were randomly assigned to the traditional group (unassisted guidewire placement) and the innovative group (temporary pressure on the IJV-SCV junction to occlude the IJV during guidewire placement).
Measurements and Main Results: The primary outcome was the incidence of guidewire misplacement into the IJV at the time of first placement. Secondary outcomes included the total number of attempts and the total time of guidewire placement. The incidence of misplacement at the first attempt was reduced from 18.06% in group C to 6.67% in group I (P=0.04). The total number of guidewire misplacements was reduced from a median (IQR) 1 (1-1) in group C to 1 (1-1) in group I, (P=0.01); the total time of guidewire placement was reduced from 35.00s (18.25-54.00s) in group C to 26.00s (17.00-38.00s) in group I, (P=0.03).
Conclusions Temporary pressure at the junction of the IJV and SCV to occlude the IJV during placement of the guidewire helps prevent accidental placement of the IJV.

PO-0303

支气管封堵器气管导管外封堵在新生儿单肺通气中的应用

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目的 探讨支气管封堵器气管导管外封堵在新生儿单肺通气中应用的有效性和安全性
方法 选择需要行单肺通气的新生儿手术患儿 40 例，按单肺通气方法随机分为支气管插管组（A 组）和支气管封堵器组（B 组），每组 20 例。记录并比较两组患儿单肺通气前（T0）、OLV 10 min（T1）、OLV30min（T2）、OLV 后 45 min（T3）、恢复双肺通气后 10 min（T4）的动脉血氧分压（PaO2）、动脉血二氧化碳分压（PaCO2）、HR、MAP 及气道压变化情况，同时比较两组患儿术中肺萎陷效果、一次气管插管成功率、插管时间、导管移位率、手术时间、术后声嘶发生率等临床情况。

结果 B 组一次性插管成功率、肺萎陷优良率、插管时间、导管移位率、术后声嘶发生率等方面均优于 A 组，差异均有统计学意义 (P＜0. 05); 各时点两组患儿 HR、MAP 比较无统计学差异；T0 时两组患儿 PaO2、PaCO2、Paw 无差异，T1、T2、T3、T4 时 B 组 PaO2 高于 A 组，而 PaCO2、Paw 较 A 组低，差异有统计学意义（P<0.05）
结论 支气管封堵器气管导管外封堵在新生儿单肺通气中可提高良好的术野及充分的通气，具有较高的安全性及有效性。

PO-0304

术前口服咪达唑仑溶液对学龄前患儿术后不良行为改变的影响

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目的 探究术前 30min 给予学龄前患儿服用咪达唑仑口溶服液对全麻患儿术后不良行为改变（negative postoperative behavioral changes，NPOBCs）的影响。
方法 选择福建医科大学附属泉州第一医院 2022 年 7 月至 2023 年 4 月期间行腹腔镜下小儿疝囊高位结扎术患儿 197 例，性别不限，年龄 1~6 岁，ASA Ⅰ—II 级。采用随机数字表法将患者分为两组：糖盐水口服对照组（C 组）咪达唑仑口服组（R 组）。C 组患儿由家长陪伴进入等候区，术前 30min 给予 0.25ml/kg 5%糖盐水喂服；M 组患儿由家长陪伴进入等候区，术前 30min 给予 0.5mg/kg 咪达唑仑口服溶液喂服。两组均由小丑医生陪同进入手术室，余处理相同。记录两组患儿干预处理前、入手术室前改良的耶鲁术前焦虑评分(Cm-YPAS 评分)、诱导期合作评分（ICC 评分）、术后 0h、6h、24h PAED 评分评估患儿围术期情绪状态；记录术后患儿疼痛及不良反应发生情况；并于术后 1 天、1 周、2 周、1 月、3 月、6 月、12 月对患儿家属电话或微信问卷星随访采用 PHBQ 量表对患儿术后不良行为改变进行评估，并记录患儿不良行为改变持续时间。
结果 与 C 组相比，M 组患儿入手术室前 Cm-YPAS 评分、ICC 评分、术后 0h PAED 评分均降低（P＜0.05）；M 组患儿术后 6 个月内 NPOBCs 发生率明显低于 C 组（P＜0.05），且 M 组患儿 NPOBCs 持续时间较 C 组明显缩短（P＜0.05）；两组患儿术后 6h、24h PAED 评分、疼痛 FLACC 评分和不良反应发生情况差异无统计学意义。
结论 术前 30min 给予患儿服用咪达唑仑口服溶液可以有效降低患儿围术期焦虑情绪以及 NPOBCs 发生率，缩短患儿 NPOBCs 持续时间，且术前服用咪达唑仑并不会增加患儿术后相关不良反应发生率。

PO-0305

程序镇静对儿科门诊睡眠质量的影响

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目的 全身麻醉药物会影响生物钟节律，患者可出现术后睡眠障碍。程序化镇静后对儿科患者睡眠的影响仍是未知。本研究旨在观察门诊镇静后儿童的睡眠质量有无变化。
方法 我们设计了一项前瞻性，观察性，自身对照研究。在监护人知情同意下，由专人根据儿童简易睡眠评分量表对监护人进行问卷调查预培训，而后采取电话随访及微信调查问卷的形式，对 3 岁以下行门诊程序化镇静的患儿，连续调查镇静前一日(D0)、镇静当日（D1）、镇静后 2 天(D2、D3)四个时间点的夜醒次数、日间睡眠、夜间入睡时间变化情况，观察患儿镇静后嗜睡时间、睡眠情况及家居期间主要不良事件的发生情况。

结果 共分析了 355 例病例，ASA 1—2 级，年龄 21.63（9.00，17.00，27.0）月，体重 11.66（8.5，10.8，13.6）Kg；与 D0 相比，使用镇静药的 D1 夜醒次数显著降低（中位数=1 VS 2）；和 D0 相比，D1 的入睡时间改变差别有统计学意义；和 D0 相比，D2 和、D3 入睡时间改变、日间睡眠改变，差别均无统计学意义（P 均>0.05）；所有随访患儿均未出现严重不良事件。
结论 中深度药物镇静可影响儿童镇静当日的睡眠节律，减少镇静当夜的夜醒次数，入睡时间推迟但未观察到有睡眠紊乱的发生。

PO-0306

静态动漫复合动态投影环境对学龄前手术患儿术前焦虑及麻醉诱导配合度的影响

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目的 探讨静态动漫复合动态投影环境对学龄前手术患儿术前焦虑及麻醉诱导配合度的影响。
方法 将 116 例学龄前手术患儿分为药物组(n=37)、干预组(n=40)和对照组（n=37）。药物组接受右美托咪定 2ug.Kg^{-1} 滴鼻；干预组患儿接受静态动漫复合动态投影干预；对照组无任何干预。采用改良耶鲁术前焦虑量表评估患儿术前 1d 访视时（T0）、离开复苏间（T1)、进入手术时(T2)、麻醉诱导时(T3）的焦虑水平。采用麻醉诱导期（T3）合作量表评估，评估患儿诱导期的配合度，记录各时间点的 MAP、HR、RR 的变化。
结果 1.三组患儿焦虑得分在 T1、T2 时出现不同程度的上升，T3 时药物组额干预组焦虑得分相当且低于对照组；2.在 T1、T2 时，三组的 MAP、HR、RR 出现不同程度的升高，在 T2 时，药物组和对照组显著高于干预组；3.药物组和干预组在 T3 时麻醉诱导期合作量表评分显著高于对照组，而药物组和干预组没有统计学差异。
结论 静态动漫复合动态投影环境与药物具有相似的作用，可有效减轻患儿的术前焦虑，提高麻醉诱导期配合程度，维持生命体征平稳。

PO-0307

探究瑞马唑仑在学龄期儿童无痛胃肠镜检查中麻醉诱导的有效剂量：偏置硬币上下序贯试验

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目的 瑞马唑仑比常用镇静药物丙泊酚具有更高的安全性，对血流动力学影响更小，或成为程序性镇静中更为安全的选择。本研究的目的是探索瑞马唑仑在学龄期儿童无痛胃肠镜中的 ED90，为瑞马唑仑的麻醉诱导应用提供更科学的临床剂量选择依据。
方法 使用偏置硬币上下序贯试验测定瑞马唑仑的 ED90，诱导使用的镇痛药物是瑞芬太尼 0.5 μg /kg，瑞马唑仑初始剂量为 0.3mg/kg，相邻间隔升降剂量为 0.02 mg/kg，使用“R”软件的 Centered Isotonic Regression（CIR）算法分析瑞马唑仑的 ED50、ED90 和 90%CI。主要观察指标为瑞马唑仑的镇静评分，次要观察指标包括检查中和检查后不良反应发生率、疼痛和恶心呕吐评分、血流动力学变化、药物使用总量等等。

结果 本研究纳入我院小儿消化内科择期胃肠镜检查学龄期患儿（7-12 岁，平均年龄为 9.31±1.59 岁）55 例，男性患儿 33 例，女性患儿 22 例。其中，ASA 分级为 I 级患儿 49 例，Ⅱ级患儿 6 例。大部分患儿（65.5%）因腹痛就诊。
瑞马唑仑的剂量范围是 0.30-0.48mg/kg。其中 42 例患儿镇静成功，13 例患儿镇静失败。瑞马唑仑起效时间为 92.87±26.05s，苏醒时间为 18.25±6.67min。本研究一共使用了 10 种不同剂量水平的瑞马唑仑，使用 CIR 算法分析的 ED90 为 0.448 mg/kg，90% CI 为（0.42-0.59）；ED50 为 0.370 mg/kg，90% CI 为（0.23-0.42）。在性别的亚组分析中，33 例男性患儿的 ED50 和 ED90 分别为 0.40 mg/kg 和 0.44 mg/kg，22 例女性患儿的 ED50 和 ED90 分别为 0.37 mg/kg 和 0.42 mg/kg，性别亚组的有效剂量未见显著差异。检查中注射痛 2 例，矛盾反应 2 例，检查后眩晕 13 例，躁动 1 例，恶心呕吐 5 例。与患儿入室的平均动脉压（MAP）和心率（HR）相比，给药后和胃镜置入时的变化均不超过入室基线值的 20%。所有患儿均未使用麻黄碱静脉推注，有一例患儿因心动过缓给予 0.2mg 阿托品静脉推注。检查后当晚患儿睡眠质量良好。
结论 在学龄期儿童无痛胃肠镜检查的麻醉诱导中，复合瑞芬太尼 0.5μg /kg 的瑞马唑仑诱导剂量的 ED90 为 0.448 mg/kg，90% CI 为（0.42-0.59）。使用瑞马唑仑可获得平稳和安全的麻醉过程，检查中血流动力学波动较小，不良反应发生率相对较低。患儿父母和内镜医生满意度高。

PO-0308

全面的细胞景观揭示了新生儿缺氧缺血性脑病的早期小胶质细胞-星形胶质细胞串扰加重了神经元损伤

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目的 新生儿缺血缺氧性脑病（neonatal hypoxic-ischemic encephalopathy，NHIE）是一种严重的脑损伤疾病。有研究表明 NHIE 的远期神经功能障碍与急性期阶段的神经元死亡密切相关，但这种死亡神经元的身份及其背后的机制尚未阐明。为探究 NHIE 急性早期阶段对缺氧缺血损伤最为敏感的神经元和神经胶质细胞亚型的身份，并探讨这些细胞亚型在病理过程中的相互作用，本研究利用单细胞核转录组测序（single-nucleus RNA sequencing，snRNA-seq）揭示了 NHIE 即刻早期阶段疾病相关的细胞分子变化，旨在为未来探索临床麻醉药物对 NHIE 患儿的作用提供可参考的指标，同时为麻醉医生对 NHIE 的早期干预和治疗提供新的生物学基础和潜在的治疗策略。
方法 我们首先构建了 NHIE 大鼠模型，随后收集了 NHIE 模型大鼠在 HI 损伤后不同时间点（1 小时、4 小时、12 小时、3 天和 7 天）的脑损伤区域组织进行 snRNA-seq，再进一步进行聚类分析、差异基因分析、基因表达趋势分析、基因功能分析及细胞通路分析，同时对比了已发表的成人中风公开数据，最后采用了免疫荧光染色和 qPCR 对关键细胞亚型及分子进行了验证，采用了 Sholl 分析及三维结构重建对关键细胞亚型进行可视化。
结果 1. L5 IT 兴奋性神经元以及 Sst+和 Mme+抑制性神经元是最敏感的神经元亚型
在 HI 损伤后的 12 小时和 1 小时，兴奋性神经元（ExN）和抑制性神经元（InN）分别出现明显的细胞死亡。其中，Sst 和 Mme 亚型是主要受损的 InN 亚型，而 L5 端脑（telencephalon，IT）是主要受损的 ExN 亚型，并且 InN 对缺氧缺血的敏感性更高。
2. Spp1+小胶质细胞和 Cd44+星形胶质细胞在 NHIE 损伤极早期被激活
在 HI 损伤后的即刻早期阶段，小胶质细胞（MG）亚型 Spp1+MG 和星形胶质细胞（AST）亚型 Cd44+AST 被激活。免疫荧光染色和三维结构重建显示激活的 Spp1+MG 呈现阿米巴样吞噬形态，这种形态与促炎及促吞噬功能高度相关，另外 Sholl 分析及三维结构重建的结果显示激活的 Cd44+AST 结构趋于复杂化。

3. MG 与 AST 的分子串扰是通过 Spp1-Cd44 信号通路实现的
细胞通讯分析发现 MG 和 AST 相关亚群可通过 Spp1-Cd44 信号通路进行分子串扰。进一步与成人中风数据对比发现，在 NHIE 中这类分子串扰除了促炎作用外更倾向于 MG 对 AST 的激活，这可能与 NHIE 早期神经元死亡密切相关。
结论 本研究首次揭示了 NHIE 大脑早期阶段的细胞异质性和疾病相关的动态变化。我们发现易受损的主要神经元是 ExN 中的 L5 IT 及 InN 中的 Sst 和 Mme，且 InN 对缺血缺氧的敏感性更高。更重要的是我们发现 MG 和 AST 在 NHIE 早期阶段被激活，并且通过 Spp1-Cd44 信号通路进行分子串扰。综上，这些发现为深入了解 NHIE 的早期病程机制及探索麻醉药物对 HIE 新生儿的作用提供了重要的理论基础，为临床麻醉医生评估 NHIE 用药提供新的见解。

PO-0309

婴幼儿胸腔镜下肺切除术后肺部并发症的危险因素分析及预测模型的准确性： 基于 LASSO-Logistic 回归

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目的 基于 LASSO-logistic 回归分析，筛选婴幼儿胸腔镜下肺切除术后肺部并 发症的危险因素并评价预测模型的准确性。
方法 对 2018 年 1 月至 2023 年 2 月期间接受视频辅助胸腔镜肺切除术（VATS） 2 岁以下患儿进行病例对照研究。根据患者术后 7 天内是否发生 PPCs 分为并发症组和非并发症组。采用 LASSO 回归筛选出变量后将其纳入多因素 logistic 回归分析筛选行 VATS 手术的 2 岁以下患儿术后 7 天内发生 PPCs 的危险因素，根据结果建立预测模型并对模型进行评价。
结果 总计 581 名婴幼儿纳入分析，中位年龄为 6 月（IQR：5-9.24 月）。109 例患儿（18.76%）发生 PPCs。男性（OR=1.99；95%CI，1.09-3.64；P=0.025）、单肺持续时间（OR=1.01；95% CI，1.00-1.01；P=0.002）和外科医生经验（OR=0.78； 95% CI，0.64-0.97；P=0.023）与 2 岁以下胸腔镜下肺切除术后肺部并发症独立相关。预测模型的受试者工作特征曲线下面积为 0.72。Calibration 校准曲线预测值与实际值的一致性较高。决策曲线分析显示阈概率范围为 0-0.7 时患者的净获益率较高。
结论 2 岁以下行胸腔镜下肺切除术的患儿术后肺部并发症发生率为（18.76%）。 男性、麻醉时长、手术经验缺乏是胸腔镜下肺切除术患儿术后 7 天内出现肺部并 发症的独立危险因素，基于 LASSO-logistic 回归建立的预测模型准确性较高。
术后肺部并发症与患儿的住院时间延长、住院费用增加有关。

PO-0310

Lung-protective ventilation and postoperative pulmonary complications during pulmonary resection in children: a prospective, single-center, randomised controlled trial

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Background Children are more susceptible to postoperative pulmonary complications (PPCs) due to their smaller functional residual capacity and greater closing volume; however, lung-protective ventilation (LPV) in children requiring one-lung ventilation (OLV) are underexplored.
Objectives: To evaluate the effects of LPV and driving pressure-guided ventilation on PPCs in children with OLV.
Design: Randomised, controlled, double-blind study.
Setting: Single-site tertiary hospital, 6 May 2022 to 31 August 2023.
Patients: 213 children aged <6 y, planned for lung resection secondary to congenital cystic adenomatoid malformation.
Interventions: Children were randomly assigned to LPV (n=142) or control ventilation (n=71) groups. Children in LPV group were randomly assigned to either driving pressure group (n=70) receiving individualized positive end-expiratory pressure (PEEP) to deliver the lowest driving pressure or to conventional protective ventilation group (n=72) with fixed PEEP of 5 cm H2O.
Main outcome measures: The primary outcome was the incidence of PPCs within 7 days after surgery. Secondary outcomes were pulmonary mechanics, oxygenation and mechanical power.
Results The incidence of PPCs did not differ between the LPV (24/173, 16.8%) and the control groups (15/70, 21.4%) (P=0.41). The driving pressure was lower in the driving pressure group than in the 5 cm H2O PEEP group (15 vs. 17 cm H2O; P=0.001). Lung compliance and oxygenation were higher while the dynamic component of mechanical power was lower in the driving pressure group than in the 5 cm H2O PEEP group. The incidence of PPCs did not differ between the driving pressure (11/70, 15.7%) and the 5 cm H2O PEEP groups (13/72, 18.1%) (P=0.71).
Conclusions LPV did not decrease the occurrence of PPCs compared to nonprotective ventilation. Although lung compliance and oxygenation were higher in the driving pressure group than in the 5 cm H2O PEEP group, these benefits did not translate into significant reductions in PPCs. However, the study is limited by a small sample size, which may affect the interpretation of the results. Future research with larger sample sizes is necessary to confirm these findings.

PO-0311

Developing and validating a nomogram for predicting extended stay in the ICU after pediatric cardiac surgery

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Background： The length of stay in the ICU is a significant measure that indicates the intricacy of the recovery process, the consumption of resources, and the possibility of problems. The identification of characteristics that lead to extended stays in the ICU is crucial in order to optimize patient management and allocate resources effectively. The present work aims to fulfill the requirement for an accurate prognostic tool by undertaking the development and validation of a nomogram. This nomogram is intended to provide an estimation of the probability of an extended stay in the ICU subsequent to pediatric cardiac surgery.
Methods： The study population consisted of children patients who had undergone cardiac surgery, and the necessary data were gathered from the Pediatric Intensive Care (PIC) database. The datasets were randomly allocated to either a training set (75%) or a testing set (25%). The principal measure of interest following heart surgery was an extended duration of stay in the ICU. The study employed the least absolute shrinkage and selection operator (LASSO) regression model and multivariable logistic regression analysis for the purpose of variable selection and model construction. The assessment of the predictive accuracy of the nomograms was conducted

through the utilization of receiver operating characteristic (ROC) analysis and calibration. The clinical benefit of the nomograms was assessed using decision curve analysis (DCA).
Results We assigned 795 and 266 patients to the training and testing sets, respectively. The variables were held constant throughout both sets. The nomogram that was obtained from the training set pertains to the prediction of longer ICU stay following pediatric heart surgery, which was based on only eight features- Age, systolic pressure (SBP), respiratory rate (RR), bicarbonate, direct bilirubin, high sensitive C-reactive protein (hs-CRP), international normalization rate (INR), operation time. The AUC values of nomogram in the training and test sets were 0.812 and 0.736, respectively. The model that relied on independent predictors demonstrated outstanding discrimination and calibration, displaying a high level of concordance between observed and predicted probabilities of generalization as indicated by the nomogram. The study conducted by DCA provided evidence that judgments supported by nomograms yield a more substantial beneficial outcome compared to the approach of treating either all patients or none.
Conclusions The nomogram shown in this study offers a user-friendly instrument for forecasting the probability of an extended stay in the ICU following cardiac surgery in pediatric patients. This nomogram aids doctors in the early identification of high-risk patients during the postoperative period by incorporating preoperative and intraoperative data. This enables timely interventions and allocation of resources. The potential for additional validation and integration into clinical practice holds promise for enhancing postoperative care strategies and ultimately leading to improved outcomes among pediatric heart surgery patients.

PO-0312

环泊酚对心内直视手术患儿左心室心肌应变力和心肌做功的影响：一项单中心双盲随机非劣效性研究

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目的 通过无创斑点追踪超声心动图(speckle-tracking echocardiography,STE)比较环泊酚和丙泊酚用于房间隔缺损（atrial septal defect,ASD）及室间隔缺损（ventricular septal defect,VSD）手术患儿的麻醉对患儿左心室心肌应变力（global longitudinal strain,GLS）及心肌做功的影响，研究环泊酚与丙泊酚相比是否具有非劣效性。
方法 1. 入组及排除标准：
入组标准：纳入 2023 年 7 月至 2023 年 12 月在上海交通大学附属儿童医学中心筛选 1 个月至 16 岁的诊断为 ASD 或 VSD 患儿，择期在体外循环(cardiopulmonary bypass，CPB)心内直视手术。
排除标准：①急诊手术；②心律失常；③既往存在神经系统疾病；④发热；⑤美国麻醉医师学会身体状况评级≥III；⑥经胸超声心动图声窗差。
2. 麻醉方法：采用数字随机分组法将患儿分为环泊酚组和丙泊酚组，患儿到达手术中心后，在家长陪同下，术前口服咪达唑仑 0.5 mg/kg 镇静。进入手术室后，常规监测心电图和脉搏血氧饱和度。入组患儿分别以 0.4 mg/kg 或 2.0 mg/kg 的剂量静注环泊酚或丙泊酚，两组均给予舒芬太尼 2.0 ug/kg，罗库溴铵 0.6 mg/kg 行麻醉诱导。气管插管后行压力控制模式通气，潮气量调整至 8ml/kg，呼末二氧化碳维持在 35~45mmHg。患儿分别持续静脉输注 0.8 mg/kg/h 环泊酚或 4mg/kg/h 丙泊酚，连续输注舒芬太尼 2ug/kg/h、罗库溴铵 0.5mg/kg/h，间歇吸入七氟醚，维持麻醉深度。脑电双频谱指数维持在 45~55 之间。

3. 经胸超声心动图：麻醉诱导后即刻和手术结束时采集经胸超声心尖两腔心、三腔心及四腔心超声图。以高帧率（90~120 帧/秒）采集 3~5 个连续的心律规律的心脏周期的图像。图像由 GE vivid iq 平台和 M6S 探头采集。

结果 在纳入的 112 名入组患者中，104 名完成了研究。环泊酚组和丙泊酚组麻醉后的 GLS 在完整分析集(full analysis set，FAS)中分别为-17.3% (95% CI，-18.0% ~ -16.6%)和-17.8%(-18.7% ~ -17.0%)，在单方案集(per-protocol set，PPS)中分别为-17.5% (95% CI，-18.2% ~ -16.9%)和-17.8%(18.7% ~ -17.0%)。FAS 和 PPS 组间差异分别为 1.58%和 1.34%，非劣效性界值设为 2%。两组患者血压、心率无显著差异（(p>0.05）。两组患者左心室收缩、舒张功能及心肌做功指标，差异均无统计学意义（(p>0.05）。两组患者手术结束时血管活性-正性肌力药物评分（VIS）、手术后 12h NT-proBNP、机械通气时间、重症监护室(intensive care unit，ICU)住院时间、住院时间差异无统计学意义（P>0.05）。

结论 在本研究中,环泊酚对 ASD 或 VSD 手术患儿心肌功能和术后结局的影响与丙泊酚没有差异。在心脏收缩敏感指标心肌应变力上，环泊酚的作用不劣效于丙泊酚。环泊酚可作为轻型先心患儿心脏手术麻醉的备选方案。

PO-0313

超声引导下选择性锁骨上神经阻滞联合改良锁胸筋膜平面阻滞在锁骨骨折手术的应用

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目的

目的 通常认为锁骨手术区域受臂丛和颈丛神经双重支配，所以锁骨骨折手术神经阻滞方案多选择颈浅丛神经联合肌间沟臂丛神经阻滞，一项尸体研究（即锁骨、胸锁关节骨和肩锁骨关节的神经支配）发现锁骨下神经、胸外侧神经和锁骨上神经都参与了锁骨的神经支配，需要进行临床试验来确定每条神经的相对重要性和功能贡献，通过临床实践，我们发现颈 7 神经根平面（图 1），膈神经位于前斜角肌内侧椎前筋膜深面，锁骨上神经位于中斜角肌上外侧椎前筋膜表面，超声引导下颈 7 神经根水平选择性锁骨上神经阻滞联合改良锁胸筋膜平面阻滞能够为锁骨骨折手术提供完善的阻滞效果，同时可以避免膈神经阻滞，也可以避免多次穿刺造成患者的不适感，同时避免臂丛神经阻滞导致的上肢肌力下降。目前关于比较超声引导下锁骨上神经阻滞联合改良锁胸筋膜平面阻滞在锁骨骨折手术中的应用尚未见报道，我们将比较超声引导下选择性锁骨上神经阻滞联合改良锁胸筋膜平面阻滞（图 2、图 3 ）和超声引导下选择性锁骨上神经阻滞联合臂丛上干神经阻滞（图 4）在锁骨骨折内固定术中的应用效果 。

方法 选择择期拟行单侧锁骨骨折内固定术的患者 70 例，男 48 例，女 22 例，年龄 18~78 岁，BMI≤24kg/m2,ASA Ⅰ - III 级。 采用随机数字表法分为两组：超声引导下选择性锁骨上神经阻滞联合改良锁胸筋膜平面阻滞组（C 组）和超声引导下选择性锁骨上神经阻滞联合臂丛上干神经阻滞（N 组）每组 35 例。C 组行超声引导下选择性锁骨上神经阻滞联合改良锁胸筋膜平面阻滞，所有患者均采用高频线阵探头沿患侧胸锁乳突肌外侧缘并由锁骨胸骨头起向乳突方向纵向扫描，首先定位 C7 横突，其典型超声显像为前结节短小或无，后结节较平坦且角度外展，C7 神经根处于后结节与椎动脉起点之间，采用超声平面内穿刺技术，使用神经阻滞穿刺针（型号：22 G，50 mm）阻滞位于中斜角肌外侧颈浅筋膜与椎前筋膜之间的锁骨上神经，推注 0.4%罗哌卡因 5ml。改良锁胸筋膜平面阻滞超声探头分别置于锁骨骨折内、外侧。采用平面内技术，从尾端向头端进针至锁骨下方深面骨膜和锁胸筋膜之间的间隙。在两个部位分别注射 0.4%罗哌卡因 10ml 局麻药。N 组行选择性锁骨上神经阻滞联合臂丛上干神经阻滞，臂丛上干阻滞给予 0.4％罗哌卡因 10ml。记录三组阻滞操作时间、麻醉起效时间。记录神经阻滞效果满意例数。记录术后 4 、 1 2 、 2 4 h 的 VAS 疼

痛评分。 记录术后即刻、４、１２、２４ｈ上肢肌力评分。记录阻滞前、阻滞后 30 分钟手术后膈肌功能。记录局麻药物中毒、声音嘶哑、术后恶心呕吐等不良反应的发生情况。
结果 两组阻滞操作时间无差异（p＞0.05）。两组麻醉起效时间无差异（p＞0.05）。两组芬太尼用量无差异（p＞0.05），两组丙泊酚用量无差异（p＞0.05）。两组神经阻滞效果满意率无差异（p＞0.05）。 两组术后４、６、24h 的 VAS 疼痛评分无明显差异（p＞0.05）。 C 组上肢肌力评分明显高于 N（p＜0.05）。 C 组膈肌运动评分明显高于 N 组（p＜0.05）。C 组膈神经阻滞率明显低于 N 组（p＜0.05）；两组均无局麻药物中毒、声音嘶哑等不良反应发生，两组术后恶心呕吐发生率差异无统计学意义。
结论 结论 超声引导下选择性锁骨上神经阻滞联合改良锁胸筋膜平面阻滞、超声引导选择性锁骨上神经阻滞联合臂丛上干阻滞均可为锁骨骨折内固定术提供安全有效的麻醉效果，而超声引导下选择性锁骨上神经阻滞联合改良锁胸筋膜平面阻滞对上肢肌力及膈神经无阻滞，患者满意度评分更高。

PO-0314

双侧竖脊肌平面阻滞对后路腰椎手术患者围手术期早期康复的影响

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目的 本研究拟观察双侧竖脊肌平面阻滞对后路腰椎手术患者术后胃肠功能恢复的影响，评价竖脊肌平面阻滞对术后早期康复的作用，并探讨其机制。
方法 本研究为单中心、前瞻性随机对照研究。纳入因腰椎间盘突出或腰椎管狭窄拟行后路腰椎椎间融合术患者 80 名，随机分入对照组和试验组。试验组（n=40）患者接受双侧竖脊肌平面阻滞，对照组（n=40）患者不接受阻滞，所有患者在全身麻醉下完成手术，术后使用静脉自控镇痛，镇痛药物为舒芬太尼。研究主要终点为患者术后首次肛门排气时间；次要终点包括术后首次饮水时间、进食时间、下床活动时间及住院时间；患者术后 72h 内静息痛及运动痛、阿片类药物用量；患者术后 48h 内脂多糖（lipopolysaccharides , LPS）、C 反应蛋白（C-reactive protein, CRP）、肿瘤坏死因子 α（tumor necrosis factor-alpha, TNF-α）、白细胞介素-6 （interleukin-6,IL-6）及血糖浓度；患者术后恶心、呕吐、伤口感染、伤口延迟愈合、肺炎、心律失常、心肌缺血、脑血管意外、电解质紊乱等不良反应及并发症情况。
结果 共有 77 名患者完成研究，其中试验组 38 例，对照组 39 例。两组患者年龄、身高、体重、手术涉及腰椎节段、手术时间、麻醉时间、出血量、术中心率、血压波动等无差别。试验组患者术后首次肛门排气时间（16.2±3.2 vs.19.7±3.0h，P=0.000）、首次饮水时间（1.7±0.2 vs. 1.9±0.3，P=0.000）、首次进食时间（1.9±0.2 vs. 2.1±0.3h，P=0.002）均早于对照组。试验组患者更早离床下地活动（27.9±3.2 vs. 31.4±3.3h，P=0.000）。试验组患者术中瑞芬太尼用量少于对照组（860.4±102.9vs. 954.9±144.5，P=0.001）。术后 24h 内，试验组患者静息痛程度低于对照组，术后 48h 内，试验组运动痛低于对照组。术后 0-24h，试验组患者舒芬太尼用量小低于对照组[48 (45-51) vs.57 (54-66) μg, P =0.000]，术后 24-48h、48-72h 两组舒芬太尼用量差别无统计学意义。术后 24h 时，试验组患者 LPS（0.588±0.258 vs. 0.760±0.307 EU/mL，P=0.000）、TNF-α（ 41.398±5.596 vs. 48.638±6.399 pg/mL ， P=0.000 ） 、 IL-6 （ 30.628±2.567 vs. 33.385±3.214pg/mL，P=0.000）、CRP（12.995±1.666 vs.14.799±1.463 mg/dl，P=0.000）水平均显著低于对照组，术后 48h 时，试验组炎性因子水平仍低于对照组。两组患者围手术期胃肠功能障碍及其他并发症发生率无差别。
结论 结论 竖脊肌平面阻滞可加速后路腰椎手术患者术后肠道功能恢复，减轻术后疼痛，有利于术后下床活动，促进患者早期康复。这种促进作用，可能与竖脊肌平面阻滞对阿片类药物的节俭及对围术期应激反应的抑制作用有关。

PO-0315

Effect of continuous infraclavicular brachial plexus block on increasing postoperative blood flow perfusion of hand tissue after finger replantation

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Background Amputated finger has a high incidence among workers in industries such as furniture, electronics manufacturing and construction. Digital replantation can provide maximum functional preservation and aesthetics for the fingers through reconstruction of phalanges, tendon, vascular, and nerve fiber. With the advancement of microsurgery techniques, the survival rate of replanted digits has been significantly increased to about 90%. However, vascular crisis occurring within 48 hours after surgery is an important risk factor leading to the failure of replantation, and postoperative pain-mediated sympathetic vasoconstriction as well as formation of thrombosis are important causes. At present, treatments to prevent vascular crisis include postoperative pain relief(opioids and NSAIDs), antispasmodic (papaverine), anticoagulation(dextran and heparin) and warm keeping. However, recent studies have suggested that the use of anticoagulant may increase the risk of complications such as heparin bleeding, brain or pulmonary edema, and allergic reactions to dextran. As the best postoperative analgesic treatment, Continuous brachial plexus block (CBPB) could provide effective analgesia and at the same time play a sympatholytic role in promoting peripheral vasodilatation. However, no controlled studies have quantitatively analyzed the blood supply in hand for digits replantation patients who have undergone CBPB.

Objective In the current prospective, randomized and controlled study, the skin temperature and the hemodynamics of the radial-ulnar arteries were used as the observation indexes, to quantitatively assess the effect of CBPB on increasing postoperative blood flow perfusion of hand tissue after finger replantation. Meanwhile, the vasodilator effects of CBPB on the prevention of vascular crisis and the 7 days' survival rate after replantation were evaluated.

Methods Patients who underwent single or multiple digit replantation from September 2023 to March 2024 as the study sample with the following criteria: age between 18 to 65 years, amputation level at proximal and middle phalanx, American Society of Anesthesiologists(ASA) physical status I to II and no concomitant serious organ injuries. Patients with preexisting systemic disease that may influence peripheral blood supply such as peripheral vascular disease, coagulopathy, cardiovascular disease and diabetes mellitus were excluded from this study. Replantation was performed under infraclavicular brachial plexus block in all patients combined with continuous sedation of dexmedetomidine. According to the different methods of postoperative analgesia, the patients were divided into patient controlled intravenous analgesia(PCIA) group and continuous brachial plexus block(CBPB) group. The skin temperature of the severed fingers was monitored with an infrared thermal imager, while the cross-sectional area and mean flow velocity of radial-unlar arteries were measured using color doppler ultrasound system at the level of wrist in all patients for the volumetric flow rate(VFR) calculation during the postoperative analgesia period of 48 hours. VFR was evaluated using the formula: VFR=A×V, (A: cross-sectional area, V: mean flow velocity). Blood flow perfusion of hand is calculated by the sum of VFR of radial artery and ulnar artery. The main outcome were The skin temperature of the severed fingers and blood flow perfusion of hand, compared in two groups at 0, 12, 24, 36, 48 hour after surgery with t test. Secondary outcomes were the incidence of vascular crisis and the 7 days' survival rate after replantation, compared in two groups with c2 test .

Results Two patients underwent general anesthesia (GA) due to insufficient effect of brachial plexus block, and three patients required to change the anesthesia method to GA due to prolonged operation. Finally, there were 27 cases, a total of 36 severed fingers received CBPB after surgery, including 19 cases of single finger amputation, 7 cases of double fingers amputation, and 1 case of triple fingers amputation. While there were 28 cases and a total of 35 fingers received PCIA after surgery, including 21 cases of single finger amputation and 7 cases of double fingers amputation.
Skin temperature of replanted fingers in CBPB group was 31.34±1.53℃, 31.54±1.79℃, 31.82±1.76℃ and 32.36±1.82℃ at 12h, 24h, 36h and 48h after surgery, respectively, which were significantly higher than 29.81±1.62℃, 29.75±1.86℃, 30.06±1.93℃ and 30.54±1.88℃ in PCIA group ($P < 0.05$). In terms of humeral arterial hemodynamics, the peak systolic velocity (PSV), end-diastolic velocity (EDV), mean velocity (MV), blood flow (Q) and artery area of the study group were significantly increased at 24 and 48h after surgery ($P< 0.05$), and the resistance index (RI) was significantly decreased ($P<0.05$). The incidence of vascular crisis within 48 hours after surgery was 9.09% in the study group, which was significantly lower than 35.00% in the control group ($P<0.05$).

Conclusions The anti-sympathetic effect of CBPB can increase blood perfusion of replanted fingers and reduce the incidence of vascular crisis.

PO-0316

全髋关节置换术围术期使用糖皮质激素的有效性及安全性：一项网状 meta 分析

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目的 髋关节作为人体主要负重及运动关节，发生骨关节炎等病变时会严重影响生活质量。对于有手术指征的患者，现多采用全髋关节置换术进行治疗，但是术后疼痛会影响术后康复及功能锻炼。目前认为，在围术期静脉应用糖皮质激素可以有效缓解术后急性炎症反应，缓解疼痛，减少阿片类药物用量，降低恶心呕吐风险。但围术期使用激素可能增加伤口感染、深静脉血栓、消化道出血等并发症的发生风险。本文旨在通过网状 meta 分析不同用法的糖皮质激素在全髋关节置换术围术期的止痛止吐作用及安全性。
方法 通过检索 PubMed、Web of Science、Cochrane Library、Embase、CNKI 数据库，纳入在全髋关节置换术围术期静脉应用糖皮质激素的前瞻性随机对照研究。提取糖皮质激素的药物用量，将不同种糖皮质激素用量转化为地塞米松当量进行计算。根据围术期地塞米松总当量<10mg, 10-20mg, 20-40mg, >40mg 分组。根据用药时间（术前、麻醉诱导时、麻醉诱导后 1 天内，麻醉诱导后 2 天内）及用药剂量进行分析。结局指标包括术后补救性镇痛、术后恶心呕吐(Postoperative Nausea and Vomiting，PONV)事件发生率、术后并发症发生率。应用 R 4.2.3 软件的 netmeta、gemtc、BUGSNET 包进行数据分析，采用频率学方法绘制森林图，并采用贝叶斯方法计算曲线下面积(Surface Under the Cumulative Ranking Curve, SUCRA)。
结果 本篇网状 meta 分析共纳入 17 篇 RCT,1919 名患者，共计 15 种采取不同用量及用药时间的干预措施。经前述方法分组后分析 8 种干预臂。给予 20-40mg 地塞米松当量时补救性镇痛的发生率显著低于其他干预组（见图 A）。在诱导后 1 天内予地塞米松总当量 20-40mg，补救性镇痛的 OR 值为 0.385 [0.148,0.952]；诱导后 2 天内予总当量 20-40mg，OR 值为 0.307 [0.107,0.857]。根据补救性镇痛 SUCRA 图（图 D），最少进行补救性镇痛的干预措施分别为诱导开始后 2 天内累计予 20-40mg 地塞米松当量（SUCRA=78.41%）；诱导开始后 1 天内累计予 10-20mg 地塞米松

当量药物（SUCRA=65.185%）；诱导时单次予 20mg-40mg（SUCRA=64.08%）。对于 PONV 发生率（见图 B），诱导开始后 1 天内给予 10-20mg 地塞米松当量的 OR 值为 0.19 [0.08,0.48]；诱导时单次 20-40mg 地塞米松当量糖皮质激素的 OR 值为 0.19 [0.09,0.37]；诱导开始后 1 天及 2 天内累计给予上述剂量药物的 OR 值为 0.34 [0.19,0.62]；0.35 [0.17, 0.72]。根据 PONV 事件的 SUCRA 图（图 E），最不易发生 PONV 事件的干预措施分别为：诱导时单次予 20mg-40mg（SUCRA=84.65%），其次为诱导开始后 1 天内累计予 10-20mg 地塞米松当量药物（SUCRA=80.55%）。共报告 28 例术后并发症，均为伤口相关并发症，未发生深静脉血栓、消化道出血。不同干预方案引发的伤口相关并发症未见明显差异（见图 C），其中诱导开始后 1 天内静脉给予 10-20mg 地塞米松当量与诱导单次给予 20-40mg 地塞米松当量的术后并发症 OR 值分别为：0.93 [0.23,3.75]；0.65 [0.18,2.41]。

结论 在全髋关节置换术诱导开始后 1 天内累计静脉给予 10-20mg 地塞米松当量糖皮质激素或诱导单次予 20-40mg 药物，可达到相近的镇痛止吐作用，同时不明显增加术后并发症的发生风险。

PO-0317

老年与年轻患者丙泊酚诱导意识消失时的脑电图特征

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目的 比较老年与年轻患者丙泊酚诱导意识消失时的脑电频谱和功能连通性差异，为寻找能准确监测老年患者麻醉深度的指标提供思路。

方法 本研究为前瞻性观察性研究，纳入 2022 年 8 月 1 日至 2023 年 12 月 31 日于复旦大学附属华东医院行择期手术的患者，根据年龄分为年轻组（18-45 岁）和老年组（≥65 岁）。采用丙泊酚靶控输注进行麻醉诱导，采集患者清醒状态和意识消失时的 64 通道脑电图。分析两组患者清醒状态和意识消失时的功率谱密度（Power Spectral Density, PSD）、α 波峰值频率（peak alpha frequency, PAF）以及加权相位延迟指数（weighted phase lag index, wPLI），比较两组患者丙泊酚诱导意识消失时的脑电频谱特征及功能连通性差异。

结果 功率谱分析发现：①丙泊酚诱导意识消失后，所有患者的全脑慢波、δ、θ、β 频段绝对功率均显著增强。②丙泊酚诱导意识消失后，全脑 high-γ 频段绝对功率以及额区和中央区的 low-γ 频段绝对功率均显著降低。③丙泊酚诱导意识消失后，除枕区外，其余脑区的 α 频段绝对功率均显著增强，同时观察到 α 功率由枕区前移至额区，PAF 右移。④丙泊酚诱导意识消失后，老年患者大部分脑区的绝对功率及 PAF 均显著低于年轻患者。功能连通性分析发现：①丙泊酚诱导意识消失后，所有脑区的 δ、θ 频段以及中央-前额区、中央-枕区、前额-枕区的 low-γ 频段功能连通性均显著增强。②丙泊酚诱导意识消失后，所有脑区的慢波、α、β、high-γ 频段以及左-右颞区、左颞-额区、右颞-额区的 low-γ 频段功能连通性均显著降低。③丙泊酚诱导意识消失后，老年患者所有脑区慢波和额-中央区、中央-枕区 low-γ 频段的功能连通性均显著强于年轻患者。④丙泊酚诱导意识消失后，老年患者所有脑区 δ、θ、β 和 high-γ 频段的功能连通性均较年轻患者显著降低。⑤丙泊酚诱导意识消失后，老年与年轻患者的 α 频段功能连通性无明显差异。

结论 （1）丙泊酚诱导意识消失后，脑电图表现为低频活动增强、高频活动抑制、α 频段功率前移以及 PAF 右移。

（2）老年患者大部分频段和脑区的绝对功率均低于年轻患者，这可能是 BIS 和频谱熵等指标易受到年龄因素影响的原因。

（3）α 频段 wPLI 可以较好地表征意识水平，而且不受年龄的影响，提示 α 频段 wPLI 有可能成为监测老年患者麻醉深度的脑电指标。

PO-0318

Impact of Preoperative Intravenous Dexamethasone on Pain and Nausea in Late-Stage Elderly Total Knee Arthroplasty Patients

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Background Postoperative pain and nausea and vomiting (PONV) after total knee arthroplasty (TKA) remain persistent issues despite optimised multimodal analgesia. Previous studies have demonstrated that preoperative 10 mg intravenous glucocorticoids can reduce postoperative pain, but their effects in late-stage elderly patients (aged ≥75 years) are not well-documented.
Methods A single-centre, double-blind, two-arm study compared preoperative dexamethasone (10 mg) versus saline on postoperative pain and PONV in 160 planned TKA patients over 75 years old. Subjects received multimodal analgesia, including femoral nerve block, cyclooxygenase inhibitors, local anaesthetic infiltration, and patient-controlled intravenous analgesia with opioids. The primary outcomes were resting numeric rating scale and incidence of PONV at 24 hours. Secondary outcomes included motion pain scores, opioid consumption, nausea severity, blood glucose, inflammatory factors, and side effects.
Results A total of 153 subjects (77 in the dexamethasone group and 76 in the control group) were included. The dexamethasone group had lower resting NRS scores at 24 hours postoperatively (median [interquartile range], 4 [3-4] vs. 5 [4-6]; P<0.001) and a significantly lower incidence of PONV within the first 24 hours (13/77, 16.9% vs. 31/76, 40.8%; p = 0.002; RR 0.41, 95% CI 0.24–0.73). The dexamethasone group also had lower motion NRS scores at 24 hours, 36 hours, and one-week post-surgery, a lower incidence of nausea between 0–6 and 0–24 hours, lower inflammatory factor levels at 24 hours post-surgery, but higher blood glucose levels at 24 hours post-surgery. The incidence of side effects was similar in both groups, except for more frequent impaired plantar flexion in the dexamethasone group on postoperative day one.
Conclusions Preoperative administration of 10 mg intravenous dexamethasone in late-stage elderly patients over 75 years undergoing TKA may improve early postoperative pain and reduce PONV risk within the first 24 hours post-surgery.

PO-0319

The role of circulating very-long-chain saturated fatty acids in the association between Life's Essential 8 and cognitive function in elderly population: A mediation analysis with NHANES

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Background There is a positive association between Life’s Essential 8 (LE8) and cognitive function in older adults, and one potential protective mechanism is lipid mechanism. The aim of this study was to investigate the role of circulating very-long-chain saturated fatty acids (VLSFAs) in the relationship between LE8 and cognitive function.

Methods This study involved 1079 elderly participants from the National Health and Nutrition Examination Survey (NHANES) in 2011–2014. LE8 scores (range 0–100) were obtained from measurements based on American Heart Association definitions, divided into health behavior and health factor scores. Cognitive function was assessed by three tests including the Consortium to Establish a Registry for Alzheimer's Disease (CERAD), Animal fluency test (AFT), and Digit Symbol Substitution test (DSST). We used generalized additive model (GAM) and mediation analysis to investigate the relationship among LE8, VLSFAs (20:0, 22:0, 23:0, 24:0,), and cognitive function.
Results LE8 had a positive linear relationship with cognitive function (P < 0.001). Meanwhile, VLSFAs was positively associated with increased cognitive function (P < 0.001) and LE8 (P < 0.001). Furthermore, the association between LE8 and cognitive function was partially mediated by VLSFAs (22:0, 23:0, 24:0), and the mediated proportion was 7.7%, 9.9%, and 12.4%, respectively. And the increasing trend of mediating effect of cognitive function associated with increased VLSFAs/22:00 remained significant.
Conclusion Our findings suggest that VLSFAs are involved in modulating the influence of lifestyle and diet on protecting cognitive function in elderly populations.

PO-0320

老年患者术前衰弱状态对诱导后低血压的影响：一项前瞻性观察性队列研究

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目的 衰弱是一种随年龄增长而出现生理储备功能下降的状态。衰弱患者出现心血管合并症的风险显著增加，体位性低血压也是衰弱患者常见的临床表现，其发生可能与自主神经功能异常有关。麻醉诱导后至手术切皮前发生的低血压可能反映患者的心血管调节功能，但衰弱与诱导后低血压相关性尚待探索。本研究旨在探索老年患者术前衰弱状态的特点，以及衰弱与诱导后低血压及患者围术期转归的相关性。
方法 本研究为一项单中心前瞻性观察性队列研究，纳入行择期腹部手术、全身麻醉、年龄≥65 岁的老年患者。根据术前衰弱快速筛查（FRAIL）量表分为衰弱及非衰弱患者两组，监测患者术中血压及术后转归情况。主要结局为诱导后低血压，定义为麻醉诱导后手术切皮之前，或诱导后 20 分钟之内出现的平均动脉压下降超过基线的 30%或平均动脉压绝对值＜65mmHg。次要结局包括术中早期低血压、术后并发症、术后功能恢复情况、住院时长等。
结果 研究共纳入 2019 年 12 月至 2022 年 4 月于北京协和医院行择期腹部手术的 147 例老年患者，其中术前衰弱患者为 25 例（17.0%）。患者平均年龄为 73.2±5.3 岁，女性、高龄、消化道肿瘤手术患者发生衰弱的比例相对更高。衰弱与非衰弱患者在基础合并症、ASA 分级、RCRI 评分方面无显著差异。术前衰弱患者出现诱导后低血压（RR 2.12，95%CI 1.57-2.87，P<0.001）和术中早期低血压（RR 2.66，95%CI 1.09-6.53，P=0.032）的风险显著高于非衰弱患者。在矫正年龄、性别、ASA 分级、手术类型、基础合并症、长期用药和麻醉诱导药物剂量后，术前衰弱仍是诱导后低血压（aRR 1.72，95%CI 1.20-2.47，P=0.003）及术中早期低血压（aRR 2.88，95%CI 1.02-8.08，P=0.045）的危险因素。衰弱患者存在体位性低血压的比例显著高于非衰弱患者，提示自主神经功能障碍可能是这些患者易发生诱导后低血压的原因之一，有待进一步的机制研究证实。术前衰弱是术后并发症的危险因素，衰弱患者术后 30 天综合并发症指数显著高于非衰弱患者（MD 7.98，95%CI 1.08-14.87，P=0.024），发生严重并发症的风险显著较高（RR 4.18，95%CI 1.54-11.39，P=0.005），尤其与感染相关并发症有关。衰弱患者基线水平及术后 QoR-15 恢复质量评分均低于非衰弱患者，但术后评分无显著差异。在住院时长、住院费用、术后功能恢复时间方面，本研究未观察到显著差异。

结论 术前衰弱状态是老年择期腹部手术患者发生全身麻醉诱导后低血压及术后并发症的危险因素。术前进行衰弱评估可能有助于识别高危患者，优化麻醉管理方案。

PO-0321

多次利多卡因静脉输注对不同年龄段小鼠认知功能的影响及机制研究

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目的 静脉输注利多卡因在围手术期广泛应用，以缓解术后疼痛、减少阿片类药物的使用、促进胃肠功能恢复，并甚至有可能改善肿瘤预后。然而围术期输注利多卡因对认知功能的影响尚不明确。探讨单次、多次静脉输注利多卡因对不同年龄段小鼠认知功能的影响及其机制。
方法 1. 6 月龄和 18 月龄的雄性 C57BL/6 小鼠分为对照组（Con），单次利多卡因组（Sin lido），多次利多卡因组（Rep lido）。单次利多卡因组（Sin lido），参照临床转换使用剂量，利多卡因 18.45mg/kg 推注后，12.30mg/kg 持续静脉泵注 2 小时。多次利多卡因组（Rep lido）：连续进行三天利多卡因输注。采用 RNA-seq 检测小鼠海马组织中的差异基因表达。评估小胶质细胞激活、星形胶质细胞 A1/A2 型极化程度、神经突触可塑性、认知功能变化。
2. 18 月龄小鼠分为 3 组。分为 Veh 组、Rep lido 组、多次利多卡因+DHMEQ 组（Rep lido+DHMEQ）。应用 NF-kB 信号通路特异性抑制剂 DHMEQ。评估小胶质细胞激活、星形胶质细胞 A1/A2 型极化程度、神经突触可塑性、认知功能变化。
结果 与 Con 组和 Sin lido 组相比，Rep lido 组在成年小鼠中未出现认知损害，而在老龄小鼠中出现学习记忆功能减退。同时，RNA-seq 结果显示，与 Con 组相比，Rep lido 组中成年小鼠海马没有明显差异基因表达，而老龄小鼠中有大量差异基因表达，与神经炎症和突触信号相关。同时我们观察到多次利多卡因输注诱发小胶质细胞激活，星形胶质细胞向 A1 型极化，神经炎症因子表达增多，并伴有突触可塑性损伤。我们惊喜的发现 DHMEQ 治疗，能够有效抑制小胶质细胞激活和星形胶质细胞 A1 极化，修复突触可塑性损伤。
结论 多次静脉输注利多卡因导致老龄小鼠小胶质细胞和 A1 型星形胶质细胞激活，进而诱发海马突触损伤和认知功能障碍，该作用与 NF-κB 信号通路激活有关。

PO-0322

外泌体减轻 ISO 诱导老年小鼠认知功能障碍及作用及机制研究

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目的 围术期认知功能障碍（Perioperative Cognitive Dysfunction，PND）常见于老年患者，确切原因尚不清楚，可能涉及麻醉剂、手术、炎症、基础健康状况和遗传因素等多种因素。异氟醚（Isoflurane，ISO）是一种常见的吸入性麻醉药物，在临床中广泛用于全身麻醉。老年患者短时间内反复多次接受 ISO 麻醉会产生神经毒性，表现为认知功能下降，这可能是 PND 的病因之一。如何减轻吸入麻醉剂的神经毒性，是目前亟待解决的难题。
间充质干细胞（Mesenchymal Stem Cells, MSCs）是一类具有多向分化潜能的干细胞，由于其具备免疫调节能力、促进组织修复及较低的免疫原性等特性，已成为疾病治疗研究的热点。外泌体（Exosomes，EXOs）是细胞释放到外部环境中的小型囊泡，在细胞之间的通讯中起着重要作用。

与直接应用细胞治疗相比，EXOs 无需引入活细胞，因此提供了一种更安全且更有效的治疗方法。MSCs-EXOs 中富含 DNA，mRNA，miRNA 和蛋白质等生物分子，不仅展现出促进组织修复、调节免疫反应和发挥抗炎作用等多种生物功能，而且其能够穿越血脑屏障，直接将分子运送到大脑中受损的神经细胞。这使得 MSCs-EXOs 在治疗神经系统疾病方面，展现出巨大的潜力和临床应用前景。

本研究通过建立 ISO 诱导的老年小鼠认知功能障碍和神经毒性的动物模型，评价 MSCs-EXOs 的治疗效果，并利用小鼠神经元细胞系 HT22 探究 MSCs-EXOs 发挥治疗作用的分子机制。

方法 1.MSCs 分离培养，MSCs-EXOs 提取鉴定：使用脐带华通胶组织，分离培养得到原代细胞，鉴定干细胞性质。使用差速离心法分离得到 MSCs-EXOs，对其进行表征。

2.通过动物及细胞实验观察 MSCs-EXOs 对 ISO 毒性的治疗效果：12 月龄的 C57BL/6 小鼠暴露于 2%的 ISO 中，连续麻醉 5 天，每天 2h，建立动物模型。使用 2%的 ISO 麻醉 HT22 细胞 24h，建立细胞模型。使用 MSCs-EXOs 对小鼠及细胞进行治疗，观察治疗效果。检测小鼠的认知功能，海马组织损伤情况。观察细胞的活性，评价治疗效果。

3.铁死亡的相关检测：检测动物及细胞的 MDA、Fe^{2+}、GSH、ptgs2 指标，检测 GPX4、SLC7A11、ACSL4、NRF2、HO-1 等蛋白表达量，检测线粒体电镜下形态。通过上述结果，研究治疗机制中铁死亡的发生情况。

结果 1.通过脐带华通胶分离出 MSCs，稳定表达 MSCs 标志物 CD90、CD105、CD73，具有成骨细胞和成脂肪细胞分化能力。通过差速离心法，分离获得了 MSCs-EXOs，表达 EXOs 的 CD9、CD63、TSG101 标志物，电镜下呈双层膜结构，粒径尺寸分布均匀，平均尺寸为 108nm，蛋白浓度为 3.542mg/mL。

2.成功建立了老年 C57BL/6 小鼠 ISO 麻醉后认知障碍模型，水迷宫的隐藏平台实验中 ISO 诱导后小鼠穿越平台次数、目标象限时间与距离百分比下降，经过 MSCs-EXOs 和 Fer-1 治疗后上述指标好转。旷场实验麻醉前后小鼠运动距离未见明显改变，麻醉并未影响运动功能。说明 MSCs-EXOs 治疗或者抑制 Ferroptosis 均可改善 ISO 的神经毒性。6×10^7 个/mL 浓度的 MSCs-EXOs 显著提升了 ISO 诱导的 HT22 细胞存活率。这些 MSCs-EXOs 可以被 HT22 摄取并主要分布在细胞质中。

3.ISO 麻醉后，小鼠海马组织线粒体膜断裂和线粒体嵴消失，MDA、Fe^{2+}、Ptgs2 升高，GSH 降低，SLC7A11、GPX4 蛋白表达量减低，ACSL4 蛋白表达量升高，上述改变提示海马组织出现铁死亡。ISO 诱导导致了 HT22 细胞线粒体形态出现损伤，MDA、Fe^{2+}、Ptgs2 升高，脂质过氧化增加，GSH 含量下降，而 SLC7A11 和 GPX4 蛋白表达量减少，ACSL4 蛋白表达量增多，这一系列变化诱发了铁死亡。在分子机制中，NRF2/HO-1 信号通路被抑制。在使用 MSCs-EXOs 治疗后，逆转了上述改变，减轻了铁死亡发生。

结论 通过健康胎儿的脐带，可以培养出增值能力强、性质稳定、生长状态良好的 MSCs，差速离心法可以获得高纯度、高浓度的 MSCs-EXOs。这些可以为后续治疗提供良好的基础。MSCs-EXOs 对 ISO 诱导的认知功能障及神经毒性具有保护作用，主要作用的机制为抑制铁死亡。涉及的分子机制为 NRF2/HO-1 信号通路。

PO-0323

口腔颅颌面手术中老年患者术后神经认知恢复延迟的脂质生物标志物

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目的 随着社会老龄化进程的加速以及外科手术技术的进一步发展，老年患者的手术量正逐年上升，故而其围手术期神经认知障碍亟待引起更多的重视。术后神经认知恢复延迟（delayed neurocognitive recovery, dNCR）被定义为术后 30 天内新发的认知功能减退。由于其发生率较高，

且与术后死亡率、远期认知功能障碍及日常生活功能受损相关，故早期精确识别 dNCR 的高危人群尤为重要。现已有相关研究表明全身麻醉可能通过作用于老年患者的脑脂质代谢导致 dNCR，但预测 dNCR 的生物标志物仍未确定。本研究通过脂质代谢产物的非靶向代谢组学分析探索 dNCR 的脂质标志物，进而促进对 dNCR 的有效预测及早期预防。

方法 作为一项前瞻性队列研究，本研究纳入了全身麻醉下择期行口腔颅颌面手术的 65 岁及以上老年患者，采用了简易精神状态检查量表（MMSE）及蒙特利尔认知评估量表（MoCA），在术前及术后第 1、3、7 天对患者进行认知功能评估。其中，dNCR 被定义为 MMSE 及 MoCA 得分同时下降 1 个及以上标准差。在麻醉前和术后 24 小时分别采集血液样本，并采用液相色谱-质谱联用仪进行非靶向脂质代谢组学检测。通过正交偏最小二乘判别分析（OPLS-DA）、Student t 检验及倍数变化法（FC）对标志物进行筛选，以变量权重投影值（VIP）>2.0、FC >1.2 或<0.83、错误发现率（FDR）<0.05 作为确定差异代谢物的阈值。所有术前及术后差异代谢物均进行了受试者工作特征曲线（ROC）和 logistic 回归分析，判断其对 dNCR 的预测价值。

结果 在 67 例患者中，25 例（37.3%）患者在术后发生了 dNCR。其中，PG(20:1/20:4)和 PG(18:1/20:4)在 dNCR 患者的术前、术后血清中的水平均显著高于未发生 dNCR 的患者。PG(20:1/20:4)的术前、术后 ROC 曲线下方面积（AUC）分别为 0.89 及 0.84。同时，PG(18:1/20:4)的术前、术后 AUC 分别为 0.82 及 0.77。在二元 logistic 回归分析中，术前 PG(20:1/20:4)（OR=1.515, 95% CI: 1.219-1.882）和 PG(18:1/20:4)（OR=1.037, 95% CI: 1.018-1.057）在经年龄、性别、教育水平校正后均与 dNCR 的发生独立相关（p<0.001）。术后 PG(20:1/20:4)（OR=1.386, 95% CI: 1.178-1.632）和 PG(18:1/20:4)（OR=1.033, 95% CI: 1.014-1.052）在校正后也与 dNCR 的发生独立相关（p<0.001）。这提示了 PG(20:1/20:4)和 PG(18:1/20:4)可作为 dNCR 的潜在标志物对其进行早期预测。

结论 术前、术后 PG(20:1/20:4)和 PG(18:1/20:4)的血清水平均与老年口腔颅颌面术后患者 dNCR 的发生相关。这些结果表明了脂质代谢产物可作为生物标志物预测 dNCR，并为 dNCR 发生与脂质代谢之间的机制研究提供了可行基础。

PO-0324
Aldrete 评分与 SSA 量表在非胃肠道术后儿童早期进食中的应用

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目的 评估 Aldrete 评分联合 SSA 量表在非胃肠道术后儿童早期进食中的应用，以确定这些评分工具在缩短禁食时间和降低并发症中的有效性。

方法 本研究纳入 2023 年 1-12 月于我科住院接受非胃肠道手术且全身麻醉的儿童（2-14 岁）。患儿被随机分为三组：对照组（A 组）接受传统的术后禁食管理，观察组（B 组）实施术后早期进食方案，联合组（C 组）使用 Aldrete 评分表和 SSA 量表共同评估早期进食安全性。对照组（A 组）采用传统术后禁食 6h，6h 后进流质饮食，逐渐过渡到普通饮食，若患儿哭闹、进食欲望强烈，咨询医生允许后少量饮水。观察组（B 组）实施术后早期进食方案。患儿诉进食需求后，护士开展早期进食安全评估。使用 Aldrete 评分表 （包括活动力、呼吸、循环、意识、经皮血氧饱和度 5 项评估指标，满分 10 分），评分 10 分的患儿再评估吞咽反射，即由固定的受过系统训练的麻醉监护护士给孩子喝水 1-5ml 水，然后，将孩子的头转向一侧，无恶心、呕吐为吞咽反射正常。随后先给饮水 5ml，根据孩子的情况，用吸管喝，或者用含有少量水的注射器往嘴里注射几次。密切观察患儿有无呛咳、恶心、呕吐、哭闹、误吸等不适。观察 20min 无不适，再饮水 30ml。再观察 30min，无不适进食流食（主要为温水、牛奶、清米汤、无渣蔬菜汁、无渣水果汁），食量为平时饮食的 30%（量< 3 ml/ kg）。观察 30min 无不适，根据患儿意愿，再进食不超过平时食量的 40%（总量< 5 ml/ kg）。如任何一个阶段出现呛咳、恶心、呕吐、哭闹、误吸等不适，立刻停止进食，必要时通知主管医生处理。联合组（C 组）在使用 Aldrete 评分表的基础上，实施 SSA 量表评分吞咽功

能评定。SSAⅠ量表分为临床检查(8 ～ 23 分) 、5 ml 水吞咽试验(5 ～ 11 分) 、30 ml 水吞咽试验(5 ～ 12 分) 3 个步骤，评分范围 18 ～ 46 分，评分越高，吞咽功能越差。第一步评价有异常为误吸风险Ⅰ级，第二步评价异常为误吸风险Ⅱ级，第三步评价异常者为误吸风险Ⅲ级，3 步均正常为误吸风险Ⅳ级。统计三组的术前禁食时间、术后禁食时间、口渴量表评分及进食后的呕吐发生情况。

结果 初步数据显示，C 组在术后禁食时间上较 A 组和 B 组有显著缩短（P<0.05），术后 3 小时口渴量表评分亦显著较低（P<0.05）。进食后的呕吐发生率在 C 组较其他两组低，差异有统计学意义（P<0.05）。

结论 Aldrete 评分联合 SSA 量表的使用可以有效提高非胃肠道术后儿童早期进食的安全性，缩短禁食时间，并显著降低呕吐等术后并发症的风险。这种综合评估方法有助于促进术后儿童的快速恢复。

PO-0325

术后亚谵妄综合征发生特征及影响因素的研究进展

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目的 提高围麻醉期对亚谵妄综合征（Subsyndromal delirium，SSD）的重视程度以及识别的准确性，为临床识别和管理提供参考。

方法 以谵妄多因素模型为指导，从易感因素和诱发因素两方面对术后亚谵妄综合征影响因素进行综述，并描述其术后发生特征。

结果 术后亚谵妄综合征发生率高、重视程度低、管理难度大，临床涉及评估、监测、干预和预防等多方面内容。亚谵妄发生的高危因素，主要包括但不限于高龄、受教育程度低、合并症指数高、认知状况差、营养状态差、手术时间长、存在术中低血压、术后疼痛程度中、肢体约束等。

结论 术后亚谵妄综合征发生率高，危险因素众多。现有研究多认为 SSD 的发生与已知的谵妄危险因素相似，且研究人群多在骨科患者，未来研究在进一步明确 SSD 与谵妄关系的同时，还需在更多疾病手术中开展危险因素研究。

PO-0326

医疗失效模式与效应分析法在麻醉科药品智能化管理中的应用

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目的 探讨医疗失效模式与效应分析法（healthcare failure mode and effect analysis，HFMEA）在医院麻醉科药品智能化管理中的应用效果。

方法 组建由 1 名麻醉医生、2 名麻醉护士、1 名临床药师、1 名中心药房组长，1 名信息科人员、1 名设备科人员，1 名护理部质控主任，1 名医务处管理人员，共 9 名人员组成的 HFMEA 实施小组。小组成员纳入标准为本科及以上学历，工作年限≥10 年，副高及以上职称且均接受系统的 HFMEA 知识培训。HFMEA 实施小组，运用 HFMEA 法，根据药品流向梳理出智能化药品管理 8 个主流程和 25 个子流程，找出流程中易发生失效的高风险环节，通过二维风险矩阵及决策树分析，找出流程中的 12 项失效模式及对应的 34 项失效原因，制定相关改善措施：（1）优化以麻醉护士为主导的协调工作模式，组建医务处、护理部、药剂科、麻醉科、信息科、设备科六大部门的联合质控管理团队，各部门职责分工明确，构建麻醉科药品智能化管理质量评价体系。（2）智能药柜系统按照麻醉医生、麻醉护士、后台管理员不同人员设置不同用户权限预警。麻醉医生取药环节，双人核

对预警提示；麻醉护士盘点环节，近效期药品弹窗预警提示；后台管理环节，麻醉医生超过两台备药异常，后台预警暂停再次备药。（3）细节把控：根据麻醉方式、麻醉医生用药习惯，设置公共和个性化取药套餐，方便麻醉医生进行精准、快速取药；院内药品转运，专人负责，闭环转运，转运前后加强核对。比较措施实施前后麻醉医生单台取药时长、麻醉护士药物盘点时长、近效期药品优先使用率、首次盘点账务相符率、麻醉药品院内规范转运率、麻醉医生对药品管理满意度及失效模式的风险优先指数（RPN）。

结果 措施实施后麻醉医生单台取药时长、麻醉护士盘药时长、失效模式的风险优先指数（RPN）均明显下降（P＜0.05）；首次盘点账务相符率、近效期药品优先使用率、麻醉药品院内规范转运率、麻醉医生对药品管理满意度评分均高于实施前（P＜0.05）。

结论 医疗失效模式与效应分析法能有效提高麻醉科药品智能化管理质量和效率，提高麻醉医生对药品管理的满意度。

PO-0327

基于失效模式与效应分析法 对手术室麻精药品的智能化管理改进与分析

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目的 国家卫健委于 2017 年及 2018 年相继出台了《关于医疗机构麻醉科门诊和护理单元设置管理工作的通知》和《关于印发加强和完善麻醉医疗服务意见的通知》，均指明麻醉护士参与麻醉药品及精神药品（以下简称麻精药品）的具体管理工作。我院麻醉手术科使用的麻精药品涉及 13 种，总基数高达 4312 支，每日生成麻精药品处方高达 800 余张。面对如此庞大的麻精药品数量，以及相关法律规范的严格要求，日益增加了麻精药品的管理难度。麻精药品的管理，国外随着智能药柜的普及及信息化水平的发展已实现全程可追溯化，而人工管理仍是国内大多数医院采用的模式，手工记录、手工排序及人工审核等，步骤繁琐、效率低下。失效模式与效应分析法（failure mode and effect analysis, FMEA）是通过分析潜在风险，前瞻性制定干预措施，达到杜绝安全隐患的系统分析工具。目前，国内外均已将 FMEA 应用到医疗及护理风险管理、药房管理体系等方面，但在麻醉手术科麻精药品管理中鲜有应用。

方法 麻醉护士基于 FMEA 法识别麻精药品管理全过程的风险点，通过计算风险优先值(risk priority number，RPN)确定优先改善的风险点，制订相应的智能化改革措施，并对实施效果进行评价。智能化改革措施包含处方电子化、余液废弃电子化、药剂师实时审核、全流程批号追溯、质量控制五个环节。

结果 在南京大学医学院附属鼓楼医院麻精药品管理过程中共找出人员、处方、签章及制度四个主要维度，涉及 14 个中高风险等级的失效模式。麻醉护士实施信息智能化改革后，14 个失效模式均降为中低风险，实施前 RPN 值为 45.36±16.07，实施后 RPN 值为 11.79±5.71；合格处方率由 86.7%上升到 98.9%；麻精药品批号准确率、专册登记完整率、知识知晓率得到明显改善；医护工作人员的开方时间及核方时间明显缩短；医护人员的工作满意度也明显提升，差异均具有统计学意义(P<0.05)。

结论 麻醉护士基于 FMEA 法构建的麻醉科麻精药品处方信息智能化管理改革不仅降低了麻精药品处方管理的风险值，也显著提高了麻精药品处方的合格率，极大程度节约了人力成本，提高了用药安全。

PO-0328

围术期全流程闭环体温管理方案在老年全髋关节置换术患者中的应用研究

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目的 探讨围术期全流程闭环体温管理方案在老年全髋关节置换术患者中的应用研究效果。
方法 采用便利抽样法选取 2021 年 7 月至 12 月在某院行全髋关节置换术的老年患者 120 例为对照组，给予常规术前指导和常规保温措施；同法选择 2022 年 1 月-6 月同类患者 131 例为观察组，实施全流程闭环体温管理方案，包括（1）围术期全流程动态评估围术期低体温风险；（2）围术期全流程体温监测与动态管理；（3）实施被动保温（棉被遮盖）及主动保温（预保温、输液输血冲洗液加温、充气式保温毯加温等）相结合的集束化保温措施；（4）“术前病房-手术等候区-手术间-麻醉复苏室-术后病房”闭环式转运环节保温措施全覆盖。从患者低体温和寒颤发生率、患者热舒适度和满意度等方面评价应用效果。
结果 两组患者性别、年龄、BMI、ASA 分级、手术时间差异均无统计学意义（均 P >0.05），具有可比性。观察组患者低体温和寒颤发生率均低于对照组，差异均有统计学意义（均 P ＜0.05）；观察组患者热舒适度和满意度均高于对照组，差异均有统计学意义（均 P ＜0.05）。
结论 围术期全流程闭环体温管理方案实现了“术前病房-手术等候区-手术间-麻醉复苏室-术后病房”集束化保温措施全覆盖，提高了全流程体温保护的有效性，显著减少了老年全髋关节置换术患者低体温和寒颤发生，提高了患者热舒适度和满意度，取得了良好的成效。但本方案仅针对老年全髋关节置换术患者进行围术期体温管理，未来可针对不同年龄、术式的人群制定体温管理细则。且由于本研究样本量较少，仅来源于 1 所医院，因此，未来仍需进一步进行多中心、大样本的临床研究证实。

PO-0329

老年食管癌根治术全麻患者术中非计划性低体温的风险列线图模型构建与验证

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目的 探讨老年食管癌根治术全麻患者术中非计划性低体温（Inadvertent intraoperative hypothermia,IIH）的影响因素，基于独立影响因素构建并验证风险列线图模型。
方法 回顾性选取 2021 年 6 月至 2023 年 6 月在我院行老年食管癌根治术全麻患者 163 例，按 7:3 比例分为建模集（n=114）和验证集（n=49），根据建模集中患者有无出现 IIH 分为低体温组（n=60）和无低体温组（n=54），通过单因素分析及多因素 Logistic 回归分析得出独立影响因素，并基于回归分析法构建预警模型，使用 R 语言软件绘制相应的列线图，采用患者工作特征(Receiver operating characteristic，ROC)曲线、校准曲线检验预测效能。采用验证集的数据绘制两种曲线对模型的预测效能进行外部验证。
结果 单因素分析及多因素 Logistic 回归分析结果显示，年龄、BMI、基线体温、麻醉时间、输液量、高血压、糖尿病均是老年食管癌根治术全麻患者发生 IIH 的独立影响因素，差异有统计学意义（P ＜0.05），基于以上 7 个独立影响因素构建的风险列线图模型其曲线下面积（Area under curve,AUC）为 0.907，最佳截断值 0.706 对应的灵敏度、特异度分别为 0.750、0.981，模型的区分能力良好。校准曲线结果显示，平均绝对误差（Mean absolute error,MAE）为 0.060，校准曲线

接近理想曲线，表示模型具有较好的校准性能，模型较为可靠稳定。验证集 ROC 曲线和校准曲线结果良好，提示模型具有较好的外部预测效能。
结论 老年食管癌根治术全麻患者发生 IIH 受年龄、BMI、基线体温等因素影响，基于以上 7 种独立影响因素构建的风险列线图模型预测效能良好，可为预防患者发生 IIH 提供依据。

PO-0330

三级医院评审标准实施细则下 麻醉专科护理管理模式的构建与应用

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目的 依据三级医院评审标准实施细则，构建并应用麻醉专科护理管理模式，以推动麻醉护理专科的科学化、规范化发展。
方法 本研究基于《江苏省三级综合医院评审标准实施细则(2017 版)》中“第四章第六条，麻醉管理与持续改进”“第五章护理管理与质量持续改进”中所有条款，结合麻醉护理工实际情况，围绕“组织管理、制度常规、人力资源、质量与安全、科研与教学”五个要素，形成各要素管理目录，构建麻醉专科护理模式。然后结合《江苏省三级综合医院评审标准实施细则(2019 版)》最新评审标准，对内容进行修订，形成最新的麻醉专科护理管理模式。
对本模式实施前（2018 年 12 月）和项目实施后（2023 年 12 月）进行评价。采用三级医院科室层面护理专科建设评价指标对麻醉护理专科建设综合成效进行评价；采用护士执业环境测评量表(PES-NWI)对麻醉科护士执业环境评价；
梳理护理科研成果对学科创新产出进行比较。
结果 从“人才梯队建设、护理专业实践、教学水平、科学研究、专科培训基地建设”五个方面进行评价，麻醉专科护理管理模式应用后效果总体较好（$p<0.05$）。从临床护理专业性、质量管理、内部支持、医护合作、专业提升、人力配备方面进行评价，结果与国内同类研究相比处于较好水平，而护士自我感知“参与医院管理”相对不足。对护理科研产出进行比较，模式应用后均有所提升，尤其是科研立项、发表论文、制定的制度规范以及开展的循证实践项目成果提升较为明显（$p<0.05$）。
结论 基于三级医院评审标准实施细则下的麻醉专科护理管理模式应用，推动了麻醉护理学科的发展，改善了护士的执业环境，能够为麻醉专科护理管理提供了实践经验。

PO-0331

我国麻醉科护士非技术技能现状调查及影响因素分析

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目的 【目的】 调查危机事件下我国麻醉科护士的非技术技能现状并分析其影响因素，为设计和实施非技术技能针对性系列培训提供参考。
方法 【方法】 便利抽样法抽取全国各省市二级以上医疗机构中在麻醉科工作 1 年以上的在职护士，采用自制调查工具进行问卷调查。调查工具包括麻醉科护士的一般资料调查表、危机事件下麻醉科

护士非技术技能自评量表 2 部分。危机事件下麻醉科护士非技术技能自评量表由课题组遵循量表构建指南，基于系统综述和多人群质性访谈结果汇聚而成。量表包括 5 个一级维度（情境意识与判断、沟通、任务管理、问题解决、应对疲劳和压力）和 28 个条目，使用 Likert5 级评分进行评价，分值越高提示护士的非技术技能水平越高。量表总 S-CVI 为 0.98，Cronbach's α 系数、分半信度和重测信度分别为 0.933，0.861，0.809，提示具有较好的信效度。

结果 本研究共回收问卷 627 份，其中有效问卷 491 份，来自 19 个省市、自治区。491 名麻醉科护士的非技术技能自评总分为（113.94±12.69）分，总体的条目均分（4.07±0.45）分。五个一级维度中任务管理维度得分最高（4.24±0.49）分；其次为情境意识与判断维（4.09±0.53）分、沟通（4.20±0.54）分、应对疲劳和压力（3.90±0.61）分、及问题解决（3.85±0.56）分。在 28 个条目中，“判断接到的行动指令是否正确，并在复述后准确而及时地执行”得分最高（4.40±0.65），“在需要时展现领导能力，在承担领导角色时能根据团队成员能力合理分配任务”得分最低（3.60±0.91）。多元线性回归分析显示，麻醉科护士的年龄、职务、近一年内主要在麻醉诱导室工作、曾在外科工作/轮转、曾参加麻醉紧急抢救相关培训等是麻醉科护士非技术技能的影响因素（$p<0.05$）。

结论 我国麻醉科护士的非技术技能水平总体较好，但问题解决和应对疲劳和压力两方面的能力仍需进一步提高。目前我国尚无针对非技术技能的培训，护理管理者应设计和实施不同类别麻醉科护士的非技术技能培训，以提升其应对危机事件的能力，提高围麻醉期的患者安全。

PO-0332

环泊酚用于妇科门诊手术镇静的有效性与安全性评价：一项多中心随机III期临床试验

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目的 环泊酚（HSK3486）在化学结构上与丙泊酚类似，并且具有相似的镇静催眠作用。本研究旨在评价环泊酚用于妇科门诊手术镇静的有效性和安全性。

方法 共有九所医院参与了这项多中心、随机、非劣效性设计的 III 期临床试验。纳入的 135 名 18-65 岁接受妇科门诊手术的患者被随机分配，接受环泊酚镇静（0.4mg/kg 用于麻醉诱导，0.2mg/kg 用于麻醉维持）或丙泊酚镇静 (2mg/kg 用于麻醉诱导，1mg/kg 用于麻醉维持)。患者和研究者（负责数据收集和结果评价）均不知晓分组情况。主要研究终点为镇静成功率，定义为在未使用补救镇静/麻醉药物的情况下完成手术，非劣效性界值设定为-8%。次要研究终点包括诱导成功的时间、完全苏醒的时间、达到离院标准的时间和医患对镇静的满意度。同时，我们观察了不良事件和注射痛的发生情况。

结果 总共纳入 135 名患者，其中 134 名患者（90 例接受环泊酚镇静，44 例接受丙泊酚镇静）最终进入意向性分析。两组镇静成功率均为 100%（率差 0.0%; 95% CI, -4.1% to 8.0%），即表明环泊酚非劣于丙泊酚。与丙泊酚镇静相比，接受环泊酚的患者需要更长的时间实现成功诱导（中位数差异 2 秒; 95% CI, 1 to 7; P<0.001）、完全清醒（中位数差异 2.3 min; 95% CI, 1.4 to 3.1; P<0.001）和达到离院标准（中位数差异 2.3 min; 95% CI, 1.5 to 3.2; P<0.001）。环泊酚组中对镇静不满意的患者比例更低（相对危险度 0.21; 95% CI, 0.06 to 0.77; P=0.024）。接受环泊酚镇静

的患者有更低的概率发生治疗期间出现的不良事件（34.4% [31/90] vs. 79.5% 46 [35/44]; P<0.001）和注射痛（6.7% [6/90] vs. 61.4% [27/44]; P<0.001）。
结论 环泊酚用于妇科门诊手术的镇静疗效非劣于丙泊酚，且更少出现不良事件和注射痛。

PO-0333

瑞马唑仑联合超声引导下喉上神经阻滞在无痛经食道超声心动图检查术中的观察研究

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目的 评估瑞马唑仑联合超声引导下双侧喉上神经阻滞用于无痛行经食道超声心动图（TEE）检查术的临床效果及安全性。
方法 选择 2023 年 7 月至 12 月于我院超声科行无痛 TEE 患者 90 例。采用随机数字表法分为两组（n=45）：R 组为瑞马唑仑 0.2 mg/kg＋超声引导下双侧喉上神经阻滞（双侧各 0.25%罗哌卡因 2ml），P 组为瑞马唑仑 0.3 mg/kg。待患者 MOAA/S 评分≤3 分且睫毛反射消失呼之不应开始操作，根据患者术中情况静脉推注瑞马唑仑 1/4 初始剂量进行补救。记录两组患者麻醉前（T0）、麻醉诱导后（T1）、食道超声探头经咽喉部时（T2）、检查结束时（T3）及清醒时患者心率（HR）、平均动脉压(MAP)、脉搏血氧饱和度(SPO2)情况；记录 TEE 检查时长，自主呼吸恢复时间，苏醒时间，麻醉恢复室（PACU）停留时间，瑞马唑仑追加次数。记录医师满意度，患者术后满意度及口述数字疼痛（VAS）评分。记录低血压、低血氧、心动过速、心动过缓、呛咳、体动、术后恶心呕吐及头晕等不良反应情况。
结果 两组患者 TEE 检查时长、在不同时间点 SPO2 及 NRS 评分相比，差异无统计学意义（P＞0.05）。与 P 组相比，R 组自主呼吸恢复时间、苏醒时间、PACU 停留时间、瑞马唑仑追加次数、T2 时间点心率、血压、呛咳、体动及清醒后头晕发生率显著降低（P＜0.05），医师及患者术后满意度显著升高（P＜0.05）。
结论 瑞马唑仑联合超声引导下双侧喉上神经阻滞在无痛 TEE 检查中可以有效减轻患者疼痛，改善患者的检查耐受性，在减少镇静药物使用同时提高患者术后舒适度，为临床无痛 TEE 检查提供了新的麻醉策略。

PO-0334

小剂量艾司氯胺酮对环泊酚用于无痛胃肠镜检查患者半数有效剂量的影响

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目的 探讨小剂量艾司氯胺酮对环泊酚用于无痛胃肠镜检查患者半数有效剂量（ED50）的影响。
方法 选择择期行无痛胃肠镜检查患者 61 例，男 27 例，女 34 例，年龄 18～64 岁，BMI 18~30 kg/m2，ASA Ⅰ级或Ⅱ级。排除标准：严重心血管系统疾病，严重呼吸系统疾病，术前一个月内有上呼吸道感染，近期服用过镇痛或镇静药物，合并精神疾病，对环泊酚、艾司氯胺酮等药物过敏或有使用禁忌，肝肾功能异常，改良 Mallampati 分级为 IV 级，近 3 个月内作为受试者参加过其他临床试验。将患者随机分为两组：环泊酚组（C 组）和艾司氯胺酮复合环泊酚组（EC 组）。EC 组给予环泊酚前 2 min 静注艾司氯胺酮 0.3 mg/kg，C 组于相同时点静注等量生理盐水。采用序贯法进

行环泊酚给药，两组环泊酚静注初始剂量均为 0.4 mg⁄kg，根据置入胃镜时是否出现阳性反应上调或下调环泊酚诱导剂量，剂量调整梯度为 0.04 mg⁄kg。以首次发生阳性反应和阴性反应交替为起始，至出现 7 个阳性反应和阴性反应交替，结束试验。阳性反应为麻醉诱导后患者 BIS 无法降至 60 或置入胃镜时出现呛咳或体动反应 2 级及以上。记录环泊酚用量、苏醒时间、离院时间、术中及术后不良反应发生情况。采用 Probit 概率回归分析法计算两组 ED50、ED95 和 95%可信区间（CI），进行组间比较。

结果 与 C 组比较，EC 组检查过程中环泊酚用量、低血压发生率及血管活性药物使用率均明显降低（P<0.05）。EC 组使用环泊酚行无痛胃肠镜检查的 ED50 为 0.20 mg/kg（95% CI 0.12~0.25 mg/kg），ED95 为 0.32 mg/kg（95% CI 0.26~0.39 mg/kg），C 组使用环泊酚行无痛胃肠镜检查的 ED50 为 0.37 mg/kg（95% CI 0.32~0.40 mg/kg），ED95 为 0.45 mg/kg（95% CI 0.41~0.50 mg/ kg），EC 组使用环泊酚行无痛胃肠镜检查的 ED50、ED95 明显低于 C 组（P<0. 05）。两组其他不良反应发生率差异无统计学意义。

结论 艾司氯胺酮 0.3mg/kg 可降低环泊酚用于无痛胃肠镜检查患者的 ED50 并减少检查过程中环泊酚用量，小剂量艾司氯胺酮复合环泊酚可安全用于无痛胃肠镜检查患者，术中循环稳定。

PO-0335

鼻面罩在胃镜镇静低氧血症高危患者中的应用: 一项前瞻性随机对照研究

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目的 低氧血症是无痛胃镜检查中常见的不良事件之一，严重的低氧血症不仅需要紧急气道管理，如面罩通气甚至气管插管，而且还可能导致内窥镜手术中断。长时间缺氧可引起心肌缺血、心律失常、永久性神经损伤，甚至死亡。鼻面罩吸氧可以提高吸入氧浓度和监测呼气末二氧化碳，本研究的目的是评估与传统的鼻导管吸氧相比，使用鼻面罩吸氧是否能降低接受无痛胃镜检查的阻塞性睡眠呼吸暂停（OSA）或肥胖患者低氧血症的发生率。

方法 这项多中心、随机、对照试验将 120 例年龄 18～65 岁、OSA 或肥胖接受无痛胃镜镇静检查的患者随机分为两组：鼻导管吸氧组（通过鼻导管吸入 4L/min O2）和鼻面罩吸氧组（通过麻醉机吸入 4L/min O2）。当患者出现亚临床呼吸抑制(90%≦SpO2 < 95%)时，采用托举患者下颌打开气道。当患者出现低氧血症(75%≦SpO2 < 90%，缺氧时间<60 秒)时，将供氧流量由 4 L/min 增加至 6 L/min，同时采用托举患者下颌打开气道。当患者发生严重缺氧(SpO2< 75%或 75%≦SpO2 < 90%，持续＞60 秒)时拔出胃镜并进行面罩通气。如果严重缺氧不能通过面罩通气纠正，则需要气管插管，由麻醉医生决定。主要结果是低氧血症的发生率（麻醉期间任意时间点 SpO2 < 90%）。次要结果包括麻醉期间亚临床呼吸抑制发生率(麻醉期间 90%≤SpO2<95%，>5s)，严重低氧血症的发生率(任意时间点 SpO2≤75%或 SpO2 < 90%持续≥60s)，胃镜检查时间，麻醉医生和消化科的满意度以及其他不良事件（包括恶心呕吐、反流、误吸和喉痉挛）。

结果 最终纳入 120 例患者进行分析，鼻导管吸氧组 60 例，鼻面罩吸氧组 60 例。鼻面罩吸氧组低氧血症发生率（8.3%）低于鼻导管吸氧组（36.6%）（P＜0. 05），鼻面罩吸氧组亚临床呼吸抑制发生率（35.0%）低于鼻导管吸氧组（56.6%）（P＜0. 05），鼻面罩吸氧组严重低氧血症发生率（0%）低于鼻导管吸氧组（11.7%）（P＜0. 05）。鼻面罩吸氧组需要托下颌比例（38.3%）低于鼻导管吸氧组（53.3%）（P＜0. 05）。两组患者异丙酚使用总剂量和胃镜检查时间没有统计学差异。鼻面罩吸氧组麻醉医生满意度（93.2%）高于鼻导管吸氧组（86.4%）（P＜0. 05）。

结论 鼻面罩吸氧显著降低了接受无痛胃镜检查的 OSA 或肥胖患者的低氧血症的发生率。

PO-0336

阿芬太尼在无痛胃镜中的镇痛策略优化

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目的 对比阿芬太尼与芬太尼分别复合丙泊酚用于无痛胃镜的不良反应发生率及麻醉效果。
方法 选择 2020 年 7 月至 9 月拟行无痛胃镜检查，将患者 120 例随机分为阿芬太尼组（AF）与芬太尼组(Con)（n=60）。所有受试者入室后面罩吸氧 (4 L /min)，AF 组静脉推注盐酸阿芬太尼注射液 5μg/kg，Con 组静脉推注枸橼酸芬太尼 50μg，进行预镇痛处理，起效后缓慢静脉推注丙泊酚注射液 2.0mg/kg，待患者 MOAA/S 评分≤2 分进镜检查，丙泊酚追加可按照 0.5mg/kg 注射。采集所有受试者 MOAA/S 评分、生命体征（血压（BP）、心率（HR）、脉搏氧饱和度（SpO2）、呼吸频率（RR）），对比药物使用情况、NRS 疼痛评分和时间变量指标（麻醉时间、内镜操作时间）。以及检查过程中的不良反应发生率（①呼吸系统：呛咳，术后咳嗽咳痰、RR<10 bpm、SpO2<90%、需行托下颌手法、呼吸暂停、需行辅助通气的发生率；②循环系统波动，③呃逆）。检查结束后送入 PACU，记录离院时间及术后满意度调查）。
结果 1）不良反应比较：所有患者均未发生严重不良反应，但 AF 组麻醉诱导开始至完全苏醒期间呛咳发生率（5.00%）显著低于 Con 组（22.03%）。循环系统不良反应仅有血压下降，使用盐酸麻黄碱注射液 6mg 治疗后好转，均未发生严重低血压。此外其他不良反应仅有呃逆，AF 组 6.67% 显著低于 Con 组 18.64%（P<0.05）；2）生命体征变化：仅在给药后即刻观察到 AF 组 SpO2 下降幅度大于 Con 组，MOAA/S 评分均低于 Con 组；3）药物使用：AF 组丙泊酚补救镇静比例明显低于低于 Con 组；4）时间变量指标及满意度：AF 组患者满足离院标准时间显著低于 Con 组，且麻醉医生、内镜医生满意度调查问卷评分均优于芬太尼组（P<0.05）。
结论 阿芬太尼用于优化无痛胃镜检查镇痛方案，可显著降低麻醉诱导后呛咳和呃逆的发生率，减少丙泊酚用量，缩短患者离院时间，且不会增加患者呼吸及循环系统不良反应。

PO-0337

Comparing the Efficacy and Safety of Remimazolam versus Propofol in Gastrointestinal Endoscopy or Fiberoptic Bronchoscopy：A systematic review and meta-analysis of Randomized Controlled Trials

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Background As life expectancy increases in most parts of the world, endoscopic procedures such as gastrointestinal endoscopy and fiberoptic bronchoscopy play an important role for diagnostic and intervention purposes. Propofol has been the most preferred drugs for sedation, but it is not so safe. Remimazolam has depicted its unique advantages in recent years. However, compared with propofol, due to the very short time to clinical practice of remimazolam, information regarding its safety and efficacy remains so limited. This study aimed to compare two drugs in gastrointestinal endoscopy or fiberoptic bronchoscopy.
Methods We performed a literature search in PubMed, Embase, the Cochrane Central Register of Controlled Trials, Web of Science, Chinese National Knowledge Infrastructure, Wanfang, and VIP databases up to October 2023 to select specific randomized controlled trials (RCTs)

comparing the efficacy and safety of remimazolam versus propofol in gastrointestinal endoscopy or fiberoptic bronchoscopy. The success rate of sedation was the primary outcome and the secondary outcome included other efficacy outcomes such as induction time of sedation, recovery time, time of operation, time to full alert, discharge time, and safety outcomes such as bradycardia, body movement, dizziness or headache, hypotension, hypotension requiring treatment, hypoxemia, injection pain, nausea and vomit, and respiratory depression.
Results Fifteen RCTs were included in the meta-analysis. Compared with propofol, remimazolam showed lower success rate of sedation (odds ratio [OR] = 0.15, 95% 95% confidence interval [CI]: 0.05~0.44; P < 0.001; I2 = 58%), but demonstrated shorter induce time of sedation (mean difference [MD]= 17.76, 95％ CI: 14.50~50.40; P=0.0004; I2 = 96％), reduced time to be fully alert (MD = -1.01, 95% CI: -1.63~-0.39; P = 0.001; I2 = 89%), and resulted in fewer adverse events (OR = 0.37, 95% CI: 0.27~0.49; P < 0.001; I2 = 77%). There was no statistical difference in time of operation, recovery time ((MD = -1.01, 95% CI: -4.06~2.04; P = 0.52; I2 = 92%) and time to discharge ((MD = -0.79, 95% CI: -3.20~1.63; P = 0.52; I2 = 86%).
Conclusion Remimazolam had lower success rate of sedation than propofol, but the difference was very limited, and it could shorten induction time, reduce time to be fully alert and decrease adverse events, which could be recommended as one of the promising alternatives applied to gastrointestinal endoscopy or fiberoptic bronchoscopy.
Registration: PROSPERO; https://www.crd.york.ac.uk/PROSPERO/; CRD42023481675

PO-0338

高龄患者“无痛”胃肠镜诊疗时理想麻醉方案的临床探讨

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目的 随着人口老龄化，越来越多的高龄患者（年龄≥80 岁）因为消化系统疾病迫切需要在全身麻醉条件下接受胃肠镜的精确诊疗，并确定进一步的治疗方案。然而高龄患者大多合并心、肺、脑等多个重要脏器的疾病，器官功能降低，对于麻醉药物的药代和药效学都会有明显的改变，因此在麻醉药物选择和麻醉方案建立等方面的要求都非常高。本研究探讨了在手术室外消化内镜中心如何安全有效地开展高龄患者的“无痛”胃肠镜诊疗，以及理想麻醉方案的选择和建立。
方法 选择择期在本院消化内镜中心接受全身麻醉下的无痛胃肠镜检查或治疗的高龄患者 52 例，男 23 例，女 29 例，年龄 80～91 岁，BMI 18.5～25.0 kg/m2， ASA 分级为 Ⅱ级或Ⅲ级，所有患者均在检查前经过麻醉评估门诊的严格评估，适合接受全身麻醉下的胃肠镜检查和治疗。将患者随机分为两组：丙泊酚组和瑞马唑仑组，每组 26 例。两组患者均先做电子肠镜，然后做电子胃镜。麻醉前建立基本生命体征监测：心电图（5 导联），无创血压，脉搏氧饱和度，呼气末二氧化碳分压，并且鼻吸氧 4L/min 持续 3 分钟以上。建立外周静脉通路，给予 500ml 乳酸钠林格氏液静脉输注。患者清醒条件下摆放好消化内镜检查体位。麻醉诱导：丙泊酚组缓慢静脉注射丙泊酚 1～1.5 mg/kg，和喷他佐辛 0.2mg/kg，待病人意识消失后开始内镜操作，术中追加药物为单次给予丙泊酚 20～30mg/次。瑞马唑仑组先静脉注射阿芬太尼 3～4ug/kg，2 分钟后注射瑞马唑仑 0.08～0.12mg/kg，。术中追加：单次给予瑞马唑仑 2～3mg/次，胃镜置入前，追加阿芬太尼 0.25mg。观察无痛胃肠镜诊疗期间的血流动力学变化、呼吸抑制情况、胃肠镜诊疗期间发生的不良反应、以及苏醒的质量等情况等。分别记录麻醉诱导前，麻醉药物推注后 1min，2min，3min、5min、10min，胃镜检查追加药物前，加药后 1min，3min，5min 的生命体征数据（心率、血压、呼吸频率、脉搏血氧饱和度等，呼气末二氧化碳分压）。记录检查期间和检查后 1 小时内患者发生的不良事件：包括但不仅限于注射痛，呛咳、呼吸抑制、体动反应、嗜睡、头晕、恶心呕吐和谵妄等不良反应的情况。

结果 丙泊酚组和瑞马唑仑组的平均年龄分别为 84.8 岁、85.1 岁，内镜诊疗的平均时间分别为 22.3min 和 21.9min,丙泊酚平均使用 218mg,喷他佐辛 13.1mg，瑞马唑仑平均使用 26.5mg，阿芬太尼 0.5mg，严重低血压（低于基础血压 30%）发生率，丙泊酚组 17.4%，瑞玛唑仑组 5.1%。氧饱和度低于 95%，丙泊酚组 22.7%，瑞马唑仑组 6.7%。两组平均苏醒时间，丙泊酚组 10.7min，瑞马唑仑组 6.6min。与麻醉诱导前基础生命体征数据比较，丙泊酚组注药后 1min，2min，3min、5min、10min，平均动脉压数值下降显著(P<0.05)，SpO2 也显著降低。而瑞马唑仑组仅平均动脉压轻度降低，与丙泊酚组相比有显著性差异(P<0.05)，瑞马唑仑组 SpO2 与麻醉前比较数值无明显降低，与丙泊酚组相比有显著性差异(P<0.05)。瑞马唑仑组患者的平均苏醒时间短于丙泊酚组，差异有统计学意义(P<0.05)。两组停药后 10、20、30 min MOAA/S 评分、Steward 评分、PACU 停留时间差异无统计学意义。

结论 在高龄患者行无痛内镜检查或治疗时，采用瑞马唑仑复合阿芬太尼的全身麻醉方式，血流动力学更稳定，呼吸抑制等并发症的发生率更低，高龄患者苏醒更快，是高龄患者无痛内镜检查或治疗时安全有效的方案。结合严格的术前麻醉评估，术中精确的监测和术后密切观察，能够达到理想麻醉的要求，满足高龄患者“无痛”胃肠镜诊疗的要求。

PO-0339

羟考酮与舒芬太尼在早期食管癌内镜下黏膜剥脱术中的镇痛效果分析

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目的 This study aims to explore the transitional analgesia with oxycodone and sufentanil in ESD patients under sufentanil general anesthesia.
方法 86 patients scheduled for ESD under sufentanil general anesthesia were randomly assigned to oxycodone (O group, n = 29), sufentanil (S group, n = 30), or normal saline (N group, n = 26). Before surgery completion, O group received oxycodone (0.1 mg/kg), S group received sufentanil (0.1 μg/kg), and N group received saline. Patient conditions, anesthetic medication, vital signs, recovery duration, decannulation time, adverse reactions, Visual Analog Scale (VAS) scores, and pain relief incidence were recorded.
结果 O group showed reduced VAS scores post-surgery compared to S and N groups. S group had reduced VAS scores postoperative 0 h and 12 h at rest compared to N group. No significant differences were observed in patient conditions or intraoperative anesthetic dosages. O group had prolonged recovery and decannulation times but similar overall recovery. No significant differences in severe vomiting were noted.
结论 Transitional analgesia with oxycodone and sufentanil provided more prolonged and comprehensive postsurgical analgesia compared to sufentanil in ESD patients , with no significant side effects. These findings inform transitional analgesia strategies in this patient population.

PO-0340

不同比例依托咪酯和丙泊酚混合液在无痛胃肠镜中对肌颤的影响

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目的 不同比例依托咪酯与丙泊酚混合液在无痛胃肠镜中对依托咪酯导致肌颤的影响。
方法 选取 2023 年 10 月到 2024 年 3 月无痛胃肠镜检查患者，性别不限，年龄 18 ～70 岁，BMI 17 ～ 30 kg /m2
，ASA Ⅰ或Ⅱ级，拟行无痛胃肠镜检查的患者。本研究共纳入患者 220 例，采用计算机随机法分为四组:依托咪酯组（E 组）41 例，依托咪酯与丙泊酚体积比 1： 1 组(EP1 组)62 例;依托咪酯与丙泊酚体积比 1： 2 组(EP2 组)58 例，依托咪酯与丙泊酚体积比 1： 3 组（EP3 组）59 例。所有患者入室后连接多功能监护仪，对患者心率(HR)、平均动脉压(MAP)、脉搏血氧饱和度(SpO2)指标进行常规监测，四组按照 0.15~0.2 mL/kg 进行静脉注射麻醉诱导，四组静脉推药速度相同，0.4ml/s, 追加剂量 0.05ml/kg，待患者自主呼吸略缓慢但平稳、睫毛反射消失、全身肌肉放松、托下颌无反应时开始插入内镜，确定无反应到达目标镇静深度，消化科医师进行内镜操作。比较麻醉诱导前（TI），麻醉诱导后 2 分钟（T2），5 分钟（T3)，10 分钟(T4)四组患者平均动脉压，心率，脉搏血氧饱和度，肌颤的发生率及严重程度，苏醒时间。
结果 EP3 组肌颤的发生率最低 37.3%，均低于 E 组（82.9%），EP1 组（71%），EP2 组（63.8%），差异有统计学意义，P < 0.05；此外，EP3 组中重度肌颤的发生率最低 20.33%，低于 EP1 组（48.39%），EP2 组（34.48%）差异有统计学意义（P < 0.05）。四组 MAP 在四个时间点均呈不同程度下降趋势，EP3 组与 EP1 组比较，T2 与 T3 的 MAP 差异有统计学意义，P < 0.05，但是下降范围均在基础血压 20%的范围内，与 EP2 比较，EP3 组四个时间点的 MAP 差异无统计学意义。四组的心率，脉搏血氧饱和度差异无统计学意义。EP1 组，EP2 组，EP3 组苏醒时间均短于 E 组，且与 E 组相比，EP2 组，EP3 组苏醒时间差异有统计学意义，P < 0.05。
结论 在无痛胃肠镜的麻醉中，依托咪酯与丙泊酚体积比例为 1：3 时，能显著降低依托咪酯引起肌颤的发生率并减轻其程度，同时保持血流动力学的相对稳定。

PO-0341

右美托咪定联合艾司氯胺酮对全麻下行牙科治疗的学龄前儿童牙科焦虑的影响：一项随机对照试验

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目的 牙科焦虑是在儿童牙科治疗期间普遍发生的并发症。艾司氯胺酮可能有助于缓解焦虑。本研究的目的是探讨右美托咪定联合艾司氯胺酮对全麻下行牙科治疗的学龄前儿童牙科焦虑的影响。
方法 这是一项前瞻性、双盲、随机对照试验。择期行全麻下龋齿治疗的门诊患者 84 例，性别不限，年龄 2～6 岁，ASA 为 I 或 II 级。排除有急性上呼吸道感染、慢性疾病、哮喘、心律失常、早产、发育迟缓或精神疾病史的患者。如果儿童对研究药物有已知的过敏反应，也将被排除。采用随机数字表法随机分为右美托咪定鼻内给药组（D 组）和右美托咪定联合艾司氯胺酮鼻内给药组（DS 组）。随机化比例为 1:1。使用的右美托咪定浓度为 100 μg/ml，艾司氯胺酮浓度为 25 mg/ml。右美托咪定和艾司氯胺酮的体积分别为 0.02 ml/kg 和 0.04 ml/kg。因此，最终鼻内给药的溶液量为 0.06 ml/kg。两组都添加了 0.9%的生理盐水，以达到最终体积 1.5 ml。主要观察指标为术后 1 天和 7 天的改良儿童牙科焦虑量表（MCDAS）评分。次要观察指标包括术后 1 天和 7 天牙科焦虑的发生率、镇静起效时间、镇静成功率、术后疼痛强度、苏醒期躁动的发生率和不良事件发生情况。

结果 与 D 组相比，DS 组术后 1 天（P = 0.004）和 7 天（P = 0.006）的牙科焦虑水平降低；DS 组术后 1 天（47% vs 71%，P = 0.04）和 7 天（44% vs 71%，P = 0.02）的牙科焦虑发生率降低；DS 组的镇静成功率更高（P = 0.03），在给药后，其镇静评分（MAS 评分）更低（P = 0.005），并且血液动力学更稳定（P < 0.01）。在麻醉恢复期间，DS 组的苏醒期躁动发生率（P = 0.03）和术后疼痛强度（P = 0.006）显著低于 D 组。两组不良事件的发生情况相似（P > 0.05）。
结论 与单用右美托咪定鼻内给药作为术前用药相比，右美托咪定联合艾司氯胺酮鼻内给药作为术前用药可以显著改善全麻下接受牙科治疗的学龄前儿童的牙科焦虑。

PO-0342

酒石酸布托啡诺联合丙泊酚对老年患者无痛结肠镜检查中血流动力学及认知功能的影响

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目的 探讨酒石酸布托啡诺联合丙泊酚对老年患者无痛结肠镜检查中认知功能及血流动力学的影响。
方法 选取 2019 年 8 月-2021 年 8 月该院拟行无痛结肠镜手术的老年患者 110 例,用随机数表法分为单药组(丙泊酚组,n=55)和联合用药组(酒石酸布托啡诺联合丙泊酚组,n=55)。单药组静脉泵注 1.5 mg/kg 丙泊酚,联合用药组先静脉泵注 1mg 酒石酸布托啡诺,3 min 后再静脉泵注 1.5 mg/kg 丙泊酚,待睫毛反射消失、全身放松后行结肠镜手术.比较两组患者给药前(T1)、术中(T2)和苏醒时(T3)心率(HR)、经皮动脉血氧饱和度(SpO2)、平均动脉压(MAP)和心脏指数(CI);丙泊酚用量、睁眼时间、手术时间、苏醒后 5、10、30 和 60 min 视觉模拟评分法(VAS);给药前、术后清醒时简易精神状态检查量表(MMSE)评分;术中及术后 1 h 不良反应发生率。
结果 T2 与 T3 时点联合用药组 HR、SpO2 和 CI 均高于单药组(P<0.05);两组患者 HR、SpO2、MAP 和 CI 在 T2 时点均低于 T1 时点,T3 时点高于 T2 时点(P<0.05);两组患者 HR 及单药组 CI 在 T3 时点低于 T1 时点(P<0.05).联合用药组丙泊酚用量少于单药组,睁眼时间短于单药组(P<0.05)。术后 10、30 和 60 min VAS 均低于单药组(P<0.05).MMSE 评分方面,两组患者术后 1 h 均低于给药前(P<0.05),术后 1 d 与给药前比较,差异无统计学意义(P>0.05);联合用药组术后 1 h 高于单药组(P<0.05),术后 1 d 两组间比较,差异无统计学意义(P>0.05)。联合用药组不良反应总发生率低于单药组(P<0.05)。
结论 酒石酸布托啡诺联合丙泊酚可减少丙泊酚用量,减少无痛结肠镜检查中对老年患者认知功能及血流动力学的影响,安全性高。

PO-0343

The efficacy and safety of Ciprofol for ERCP anesthesia in elderly patients: A single-center, Randomized, Parallel Controlled Clinical Study

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Objectives: The purpose of this study was to evaluate the efficacy and safety of ciprofol in endoscopic retrograde cholangiopancreatography (ERCP) anesthesia in elderly patients.
Methods 284 patients aged 65 ~ 80 who received ERCP were randomly divided into two groups: ciprofol group (Group C, n = 142) and propofol group (group P, n = 142). Observe the success

rate of sedation, record the length of successful induction, the length of awakening, the length of leaving the room, the values of MAP, HR, SpO2 and Bis of the two groups at each time point, and the incidence of perioperative adverse events.
Results The both groups of patients successfully completed the operation, and the success rate of sedation was 100%. The 95% CI of the difference of sedation success rate was (- 2.63%, 2.63%), and the lower limit was greater than the non inferiority limit of - 8%. During T1-T5, MAP, HR, SpO2 (85.18 ± 9.16mmHg, 67.33 ± 9.84bpm, 97.75 ± 2.01%, 87.47 ± 9.99mmHg, 67.82 ± 9.49bpm, 97.66 ± 2.18%, 88.37 ± 9.04mmHg, 67.91 ± 9.44bpm, 98.06 ± 1.46%, 86.87 ± 10.34mmHg, 68.35 ± 9.13bpm, 98.29 ± 1.20%, 87.87 ± 10.14mmHg, 68.36 ± 8.44bpm, 98.11 ± 1.09%) was significantly higher than that in group P （82.23±8.53mmHg，63.63±8.02bpm，96.80±2.89%,85.13±7.79mmHg ， 65.26±8.14bpm ， 96.70±2.43%,86.41±7.02mmHg ， 64.83±7.79bpm ， 97.24±1.80%,83.59±6.19mmHg ， 66.09±7.19bpm ， 97.70±1.11%,85.46±7.18mmHg，65.80±5.90bpm，97.54±1.05%）（p＜0.05）； There was no significant difference in MAP, HR and SpO2 between the two groups at T0, and there was no significant difference in BIS points at T0-T5. The duration of successful sedation induction in group C (38.42 ± 6.48s) was longer than that in group P (30.59 ± 6.18s) (P < 0.05). The time of complete recovery and the time of leaving the room in group C (12.78 ± 5.75min, 21.80 ± 5.77min) were shorter than those in group P (16.85 ± 5.01min, 25.89 ± 5.11min) (P < 0.05). The incidence of injection pain in group C (2.1%) was significantly lower than that in group P (24.6%) (P < 0.05). There was no significant difference in the incidence of hypoxemia and hypotension between the two groups.
Conclusions Ciprofol is safe and effective for ERCP sedation and anesthesia, and the incidence of perioperative adverse events is low.

PO-0344

不同麻醉方案在老年 ERCP 中应用的回顾性分析

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目的 胆总管结石是肝胆外科常见病、多发病，ERCP(经内镜逆行性胰胆管造影术)取石具有创伤小、恢复快等优点，是目前治疗胆总管结石的重要手段。但由于手术操作时间不等、操作相对复杂，多数患者、尤其是老年患者局麻下不能耐受，全身麻醉是较好的选择。我院开展 ERCP 手术麻醉 10 余年，年平均麻醉量 1500 余例，65 岁以上患者约占 69%，老年患者常合并多种基础疾病，病情复杂，病情变化快，对麻醉耐受能力下降，药物代谢慢，因此对麻醉用药方案和麻醉管理提出了更严格的要求。目前，对于 ERCP 手术麻醉的气道管理方式无明确定论及相关指南，有研究表明，在接受 ERCP 的药物相关不良反应高风险患者中，使用非气管插管丙泊酚镇静麻醉显著降低药物不良反应的发病率，而不会影响手时间、成功率、恢复室停留时间,本研究回顾性分析不同麻醉方案在老年患者 ERCP 手术麻醉中的效果，选择更安全方便、并发症更少的麻醉方案以优化临床麻醉，为提高 ERCP 手术临床麻醉的安全性及有效性提供指导。
方法 选择胆总管结石于我院全身麻醉下行择期 ERCP 手术的患者 322 例，年龄＞65 岁，性别不限，BMI＜30 ，ASA 分级 I～III 级，根据不同的麻醉方案分为瑞芬太尼(R 组)和右美托咪定组(D 组)，两组各随机抽取 161 例。R 组采用静脉泵注丙泊酚复合瑞芬太尼行术中维持，D 组采用静脉泵注丙泊酚复合右美托咪定行术中维持。比较两组患者术中需追加丙泊酚的药量、术后苏醒时间，比较两组患者术中呼吸抑制、胆心反射、术中知晓、术后谵妄的发生率。
结果 两组患者术中维持追加丙泊酚的药量、术后苏醒时间差异无统计学意义（P＞0.05）,严重胆心反射、术中知晓差异无统计学意义（P＞0.05）。术后谵妄和呼吸抑制的发生率 D 组低于 R 组（P＜0.05）,差异有统计学意义。

结论 丙泊酚复合瑞芬太尼方案和丙泊酚复合右美托咪定方案均能有效地用于胆总管结石 ERCP 手术麻醉术中维持用药。与瑞芬太尼方案相比，右美托咪定方案更安全、有更低的术中呼吸抑制和术后谵妄的发生率。

PO-0345

亚麻醉剂量艾司氯胺酮对接受齿科治疗的学龄前儿童术后牙科焦虑的影响

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目的 探讨术中静脉输注亚麻醉剂量艾司氯胺酮（0.2mg/kg）对学龄前儿童全麻下行齿科治疗牙科焦虑的影响。
方法 这是一项随机、双盲、安慰剂对照试验。择期行全麻下齿科治疗的门诊患者，性别不限，年龄 3～6 岁，ASA 分级，手术时长≥1h。排除有 2 周内有上呼吸道感染史，肝肾功能严重不全，神经精神系统发育异常，如自闭症、脑瘫等，对全麻药物过敏者，发育不良和艾司氯胺酮禁忌症患者。采用随机数字表法分为艾司氯胺酮组（E 组）和生理盐水组（N 组）。艾司氯胺酮组：艾司氯胺酮 0.2mg/kg+生理盐水稀释至 20mL；生理盐水组：生理盐水 20mL。将分组结果放至不透明的信封内，所有参与者和研究者均不知晓随机分组结果。在齿科医生手术开始时，接受静脉输注 0.2mg/kg 艾司氯胺酮或安慰剂生理盐水（泵速均调至为 20ml/h，并在 1 小时内泵注完成）。两组术中均接受 1.5~2%七氟烷吸入，联合静脉泵注瑞芬太尼 0.05~1 μg/kg/min、丙泊酚 4~6 mg/kg/h，并根据术中 BIS 值（50~65）调整丙泊酚和瑞芬太尼的用量。主要结局指标为术后 2h、1d、7d 改良儿童牙科焦虑量表评分 MCDAS（一共 8 个项目，对于每个项目，从 1 到 5 分进行回答，从“不害怕”到“非常害怕”。总分范围 8~40 分。MCDAS 评分≥ 19 分被定义为牙科焦虑 DA），术后 2h 的评分当面询问，术后 1d、7d 评分进行电话随访。次要结局指标为术中不良反应（低氧血症、血压过低、血压过高）、术后不良反应（恶心呕吐、上呼吸道梗阻、低血压、低氧血症、流涎、拔管后呼吸暂停/抑制、喉痉挛、喉咙痛、苏醒延迟）的发生情况、苏醒期躁动发生率、拔管时间及苏醒时间。
结果 共有 21 名儿童（年龄 4±1 岁）被纳入并随机分组。与对照组相比，在术前、术后 2h、1d、7d，艾司氯胺酮组 MCDAS 评分较低（P =0.134）。与术前相比，艾司氯胺酮组在第 7 天（23.7±3.8 vs 22.1±5.3，P =0.414）MCDAS 评分最低。艾司氯胺酮组和对照组术中均未发生不良反应。两组的丙泊酚（P =0.714）和瑞芬太尼（P =0.397）消耗量无显著差异。两组患者的苏醒时间（22.1±4.6 vs 21.1±2.2，P =0.621）、PACU 停留时间（15.3±3.8 vs 14.1±3.1，P =0.510）、不良反应发生率（22.2% vs 57.1%，P =0.152）、苏醒期躁动评分 PAED（7.1±3.4 vs 9.5±2.4 ，P =0.127）没有显著差异。
结论 与对照组相比，术中静脉输注亚麻醉剂量艾司氯胺酮（0.2mg/kg）对于学龄前儿童牙科焦虑缓解没有很好的改善。

PO-0346

Effect of remimazolam on emergence agitation in children undergoing root canal therapy when combined with sevoflurane

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Objective
The utilization of combined intravenous and inhalation anesthesia has been shown to be a beneficial approach for root canal surgery in pediatric patients. Despite the efficacy of the commonly used inhaled anesthetic, sevoflurane, it has been associated with agitation during the recovery period, potentially impacting the overall outcome. While propofol has been suggested as a means to mitigate the agitation induced by sevoflurane, it is important to note that propofol may also lead to injection pain, as well as respiratory and circulatory depression, which could have a negative impact on postoperative recovery in children. The effects of remimazolam in conjunction with sevoflurane remain uncertain and warrant further investigation.
This study aims to examine the impact of remimazolam in conjunction with sevoflurane on emergence agitation in pediatric patients undergoing root canal therapy.
Methods
This prospective, observer-blinded randomized controlled trial (RCT) included male and female patients undergoing root canal therapy. **Participants** Patients (aged 2-7 yr, American Society of Anesthesiologists (ASA) physical status 1 or 2) scheduled to undergo root canal therapy. The exclusion criteria were congenital heart disease (patent ductus arteriosus, tetralogy of Fallot, ventricular septal defect, etc.), respiratory diseases (upper respiratory tract infection, lung infection, bronchial asthma, etc., within the last two weeks), rhinitis or nasal deformity, intellectual disability and suffering from other psychiatric disorders (such as mania, schizophrenia, mental disorder and cognitive dysfunction), allergic to remazolam, propofol and opioids. After obtaining written informed consent, patients who met the eligibility criteria were enrolled in the trial. Patients were subsequently excluded if they required unexpected collaborative surgery (i.e., involving another surgical specialty), experienced delays in the surgery schedule, or committed significant protocol violations.Patients were randomised into the following two groups: the remimazolam group and propofol group. Randomisation was performed using a random number table method. Because of the difference in color and infusion method between propofol and remimazolam, anesthesiologists do not blind. One other investigator who was completely blind to group assignment supervised the entire process of emergence and recovery, including the evaluation of EA. **General anaesthesia** All children were fasted for 6 to 8 hours and water was forbidden for 2 to 4 hours before surgery. After entering the operating room, ECG monitoring was performed, and anesthesia induction was performed: the children were assisted with inhalation anesthesia by "blowing up balloons" and other behavioral induction methods (sevoflurane 8%), then, intravenous access was opened, the remimazolam group was given intravenous remimazolam 0.2 mg/kg, remifentanil 0.5~1 μg/kg, and cisatracurium 0.1~0.15 mg/kg. The control group was given intravenous propofol 1.5~2 mg/kg, remifentanil 0.5~1 μg/kg, and cisatracurium 0.1~0.15 mg/kg. Anesthesia maintenance: Remimazolam group was given 2% sevoflurane, remimazolam 0.5~1mg/kg, remifentanil 0.05~1 μg/kg/min by intravenous pump; The control group was injected with 2% sevoflurane, propofol 4~6 mg/kg, remifentanil 0.05~1 μg/kg/min by intravenous pump, targeting a BIS between 40 and 60. At the end of the operation, All drugs were discontinued immediately. During anesthesia, blood pressure, heart rate, pulse oxygen saturation, electrocardiogram and other vital signs were monitored. and room temperature was maintained at about 25℃ during the operation. **The primary outcome** was the incidence of EA (PAED score ≥12). For evaluation of EA, the pediatric anesthesia emergence delirium scale(PAED) and Anno was used, PAED scale was used to evaluate the incidence of agitation, PAED score and Aono

score were used to evaluate the severity of agitation. the PAED scale consists of five psychometric items with scores ranging from 0 to 20, children with a PAED score of 12 or more was diagnosed with EA. Aono scale was scored from 1 to 4 as follows:1—calm; 2—not calm but comforting; 3—not easily calm or moderately agitated; 4—aggressive, disoriented or excited. **Secondary outcomes** included PAED score and Anno score, the incidence of intraoperative bradycardia, tachycardia and hypotension, and family satisfaction.

Results

A total of 132 patients were assessed for eligibility, and 126 participants were included in the randomisation after excluding 6 patients (Fig 1). Patients were excluded because they refused to participate, or change in operation schedule. 2 patients in each group were excluded because they did not receive allocated intervention or did not receive completed case assessment. Data from 122 subjects were included in the final analysis. The baseline characteristics were similar between the two groups and are presented in Table 1. The incidence of emergence agitation in PACU was lower in the remimazolam group (25/36 [40.98%] vs 12/49 [19.67%]; relative risk [95% confidence interval], 1.595 [1.123-2.216], $P < 0.05$; Fig 2). The PAED score (8 [6-13] vs 6 [3-9.5], $P < 0.05$; Fig 3A) and Anno score 2 ([1-3] vs 2[1-2], $P < 0.05$; Fig 3B) were also lower in the remimazolam group. The incidence of intraoperative bradycardia, tachycardia and hypotension did not differ significantly between the groups($P > 0.05$; Table2). Family satisfaction was higher in remazolam group ($P < 0.05$).

Conclusions

When combined with sevoflurane, remimazolam may serve as a applicable intravenous anesthetic to reduce emergence agitation in children after general anaesthesia.

PO-0347

Hemodynamic Stability of Ciprofol versus Propofol as Anesthetic for Patients Undergoing Painless Colonoscopy: A Randomized, Double-Blind, Controlled Trial

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Abstract

Background Ciprofol is a novel propofol analogue with a characteristic of hemodynamic stability. At present, there is a lack of research comparing the hemodynamic stability of ciprofol and propofol during painless colonoscopy. In this study, we aim to test the hypothesis that ciprofol is superior to propofol in terms of hemodynamic stability for sedation anesthesia in patients undergoing colonoscopy.

Methods 222 patients were randomized into two groups. Patients in group A (n=112) and group B (n=110) received propofol and ciprofol sedation, respectively. Noninvasive blood pressure were monitored starting from induction (T0) to the end of the procedure, at 2-min intervals (T1 to T10). Pain injection, Modified Observer's Assessment of Alertness and Sedation (MOAA/S) score, body movement, doses of norepinephrine, modified Aldrete score, drug-related adverse reactions; and patient's satisfaction and endoscopist's satisfaction were recorded. Results: In group A, fewer patients experienced a decrease in blood pressure, the incidence of pain injection was reduced, the amount of norepinephrine dose was decreased, patient's satisfaction was increased compared with group B (all $P < 0.05$). There were no signifcant difference in induction time, Modified Aldrete score, Alertness time,drug-related adverse reactions and endoscopist's satisfaction.

Conclusions Our study indicated intravenous induction with ciprofol was superior, with regard to hemodynamic stability and reduced injection pain, than induction with propofol for anesthesia in patients undergoing painless colonoscopy.

PO-0348

Comparison of hypotension between propofol and remimazolam-propofol combinations sedation for day-surgery hysteroscopy: a prospective, randomized, controlled trial

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Background A combination of remimazolam and propofol could produce more stable sedation. A good medication regimen should consider not only efficacy but also safety, especially hypotension. The aim of the current study was to compare the incidence and amount of hypotension by propofol versus remimazolam-propofol combinations in day-surgery hysteroscopy.
Methods Patients were randomly assigned to receive either propofol (Group P, n=125) or remimazolam-propofol combinations (Group RP, n=125) at a 1:1 ratio. Intravenous injection of sufentanil 0.1ug/kg were administered before sedative medication. In group P, a bolus of 2.5 mg/kg propofol was administered. In group RP, Intravenous anesthesia was commenced with 0.125mg/kg remimazolam and 1mg/kg propofol. After loss of consciousness, propofol was maintained at 6mg/kg/h. The primary outcomes were the incidence and amount of hypotension during surgery. Hypotension was defined as a MAP less than 65mmHg for at least 1min. The amount of hypotension was assessed by time-weighted average intraoperative MAP under a threshold of 65 mmHg. The secondary outcomes were various anesthesia related parameters and some adverse events.
Results In group P, 25 patients (20.0%) experienced hypotensive during hysteroscopy compared with 9 patients (7.2%) in group RP, for a difference of 12.8% (RR 2.778, 95%CI [1.352-5.709]). The combination of remimazolam and propofol resulted in significantly lower TWA threshold 0.14 (0.10-0.56) mmHg in group RP compared to 0.31 (0.15-0.67) mmHg in group P. The total dose of propofol was nearly double in group P compared to group RP. A significantly higher frequency of injection pain and low oxygen saturation was observed in the group P than that of the group RP. Hiccup was observed only in group RP. The incidences of body movement, bradycardia and vomit were no significant difference between groups.
Conclusion The incidence and amount of hypotension by remimazolam-propofol combinations was significantly less than that by propofol sedation in day-surgery hysteroscopy. The optimization of medication regimen would attenuate the harm of hypotension and contribute to patients' rapid recovery in day surgery.
Trial registration : Chinese Clinical Trial Registry, ChiCTR2400079888 (date: 15/01/2024),

PO-0349

年龄因素对复合丙泊酚时奥赛利定用于无痛胃肠镜检查麻醉诱导半数有效剂量的影响

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目的 评价年龄因素对复合丙泊酚时奥赛利定用于无痛胃肠镜检查麻醉诱导半数有效剂量的影响。
方法 选择拟行无痛胃肠镜检查术患者，性别不限，ASA 分级Ⅰ或Ⅱ级，BMI 18-27 kg/m2。根据年龄分为两组：成年组（A 组：年龄 18-65 岁）和老年组（E 组：年龄＞65 岁）。静脉注射奥赛利定 2min 后缓慢静脉注射丙泊酚 1.5mg/kg，待患者睫毛反射消失、下颌松弛后开始胃镜检查。采用改良 Dixon 序贯法进行试验，根据预实验结果设定奥赛利定起始剂量为 0.015mg/kg，相邻药物剂量比值为 1:1.2，若进镜时及检查开始 2min 内患者出现吞咽、呛咳、体动等影响检查操作的反应为阳性，下一例患者增加 1 个剂量梯度，否则视为阴性下一例患者降低 1 个剂量梯度，重复此过程直至出现 7 个转折。采用 Probit 法计算奥赛利定的半数有效剂量（ED50）、95%有效剂量（ED95）及其 95%置信区间（95%CI）。
结果 A 组患者复合丙泊酚时奥赛利定抑制胃肠镜检查反应的 ED50（95%CI）为 0.0147（0.0072-0.0231）mg/kg，ED95（95%CI）为 0.0255（0.0198-0.1717）mg/kg；E 组患者复合丙泊酚时奥赛利定抑制胃肠镜检查反应的 ED50（95%CI）为 0.0121（0.0026-0.0190）mg/kg，ED95（95%CI）为 0.0232（0.0176-0.1617）mg/kg。
结论 小剂量奥赛利定复合丙泊酚静脉麻醉可安全用于无痛胃肠镜检查患者。

PO-0350

全身麻醉术后患者低体温影响因素预测模型的构建及验证

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目的 开发和验证全麻手术术后患者低体温风险预测模型，比较决策树算法和 Logistic 回归分析方法所构建模型的预测性能，降低患者全麻术后意外低体温出现的几率。
方法 回顾性收集 2023 年 1 月至 2023 年 12 月在江西省某三甲医院麻醉复苏室（PACU）进行苏醒的患者作为建模组，2024 年 1 月至 2024 年 7 月在江西省某三甲医院麻醉复苏室（PACU）进行苏醒的患者作为验证组。提取患者一般资料、手术资料、围手术期液体管理资料等信息，并建立决策树模型及 Logistic 回归模型探究老年 VTE 患者复发的危险因素。采用受试者工作特征曲线（ROC）及混淆矩阵来对决策树模型和 Logistic 回归模型进行内部和外部验证。绘制列线图、校准曲线及决策曲线来评估 Logistic 回归模型的预测精度。
结果 研究共纳入建模组患者 326 例，验证组患者 164 例，其中建模组患者低体温发生率 41.7%（136/326）、验证组患者低体温发生率 45.7%（75/164）。决策树模型及 Logistic 回归模型均显示 BMI (OR=7.11, 95%CI:4.98-9.24, P<0.001)、手术时间 (OR=3.29, 95%CI:2.96-3.62, P<0.001)、手术方式(OR=0.27, 95%CI:0.20-0.34, P=0.007)、麻醉方式(OR=0.67, 95%CI:0.47-0.87, P<0.001)是患者术后发生低体温的重要危险因素，其中决策树模型指出前五个重要变量为年龄、手术方式、BMI、手术时间、基础体温，校准曲线结果显示，实际概率和列线图预测概率之间具有良好的预测精度，决策曲线显示，当阈概率在 0.1~0.99 之间时，列线图临床预测有效性良好。在内外部验证中，内部验证结果显示，AUC 为 0.901，模型准确率 91.2%、灵敏度 77.4%、特异度 95.7%、阳性预测值 80.6%、阴性预测值 80.1%，模型错判率 31.7%。外部验证结果显示，决策树模型预测低体温发生率 39.6%，AUC 为 0.886，准确率 81.2%、灵敏度 93.3%、特异度 69.2%、阳性预测

值 64.5%、阴性预测值 92.6%，模型错判率 33.5%；Logistic 回归模型预测低体温发生率 42.1%，AUC 为 0.911，准确率 88.1%、灵敏度 42.7%、特异度 98.2%、阳性预测值 71.6%、阴性预测值 69.8%，模型错判率 39.9%。内外部验证结果均表明两种预测模型的整体预测性能均较好。
结论 患者在全身麻醉术后苏醒阶段会出现意外低体温的情况，因此，早期预防低体温的出现对于患者术后康复极为重要。本研究结果表明，决策树模型与 Logistic 回归模型应联合使用，以更好地帮助临床医护人员正确预防手术术后患者恶性低体温的发生。

PO-0351

Comparison of 95% effective dose of remimazolam besylate and propofol for gastroscopy sedation on older patients: A single-centre randomized controlled trial

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Introduction

Perioperative hypotension and bradycardia are associated with an increased risk of organ injury and adverse events for ischemia of vital organs are the most prevalent sedation-related complication in endoscopic procedures. Although midazolam and propofol are widely used for endoscopic sedation, cardiopulmonary adverse events remain common. However, several risk factors - such as comorbidity, premedication status, and increased vascular fragility, a decreased volume of distribution and total body clearance in elderly patients, making it difficult to design a dosage regimen. Remimazolam brings about a rapid onset and recovery with adequate sedation efficacy to meet its target profile on painless gastroscopy, which may be a more suitable choice for older patients with lower rates of adverse events according to previous clinic trials.

Methods

The trial consists of 2 parts, patients aged>65 years, and scheduled for outpatient painless gastroscopy were enrolled. Inclusion criteria were Society of Anesthesiologists (ASA) physical status of I to II and a body mass index of 18–28 kg/m2. Exclusion criteria were allergy to benzodiazepines, opioids propofol, lidocaine, upper respiratory tract infection within 2 weeks, use of benzodiazepines or opioids, epilepsy, any mental illnesses, a history of addiction to analgesics. Patients fasted for at least 6 hours and received 10 g of lidocaine viscous oral liquid within 1 hour before the start of the gastroscopic procedure.

Firstly, Dixon's up-and-down methodology was used to determine the ED95 of remimazolam besylate and propofol for gastroscopic insertion, in combination with 0.2 μg/kg remifentanil.

Secondly, patients in each group received 0.2μg/kg remifentanil and ED95 dose of the study drugs for sedation induction randomly, supplemental doses were added to maintain sedation depth when necessary. The primary outcome was the incidence of adverse events and secondary outcome was the recovery time.

Results

In the Dixon method, the stopping rule requires at least 6 ineffective/effective pairs. We chose 7 failure–success crossovers in each group to stop the study. There were 34 patients in the remimazolam group. The ED95 induction dose to inhibiting movements of older patients

gastroscopy was 0.2039 (95%CI 0.1753–0.3896) mg/kg undergoing for remimazolam besylate and 1.9944 (95%CI 1.7386–5.9553) mg/kg for propofol.

The onset of action of remimazolam was accelerated from 1.5–2.5 min in the reported study to <1 min in our trial where a large initial dose was used, without increasing the risk of respiratory depression. Given the above, remimazolam has an advantage in maintaining circulation and respiratory stability.

Remimazolam group presented a shorter recovery time, indicating its good controllability, which can avoid excessive sedation due to a short elimination half-life.

Conclusion

Remimazolam can reduce adverse reactions such as perioperative hypotension and bradycardia, excessive sedation, and injection pain in elderly patients compared with propofol.

PO-0352

呼气末二氧化碳监测在轻度肥胖患者在 EGD 和结肠镜检查镇静期间的应用

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目的 通过持续监测呼气末二氧化碳浓度，二氧化碳图可以及早发现通气异常或呼吸暂停。 这项随机对照研究探讨了二氧化碳图早期干预对接受食管胃十二指肠镜检查 (EGD) 和结肠镜检查镇静的轻度肥胖患者缺氧发生率的影响
方法 这是一项单中心、随机、单盲、平行分配、对照试验。 接受 EGD 和结肠镜检查镇静的轻度肥胖患者（28 kg/m2 ≤ BMI < 40 kg/m2）被随机分配到标准组或二氧化碳图组。 两组均使用标准心肺监测设备，并在二氧化碳图组中进行额外的二氧化碳图。 如果镇静期间肺泡通气不足，则按顺序进行五种干预措施（a-e）：a：增加氧气流量（5 L/min）； b：下巴抬起或下颌推力动作； c：放置鼻咽通气道和下巴提升术； d：面罩正压通气，e：插入管子的呼吸机辅助通气。 主要结局为各组缺氧发生率（SpO2 < 90%，≥10 s）。 次要结局包括严重缺氧（SpO2≤85%）、亚临床呼吸抑制（90%≤SpO2<95%）的发生率、干预措施、术中最低 SpO2、患者满意度、内镜医生满意度以及麻醉镇静的其他不良事件。
结果 本研究纳入 228 名患者（二氧化碳图组 = 112；标准组 = 113；排除 3 名患者）。 二氧化碳图组缺氧发生率显着低于标准组（13.4% vs. 30.1%，P = 0.002）。 二氧化碳图组亚临床呼吸抑制率高于标准组（30.4% vs. 17.7%，P = 0.026）。 二氧化碳图组的严重缺氧发生率为 5.4%，而标准组为 14.2%（P = 0.026）。 在镇静期间，二氧化碳图组和标准组分别有 96 人和 34 人接受了干预。 两组最后一次术中干预次数比较，差异有统计学意义（P < 0.0001）（a：47 次 vs 1 次，b：46 次 vs 26 次，c：2 次 vs 5 次，d：1 次 vs 2 次） ，e:0 与 0 ）。 两组在术中最低 SpO2、患者满意度或内窥镜医师满意度评分方面没有发现显着差异。 两组麻醉镇静不良事件发生率无统计学差异。
结论 EGD 镇静期间的二氧化碳图和结肠镜检查可以在 SpO2 降低之前监测到轻度肥胖患者的呼吸暂停和呼吸模式改变。 在这个时间范围内对患者给予有效的干预措施，减少了患者缺氧和严重缺氧的发生率。

PO-0353

中心还是外周：一项关于肺移植术中不同 V-A ECMO 插管方式对 PGD 影响的回顾性研究

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目的 回顾性分析肺动脉高压肺移植术中不同 VA-ECMO 插管方式对术后早期 PGD 的影像
方法 回顾收集了 2019/1/1 至 2022/03/31 于无锡肺移植中心接受不同 V-A ECMO 肺移植的 103 例患者资料，采集受者基本信息、术前肺动脉压、手术时间、冷缺血时间、术中及术后三天平均动脉压(MAP)、血管活性药用量、氧合指数等数据。中心 ECMO 采用右心房-升主动脉置管(cVA-ECMO)，外周 ECMO(pVA-ECMO)通过腹股沟入路置管并维持术中管理。主要结局包括结束再灌注后 72 小时内是否出现 PGD。次要结局包括术后通气时间、ICU 停留天数等早期结局；术后 72 小时内脑钠肽(BNP)、肌钙蛋白 T(Troponin T)等实验室指标及院内死亡率、术后一年生存率。使用 SPSS 25.0 统计软件对人口学和术中因素进行分析，采用 t 检验(t-test)、卡方分析(chi-square analysis)分别筛选连续或不连续变量，应用多变量回归模型调整纳入标准，计算术后生存率与 PGD 相关指标发生率，绘制 Kaplan-Meier 生存曲线以评估两种模式间差异。
结果 根据 ECMO 不同插管方式分成 p 组(pVA-ECMO=80)和 c 组(cVA-ECMO=18)，两组患者的一般情况无统计学差异。与外周插管组的相比，中心插管组术后 72h 内 PGD 发生率、气管插管拔除时间、ICU 停留时间、术后肌钙蛋白-T(Troponin T)均低于前者(p=0.005、0.008、0.017、0.009)。术后 MAP、BNP、是否行连续性肾脏替代治疗(CRRT)等指标无明显差异(p>0.05); 术中 c 组转流流量明显高于 p 组[4(3，4) vs 2.2(2，2.55), L/min, p = 0.001]。院内平均死亡天数为[cECMO 5.5(4,58) vs pECMO 25.5(14.75,85.25), day, p=0.042]，一年生存率无差异(p=0339)。
结论 cV-A ECMO 插管方式较外周提供了更优的心脏保护和循环稳定，有助于降低术后 PGD 发生率。

PO-0354

Cx43 负调控 AMPK-mTOR-ULK1 介导的自噬动态变化在胆总管结扎大鼠心肌损伤中的作用

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目的 心脏损伤是黄疸患者的严重并发症，但是发病机制尚不清楚。Connexin43 参与心肌电信号传导和氧化应激，自噬 AMPK-mTOR-ULK1 信号通路在心肌损伤机制中具有至关重要的作用。本研究旨在探讨黄疸型心脏中缝隙连接蛋白 43 （Connexin 43, Cx43）表达与 AMPK-mTOR-ULK1 信号通路介导的自噬之间的关系，为黄疸型心脏保护的研究提供新的参考依据。
方法 通过胆总管结扎（common bile duct ligation, CBDL）建立 SD 大鼠黄疸模型，随机分为：假手术组（Sham 组）、胆总管结扎组（CBDL 组）、CBDL+3-甲基腺嘌呤组（CBDL+3-MA 组）、CBDL+雷帕霉素组（CBDL+Rapa 组）和 CBDL+Cx43 通道抑制剂组（CBDL+Gap26 组）。在 CBDL 后 24 小时、48 小时、3 天、1 周、2 周和 3 周观察大鼠心脏损伤情况。在心脏损伤大鼠的 CBDL 3 天和 CBDL 2 周时观察 CBDL+3-MA、CBDL+Rapa 和 CBDL+Gap26 三组的心肌损伤情况，以研究 Cx43 和自噬 AMPK-mTOR ULK 通路之间的调节关系。在体外，将细胞暴露于 CBDL 大鼠血清 24 小时，分别用 AMPK 抑制剂化合物 C（Com C）和 AMPK 激活剂 （AICAR）干预 24 小时和 48 小时，观察细胞自噬与 AMPK-mTOR-ULK1 通路之间的关系。测定 CBDL 大鼠血清总胆红

素（TBIL）、天门冬氨酸转氨酶（AST）、丙氨酸转氨酶（ALT）、乳酸脱氢酶（LDH）、肌酸激酶-MB 同工酶（CK-MB）、心肌组织超氧化物歧化酶（SOD）、丙二醛（MDA）和谷胱甘肽过氧化物酶（GSH-PX）。同时对 CBDL 大鼠监测超声心动图；透射电镜观察心肌组织超微结构及自噬情况；HE 染色、Masson 染色观察心肌形态。免疫组化及免疫荧光观察蛋白表达。Western blot 检测 Cx43, Beclin1, p-62, LC3Ⅱ/I, AMPK, ULK1, mTOR, p-AMPK（Thr.172）, p-ULK1（Ser757）和 p-m TOR（Ser2448）蛋白水平。

结果 CBDL 通过激活 AMPK-mTOR-ULK 通路诱导自噬，自噬从低到高动态变化影响心脏功能。与假手术组相比，CBDL 组大鼠的心功能逐渐下降。血清中的 TBIL, ALT 和 AST 水平最初升高，随后下降。LDH 和 CK-MB 的水平逐渐升高。血清中的 SOD 含量降低，而 MDA 和 GSH-PX 含量升高。电镜下可见，随着时间的延长，大鼠心肌组织中自噬小体增多。光镜下观察到，随着胆总管结扎时间的延长，心肌损伤加剧。与 CBDL 组相比，Rapa 预处理促进自噬在 CBDL 3 天时对心肌损伤有保护作用，3-MA 抑制自噬则没有影响。在 CBDL 2 周时使用 Rapa 预处理可增强自噬，加重心脏损伤，但使用 3-MA 抑制自噬可减轻心脏损伤。在体外实验中可见 AMPK 抑制剂增强了细胞活力，心肌细胞损伤减轻；而 AMPK 激动剂则抑制了细胞活力，加重心肌细胞损伤。此外，我们还观察到自噬增加会导致 Cx43 表达减少，从而对心脏功能产生负面影响。

结论 CBDL 通过 AMPK-mTOR-ULK 通路激活自噬，导致 Cx43 水平下降诱导大鼠心肌损伤。自噬在 CBDL 从低到高动态变化，在 CBDL 早期自噬的适度增加可以改善心脏损伤，而后期自噬的过度激活可以造成心肌损伤。

PO-0355

胆碱脱氢酶对幼鼠肝缺血再灌注后脑损伤及远期认知功能的影响

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目的 探讨胆碱脱氢酶（CHDH）在幼鼠肝缺血再灌注（HIR）海马及远期认知功能损伤中发挥的作用。

方法 健康 C57 小鼠 52 只，2 周龄，体重 6～9 g，采用随机数字表法分为 4 组（n=13）：假手术组（S 组）、缺血再灌注组（I/R 组）、CHDH 过表达腺病毒+缺血再灌注（Ad-CHDH+I/R 组）和敲低 CHDH 腺病毒+缺血再灌注组（Ad-shCHDH+I/R 组）。采用阻断肝左叶及中叶肝蒂 60min 后再灌注的方法建立肝缺血再灌注损伤模型，于造模前一天使用脑立体定位仪进行腺病毒海马区注射。每组随机 10 只小鼠于术后 6 小时处死，分离血清并取脑组织，酶联免疫吸附测定（ELISA）检测血清脑损伤标志物 S100β 和神经元特异性烯醇化酶（NSE）水平，HE 染色观察海马组织病理改变，Western blot 检测 Parkin、TOM20、COX4I1 表达水平，TUNEL 染色检测海马神经元凋亡，其余小鼠于术后 30 d 进行 Morris 水迷宫实验，评价远期认知功能。

结果 与 S 组比较，I/R 组血清 S100β 和 NSE 水平明显升高，海马组织水肿，细胞排列紊乱，Parkin 表达上调，TOM20、COX4I1 表达下调，TUNEL 阳性率增加，平台所在象限滞留时间缩短（P＜0.05）；与 I/R 组比较，Ad-CHDH+I/R 组血清 S100β 和 NSE 水平降低，海马神经元病理损伤减轻，Parkin 表达上调，TOM20、COX4I1 表达下调，TUNEL 阳性率降低，平台所在象限滞留时间明显延长（P＜0.05）；Ad-shCHDH +I/R 组血清 S100β 和 NSE 水平升高，海马病理损伤加重，Parkin 表达下调，TOM20、COX4I1 表达上调，TUNEL 阳性率增加，平台所在象限滞留时间明显缩短。（P＜0.05）

结论 CHDH 在肝缺血再灌注致脑损伤及远期认知功能障碍中发挥保护作用，该保护作用与增强线粒体自噬活性密切相关

PO-0356

S100A9 在肝缺血再灌注致小鼠急性肺损伤中的作用：与 Nrf2 的关系

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目的 评价钙结合蛋白 S100A9 在肝缺血再灌注(HIR)诱导的急性肺损伤中的作用及其与 NF-E2 相关因子 2(Nrf2)的关系。
方法 SPF 级 2～3 周雄性野生型(WT)及 S100A9 敲除型(S100A9KO)C57BL/6J 小鼠各 12 只，体质量 10～15g，采用随机数字表法将小鼠分为 4 组(n=6): 假手术组(WT+Sham 组、S100A9KO+Sham 组)和 HIR 组(WT+HIR 组、S100A9KO+HIR 组)。采用夹闭肝左、中叶门静脉和肝动脉 60 min 恢复灌注的方法制备 HIR 损伤模型。于恢复灌注 6 h 时麻醉小鼠，下腔静脉取血，随后处死小鼠取双侧肺组织，确定肺湿重/干重(W/D)比值，HE 染色法观察肺组织病理学结果，计算肺组织损伤评分，用 ELISA 法检测血清和肺组织中 S100A9、TNF-α、IL-6 浓度和 MPO 活性，用荧光染色法检测 ROS 含量，采用 Western blot 方法测定细胞核中 Nrf2 及细胞浆中 Nrf2、HO-1 的表达。
结果 与 WT+Sham 组比较，WT+HIR 组与 S100A9KO+HIR 组肺损伤评分、W/D 比值、血清和肺组织中 S100A9、TNF-α、IL-6 浓度，ROS 含量及 MPO 活性均升高(P<0.05)。与 WT+HIR 组比较，S100A9KO+HIR 组肺损伤评分、W/D 比值、血清和肺组织中 TNF-α、IL-6 浓度，ROS 含量及 MPO 活性均下降(P<0.05)，且 S100A9KO+HIR 组细胞核中 Nrf2 表达升高，细胞浆中 Nrf2 表达下降，细胞浆中 HO-1 表达升高(P<0.05)。
结论 S100A9 上调参与了 HIR 导致的急性肺损伤过程，该机制与抑制 Nrf2 核易位有关。

PO-0357

12 岁以下儿童肺移植的麻醉管理

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目的 本研究旨在总结儿童双肺移植手术的麻醉管理策略。
方法 对 2019 年 9 月至 2022 年 11 月间在无锡市人民医院接受双肺移植的 14 名儿童患者的数据进行了回顾性分析。记录并统计患者的基本情况、手术方法、气道管理、麻醉药物及血管活性药物种类、术中监测设备及方法、体外支持设备的使用、液体管理、围术期血流动力学指标（心率、平均动脉压、平均肺动脉压、中心静脉压）、血气和电解质情况以及术后转归。
结果 在 14 名患者中，最小的患者 2 岁，平均年龄 8 岁。10 名患者基础疾病为闭塞性细支气管炎综合征(BOS)，2 名为囊性肺纤维化(CF)，1 名为特发性肺动脉高压(IPAH)，1 名为特发性肺纤维化(IPF)。7 名患者接受了体外膜氧合（ECMO），1 名接受了体肺转流（CPB）。术中 4 例患儿采用单腔气管导管、10 例患儿采用双腔支气管导管实现单肺通气。平均手术时间为 303 ± 53 分钟，中位拔管时间为 26 小时，平均重症监护室（ICU）住院天数为 4 天。术中输液晶体 26.3 ml/kg，20%白蛋白 1.19 g/kg，红细胞 20.3ml/kg，血浆 22.2ml/kg；出液量尿量 27.3 ml/kg，出血 30.5 ml/kg，引流 8.1 ml/kg。所有儿科肺移植手术均成功完成，术后有 13 名患者成功出院，1 名患者在术后第四天因感染性休克死亡。
结论 成功的儿童肺移植需要有效的围手术期麻醉管理，其中重点在于循环的控制。直接测量的血流动力学指标（包括心率、平均动脉压及中心静脉压）是决策的基石，而一些血流动力学监测技术，如 Vigilance 和脉搏指示连续心输出量监测（PICCO），在监测儿童血流动力学结果时产生很大的

偏差。由于儿童心输出量的维持主要依赖于心率，术中维持较快心率对维持血流动力学稳定至关重要。此外，积极使用血管活性药物不可或缺。输液管理的原则是根据血压和中心静脉压限制输液，同时维持血红蛋白在 100 g/L 以上。由于 ECMO 的血管相关并发症，围术期必须审慎评估 ECMO 的必要性（术前、术中单肺通气后、肺动脉阻断后），手术期间应优先使用中心 ECMO。

PO-0358

Myeloid β-catenin/Hedgehog Axis Controls NLR Family Pyrin Domain Containing 3 Activation and Governs Immunoregulation in Inflammatory Liver Injury

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Background β-catenin plays important roles in cell metabolism, oxidative stress, inflammation and apoptosis. Activation of Hedgehog/Gli1 signaling regulates cell growth, differentiation and immune function. However, it remains unknown whether and how myeloid β-catenin signaling may modulate the Hedgehog/Gli1 pathway in sterile inflammatory liver injury. This study investigates the functional roles and molecular mechanisms of myeloid β-catenin signaling in the modulation of NLRP3-mediated innate immune responses during ischemia/reperfusion (IR)-triggered liver inflammation.

Methods Myeloid-specificβ-catenin knockout (β-catenin M-KO) and β-catenin -proficient (β-catenin FL/FL) mice were subjected to liver ischemia. Mice were sacrificed after 6 h of reperfusion. For in vitro study, Bone marrow-derived macrophages (BMMs) were isolated and transfected by CRISPR/Cas9-mediated Gli1 knockout vector followed by LPS stimulation.

Results β-catenin M-KO mice were susceptible to IR-induced hepatocellular damage, with enhanced serum ALT levels, shifted macrophage polarization from M2 to M1 phenotype, and increased inflammatory mediators. Unlike β-catenin FL/FL controls, β-catenin M-KO diminished Hedgehog signaling effector Gli1, and Snail but enhanced RIPK3 and NEK7/NLRP3 activation. In parallel in vitro study, we found that β-catenin and Gli1 co-localized in the nucleus. Disruption of the β-catenin-Gli1 axis reduced Snail signaling, leading to the inhibited RIPK3 and NEK7/NLRP3. Moreover, macrophage Gli1 or Snail knockout activated RIPK3, which augmented hepatocytes necroptosis after hepatocytes/macrophages co-culture while macrophage RIPK3 knockout diminished NEK7/NLRP3-mediated immune and inflammatory responses.

Conclusion Myeloid-specificβ-catenin deficiency inactivates the Hedgehog-Gli1 signaling leading to enhanced Snail/RIPK3 activity and NEK7-NLRP3-driven liver inflammation. Our findings underscore the crucial role of myeloid-specificβ-catenin signaling in the modulation of NLRP3-mediated innate immunity and inflammatory responses during sterile inflammatory liver injury, and imply the therapeutic potential in organ IRI and transplant recipients.

PO-0359

Impact of differential glycemic management goals in pre-anhepatic and anhepatic phase on early grafted liver function after liver transplantation: an open-label, randomized, controlled study

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目的 Liver graft function is closely related to the quality of liver transplantation (LT). Perioperative blood glucose management, especially glycemic variability (GV) control, is considered to protect liver graft function. However, no studies have explored the protective effects of specialized and staged blood glucose management target ranges on reducing GV and early allograft dysfunction (EAD) after LT.
方法 188 LT recipients were randomly assigned 1:1 to the less intensive glucose management (LIGM) group and the more intensive glucose management (MIGM) group. They followed blood glucose management goals of 7.8 ~10 mmol/L and 4.5 ~ 6.7 mmol/L in the pre-anhepatic and anhepatic phases, respectively, and the goals of 4.1~10.0 mmol/L in the neohepatic phase and postoperatively. The primary outcome was EAD, and the secondary outcomes were GV, incidence of hyperglycemia/hypoglycemia, postoperative liver enzyme levels, 30-day postoperative infection rate, one-year survival rate, and levels of TNF-α, IL-6 and C-reactive protein.
结果 A total of 182 adult patients (89 in the LIGM group and 93 in the MIGM group) completed the study. The mean age of the recipients was 51.46 ± 10.79 years, and the median MELD score before surgery was 16. The incidence of EAD on day 7 after surgery was significantly lower in the LIGM group than in the MIGM group (10.11 % vs 31.18 %, P ＜ 0.001), with a relative risk (RR) of 0.32 (2-sided 95% CI 0.110~0.562). There was no statistical difference in the infection rate within 30 days after surgery between the two groups (P > 0.001). The one-year survival rate of the LIGM group was higher than that of the MIGM group (92.13 % vs 82.02 %, P = 0.044).
结论 Adopting less strict glycemic management (7.8~10.0 mmol/L) during the pre-anhepatic and anhepatic phases helps to reduce the incidence of EAD after LT and promotes the recovery of grafted liver function, but does not increase the incidence of postoperative infections.

PO-0360

术中泵注去甲肾上腺素对比多巴胺对移植肾灌注的影响：一项随机对照临床试验

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目的 本研究的目的是研究同种异体肾移植术中分别输注去甲肾上腺素或多巴胺对肾移植受体移植肾灌注、早期移植肾功能和心血管并发症的影响，并将移植受体的结局进行比较。
方法 本研究是一项前瞻性、双盲、随机对照临床试验，在纳入符合入组标准的 84 例患者中，4 例被排除，80 例被随机分配。来自同一供体的一对供肾，采用随机数字法将受试人员按照 1 ：1 比例分配至去甲肾上腺素组（n=40）和多巴胺组（n=40）。主要结局指标为两组患者在移植肾血流开放后 10 分钟、手术结束时和术后 24 小时的移植肾脏超声血管阻力指数 RI。次要结局指标包括

肾动脉血流；两组患者术前及术后的肌酐、心肌损伤标志物和 NT-proBNP 水平；术后 24 小时尿量和胱抑素-C 水平；移植后早期肾功能延迟恢复的发生率、急性排斥反应发生率及住院时间。
结果 在移植肾血流开放后 10 分钟、手术结束时和术后 24 小时，去甲肾上腺组与多巴胺组两组的各级肾血管（肾门动脉、肾段动脉、叶间动脉）RI 间均无统计学差异。两组患者肾血流、术后早期肾功能恢复、心脏损伤指标、急性排斥反应发生率、住院时间等方面均无统计学差异，但多巴胺组的补液量（P=0.031）、白蛋白输入量（P=0.027）多于去甲肾上腺组，同时术中移植肾动脉开放前的心率明显快于去甲肾上腺组（P=0.027）。
结论 去甲肾上腺素（0.03-0.2 ug/kg/min）和多巴胺（2-10 ug/kg/min）均能有效维持肾移植术中受体血流动力学稳定，不增加移植肾 RI 值并保障移植肾的良好灌注；同时不影响术后早期肾功能恢复和不增加心脏损伤等。此外，与多巴胺相比，泵注去甲肾上腺素复合更少的术中补液量即可维持血流动力学稳定。

PO-0361

局部脑氧饱和度监测在脑瘫患儿颈总动脉外膜剥脱术围术期的应用研究

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目的 研究局部脑氧饱和度值在脑瘫患儿颈总动脉外膜剥脱术中的变化情况，并探究其与各围术期指标的关系
方法 随机选取新疆医科大学第二附属医院 2023 年 1 月至 2023 年 9 月择期行颈总动脉外膜剥脱术的脑瘫患儿 73 人，记录各术前指标。所有患者进入手术室后常规监测生命体征，按照预定方案实施麻醉诱导，在术中各个节点：术前不吸氧时（T0）、吸纯氧（2L/min）五分钟后（T1）、气管插管完成后 5 分钟（T2）、切皮时（T3）、术中明显剥离颈总动脉外膜时（T4），在麻醉苏醒期各节点：适度刺激无反应时（T5）、给予适度刺激有反应前 2 分钟（T6），对适度刺激有反应、达到拔管指针时（T7）、拔管后（T8）的局部脑氧饱和度值及各常规指标：HR（Heartrate，心率）、MAP（Mean Arterial Pressure，平均动脉压）、SPO2（Pulse Oxygen Saturation，脉搏氧饱和度）、PETCO2(Partial Pressure Of End-Tidal Carbon Dioxide，呼气末二氧化碳)、气道峰压、拔管时长等，并记录术后并发症的发生情况。总结分析各指标与 rScO2（Cerebral Regional Oxygen Saturation，局部脑氧饱和度）的相关性及各指标对评估脑瘫患儿麻醉苏醒期意识恢复的评估效能。
结果 rScO2 在术中呈先缓慢下降，在苏醒期迅速上升趋势，即在入室时及拔管时 rScO2 值最大，在麻醉诱导后 rScO2 呈现下降趋势，在切皮及明显剥离外膜时达到最低点，其整体下降趋势小于 T0 值的 20%；rScO2 在各节点除 T1 节点与 T0 节点相比差值无统计学意义外，其余各节点与 T0 相比差值均有统计学意义（P＜0.05）；HR、SPO2、年龄、PETCO2、术前动脉血氧分压、术前 Hb、BMI 与 rScO2 无相关性（P＞0.05），MAP 与 rScO2 呈正相关；拔管时长与 rScO2 呈负相关。在患儿苏醒情况的预测方面，rScO2 相较 MAP 和 HR 更具有预测效能。
结论 rScO2 在脑瘫患儿颈总动脉外膜剥脱术可发生一定程度的下降，但其下降程度在安全范围内；各常规指标中 MAP 和拔管时长与 rScO2 存在一定相关性；在苏醒期 rScO2 相较 MAP 和 HR 更能够预测脑瘫患儿的苏醒程度；术后并发症的发生与术中 rScO2 的变化无相关性。

PO-0362

The Effects of Ropivacaine Combined with Compound Betamethasone in Scalp Nerve Block on Inflammatory Response and Postoperative Pain in Patients Undergoing Elective Craniotomy: A Prospective Randomized Controlled Clinical Study

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Background：Scalp nerve block is an essential anesthetic technique for enhancing recovery in neurosurgical procedures. However, the administration of local anesthetics alone prior to craniotomy provides only short-term analgesia and limited effectiveness. Compound Betamethasone, commonly referred to as Diprospan, is a pharmacological formulation comprising the fast-acting Betamethasone Sodium Phosphate and the long-acting Betamethasone Dipropionate. Diprospan, as an adjuvant to local anesthetics, effectively prolongs their duration and enhances analgesic intensity. However, its application in scalp nerve blocks has yet to be investigated.

Method：This study is a prospective, single-center, triple-blinded, randomized controlled clinical trial, which targets patients aged 18-64 years, with an American Society of Anesthesiologists (ASA) physical status of I to III, scheduled for elective craniotomy. Eligible patients were randomly allocated in a 1:1 ratio to either the DP-SNB group (n=45), which received a scalp nerve block with 0.5% ropivacaine combined with compound betamethasone, or the SNB group (n=45), which received treatment with 0.5% ropivacaine alone. The primary outcomes measured were the levels of interleukin-6 (IL-6), interleukin-10 (IL-10), and interferon-gamma (IFN-γ) in arterial blood following cranial lesion resection, as well as pain scores (NRS) at 2h, 8h, 16h, 24h, and 48h postoperatively.

Outcomes：Baseline data showed no statistically significant differences between the two groups.；The addition of compound betamethasone as an adjuvant in scalp nerve block reduced IL-6 and IFN-γ levels post-tumor resection and significantly decreased pain scores within 48 hours postoperatively.

Conclusion Scalp nerve block with 0.5% ropivacaine combined with compound betamethasone significantly decreases IL-6 and IFN-γ levels and postoperative pain intensity within 48h after elective craniotomy. This method provides a simple, effective, and convenient enhanced recovery protocol.

PO-0363

脑电双频指数（BIS）监测下的全身麻醉镇静深度调控对慢性意识障碍患者行 SCS 植入术促醒结局的影响：一项真实世界的回顾性研究

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目的 观察使用脑电双频指数（Bispectral Index,BIS）维持合适麻醉深度是否有助改善慢性意识障

碍 (Disorders of consciousness,DoC) 患者行脊髓电刺激 (Spinal Cord Stimulation, SCS) 植入术的预后

方法 回顾 103 例行 SCS 植入术的 DoC 患者，根据纳排标准共纳入 83 名 DoC 患者，根据术中是否使用 BIS 监测，将患者分成 BIS 组（n =45）和非 BIS 组（n =38），收集患者病程、病因、麻醉时间、手术时间等相关信息。收集患者术前 CRS-R(CRS-R(术前))评分、术后 24 小时（CRS-R（24h））及术后 3 个月 CRS-R（CRS-R(3m)）的变化情况。结果： CRS-R(术前)与 CRS-R（3m）评分相比，BIS 组高于非 BIS 组，差异有统计学意义（P ＜0.05）；CRS-R（术后 24h）中的听力方面 BIS 组高于非 BIS 组，差异有统计学意义（X2=8.787,P =0.004）；将意识好转纳入多因素 Logistic 回归分析模型，发现丘脑是意识改善的独立影响因素（P ＜0.05）；随访中 BIS 组有 1 例患者意识水平从 MCS-下降至 VS，非 BIS 组 2 例患者在随访期间死亡。

结果 回顾 103 例行 SCS 植入术的 DoC 患者，根据纳排标准共纳入 83 名 DoC 患者，根据术中是否使用 BIS 监测，将患者分成 BIS 组（n =45）和非 BIS 组（n =38），收集患者病程、病因、麻醉时间、手术时间等相关信息。收集患者术前 CRS-R(CRS-R(术前))评分、术后 24 小时（CRS-R（24h））及术后 3 个月 CRS-R（CRS-R(3m)）的变化情况。

结论 CRS-R(术前)与 CRS-R（3m）评分相比，BIS 组高于非 BIS 组，差异有统计学意义（P ＜0.05）；CRS-R（术后 24h）中的听力方面 BIS 组高于非 BIS 组，差异有统计学意义（X2=8.787,P =0.004）；将意识好转纳入多因素 Logistic 回归分析模型，发现丘脑是意识改善的独立影响因素（P ＜0.05）；随访中 BIS 组有 1 例患者意识水平从 MCS-下降至 VS，非 BIS 组 2 例患者在随访期间死亡。

PO-0364

The effect of intraoperative phrenic nerve stimulation on diaphragm thickening fraction in patients undergoing neurosurgery

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Objective Respiratory muscle dysfunction is one of the main causes leading to pulmonary complications, and postoperative pulmonary complications are commonly seen mid-term complications in neurosurgical procedures. The diaphragm plays a vital role in respiratory function in the human body. Therefore, we aim to investigate the preventive effects of phrenic nerve stimulation (PNS) on postoperative diaphragm dysfunction. These findings could potentially aid in the development of postoperative recovery plans and help prevent postoperative pulmonary complications.

Methods A total of 80 patients who underwent elective craniotomy between January 2024 and June 2024 were enrolled in this study. Patients were randomly assigned to the intervention group (received intraoperative PNS) or control group (without PNS). Diaphragm thickening fraction (DTF) was assessed using bedside diaphragm ultrasonography preoperatively at 24 and 48 hours postoperatively. Diaphragm dysfunction was defined as post-extubation DTF 30% from baseline.

Result: A total of 80 patients (40 in the intervention group and 40 in the control group) completed the study. Diaphragmatic dysfunction occurred in 50%(40/80) of the patients after surgery, of which 35% occurred at 24 hours after surgery and 32% at 48 hours after surgery. The incidence of postoperative diaphragm dysfunction in the intervention group (22%, 9/40) was significantly lower than that in the control group within 48 hours (45%, 18/40, P=0.033).

Conclusions Diaphragmatic dysfunction is a prevalent complication following surgery that warrants greater attention. The utilization of intraoperative PNS has been shown to decrease the occurrence of postoperative diaphragmatic dysfunction within 48 hours.

PO-0365

成人烟雾病患者脑血运重建术后院内早期神经系统并发症的危险因素分析及预测模型构建

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目的 烟雾病（MMD）是一种脑动脉狭窄闭塞性疾病，以双侧颈内动脉末端及其主要分支慢性进行性自发性狭窄闭塞为主要特征。MMD 被认为是缺血性和出血性脑梗死的主要原因，可导致严重的神经功能障碍甚至死亡。脑血运重建术可以减少 MMD 患者进一步缺血性损伤和神经功能恶化，是目前唯一确定的最佳治疗方法。MMD 患者术后院内早期神经系统并发症的发生，直接影响患者的住院时间、近、远期神经系统结局及其术后生活质量。本研究旨在探讨和分析成人 MMD 患者脑血运重建术后院内早期神经系统并发症的危险因素，并以此构建一个风险预测模型，为成人 MMD 患者围手术期管理提供参考。
方法 回顾性收集 2016 年 01 月至 2022 年 04 月于浙大二院神经外科收治的 263 例成人 MMD 患者，共计行 338 例次脑血运重建术。根据患者术后是否发生院内早期神经系统并发症，分为术后发生院内早期神经系统并发症组和术后未发生院内早期神经系统并发症组。对纳入分析的变量与术后发生院内早期神经系统并发症之间进行 Pearson 相关性分析后，运用单因素 Logistic 回归分析。根据单因素 Logistic 回归分析结果，将 P<0.2 的变量筛选作为协变量，以术后发生院内早期神经系统并发症作为因变量，再通过多因素 Logistic 回归分析法分析筛选预测变量。根据变量筛选结果构建多因素 Logistic 回归模型，采用受试者操作特征曲线（ROC）、校准曲线和临床决策曲线分析（DCA）评价模型性能。通过绘制列线图实现模型可视化。P<0.05 为差异有统计学意义。
结果 术后发生院内早期神经系统并发症组 101 例，占 29.9%；术后未发生院内早期神经系统并发症组 237 例，占 70.1%。单因素 Logistic 回归分析结果显示：年龄、糖尿病、术前脑缺血史、入院改良 Rankin 量表（mRS）评分、总白蛋白、同型半胱氨酸、ASA 分级、手术时间、术中低血压事件、PACU 停留时间是与成人 MMD 患者术后院内早期神经系统并发症的发生相关。对以上因素进一步行多因素 Logistic 回归分析，并使用向后逐步回归发现，4 个术前变量（术前脑缺血史、入院 mRS 评分、总白蛋白、同型半胱氨酸 ）和 2 个术后变量（手术时间、PACU 停留时间）是影响成人 MMD 患者术后院内早期神经系统并发症的相关因素。根据上述 6 个影响因素建立风险预测模型，绘制 ROC 曲线和列线图，其曲线下面积（AUC）值为 0.741（95%CI：0.685，0.796）。采用自举重抽样法进行 1000 次重抽样，计算校正后的 AUC 值为 0.72。校准曲线及临床决策曲线均显示模型有较好的校准度和临床效用，提示模型预测性良好。
结论 行脑血运重建术的成人 MMD 患者，术前缺血史、入院 mRS 评分高、总白蛋白低、同型半胱氨酸高、手术时间长和 PACU 停留时间长的患者术后院内早期神经系统并发症的事件发生增加，应提高警惕。基于上述简单而易取的 6 个变量构建的风险预测模型具有良好的效能，建立的列线图有助于识别高危人群，有望在临床实践中应用。

PO-0366

The association between perioperative oral benzodiazepine receptor agonist and postoperative delirium in Parkinson's disease undergoing deep brain stimulation under general anesthesia

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Objective：
Postoperative delirium (POD) is an acute and temporary brain dysfunction, which mostly occurs within 1 week after surgery. It is associated with prolonged hospitalization, deterioration of cognitive trajectory and increased medical costs, complications and mortality, which imposes a burden on families and the whole society. Parkinson's disease (PD) is a common neurodegenerative disease in middle-aged and elderly patients. PD patients have high risk of POD. The incidence of POD in PD patients after deep brain stimulation (DBS) under general anesthesia may reach as high as 42.6%. PD patients often take benzodiazepine receptor agonist (BZDRA) orally due to sleep disorders and anxiety. However, several clinical guidelines suggest those at risk of POD to be prudent to use BZDRA during perioperative period. Considering that there are few literatures reporting whether perioperative oral BZDRA increases the incidence of POD in PD patients, this study is to observe the relationship between perioperative oral BZDRA and POD in PD patients undergoing bilateral subthalamic nucleus deep brain stimulation under general anesthesia, so as to provide a basis for perioperative BZDRA management for the prevention and treatment of POD.
Methods：
In this study, a retrospective cohort study was conducted on PD patients undergoing bilateral subthalamic deep brain stimulation under general anesthesia in our hospital from March 1, 2018 to February 28, 2023. Patients were divided into two groups according to whether or not BZDRA was taken orally during the perioperative period. The primary outcome was the incidence of POD within 7 days after the surgery. The secondary outcome was the incidence of a composite of other postoperative complications, including neurological complications (stroke, epilepsy, and intracranial pneumatosis), pneumonia, acute kidney injury, and myocardial injury. Potential confounding variables were screened by single factor analysis ($P < 0.1$). The association between perioperative oral BZDRA and POD, perioperative oral BZDRA and other postoperative complications were assessed by multivariate Logistic regression analysis. In primary analysis, subgroups were set for factors with statistically significant differences between groups, and multivariate logistic regression was performed within the subgroups.
Results：
In this study, 205 PD patients were finally analyed, including 79 patients in the BZDRA group and 126 patients in the non-BZDRA group. The overall incidence of POD was 29.3% (60 cases), 26.6% (21 cases) in the BZDRA group and 31.0 % (39 cases) in the non-BZDRA group. After the single factor analysis with POD, age (P=0.015), education years (P=0.010), preoperative Mini-Mental State Examination (MMSE) score (P=0.002) and preoperative Hamilton Anxiety Scale (HAMA) score (P=0.081) were included in the multivariate Logistic regression analysis. After adjusting for potential confounding variables, perioperative oral BZDRA was not associated with an increased risk of POD (aOR, 0.709; 95%CI, 0.366 - 1.374; P=0.309). In secondary analysis, perioperative oral BZDRA was associated with an increased risk of other postoperative complications (aOR, 3.246; 95%CI, 1.264 - 8.339; P=0.014). In the subgroup analysis stratified by previous history (P<0.001), gender (P=0.014), body mass index (BMI) (P=0.011), Pittsburgh Sleep Quality Index (PSQI) score (P<0.001), for PD patients with a history of BZDRA medication before admission, the BZDRA group had a lower risk of POD (aOR, 0.217; 95% CI, 0.074 - 0.634; P=0.005).

Conclusions:
In this study, perioperative oral BZDRA is not associated with an increased risk of POD in PD patients, but is associated with an increase in other postoperative complications. Individualized assessment of the risk of other postoperative complications should be conducted before the use of BZDRA in PD patients during perioperative period. For PD patients with a history of BZDRA medication, perioperative oral BZDRA is associated with a decrease in POD, which needs to be validated by further clinical trials.

PO-0367

术前肌酐清除率与围术期脑卒中发病风险的相关性研究

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目的 慢性肾脏病（Chronic kidney disease，CKD）是由于各种原因引起的慢性肾脏结构和功能障碍，包括肾小球滤过率（Glomerular filtration rate ,GFR）正常和不正常的病理损伤、血液或尿液成分异常，及影像学检查异常，或不明原因 GFR 下降（<60mL/min·1.73m2）超过 3 个月。CKD 在全球的患病率逐年上升，是世界人口的主要健康负担，也是心脑血管疾病的危险因素。与健康人群相比，CKD 患者发生卒中的几率更高，病情更严重，其中透析患者发生卒中的预后更差，病死率更高。肌酐可经肾小球自由滤过，既不会被肾脏重吸收也不会被代谢。因此，通常用肌酐清除率（Creatine clearance rate，CCR）来估算肾小球滤过率。围术期脑卒中是麻醉手术后最严重的并发症之一，致死致残率高，可能与术后多器官损伤的叠加效应相关。由于肾脑两个器官病理生理学的相似性，对血管危险因素的共同敏感性，从而导致肾脑功能受损相关。而对于 CKD 患者发生围术期脑卒中的相关性及危险因素至今尚未研究报道。本研究旨在探究围术期患者发生脑卒中的 CCR 风险阈值和相关危险因素。
方法 利用解放军总医院第一医学中心麻醉手术中心 2008-2019 年围术期数据库（共计纳入患者 223415 例，其中脑卒中患者 525 例），收集统计基线变量，提取患者术前内生肌酐清除率指标，分析其与围术期脑卒中发生的相关性，绘制受试者工作特征（Receiver operating characteristic ,ROC）曲线，获取最佳截断值（Cut-off value）；单因素分析寻找危险因素，逻辑回归构建风险预测模型；通过亚组分析，探究 CCR 异常患者发生围术期脑卒中的其他危险因素。
结果 ROC 曲线显示 CCR 最佳截断值为 84.06mL/min；基线统计结果显示，CCR 小于 84.06mL/min 的患者围术期脑卒中发生率为 0.3%，大于 84.06mL/min 的患者围术期脑卒中发生率为 0.2%;经倾向性评分匹配后，CCR 小于 84.06mL/min 的患者围术期脑卒中发生率为 0.05%，大于 84.06mL/min 的患者围术期脑卒中发生率为 0.04%。单因素逻辑回归结果显示，腹腔外科类手术、既往吸烟史现戒烟、冠心病为 CCR 小于 84.06mL/min 的患者发生围术期脑卒中的独立危险因素。亚组分析结果显示，术中发生低血压是术前 CCR<84.06mL/min 的患者发生围术期脑卒中的影响因素。
结论 术前 CCR<84.06mL/min 是围术期脑卒中发生的危险因素。本研究首次确定了中国手术患者预防围术期脑卒中的术前肾功能（肌酐清除率）阈值。对于 CCR<84.06mL/min 的患者，要更加关注围术期脑卒中的防治，维持术中血压平稳，保证组织血流灌注。

PO-0368

吸入麻醉药物与静脉麻醉药物对于烟雾病搭桥手术术中血流动力学及术后神经功能预后的影响

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目的 比较吸入麻醉药物与静脉麻醉药物对于烟雾病搭桥手术术中血流动力学及术后神经功能预后的影响

方法 本研究纳入对象为单中心回顾性队列研究，回顾性分析 2019 年 1 月 1 日至 2020 年 12 月 31 日期间接受颅内和颅外血运重建治疗的 461 例 MMD 患者（年龄 18～69 岁）的临床资料。纳入标准：a.患者根据烟雾病诊断标准 2009（2012 年出版的英文版）5，术前脑血管造影或磁共振血管造影确诊为 MMD；b.患者经术前磁共振成像(MRI)或正电子发射断层计算机断层扫描(PETCT)检查确诊为颅内低灌注，需行颅内、外搭桥手术。排除标准：a.患者合并有心、肝、肺、肾等疾病；b.美国麻醉医师协会体质健康状态分类系统(ASA)IV 级及以上；c.妊娠期或哺乳期患者；d.患者临床资料不完整或失访。通过队列研究追踪神经系统终点事件，收集患者资料，包括年龄、性别、术前临床症状、高血压、糖尿病、冠心病史、吸烟、饮酒史、体质指数（BMI 指数）、ASA 分级、手术方式、术中生命体征、补液及尿量，手术结束前血气分析中的血红蛋白、血细胞比容、血乳酸、血糖值、癫痫发作发生率、住院时间、术前、术后 7 天及术后 6 个月美国国立卫生研究院卒中量表（NHISS）评分，术前、术后 7 天及术后 6 个月 mRS 评分。进行单变量分析以确定两组之间的差异变量。分类变量采用 Fisher 精确检验法分析，连续变量采用 Mann-Whitney U 检验法分析。统计显著性标准为 $\alpha < 0.05$。

结果 我们比较了接受吸入麻醉药（七氟醚麻醉药，n = 199，S 组）和静脉麻醉药（丙泊酚麻醉药，n = 219，P 组）的 MMD 患者的数据。两组（S 组 vs. P 组）的卒中发生率分别为 6.6%vs. 5.9%（OR = 0.893；95% CI，0.404-1.976；p = 0.841），S 组 vs. P 组的 HPS 发生率分别为 32.5%vs. 31.1%（OR=0.936；95% CI，0.691-0.1.415，p = 0.883）。出院时，麻醉药未影响神经系统终点。术后 7 天 NHISS 评分（S 组 vs. P 组=2:1，p=0.082）差异无统计学意义，但术后 7 天 mRS 评分（S 组 vs. P 组=2:1，p<0.001）及随访 6 个月 mRS 评分（S 组 vs. P 组=0:0，p<0.001）差异有统计学意义，但差异较小。

结论 数据表明吸入麻醉药和静脉麻醉药对接受 MMD 搭桥术的患者均有保护作用。接受吸入麻醉药和静脉麻醉药的 MMD 患者出现神经功能缺损的几率相似。比较长期临床数据时，大多数患者在接受吸入麻醉或静脉麻醉后神经功能恢复良好，但比较 6 个月 p75 mRS 评分（S 组 vs. P 组 = 3:1）表明静脉麻醉药可能更适合接受 MMD 搭桥术的患者。

PO-0369

Relationship between preoperative high arterial blood lactate level and delirium after deep brain stimulation surgery in Par-kinson’s disease

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Abstract: Objective: We performed the retrospective study to investigate the relationship between preoperative arterial blood lactate level and postoperative delirium (POD) in Parkinson's disease (PD) patients receiving deep brain stimulation (DBS) surgery. Methods: Preoperative baseline data were collected in the study. In addition, mini-mental state exam (MMSE) score for assessing

cognitive function and confusion assessment method (CAM) for assessing perioperative delirium in the PD patients were collected. The relationship between preoperative lactate level and POD was analyzed using binary logistic regression analysis. Results: A total of 156 patients were included, of whom 29 (17.6%) patients developed POD. Multivariate logistic regression analysis showed that preoperative lactate level was independently associated with POD regarding of continuous variable [odds ratio (OR) = 12.46, 95% confidence interval (CI) = 3.12~49.71, P < 0.001] or categorical variable (OR = 3.58, 95% CI = 1.20~10.65, P = 0.022 for lactate < 1.41). Receiver operating characteristic curve analysis showed that preoperative arterial blood lactate level was a significant predictive biomarker for POD, with an area under the curve of 0.708 (95% CI = 0.606-0.809, P< 0.05). Conclusions: Preoperative high level of lactate is an independent factor for postoperative delirium after DBS surgery in patients with Parkinson's disease.

PO-0370

LncRNA H19 Overexpression Protects Against AKI After Cardiopulmonary Bypass via activating Pink1/Parkin-Mediated Mitophagy

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Background:
Cardiopulmonary bypass-associated acute kidney injury (CPB-AKI) is a serious and common complication following cardiopulmonary bypass (CPB), leading to worse outcomes and higher mortality. However, the underlying pathological mechanisms of CPB-AKI remain largely unknown. This study was performed to investigate the role of long non-coding RNA H19 in regulating CPB-AKI.
Methods:
We examined the expressions of H19 and mitophagy-related proteins in the CPB-AKI rat model and HK-2 cells following oxygen-glucose deprivation/reperfusion (OGD/R). In vivo, tail vein injection of lentiviral mediated overexpression of H19 in renal. We then evaluated renal functions, kidney pathological damage, the levels of inflammatory cytokines (IL-1β, IL-6, IL-10, TNF-α), the infiltration of neutrophils, and the activation degree of PINK1/Parkin-mediated mitophagy following CPB-AKI. In vitro, small interfering RNA (siRNA) was treated to downregulate the expression of H19 in HK-2 cells. We also examined the cell viability, apoptosis, inflammation, and PINK1/Parkin-mediated mitophagy after OGD/R.
Results:
We demonstrated an increase in H19 expression and activation of PINK1/Parkin-mediated mitophagy in the rat model of CPB-AKI and HK-2 cells following OGD/R. In the rat models of CPB-AKI, lentivirus-mediated overexpression of H19 led to significant amelioration of renal injury, characterized by improved renal function, diminished tissue pathology, and decreased neutrophil infiltration and inflammatory cytokine release. Notably, we confirmed that overexpression of H19 significantly activated PINK1/Parkin-mediated mitophagy. Furthermore, in vitro, downregulation of H19 by specific siRNA in HK-2 cells significantly decreased cell viability, aggravated HK-2 injury after OGD/R treatment, increased inflammatory cytokine release, and decreased the activity of PINK1/Parkin-mediated mitophagy, which eventually promoted cell apoptosis.
Conclusion:
These findings suggest that H19 overexpression may protect against CPB-AKI by activating PINK1/Parkin-mediated mitophagy and decreasing inflammatory responses, indicating that H19 overexpression might be a promising therapeutic target for the treatment of CPB-AKI.

PO-0371

非心脏手术后新发心脏传导阻滞：一项超过 28 万人的回顾性研究

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目的 心脏传导阻滞发生时常常无明显症状，心脏手术后很常见且与患者不良预后有关，但关于非心脏手术后新发心脏传导阻滞的研究却少有。本研究拟探寻非心脏手术后新发心脏传导阻滞的流行病学信息并建立预测模型，同时探讨其预后价值。
方法 纳入 2008 年 1 月至 2019 年 8 月在解放军总医院第一医学中心接受非心脏手术的 281497 名 18 岁以上患者的电子病历信息，主要结局为术后 30 天内新发的心脏传导阻滞，包括房室传导阻滞和左右束支传导阻滞。使用 LASSO 回归排除高度相关变量，将剩余围手术期变量用于 logistic 回归预测模型与四种不同的机器学习预测模型的建模。预测模型的预测效能评价采用受试者工作特征曲线下面积（area under the receiver operating characteristic curve, AUC）。机器学习预测模型的指标重要性及可解释性采用 SHapley Additive exPlanation 方法。采用 Kaplan-Meier 生存曲线和时间依赖性 Cox 回归分析来研究术后新发心脏传导阻滞与老年患者术后一年生存状态的关系。
结果 共有 1000 名患者（0.36%）术后 30 天内新发了心脏传导阻滞。经过 LASSO 回归分析后，剩下 30 个变量用于预测模型构建。为精简预测模型指标数量，我们在尽可能保证模型预测准确性的前提下，根据各变量 logistic 预测模型中的 OR 值和各变量在机器学习预测模型中的重要性排序，将指标数量调整为 12 个：年龄、女性、冠心病史、心衰病史、ASA 分级>II、手术类型、急诊手术、术中失血量、术前抗凝药物使用、术前红细胞计数、术前高血糖、手术时长>3 h。在训练集和验证集中，表现最好的机器学习预测模型 XGB 预测模型的 AUC 分别为 0.808（95% CI, 0.792-0.824）和 0.804（95% CI, 0.771-0.837），而 logistic 预测模型的 AUC 分别为 0.810（95% CI, 0.794-0.825）和 0.800（95% CI, 0.766-0.833）。调整混杂因素后，新发心脏传导阻滞对老年患者非心脏手术后 1 年内的生存有显著影响（aHR：1.60, 95% CI: 1.13-1.69, p=0.021）。
结论 本研究中，非心脏手术后新发心脏传导阻滞的发生率为 0.36%，我们建立的预测模型有助于预测这一并发症，而老年患者新发心脏传导阻滞与长期死亡率之间的关联强调了改善围手术期管理以降低该并发症发生风险的重要性。

PO-0372

Prevention of mid-tidal volume mechanical ventilation exacerbating septic lung injury : the lung-protective effect of electroacupuncture

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Background Mechanical ventilation (MV) is life-saving but may evoke ventilator-induced lung injury(VILI). Until today, the effects of MV on the lungs are controversial, with the view that the degree of mechanical distraction is associated with lung injury. However, the reality may be more complex, and healthy lungs can tolerate large tidal volumes mechanical ventilation very well. When combined with other systemic or lung inflammatory conditions, even modest mechanical distraction can cause or exacerbate pre-existing injury. Electroacupuncture(EA) are currently attempted for lung protection during MV in the OR and ICU, but the exact mechanism remains

unclear.The choice of model constrains the in-depth exploration of this issue. The clinical practice is mostly based on lung-protective ventilation strategies, in addition, patients requiring MV are mostly comorbid with other underlying diseases, and the large tidal volume-induced VILI model cannot fully simulate the clinical situation.

Methods C57BL/6 mice were injected intraperitoneally with LPS to establish a sepsis model, and low/moderate tidal volume(6/10ml/kg) MV was performed for 4 h after 12 h of LPS injection. EA at BL13 and ST36 was performed 30 min before and during mechanical ventilation.HE staining was used to assess lung injury, and blood gas analysis was used to assess oxygenation function. We assessed pulmonary vascular permeability, and WB was used to detect Neutrophil Extracellular Traps(NETs) formation and related upstream molecular pathway expression.

Results Moderate tidal volume but not low tidal volume MV aggravated lung injury in septic mice, as shown by increased lung pathologic damage and decreased arterial blood PaO2 and SPO2. EA improved pathological damage and oxygenation function in MV/LPS model and was associated with reduced pulmonary vascular permeability, as evidenced by reduced lung dry/wet ratio and reduced bronchoalveolar lavage fluid protein content. Mechanistically, the expression of NETs-related protein Cit-H3, and NETs formation-related upstream HMGB1/NF-κB pathway-related proteins (HMGB1, p-P65) was inhibted by EA.

Conclusions EA alleviates lung injury of a moderate tidal volume MV/LPS model associated with ameliorated pulmonary vascular hyperpermeability.The lung-protective effect of EA can be associated with the inhibition of NETs formation mediated by the HMGB1/NF-κB pathway.

PO-0373

Acupoint Catgut Embedding Enhanced Recovery of Gastrointestinal Function after intestinal surgery through regulating Parasympathetic Nervous

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Background Postoperative gastrointestinal dysfunction (POGD) is a common symptom, specially occurs in the gastrointestinal operation. POGD severely impacts recovery after surgery. Although minimally invasive techniques and multimodal analgesia have played a role in enhancing the recovery of gastrointestinal function, further improvement is needed. Finding a way to accelerate the recovery of postoperative gastrointestinal function and reduce complications is particularly important. Acupoint catgut embedding (ACE) has been proved to improve gastrointestinal function, but the mechanism is still unclear. This study aimed to investigate the effect of ACE on parasympathetic nervous system (PNS) activation to enhance the recovery of gastrointestinal function after intestinal surgery.

Methods Male Sprague Dawley (SD) rats fasted for 12 hours, underwent the operation of partial cecectomy and anastomosis. Rats were randomly divided into 5 groups: sham group, operation group, acupoint catgut embedding + operation (EO) group, parasympathetic dysfunction + operation (PDO) group and parasympathetic dysfunction+ acupoint catgut embedding + operation (PDEO) group. The rats in the Sham group did not undergoing operation. Other rats all underwent the operation. The rats in the EO and PDEO groups treated with ACE on 1 day before the operation. The rats in the PD and PDEO groups underwent unilateral vagotomy combined with intravenous atropine before ACE to trigger parasympathetic dysfunction (PD). All rats were observed for 7 days. Body weight, food intake, and gastrointestinal emptying rate were recorded

throughout the experiment. The LF/HF ratio of heart rate variability (HRV) was calculated and gastrointestinal motility was recorded, and gastrointestinal barrier function and the systemic inflammatory response were assessed. The activity of the dorsal motor nucleus of the vagus (DMV) detected by c-fos immunohisetochemistry. The degree of intestinal epithelial tissue damage and the number of interstitial cells of Cajal (ICCs) were evaluated.

Results Postoperative gastrointestinal dysfunction (POGD) occurred after surgery. Compared with the PDO and PDEO groups, not only gastric emptying significantly accelerated after surgery in the EO group, but also significantly increased in the contractile force of small intestinal smooth muscle, small intestine propulsion rate, postoperative food intake and body weight of rats. Moreover, the degree of intestinal epithelial tissue damage in the EO group significantly reduced, kept gastrointestinal mucosal barrier function, and reduced systemic inflammation. The LF/HF ratio of heart rate variability decreased significantly in the EO group, which significantly increased the number of ICCs and c-fos expression of DMV compared with that in the PDO and PDEO groups.

Conclusions Acupoint catgut embedding enhanced the recovery of gastrointestinal function after partial cecectomy, reduced systemic inflammation, and protected intestinal barrier function, which is related to the activation of the parasympathetic nervous and the number of ICCs.

PO-0374

Molecular hydrogen protects against sepsis-induced cardiomyopathy by improving Golgi stress-mediated autophagy, inflammation and apoptosis

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Background Hydrogen (H2) alleviates sepsis-induced cardiomyopathy (SIC), however the underlying mechanism remains unclear. Recent studies have shown that Golgi stress is one of the mechanisms of SIC. The purpose of this study is to investigate whether 2% H2 can protect SIC by inhibiting Golgi stress and the specific mechanism.
Methods C57BL/6J male mice were subjected to cecal ligation and puncture (CLP) to construct the sepsis model. To observe the effects of 2% H2 on SIC and Golgi stress, 7-day survival, cardiac function, myocardial damage enzymes, and myocardial HE staining were measured. Immunofluorescence and electron microscopy were used to observe the morphological changes of Golgi apparatus. Meanwhile, WB and qPCR were used to detect the changes of Golgi stress proteins. In addition, on the basis of inhaling 2% H2, Golgi stress-specific agonist (Brefeldin A) was given to observe whether the therapeutic effect of H2 could be reversed. Subsequently, to explore how 2% H2 acts on downstream mechanisms of Golgi stress, we examined indicators of autophagy, inflammation, and apoptosis.
Results After CLP, the 7-day survival rate of mice was decreased, cardiac function was damaged, myocardial damaging enzymes were increased, and Golgi stress was accompanied by increased autophagy, inflammation and apoptosis. After 2% H2 inhalation treatment, myocardial injury, Golgi stress, and its mediated autophagy, inflammation, and apoptosis were improved. However, after the use of the Golgi stress-specific agonist (Brefeldin A), the therapeutic effect of 2% H2 was reversed.
Conclusion 2% H2 has a protective effect on SIC, and the mechanism is related to improving autophagy, inflammation and apoptosis mediated by Golgi stress.

PO-0375

电针刺在 LPS 诱导的 ALI 中通过激活迷走神经调控 SPMs 并促进 ARDS 患者的炎症消退

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目的 α7 烟碱乙酰胆碱受体（α7nAChR）在脓毒症相关急性肺损伤（ALI）期间的胆碱能抗炎通路（CAP）中发挥着至关重要的作用。越来越多的证据表明，专门的促溶解介质（SPMs）在 α7nAChR 介导的 ALI 溶解过程中起着重要作用。我们的研究旨在阐明 α7nAChR 在 LPS 相关急性肺损伤（ALI）期间的 CAP 中的关键作用。
方法 我们使用电针刺（EA）激活了 CAP 及其关键亚基 α7nAChR。使用 UPLC 检测小鼠血清中的 SPMs 变化。
结果 电针刺（EA）激活了 CAP 及其关键亚基 α7nAChR，能有效降低肺通透性和炎性细胞因子的释放。我们进一步的研究发现 SPMs 中的 Lipoxin(LXA4) 的合成在 ALI 中占主导地位。通过使用 α7nAChR 基因敲除小鼠，我们证实了 α7nAChR 在调控 LXA4 合成中的重要性，并改变了肺泡灌洗液（BALF）中的巨噬细胞比例。进一步的，我们耗竭了肺部巨噬细胞，发现 LXA4 主要通过巨噬细胞发挥肺保护作用。最后，我们证实了 EA 增加脓毒症相关急性呼吸窘迫综合征（ARDS）患者的 LXA4 合成并缓解肺部的总体症状。
结论 我们的研究结果揭示了一种新的抗炎途径，即 EA 激活 CAP 中的 α7nAChR，最终导致 LXA4 的合成和随后的肺保护。

PO-0376

线粒体过度分裂介导脂多糖诱发认知障碍小鼠海马神经元凋亡的机制研究

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目的 探究线粒体过度分裂和神经元凋亡在脂多糖（LPS）诱导小鼠认知障碍中的潜在机制。
方法 采用雄性 C57BL/6 小鼠行 LPS 侧脑室注射，构建炎症相关认知障碍动物模型。随机数表法将小鼠分为对照组、LPS 组和 Mdivi-1 组，每组 20 只。造模 6 h 后检测海马 TNF-α 和 IL-1β 含量。造模后第 1 天通过行为学测试评估认知功能；TUNEL 染色观察神经元凋亡；流式细胞术检测线粒体膜电位（MMP）；免疫印迹法检测 mito-Drp1、p-Drp1-Ser616、Caspase-9 和 Caspase-3 表达；免疫荧光观察海马 CA1 区 p-Drp1-Ser616 荧光强度。取 LPS 处理 BV-2 细胞的上清液作为条件培养基培养海马神经元细胞系 HT-22 细胞，构建炎症相关认知障碍细胞模型。随机分为对照组、LPS 组和 Mdivi-1 组。Mdivi-1 组在 Mdivi-1 预处理 HT-22 细胞后，使用条件培养基培养 HT-22 细胞。通过免疫印迹法检测 mito-Drp1、p-Drp1-Ser616、Caspase-9 和 Caspase-3 表达；TUNEL 染色观察细胞凋亡；JC-1 染色检测 MMP；PK Mito 探针结合 HIS-SIM 超分辨率显微镜观察细胞线粒体形态；免疫荧光观察 Drp1 和 COX IV 共定位。
结果 LPS 组小鼠学习记忆能力下降，Mdivi-1 处理改善小鼠学习记忆缺陷。与对照组相比，LPS 组 p-Drp1-Ser616 、 mito-Drp1 、 Cleaved-caspase-9/Pro-caspase-9 和 Cleaved-caspase-3/Pro-caspase-3 升高，CA1 区 p-Drp1-Ser616 荧光强度增加；神经元凋亡增加；MMP 下降；TNF-α 和 IL-1β 含量增加。与 LPS 组相比，Mdivi-1 组逆转上述改变。对照组相比，LPS 组 HT-22 细胞 p-Drp1-Ser616 、 mito-Drp1 、 Cleaved-caspase-9/Pro-caspase-9 和 Cleaved-caspase-3/Pro-

caspase-3 升高；MMP 降低；HT-22 细胞凋亡增加。与 LPS 组相比，Mdivi-1 组逆转上述改变。与对照组相比，LPS 组线粒体呈现点状，Drp1 与 COX IV 共定位增加。与 LPS 组相比，Mdivi-1 组线粒体呈现网络状，Drp1 与 COX IV 共定位减少。

结论 LPS 侧脑室注射诱导小鼠认知功能障碍、线粒体功能障碍、线粒体过度分裂和海马神经元凋亡。线粒体过度分裂是引发神经元凋亡的关键节点，抑制线粒体分裂可能成为防治炎症相关认知障碍的新思路。

PO-0377

肝素钠通过靶向抑制 Drp1 介导线粒体质量失衡的非抗凝途径改善脓毒症的血管内皮功能及预后

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目的 脓毒症是由感染引起的器官功能障碍，整个过程涉及炎症因子风暴、血管内皮损伤、血管渗漏和微血栓形成，最终导致组织灌注不足、器官衰竭甚至死亡。其高发病率、高死亡率和巨大的治疗成本对全球健康构成重大挑战。肝素是一种广泛应用于临床的药物，研究发现其不仅具有抗凝作用，还具备抗炎、抗增殖和抗病毒等潜在的非抗凝作用。然而，这些非抗凝作用的具体机制及其对患者治疗的影响尚不明确。越来越多的证据表明，线粒体质量失衡在脓毒症病理生理过程中起重要作用，尤其是分裂蛋白 Drp1 在调节线粒体分裂和凋亡方面至关重要。线粒体不仅是细胞的能量工厂，还在代谢、信号调节、钙离子摄取和细胞死亡过程中发挥关键作用。因此，改善线粒体质量成为保护多器官并改善预后的重要策略。本研究旨在探讨肝素通过靶向抑制 Drp1 介导的线粒体质量失衡，从而改善脓毒症患者的血管内皮功能及预后。

方法 我们首先通过 MIMIC-IV 临床数据库和基础动物实验观察了肝素对脓毒症的治疗效果。然后通过 Drp1 重组蛋白芯片、SPR 亲和力检测和分子对接等方式探究了脓毒症后肝素与 Drp1 的结合情况及具体位点。最后在整体和细胞水平观察了肝素对脓毒症后细胞质 Drp1 的转位、血管内皮细胞的线粒体质量、血管组织渗漏、动物存活及预后的影响。

结果 回顾性临床研究发现，相较于低分子肝素，适量的普通肝素对脓毒症患者临床预后具有明显的保护效果（$p<0.05$），该过程与肝素具备的非抗凝作用途径有关。SPR 和分子对接结果显示，肝素可以通过其 Zone 2 非抗凝区段与细胞质 Drp1 蛋白特异性结合，减少脓毒症后细胞质 Drp1 向线粒体的聚集（$p<0.05$）。细胞水平观察发现，肝素特异结合 Drp1 可以改善脓毒症后内皮细胞的线粒体形态、功能和代谢，全面保护了脓毒症后内皮细胞的线粒体质量（$p<0.05$）。动物模型实验观察发现，肝素靶向抑制 Drp1 介导的线粒体质量失衡显著减少了脓毒症后血管渗漏（$p<0.05$），改善了脓毒症预后（$p<0.05$）。

结论 本研究为肝素通过非抗凝途径治疗脓毒症提供了新的见解。脓毒症液体复苏过程中，适当的肝素输注可以通过特异结合细胞质 Drp1，改善了脓毒症后血管内皮细胞的线粒体质量，最终减少了脓毒症后血管渗漏，改善了脓毒症预后。这一发现有助于开发新的脓毒症治疗策略，强调了在临床应用中考虑肝素的重要性。

PO-0378

水蛭素通过抑制细胞凋亡和焦亡减轻失血性休克复苏大鼠心肌损伤

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目的 评价水蛭素对失血性休克复苏大鼠心肌损伤的保护作用。
方法 清洁级健康雄性 Sprague-Dawley（SD）大鼠共 48 只，随机数字表法分为 4 组（n=12），假手术组（S），失血性休克复苏组（H），失血性休克复苏+水蛭素组（HS 组），失血性休克复苏+溶剂组（HV）。通过左股动脉将大鼠放血至平均动脉压 30~35mmHg 并持续 45 min，通过收集的血液对其进行复苏来建立 HSR 大鼠模型。复苏后立即通过左股静脉静脉注射水蛭素（1 mg/kg）。24 h 后通过腹主动脉采血 2 ml，检测肌酸磷酸激酶（CK-MB）和心肌肌钙蛋白 T（cTnT）水平；灌注后取心肌组织，HE 染色光镜下评估心肌细胞损伤程度；免疫荧光染色检测 cleaved caspase-1/PI/Hoechest 和 cleaved caspase-3/PI/Hoechest 的阳性细胞率，计算心肌细胞凋亡率和焦亡率；采用蛋白印迹法检测 cleaved caspase-1、cleaved caspase-3、IL-1β、IL-18、Bcl-2、Bax 的蛋白表达水平。
结果 与 S 组比较，H 组、HS 组和 HV 组大鼠血清 CK-MB 和 cTnT 水平、心肌损伤评分、焦亡率及凋亡率显著增高，cleaved caspase-1、cleaved caspase-3、IL-1β 和 IL-18 的表达上调，Bcl-2/Bax 比值下降，差异均有统计学意义（P<0.05）；与 HS 组比较，H 组和 HS 组大鼠血清 CK-MB 和 cTnT 水平、心肌损伤评分、焦亡率及凋亡率升高，cleaved caspase-1、cleaved caspase-3、IL-1β 和 IL-18 的表达上调，Bcl‑2/Bax 比值降低，差异均有统计学意义（P<0.05）；H 组与 HS 组组间比较无统计学差异（P>0.05）。
结论 水蛭素对失血性休克复苏大鼠致心肌缺血再灌注损伤具有保护作用，其机制可能与抑制心肌细胞凋亡和焦亡有关。

PO-0379

人重组神经调节蛋白 1 激活 ErbB/GABP 信号通路抑制烟碱型乙酰胆碱受体异化重构减轻 ICUAW 模型大鼠神经肌肉功能障碍

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目的 观察烟碱型乙酰胆碱受体（nAChR）异化重构对 ICU 相关获得性肌无力（ICUAW）模型大鼠神经肌肉功能的影响，探讨人重组神经调节蛋白 1（rhNRG-1）减轻 ICUAW 模型大鼠神经肌肉功能障碍的机制。
方法 选择 SPF 级健康雄性 SD 大鼠 30 只，随机分为 5 组：假手术组（Sham 组，n=6）；通过制动建立不同时间点 ICUAW 大鼠模型，Day1 组（Im-Day1 组，n=6）；Day3 组（Im-Day3 组，n=6）；Day7 组（Im-Day7 组，n=6）；Day14 组（Im-Day14 组，n=6）。采用大鼠单侧后肢克氏针固定构建 ICUAW 大鼠模型，Sham 组大鼠仅行相应手术操作但不用克氏针固定。另选取 SPF 级雄性 SD 大鼠 24 只，随机分为 4 组：模型组（Im，n=6）；模型+rhNRG-1 组（Im+rhNRG-1，n=6）；模型+PD-158780 组（Im+PD-158780，n=6）；模型+rhNRG-1+PD-158780 组（Im+rhNRG-1+PD-158780，n=6）。于相应时间点检测大鼠体重及复合肌动作电位（compound muscle action potential, CMAP）。通过 HE 和 Masson 染色检测骨骼肌细胞形态变化，运用

Western blot 检测骨骼肌 NRG-1 及其下游受体 ErbB2/3/4 及其磷酸化水平，Erk1/2 及其磷酸化水平，生长相关转录因子（GABPα/β）表达水平，三种 nAChR 表达变化。免疫荧光三重标记检测 nAChR 空间表达变化，明确其异化重构的程度。

结果 与 Sham 组相比，Im 组随建模时间的延长，其胫前肌萎缩逐渐加重，胫前肌质量减轻（P<0.05），肌肉/体重比值减小（P<0.05），胫前肌直径和横截面积减小（P<0.05）；神经肌肉功能障碍逐渐加重，CMAP 提示振幅降低，神经传导速度减慢（P<0.05）；潜伏期延长，周期延长（P<0.05）；免疫荧光提示 nAChR 异化重构程度逐渐加重，表现为异质化受体 γ-nAChR 和 α7-nAChR 表达逐渐增多，正常受体 ε-nAChR 表达降低（P<0.05）；胫前肌 NRG-1 蛋白水平降低（P<0.05）；与 Im 组相比，肌肉注射 rhNRG-1（Im+rhNRG-1 组）可以减轻建模导致的胫前肌萎缩，骨骼肌直径和横截面积增加（P<0.05）；减轻神经肌肉功能障碍，CMAP 提示振幅增加，潜伏期和周期缩短，神经传导速度增加（P<0.05）；NRG-1 及其下游 ErbB2/3/4 蛋白及其磷酸化水平升高，磷酸化 Erk1/2 蛋白水平增加，GABPα/β 蛋白水平表达增高，γ-nAChR 和 α7-nAChR 蛋白水平降低，ε-nAChR 蛋白水平表达增加（P<0.05）；免疫荧光提示 nAChR 异化重构程度减轻；与 Im+rhNRG-1 组相比，Im+rhNRG-1+PD-158780 组逆转了肌肉注射 rhNRG-1 的治疗作用。Im+PD-158780 组和 Im+rhNRG-1+PD-158780 组相比，各项指标差异无明显统计学意义（P>0.05）。

结论 制动引起骨骼肌发生 nAChR 异化重构导致神经肌肉功能障碍，肌肉注射 rhNRG-1 可通过 ErbB/GABP 信号通路抑制 nAChR 异化重构，减轻骨骼肌肌肉萎缩，改善 ICUAW 模型大鼠神经肌肉功能障碍。

PO-0380

感染新型冠状病毒对颌面外科手术患者术后肺部并发症的影响

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目的 回顾性分析术前感染新型冠状病毒对颌面外科手术患者术后肺部并发症的影响。

方法 纳入 2023 年 1 月下旬至 2 月于第四军医大学口腔医院就诊的患者，纳入标准为全身麻醉下行择期颌面外科手术的成人患者，排除标准包括关键数据缺失严重、数据收集质量不合格的患者。将所有受试者分为对照组（感染新冠病毒后≥7 周+未感染新冠病毒）、感染新冠病毒后 0-4 周组和 4-6 周组。需收集患者的以下信息：术前基础疾病、手术信息、感染新冠病毒时间、新冠症状分级、目前是否仍有新冠病毒感染症状、术后 30 天内肺部并发症发生率和死亡率。研究指标为术后 30 天内肺部并发症的发生率，发生以下一项则定义为出现阳性事件：肺炎、急性呼吸窘迫综合征、意料之外的术后通气。构建 logistic 回归模型分析新冠病毒感染对术后肺部并发症的影响，将以下变量纳入 logistic 单因素回归分析：确诊新冠到手术的时间间隔、年龄、性别、ASA 分级、改良心脏风险指数评分、手术等级、是否有呼吸系统合并症，单因素回归分析中 P<0.1 的变量纳入 logistic 多因素回归分析，多因素回归分析中 P<0.05 认为差异有统计学意义。敏感性分析：对感染新冠时未确诊肺部炎症的患者、手术时已无相关感染症状的患者再次进行术后 30 天内肺部并发症发生的分析。

结果 本研究共筛选纳入 267 例受试者，对照组、确诊感染新冠病毒到实施手术间隔 0-4 周、4-6 周的患者分别为 180、44 和 43 例，其中术后 30 天内出现肺部并发症的受试者分别为 4 人（2.22%）、5 人（11.36%）、3 人（6.98%）。

logistic 单因素回归分析结果显示年龄、ASA 分级、术前感染新冠病毒及感染时机可能影响肺部并发症的发生（P<0.1），将他们进一步纳入多因素回归分析，结果显示年龄≥70 岁（OR: 5.87, 95% CI: 1.63-21.22, P=0.026）、感染新冠病毒到手术的时间短于 4 周（OR: 5.64, 95% CI: 1.45-21.97, P=0.006）是术后 30 天内肺部并发症发生的危险因素，而感染新冠后 4-6 周并未增加颌面外科手术术后 30 天内肺部并发症发生的风险。

敏感性分析结果显示对于已无相关感染症状的患者或者感染新冠时未发生肺部炎症的患者，若在感染新冠病毒 4 周内行颌面外科手术，术后肺部并发症的发生明显增加，在 4-6 周后进行手术则对肺部并发症的发生无明显影响。
结论 术前 4 周内感染新型冠状病毒将增加颌面外科手术术后肺部并发症发生的风险。

PO-0381

Impact of dexmedetomidine on mortality in critically ill patients with acute kidney injury: a retrospective propensity score matching analysis

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目的 This study sought to estimate the effect of dexmedetomidine (DEX) administration on mortality in critically ill patients with acute kidney injury (AKI).
方法 A retrospective cohort study. Setting The study sourced its data from theMultiparameter Intelligent Monitoring in Intensive Care Database IV (MIMIC-IV), a comprehensive database of intensive care unit patients. Participants A total of 15754 critically ill patients with AKI were enrolled from the MIMIC-IV database.Primary and secondary outcome Primary outcome was in-hospital mortality and secondary outcome was 180-day mortality.
结果 15 754 critically ill AKI patients were included in our analysis. We found that DEX use decreased in-hospital mortality risk by 38% (HR 0.62, 95% CI 0.55 to 0.70) and 180-day mortality risk by 23% (HR 0.77, 95% CI 0.69 to 0.85). After adjusting for confounding factors, DEX can reduce all three stages of AKI in in-hospital mortality.
结论 Our retrospective cohort study suggests that DEX significantly correlates with decreased risk-adjusted in-hospital and 180-day mortality in critically ill AKI patients. Nonetheless, future randomised controlled trials are warranted to validate our findings.

PO-0382

胰岛素瘤合并昏迷患者 1 例

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目的 通过手术切除胰岛素瘤是成功率较高的根治性治疗方案，围手术期的主要重点是预防和控制血糖浓度的大幅度波动。术前 2-3 小时补充适量葡萄糖，避免用量过大影响术中血糖监测结果；麻醉诱导时出现低血糖，应给予葡萄糖的同时，静脉注射肾上腺皮质激素;切除肿瘤前 10-30min 停用葡萄糖，只输注平衡液，维持血糖中低水平，能够准确反映肿瘤是否彻底切除。
方法 现病史：
患者，女，16 岁，因“嗜睡半年，加重伴发热 4 天”入院。患者于 2023 年 12 月无明显诱因出现间断腹泻、浑身乏力，就诊于 xx 医院.给予胃镜检查未见异常后返回，腹泻后精神萎靡、嗜睡持续数月，2024 年 4 月行脑电图未见异常，5 月 11 日轻微活动后即出现意识障碍伴发热，于当地医院测血糖为 0mmol/L、体温为 38.5℃，行头颅 CT 未见明显病变，为进一步诊治就诊于我院。
诊疗经过：

患者入院期间处于持续浅昏迷状态，测定葡萄糖、胰岛素、C 肽数值，全腹 CT 示胰腺体部占位，高度怀疑胰岛细胞瘤，为避免进一步加重，有诱发脑缺血坏死及脑梗死可能，于 2024 年 5 月 23 日行腹腔镜下胰体尾切除术。

麻醉过程：

防治低血糖：麻醉前测血糖 9.6mmol/L，予静脉推注地塞米松 10mg，术中间断监测血糖，据血糖调节微量泵泵入 10%葡萄糖溶液的泵注速度，肿瘤切除前 30min 停止泵注葡萄糖溶液。

生命体征：10:45 患者入室后，开放外周静脉，监测 NIBP、ECG、SpO2 和 BIS，行左桡动脉穿刺、右侧颈内静脉穿刺置管，用于监测连续动脉血压、间断进行血气分析及补充血容量。HR130 次/min；SpO2100%；无创动脉血压(NIBP)137/77mmHg。

麻醉诱导：诱导时静脉推注舒芬太尼 30μg，依托咪酯 25mg，罗库溴铵 30mg。

麻醉维持：七氟醚、丙泊酚+瑞芬太尼泵注，在 BIS 指导下调整参数；间断静脉推注罗库溴铵维持肌松；去甲肾上腺素泵注维持循环系统稳定。

麻醉管理：

麻醉处理应力求平稳，避免外源性葡萄糖引起的血糖波动，选用对血糖影响较小的丙泊酚、舒芬太尼、罗库溴铵及七氟醚等药物，避免麻醉药对血糖产生影响，并且在全麻期间注意鉴别低血糖昏迷；

保持足够的通气量，维持正常的 PaO2 和 PaCO2，避免过度通气出现继发性脑血流下降，减少低血糖造成脑缺糖性缺氧性损害；

避免血糖过低，血糖<2.8mmol/L 则脑利用葡萄糖受限，能量不足而导致脑功能紊乱，延长术后转归。肿瘤切除后如出现高血糖，可使用小剂量胰岛素控制。

麻醉总结：术中循环稳定，13:20 手术结束，历时 3h，输入 10%葡萄糖溶液 200ml、复方氯化钠 1500mL，出血 300mL，尿量 350mL。

13:52 术毕，测血糖 8.0mmol/L,考虑患者入室时浅昏迷、低血糖性脑损伤等，一般情况较差，为保证术后病情平稳过渡，带气管导管入重症监护室。

术后随访：

血糖：术后七天空腹血糖波动范围为 5.7-8.6mmol/L

术后转归：

呼吸：术后第一天入住重症医学科，患者虽意识障碍，但氧合指数大于 300mmHg,无呼吸性酸中毒，脱机试验及 SBT 试验成功，予拔除气管导管后面罩吸氧，其 SpO2 为 99%；

神经:术后第七天转入康复科，给予经颅重复磁刺激治疗、直流电治疗，改善脑循环增强代谢，促进恢复；给予高压氧治疗，增加颅神经供氧，减轻脑组织水肿，改善脑循环，减轻氧化应激反应，患者术后二十四天精神、饮食、睡眠尚可，语言功能好转，交流尚可。

其他：术后十五天患者吞咽恢复尚可，已拔出胃管；已拔出尿管，暂未发现尿路感染。

结果 胰岛素瘤占胰岛细胞肿瘤 （ICT） 的 60%，其特征是内源性胰岛素分泌过多，随后出现神经血糖减少症状和儿茶酚胺能反应引起的症状，患者可呈发作性低血糖昏迷，久之将损害脑组织，发生意识障碍、精神异常等。低血糖发作常随病程延长而频繁且持续时间延长及程度加重，多伴有身体逐渐肥胖，记忆力、反应力下降。疾病的早期定位对于预防致死性低血糖至关重要。对于单发性孤立性胰岛素瘤，根治性手术切除仍然是首选的治疗方法。

丙泊酚对血液中胰岛素及血糖水平影响轻微，七氟醚则没有降低血糖的作用，不影响肿瘤切除后的血糖含量，因此采用静吸复合麻醉，能达到较满意的麻醉效果。

结论 胰岛素瘤在麻醉期间可能会带来重大挑战，围手术期中应监测血糖变化和避免外源性因素对血糖产生的影响，从而及时发现处理肿瘤时的低血糖和肿瘤切除后的高血糖、判断肿瘤是否完全切除及避免血糖过低加重患者脑损伤。

PO-0383

局部脑组织氧饱和度与局部肌肉组织氧饱和度的差异

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目的 探究局部脑组织氧饱和度（rScO2）与局部肌肉组织氧饱和度（rSmO2）的差异，探究不同影响因素对 rScO2 和 rSmO2 的影响，以及 rScO2 和 rSmO2 在相同影响因素下的不同反应。
方法 选取天津医科大学口腔医院行口腔颌面外科择期手术患者 50 例。在术前一天（T0）、患者入室（T1）、诱导插管阶段（T2）、局部麻醉后（T3）、术中稳定阶段（T4）、吸痰拔管阶段（T5）采集患者心电信号。并在各时间段监测并记录患者各项指标。循环相关指标包括：患者 T0~T5 的心率 HR、收缩压 SBP、舒张压 DBP、平均压 MBP。代谢相关指标包括：T0~T5 患者的基础代谢率（basal metabolic rate，BMR）、T3~T5 的呼吸频率 RR、潮气量 VT、吸入氧浓度 FiO2、呼出氧浓度 FetO2、呼末二氧化碳浓度 PetCO2。局部组织氧饱和度选取 T1~T5 患者左前额局部脑组织氧饱和度 rScO2 及左小腿局部肌肉组织氧饱和度 rSmO2。计算 T0~T5 相邻 RR 间期差值的均方根（RMSSD）、全部窦性 RR 间期的标准差（SDNN）、低频功率（LF）、高频功率（HF）、总功率（TP）、低频与高频（LF/HF）比值、散点图短轴 SD1、散点图长轴 SD2、心率减速力 DC。并将 LF、HF 与 TP 作对数转换处理。
结果 患者 HR、SBP、MBP 从 T1 到 T2 显著上升，T2 到 T3、 T3 到 T4 显著下降，T4 到 T5 显著上升；DBP 从 T2 到 T3 显著下降， T4 到 T5 显著上升（P<0.05）。患者 BMR 从 T1 到 T2 显著上升，T2 到 T3、 T3 到 T4 显著下降，T4 到 T5 显著上升；PetCO2 T4 到 T5 显著上升（P<0.05）。患者 RMSSD、logHF、SD1、DC 从 T1 到 T2、 T2 到 T3 显著下降， T4 到 T5 显著上升；SDNN、logTP、LF/HF 比值、SD2 从 T1 到 T2 显著上升，T2 到 T3、 T3 到 T4 显著下降，T4 到 T5 显著上升；logLF 从 T2 到 T3 显著下降，T4 到 T5 显著上升（P<0.05）。患者 rScO2 从 T1 到 T2 显著上升，T2 到 T3 显著下降，T4 到 T5 显著上升；rSmO2 从 T2 到 T3 显著上升，T3 到 T4 显著下降（P<0.05）。在 T1~T5 各时点，rScO2 与 rSmO2 均与患者年龄呈显著负相关性（P<0.05）。在 T1，rSmO2 与 HR、BMR 呈显著正相关（P<0.05）。在 T2，rSmO2 与 logLF、logHF 呈显著正相关（P<0.05）。在 T3，rScO2 与 DC 呈显著正相关，rSmO2 与 RMSSD、SD1、logHF 呈显著正相关（P<0.05）。
结论 rScO2 与 rSmO2 均随着年龄增加而降低。在不同的应激情况下，脑组织与肌肉组织的反应有所不同，rScO2 相对在循环波动的情况下更加稳定，但受到大量纯氧吸入以及 CO2 水平的变化影响更明显。rSmO2 则受循环影响更大。rScO2 与 rSmO2 均主要受到迷走神经的支配调节。在机体受到刺激而做出应激反应时，在一定范围内 rSmO2 与 rScO2 的自身调节均能够保持其氧合稳定充足。

PO-0384

单侧及双侧颈上交感神经节切除对大鼠心肌缺血再灌注损伤的影响

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目的 探讨双侧及左侧交感神经切除术对大鼠心肌缺血再灌注损伤的影响。
方法 选取健康成年雄性 SD 大鼠 30 只。将大鼠随机平均分为 3 组：缺血再灌注损伤组（A 组)、左侧颈上交感神经切除+缺血再灌注损伤组（B 组）、双侧颈上交感神经切除+缺血再灌注损伤组（C

组)。三组均结扎左冠状动脉前降支制备再灌注模型，A 组开胸后只结扎左冠状动脉，B 组左侧颈上交感神经切除后行缺血再灌注，C 组双侧颈上交感神经切除后行缺血再灌注。制备大鼠心梗模型，当出现心尖部及左心室壁颜色由红变白伴心室壁运动减弱 ST 段弓背向上抬高时提示缺血成功。缺血成功 30min 后，B 组行左侧颈上交感干离断术,松开结扎线可见心尖及左心室颜色逐渐恢复红润且 ST 段恢复提示再灌注成功并持续 2h。各组大鼠原位结扎左冠状动脉前降支，股静脉注射 1%伊文氏蓝 1ml 可见结扎以下的缺血区呈非蓝染结扎以外的非缺血区呈蓝染。将切片置于 1%TTC 溶液中避光孵育 30min，4%多聚甲醛固定 15 min 扫描仪检测。正常心肌呈蓝色缺血心肌呈红色,梗死心肌呈灰白色,采用 Image-ProPlus6.0 图像分析软件测定各个截面的梗死面积和缺血面积的百分比表示心肌梗死面积取平均值。于再灌注 2h 时采集右颈动脉血样 2ml 常温静置 30min 后 4℃下离心 15 min,取上清液,采用 ELISA 法检测血清 cTnI 浓度，检测心肌细胞凋亡和白介素-1、白介素-6、肿瘤坏死因子-a（TNF-α)以及丙二醛（MDA)、超氧化物歧化酶(SOD)的含量比较单双侧神经节切除对心肌损伤的影响。

结果 C 组的心肌酶含量、氧化产物含量、炎症因子水平、心肌梗死面积低于 B 组，抗氧化酶含量高于 B 组。

结论 双侧颈上神经节切除可更好地减少心肌酶泄漏，减少细胞器损伤和心肌梗死，保护缺血心肌。

PO-0385

Metabolic insights from aged hippocampal single-cell atlas: unveiling neuroglial disruptions in postoperative cognitive impairment

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Aim: Glia-neuron interaction is a crucial feature in the hippocampus during the occurrence of postoperative cognitive impairment. However, the detailed metabolic pathways and gene targets involved in these interactions, particularly focusing on the metabolic imbalance during perioperative period, are yet to be fully elucidated. Here, perioperative single-cell genomic expression characteristics of the neuroglial system in the hippocampus of aged mice were detected. The metabolic cross-cellular mechanisms and valuable treatment options for cognitive impairment were investigated.

Methods 18-month-old mice were used to build pathological models of postoperative cognitive impairment. Single-cell RNA sequencing was performed within the hippocampus, and the transcriptomic profile was analyzed to model the glia-neuron interaction via functional enrichment network and ligand-receptor analysis. The possible intervention targets of anesthetics were predicted by the DrugBank database. Perioperative dexmedetomidine intervention model was established and assessed by fear conditioning test and Morris water maze test. RNA fluorescence in situ hybridization was performed to validate the metabolic characteristics of the neuroglial system.

Results We constructed the single-cell atlas of aged hippocampus during the perioperative period, unveiling the disrupted neuroglial system. Postoperative neurons and glia exhibited significant metabolic alterations, including protein dysmetabolism and mitochondrial electron

misrouting. Metabolic imbalance in neurons was notably marked by peptide metabolism and ceramide metabolism imbalances, involving critical DEGs like Atf3. These metabolic alterations were linked to exacerbated microglia activation, neuroinflammation, and further affected synaptic function and neuronal myelination. Additionally, the intervention with dexmedetomidine showed potential in enhancing neuronal metabolic rebalance, thus ameliorating postoperative cognitive impairment.

Conclusions This study proposes an aged hippocampal cell atlas and provides insights into the role of disrupted glia-neuron cycle in postoperative cognitive impairment. Our findings highlight the critical impact of metabolic alterations within the neuroglial system and elucidate the therapeutic potential and mechanism of dexmedetomidine intervention in targeting metabolic imbalance.

PO-0386

α 亚麻酸预处理对老年小鼠术后谵妄样行为的影响

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目的 观察 α 亚麻酸预处理对老年小鼠术后谵妄样行为的影响，并探索可能机制。
方法 选择 16-18 月龄老年小鼠根据不同处理方式分为 Con 组、ALA 预处理组（ALA 组）、麻醉手术组（AS 组）和 ALA 预处理+手术组（ALA+AS 组）。ALA 预处理方式为术前小鼠灌胃给予 α 亚麻酸 32mg/kg/d，连续给药 7 天。AS 组指在七氟烷吸入麻醉下行剖腹探查术建立 POD 模型。所有动物于造模后 24h 利用 Y 迷宫、旷场实验及埋藏食物实验观察小鼠谵妄样行为的改变。通过尼氏染色和透射电镜观察不同处理方式对老年小鼠海马 CA1 区神经元形态结构的影响。Elisa 及 qPCR 检测海马组织炎症因子的释放水平，可见分光光度法测定线粒体呼吸链复合体的酶活性。体外实验探索 HT22 细胞中 ALA 最佳干预浓度后，将细胞分为 Con 组、ALA 组（250uM/L 干预 24h）、LPS 组（1ug/ml 的 LPS 诱导细胞炎症模型）和 ALA+LPS 组。处理 24h 后 CCK8 检测不同组细胞活力， ELISA 检测细胞上清中炎症因子的释放。ROS 活性氧检测和 JC-1 膜电位测定评估 ALA 预处理对线粒体功能的影响。
结果 AS 组与 Con 组相比较，提示七氟烷吸入麻醉下行剖腹探查术可致老年小鼠出现行为障碍 ($P<0.05$)，而 ALA 预处理可改善这种行为障碍。通过尼氏染色和透射电镜可见，麻醉手术后小鼠大脑海马 CA1 区神经元受损，出现细胞数量减少、排列紊乱，核膜皱缩、线粒体肿胀和高尔基扩张，而 ALA 预处理可减轻细胞损伤。AS 组较 Con 组促炎因子含量明显升高、抗炎因子含量下降 ($P<0.005$)，而 ALA 预处理可降低促炎因子 IL-1β、IL-6 和 TNF-α 的升高，增加抗炎因子 IL-10 表达。与 Con 组相比，AS 组线粒体复合物 I-V 活性明显降低，而 ALA 预处理组复合物活性均明显提高。体外实验得出同样的结果，即 ALA 预处理可减轻 LPS 导致的细胞损伤，降低炎症因子释放并改善线粒体的功能受损。
结论 七氟烷麻醉下的剖腹探查术可诱导老年小鼠发生急性认知功能障碍，而 α 亚麻酸预处理可以减轻谵妄样行为，其机制可能是通过抑制神经炎症所致的线粒体功能障碍。我们的研究为术后谵妄的预防提供了新的证据和前景。

PO-0387

基于蛋白质组学和代谢组学联合分析探究肥胖促进 ARDS 的机制：肥胖通过影响肺泡巨噬细胞 CERT1-神经酰胺-ROS/凋亡通路促进 ARDS 发生

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目的 肥胖与急性肺损伤(acute lung injury, ALI)/急性呼吸窘迫综合征(acute respiratory distress syndrome, ARDS)预后的关系仍存在诸多矛盾。为了阐明肥胖患者 ALI 期间的病理生理过程，本研究旨在探索肥胖患者 ALI 期间肺部的蛋白谱和代谢谱的变化。
方法 使用液相色谱-质谱（LC-MS/MS）对正常体重小鼠（Lean）、高脂饮食诱导的肥胖小鼠（DIO）、ALI 小鼠（Lean-LPS）和肥胖 ALI 小鼠（DIO-LPS）的肺组织进行了蛋白质组学和非靶向代谢组学检测，并通过 GO 分析和 KEGG 分析等生信分析方法探讨差异表达分子的生物学功能，并寻找肥胖影响 ALI 的可能的关键代谢通路。采用 WB 和 ELISA 检测肥胖和肥胖 ALI 期间改变的鞘脂代谢通路关键分子在肥胖患者(BMI ≥ 30.0 kg/m2)和对照组患者(BMI 18.5–24.9 kg/m2)、小鼠肺组织和肺巨噬细胞（MH-S）的表达水平。在 MH-S 巨噬细胞中过表达神经酰胺转移蛋白（Ceramide transfer protein，CERT）以及外源性加入神经酰胺（Ceramide，Cer），探讨其功能。流式细胞术检测 ROS 的产生和细胞凋亡。
结果 DIO 和 Lean 之间有 1481 个蛋白质和 57 个代谢物表达差异，DIO-LPS 和 Lean-LPS 之间有 849 个蛋白质和 79 个代谢物表达差异。肥胖降低了患者和小鼠肺组织 CERT、鞘胺醇（Sphingosine，Sph）的水平，增加了 Cer 的水平；同时，高脂环境培养降低了 MH-S 内 CERT 的表达，增加了 Cer 的水平。累积的 Cer 导致 ROS 的产生和细胞凋亡增加。过表达 CERT 可以通过增加 Cer 的转运，降低细胞内 Cer 的水平，减少 ROS 的产生和细胞凋亡。在体内，当 CERT 在肥胖小鼠中过表达时，可显著改善 LPS 刺激后肺的损伤程度。
结论 我们的研究表明，肥胖诱导的 CERT 表达降低可以通过减少 Cer 的 CERT 依赖性运输，增加 Cer 水平，通过增加 ROS 的产生和细胞凋亡加重 ALI。CERT 可作为治疗肥胖相关 ALI 的一个有希望的靶点。

PO-0388

胸腔镜肺手术后肺不张的特征:一项随机对照试验的二次分析

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目的 探讨胸腔镜肺手术后肺不张部位与手术部位的关系，验证肺不张的不对称性特征。
方法 这是一项对前瞻性随机对照研究结果的二次分析。该随机对照研究纳入了年龄≥18 岁，ASA 分级Ⅰ—Ⅲ级、预计单肺通气时间≥1h 拟在全身麻醉下行择期胸腔镜肺手术的患者。在完成气管插管后这些患者随机接受全程 VCV、PCV 或 PCV–VG 三种通气模式进行机械通气，主要研究结果是术后前 7 天肺部并发症的发生率。本研究通过方差分析探讨肺不张部位与手术部位的关系，并通过 Bonferroni 方法进行校正，并利用 logistic 回归分析影响肺不张发生部位的危险因素。
结果 最终 1086 例患者数据纳入统计，其中 100 例患者(9.2%)发生肺不张。方差分析显示术后肺不张发生部位有统计学差异，手术侧发生率较高（p=0.042）。多因素 logistic 回归分析表明手术侧别是术后肺不张部位的独立危险因素(RR 7.16, 95% CI (1.54–59.86), p = 0.02)。
结论 本研究表明，胸腔镜肺手术后肺不张表现出不对称性，主要发生在手术侧。

PO-0389

麻醉苏醒期不同通气模式对腹腔镜腹部手术患者术后早期肺不张的影响：随机对照研究

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目的 麻醉苏醒期肺不张发生风险约占术后总体肺不张的 39%，并可持续至术后数天。肺不张可导致患者术后不同程度的呼吸力学损害和气体交换障碍，其发展与术后肺部并发症（PPCs）发生密切相关，PPCs 影响患者康复质量并增加围术期死亡率。因此，降低麻醉苏醒期肺不张至关重要。研究发现苏醒期通气模式的选择可能对肺不张的发生有影响，然而，国内外围术期机械通气指南由于缺乏高质量证据未对麻醉苏醒期的通气模式给出推荐。
因此，本研究旨在评估麻醉苏醒期使用同步间歇指令通气（SIMV）（同步间歇指令-压力控制通气（SIMV-PC）或同步间歇指令-压力支持通气（SIMV/PSV））或间歇人工辅助通气对腹腔镜腹部手术患者术后早期肺不张的影响。
方法 本研究为一项前瞻性、随机对照研究，将接受腹腔镜腹部手术的成年患者按 1: 1: 1 随机分至三组（每组 42 例）：SIMV-PC 组、SIMV/PSV 组和对照组。在麻醉苏醒期（从手术结束至气管拔管），SIMV-PC 组使用 SIMV-PC 模式、SIMV/PSV 组使用 SIMV/PSV 模式，对照组采用间歇人工辅助通气。由于本研究旨在比较 SIMV 与间歇人工辅助通气两种通气模式，因此将 SIMV-PC、SIMV/PSV 合并为一组（SIMV 组）对结局指标进行统计分析。主要结局指标是气管拔管后 30 分钟在麻醉后恢复室（PACU）通过肺超声诊断的肺不张发生率。次要结局指标为 PACU 期间的低氧血症发生率、氧合指数和住院期间术后肺部并发症（PPCs）发生率。术后肺部并发症包括肺炎、再次气管插管、无创呼吸机通气和急性呼吸窘迫综合征（ARDS）。
结果 本研究共筛选 393 例受试患者，115 例患者被纳入最终分析。SIMV（SIMV-PC 和 SIMV/PSV）组与对照组相比术后肺不张的发生率更低（29.5% vs. 48.6%; 相对危险度（RR）0.61; 95%置信区间（CI）: 0.38-0.98; P=0.045）。两组 PACU 期间低氧血症发生率比较无统计学差异（20.5% vs. 21.6%; RR 0.95; P=0.891），两组氧合指数比较无统计学差异（中位数[IQR], SIMV 组 vs. 对照组，366 [314-527] vs. 345 [310-458]; P=0.801）。两组术后肺炎发生率无显著差异（24.4% vs. 29.7%; RR 0.819; P=0.540）。无患者再次气管插管、无创呼吸机通气或发生 ARDS。
结论 与间歇人工辅助通气相比，麻醉苏醒期使用 SIMV（SIMV-PC 或 SIMV/PSV）可降低腹腔镜腹部手术患者术后早期肺不张发生率。

PO-0390

右美托咪定与瑞芬太尼在脑卒中患者溶栓术中的应用及对脑代谢及抗氧化的影响

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目的 探讨右美托咪定与瑞芬太尼在脑卒中患者溶栓术中的应用效果，及对脑代谢、抗氧化的影响。
方法 选择 2022 年 1 月-2023 年 12 月收治的脑卒中患者 96 例，均接受溶栓术治疗，根据入院号尾数的奇偶按 1:1 分为对照组和研究组，48 例/组。对照组予以常规+瑞芬太尼麻醉，研究组在对照组

基础上予以右美托咪定。比较两组麻醉即刻、麻醉后 1h 的脑代谢，术前、术后 1h 的血清指标，术前、术后 1d 颅内压，以及术后睁眼时间、Ramsay 评分、并发症。
纳入标准：①符合缺血性脑卒中[7]诊断标准，脑实质成像、脑血管检查提示缺血性脑卒中，排除脑实质出血、脑肿瘤等其他脑部疾病；②20 岁≤年龄≤75 岁，依从性良好；③符合溶栓术指征，发病≤4.5h；④患者、家属签署知情同意书。排除标准：①对右美托咪定、瑞芬太尼不耐受或存在溶栓禁忌症；②合并帕金森、癫痫等神经系统疾病；③合并恶性肿瘤、严重器质性疾病、自身免疫性疾病；④存在数字减影血管造影禁忌症；⑤合并血液系统疾病；⑥精神病发作期；⑦合并急性感染；⑧长期服用抗心律失常药物。剔除脱落标准：①中途转院、失访；②因为其他原因无法按照研究方案完成治疗者。
结果 研究组麻醉后 1h 的 Da-jvO2、CjvO2、CMRO2 高于对照组（P<0.05）。两组术后 1h 的 MDA、ET、SOD 明显高于术前，但观察组术后 1h 的 MDA、ET、SOD 低于对照组（P<0.05）。研究组术后 1d 的颅内压及术后睁眼时间、Ramsay 评分均低于对照组（P<0.05）。两组术后出现躁动、寒战、肌张力增高的患者总人数占比，组间比较差异无统计学意义（P>0.05）。
结论 在脑卒中溶栓术中采取右美托咪定与瑞芬太尼联合麻醉方案，能提高脑代谢及抗氧化能力，减轻氧化应激和炎症反应，降低颅内压，促进术后恢复，且具有一定的用药安全。
右美托咪定联合瑞芬太尼在脑卒中溶栓术中能达到显著效果，能提高脑代谢功能及抗氧化能力，减轻氧化应激和炎症反应，降低颅内压，促进术后恢复，且有一定用药安全性。本研究主要不足之处在于研究样本数有限，且指标观察时间有限，尚未能证实右美托咪定联合瑞芬太尼的广泛效力及远期疗效，所以在今后研究中还需要扩大研究范围，以期为右美托咪定联合瑞芬太尼麻醉方案的推广应用提供更多参考。

PO-0391

臭氧预处理通过激活 Nrf2/Slc7a11/Gpx4 信号通路减轻缺血再灌注损伤引起的心肌细胞铁死亡

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目的 已有的研究表明，臭氧具有保护心肌细胞免受缺血再灌注损伤的作用，同时铁死亡是心肌缺血再灌注损伤中的重要病理生理过程，但臭氧发挥保护作用的机制是否与抑制铁死亡相关尚不明确。本研究旨在确定臭氧预处理是否通过抑制缺血再灌注损伤中的心肌细胞铁死亡来发挥保护作用。
方法 本研究首先通过生物信息学方法筛选了数据集 GSE153493 中缺血再灌注相关的差异基因，并通过将差异基因与铁死亡标记基因求交集找到其中与铁死亡相关的基因，并对这些基因进行富集分析找到其相关的生物学过程以及核心转录因子并作为研究的主要方向。为了验证臭氧预处理可以在心肌缺血再灌注过程中发挥保护作用，我们对 C57 小鼠心肌缺血再灌注损伤模型进行了臭氧预处理干预，通过检测心肌梗死面积及 ST 段抬高水平来明确其作用。为了进一步探讨臭氧保护作用与铁死亡是否相关，我们使用了铁死亡诱导剂 Erastin 和铁死亡抑制剂 Fer-1 进行干预使用大鼠 H9c2 心肌细胞系建立 H/R 细胞模型模拟心肌缺血再灌注过程。为了进一步明确核转录因子 Nrf2 在臭氧发挥保护作用中的扮演的角色，我们使用了 SiRNA 对 Nrf2 的表达进行了特异性抑制进行证明。实验中通过 CCK-8 试剂盒检测细胞的活性，LDH 试剂盒检测细胞毒性；通过流式细胞仪评估各组细胞中的活性氧物质（ROS）水平；通过检测超氧化物歧化酶（SOD）活性和丙二醛（MDA）的含量来反映每组细胞的氧化应激水平；通过 Western blot 检测铁死亡相关蛋白 Slc7a11、Gpx4、Fth1、Ho-1 和核转录因子 Nrf2 表达水平；通过免疫荧光检测来反映 Nrf2 和 Gpx4 的共表达、Nrf2 的核转位情况以及线粒体内亚铁离子的聚集。
结果 生物信息学分析筛选出了 31 个铁死亡相关的差异基因（DGEs），对 31 个差异基因进行富集分析确定核转录因子 Nrf2 与抗氧化应激在其中起重要作用，并且根据蛋白蛋白之间的互相作用确

定了两个核心基因 Slc7a11 和 Ho-1。我们的体内实验证明了臭氧预处理可以降低小鼠心肌风险和梗死区域面积以及降低心电图 ST 段抬高水平，这些结果提示臭氧预处理在心肌缺血再灌注损伤中发挥了保护作用。我们的体外实验证明臭氧预处理可以减少 H/R 处理引起的 H9c2 心肌细胞损伤，而且这种保护作用可能与减轻线粒体内亚铁离子聚集、降低氧化应激水平、增强抗氧化应激相关蛋白的表达相关，值得注意的是臭氧预处理能够促进 Nrf2 的核转位，在缺血再灌注损伤中上调 Slc7a11 和 Gpx4 的表达。同时 Erasin 处理显著逆转了臭氧预处理的保护作用，增加了线粒体内亚铁离子聚集、增强了氧化应激水平、降低了抗氧化应激相关蛋白的表达；而铁死亡抑制剂 Fer-1 则进一步增强了臭氧预处理的保护作用。在沉默了核转录因子 Nrf2 后，我们发现臭氧预处理的保护作用被显著抑制，线粒体内亚铁离子的聚集显著增加，抗氧化应激相关蛋白的表达显著下降，细胞氧化应激水平显著增加。

结论 综上所述，我们的实验证明低浓度的臭氧预处理可以通过抑制铁死亡来保护心肌免受缺血再灌注损伤，同时臭氧的保护作用可能与 Nrf2/Slc7a11/Gpx4 信号通路有关，这突出了臭氧预处理作为一种新的的冠状动脉疾病治疗方法的潜力。

PO-0392

IL-17 介导 Ly6Chi 型单核细胞促进肺上皮细胞 EMT

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目的 呼吸机相关性肺损伤（VILI）是机械通气过程中不可避免的常见并发症。研究报道 IL-17 在各种疾病中起到不同作用。然而 IL-17 与单核巨噬细胞在急性肺损伤期间的潜在机制尚未明确。本研究拟构建急性肺损伤动物和细胞模型，研究 IL-17 与单核巨噬细胞交互作用在 VILI 中的作用和机制。

方法 气管插管高潮气量通气（HTV）诱导小鼠急性呼吸机相关性肺损伤模型。HE 染色和透射电镜观察肺病理损伤，Masson 染色观察纤维化。ELISA 检测炎症因子明确炎症反应发生。通过流式细胞术鉴定不同时期小鼠肺 Ly6Chi 型单核细胞募集情况。应用免疫荧光共定位技术检测 IL-17A 的细胞来源。腹腔注射 anti-IL-17 抗体和 rm IL-17 蛋白后检测肺炎症和损伤水平，探究 IL-17 与 Ly6Chi 型单核细胞的交互作用。WB 探究 p38MAPK/MCP-1 信号通路磷酸化和 EMT 关键蛋白的表达。构建慢病毒敲低 p38 MAPK RAW264.7 细胞株；使用 RAW264.7 小鼠巨噬细胞与 MLE-12 小鼠肺上皮细胞共培养，明确 IL-17 明确 IL-17A 在 VILI 中的作用机制。

结果 HTV 诱导小鼠 VILI。HTV1d 时小鼠 IL-1β 和 TNF-α 水平达到峰值， HTV7d 后有所恢复，IL-17 持续表达。HTV1d 肺 HE 染色见肺泡中红细胞和炎性细胞浸润，蛋白碎片增加；透射电镜见肺泡上皮细胞微绒毛消失，细胞核结构破坏，线粒体肿胀和空泡化。Masson 染色 HTV28d 蓝色胶原沉积，α-SMA 荧光上调，提示发生纤维化修复。WB 检 HTV28d 后小鼠肺内 E-Cadherin 表达降低，N-Cadherin 和 Vinmentin 表达升高，提示发生 EMT。流式细胞术结果提示 1d 时肺内 Ly6Chi 型单核细胞募集。HTV 诱导小鼠肺 p38MAPK / MCP-1 磷酸化。HTV 组小鼠免疫荧光 IL-17 与 Ly6G 共定位，为了进一步探究 IL-17 的来源，使用 anti-Ly6G 耗竭小鼠体内中性粒细胞，发现 HTV+anti-Ly6G 组小鼠肺内 IL-17 显著降低，提示 IL-17 来源于中性粒细胞。使用 anit-IL-17 腹腔注射至小鼠体内，ELISA 检测 BALF 中 MCP-1 减少，Ly6Chi 型单核细胞与 CON 无明显差异。进一步细胞层面验证，使用 rmIL-17 刺激 RAW264.7 细胞 p38 MAPK 蛋白磷酸化，促进 MCP-1 分泌和释放。慢病毒敲低 RAW264.7 细胞 p38MAPK，可逆转这一现象。IL-17 与 RAW264.7 细胞和 MLE-12 肺上皮细胞共培养，细胞上清中 IL-1β 和 IL-6 显著上调。

结论 HTV 诱导小鼠 VILI，1d 时肺部炎症反应和病理损伤达到高峰，28d 时发生纤维化修复和 EMT，IL-17 持续表达。IL-17 来源于肺内 Ly6G+中性粒细胞。IL-17 激活 p38MAPK 磷酸化，分泌 MCP-1，招募 Ly6Chi 型单核细胞至肺组织，加重急性肺损伤，介导 EMT。

PO-0393

经皮穴位电刺激对脑血管介入手术患者术后并发症的影响研究

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目的 随着脑血管疾病发病率和检出率的逐年攀升，以及外科技术的发展，接受脑血管手术治疗特别是血管内介入治疗的患者日益增多。此类患者围手术期发生脑损伤和脑缺血的风险性较高，为了避免手术和麻醉因素导致的神经功能损伤，合理的麻醉方案和预防显得尤为重要。针灸及其相关技术在脑血管疾病的治疗方面广泛应用。我们既往的研究证实电针预处理可减轻脑缺血损伤，产生脑保护作用。此外，经皮穴位电刺激（transcutaneous electrical acupoint stimulation，TEAS）用于围手术期已被证实可产生诸多益处，包括术前减轻患者焦虑情绪，术中减少麻醉药剂量，减少血流动力学波动，术后改善镇痛并减轻恶心呕吐等，这些都有利于患者术后快速康复。因此经皮穴位电刺激的应用对脑血管介入患者具有潜在价值。但目前经皮穴位电刺激用于神经外科手术的研究较少。因此，本研究拟探索经皮穴位电刺激对脑血管介入治疗患者术后并发症等恢复指标的影响，以期为此类患者的围手术期管理提供参考。

方法 本研究是一项单中心、前瞻性、双盲随机对照临床试验。筛选 166 例脑血管介入手术治疗的患者，按照 1：1 随机分配至经皮穴位电刺激组和对照组。经皮穴位电刺激组患者在麻醉诱导后接受 60min 的经皮穴位电刺激，对照组患者仅粘贴电极片和连接刺激仪，不给予刺激。穴位选择为百会穴、内关穴、足三里穴。刺激强度为患者能耐受的最大强度（4-11mA），频率为 2/10Hz 的疏密波。主要观察指标为术后住院期间主要并发症发生率。次要观察指标包括术后住院期间神经系统相关并发症发生率；拔管后 30min、术后 1d、3d 谵妄发生率；术后 1d、3d MMSE 评分，术后 3d QoR-40 评分和改良 Rankin 评分；住院时长、术后 30d 和 6 个月全因死亡率。其它结局指标有包括术中血流动力学指标和手术结束时 IL-6、TNF-α 水平。主要结局指标术后并发症发生率采用意向性分析（Intention-to-treat, ITT）。根据不同类别并发症、性别、年龄、BMI 及合并高血压进行亚组分析。根据 PP 分析和神经系统并发症进行敏感性分析。

结果 1) 2022 年 7 月 26 日至 2023 年 5 月 25 日，本研究共 166 例受试者接受随机分配，其中 154 例完成研究。受试者基线资料和手术相关特征组间分布均衡。

2) 主要结局指标：ITT 分析结果总体并发症发生率为 4.8%，经皮穴位电刺激组为 3.6%，对照组为 6%，率差（95%置信区间）为-2.4%（-10.1%，4.9%），P=0.054，两组差异无统计学意义。

3) 次要结局指标：两组患者在拔管后 30min、术后 1d 和术后 3d 的谵妄发生率无显著差异（P 均＞0.05）。两组患者术后 3d MMSE 评分、QoR40 评分和改良 Rankin 评分无显著差异（P 均＞0.05）。两组患者住院时长、术后 30d 和 6 个月死亡率无显著差异（P 均＞0.05）。

4) 其它结局指标：插管后即刻心率经皮穴位电刺激组（71.99±16.31 次/分）显著低于对照组（77.82±15.40 次/分）（P=0.019）。重复测量方差分析显示两组平均动脉压无显著组间差异。两组患者手术结束时 IL-6 和 TNF-α 水平均无显著差异（P 均＞0.05）。

5) 亚组分析结果显示，对于年龄≥65 岁者，BMI≥28kg/m2 者以及非吸烟患者，经皮穴位电刺激组相比对照组可能术后住院期间主要并发症更少。

6) 敏感性分析显示，主要结局指标的 PP 分析结果与 ITT 分析一致。两组主要神经系统并发症发生率无显著差异。

结论 麻醉诱导后经百会、内关、足三里给予患者 60 分钟的经皮穴位电刺激，与对照组相比对脑血管介入手术患者术后住院期间主要并发症发生率无显著影响。亚组分析提示年龄≥65 岁者，BMI≥28kg/m2 者以及非吸烟患者可能从经皮穴位电刺激中获益，尚需进一步研究验证。

PO-0394

Improvement of Cardiovascular Risk Prediction for Noncardiac Surgery with Preoperative Frailty Assessment: A Prospective Cohort Study

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Background Elderly patients undergoing noncardiac surgery are at risk of postoperative cardiovascular events. Accurate risk assessment is important for informed decision-making.
Objective To evaluate the added value of preoperative frailty assessment for predicting cardiovascular events after noncardiac surgery beyond conventional risk predictors.
Methods This prospective cohort study enrolled elderly patients undergoing elective major noncardiac surgery. A frailty index was constructed based on 32 health-related parameters derived from preoperative geriatric assessments. The primary outcome was the occurrence of any cardiovascular events within 30 days after surgery. Logistic regression models were used to assess the associations between the frailty index and outcomes. Predictive performance was evaluated by improvement of model fit, fraction of new predictive information, and decision curve analysis. The predictive value of the Clinical Frailty Scale was also evaluated.
Results A total of 1808 patients were included, with 316 (17.5%) patients experiencing the primary outcome. The frailty index was continuously associated with increased odds of the primary outcome after adjustment for clinical predictors (odds ratio 1.56, 95% CI 1.33-1.82 per 0.1-point increment), and clinical predictors plus preoperative N-terminal pro–B-type natriuretic peptide (odds ratio 1.37, 95% CI 1.16-1.61 per 0.1-point increment). Integration of the frailty index significantly improved model fit and provided new predictive information. Decision curve analysis showed the models containing frailty achieved higher net benefit. Similar findings were obtained when the Clinical Frailty Scale was used for frailty assessment.
Conclusions The frailty index, derived from preoperative multidimensional geriatric assessment, improved the prediction for cardiovascular events after noncardiac surgery.

PO-0395

KLF4 改善老年小鼠手术和麻醉后的血脑屏障通透性增加和记忆障碍

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目的 术后认知功能障碍是麻醉和手术后常见的神经系统并发症。越来越多的证据表明，外周手术创伤导致的神经系统功能障碍与血脑屏障通透性增加密切相关，Krüppel 样因子 4（KLF4）是 kruppel 基因家族的一员，已在内皮细胞中被证实，可能是内皮屏障功能的重要调节因子。然而，KLF4 在外周手术创伤后血脑屏障内皮细胞中的表达和功能尚不清楚。
方法 本研究选取 18 月龄 C57BL/6J 雄性小鼠，通过麻醉状态下左侧胫骨骨折内固定术构建术后认知功能障碍小鼠模型，采用水迷宫实验和新物体识别实验评估认知功能。采用 qRT - PCR、Western blot 和免疫荧光法检测术后 3 d 海马组织中 KLF4 mRNA 和蛋白的表达。此外，为了确定胫骨骨折内固定术后海马中 KLF4 的升高是否有助于改善血脑屏障通透性，小鼠在骨科手术前 3 天，间隔一天经腹腔注射 1mg/kg 的 APTO253 或等体积的 DMSO，评估了术后 3 天血脑屏障通透性、小胶质细胞激活和记忆力的变化。在体外研究中，选择人脑微血管内皮细胞构建体外血脑屏障模型，

siRNA 敲减脑微血管内皮细胞中的 KLF4，通过免疫荧光和 Western blot，跨内皮细胞电阻评估 KLF4 改善 IL-1β 诱导脑内皮细胞通透性增加的保护机制。
结果 体内研究证实，APTO253 预处理抑制了 wnt/β-catenin 信号通路的激活，进而改善麻醉手术诱导的 BBB 损伤、小胶质细胞活化和记忆力下降；在体外 BBB 模型中，APTO253 保护 IL-1β 暴露后的内皮细胞通透性、内皮紧密连接，然而，siRNA 干预 klf4 后抑制了 APTO253 的这种保护作用，我们发现了 APTO253 可以通过小鼠 wnt/β-catenin 信号通路改善老年小鼠麻醉手术后血脑屏障通透性，进而减轻术后认知功能障碍。
结论 我们的研究揭示了 KLF4 调节外周手术创伤后血脑屏障通透性的功能，并确定了 APTO - 253 是改善术后认知功能障碍的潜在药物。

PO-0396

NFkB p56 活化 NLRP3 炎症小体 在七氟烷诱导老年鼠神经认知功能障碍中的作用

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目的 通过观察七氟烷处理后的衰老模型大鼠前额叶皮质区神经元的尼氏小体数量，细胞核和细胞质中 NFkB p56、NLRP3 的表达，水迷宫行为学测试，共同探讨 NFkB p56 活化 NLRP3 炎症小体在七氟烷诱导老年鼠神经认知功能障碍中的作用。
方法 D 半乳糖衰老模型大鼠 36 只，随机分为三组：对照组（Ctrl, n=12），七氟烷组（Sev, n=12），NFkB 抑制剂吡咯烷二硫基甲酸盐组（PDTC, n=12）。Ctrl 组吸入混合气体（1L/min 氧气和 1L/min 空气）6h，Sev 组和 PDTC 组吸入 3.2%七氟烷+混合气体 6h。Ctrl 组和 Sev 组分别于气体吸入结束后 30min、24h、48h 腹腔注射生理盐水 1ml；PDTC 组在相同时间点注射 PDTC 1mL。取大鼠前额叶皮质：①Nissl 染色法观察尼氏小体数量；②Western Blot 法检测细胞核和细胞质 NFkB p65 的表达和细胞质 NLRP3 蛋白相对表达；③RT-PCR 法检测 NFkB 及 NLRP3 转录表达；④Morris 水迷宫行为学实验观察大鼠神经认知功能变化情况。
结果 ①前额叶皮质 Nissl 染色与 Ctrl 组比较，Sev 组尼氏体数量明显下降（$P < 0.05$），与 Sev 组比较，PDTC 组尼氏体数量增加（$P < 0.05$）。②前额叶皮质区 Western Blot 与 Ctrl 组比较，Sev 组细胞核 NFkB P65、NLRP3 蛋白表达显著上调（$P <0.05$），与 Sev 组相比，PDTC 组细胞核 NFkB p65、NLRP3 蛋白相对表达显著下降（$P< 0.05$），三组间细胞浆 NFkB P65 蛋白表达差异没有统计学意义（$P > 0.05$）。③前额叶皮质 RT-PCR 与 Ctrl 组比较，Sev 组 NFkB p65 和 NLRP3 转录表达显著上调，差异有统计学意义（$P < 0.05$），与 Sev 组比较，PDTC 组 NFkB 和 NLRP3 转录表达显著下降（$P<0.05$）。④Morris 实验与 Ctrl 组比较，Sev 组大鼠逃避潜伏期明显延长（$P < 0.05$)，穿越 12 平台次数明显下降（$P < 0.05$）；与 Sev 组比较，PTDC 组大鼠逃避潜伏期明显缩短（$P <$
0.05）,穿越平台次数明显增加（$P < 0.05$）。
结论 NFkB P65 的核转位增加促进 NLRP3 炎症小体活化可能是七氟烷介导大鼠前额叶皮质区神经炎症发生，从而诱发神经认知功能障碍的潜在机制。

PO-0397

去氧肾上腺素与去甲肾上腺素对肾素-血管紧张素-醛固酮系统及急性肾损伤影响的研究进展

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目的 对不同的血管活性药物影响肾素-血管紧张素-醛固酮系统及急性肾损伤的作用机制、发生发展及预防与治疗进行综述及分析，为选择血管活性药物、维持肾素-血管紧张素-醛固酮系统稳态、预测预防急性肾损伤提供依据。
方法 检索对不同的血管活性药物影响肾素-血管紧张素-醛固酮系统及急性肾损伤的作用机制、发生发展及预防与治疗的文献并进行预览、选择和组织；展开论证和文献研究，对检索到的文献进行集中、综合信息和论证分析；总结思路和结果进行研究综述的撰写。
结果 基于药理学机制、现有的临床研究不能给去氧肾上腺素与去甲肾上腺素对肾素-血管紧张素-醛固酮系统及急性肾损伤的影响做出明确的结论。
结论 目前基于药理学机制、现有的临床研究不能给去氧肾上腺素与去甲肾上腺素对肾素-血管紧张素-醛固酮系统及急性肾损伤的影响做出明确的结论，没有明确的机制来解释药理学机制与临床研究存在矛盾的真正原因。但是可以明确的是肾素-血管紧张素-醛固酮系统与急性肾损伤有着紧密的联系。因此，在未来可以纳入更多人群的临床研究来验证结果，通过肾素-血管紧张素-醛固酮系统与急性肾损伤的关联探索可能的机制，以及从围术期管理及药物治疗的角度对急性肾损伤进行深入研究。

PO-0398

P75NTR+ 单核细胞在冠脉搭桥手术后急性肾损伤的预测价值分析

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目的 中国心血管疾病患病率处于持续上升阶段，中国冠状动脉旁路移植术（CABG）年均超 5 万例。围术期急性肾损伤（AMI）为 CABG 术后常见并发症，与病死率、慢性肾病发展、住院费用等密切相关。故构建个体化 CABG 患者围术期 AKI 风险的综合与网络防治平台，提出个性化的临床决策建议和知识图谱对减轻医疗和社会负担、患者预后至关重要。
方法 利用湘雅医学大数据回顾性研究近 10 年 CABG 患者，通过机器学习和统计学方法分析 AKI 的危险因素。进一步通过 RNAseq 和流式细胞术等筛选 AKI 的临床预警标记物。
结果 通过湘雅医学大数据回顾性获取 2013 年到 2023 年在湘雅医院、湘雅二医院、湘雅三医院进行 CABG 手术的 4234 名患者，是否发生 AKI 分成 AKI 组和对照组，对照组根据倾向性评分匹配获得。利用机器学习模型结合 logistic 回归等观察到糖尿病史和术前单核细胞比例、术中大剂量阿片类药物的使用为 AKI 的独立危险因素。进一步对 AKI 组和对照组患者外周血单核细胞 RNA 测序分析得出 AKI 组患者 p75 神经营养因子受体(p75NTR)高表达，流式细胞术证实 AKI 患者 CD14+HLA+p75NTR+的表达显著升高，与 AKI 显著相关。
结论 糖尿病史和术前单核细胞比例、术中大剂量阿片类药物的使用为 CABG 患者围术期 AKI 的独立危险因素。CABG 患者循环 CD14+HLA+p75NTR+ 可作为 AKI 的临床预警标记物。

PO-0399

C 型凝集素受体 Mincle 参与术后认知功能障碍的机制研究

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目的 术后认知功能障碍（POCD）是一种常见的术后并发症，与发病率和死亡率增加有关。然而，这种并发症的发生机制仍然未知。神经炎症，特别是海马区的炎症反应，可以诱导 POCD 的发生。最近，越来越多的证据支持 C 型凝集素受体 Mincle 参与神经系统疾病中的炎症反应。在本研究中，我们研究了先天免疫反应的关键调节因子 Mincle 在手术诱导的海马炎症反应和术后认知功能障碍中的作用。
方法 本研究采用 C57BL/6J（20～22 月龄）小鼠。我们通过麻醉和单侧肾切除术建立了 POCD 小鼠模型。在脂多糖（LPS）刺激的 BV2 小胶质细胞和 POCD 模型小鼠的海马组织中检测 Mincle 蛋白的表达。通过在 BV2 小胶质细胞中基因沉默 Mincle 和在手术/麻醉前海马内注射 Mincle 激动剂 TDM 进行功能丧失和过度表达研究，以确定 Mincle 在神经炎症和认知障碍中的作用。RT-PCR 和 Western 印迹用于测定下游衔接蛋白和促炎细胞因子的表达水平。应用免疫荧光染色评价小胶质细胞的活化情况。通过用 siRNA 进行体外研究，观察 SYK 下游靶标的 mRNA 和蛋白质表达水平以及促炎细胞因子（COX-2 和 iNOS）的表达。在手术后 1、3 和 7 天进行恐惧测试（FCT）和旷场测试（OFT）。染色质免疫沉淀（ChIP）用于确定 Mincle 表达与 POCD 的关系。
结果 在 LPS 刺激的 BV2 小胶质细胞和 POCD 模型小鼠的海马组织中观察到 Mincle 的表达增加。此外，使用 Mincle 中和抗体可减轻 POCD 小鼠的学习和记忆障碍，同时伴有 SYK/核因子 NF-κB 通路的表达减少和海马小胶质细胞活化的下调。Mincle 中和抗体降低了 POCD 小鼠 Iba1 阳性细胞的表达以及 COX-2 和 iNOS 蛋白的表达。此外，体外实验结果显示，LPS 刺激 BV2 小胶质细胞后，Mincle 和 p-Syk 的表达增加。Mincle 基因沉默还降低 LPS 刺激后 BV2 细胞中 COX-2 和 iNOS 的表达。染色质免疫沉淀（ChIP）分析显示 NF-κB/p65 与 Mincle 启动子存在物理结合，这进一步表明 NF-κB 信号通路对 Mincle 表达的调节作用。
结论 我们的研究结果证明 Mincle 在 POCD 的发生中起了重要作用，并表明 Mincle 可能是 POCD 的潜在治疗靶点。

PO-0400

The mechanisms of sepsis induced coagulation dysfunction and its treatment

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Background Sepsis is a life-threatening condition characterized by organ dysfunction resulting from a dysregulated host response to infection. It carries a high morbidity and mortality rate, posing a substantial threat to global health. Nearly all sepsis patients exhibit coagulation abnormalities, but its mechanism is not entirely clear.
Main text The pathogenesis of sepsis is not mutually exclusive; rather, these mechanisms are interdependent and interconnected, each contributing to the progression of coagulopathy in varying degrees. Inflammation can activate endothelial cells and platelets, leading to coagulation, while the activation of coagulation can, in turn, exacerbate inflammation. The immune system enhances coagulation by amplifying inflammatory responses and releasing neutrophil extracellular traps (NETs). Mitochondrial function, the neuroendocrine network, and the endoplasmic reticulum all play roles in inflammation and trigger coagulation via distinct pathways.

Finally, early diagnosis, timely intervention, and dynamic continuous management are the best principles for treating DIC. We recommend the SIC assessment system as a basis for the early diagnosis of DIC. Based on this, clinicians should precisely assess the patient's condition and promptly initiate anti-infective and anticoagulant therapies. It is recommended to select medications with minimal effects on coagulation, employ crystalloid solutions, component transfusions, and vasopressors to stabilize vital signs and ensure patient safety.
Conclusion We explore the mechanisms underlying coagulopathy in sepsis from several aspects, including the activation of platelets and the coagulation cascade, an imbalance in inflammatory responses, immune dysfunction, mitochondrial damage, disruptions in the neuroendocrine network, and endoplasmic reticulum stress. The focus is on the production of TF, damage to the endothelial glycocalyx, and the release of NETs, as well as therapeutic interventions.

PO-0401

Ischemic-preconditioning induced serum exosomal miR-133a-3p improved post-myocardial infarction repair via targeting LTBP1/TGF-β1/PPP2CA axis

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Background Previous studies have demonstrated that ischemic preconditioning-induced serum exosomes (IPC-exo) effectively protect the heart against myocardial ischemia/reperfusion injury in rats. However, it remains unclear whether IPC-exos can also promote cardiac repair following myocardial infarction (MI), and the precise mechanisms involved are unknown. Therefore, this study aimed to investigate the cardioprotective effects of IPC-exos against MI and elucidate the molecular mechanisms underlying these effects in rats.
Methods Exosomes were obtained from the serum of adult rats in the control (Con-exo) and IPC (IPC-exo) groups. Differential expression of microRNAs (miRNAs) in these exosomes was identified using high-throughput miRNA sequencing. In an in vivo MI rat model, exosomes or free-exosome serum were administered intracardially immediately after ligation. Cardiac function, inflammatory and heart failure cytokines, apoptosis, and myocardial tissue fibrosis were quantified. Additionally, luciferase reporter assays were performed to confirm the target genes of miR-133a-3p. MiR-133a-3p antagomir was transfected into IPC-exos to confirm the role of miR-133a-3p in mediating IPC-exos' cardioprotective effects and to uncover the specific mechanism.
Results IPC stimulation increased the protein content in serum exosomes. MiRNA sequencing revealed significant differences ($p<0.05$) in the abundance of 40 miRNAs between IPC-exo and Con-exo, with 23 miRNAs upregulated and 17 miRNAs downregulated. RT-qPCR further confirmed the upregulation of miR-133a-3p in IPC-exos ($p<0.01$). In vivo experiments demonstrated that IPC-exos inhibited early inflammation, reduced apoptosis and myocardial fibrosis (fibrosis area: 34.02±0.64% versus 45.73±0.92%, $p<0.0001$), and improved cardiac function (left ventricular ejection fraction: 65.93±2.04% versus 46.00±1.63%, $p<0.001$) compared to Con-exo, providing protection against heart failure after MI. Luciferase reporter assays confirmed that miR-133a-3p targeted latent transforming growth factor beta binding protein 1 (LTBP1) and protein phosphatase 2, catalytic subunit, alpha isozyme (PPP2CA). Downregulation of miR-133a-3p in IPC-exos reversed their cardioprotective effects against MI in vivo and restored the activation of profibrotic cascades of the TGF-β signaling pathway mediated by LTBP1 and PPP2CA.
Conclusion IPC-induced serum exosomes inhibit myocardial fibrosis and improve cardiac function following MI by transferring miR-133a-3p, which targets LTBP1 and PPP2CA, to regulate the TGF-β signaling pathway in rats.

PO-0402

亚低温通过调节 CaMKK2/AMPK 信号通路减轻脑缺血再灌注损伤诱导的神经细胞凋亡

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目的 探讨亚低温对大鼠脑缺血再灌注损伤中细胞凋亡的影响，并进一步探讨亚低温是否通过调节 CaMKK2/AMPK 信号通路发挥神经保护作用。

方法 选取 SPF 级雄性 SD 大鼠 40 只（6～8 周龄，体重 200～250 g），采用随机数字表法分 5 组(n＝8)，假手术组（Sham 组）、常温模型组（NIR 组）、低温模型组（HIR 组）、低温溶剂组（HIR-DMSO）、低温抑制剂组（HIR-STO609）。NIR 组、HIR 组、HIR-DMSO 组、HIR-STO609 组采用 4 血管阻断法建立全脑缺血再灌注损伤模型，假手术组未行双侧椎动脉电灼和双侧颈总动脉夹闭。低温模型组大鼠在诱导脑缺血即刻使用冰毯降温，使核心温度达到 33℃±0.5℃，4 h 后撤掉冰毯，采用加热灯照射复温，于 1 h 内使大鼠核心温度升至基线温度 37℃±0.5℃。假手术组、常温模型组维持大鼠体温于基线水平。造模前 1 h HIR-STO609 组侧脑室注射 4 ul 的 STO-609，HIR-DMSO 组注射等量 DMSO 溶液。再灌注 24 小时后，对 5 组大鼠进行改良的神经功能损伤严重程度评分。评分后深麻醉下处死大鼠，取完整脑组织切片。HE 染色、Nissl 染色观察大鼠海马组织病理学改变，TUNEL 染色测定大鼠海马组织细胞凋亡，Western blot 检测海马组织中 Bcl-2、Bax、CaMKK2、p-AMPK、AMPK 蛋白表达水平。

结果 与 Sham 组比较，NIR 组、HIR 组、HIR-DMSO 组、HIR-STO609 组神经功能损伤严重评分明显增加，神经细胞破坏严重、尼氏体数量明显减少，神经细胞凋亡率增加（P<0.01），Bax 蛋白表达显著增加，Bcl-2、CaMKK2、p-AMPK 蛋白表达显著下降，p-AMPK/AMPK 比值显著下降（P<0.01）；与 NIR 组比较，HIR 组、HIR-DMSO 组神经功能损伤严重程度评分明显降低，细胞形态改善、尼氏体数量增加，神经细胞凋亡率增加（P<0.01），Bax 蛋白表达降低，Bcl-2、CaMKK2、p-AMPK 蛋白表达显著增加，p-AMPK/AMPK 比值显著增加（P<0.05）；HIR-STO609 组差异无统计学意义。与 HIR 组比较，HIR-STO609 组神经功能损伤严重评分明显增加，神经细胞破坏严重、尼氏体数量明显减少，神经细胞凋亡率增加（P<0.05），Bax 蛋白表达显著增加，Bcl-2、CaMKK2、p-AMPK 蛋白表达显著下降，p-AMPK/AMPK 比值显著降低（P<0.05）；HIR-DMSO 组差异无统计学意义。与 HIR-DMSO 组比较，HIR-STO609 组神经功能损伤严重评分明显增加，神经细胞破坏严重、尼氏体数量明显减少，神经细胞凋亡率增加（P<0.05），Bax 蛋白表达显著增加，Bcl-2、CaMKK2、p-AMPK 蛋白表达显著下降，p-AMPK/AMPK 比值显著降低（P<0.05）。

结论 亚低温可能通过调控 CaMKK2/AMPK 信号通路减轻细胞凋亡，进而在脑缺血再灌注损伤中发挥神经保护作用。

PO-0403

Electroacupuncture reduces cerebral ischemia-reperfusion injury by upregulating peripheral endogenous protective molecule GPC4

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Stroke is one of the leading causes of death and adult disability worldwide. Ischemic stroke is the

most common type of stroke and accounts for approximately 80% of all strokes. To date, recombinant tissue plasminogen activator (rtPA) is the only clinically approved treatment for acute ischemic stroke. However, its narrow therapeutic window and safety concerns limit the clinical use of rtPA. Therefore, it is crucial to develop new therapies for ischemic stroke. Numerous studies have demonstrated the protective effect of acupuncture on ischemic brain injury, but previous studies have focused on central mechanisms. The peripheral protective mechanisms exerted by acupuncture in ischemic stroke, as a therapeutic strategy that can regulate body functions holistically, have not yet been clarified.
Electroacupuncture pretreatment could reduce cerebral ischemia-reperfusion injury and exert protective effects by up-regulating the secretion of peripheral endogenous protective molecule GPC4 by the liver.

PO-0404

靶控输注不同血浆浓度瑞芬太尼复合丙泊酚在玻璃体切割术监护麻醉（MAC）下的效果

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目的 比较玻璃体切割术中靶控输注不同血浆浓度瑞芬太尼复合丙泊酚在监护麻醉（monitored anesthesia care, MAC）下的临床效果。
方法 拟在 MAC 下行择期玻璃体切割术患者 135 例，年龄 45~59 岁，性别不限，18.5≤BMI 值＜28 kg/m2，ASA 分级Ⅰ或Ⅱ级，NYHA 分级Ⅰ或Ⅱ级，采用随机数字表法将患者分为 3 组（n=45）：瑞芬太尼 0.4ng/ml 组（A 组）、0.5ng/ml 组（B 组）、0.6ng/ml 组（C 组）。麻醉诱导及维持：三组 TCI 瑞芬太尼血浆靶浓度恒定，分别为 0.4ng/ml、0.5ng/ml、0.6ng/ml，调节丙泊酚血浆靶浓度，术中维持 BIS 值＞80，维持 MAP 和 HR 波动幅度不超过基础值 20%，术毕停止注射瑞芬太尼和丙泊酚，根据需要给予口服镇痛药。记录手术时间；手术期间未预料体动反应、SpO2 低于 90%、眼心反射以及术后恶心呕吐发生率，经鼻呼气末 CO2 分压；术毕丙泊酚输注总量及血浆靶浓度；术毕 24h 内口服镇痛药发生率；患者满意度评分和口述分级评分。
结果 与瑞芬太尼 0.4ng/ml 组（A 组）相比，瑞芬太尼 0.5ng/ml 组（B 组）和瑞芬太尼 0.6ng/ml 组（C 组）手术期间未预料体动反应、SpO2 低于 90%发生率降低，术毕丙泊酚输注总量及血浆靶浓度降低（P＜0.05），B 组和 C 组差异无统计学意义。手术时间，经鼻呼气末 CO2 分压，眼心反射及术后恶心呕吐、术毕 24h 内口服镇痛药发生率，患者满意度评分以及口述分级评分三组差异无统计学意义（P＞0.05）。
结论 MAC 下玻璃体切割术中复合丙泊酚的 TCI 瑞芬太尼血浆靶浓度推荐范围是 0.5~0.6ng/ml。

PO-0405

Prevalence and burden of oral and oropharyngeal cancers in adolescents and young adults: a novel analysis for the Global Burden of Disease Study 1990-2021

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Background Oral and oropharyngeal cancers are significant contributors to the global cancer burden; however, adequate estimates in younger groups are scarce. To address this gap, we

examined the global, regional, and national changes in the burden of lip and oral cavity cancer (LOC) and other pharyngeal cancers (OPC) in adolescents and young adults and their associated risks from 1990 to 2021.
Methods In this systematic analysis based on the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021, we report the number of cases and incidence, mortality, and disability-adjusted life-years (DALYs) per 100,000 population, corresponding estimated annual percentage changes (EAPCs), and risk factors for LOC and OPC among individuals aged 15–39 years in 204 countries and territories from 1990 to 2021. We further analysed the trends according to age, sex, and sociodemographic index (SDI).
Findings: From 1990 to 2021, significant increases in the number and rates of incidence, mortality, and DALYs were observed for LOC and OPC among adolescents and young adults globally. In 2021, a total of 165,281 (93,683 males [56.68%]) were lip, oral cavity, and other pharyngeal cancers aged 15–39 years worldwide, increasing 123.68% compared to 1990. The incidence rate of LOC increased from 0.64 to 0.98, LOC-associated death rate expanded from 0.26 to 0.33, and DALYs rate raised from 15.45 to 19.54, per 100,000 population. Incidence of OPC increased from 0.10 to 0.15, the OPC-associated death rate expanded from 0.07 to 0.08, and the DALYs rate raised from 3.72 to 4.61, per 100,000 population. South Asia and Eastern Europe had the highest incidence, mortality, and DALYs for oral and oropharyngeal cancers in 2021, while the middle SDI countries had the largest increase in LOC and OPC incidence, death and DALYs. Among 204 countries, Palau and Slovakia had the highest national incidence of younger LOC and OPC in 2021, respectively. Males accounted for 57.90% of the incidence LOC cases in 2021 and 62.54% of the incident cases of OPC. The proportional contribution of the risk factors varied across regions, with higher proportions of alcohol consumption in countries with a higher SDI and higher proportions of smoking in countries with a low SDI.
Interpretation: The prevalence, incidence, deaths, and DALYs of LOC and OPC increased in adolescents and young adults aged 15-39 years from 1990 to 2021. These findings provide helpful insights into the global distribution and discrepancies in the burden of LOC and OPC as well as support for younger cancer control planning efforts and appropriate steps by global health authorities.
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PO-0406

Study on the effect of superior laryngeal nerve block in vocal cord polypectomy under supportive laryngoscopy

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Objective To compare the three anesthesia methods of superior laryngeal nerve block combined with intravenous anesthesia, lidocaine spray combined with intravenous anesthesia, and total intravenous anesthesia by analyzing the hemodynamic data of patients undergoing vocal cord polypectomy under supportive laryngoscopy and the Prince Henry score of postoperative pharyngeal pain. This provides a basis for selecting appropriate anesthesia methods for patients undergoing vocal cord polypectomy under supportive laryngoscopy.
Methods 75 patients with unilateral or bilateral vocal cord polyps who were scheduled to undergo propping laryngoscopy were selected. All patients underwent preoperative visit the day before surgery and were divided into SLN group (superior laryngeal nerve block combined with intravenous general anesthesia), LDKY group (lidocaine injection combined with intravenous general anesthesia) and C group (total intravenous anesthesia) by blind box drawing method, with 25 cases in each group.

The SLN group received 5ml of 0.3% ropivacaine and bilateral superior laryngeal nerve block under ultrasound guidance. Anesthesia induction was performed 5 minutes later. In LDKY group, 3ml 2% lidocaine was sprayed before endotracheal intubation. Three groups of anesthesia induction were used: midazolam 0.04mg/kg, remifentanil 2ug/kg, cisatracurium 0.2mg/kg, and propofol 2.5mg/kg. Propofol and remifentanil are used for anesthesia maintenance, with a BIS maintained between 40 and 60. The anesthesia maintenance medication is discontinued when the supportive laryngoscope is withdrawn after surgery. The surgery is performed by the same surgeon, and anesthesia is performed by skilled anesthesiologists. Monitor and record the heart rate and blood pressure of three groups of patients at time points of entry (T0), tracheal intubation (T1), insertion of supportive laryngoscope (T2), and withdrawal of supportive laryngoscope (T3); The Prince Henry scores of patients at 2 hours, 6 hours, and 24 hours after surgery; Inquire about patient satisfaction on the second day after surgery; The incidence of adverse reactions.
Result There were no significant differences in blood pressure and heart rate among the three groups at time points such as entry (T0), tracheal intubation (T1), insertion of supportive laryngoscope (T2), and withdrawal of supportive laryngoscope (T3) (P>0.05). There were no significant differences in Prince-Henry scores at 2H, 6H and 24H after surgery (P >0.05). There was no significant difference in postoperative satisfaction (P >0.05). There was no significant difference in the incidence of adverse reactions among the three groups (P >0.05).
Conclusion The operation time of vocal cord polyp resection under support laryngoscope is short and the wound is small. This experiment is not sufficient to show that superior laryngeal nerve block combined with intravenous anesthesia has advantages of more stable hemodynamics and less postoperative pharyngeal pain in vocal cord polyp extraction under supportive laryngoscope compared with intravenous anesthesia alone.

PO-0407

鼻内窥镜手术中全凭静脉麻醉与吸入麻醉对术中出血速度的影响：346 例患者的回顾性研究

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目的 慢性鼻窦炎患者行鼻内窥镜手术（ESS）术野出血可延缓手术进程，甚至导致严重并发症的发生。目前在 ESS 中，不同麻醉维持方法对术中出血速度的影响尚无定论。我们通过回顾队列性研究，比较慢性鼻窦炎患者行 ESS，术中采用全凭静脉麻醉（TIVA）与吸入麻醉（IA）维持对出血速度的影响。
方法 对 2024 年 1 月至 2024 年 5 月期间于首都医科大学附属北京同仁医院南院区连续接受 ESS 治疗的 346 例慢性鼻窦炎患者进行回顾性研究。根据麻醉维持方法的不同，将患者分 TIVA 组（丙泊酚+瑞芬太尼）和 IA 组（七氟烷+瑞芬太尼）。主要结局为术中出血速度，次要结局为术中出血量。
结果 共有 346 例纳入研究，其中 TIVA 组 215 例，IA 组 131 例。两组术前鼻 CT 评分（Lund-Mackay score）（7.4±6.4）比（7.6±6.2），年龄（47.1±13.1）比（49.4±12.3），BMI（24.5±3.8）Kg/m^2 比（24.4±3.8）Kg/m^2，术中 MAP（73.3±12.2）mmHg 比（72.7±6.3）mmHg，心率（61.85±8.10）bpm 比（59.58±8.47）bpm，两组比较差异无统计学意义。两组出血速度为（0.6-2.7）ml/min 比（0.8-2.9）ml/min，出血量（25-200）ml 比（30-203）ml，亦无统计学意义（P＜0.05）。
结论 对于慢性鼻窦炎患者行 ESS，采用丙泊酚联合瑞芬太尼为基础的全凭静脉麻醉和七氟烷联合瑞芬太尼为基础的吸入麻醉两种麻醉维持方法对术中出血速度和出血量均无影响，均可用于该类手术的麻醉维持。

PO-0408

Sugammadex induced laryngospasm under deep anesthesia

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Laryngospasm, a continue adduction of vocal cords, is a commonly encountered airway complication during light anesthesia with an overall incidence of 8.7/1,000 at any time.[1] And it is mainly stimulated by excessive secretions, manipulation of the airway or anesthetics.[2] Sugammadex, a modified γ-cyclodextrin, provides rapid and complete reversal for neuromuscular blocking drugs (NMBDs), especially rocuronium.[3] It bring us a lower residual paralysis,[4] a lower incidence of hospital readmission,[5] a safe and reliable reversal[6] and approved by the Food and Drug Administration(FDA) in 2015. However, with the usage of sugammadex increasing during the past decade, its related airway complications reports are increasing, such as laryngospasm or bronchospasm.[7, 8]

PO-0409

Prediction of postoperative complications in patients undergoing head and neck surgery with free-flap reconstruction

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Objective Free-flap reconstruction (FFR) has been considered the preferred technique for head and neck reconstruction after tumour resections, facilitating optimal wound closure, restoration of function, and aesthetic outcome. However, patients are still subject to postoperative complications (PCs) due to the difficult airway, long duration of surgery, and massive surgical resection with immense haemorrhage, which may affect the short- and long-term prognosis of patients. This study aimed to propose a new model to predict the risk of PCs after head and neck surgery with FFR to aid in early intervention.

Materials and Methods A retrospective analysis was performed on 528 patients undergoing head and neck surgery with FFR between March 2020 and June 2022 in a tertiary head and neck centre. Patients with adults aged ≤ 85 years old, ASA physical status Ⅰ-Ⅲ, selective surgery for free-flap reconstruction under general anesthesia and the primary diagnosis was head and neck mass or tumour were enrolled the study. Patients with more than 20% missing data were excluded. All data were collected from the Department of Oral and Maxillofacial Surgery by investigators using a Data Collection Form and it included 47 variables that were on patient-related factors, tumour-related factors, preoperative laboratory tests-related factors (the latest blood tests within ten days before surgery), and surgery and anaesthesia-related factors.

The primary outcome was the composite of severe non-surgical PCs, that occurred at any time postoperatively (up to discharge from the hospital following surgery) and required intervention by medication or interventional means, which was defined by ≥1 of cardiovascular, respiratory, neurologic, gastrointestinal, urological, haematological, infectious, unexpected transfer, and death. All patients were grouped into those with PCs and those without PCs. Based on univariable and multivariable logistic regression analysis, the model for predicting PCs was established by the proportional odds and was validated in the internal cohort by the bootstrap method (1000 resampling iterations). The area under the receiver operating characteristic curve (ROC AUC) was used to assess the ability of predictive discrimination. Bias-corrected calibration curves were

constructed to illustrate graphically any bias in predicted values. The agreement was also further assessed in terms of the Brier score (the ideal is 0, with values >0.3 suggesting poor calibration). Decision curve analysis was conducted to determine the clinical value of the prediction model by quantifying the net benefits at different threshold probabilities.
Results A total of 528 patients were enrolled in the study. Most patients were men (59.28%) and older than 60 years (40.53%). The common tumour site was the oral cavity (78.98%). 46.21% of all patients were staged Ⅳ. A total of 81.82% of all cases, neck dissection was performed, among which 72.16% was unilateral neck dissection. Duration of surgery lasted over 6 hours in 302 patients (57.20%) and most flap types were non-osseous (80.49%). 476 patients (90.15%) graded Adult Comorbidity Evaluation 27 index (ACE-27) 0-1 and 472 patients (89.40%) were ASA I-II. In terms of numbers, the top donor sites of the free flap were anterolateral thigh free flap (ALTFF) (287/528). Patients with PCs had a median (interquartile range) length of stay of 15 (12-18) days compared with 10 (8-12) days for patients without PCs. The incidence of PCs was 23.30% (123/528). There were 13.64% (72/528) infectious complications and 7.95% (42/528) haematological complications. In addition, patients with respiratory complications were 3.41% (18/528), and with cardiovascular complications were 2.08% (11/528), and other complications collectively were less than 1.2% (6/528). The univariate logistic regression analysis showed that ACE-27 grade, operation time, type of neck dissection, blood transfusion, tourniquet use, vasopressor administration, type of airway, transfer to AICU directly, haemoglobin (Hb), hematocrit (Hct) (%), albumin, flap size, fluid infusion, crystalloid infusion, colloid infusion, blood loss, red blood cell (RBC) infusion, plasma infusion, maximum glycemic value, maximum lactic acid value, and duration of stay in AICU were significantly associated with PCs (P<0.1). Considering the causality between the duration of stay in AICU and the development of PCs, we did not include it in further analysis. The multivariate logistic regression analysis showed that the type of airway [Indwelling tracheal catheter, (OR: 4.20, 95%CI: 1.94-10.07,P<0.01); Tracheotomy, (OR: 7.50, 95%CI: 3.41-18.37,P<0.01)], flap size (OR: 1.01, 95%CI: 1.00-1.01,P=0.03), blood loss (OR: 1.01, 95%CI: 1.00-1.01,P=0.09), and maximum lactic acid value (OR: 1.28, 95%CI: 0.97-1.70, P=0.08) were independent predictors of PCs (P<0.1). Age was also integrated into the model, as it was widely considered to be a clinically important indicator. The model incorporating these variables had moderate predictive discrimination (AUC, 0.737[95% CI, 0.690-0.785]) for PCs and maintained satisfactory calibration abilities (Brier score of 0.157). Meanwhile, the model showed satisfactory clinical significance if the threshold probability of an individual was between 0.05 and 0.6.
Conclusions We propose a new simple PCs prediction model that relies on readily available information to accurately predict PCs after head and neck surgery with FFR. Our prediction model may be useful to guide perioperative management.

PO-0410

瑞马唑仑与咪达唑仑对老年患者拔牙术后早期认知恢复的影响：一项前瞻性随机对照研究

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目的 老年患者镇静下牙拔除术后认知恢复延迟不仅影响术后恢复质量，而且降低患者依从性，增加拔牙术后出血等并发症发生率。本研究旨在比较瑞马唑仑和咪达唑仑对老年患者拔牙术后早期认知恢复的影响。
方法 本研究为前瞻性随机对照研究。选取在第四军医大学口腔医院接受镇静下牙拔除术的老年患者 110 例，年龄 60~80 周岁，ASAⅠ~Ⅲ级。随机分为瑞马唑仑组（R 组）：初始剂量 2 mg，追加剂量 1 mg；咪达唑仑组（M 组）：初始剂量 1 mg，追加剂量 0.5 mg。镇静达到 MOAA/S 评分

≤4 分进行局部麻醉及拔牙操作。接受镇静前及镇静后 30 分钟、1 小时均进行 5 分钟蒙特利尔认知量表（Montreal cognitive assessment 5-minute, MoCA 5-minute）评估。主要研究结果是术后 30 分钟（T30）MoCA 5-minute 得分。次要研究结果包括术后 1 小时（T1h）的 MoCA 5-minute 得分、牙拔除术后出血的发生率、镇静成功率、恢复时间、离院时间、术后并发症等。
结果 最终纳入 106 例患者，两组各 53 例。在 T30 时，R 组的 MoCA 5-minute 得分为 25 分（IQR 23.5，27），显著高于 M 组的 23 分（IQR 21，25）（p＜0.001）。在 T1h，两组 MoCA 5-minute 得分差异持续存在[27（IQR 26，28）与 26（IQR 25，27），p=0.003]。与 M 组相比，R 组中更多患者在 T30 时恢复到基线 MoCA 5-minute 得分[62.26% vs 30.19%，c2=10.07，P=0.001]。R 组患者拔牙后出血发生率更低，在 T30 时，R 组出血发生率为 5.67%，显著低于 M 组（χ2=13.36，P<0.001）。两组在镇静期间的不良事件发生率没有统计学差异，R 组 1 名患者和 M 组 2 名患者出现低血压，R 组 2 名和 M 组 3 名患者镇静中出现呛咳（5.66%和 9.43%，p=0.713）。两组镇静后并发症发生率也没有统计学差异（3.77% VS 5.66%，p=1.000）。与 M 组相比，R 组在药物起效时间、清醒时间及离院时间均显著缩短（p<0.0001，p<0.001，p<0.0001）。
结论 接受瑞马唑仑镇静下牙拔除术的老年患者术后认知功能恢复的更快，提高了患者的依从性，降低了老年患者拔牙后出血等风险。瑞马唑仑镇静显著改善术后早期认知恢复，加快止血，缩短出院时间。

PO-0411

小儿全麻斜视手术中发生眼呼吸反射的危险因素分析

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目的 筛选小儿全麻斜视手术中发生眼呼吸反射（ORR）的危险因素。
方法 选择 2023 年 3 月至 2023 年 9 月于本院行喉罩自主通气全身麻醉下斜视矫正术的儿童患者，ASA Ⅰ级，年龄 3~12 岁，性别不限；纳入单独使用七氟烷、艾司氯胺酮或丙泊酚麻醉维持的患儿。回顾相关文献并结合临床经验总结出可能与 ORR 相关的因素，收集患者一般情况、现病史、既往史及手术和麻醉相关指标作为自变量，以潮气量减少超过 20%定义为发生 ORR 并作为因变量，采用单因素和多因素 logistic 回归模型分别计算研究因素对结局的粗 OR 值与校正 OR 值，筛选术中发生 ORR 的危险因素。
结果 研究共纳入 1386 例患儿，1025 例发生 ORR，发生率 73.95%。Logistic 回归分析显示：麻醉较浅（OR=4.800，95% CI，2.510-9.553）、牵拉内直肌（OR=4.243，95% CI，1.891-10.422）、牵拉下斜肌（OR=6.231，95% CI，2.726-14.583）、高碳酸血症（OR=1.211，95% CI，1.170-1.252）和使用丙泊酚（OR=4.851，95% CI，2.137-11.739）是斜视矫正术患儿术中发生 ORR 的危险因素；使用七氟烷（OR=0.353，95% CI，0.192-0.612）是斜视矫正术患儿术中发生 ORR 的保护性因素（P＜0.05）。
结论 麻醉较浅、牵拉内直肌、牵拉下斜肌、高碳酸血症及使用丙泊酚是斜视矫正术患儿术中发生 ORR 的危险因素，使用七氟烷是保护性因素。

PO-0412

喉部分切除患者再次全身麻醉气管插管失败 2 例

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目的 本文报道 2 例喉部分切除患者再次全身麻醉气管插管失败病例，将有助于喉部分切除患者再

次手术麻醉方法及气道控制方式的选择，提高患者围术期的安全性。

方法 病例资料 1

患者男性，63 岁，身高，170cm，体重 70kg，因“右下腹疼痛 1 天”入院，既往有喉部分切除术 4 年余，有“糖尿病”、“高血压”数年。体格检查：颈前一瘢痕增生，右下腹压痛，反跳痛，余无殊。患者入室拟行腹腔镜下阑尾切除术，常规心电监护，麻醉监测项目有心电图（Electrocardiogram，ECG）、有创动脉血压（Invasive blood pressure, IBP）、血氧饱和度（Pulse oxygen saturation, SpO2），呼吸末二氧化碳分压（End-tidal carbon dioxide partial pressure, PetCO2），予以面罩吸氧。由于患者既往喉部分切除，考虑困难气道，于是与患者沟通，计划以纤支镜引导下清醒气管插管。以利多卡因喷雾剂进行呼吸道局麻，患者吸入利多卡因喷雾剂后突然自述呼吸困难，脉搏氧饱和度下降至 85%，立刻停止操作，继续面罩吸氧。约 5min 后，患者呼吸困难症状较前缓解，脉搏氧饱和度下降至 93%。再次与患者沟通能否继续进行局麻，患者表示难以耐受，并拒绝继续做麻醉和手术。主刀医生也表示该手术暂缓进行，先保守治疗。最后在与患者本人及其家属沟通病情后取消该麻醉。观察半小时后，患者生命体征稳定，送回病房。

病例资料 2

患者中老年男性，57 岁，体重 86kg,身高 168cm。入院后诊断为：喉恶性肿瘤术后复发。既往史：喉部分切除术数年，高血压病史数年，余无殊。否认糖尿病、心脏病病史，否认食物药物过敏史。体格检查双侧锁骨上窝及腋窝未触及肿大淋巴结，颈前见约 5 cm 长瘢痕，胸廓无明显畸形，肋间隙正常，呼吸运动两侧基本对称一致，双侧初诊语颤基本对称一致；双肺呼吸音清晰对称、未闻及明显湿啰音。电子喉镜示：鼻咽光滑，喉术后改变未见异常隆起，声门狭窄（图 1）。

图 1 患者术前电子喉镜检查示：声门狭窄。

本次拟行全喉切除术。患者入室心电监护，麻醉监测项目有心电图（Electrocardiogram，ECG）、有创动脉血压（Invasive blood pressure, IBP）、血氧饱和度（Pulse oxygen saturation, SpO2），呼吸末二氧化碳分压（End-tidal carbon dioxide partial pressure, PetCO2），予以面罩吸氧。麻醉诱导以丙泊酚注射液(西安力邦制药有限公司，国药准字 H20123318) 2mg/kg 静脉推注，顺式阿曲库铵（恒瑞药业有限责任公司，国药准字 H20046359）0.15mg/kg 静脉推注，舒芬太尼（宜昌人福药业有限责任公司，国药准字 H20030200）0.05ug/kg 静脉推注。诱导完成后予以面罩通气，发现气道阻力大，加大诱导药物剂量，仍无法改善面罩通气困难，脉搏氧饱和度呈下降趋势，立刻可视喉镜下行气管插管，声门无法准确辨认，插管失败。此时脉搏氧饱和度继续下降，再次面罩通气仍无法维持，最低降至 20%，立刻请耳鼻喉医生行气管切开，同时高流量喷射通气维持氧合。约 3min 后气管切开完成，插入 VP 导管机械通气，患者脉搏氧饱和度逐渐上升至 100%。手术进程顺利，历时约 3 小时，术毕返 ICU，术后第二天患者清醒，生命体征稳定，转普通病房继续治疗。

结果 病例 1 患者因清醒纤支镜引导下气管插管失败后暂缓腹腔镜下阑尾切除手术，于病房保守治疗，后病情稳定后出院。病例 2 患者，快速序贯诱导后气管插管失败，面罩通气困难，行气管切开后顺利完成全喉切除术，术后转入 ICU，后病情稳定于普通病房继续治疗，无后遗症。

结论 综合两例患者的麻醉处理过程，喉部分切除术患者生理及心理均有极大差异，术前必须进行充分的气道评估，电子喉镜或喉部 CT/MRI 可准确评估气道狭窄部位及狭窄程度。纤支镜引导气道表麻下清醒气管插管是相对安全的气管方式，然而并不适用于所有患者，操作前进行适当的镇静镇痛，可以提高成功率。气管切开是保证患者气道安全的最可靠措施。总之，对于此类患者，选择合理的气管插管方式是麻醉成功的关键。

PO-0413

可视喉镜联合帝视观察用内窥镜软镜在左侧双腔支气管导管插管及定位中的应用

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目的 分析可视喉镜联合帝视观察用内窥镜软镜在左侧双腔支气管导管插管及定位中的应用效果。
方法 80 例本院 2024 年 2 月至 2024 年 6 月择期行全麻下胸腔镜肺手术患者，美国麻醉医师协会（ASA）分级 I 级或 II 级，年龄 25～75 岁，无预测困难气道因素、拟以左侧双腔支气管导管实施肺隔离术的成年患者。采用随机数字表法分为两组：帝视镜组(D 组)和纤支镜组(F 组)。D 组可视喉镜联合帝视观察用内窥镜软镜辅助下行左侧双腔支气管导管插管及定位，F 组可视喉镜辅助下行左侧双腔支气管导管插管联合纤维支气管镜定位。记录插管及定位时间（从开始左侧双腔支气管插管到完成正确定位的时间）、首次插管成功率、隆突黏膜损伤程度、显示器视图质量、肺萎陷程度等。
结果 两组患者年龄、身高、体重、BMI、性别比较差异无统计学意义(p＞0.05);D 组插管及定位时间短于 F 组(p＜0.05)，首次插管成功率高于 F 组(p＜0.05)，隆突黏膜损伤程度低于 F 组(p＜0.05);显示器视图质量、肺萎陷程度两组无明显差异(p＞0.05)。
结论 可视喉镜联合帝视观察用内窥镜软镜在左侧双腔气管插管及定位中应用安全有效，值得临床推广。

PO-0414

Liposomal bupivacaine serratus anterior plane block versus thoracic paravertebral block for postoperative analgesia in video-assisted thoracoscopic surgery: a non-inferiority randomized controlled trial

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Objective To evaluate the efficacy and safety of the world's first generic liposomal bupivacaine (AiHengPing, Hengrui, Jiangsu, China) for postoperative analgesia in serratus anterior plane block (SAPB) compared to the "gold standard" thoracic paravertebral block (TPVB) in a non-inferiority study.
Methods This trial was conducted from November 2023 to January 2024 at the Tongji University affiliated Shanghai Pulmonary Hospital. 168 patients undergoing thoracic surgery were randomly assigned to receive either SAPB (treatment group) or TPVB (control group). The primary outcome was pain scores assessed by the Numeric Rating Scale (NRS) at 24 hours postoperatively. Secondary endpoints included cumulative opioid consumption post-surgery, procedure time, safety assessments, and postoperative recovery quality measured by the QoR-15 score.
Results At 24 hours postoperatively, the estimated difference in resting and coughing pain NRS between the treatment and control groups was 0.13 (97.5%CI, -0.14 to 0.40) and 0.21 (97.5%CI, -0.09 to 0.52) respectively, with both limits not reaching the non-inferiority margin of 1. Thus, the 24-hour postoperative pain NRS in the treatment group was non-inferior to the control group. There were no statistically significant differences in the resting and coughing pain NRS at 1, 6, 12, 48, and 72 hours postoperatively between the two groups. The area under the curve of resting

and coughing pain NRS over 72 hours was also not statistically different between the groups. Cumulative opioid consumption converted to morphine milligram equivalents (MMEs) at 24 hours was similar in both groups: 50.24 mg (95%CI, 49.48-51.00) vs 50.24 mg (95%CI, 49.61-50.86). From 25-48 hours it was 34.35 mg (95%CI, 33.09-35.62) vs 34.17 mg (95%CI, 32.95-35.38), with no statistical difference. There was also no statistical difference in the number of patients requiring rescue analgesia postoperatively between the two groups. The treatment group had a shorter operation time of 5.17 minutes (95%CI, 4.87-5.47) vs 7.24 minutes (95%CI, 6.83-7.65), $p < 0.01$, and better safety with 0% vs 7.14% pleural puncture in the control group, p=0.038. There were no statistically significant differences in postoperative heart rate and blood pressure abnormalities, incidence of PONV, postoperative recovery quality measured by the QoR-15 score, and postoperative hospital stay between the two groups.
Conclusion Liposomal bupivacaine (AiHengPing) SAPB provides comparable analgesic effects to TPVB within 24 hours postoperatively, with a simpler and safer procedure. Therefore, liposomal bupivacaine has potential for clinical application in China and offers a new option for long-lasting local anesthetics in postoperative analgesia for thoracic surgery.
Clinical trial registration: Clinicaltrials.org, registry number: NCT06135545

PO-0415

可视双腔支气管导管对胸腔镜手术患者单肺通气时低氧血症发生的影响：一项前瞻性随机对照试验

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目的 与传统的普通双腔支气管导管相比，可视双腔支气管导管可以显著降低插管时间，具有随时观察和调整错位的能力，然而可视双腔支气管导管在围术期低氧血症的发生却鲜有报道。本研究旨在观察可视双腔支气管导管对胸腔镜手术患者单肺通气时低氧血症发生的影响，进一步发现可视双腔支气管导管相对于普通双腔支气管导管的优缺点。
方法 100 名接受胸腔镜手术的患者随机分配到普通双腔支气管导管组和可视双腔支气管导管组。在围术期单肺通气期间，两组患者实施吸入 50%氧浓度的低潮气量通气（5-8ml/kg）。当单肺通气期间患者的血氧饱和度下降至 95%以下时，将依次按照以下步骤进行处理：重新定位并吸净气管内分泌物、提高吸入氧浓度、调整麻醉机呼吸参数、通气侧肺使用 5 cmH2O PEEP、手术侧肺使用 5 cmH2O CPAP，必要时采取双肺通气措施来防止血氧饱和度进一步下降。主要观察指标为单肺通气期间两组患者低氧血症（SpO2＜90%）、血氧饱和度低于 95%的发生率，次要观察指标包括术后并发症及麻醉医生在方便性、插管时间、插管容易程度、插管成功率、工作量、工作效率、满意度等方面对两种支气管导管的评分。
结果 100 名接受胸腔镜手术的患者随机分配到普通双腔支气管导管组和可视双腔支气管导管组。在围术期单肺通气期间，两组患者实施吸入 50%氧浓度的低潮气量通气（5-8ml/kg）。当单肺通气期间患者的血氧饱和度下降至 95%以下时，将依次按照以下步骤进行处理：重新定位并吸净气管内分泌物、提高吸入氧浓度、调整麻醉机呼吸参数、通气侧肺使用 5 cmH2O PEEP、手术侧肺使用 5 cmH2O CPAP，必要时采取双肺通气措施来防止血氧饱和度进一步下降。主要观察指标为单肺通气期间两组患者低氧血症（SpO2＜90%）、血氧饱和度低于 95%的发生率，次要观察指标包括术后并发症及麻醉医生在方便性、插管时间、插管容易程度、插管成功率、工作量、工作效率、满意度等方面对两种支气管导管的评分。
结论 与普通双腔支气管导管相比，可视双腔支气管导管可以显著降低单肺通气期间低氧血症发生率和血氧饱和度低于 95%的发生率。同时，它可以减轻麻醉医师的工作量，提高工作效率和满意度。

PO-0416

60 例心尖入路经导管主动脉瓣植入术患者的麻醉管理

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目的 探讨心尖入路经导管主动脉瓣植入术（TA-TAVR）的围术期麻醉管理经验。
方法 回顾性分析 2023 年 1 月~2024 年 1 月，北部战区总医院心血管外科行 TA-TAVR 患者临床资料，总结该类手术围术期优化策略和麻醉要点。
结果 本组共收集 60 例患者的临床资料，其中男 36 例、女 24 例，平均年龄（70.52±6.01）岁，BMI 平均（24.32±6.49）；其中主动脉狭窄患者 34 例，反流患者 26 例，合并症较多，基础疾病包括高血压、糖尿病、慢性阻塞性肺病、冠心病、肾病及脑梗塞、房颤等；术中 1 例患者开胸行主动脉瓣置换术，2 例患者在体外循环下完成手术，术后随访手术成功 59 例，手术成功率达 98.33%；完成超快通道（手术室内拔管）麻醉患者 5 例；完成快通道麻醉（手术完成 6 小时内拔管）患者 15 例；术后平均通气时间为 17（4:21）h；机械通气时间超过 48h 患者 7 例；补救镇痛需求 8 例(13.33%)；ICU 停留时间 21（17:24) h，术后住院天数 （7.8±4.5）d，住院费用 （30.0±5.2）万元；术后并发症包括：III 度房室传导阻滞、急性肾损伤、术后肺炎， 所有患者均好转出院。
结论 TA-TAVR 手术患者麻醉需要进行有计划、全程、全方位的麻醉管理；优化麻醉干预措施（麻醉细节、麻醉监测手段、麻醉镇痛方案），多学科协作完成临床实践，确保患者围术期安全。

PO-0417

1 例主动脉夹层术后横纹肌溶解导致心跳骤停的病例报告

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目的 急性主动脉夹层是一种死亡率高的临床急症。在一项国外多中心 208 例急性 Standford A 型主动脉夹层手术治疗研究中，院内死亡率为 26%（23%-29%）[1] 。已有研究表明，住院死亡率与术后早期并发症发病率明显相关[2] 。孙氏手术术后早期并发症的发生率仍然较高，其中神经系统并发症、急性肾功能衰竭及呼吸循环衰竭是导致患者住院死亡的主要原因。术中若止血困难、出血难以控制，必然导致手术时间延长，必要时还需再次建立体外循环而进一步增加了手术对机体的打击，严重时可因体外循环时间超过了机体可耐受的时间，或者因无法关胸导致患者死亡。本次报告一例主动脉夹层手术体外循环转机时间过长，导致腋动脉缺血，引起横纹肌溶解、高钾致患者死亡的病例。
方法 患者男性，50 岁，身高 173cm，体重 76kg，主因“间断剑突下不适 4 天”入院，行胸部 CTA 示：升主动脉增粗、主动脉弓增粗，主动脉弓、降主动脉及所扫腹主动脉可见双腔征，主动脉弓层面可见内膜不连续；弓上分支出自真腔，扫及腹腔动脉干源自真腔，两肺见弥漫分布点片状、斑片状模糊影，边界不清,遂以"主动脉夹层"收入院。既往高血压病史 1 年余，未规律监测血压。吸烟史 30 年余，20 支/日。ECG：窦性心律，II、AVF、V4-6 导联 T 波倒置，I、V4-6 导联 ST 段压低 0.05-0.1mV。心超：主动脉窦部内径 40mm,升主动脉内径 50mm，提示主动脉夹层，左房大，左室室壁增厚，节段性室壁运动异常；双侧下肢动脉内中膜增厚伴斑块形成；右侧锁骨下动脉起始段斑块形成。
2023-5-23 在全身麻醉下行"升主动脉人工血管置换术+孙氏手术"，术中予右侧腋动脉、右房、右上肺静脉插管建立体外循环。手术时间 877min，体外循环时间 641min，术中总入量 19300ml(自体血 4200ml 红细胞 3600ml 血浆 1550ml 血小板 100ml 冷沉淀 200ml)，术中泵入去甲肾上腺素 0.02-1.5ug/kg/min、多巴胺 2-10ug/kg/min、肾上腺素

0.05-0.4ug/kg/min 维持循环，总出量 15645ml(失血 12500ml 尿量 3145ml)。术毕于 05-24 00:47 转入 AICU 进行监护治疗。T 36.0℃，HR 92 次/分，BP 119/52mmHg，SPO2 82%。双侧瞳孔正大等圆，直径约 5mm，对光反射消失；术后给予亚胺培南+万古霉素抗感染治疗，扩容补液，乌司他丁抗炎，输注血小板 1 个治疗量，新鲜冰冻血浆 400ml，悬浮红细胞 2 单位，予冰帽、甘露醇、甲强龙进行脑保护。

05:23 检查显示 K+:5.20mmol/L, CK：429U/L，LDH:1095.0U/L，CK-MB 73.9U/L。08:00 晨查房见病人右上肢花斑、发凉，桡动脉及尺动脉搏动消失，关节僵硬。上肢动脉超声：未见明显异常。血管外科急会诊，考虑急性动脉缺血，于床旁右腋动脉原手术切口切开减压处理，皮肤花斑明显改善，桡动脉搏动可触及，关节僵硬同前。13:15 患者血压急剧下降，心电监测示室性心动过速，立即行心外按压，同时静脉推注肾上腺素 1mg、利多卡因 0.1g，胺碘酮 0.15g 静推，予电除颤(双相 150J)，心电监测示心跳骤停。持续心外按压，电除颤(双相 150J），14:22 检查显示 CK:10918U/L，LDH：6536U/L，CK-MB：301.5，TNI:>50ng/ml，K+:7.40。14:25 抢救失败，患者死亡。

结果 讨论：导致患者死亡原因主要有以下几点：1.患者术中心包组织致密黏连，组织水肿严重，手术转机时间过长；2.术中止血困难，大量失血，造成代谢性酸中毒，乳酸堆积，循环需要大量血管活性药物维持，心脏功能差；3.术后出现腋动脉闭塞，肌肉组织缺血缺氧，导致横纹肌溶解，出现高钾血症，导致心脏骤停，持续心脏按压，期间心电监测示无电生理，复苏效果差。

结论 横纹肌溶解综合征 RM 一般由过量运动、创伤、电击、自身免疫性 疾病、缺血和感染等引起的横纹肌细胞溶解、破坏， 细胞内容物（如肌酸激酶、肌红蛋白、细胞内电解质等）释放进入血液循环，可引起电解质紊乱、急性肾功能衰竭等临床综合征［3］。I 型主动脉夹层患者因夹层累及范围广，术中经动脉插管，可能发生缺血再灌注损伤，严重者可发生横纹肌溶解症，常常伴有威胁生命的代谢紊乱和急性肾衰竭 [4]。横纹肌溶解症早期由于低血容量症和电解质平衡紊乱，从而引起心律失常甚至心跳骤停，蛋白酶的释放引起肝脏炎症反应[8]。RM的治疗手段主要首先是针对病因治疗，如控制感染、解除肌肉挤压、停用相关药物等。其次为补液、给予碳酸氢钠碱化尿液以及使用甘露醇等利尿药［5］。及时进行连续性血液滤过治疗可以使主动脉夹层外科术后横纹肌溶解患者肾功能恢复，改善患者的血流动力学，从而改善了主动脉夹层患者的预后［6］。

PO-0418

评估可穿戴式心电心音同步记录技术在麻醉术前心功能评估中检测左心室收缩功能和中重度瓣膜疾病的可行性和有效性

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目的 This study aimed to evaluate the diagnostic efficacy of ACG for preoperative left ventricular systolic dysfunction (LVSD) and valvular heart disease (VHD), and its role in enhancing preanesthetic risk stratification.

方法 Patients scheduled for major non-cardiac surgeries under general anesthesia were enrolled. Echocardiogram served as reference standard for diagnosing LVSD and moderate-to-severe VHD. A wearable ACG patch was attached to the aortic and mitral auscultation area of each patient for 60 seconds, respectively. ACG parameters, electromechanical activation time (EMAT) and pathological murmurs, were algorithmically interpreted and documented. Anesthesiologists of varying experience levels conducted a three-step assessment to compare the effectiveness of combining ACG with PE versus using PE alone.

结果 262 patients were included. EMAT exhibited a significant correlation with LVEF (r= -0.53, P<0.001). Using an EMAT cutoff of >87ms, ACG achieved 90.0% sensitivity and 85.5% specificity for diagnosing LVEF <50%. Additionally, a sub-cohort analysis performed on 59 patients who had preoperative NT-proBNP concentrations showed that EMAT had a greater AUC (0.984)

compared to NT-proBNP (0.841) (95% CI: 0.016 to 0.270, P=0.028). ACG showed 84.5% sensitivity and 89.7% specificity in identifying moderate-to-severe valvular stenosis/regurgitation (k=0.69, p<0.001). The assessment using PE alone displayed a moderate agreement (k=0.53) with expert evaluation for detecting high-risk patients, whereas incorporating ACG improved agreement substantially (k=0.71) and reduced subsequent tests requirements by 74.2%.
结论 ACG provided accurate and rapid detection of LVSD and moderate-to-severe VHD. Integrating ACG with physical examination enhanced preoperative risk stratification, potentially reducing unnecessary tests.

PO-0419

Ciprofol versus Propofol for Anesthesia Induction in Cardiac Surgery: A Randomized Double-blind Controlled Clinical Trial

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Background Ciprofol, a novel intravenous general anesthetic with a chemical structure akin to propofol, boasts significantly enhanced potency. It offers a rapid onset, reduced incidence of injection pain, and minor impact on the cardiovascular system. However, clinical research regarding ciprofol's use for anesthesia induction in cardiac surgery remains limited.
Methods A total of 78 patients undergoing coronary artery grafting or valve replacement surgery were randomly assigned to receive either ciprofol (N=40) or propofol (N=38) for anesthesia induction. The following variables were recorded: changes in mean arterial pressure and heart rate during anesthesia, alterations in oxygenation index and lactic acid concentration before and 10 minutes after anesthesia, and the incidence of adverse events such as bradycardia, hypotension, and injection pain.
Results The incidence of anesthesia-induced injection pain was significantly lower in the ciprofol group compared to the propofol group (3% vs. 18%, P < 0.05). Nevertheless, the incidence of other adverse events was comparable between the two groups. No significant differences in hemodynamics or oxygenation index were observed during anesthesia induction between the ciprofol and propofol groups.
Conclusions Ciprofol anesthesia demonstrated a lower incidence of injection pain relative to propofol, potentially enhancing patient comfort during anesthesia induction. Ciprofol exhibited circulatory stability similar to propofol during anesthesia induction in cardiac surgery, suggesting that it may serve as a suitable alternative to propofol for this application.

PO-0420

Potential effect of preoperative neo-adjuvant chemotherapy on postoperative cognitive dysfunction in patients with breast cancer

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Background Postoperative cognitive dysfunction (POCD) is the most common neurological complication. Preoperative neoadjuvant chemotherapy (NAC) can decrease the tumor burden in the breast and axilla to enable de-escalation of surgery. Research shows that cognitive decline is a major concern among breast cancer survivors after NAC. However, the relationship between NAC and POCD remains unclear.
Methods In total, 104 patients with breast cancer were enrolled in this prospective observational cohort study. Patients were divided into NAC and non-NAC groups according to NAC treatment. Preoperative Mini Mental State Examination (MMSE) and Montreal cognitive assessment scale (MoCA) were used to assess cognitive function. The MMSE and MoCA were performed again on the 3rd day after surgery. Follow-up cognitive measures were performed using the Telephone Interview for Cognitive Status-Modified (TICS-M) on the 7th (short-term POCD), 30th (mid-term POCD), and 90th (long-term POCD) day after surgery. Postoperative complications, visual analog scale (VAS) scores, and Quality of Recovery score-15 (QoR-15) scores were also assessed.
Results The study included 125 patients. An overall 90-day surgical follow-up was finished by 104 individuals, of whom, 39 received NAC and 65 did not. Additionally, 23 cases (22.1% of 104 patients) experienced cognitive decline on the 3rd day after surgery. POCD was detected in 18 patients (17.3% of 104) on the 7th day and in 14 patients (13.5% of 104) on the 30th day after surgery. POCD persisted in only 10 patients (9.6% of 104 cases) on the 90th postoperative day. In addition, the incidence of POCD in the NAC group was higher than in the non-NAC group on the 7th (P=0.023) and the 30th (P=0.026) day after surgery. NAC and age were independent risk factors of short-term (P=0.008, OR=6.287, 95% CI=1.626-24.308; P=0.004, OR=1.100, 95% CI=1.030-1.174, respectively) and mid-term POCD (P=0.016, OR=5.968, 95% CI=1.395-25.535; P=0.020, OR=1.087, 95% CI=1.013-1.167, respectively).
Conclusion Our study found that preoperative neoadjuvant chemotherapy may increase the incidence of short- and mid-term POCD.

PO-0421

罗哌卡因通过 IL-6/STAT3 途径协同索拉菲尼诱导肝癌细胞凋亡

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目的 原发性肝细胞癌耐药性的发展限制了索拉非尼（Sor）的有效性，局部麻醉药罗哌卡因（Rop）在诱导肝癌细胞凋亡方面具有很大的潜力。然而，罗哌卡因与索拉非尼联合治疗（Rop+Sor）肝癌细胞细胞的效果及其潜在的调节机制尚不清楚。本研究为发现 Rop+Sor 诱导肝癌细胞凋亡以及 Rop 非麻醉作用的新突破。

方法 通过 CCK-8 法分析 Rop、Sor 和 Rop+Sor 处理的肝癌细胞 HepG2 和 Huh7 的增殖和凋亡。通过 Western-blot 测定 Rop、Sor 和 Rop+Sor 处理的 HepG2 和 Huh7 中 Cleaved caspase-3、Cleaved caspase-9、CyclinD1、IL-6 和 p-STAT3 的蛋白质水平。通过 qRT-PCR 和 ELISA 评估 Rop、Sor 和 Rop+Sor 处理的 HepG2 和 Huh7 细胞中 IL-6 mRNA 表达蛋白质含量。通过 Western-blot 评估 IL-6 细胞因子刺激后 Rop+Sor 处理的 HepG2 和 Huh7 细胞中 STAT3 和 p-STAT3 蛋白的表达，CCK-8 测定 IL-6 刺激后 Rop+Sor 处理的 HepG2 和 Huh7 细胞增殖情况。通过测量 Rop、Sor 和 Rop+Sor 处理的肿瘤异种移植动物模型的肿瘤体积和重量验证其抗肿瘤作用。
结果 Rop、Sor 和 Rop+Sor 处理的 HepG2 和 Huh7 48h 后细胞的增殖均受到显著抑制，尤其是当 Rop+Sor 使用时。与 Rop 或 Sor 单独治疗相比，Rop+Sor 联合治疗增加了 HepG2 和 Huh7 中 Cleaved caspase-3、Cleaved caspase-9 和 CyclinD1 蛋白的表达，同时降低了 IL-6 和 p-STAT3 蛋白的表达。与 Rop 或 Sor 单独治疗相比，Rop+Sor 联合治疗降低了 HepG2 和 Huh7 中 IL-6 mRNA 表达和蛋白质含量，并抑制了体内肿瘤生长。CCK-8 测定结果表明，激活 IL-6/STAT3 途径显著增加了用 Rop+Sor 联合治疗降低了 HepG2 和 Huh7 细胞的增殖。
结论 罗哌卡因通过 IL-6/STAT3 途径协同诱导索拉非尼诱导的肝癌细胞凋亡。罗哌卡因与索拉非尼联合用药是治疗肝癌细胞的潜在药物。

PO-0422

七氟醚通过影响 EGFR-VEGF-AKT 信号通路抑制血管内皮细胞生成而改善神经胶质瘤预后

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目的 胶质瘤是最具侵袭性和致命性的脑肿瘤类型之一，其特征是快速进展和预后不良。七氟醚是一种常用的吸入麻醉剂，研究发现，其对神经胶质瘤生物学特性有一定的影响，但其对胶质瘤相关血管生成的影响尚不清楚。本研究旨在探讨七氟醚对神经胶质瘤相关血管生成的影响，并阐明其潜在的分子机制。
方法 我们使用 GEOquery 包从基因表达综合数据库（GEO）下载并处理了 GSE179004 数据集，该数据集包括 3 例七氟醚处理的胶质瘤样本和 3 例对照样本。使用 R 包 limma 进行差异表达分析，阈值设定为|logFC| > 1 和 p < 0.05。通过将差异表达基因（DEGs）与从 GeneCards、CTD 和 OMIM 数据库收集的血管生成相关基因（ARGs）交集，鉴定出血管生成相关差异表达基因（ARDEGs）。接着进行基因本体（GO）和京都基因与基因组百科全书（KEGG）路径分析。通过 STRING 数据库构建蛋白质-蛋白质相互作用（PPI）网络，并在 Cytoscape 中使用 CytoHubba 识别关键基因，同时构建关键基因的 ceRNA 网络。在 GEO 和癌症基因组图谱（TCGA）数据集中对关键基因表达进行了验证。此外，还进行了血管内皮细胞体外实验，包括 Transwell 迁移实验、划痕实验、血管形成实验，并对关键基因和 VEGF-AKT 信号通路进行了实时定量 PCR（qRT-PCR）和蛋白质印迹验证。
结果 我们的分析在 GSE179004 数据集中鉴定出 1245 个差异表达基因，其中 918 个上调，327 个下调。从这些差异表达基因中，我们分离出 36 个在平滑肌细胞增殖等生物过程和 PI3K-AKT 信号通路等路径中显著富集的血管生成相关差异表达基因。通过 PPI 网络分析识别出七个关键基因——EGFR、AGT、EGR1、HBEGF、ITGA2、FGFR2、NPY，并且构建了 mRNA-miRNA-LncRNA 网络。值得注意的是，在七氟醚处理的胶质瘤样本中，ITGA2 和 FGFR2 上调，而 EGFR1 和 HBEGF 下调，EGFR 和 NPY 的表达没有统计学意义。TCGA 验证显示，EGFR 在胶质瘤中的表达显著高于正常组织，并与预后不良相关。对关键基因进行的实验验证结果显示，EGFR 和 VEGF 的 mRNA 表达相较于对照组，七氟醚组的表达是降低的，同时 WB 实验结果发现，七氟醚组 VEGF 和 P-AKT 的蛋白表达也是下降的。划痕实验结果显示，与对照组相比，七氟醚组的血管内皮细胞

在 24 小时内的增殖能力较低。Transwell 实验结果同样表明，七氟醚组细胞的迁移能力也低于对照组。此外，经过七氟醚处理 8 小时后，血管内皮细胞的成管能力显著下降。
结论 七氟醚可能通过调节 EGFR-VEGF-AKT 等关键分子通路，影响神经胶质瘤相关的血管生成。这些发现为七氟醚在神经胶质瘤生物学中的作用提供了一定的证据，并可能成为改善胶质瘤治疗结果的潜在治疗靶点。

PO-0423

利多卡因调控肿瘤相关巨噬细胞 M2b 型极化减少 TNF-α 的分泌抑制非小细胞肺癌转移的机制研究

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目的 肿瘤相关巨噬细胞（TAMs）与肿瘤转移密切相关，既往利多卡因表现出了积极的抗肿瘤作用但存在剂量过大或作用时间过长的问题，且与 TAMs 间的关系尚未有报道。本研究旨在观察在更贴近临床作用时间与剂量下的利多卡因对非小细胞肺癌（NSCLC）中 TAMs 极化的影响，以及在利多卡因作用下的 TAMs 是否会影响 NSCLC 细胞的迁移。并探索利多卡因影响 TAMs 极化以及利多卡因通过 TAMs 影响 NSCLC 细胞迁移的可能机制。
方法 采用佛波酯（PMA）诱导人白血病单核细胞（THP-1）分化成为 M0 巨噬细胞后，收集 NSCLC 细胞系 A549 或 H1838 培养液上清刺激 M0 巨噬细胞，构建 TAMs 的模型。采用 RT-qPCR、流式细胞术检测利多卡因对 TAMs 极化以及相关细胞因子表达与分泌的影响；通过 Transwell 实验检测利多卡因作用于 TAMs 后对 NSCLC 细胞迁移能力的影响以及是否通过抑制 TNF-α 影响 NSCLC 细胞迁移能力；通过转录组测序的手段探索利多卡因影响 TAMs 极化的可能机制。
结果 1）有别于传统的表现为 TNF-α、IL6 及 IL12 表达上调的 M1 型巨噬细胞以及表现为 TGF-β、IL-10 表达上调的 M2a 型巨噬细胞，由 NSCLC 细胞刺激形成的 TAMs 主要表现为 TNF-α、IL10、CCL1 的升高以及 IL12 下降的特点，符合 M2b 型巨噬细胞的特征，且 TAMs 促进了 NSCLC 细胞的迁移。2）利多卡因（1mM）作用于 TAMs 3h 后，TNF-α 的表达以及 M2b 型巨噬细胞标志物 CD86 的表达均出现下调，NSCLC 细胞的迁移能力受到了抑制。3）低剂量的 TNF-α（1ng/ml）作用于 NSCLC 细胞 24h 后，NSCLC 细胞的迁移能力显著提升；TNF-α 的抑制剂 Certolizumab 预处理后，其促迁移能力受到了抑制。4）利多卡因可能通过影响 MAPK/nf-KB 等通路减少 TNF-α 的表达与分泌。
结论 NSCLC 微环境中的 TAMs 主要表现为 M2b 型巨噬细胞，利多卡因可抑制 TAMs 向 M2b 型极化，从而减少 TNF-α 的分泌，抑制 NSCLC 细胞迁移。目前仍较少临床医生会选择在术中静脉输注利多卡因，本研究揭示了利多卡因对预防 NSCLC 转移的积极作用，有望为肿瘤患者手术麻醉药物的选择提供参考。

PO-0424

新辅助化疗不增加胃肠道恶性肿瘤根治手术患者围术期心肌损伤风险：一项历史性倾向评分匹配队列研究

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目的 由于肿瘤治疗中使用的化疗药物也会导致心脏毒性，外科和麻醉医师非常关注新辅助化疗（neoadjuvant chemotherapy, NACT）是否会增加围术期心肌损伤（perioperative myocardial injury, PMI）。本研究旨在探讨 NACT 对胃肠道恶性肿瘤根治手术患者 PMI 发生的影响。
方法 本项历史性队列研究包括了 2019 年 4 月至 2023 年 4 月期间接受了根治性手术的胃肠道恶性肿瘤患者。收集人口统计学特征、术前基线信息、麻醉和手术特征以及术后数据。进行倾向性评分匹配后，比较未 NACT 组和 NACT 组 PMI 的发生率以及麻醉和手术特征差异。采用 Logistic 逻辑回归分析匹配前后的数据，以评估 NACT 对 PMI 发生的影响以及 PMI 发生的独立危险因素。同时根据术前是否已发生了心肌损伤，术中平均动脉压是否小于等于过 65mmHg 和肿瘤类型进行亚组分析。
结果 在 1:1 倾向评分匹配后，每组有 191 名患者。未 NACT 组和 NACT 组的 PMI 发生率分别为 12.57%和 13.09%。NACT 组患者的手术和麻醉时间明显长于未接受 NACT 的患者（分别为 196 [157, 245] vs. 209 [173, 256] 分钟; P = 0.008， 237 [197, 282] vs. 258 [210, 300] 分钟; P = 0.005）。NACT 组需要术中输血的患者较少（34 [17.80%] vs. 17 [8.90%]; P = 0.016），而未 NACT 组在手术期间静脉注射利多卡因的患者较多（13 [6.81%] vs. 1 [0.52%]; P = 0.003）。两组在其他麻醉和手术特点方面无统计学差异（P > 0.05）。匹配后的多变量 logistic 回归分析结果显示，NACT 与 PMI 的发生无关（OR 1.28；95%CI 0.61-2.74；P > 0.05），而术前二氢吡啶钙通道阻滞剂（dihydropyridine calcium channel blocker，DHP-CCB）用药史（OR 2.72；95%CI 1.04-6.79；P = 0.035）和术前血清高敏肌钙蛋白 T（high-sensitivity cardiac troponin T, hs-cTnT）浓度（OR 1.35；95%CI 1.24-1.48；P < 0.001）是 PMI 发生的独立危险因素。匹配前的多变量 Logistic 回归分析结果显示，PMI 的独立危险因素是年龄（OR 1.05；95%CI 1.02-1.08；P < 0.001）和术前血清 hs-cTnT 浓度水平（OR 1.14；95%CI 1.11-1.19；P < 0.001）。在所有匹配后的亚组分析中，均显示 NACT 与 PMI 发生无关（P > 0.05）。除术前已有心肌损伤和结肠癌患者亚组外，单变量逻辑回归分析显示，术前 DHP-CCB 用药史和血清 hs-cTnT 浓度与 PMI 发生相关（P ＜ 0.05）。
结论 根据该队列研究的结果，在胃肠道恶性肿瘤根治手术患者中未观察到 NACT 与 PMI 发生之间的显著关联。然而，术前血清 hs-cTnT 检测结果对预测该患者群体中 PMI 的发生具有重要价值。

PO-0425

初次卵巢癌根治术患者术前腹直肌厚度与术后短期结局和长期预后的相关性分析：一项回顾性队列研究

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目的 肌少症被定义为一种渐进性和系统性的骨骼肌疾病，往往伴随着肌肉质量和功能的加速丧失。越来越多的研究证据表明，术前肌少症与患者术后跌倒、功能下降、虚弱和死亡等不良结局密切相关。本研究旨在探究初次卵巢癌手术患者术前肌少症与术后短期结局和长期预后之间的关联。

方法 这项回顾性研究纳入了 2020 年 1 月至 2021 年 12 月期间在复旦大学附属中山医院择期行初次卵巢癌根治术的患者。测量术前 CT 影像中患者第三腰椎水平的腹直肌厚度作为肌少症的放射学指标。将术后出现严重并发症(Clavien-Dindo 分级≥3b 级)的患者与未发生严重并发症的患者进行比较，利用 Pearson 相关系数分析肌少症指数与患者住院时间(Length of stay, LOS)及综合并发症指数(composite complication index, CCI)之间的关系。

结果 本研究共纳入 212 名女性患者，平均年龄 58 岁 (52, 65.25)，平均体质指数(body mass index, BMI)22.54 kg/m² (20.703, 24.676)。其中 28 名(13.2%)患者术后出现严重并发症，其余 184 名(86.8%)未发生严重并发症。结果显示出现严重并发症的患者术中失血量更大(475 mL vs. 200 mL，P=0.006)，手术时间更长(372.5 min vs. 199 min，P<0.001)，同时，CCI 得分显著高于无严重并发症组(0 vs. 36.7，P<0.001)。但两组间术后一年复发率(35.7% vs. 29.3%)和住院时间(14 vs. 14)未见显著差异。此外，严重并发症组患者的腹直肌厚度更低(3.4 cm vs. 5.8 cm，P<0.001)。同时，较薄的腹直肌厚度与更长的住院时间(r=-0.308，P<0.001)和较高的 CCI 指数(r=-0.453，P<0.001)存在相关性。

结论 综上所述，CT 影像下第三腰椎水平的腹直肌厚度可作为一种特定的肌少症标志参数，其在有术后严重并发症的患者中较低，同时在预测卵巢癌手术后的不良结局方面表现出良好的预测能力。

PO-0426

基于磁共振弥散张量成像研究乌司他丁对脑膜瘤切除术后脑水肿和早期脑功能的影响

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目的 脑膜瘤切除术所致损伤被称为外科性脑损伤（surgical brain injury, SBI）此类脑损伤常导致患者出现不同程度的术后脑水肿,严重影响患者生活质量。乌司他丁已被证实可以改善脑水肿小鼠的预后，但其对脑膜瘤患者术后脑水肿的影响尚不清楚。本研究目的在于借助弥散张量成像技术探究围手术期使用乌司他丁能否抑制炎症，从而减少术后脑水肿导致的脑白质微结构改变，促进术后脑功能恢复。

方法 连续纳入 40 例拟行择期脑膜瘤切除术患者。围手术期使用乌司他丁者归入乌司他丁暴露组（N=20）。非暴露组（N=20）定义为围手术期均未输注乌司他丁者。分别在手术前内及术后 3~4 天进行磁共振成像弥散张量成像扫描，并采用基于白质纤维束示踪的空间统计方法通过平均扩散系数（MD）、各向异性分数（FA）、轴向弥散系数（AD）和径向弥散系数（RD）等指标分析两组患者术后脑白质的改变。采集手术开始前、术毕、术后第 1 天、第 4 天及第 7 天的血液标本检测 IL-6、VEGF 的血清学浓度。在手术前 1 天、术后第 1 天、第 4 天及第 7 天进行一系列神经心理学测试以及焦虑抑制评估，综合评价患者术后脑功能恢复情况。

结果 基于弥散张量数据统计分析结果提示手术前后存在全脑弥散性分布的各向异性分数下降区域和径向弥散系数增高区域，但乌司他丁组与非暴露组患者的各弥散张量变化均不具有统计学意义（图 1）。血清学指标统计结果提示两组患者的 IL-6 和 VEGF 组间差异差值不具有统计学意义（图 2）。基于神经心理学量表分析结果可知乌司他丁组患者与非暴露组患者各个时间点的认知水平均不具有统计学差异，只有术后第 7 天的焦虑评分乌司他丁组患者显著低于非暴露组患者，且差异具有统计学意义（图 2）。

结论 脑膜瘤切除术后存在全脑弥散分布的脑白质微结构改变，存在脑白质水肿或髓鞘损伤，乌司他丁未缓解脑膜瘤患者术后脑水肿损伤。乌司他丁可减轻脑膜瘤患者术后第 7 天的焦虑评分，但未能改善患者术后脑功能恢复进程。

PO-0427

围手术期危险因素对乳腺癌术后患者睡眠障碍的影响：一项前瞻性队列研究

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目的 The aim of this study was to indentify perioperative risk factors associated with PSD in patients after mastectomy.
方法 DESIGN, SETTING, AND PARTICIPANTS The prospective cohort study was conducted from April 2022 to October 2023 at Beijing Cancer Hospital in China. Data was collected for 335 consecutive patients who underwent elective mastectomy. Demographic, clinical, and sleep-related variables were collected. Univariate and multivariable logistic regression analyses were used to identify risk factors associated with PSD. INTERVENTIONS PSD were assessed before and after surgery. All patients underwent mastectomy received either total intravenous or inhalation-based general anesthesia. Baseline data were stratified by categorizing the study population into two groups, PSD and non-PSD, according to whether the patients developed PSD after surgery.
结果 MAIN OUTCOMES AND MEASURES The primary outcome was the incidence of PSD on the first night after surgery. Postoperative sleep disturbance was defined as having a Richards-Campbell Sleep Questionnaire (RCSQ) score of less than 40. Risk factors associated with PSD were evaluated as the secondary outcomes. RESULTS PSD was found in 106 of 335 patients (31.6%) on the first night after surgery. The perioperative risk factors associated with PSD were Satisfaction with ward environment at baseline (OR: 0.983; 95% CI: 0.969–0.997; P=0.019), intraoperative sufentanil consumption (OR: 1.063; 95% CI: 1.016–1.113; P=0.009), while the intraoperative infusion of esketamine (OR: 0.251; 95% CI: 0.134–0.470; P<0.001) were identified as protective factors against PSD.
结论 These results suggested that a good sleep quality after mastectomy is associated with higher level of satisfaction with ward environment before surgery and lower dosage of sufentanil during surgery. Intraoperative infusion of esketamine also exerted a protective effect against PSD.

PO-0428

Inhibition of Liver Cancer Cell Growth by Metabolites S-adenosyl-l-methionine and Nicotinamide Originating from Liver Progenitor Cells

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Background Hepatocellular carcinoma (HCC), the most common form of liver cancer, presents a challenging malignancy with scarce treatment options. Liver progenitor cells (LPCs) play a pivotal role in both liver regeneration and the progression of liver cancer, yet the specific functions of LPCs from different origins in liver cancer remain to be fully elucidated.
Methods We explored the HepLPCs on the proliferation of HCC both in vitro and in vivo. The mitochondrial function changes after co-culture were assessed through electron microscopy and functional experiments. Transcriptomic sequencing and western blot unveiled the fundamental mechanisms at play, whereas metabolomic sequencing pinpointed crucial effector molecules involved in the paracrine secretion of HepLPCs.

Findings: We revealed that HepLPCs, even in the absence of direct cell-cell contact, could inhibit the growth phenotype of HCC cells by triggering mitochondrial dysfunction, then turn to suppress the Notch1 and JAK1/STAT3 signaling pathways. Moreover, we pinpointed two metabolites produced by HepLPCs, S-adenosyl-l-methionine (SAM) and nicotinamide (NAM), as key factors that induced mitochondrial dysfunction and led to the simultaneous suppression of Notch1 and JAK1/STAT3 signaling pathways, effectively hindering the proliferation of liver cancer cells.
Interpretation: Our findings suggest that HepLPCs, alongside inhibitors targeting Notch1 and STAT3, and the manipulation of HepLPC-derived metabolites, could serve as novel therapeutic strategies for HCC treatment. These strategies aim to reduce tumor mass by inducing mitochondrial dysfunction, offering promising alternative treatment avenues.

书面交流

PU-0001

膜联三肽对糖尿病大鼠心肌缺血再灌注损伤的影响

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目的 通过观察膜联三肽对糖尿大鼠心心肌缺血再灌注损伤的保护作用，并探讨 Sirt3 在其中发挥的作用

方法 选择 SPF 级雄性健康 SD 大鼠 18 只，体重 300g-350g，周龄 12-14 周，建立为 2 型糖尿病模型。将糖尿病大鼠随机分为 3 组：假手术组（Sham 组）、缺血再灌注组（MIRI 组）、膜联三肽组（ANXA1sp 组），每组分别为 6 只糖尿病大鼠。S 组做开胸穿刺处理，不进行冠脉结扎及再灌注处理；MIRI 组结扎冠状动脉前降支 40min 后再灌注 3h；ANXsp 组结扎冠状动脉前降支 40min 后再灌注 3h，再灌注即刻经尾静脉给予膜联三肽。再灌注 3h 时，ELISA 法检测血清中 CK-MB、LDH 含量、ELISA 法检测心肌组织 SOD、MDA 含量、DHE 法检测心肌组织 ROS 表达量，TTC 法检测心肌梗死面积，电子显微镜观察糖尿病大鼠心肌超微结构并进行线粒体 Flameng 评分，ATP 试剂盒检测心肌组织 ATP 含量，超声心动图检测各组糖尿病大鼠心功能，Western-Blot 法检测心肌组织 Sirt3 表达量。

结果 与 S 组相比，心脏缺血 40min 再灌注 3h 时，MIRI 组、ANXA1sp 组 CK-MB、LDH、MDA、ROS 明显增加（P＜0.05）、SOD 明显降低（P＜0.05）、心肌梗死面积明显增加（P＜0.05）、心肌超微结构损伤加重及线粒体评分明显增加（P＜0.05）、大鼠心功能明显降低（P＜0.05）、Sirt3 表达量明显降低（P＜0.05）。与 MIRI 组相比，ANXA1sp 组，心肌缺血 40min，再灌注 3h 时，CK-MB、LDH、MDA、ROS 明显降低（P＜0.05）、SOD 明显增加（P＜0.05）、心肌梗死面积明显减少（P＜0.05）、心肌超微结构减轻及线粒体评分明显降低（P＜0.05）、大鼠心功能明显增加（P＜0.05）、Sirt3 表达量明显增加（P＜0.05）。

结论 膜联三肽可降低心肌损伤标志物 CK-MD、LDH 含量，降低 MDA、ROS 含量，增加 SOD 含量，降低糖尿病大鼠心肌梗死面积，降低线粒体评分，改善线粒体超微结构，改善大鼠心功能，增加 Sirt3 表达量，维持线粒体功能，减轻糖尿病大鼠 MIRI。

PU-0002

负载局麻药的喷涂凝胶材料的研发及其多重局部效应研究

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目的 持续剧烈疼痛、细菌感染、过度炎症和氧化应激损伤等是慢性溃疡创面治疗的棘手问题，目前尚缺乏有效治疗方法，迫切需要研发一种新型有效治疗慢性创面的生物材料敷料。在前期基础上，本研究拟进一步优化材料形式和给药方式，减少药物副作用的同时，探究局麻药负载的喷涂凝胶材料在糖尿病等慢性创面的镇痛及治疗作用，进一步发展局麻药材料用于慢性创面治疗的应用前景。

方法 采用 F127-TMB 软模板法制备介孔聚多巴胺纳米颗粒（Mesoporous polydopamine nanoparticle，MPDA），并通过化学键合反应制备负载铂簇（Platinum，Pt）的 MPDA@Pt 纳米颗粒；采用化学交联方法制备负载局麻药 QX-314（一种利多卡因季铵衍生物）的可喷涂的纤维蛋白凝胶（Fibrin）；然后按比例混合得到可喷涂性 MPDA@Pt/Fibrin-QX314 颗粒-凝胶复合材料。通过 SEM、TEM、EDS、流变学、体外药物释放和降解实验对复合材料表征，并探究复合材料的光热效应、抗菌和抗氧化能力。在糖尿病大鼠创面感染模型和足底切开缝合的疼痛模型，探究该复合材料的局部镇痛效果和机制，以及对糖尿病慢性创面的多功能治疗作用。最后，通过血清学和组织

学病理，验证复合材料的体内生物安全性。
结果 成功制备了一种负载局麻药的多功能 MPDA@Pt/Fibrin-QX314 喷涂凝胶，该复合材料具有良好的生物相容性和降解性，可通过喷涂形式原位快速成胶。在糖尿病大鼠感染创面模型和足底切开缝合疼痛模型中，该材料表现出良好的光热激活 TRPV1 通道介导的 QX-314 局部镇痛作用，以及抗炎、抗菌、抗氧化、止血和促创面愈合的多功能治疗作用。通过分子生物学检测，我们发现该颗粒-凝胶复合物可通过抑制脊髓背根神经节 c-Fos 的表达，以及脊髓背角胶质区细胞的激活，抑制疼痛上传，从而有效缓解切口疼痛。
结论 MPDA@Pt/Fibrin-QX314 喷涂凝胶具有良好的生物相容性，表现出光热激活 TRPV1 通道介导的 QX-314 局部镇痛作用，以及抗炎、抗菌、抗氧化、止血、促创面愈合的多功能作用，是一种新型慢性创面镇痛及治疗的局麻药生物材料，有望进一步临床转化。

PU-0003

允许性二氧化碳麻醉的临床观察与应用

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目的 一些日间手术的开展，短效镇痛药配合 HFNC 的使用，患者在不缺氧的情况下，出现高碳酸血症，甚至病人在理论上药物代谢消失后，病人仍处于麻醉 状态，经过几次过度通气之后，病人便快速清醒。所以我们此时所谈及的问题是：允许性高碳酸血症有无麻醉作用？二氧化碳麻醉通常的定义的危害较大，是不是可以存在一定范围之下血气中二氧化碳的分压，既有麻醉作用，又能保持呼吸，类似于冬眠。本文的目的在于探讨允许性二氧化碳麻醉可能作为自身产出的麻醉药物，副作用可能较少，安全范围大，有一定的应用前景。
方法 允许性高碳酸血症可以通过调整呼吸参数来实现。在腔镜手术中，CO2 气腹是常见的手段，它可以导致高碳酸血症。通过适当提高呼吸频率和降低潮气量，可以控制 CO2 的产生并维持适当的 PaCO2 水平。对于单肺通气病人和肺功能较差的病人，普通麻醉可能导致通气不足和 CO2 潴留。此时，采用高流量湿化通气可以改善通气/血流比值，减少 CO2 潴留。
允许性高碳酸血症具有一系列的生理效应，可以用于术中及术后的管理和治疗。首先，其兴奋心血管功能，可以平衡麻醉药对心血管的抑制作用。这有助于维持术中循环稳定，减少低血压等并发症的发生。其次，高碳酸血症的扩张心脑血管作用对心脑有保护作用，可以减少术后 POCD 的发生。此外，利用其潜在的麻醉作用，可以减少麻醉药的用量，从而降低术后呼吸和认知功能障碍的风险。在日间手术、小儿、老年和危重病人的麻醉中，允许性高碳酸血症的应用尤为重要。对于这些病人群体，由于其生理特点和疾病状态，对麻醉的耐受性较差，容易出现循环和呼吸系统的问题。通过合理应用允许性高碳酸血症，可以优化麻醉管理，保护病人的肺功能，并促进术后快速清醒。
结果 日间手术、小儿、老年和危重病人的麻醉中，允许性高碳酸血症的应用尤为重要。对于这些病人群体，由于其生理特点和疾病状态，对麻醉的耐受性较差，容易出现循环和呼吸系统的问题。通过合理应用允许性高碳酸血症，可以优化麻醉管理，保护病人的肺功能，并促进术后快速清醒。
结论 允许性高碳酸血症应用产生的允许性二氧化碳麻醉在临床麻醉中具有广泛的应用前景。通过合理的呼吸管理和药物使用，可以有效地利用其生理效应为病人带来益处。然而，在实际操作中仍需注意监测和调整，以确保病人的安全和舒适。

PU-0004

蒙药额尔敦-乌日勒基础方减轻术后认知功能障碍

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目的 术后认知功能障碍（Postoperative Cognitive Dysfunction，POCD）是接受麻醉和手术后相当长一段时间内出现的其他原因无法解释的认知功能下降，研究显示老年患者发病率较高，POCD 导致的记忆力和学习能力减退等表现给患者家庭带来了沉重的精神、生理、经济压力，然而目前对于 POCD 尚无较好的治疗方法。目前主要认为麻醉和手术导致的中枢和（或）外周炎症通过各种机制引起海马区域神经细胞损伤，因此减轻围术期中枢炎症成为可能的治疗方向。蒙药额尔敦-乌日勒（Eerdun Wurile, EW）是蒙医的一味经典方剂，根据蒙医药理论具有治疗白脉损伤、清陈旧热、燥协日乌素的功效，在治疗中枢神经系统疾病方面有着悠久的临床应用历史，已有文献证实 EW 在体内外均有抑炎作用，并且能够改善 POCD 模型动物的认知功能，鉴于此，依据蒙医药理论将 EW 中与 POCD 相关的药物成分配伍组成基础方以减少药材浪费和患者家庭经济负担。
方法 对 C57 小鼠灌胃 EW 基础方，通过 MWM 测试小鼠学习和记忆能力，通过侧脑室注射 LPS 及单侧肾脏切除术模拟手术和麻醉导致的中枢和外周炎症。通过实时荧光定量聚合酶链式反应（Real-time Quantitative PCR, qPCR）及蛋白质印迹（Western blot, WB）检测细胞炎症水平和通路相关蛋白表达，通过生化检测游离铁、GPX4 水平。
结果 EW 基础方含药血清能明显抑制 C57 小鼠外周和海马区炎症因子（IL-1β、IL-6、iNOS）的表达，EW 可能是通过激活铁死亡抑制炎症反应以改善 POCD。
结论 蒙药 EW 基础方能够通过激活铁死亡抑制炎症从而缓解 POCD。

PU-0005

七氟烷对线粒体钙稳态影响的研究

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目的 探究七氟烷对线粒体 Ca2+浓度和线粒体钙单向转运蛋白（mitochondrial Ca2+ uniporter，MCU）影响。
方法 使用 HT22 细胞（小鼠海马神经元细胞系）作为研究对象。实验分为对照组和七氟烷组，对照组细胞暴露于含对照溶剂的培养基，七氟烷组置于含 1 mM 七氟烷的培养基，两组细胞于 37℃，5% CO2 的培养箱中处理 6h。利用乳酸脱氢酶（lactate dehydrogenase，LDH）试剂盒评估细胞损伤情况，细胞增殖检测试剂盒（MTS）评估细胞活力。利用细胞钙离子探针 Calbryte-520 AM 和 Rhod-2 AM，同时评估细胞质和线粒体 Ca2+浓度。利用线粒体 PK Mito Deep Red 进行线粒体定位。应用 Western blot 方法分析 MCU 表达量。
结果 与对照组相比，实验组 HT22 细胞活力降低（$P<0.05$）、细胞受损（$P<0.05$）、细胞质和线粒体钙 Ca2+浓度显著升高（$P<0.05$），但 MCU 表达量无差异（$P>0.05$）。
结论 七氟烷对线粒体钙稳态影响的研究

PU-0006

TRIM65 deficiency alleviate renal fibrosis through NUDT21 mediated alternative polyadenylation

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Chronic kidney disease (CKD) is the third leading cause of premature death worldwide and has emerged as a significant public health concern. Renal fibrosis is the primary pathological process that leads to the continuous deterioration of CKD. However, the underlying regulatory mechanisms remain unresolved, limiting the therapeutic options for patients. Here, we focus on TRIM65, an E3 ubiquitin ligase that serves as a positive genetic regulator of renal fibrosis, and demonstrate that deletion of TRIM65 reduces pathological lesions and renal fibrosis in both unilateral ureteral obstruction (UUO)- and folic acid (FA)-induced mouse models of kidney fibrosis. Through yeast-hybrid system screening, we discovered a previously unidentified substrate of TRIM65, the mammalian cleavage factor I subunit CFIm25 (NUDT21), which was recently recognized as a crucial regulatory factor in fibrosis through alternative polyadenylation (APA). TRIM65 directly interacts with and catalyzes the K48-linked polyubiquitination of lysine 56 on NUDT21 for proteasomal degradation, which further negatively regulates the TGF-β1-mediated SMAD and ERK1/2 signaling pathways. NUDT21 degradation subsequently leads to alterations in the length and sequence content of the 3’UTR (3’UTR-APA) of multiple genes related to fibrosis, such as COL1A1, FN-1, TGFBR1, WNT5a, and FZD2. Furthermore, decreasing the expression of NUDT21 in the kidney tissues of WT or TRIM65-/- mice though hydrodynamic renal pelvis injection of adeno-associated virus 9 (AAV9) not only reversed the protective effect of TRIM65 deficiency but also significantly exacerbated UUO-induced renal fibrosis compared to AAV9-control mice. Overall, this study demonstrates that TRIM65 promotes renal fibrosis by specifically regulating NUDT21-mediated APA. This provides evidence to support TRIM65 as a promising target for minimizing renal fibrosis, suggesting that inhibiting TRIM65 may be an effective strategy for patients with chronic kidney disease.

PU-0007

TRIM65 deficiency confers protection against acute kidney injury via alleviating mitochondrial dysfunction

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Acute kidney injury (AKI) is a prevalent and serious clinical disease worldwide, with a high incidence rate and a significant health burden. Our limited understanding of the complex pathological mechanisms involved in AKI has impeded the development of efficacious therapeutics. As a ubiquitin ligase, tripartite motif 65 (TRIM65) has recently been identified as a key regulator of acute inflammation, but its role in acute kidney injury remains unclear. In the present study, we observed that TRIM65 expression was upregulated in AKI. Furthermore, knockout of the Trim65 gene in mice demonstrated a significant protective effect against rhabdomyolysis, ischemia-reperfusion (I/R), and cisplatin-induced AKI. Mechanistically, TRIM65 directly binds and mediates K48/K63-linked polyubiquitination modifications of voltage-dependent anion channel 1 (VDAC1) at its K161 and K200 amino acid sites. TRIM65 maintains the stabilization of VDAC1 and prevents its degradation by the autophagy pathway. TRIM65 deficiency attenuates mitochondrial dysfunction in renal tubular epithelial cells in AKI. Conversely, overexpression of VDAC1 in renal tissues using AAV vectors has been demonstrated to negate the protective effect of TRIM65 deficiency on AKI. In conclusion,

TRIM65 may be involved in the regulation of AKI through the targeting of VDAC1-dependent mitochondrial function, offering potential avenues for the development of new drug targets and strategies for the treatment of AKI.

PU-0008

基于 Nrf2/SLC7A11 轴抑制铁死亡探讨虾青素在减轻鞘内注射布比卡因所致脊髓神经毒性中的作用及机制研究

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目的 铁死亡被证明在鞘内注射布比卡因（bupivacaine，BUP）引起大鼠脊髓神经毒性中发挥着重要的作用。本研究旨在探索虾青素（Astaxanthin, AST）在鞘内注射布比卡因引起的脊髓神经毒性中的保护作用及其潜在机制。

方法 使用鞘内注射 5%布比卡因建立了大鼠布比卡因脊髓神经毒性模型。将大鼠分为 Control 组、BUP 组、BUP+AST 组。使用分子对接探索虾青素和核因子 E2 相关因子 2（nuclear factor erythroid 2-related factor 2，Nrf2）的直接结合作用。使用腹腔注射 Brusatol 阻断 Nrf2 的表达。采用甩尾感觉潜伏期（Tail-flick latency, TFL）的最大抗辐射热效应百分比（The percentage maximal possible effect, %MPE），和 Basso, Beattie, and Bresnahan（BBB）评分对各组大鼠的尾部感觉功能和后肢运动功能进行评价。采用 H&E 和 Nissl 染色检测大鼠脊髓病理损伤程度和存活神经元数量。使用透射电镜观察大鼠脊髓中的线粒体超微结构。活性氧（Reactive oxygen species，ROS）探针检测新鲜冰冻脊髓组织中 ROS 的含量。生化检测各组大鼠脊髓谷胱甘肽（glutathione，GSH）、丙二醛（malondialdehyde，MDA）、铁含量的变化。组织免疫荧光检测 Nrf2、谷胱甘肽过氧化物酶 4（glutathione peroxidase 4，GPX4）的表达。PCR 检测 Nrf2/ 溶质载体家族 7 成员 11（solute carrier family 7 member 11，SLC7A11）/ GPX4 mRNA 的变化，WB 检测 Nrf2/ SLC7A11/ GPX4/ 4-羟基壬烯醛（4-hydroxynonenal，4HNE）的蛋白表达水平。

结果 虾青素治疗可以促进大鼠尾部感觉功能和后肢运动功能的恢复，缓解鞘内注射布比卡因所致脊髓神经毒性作用。在形态学上，H&E 和 Nissl 染色结果表明，虾青素可以减轻神经元的变性、皱缩和丢失等现象。机制方面，虾青素缓解了鞘内注射布比卡因引起的脊髓线粒体缩小、脊断裂、铁超载、MDA 和 4HNE 的上调、ROS 的积聚、GPX4 和 GSH 的下调。分子对接结果显示，虾青素能够直接结合 Nrf2。另外，虾青素通过激活 Nrf2/SLC7A11 轴抑制铁死亡缓解鞘内注射布比卡因所致脊髓神经毒性作用。特别值得注意的是，Brusatol 通过阻断 Nrf2/SLC7A11 轴逆转了上述铁死亡相关的分子变化。

结论 虾青素通过激活 Nrf2/SLC7A11 轴抑制铁死亡减轻了鞘内注射布比卡因引起的脊髓神经毒性。

PU-0009

Tetracaine hydrochloride modulates alternative splicing to suppress melanoma growth

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Objective: Local anesthetics have gained attention for their potential anti-tumor effects, but the underlying molecular mechanisms remain elusive. Recent studies have implicated alternative splicing, a crucial post-transcriptional process, as a key regulator of cancer pathogenesis [1-3]. This study delineated how tetracaine hydrochloride affects alternative splicing processes, unveiling potential mechanisms through which alternative gene splicing mediates the antitumor effects of local anesthetics.

Methods： The anti-proliferative effects of tetracaine hydrochloride were evaluated in melanoma cell lines using in vitro assays and an in vivo xenograft model [4]. The melanoma cells treated with tetracaine then underwent whole transcriptome analysis using RNA-seq. Bioinformatic analyses were employed to identify differentially expressed genes (DEGs) and splicing factors affected by tetracaine. Key splicing regulators were further validated using qRT-PCR and western blotting. Differential splicing analysis was performed to detect tetracaine-induced alterations in splicing patterns of cancer-related genes.

Results： 1.Expression profiles of mRNAs between control and treatment group

Tetracaine hydrochloride exhibited potent anti-proliferative activity against multiple melanoma cell lines in vitro and significantly impaired tumor growth in a melanoma xenograft model. To investigate the pivotal role of mRNAs that were related to the tetracaine inhibiting tumor proliferation. RNA-Seq was carried out to detect the abnormal expression of mRNAs between tetracaine treatment group and DMSO treatment group. In summary, there were 2458 mRNAs observed to be significantly differentially expressed. 1628 mRNAs were significantly upregulated, while 830 mRNAs were downregulated.

2.Functional annotation and classification GO analyses were made on three different aspects namely biological process(BP), cellular component(CC) and molecular function(MF), reflecting the dynamic alteration processes after giving tetracaine. The most enriched BP terms include cell cycle, cell division, negative regulation of cell proliferation.

Conclusions: Our multi-omics approach uncovered that tetracaine hydrochloride elicits pleiotropic effects on the melanoma transcriptome and spliceosome. Tetracaine treatment led to dysregulated expression of key splicing factors and genome-wide alterations in splicing patterns of cancer-related genes. These splicing abnormalities, coupled with disrupted cell cycle and proliferative pathways, may underlie tetracaine's anti-tumor effects in melanoma. Our findings provide novel insights into the mode of action of this local anesthetic, implicating splicing modulation as a potential therapeutic.

PU-0010

High Concentration Hydrogen Attenuates Sepsis-Induced Acute Kidney Injury by Promoting Mitochondrial Biogenesis and Fusion

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Background： Sepsis is a major cause of mortality among patients in the intensive care unit (ICU). Acute kidney injury (AKI) is a common complication in patients with sepsis, characterized by rapid deterioration of renal function. Approximately 40–50% of patients with sepsis develop AKI. There is a lack of effective therapies for sepsis, which is currently treated with antimicrobials and supportive care.

Hydrogen is a diatomic gas molecule consisting of two hydrogen atoms. It is reported that hydrogen can function as an antioxidant by effectively scavenging cytotoxic reactive oxygen species (ROS), hydroxyl radicals (·OH), and peroxynitrite (ONOO-), which is a type of reactive nitrogen species (RNS). A growing number of research on the use of high concentration hydrogen have been conducted in recent years due to the introduction of novel high-concentration hydrogen therapy equipment. Theoretically, hydrogen can diffuse into tissues, cells, and even organelles to exert antioxidant effects. However, the exact mechanism has yet to be fully understood.

Mitochondria are the main site of aerobic respiration in the cell and are crucial for energy metabolism. Mitochondria are extremely active organelles which frequently go through the processes of autophagy, division/fusion, and biosynthesis. Mitochondrial dynamics play a crucial role in regulating various functions, including metabolism, inflammation, energy production, and cell differentiation, and are essential for maintaining cellular homeostasis.

The purpose of this study is to assess the impact of inhaling high concentration hydrogen on septic mice with AKI and to examine the involvement of mitochondria in this process.

Methods： Cecal ligation and puncture (CLP) is used to construct an in vitro sepsis model in this study. The mice are given 1-hour inhalation of high concentration of hydrogen (67%) at 1 and 6 hours after surgery, respectively. Arterial blood gases are recorded in mice after hydrogen inhalation. The severity of renal damage in mice is assessed by measuring serum creatinine (Cr) and blood urea nitrogen (BUN), as well as performing HE staining. Inflammatory factors [TNF-α, IL-1β, and high mobility group protein B1 (HMGB1)] and antioxidant enzymes [superoxide dismutase (SOD) and catalase (CAT)] activities are also assayed in serum and renal tissues. Mitochondria are extracted from mouse kidney tissue using mitochondrial extraction kit. To reflect mitochondrial function, mitochondrial membrane potential (MMP) and ATP content are detected in renal tissue. Mitochondrial morphology is visualized by transmission electron microscopy (TEM). Proteins involved in mitochondrial fusion, division, and biosynthesis, including PGC-1α, Nrf2, TFAM, Drp1 and MFN2, are detected using western blotting.

Results： Arterial blood pH, PaO2, and PaCO2 are measured in each group of mice after inhalation of the high concentration hydrogen for 30 minutes. There is no statistical significance between the groups. These results suggest that inhaling high concentration hydrogen does not cause hypoxia in mice. Inhalation of high concentration hydrogen can alleviate acute kidney injury and improve 7-day survival from 50% to 90% in septic mice. Inflammatory factors are markedly elevated in the serum and renal tissues in CLP group as compared to Sham and Sham+H2 groups, and pro-inflammatory cytokine levels are dramatically down-regulated by hydrogen. The activities of the antioxidant enzymes SOD and CAT can reflect the ability to combat oxidative stress in vivo. The results show that the activities of both antioxidant enzymes are significantly reduced after CLP, whereas inhalation of high concentration hydrogen markedly increases the activities of SOD and CAT in septic mice. The mitochondrial ridges in the Sham and Sham+H2 groups are intact and not significantly swollen. In contrast, the mitochondria in the CLP group become vacuolated and lacked mitochondrial ridges. These changes are ameliorated by H2. MMP is found to be significantly lower

in CLP group when compared to both Sham and Sham+H2 group whereas this effect is reversed by hydrogen. The trend of ATP content in renal tissues corresponded with that of MMP. These findings imply that treating septic mouse with high concentration hydrogen enhances mitochondrial activity.
PGC-1α, Nrf2 and TFAM are involved in mitochondrial biogenesis, while Drp1 and MFN2 are associated with mitochondrial fusion-fission. There is no difference between Sham and Sham+H2 groups in the protein expression of PGC-1α, Nrf2, and TFAM. When comparing CLP group to Sham group, there is a substantial downregulation of PGC-1α, Nrf2, and TFAM protein expression. When septic mice are treated with H2, the levels of these three proteins are considerably higher than those in CLP group. For Drp1 and MFN2, there is no expression change between Sham and Sham+H2 groups. Drp1 expression is significantly higher in CLP group compared to Sham group, while the opposite trend is observed for MFN2. After inhaling high concentration hydrogen, MFN2 expression is dramatically elevated and Drp1 expression is significantly reduced. These findings indicate that the suppression of mitochondrial division and promotion of mitochondrial fusion and biogenesis may be connected to the relief of sepsis-induced AKI by high concentration hydrogen.
Conclusion： In mice with sepsis, inhaling high concentration hydrogen improves 7-day survival and reduces acute kidney injury, inflammatory response, and oxidative damage to renal tissues. The mechanism may be related to inhibit renal mitochondrial fission and promote mitochondrial fusion and biogenesis.

PU-0011

ADAR1 通过阻止 ZBP1 依赖的 A-to-I RNA 编辑缓解七氟醚发育毒性

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目的 It is well established that sevoflurane exposure leads to widespread neuronal cell death in the developing brain. Adenosine deaminase acting on RNA-1 (ADAR1) dependent adenosine-to-inosine (A-to-I) RNA editing is dynamically regulated throughout brain development. The current investigation is designed to interrogate the contributed role of ADAR1 in developmental sevoflurane neurotoxicity.
方法 The primary hippocampal neuronal culutures and rat pups were exposed to sevoflurane (3%, 6 h) . For in vitro study, the cell viability was assessed by ToxiLight Non-destructive Cytotoxicity BioAssay Kit. RNA immunoprecipitation (RIP) was carried out using a Magna RIP RNA-Binding Protein Immunoprecipitation kit. For in vivo study, AAV-cadRNAs were injected retro-orbitally. RNA Sequencing library was detected by using a HiSeq XTen platform. For behaviour study, the spatial cognitive functions of young rats were evaluated by Morris water maze. The fear conditioning test was performed to assess the capability of emotional cognitive functions.
结果 Developmental sevoflurane priming triggers PANoptosis, and elicits the release of inflammatory factors including IL-1β, IL-18, TNF-α and IFN-γ. Additionally, ADAR1-P150, but not ADAR1-P110, depresses cellular PANoptosis and inflammatory response by competing with ZBP1 for binding to Z-RNA in the presence of sevoflurane. Further investigation demonstrates that ADAR1-dependent A-to-I RNA editing mitigates developmental sevoflurane-induced neuronal PANoptosis. AAV-cadRNAs diminishes sevoflurane-induced cellular Z-RNA production and PANoptosis, which could be abolished by ADAR1-P150 shRNA transfection. Moreover, AAV-cadRNAs delivery ameliorates developmental sevoflurane-induced spatial and emotional cognitive deficits without influence on locomotor activity.
结论 These results illustrate that ADAR1-P150 exhibits a prominent role in preventing ZBP1-dependent PANoptosis through A-to-I RNA editing in developmental sevoflurane neurotoxicity.

PU-0012

小胶质细胞吞噬 PNN 介导术后记忆巩固障碍

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目的 围手术期神经认知障碍(perioperative neurocognitive Disorders，PND)与海马小胶质细胞的激活有关。小胶质细胞作为中枢常驻免疫细胞，不仅在生理条件下维持脑内稳态，也被发现越来越多的参与多种认知疾病的进展，术后发生的小胶质细胞功能障碍可能扰乱神经元功能，诱发 PND。除了作用于细胞功能外，最近的研究表明小胶质细胞也参与细胞外基质(extracellular matrix, ECM)重塑的调节。神经元周围网络（perineuronal net，PNN）是一种特化的细胞外基质，其网状的结构能够稳定突触，被认为是记忆存储的框架。进一步研究发现海马 PNN 对近期到远期的记忆巩固过程至关重要。因此我们提出假设手术后激活的小胶质细胞是否通过调节 PNN 介导 PND，并且损害记忆巩固过程。
方法 我们在条件恐惧训练后不同的时间点进行麻醉手术，以区分记忆巩固或检索障碍，并结合在体电生理技术，在行为学的不同阶段进行局部场电位的记录，研究记忆巩固相关的震荡节律改变。免疫荧光标记小胶质细胞、PNN、PV 中间神经元等，高分辨率共聚焦 3D 重建小胶质细胞和 PNN 空间关系。结合 western blot 对相关蛋白表达定量分析。使用腺相关病毒过表达 PNN 蛋白 hapln1 挽救 PNN 的丢失。
结果 在本研究中，我们发现 PND 小鼠发生记忆巩固障碍，而检索不受影响。麻醉手术后海马区小胶质细胞过度激活，吞噬功能增强，小胶质细胞与 PV 中间神经元周围的 PNN 接触增加，并吞噬 PNN，导致其数量减少；除此之外，我们还发现海马 PV 中间神经元功能的异常和 theta 震荡功率降低。通过恢复术后 PNN 的表达可以改善 PV 神经元功能和 theta 震荡，挽救记忆巩固障碍。
结论 我们的结果表明，麻醉手术导致的认知障碍，记忆巩固过程主要受到损害。小胶质细胞吞噬 PNN 导致其丢失增加是重要的分子机制。我们从细胞外基质的角度为 PND 的记忆障碍和相关病理改变提供了新的见解。

PU-0013

米诺环素对气道高反应共病焦虑的治疗作用及其机制研究

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目的 本课题组前期已验证：气道高反应与焦虑存在共病情况，其原因可能是海马脑区小胶质细胞激活所致。小胶质细胞是中枢神经系统常驻的免疫细胞，在启动先天性和获得性免疫反应中发挥关键作用。米诺环素是四环素类抗生素，能够抑制小胶质细胞活化，被认为具有抗炎特性和神经保护作用，可能在 AHR 共病焦虑的发生过程中起调控的作用。故本课题拟探究米诺环素缓解气道高反应共病焦虑的作用机制。
方法 选取 6-8 周 BALB/c 雌性小鼠，随机分 3 组：对照组（Control 组），腹腔注射卵清蛋白诱导小鼠气道高反应组（AHR 组）和腹腔注射米诺环素治疗组（Mino 组）。使用数据非依赖采集（DIA）质谱采集技术，分析 Control 组与 AHR 组蛋白质表达差异。通过旷场、高架十字迷宫实验来评估小鼠行为学变化，通过小鼠有创肺功能、苏木素-伊红（HE）染色、阿利新蓝-过碘酸雪夫（AB-PAS）染色、肺干湿比等评估气道反应性与肺部炎症。此外，通过免疫荧光评估小鼠海马脑区小胶质细胞状态，通过 Western blot 评估炎症信号通路激活情况。
结果 Control 组与 AHR 组小鼠肺内蛋白质组学发现：MMP9 作为枢纽蛋白与巨噬细胞相关通路在

AHR 的疾病发展过程中起到重要作用。与 Control 组相比，AHR 组在旷场实验中进入中央区时间与次数减少、在高架十字迷宫实验中进入开放臂内次数与时间减少，表现出焦虑样情绪改变，而 Mino 组有所缓解。AHR 组肺功能提示气道阻力增高，HE 染色等可见大量炎性细胞包绕在气道周围、气道粘液处于高分泌状态、杯状细胞显著增生增加，而 Mino 组有所缓解。此外，AHR 组免疫荧光染色显示小胶质细胞的标记物 iba1 在海马脑区的表达增加，形态上表现为胞体变大、突起缩短的阿米巴状；Western blot 结果显示，AHR 组 MMP9 蛋白含量增加，NLRP3、Caspase-1、IL-1β 的蛋白表达水平增加，以上 Mino 组均有所缓解。

结论 米诺环素能够缓解气道高反应共病焦虑，是通过抑制海马脑区小胶质细胞激活，减少 MMP9 的分泌，从而抑制 NLRP3/Caspase-1/IL-1β 信号通路所致。

PU-0014

右美托咪定通过抑制 HMGB1 介导的炎症和氧化应激保护胃粘膜上皮细胞抗缺血/再灌注诱导的细胞凋亡

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目的 利用胃粘膜上皮细胞(GES-1)模型，探讨右美托咪定在胃缺血再灌注损伤中的作用,为临床上胃缺血再灌注损伤的预防和治疗提供一种新思路。

方法 方法胃粘膜上皮细胞(GES-1)细胞在 37℃，5%二氧化碳的孵箱中孵育，在无糖条件下，在 1%O2、5%CO2 和 94%N2 中培养 2 h，对照组细胞在 5%CO2 和 95%大气中正常培养。用不同浓度右美托咪定(0.5、1.0 或 1.5 μM)处理，复氧 4h。采用 3-(4,5-二甲基噻唑-2-基)-2,5-二苯基- 2h -溴化四唑和流式细胞仪检测细胞凋亡率，用酶联免疫吸附试验(ELISA)分析氧化应激和炎症反应

结果 缺氧缺糖条件通过降低细胞存活率和增加细胞凋亡率而诱导 GES-1 细胞毒作用。右美托咪定可显著提高缺氧/复氧诱导的 GES-1 细胞存活率($p<0.01$)，但减少细胞凋亡率。右美托咪定还可减轻缺氧/复氧引起的 GES-1 中丙二醛和髓过氧化物酶的升高，而超氧化物歧化酶和谷胱甘肽的降低。此外，右美托咪定可下调缺氧/复氧诱导的 GES-1 中肿瘤坏死因子-α、白介素 1β 和 IL-18 的表达。右美托咪定还可提高 IL-10 水平，抑制促炎因子的产生($P<0.01$)。缺氧/复氧可上调 GES-1 高迁移率族蛋白 1(HMGB1)，右美托咪啶可使 HMGB1 蛋白表达降低。在缺氧/复氧诱导的 GES-1 中，HMGB1 过表达可减弱右美托咪定诱导的细胞活力增加以及细胞凋亡、氧化应激和炎症反应的减少($p<0.01$)。

结论 右旋美托咪定通过抑制 HMGB1 保护 GES-1 细胞免受缺血/再灌注所致的细胞凋亡、炎症和氧化应激的损伤，从而为治疗胃缺血/再灌注损伤提供了一种潜在的策略。

PU-0015

Optimizing triple anesthetic combination for enhanced anticancer effects in lung adenocarcinoma cell: unveiling NAD+ and ADH1B pathways

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目的 虽然已有研究丙泊酚、舒芬太尼和罗库溴铵有抗癌作用，但三药联合在非小细胞肺癌的作用尚不明确。本研究研究丙泊酚、舒芬太尼和罗库溴铵对非小细胞肺癌细胞系的协同作用，探讨了其对肺腺癌细胞活力、凋亡及相关分子机制。

方法 用不同浓度的丙泊酚、舒芬太尼和罗库溴铵对 非小细胞肺癌细胞系进行处理。通过 CCK8 试验测量细胞活力，通过流式细胞仪和 TUNEL 凋亡试验评估细胞凋亡。蛋白质印迹分析阐明了凋亡相关蛋白的表达谱。利用体内异种移植模型和肺癌类器官用于评价其对肿瘤生长的抑制作用。
结果 联合使用丙泊酚、舒芬太尼和罗库溴铵的最优浓度抑制了细胞活力，抑制异种移植物和类器官的肿瘤生长，显示协同作用。这种组合不仅诱导凋亡相关蛋白（如 PARP）的表达，同时降低增殖标记 Ki67。同时优化的浓度联合导致烟酰胺腺嘌呤二核苷酸水平显著下降。活性氧（ROS）增加、三羧酸（TCA）循环代谢物改变、线粒体膜电位降低和线粒体动力学异常。然而，补充烟酰胺单核苷酸（NMN），一种 NAD+前体，恢复了 NAD+含量，降低了 ROS 水平，改善了线粒体功能
结论 优化的丙泊酚、舒芬太尼和罗库溴铵的联合应用有望成为非小细胞肺癌腺癌的治疗策略。值得注意的是，NAD+和 ADH1B 在这些麻醉药物的抗癌作用中成为潜在的关键角色。NMN 补充剂证明了对药物诱导的细胞变化的保护作用。

PU-0016

hnRNPA2B1 促进内皮祖细胞来源外泌体携载 miR-103-3p 减轻急性肺损伤肺泡巨噬细胞炎症

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目的 探索内皮祖细胞来源的外泌体（EPCs-Exos）在 ALI 的病理炎症过程中的治疗作用及其机制
方法 分离和鉴定原代小鼠 EPCs 和 EPCs-Exos。PKH-26 染色检测小鼠肺泡巨噬细胞（MH-S 细胞）对 EPCs-Exos 的吸收。流式细胞仪和 RT-qPCR 分析显示 MH-S 细胞的极化。通过双荧光素酶测定、RNA 下拉和 RNA 免疫共沉淀检测和验证分子之间的相互作用。建立 ALI 小鼠模型，通过 HE 染色、RT-qPCR 和蛋白质印迹法进行病理染色和相关分子检测。
结果 共培养的 EPCs-Exos 可以转移到 MH-S 细胞，并有效逆转 LPS 诱导的 MH-S 细胞的 M1 极化和 M2 极化，而当 TLR4/NF-κB 通路在 MH-S 细胞中失活时，这些变化会减弱。此外，miR-103-3p 从 EPCs Exos 中释放，并直接与 TLR4 结合以抑制其表达。体外和体内数据表明，EPCs 分泌的外泌体通过携载 miR-103-3p 促进了 MH-S 细胞的 M2 极化，但抑制了 M1 极化，而 EPCs-Exos 中 miR-103-3p 的缺失呈现出相反的效果，从而改善 ALI 小鼠模型中的肺泡巨噬细胞炎症。HnRNPA2B1 是一种 RNA 结合蛋白，被证明与 miR-103-3p 相互作用，并负责其外泌体分泌，从而改善 AM 的促炎极化。
结论 课题研究表明，hnRNPA2B1 通过 TLR4/NF-κB 途径的失活来控制 miR-103-3p 从 EPC 的外泌体递送，以对抗 ALI 中的肺泡巨噬细胞炎症。

PU-0017

Participation of liproxstatin-1 in the mechanism of ferroptosis in hippocampal neuronal cells of perioperative neurocognitive dysfunction in senescent model mice

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Objective：To investigate the potential regulatory mechanism of the ferroptosis inhibitor

Liproxstatin-1 in attenuating ferroptosis in hippocampal neurons by constructing a model of perioperative neurocognitive dysfunction in SAMP8 rapidly aging mice.

Methods： Forty healthy male 6-month-old SAMP8 mice were selected and randomly divided into a control group (Con group), a model group (PND group), a model+Liproxstatin-1 group (PND+Lip-1 group), and a Liproxstatin-1-only group (Lip-1 group), with 10 mice in each group.The PND and PND+Lip-1 groups were anesthetized with 2% iso halothane inhalation anesthesia for 4 hours, and equal amounts of air were inhaled in the control and Lip-1 groups. After surgery, all mice were intrathecally injected for five consecutive days with 30 mg/kg Liproxstatin-1 in the PND+Lip-1 group and the Lip-1 group, and an equal amount of saline was injected in the control group and the model group. Morris water maze, new object recognition and absent field experiments were performed to assess the cognitive functions, followed by observation of hippocampal structural changes by Nichols staining, immunofluorescence staining and transmission electron microscopy, and analysis of hippocampal protein expression by Western blot.

Results： 1. Behavioral test results: the absent field experiment showed that the difference in central activity time between the PND group and the Control group was statistically significant (z=2.821, P=0.005), and the central activity time was reduced in the PND group; the new object recognition experiment showed that the difference in the new object recognition index of SAMP8 mice in each group was statistically significant (F=33.888, P<0.001), and the PND group explored fewer new things than old things compared with the Control group, the PND+Lip-1 group, and the Lip-1 group; the Morris water maze experiment showed statistically significant differences in the avoidance latencies of the SAMP8 mice in each group (F=941.127, P<0.001) and there was an interaction between time and group (F=7.973, P<0.001), so that the rate of change of avoidance latency was not all the same in different groups at different times. Compared with the Control group, the avoidance latency was prolonged in the PND group, and the difference between the PND and PND+Lip-1 groups was statistically significant (P<0.001), the avoidance latency was reduced in the PND+Lip-1 group, and the avoidance latency in the PND+Lip-1 group was longer than that in the Control group (P=0.001). The spatial exploration experiment showed that the difference in the number of crossing platforms between the groups of mice was statistically significant (F=2.962, P=0.045).

2. Histopathological sections of the brain: Nissl staining showed that the Control group exhibited typical hippocampal structural features, in which neurons showed a regular and dense arrangement pattern, clear staining reaction, and uniform distribution of Nissl bodies, while the PND group showed an obvious sparse arrangement of neurons in the hippocampal region, and the phenomenon of neuronal nucleus consolidation was more significant, accompanied by a significant enlargement of the cell gap and uneven distribution of Nissl bodies. The PND group showed a markedly sparse arrangement of neurons in the hippocampus, with significant consolidation of neuronal nuclei accompanied by a significant enlargement of the cell gap and an uneven distribution of Nitinol. Transmission electron microscopy showed that mitochondrial swelling with mitochondrial cristae breakage was observed in the CA1 region of the hippocampus of the PND group, while the mitochondrial damage was reduced in the PND+Lip-1 group.

3. Immunofluorescence staining: Compared with the PND group, the expression of Iba-1 and GAFP in the hippocampal CA1 area was enhanced in the PND+Lip-1 group.

4. Neuronal damage changes：Neuronal damage changes: fjc (Fluoro-Jade B) staining showed that the fluorescence intensity was stronger in the hippocampal CA1 area and at the cerebral cortex in the PND group than in the control group, while the fluorescence intensity was weakened in the PND+Lip-1 group, suggesting that a rise in the number of degeneration-damaged neurons occurred in the PND group.

5. Cognition-related protein expression: the difference in expression between the Control group and the PND group was statistically significant (t=4.920, P=0.0079), and the p-tau/tau ratio was significantly increased in the PND group. And the expression of neurogenic trophic factor BDNF was decreased in the PND group.

6, ferroptosis process-related regulatory protein expression: one-way ANOVA on the relative gray scale values of GPx4, FPN1 and CD71 expression in fresh hippocampal tissues of SAMP8 mice in each group showed that the expression of GPx4 in the PND group was significantly reduced

compared with that of the Control group; the expression of GPx4 in the PND+Lip-1 group was significantly increased compared with that of the PND group; the expression of CD71 in the PND group was significantly increased compared with that of the PND+Lip-1 group; and the expression of CD71 in the PND group was significantly increased compared with that of the PND+Lip-1 group. Compared with the PND+Lip-1 group, the expression of CD71 was increased in the PND group, while the expression of FPN1 was decreased; the expression of 4-HNE, a molecule related to lipid metabolism, was elevated in the PND group.
Conclusion 1. SAMP8 mice exposed to 2% isoflurane by continuous inhalation for 4h showed cognitive impairment and neuronal ferroptosis in the hippocampus.
2. Implementation of intrathecal injection of the ferroptosis inhibitor Liproxstatin-1 solution reduced the degree of neuronal ferroptosis, improved neuronal cell damage, and enhanced cognitive performance in PND mice.

PU-0018

N/OFQ 通过调节血流量加重糖尿病周围神经病变

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目的 探讨糖尿病周围神经病变（Diabetic Peripheral Neuropathy, DPN）的大鼠血清伤害性感受素/孤儿素（N/OFQ）及其受体 OPRL1 的表达与下肢股动脉血流量之间的关系及其下游分子机制，为调节下肢血流量，减缓糖尿病周围神经病变提供新的理论和治疗思路。糖尿病周围神经病变的大鼠，血清 N/OFQ 通过调节下肢股动脉血流量加重外周神经病变。我们课题组之前的相关研究表明糖尿病患者血 N/OFQ 水平增加，降低糖尿病患者的血清 N/OFQ 水平对预防部分心血管疾病有重要意义。然而，由于血清 N/OFQ 及其受体 OPRL1 的表达在糖尿病周围病变发展过程中与内皮细胞功能异常相关的机制尚不清楚，这极大地阻碍了靶向 OPRL1 治疗糖尿病周围神经病变。本研究为糖尿病周围神经病变的治疗提供了新的思路。
方法 实验采用 6-8 周龄 250-280g Sprague-Dawley（SD）雄性大鼠，n=6。链脲佐菌素（STZ）(索莱宝，北京，中国)溶解于柠檬酸缓冲液(PH4.0-4.5)（索莱宝，北京，中国）中，配置成 STZ 溶液，采用腹腔注射 STZ 溶液的方法建立 DPN 大鼠模型。实验动物分为 Control 组（C 组，n=6）和 DPN 组（D 组，n=6），D 组腹腔注射 STZ 溶液 55mg/Kg，Control 组同等方法同等剂量注射生理盐水。7 次测量各组血糖≥16.7mmol/L 即糖尿病模型(Diabetes mellitus, DM)建立成功。DM 模型建立成功后 14d 测定各组大鼠甩尾潜伏期（TFL）,20d 确诊 DPN 模型建立成功。
结果 造模成功后，D 组大鼠的体重显著低于 C 组，而血糖显著升高（P<0.05），D 组的 TFL 也显著高于 C 组（P<0.05）,提示 DPN 的模型成功。D 组的下肢股动脉血量相对于 C 组显著减少（P<0.05）。血清 N/OFQ、下肢股动脉 N/OFQ 受体 OPRL1 的表达和坐骨神经刺激阈值 D 组显著高于 C 组（P<0.05）。我们做了 D 组血清 N/OFQ、下肢股动脉血量和坐骨神经刺激阈值之间的相关性分析，得出血清 N/OFQ 与下肢股动脉血量成反比（r=0.0833,P=0.011）;血清 N/OFQ 与坐骨神经反应性成正比（r=0.0706,P=0.036）;下肢股动脉血流量与坐骨神经刺激阈值成反比（r=0.802,p=0.016）。
结论 研究结果表明 DPN 大鼠血清 N/OFQ 浓度升高，N/OFQ 与下肢股动脉血流量和坐骨神经刺激阈值存在较强的相关关系，可能 DPN 大鼠血清 N/OFQ 通过调节下肢股动脉血流量加重周围神经病变。我们课题组猜测血清 N/OFQ 可能是通过 PKC 通路调节下游蛋白分子 Neprilysin（MME）和 C 型利钠肽（CNP）影响下肢动脉血流量，加重外周神经病变的发生发展。但是在该疾病中，血清 N/OFQ 和 OPRL1 是怎样上调的，又是怎样调节下游分子机制影响病情的，目前尚不明确，我们需要进一步的实验研究。

PU-0019

CD8+T 细胞诱导海马神经元损伤并抑制成年海马神经发生与小鼠术后神经认知功能障碍相关

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目的 术后神经认知功能障碍(POCD)是术后出现的神经系统并发症。研究发现，约 1.5%-54.9%的外科患者在术后会出现 POCD。海马齿状回的颗粒下带的神经发生终生存在，影响人的学习和记忆功能。研究表明，CD8+T 细胞在多种神经退行性疾病、自身免疫性神经疾病中发挥重要作用，然而，海马神经发生和 CD8+T 细胞在 POCD 进展中的作用尚不清楚。
方法 对 8~12 月龄 C57BL/6 小鼠进行剖腹手术，建立 POCD 模型。Morris 水迷宫和新奇物体识别测试评估小鼠认知功能。对小鼠海马区进行全转录组测序(RNA-seq 分析)。采用流式细胞术和免疫组织化学方法检测小鼠脾、外周血和海马区 CD8+T 细胞。尼氏染色检测小鼠海马神经元损伤，免疫荧光法检测小鼠海马神经元再生。
结果 RNA-seq 分析显示，POCD 的发生与神经免疫系统的相互作用之间存在潜在的关联，提示 POCD 发生可能与 CD8+T 细胞有关。POCD 小鼠的脾、外周血和海马区 CD8+T 细胞的存在显著增加，抑制海马神经发生。利用抗 CD8 抗体 InVivoPlus anti-mouse CD8α 减少小鼠体内 CD8+T 后，细胞显著促进 POCD 小鼠的海马神经发生，并减轻认知障碍。
结论 CD8+T 细胞进入小鼠海马区可引起神经元功能障碍，促进 POCD 的发生发展。围术期监测 CD8+T 细胞活性可作为预测 POCD 发生的有效手段。

PU-0020

iTBS 术前干预在改善围术期神经认知障碍中的作用

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目的 围术期神经认知障碍（Perioperative neurocognitive disorder，PND）是指在围手术期发生的神经认知障碍，可增加手术风险，影响临床预后。目前仍无有效方法，可以预防或降低 PND 发生或严重程度。iTBS 作为经颅磁刺激的一种干预模式，可通过提高大脑功能，改善神经认知功能。因此本研究拟通过剖腹探查术建立 PND 大鼠模型，探索术前 iTBS 干预在减少 PND 发生，或降低 PND 严重程度中的作用。
方法 采用 18 月龄的老年大鼠作为实验动物，使用 iTBS 在术前连续干预大鼠 10 天，干预结束后大鼠接受剖腹探查术建立 PND 模型，具体方法是采用 3%异氟醚吸入麻醉，腹部正中切口，拉出小肠外置 1min，然后缝合伤口，最后再继续吸入麻醉 3h。采用 Morris 水迷宫试验评估术前和术后的认知功能，在造模 72h 后，处死大鼠，获取大鼠皮层和海马组织，观察神经元形态变化，及检测炎症因子的变化。
结果 iTBS 术前干预可显著降低大鼠麻醉苏醒时间，但诱导时间无显著差异。大鼠在术前经 iTBS 干预后，在平台穿越次数、总路程和穿行速度等认知指标中，均显著得到改善。通过分析炎症因子的变化，发现 iTBS 术前干预的大鼠，(TNF)-α 等促炎因子显著降低，IL-4 等抗原因子显著升高。HE 结果发现，iTBS 术前干预可以改善神经元形态功能。
结论 术前 iTBS 干预，可以提高神经元功能，抵抗麻醉和手术带来的神经元损伤，预防或降低 PND 的发生或严重程度，在 PND 临床治疗中具有重要的潜在价值。

PU-0021

艾司氯胺酮通过 HCN2/AXIN/β-catenin 抑制结直肠癌转移

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目的 探讨艾司氯胺酮对结直肠癌发生发展的影响及其机制
方法 为了探究艾司氯胺酮对结直肠癌转移过程的影响及其机制，通过 Transwell 试验和构建体内结直肠癌肺转移模型探索 Esket 对结直肠癌细胞迁移、侵袭能力和肺转移的影响，并通过生物信息学方法、RT-qPCR 和 WB 实验筛选并且验证 Esket 通过 HCN2 受体发挥作用，并对机制进行探索，发现 Esket 能够通过 AXIN 抑制 β-catenin 通路，从而抑制结直肠癌转移。
结果 1、 Esket 抑制结直肠癌细胞的侵袭迁移和肺转移
通过 Transwell 实验发现 Esket 能够在体外明显抑制结直肠癌细胞系的迁移和侵袭能力，通过构建小鼠结肠癌肺转移模型发现 Esket 能够明显抑制结直肠肿瘤的肺转移能力。
2、 Esket 通过 HCN2 通道抑制结直肠癌的转移
通过生物信息学方法发现 HCN2 mRNA 在结直肠癌细胞中较正常肠粘膜细胞高表达，并且 HCN2 通道高表达的结直肠癌患者预后明显变差，通过分子对接发现 Esket 与 HCN2 通道能够特异性结合，因此推断 Esket 能够通过 HCN2 通道抑制结直肠癌细胞的转移。通过构建 sh-HCN2 细胞系验证。
3、 Esket 通过 HCN2 通道抑制 β-catenin 的核转位
通过转录组测序结果发现 sh-HCN2 后结直肠癌细胞 Wnt/β-catenin 通路下调，通过核质分离和免疫荧光发现使用 Esket 和 sh-HCN2 后 β-catenin 细胞核定位明显减少且蛋白总量下调，因为 β-catenin 主要为入核发挥作用，因此，Esket 通过 HCN2 通道抑制 β-catenin 的核转位。
4、 sh-HCN2 通过减少 Axin 降解促进 β-catenin 的降解
通过添加 CHX 发现在 sh-HCN2 后 β-catenin 降解加快，因此 sh-HCN2 后通过促进 β-catenin 的降解从而降低 β-catenin 的总量，同时通过 WB 发现 sh-HCN2 后 p-β-catenin 以及 β-catenin 的破坏复合物组成支架成分 AXIN 明显增加，因此 sh-HCN2 通过减少 Axin 降解促进 β-catenin 的降解，添加 Esket 后可达到同样的效果。
结论 本研究发现 Esket 能够通过 HCN2 通道抑制结直肠癌的 Wnt/β-catenin 通路，进而抑制结直肠癌的转移，改善结直肠癌患者的预后，提高预期寿命。

PU-0022

Tryptophan-rich diet and its effects on Htr7+ Tregs in alleviating neuroinflammation and cognitive impairment induced by lipopolysaccharide

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Background： Neuroinflammation, a part of systemic immune response, is characterized by increased oxidative stress, elevated pro-inflammatory cytokine expression, and activated microglia. Neuroinflammation plays a crucial role in neurodegenerative diseases such as Alzheimer's, schizophrenia, and age-related cognitive decline. Nevertheless, the exact pathological mechanisms by which neuroinflammation affects cognitive function remain elusive. In animal models, systemic and intracerebroventricular administration of lipopolysaccharide (LPS) can induce cognitive impairment. Regulatory T cells (Tregs) are vital components of the immune system that function to maintain immune homeostasis and limit excessive inflammatory responses, thereby

protecting the body from inflammatory damage. There was one specific subtype of Tregs express the receptor 5-HT_7 for 5-hydroxytryptamine (5-HT), also known as serotonin. Binding 5-HT to 5-HT_7 receptor stimulates the proliferation of $Htr7^+$ Tregs and enhances their immune activity. $Htr7^+$ Tregs proliferate in the cervical lymph nodes and can also infiltrate effector brain regions, where they exert immunosuppressive effects. It is highly plausible that $Htr7^+$ Tregs expressing unique genes associated with the nervous system, including the Htr7 gene encoding the serotonin receptor 5-HT_7, play a pivotal role.

Methods： Mice were given a tryptophan-rich diet (with a tryptophan content of 0.6%) or a normal diet (with a tryptophan content of 0.16%). The neuroinflammation-mediated cognitive dysfunction model was established by intracerebroventricular injection of lipopolysaccharide (LPS) in 8-week-old C57BL/6J mice. The activation and infiltration of Tregs were measured using flow cytometry. Metagenomic sequencing of fecal samples was employed to investigate alterations in gut bacterial abundance following LPS administration. Primary Tregs were cocultured separately with primary $CD8^+$ T cells and primary microglia for in vitro validation of the impact of 5-HT and 5-HT_7 receptor on Tregs. Prior to their transfer into recombination activating gene 1 ($Rag1^{-/-}$) mice, Tregs were ex vivo transfected with lentivirus to knock down the expression of Htr7.

Results： The study demonstrated that a tryptophan-rich diet effectively reversed cognitive impairment induced by LPS in mice. Using the Morris water maze (MWM) test, it was observed that mice in the LPS group exhibited a significant decrease in the time spent in the target quadrant, indicating memory impairment. In contrast, mice fed a tryptophan-rich diet displayed improved performance in the MWM test, suggesting that the diet could protect against LPS-induced memory deficits. Additionally, the tryptophan-rich diet did not affect the swimming velocity of the mice, indicating that the observed improvements in cognitive function were not due to changes in motor or perceptual abilities. The research found that LPS treatment led to decreased serum levels of 5-HT, a neurotransmitter synthesized from tryptophan and heavily involved in mood and cognitive functions. This decrease was not observed in the hippocampal region, suggesting a specific impact on peripheral 5-HT levels. The study also highlighted the role of the gut-brain axis, where LPS injection affected the synthesis of intestinal 5-HT, potentially through alterations in gut microbiota. This finding points to a complex interplay between the gut microbiota, 5-HT production, and cognitive function. Metagenomic sequencing revealed a significant shift in gut microbiota composition following LPS treatment, particularly affecting bacteria associated with 5-HT synthesis. Species such as s_Escherichia_coli, s_Klebsiella_pneumoniae, s_Klebsiella_quasipneumoniae, and s_Klebsiella_variicola showed decreased abundance after LPS treatment, which could contribute to the observed decrease in peripheral 5-HT levels. The study found that the proportion of $Htr7^+$ Tregs in the cervical lymph nodes was lower in the LPS group compared to other groups. However, a tryptophan-rich diet increased the levels of peripheral blood 5-HT, which in turn promoted the proliferation and activation of $Htr7^+$ Tregs. This suggests that the diet may enhance the immunosuppressive activity of these Tregs, potentially contributing to the mitigation of neuroinflammation. The infiltration of $CD8^+$ T lymphocytes in the hippocampus was significantly increased in the LPS group, an effect that was mitigated by the tryptophan-rich diet. This finding indicates that $Htr7^+$ Tregs, activated by the diet, may suppress the infiltration of $CD8^+$ T cells into the brain, thereby reducing neuroinflammation. The activation of T lymphocytes, neutrophils, and microglia in response to LPS was associated with increased demyelination of neurons. The study showed that a tryptophan-rich diet reduced neuroinflammation by activating $Htr7^+$ Tregs. This was evidenced by decreased levels of pro-inflammatory cytokines and increased levels of anti-inflammatory cytokines in the hippocampal region of mice fed the tryptophan-rich diet. Cellular experiments demonstrated that 5-HT, through the 5-HT_7 receptor, enhanced the immunosuppressive effects of Tregs on $CD8^+$ T cells and microglia. This was shown by decreased proliferation of $CD8^+$ T cells, increased apoptosis, and reduced expression of cytotoxic proteins and inflammatory cytokines. In $Rag1^{-/-}$ mice, which lack mature T and B cells, the adoptive transfer of $Htr7^+$ Tregs mitigated LPS-induced cognitive impairment. This was confirmed through MWM testing, which showed improved cognitive function in mice with transferred Tregs compared to those without. Additionally, the study found that the downregulation of Htr7 in Tregs exacerbated cognitive impairment and neuroinflammatory responses, further highlighting the protective role of $Htr7^+$ Tregs.

The study also evaluated the neuroinflammatory response in Rag1$^{-/-}$ mice and found that Htr7^{+} Tregs reduced the activation of microglia and macrophages, promoting a protective polarization. This was indicated by decreased expression of MHC-II and increased expression of CD206 in these cells. Furthermore, the levels of inflammatory factors were reduced in the hippocampal region of mice with Htr7^{+} Tregs, suggesting a significant reduction in central inflammation.

Conclusions： In conclusion, our study demonstrated the pivotal role of Htr7^{+} Tregs in LPS-induced cognitive impairment, suggesting that Htr7^{+} Tregs may be critical for alleviating central inflammation-associated cognitive impairment. Htr7^{+} Tregs alleviated the inflammatory response and prevent neuronal damage by suppressing the infiltration of CD8^{+} T cells into the brain and excessive activation of microglia, thereby ameliorating LPS-induced cognitive impairment. This study may offer new potential therapeutic targets based on Tregs for neuroinflammation-mediated cognitive dysfunction.

PU-0023

Electroacupuncture pretreatment on HO-1-EPCs pathway in cerebral ischemia-reperfusion injury rats

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Background： Observation the effect of electroacupuncture pretreatment on neurobehavioral and HO-1-EPCs Path in rats with cerebral ischemia reperfusion injury.

Materials and Methods: Male SD rats were randomly divided into a model group, a sham surgery group, and an electroacupuncture group, with 6 rats in each group. The model group established a cerebral artery ischemia-reperfusion model using the method of inserting thread plugs; The electroacupuncture group was pretreated with electroacupuncture for 14 days before molding. After modeling, relevant indicators were measured using mNSS scoring, open experiments, Morris water maze, ELISA, and flow cytometry.

Results and Discussion: After modeling, the cerebral blood flow of the model group and the electroacupuncture group significantly decreased ($P<0.01$); After 30 minutes of reperfusion, the cerebral blood flow in the electroacupuncture group was significantly higher than that in the model group ($P<0.05$). The mNSS score of the electroacupuncture group significantly decreased ($P<0.05$). In field experiments, the average speed of the model group rats was lower than that of the sham surgery group and the electroacupuncture group ($P<0.05$). In the Morris water maze experiment, the target quadrant residence time of the electroacupuncture group significantly increased ($P<0.05$). The serum HO-1 level in the electroacupuncture group significantly increased ($P<0.05$). Compared with the sham surgery group, the
serum EPCs of both the model group and the electroacupuncture group decreased ($P<0.05$), but the EPC of the electroacupuncture group was significantly higher than that of the model group ($P<0.05$).

Conclusion： Electroacupuncture pretreatment can improve the cerebral blood flow status of acute cerebral ischemia-reperfusion rats, reduce nerve damage, enhance learning, memory, and motor abilities, and increase the level of HO-1-EPCs Path. This experiment provides experimental evidence and potential therapeutic approaches for the treatment of ischemic stroke.

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PU-0024

IFN-γ/JAK/STAT 信号通路介导活化的 CD8+T 细胞对神经干细胞增殖的抑制

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目的 术后认知功能障碍（POCD）发生率高且与长期预后和死亡率密切相关，但发病机制迄今仍不明确。有临床证据表明，术后神经炎症的发生可能是导致 POCD 的关键因素。神经炎症在许多中枢神经系统疾病中发挥着重要作用，也有研究发现，成年后神经干细胞增殖补充新的神经元可能是对抗认知功能衰退的重要方法。我们前期研究发现，老年小鼠术后海马神经干细胞增殖受抑制且有 CD8+T 细胞浸润。有研究表明，老年海马 CD8+T 细胞浸润与神经干细胞增殖被抑制有关。但是 CD8+T 细胞抑制神经干细胞增殖的信号机制尚不清楚。

方法 建模方法：分离培养的海马神经干细胞和脾脏中 CD8+T 细胞，随机分为未活化组（unactivated 组）、活化的 CD8+T 细胞与神经干细胞比值为 0.5:1 组（0.5:1 组）、活化的 CD8+T 细胞与神经干细胞比值为 1:1 组（1:1 组）至 5:1 组。细胞在恒温培养箱中用 transwell 24 孔板共培养。

细胞鉴定：免疫荧光检测 Nestin 染色观察阳性细胞数目，流式细胞术用于分别检测 Nestin 阳性细胞和 CD8+T 细胞占总细胞数比值。

评估神经干细胞增殖：免疫荧光观察 EdU 阳性细胞比例。

IFNGR 表达检测：免疫荧光检测 Nestin 和 IFNGR 双染定位。

细胞毒性检测和细胞增殖检测：CCK8 检测共培养后神经干细胞活性及增殖比例。

IFN-γ 表达水平检测：捕获 Elisa 法检测共培养细胞上清液中 γ 干扰素浓度。

JAK/STAT 通路检测：Western blotting 检测通路位点磷酸化及抑制后表达水平。

结果 提取并培养神经干细胞和 CD8+T 细胞后进行鉴定，鉴定结果表明，分离培养的细胞中神经干细胞和 CD8+T 细胞均占 95%以上。随后我们将神经干细胞和 CD8+T 细胞在 transwell 24 孔板中共培养。为排除 CD8+T 细胞对神经干细胞细胞毒性的影响，我们使用 CCK8 进行细胞活性检测，结果显示高比例 T 细胞（4:1），对神经干细胞有明显的细胞毒性；而中低比例 T 细胞（3:1 及以下）几乎没有细胞毒性。因此，后续实验中我们选取比例为 2:1 的分组作为研究重点。CCK8 结果亦显示，在 72h 时，与活化的 T 细胞共培养神经干细胞受抑制程度最大，72h 后荧光结果显示，与活化的 T 细胞共培养的神经干细胞的增殖受到抑制，且 T 细胞比例越高，神经干细胞受抑制程度越高，这表明 T 细胞对神经干细胞的增殖有时间和剂量的双重依赖性。我们用 Elisa 试剂盒检测了共培养细胞上清液中 IFN-γ 浓度以及用免疫荧光检测神经干细胞上 IFNGR 表达情况，随后外源性给予 IFN-γ 和 IFNGR Inhibitor，也发现了神经干细胞增殖受抑制及改善的情况。在对 JAK/STAT 通路进行 Western blotting 检测后，我们发现 STAT 1 tyr 和 Jak 2 在活化的 T 细胞共培养组中，磷酸化水平明显增加，进一步拮抗掉 Jak 2 通路后，其和 p-STAT 1 tyr 表达水平均降低，此外，神经干细胞增殖受抑制情况也有所改善。

结论 神经炎症所形成的 T 细胞浸润会分泌炎症因子 IFN-γ，进而导致 JAK/STAT 通路的磷酸化，从而抑制了神经干细胞的增殖。我们的结论可以为预防老年患者术后 POCD 提供新思路及新的靶点，更好的为老年患者的围术期安全保驾护航。

PU-0025

CT 评估不同剂量麻黄碱对子宫动脉和外周血管的作用

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目的 低血压是剖宫产腰麻中最常见的并发症。持续低血压会影响子宫胎盘循环的稳定，从而损伤胎儿的氧供、酸碱平衡和营养物质输送。研究表明，麻黄碱在收缩外周血管的同时有利于维持子宫胎盘循环的稳定。但是纠正低血压所需的麻黄碱剂量因个体敏感性而有所差异，随着剂量的增加，不同血管对麻黄碱的反应鲜有报道。

子宫动脉位于腹腔深处并被组织包围，传统的测量方式如多普勒超声，直接置管测压法，对血管直径变化的评估并不准确。计算机断层扫描（Computed Tomography,CT）具有出色的穿透能力，能探查较小的血管分支。在本研究中，使用 CT 技术观察不同剂量麻黄碱对子宫和外周动脉直径的变化，探索不同剂量麻黄碱对孕妇外周动脉和子宫动脉的影响差异。

方法 本实验一共使用 32 只母兔，随机分为四组，对照组，麻黄碱等效人体剂量 7.5mg ，15mg ，30mg 三组 。组内具体注射剂量，基于家兔体表面积的人体当量剂量换算而来，假设孕妇体重为 70 kg，孕妇当量剂量为 7.5 mg(7.5mg×70 kg-1 = 0.107 mg(kg-1)，转换系数 3.1，兔子使用剂量为 0.107×3.1=0.332 mg(kg-1);M 组和 H 组的剂量也按此方法计算。造影剂以 1.5 mL/kg 的剂量，1.5 mL/s 的速度，注入耳静脉。使用双源 X 射线计算机断层扫描机快速扫描头部到尾部，根据麻黄碱血药浓度代谢情况，在给药后 5、10、15、30、45 分钟进行 CT 扫描，收集了 741 个切片。每两片切片之间的间隔为固定值 0.06mm。总采集时间为 39s。每次测量重复两次，记录平均值。

结果 本研究发现，三组麻黄碱均能有效收缩周围血管，升高血压，但是不同剂量的麻黄碱对子宫动脉的影响有所不同。麻黄碱对子宫动脉扩张和收缩的典型例子（图 1）。图 1b,f 是未用药的初始子宫动脉的直径。给予等效剂量 15mg 的麻黄碱后，子宫动脉直径扩张（图 1c），子宫动脉的直径在 30 分钟后扩张至最大值(图 1d)。在给予等效的 30mg 麻黄碱后，子宫动脉随时间逐渐收缩的典型表现如图 1g,h。麻黄碱 7.5mg 和 15mg 剂量使子宫动脉直径在 5min 后较初始直径分别扩大 5%和 7%，之后缓慢增加，在 45min 后达到峰值，扩大 20%和 34%。30mg 麻黄碱会使子宫动脉径在 10min 内收缩 27%。

结论 麻黄碱在 7.5 和 15mg 剂量会扩张子宫动脉。而 30 mg 剂量不仅外周动脉明显收缩，子宫动脉也明显收缩，且抑制作用持续到实验结束。但是，该研究也有一些局限性，此研究基于一种动物模型。兔子宫的特点是子宫蜕膜表面有浅表滋养层细胞，在人类的子宫中，滋养层存在于子宫肌层深处，这会引起子宫动脉对药物或交感神经的敏感性。此外，该研究以子宫动脉为基础，未讨论与胎儿健康密切相关的胎盘弓状动脉、胎儿脐带等血管。不同剂量麻黄碱对孕妇子宫胎盘循环的影响有待进一步研究，麻醉方法的差异也有待进一步研究。

综上所述，CT 可以在短时间内无创评估周围血管的变化。此外，麻黄碱的临床常用剂量对子宫动脉直径无明显影响，而在 30 mg 时，麻黄碱可显著抑制子宫动脉的直径。

PU-0026

基于网络药理学探讨白花蛇舌草对围术期神经认知障碍的治疗作用及其机制研究

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目的 白花蛇舌草具有抗炎、抗氧化、神经保护和抗肿瘤等多种治疗作用，但其对围术期神经认知

功能紊乱(PND)的治疗效果尚不清楚。本研究通过网络药理学的方法探索白花蛇舌草防治 PND 的可行性，并通过体内外实验进行验证。
方法 使用生物信息学的方法对白花蛇舌草的活性成分及其潜在作用靶点进行预测，基于网络模块技术识别 PND 的关键靶点，使用基因本体（GO）和京都基因与基因组百科全书(KEGG)数据平台将上述得到的靶点富集到相应的信号通路。选择 C57BL/6 小鼠剖腹探查术作为小鼠 PND 模型，将小鼠随机分为对照组（sham 组）、手术组（S 组）、手术＋白花蛇舌草治疗组（S+HDW 组），使用旷场实验、新物体识别实验、恐惧实验检测小鼠认知功能，免疫荧光和 qRT-PCR 检测海马组织中关键靶点的表达变化。LPS 刺激小胶质细胞建立细胞模型，CCK-8 法检测细胞活力、免疫荧光和 qRT-PCR 检测小胶质细胞中促炎因子及关键靶点表达的变化。
结果 1. 网络药理学结果显示，从白花蛇舌草中获得 24 种活性成分，筛选出白花蛇舌草防治 PND 的核心靶点为 STAT3、MYC、JUN，GO 分析获取 2447 个条目，KEGG 富集分析主要涉及神经退行性疾病的途径-多种疾病。2. 动物实验行为学结果显示，各组小鼠总运动距离、中间区域的时间占比无差异，与 sham 组相比较，S 组小鼠新物体探索时间、冻结时间显著缩短，使用白花蛇舌草治疗后恢复（$P < 0.05$）。3. qPCR 结果显示，与 sham 组相比较，S 组小鼠海马区炎症因子 IL-6、IL-1β、TNF-α 的转录水平显著提高，使用白花蛇舌草治疗后转录水平显著下降（$P < 0.05$）。4. 免疫荧光结果显示，与 sham 组相比较，S 组小鼠海马区抑制性中间神经元标志物 pavalbumin、Somatostatin 和神经突触可塑性标志物 ARC 均显著减少，使用白花蛇舌草治疗后相应表达恢复，差异有统计学意义（$P < 0.05$）。5. 细胞实验结果显示，与 C 组相比较，LPS 刺激使 BV.2 细胞 STAT3、c-jun 的磷酸化显著增加，c-myc 的表达显著降低，白花蛇舌草处理可以抑制小胶质细胞活化、限制炎症的发生与发展，并限制了 STAT3、c-jun 的磷酸化，也降低了 c-myc 的表达（$P < 0.05$）。
结论 白花蛇舌草可以通过作用于 STAT3、MYC、JUN 等靶点来限制神经炎症的进展，减轻中间神经元和突触的损伤，继而改善 PND 小鼠的认知功能。

PU-0027

Study on the molecular mechanism pathway of the effect of sevoflurane on cognitive function in patients with depression based on network pharmacology

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Objective: clinical observation found that preoperative depression is a high risk factor for postoperative cognitive dysfunction. Net pharmacology was used to explore the molecular mechanism of the effect of sevoflurane on cognitive function in patients with depression.
Methods: DrugBank was used to find the drug targets of sevoflurane, DisGeNet was used to find the disease targets of depression and POCD, and Venny2.1 software was used to construct Wayne diagram to find the common targets of depression, sevoflurane and postoperative cognitive dysfunction. String was used to construct the protein network interaction map of sevoflurane and depression targets to find the key proteins. Then use KEGG for pathway analysis to find the upstream and downstream molecules of key protein expression, so as to explore the molecular mechanism of the effect of sevoflurane on cognitive function in patients with depression.
Results: 1. DrugBank was used to find more than 20 drug targets of sevoflurane,. DisGeNet was used to find more than 20 main targets of depression and 90 disease targets of POCD. Using Venny2.1 software to construct Wayne diagram (figure 1), depression and POCD have three common targets, namely BDNF, IL-6 and NR3C1.**2**. Using String to construct the protein network interaction map of sevoflurane and depression target, it can be seen that there is a close relationship between GABA receptor, the main target of sevoflurane, and dopamine receptor D2 (DRD2), the main disease target of depression, and there is a direct correlation between DRD2

and BDNF (figure 2).**3.**According to KEGG pathway analysis, DA receptors (DA2R) could be divided into two groups. D1-like receptors (D1R) composed of D1 and D5 receptors were positively coupled with adenylate cyclase and cAMP production, while D2-like receptors composed of D2, D3 and D4 receptors (D2R) were negatively coupled with adenylate cyclase and cAMP production (Fig. 3). Therefore, the binding of DA to different receptor subtypes can regulate cAMP, thus affecting the expression of downstream BDNF (figure 4). **4.** Sevoflurane produces anesthetic effect by stimulating GABA receptors. DA and GABA receptors are co-expressed and distributed in both the cerebral cortex and hippocampus. According to the hypothesis of receptor dialogue, the receptors in the synaptic region are closely related to each other and can regulate and influence each other's expression and function. Therefore, sevoflurane may affect DA2R after acting on GABA receptor.
Conclusion: After sevoflurane acts on GABA receptor, it may cause the change of DA2R subtype expression in hippocampus, then regulate cAMP-PKA-CREB pathway, affect the expression of BDNF, thus affect the cognitive function of patients with depression, which can be further verified by animal experiments in the later stage.

PU-0028

Saikosaponin-d 诱导不依赖 NADPH 氧化酶但依赖自噬的中性粒细胞外陷阱的快速形成

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目的 本研究的目的是研究 SSd 对 NET 形成的影响，并确定调节该过程的机制。
方法 通过 Sytox green 分析和免疫染色技术，我们发现 SSd 以剂量和时间依赖的方式诱导 NET 的形成。
结果 SSd 诱导的 NET 形成发生迅速，不依赖于 NADPH 氧化酶（NOX），但依赖于自噬和 ERK 和 AKT 的激活。尽管 SSd 诱导的 NETs 伴随着组蛋白 H3 的瓜氨酸化，但蛋白精氨酸脱氨酶 4（PAD4）抑制剂没有抑制 NET 的形成，这表明 SSd 诱导 NETs 不需要组蛋白 H3 的瓜氨酸化。我们进一步证明，在 SSd 形成 NET 的前 2 小时，中性粒细胞保持细胞活力。
结论 SSd 形成 NET 是一种主动的过程，需要激活信号通路，而不是膜破坏的被动结果，这有助于理解由于 NET 诱导的免疫毒性，SSd 应在临床上谨慎使用。

PU-0029

β- hydroxybutyrate activates BDNF/TRKB pathway and attenuates inflammatory and prevents apoptosis in the hippocampus regions of septic mice

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Sepsis-associated encephalopathy (SAE) is one of the common serious complications in sepsis, and the pathogenesis of SAE remains unclear.Brain-derived neurotrophic factor (BDNF) signaling through its receptor TrkB has for a long time been recognized as a critical mediator of the antidepressant drug action. BDNF has been reported to be downregulated in the hippocampus and TrkB agonists and TrkB antagonists have the potential to act as therapeutic drugs for patients with lowered BDNF in the hippocampus. β-hydroxybutyrate (BHB) is the most abundant ketone body in the body, reaching more than 70% of the total ketone body content. With the research progress in

recent years, BHB has been reported to be promising in treating neurodegenerative diseases and neuroinflammation. Thus we sought to investigate the potential role of BHB in SAE treatment. The SAE model was established by cecal ligation and puncture (CLP) in vivo, and neuroinflammation model was established with LPS-treated BV-2 cells in vitro. Memory impairment was assessed by Morris water maze and novel object recognition test. As a result, the levels of BDNFand p-Trkb were significantly reduced in the hippocampus of septic mice. All these changes induced by sepsis were inverted by BHB. Treating with BHB resulted in improved behavior performance in the novel object recognition test and Morris water maze. Apoptosis and inflammatory in the hippocampus of septic mice were attenuated significantly after BHB administration. These protective effect of BHB against memory dysfunction, inflammatory and cell apoptosis were reversed by the Trkb inhibitor, ANA-12. Similarly, LPS-induced activation of BV-2 cells were attenuated by BHB, ANA-12 could reverse such effect of BHB in vitro. In conclusion, BHB is protective against sepsis-induced memory dysfunction, and the inflammatory and cell apoptosis in the hippocampus region of septic mice. The BDNF/TRK pathway might be involved in one of the mechanisms of the protective effect.

PU-0030

Sevoflurane-induced excitotoxic insults in developing neurons via Tau-PGC-1α-NMDAREX pathway

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Background: Sevoflurane anesthesia has been shown to lead to the accumulation and spread of tau hyperphosphorylation, contributing to sevoflurane-induced cognitive impairment in neonatal mice. However, the underlying mechanisms remain to be fully elucidated. This study aims to test the hypothesis that the Tau-PGC-1α-extrasynaptic NMDAR (NMDAREX) signaling pathway may contribute to the effects of sevoflurane on excitotoxic insults in developing neurons.
Method: Using whole-cell patch-clamp techniques, NMDAR currents were recorded in primary cultures of C57BL/6J WT or tau KO mice hippocampal neurons following exposure to sevoflurane. NMDAREX currents were isolated by preconditioning with the synaptic NMDAR (NMDARSYN) blocker MK-801 (10 μM). Western blot analysis was employed to evaluate the levels of Tau phosphorylation and PGC-1α expression in hippocampal neurons. ROS and ATP levels were used to assess mitochondrial function following exposure to sevoflurane. Hippocampal neurons from tau KO mice were used to investigate the role of tau in sevoflurane-induced excitotoxic insults in developing neurons. The vector PcDNA-PGC-1α was employed to overexpress exogenous PGC-1α in cultured neurons.
Results: Following sevoflurane anesthesia, significant increases were observed in NMDAREX currents, but no changes were noted in NMDARSYN currents, in developing hippocampal neurons. Significant elevations in the levels of Tau 262, AT8, and ROS, and notable reductions in PGC-1α and ATP levels, were observed in cultured neurons following repeated sevoflurane anesthesia. Up-regulation of PGC-1α was associated with a decrease in NMDAREX activity and reduced levels of Tau 262 and AT8 in cultured hippocampal neurons. Genetic ablation of tau resulted in the abolition of sevoflurane-induced NMDAREX hyperactivity, PGC-1α repression, and mitochondrial dysfunction in developing neurons.
Conclusion: Tau hyperphosphorylation, aberrant NMDAREX activity, and PGC-1α repression are implicated in sevoflurane anesthesia-induced neurotoxic insults in developing neurons. Elevated levels of exogenous PGC-1α counteract NMDAREX hyperactivity and tau hyperphosphorylation in mouse hippocampal neurons. Inhibiting tau hyperphosphorylation could mitigate sevoflurane-induced downregulation of PGC-1α and NMDAREX hyperactivity. The Tau-PGC-1α-NMDAREX pathway might play a role in the mechanism underlying sevoflurane-induced excitotoxicity in the developing rodent brain.

PU-0031

CircKat6b mediates the antidepressant effect of esketamine by regulating astrocyte function

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Esketamine is a novel antidepressant with a rapid onset and prolonged action. However, the precise mechanism underlying its therapeutic efficacy remains uncertain. The abundant expression of circular RNAs (circRNAs) in the central nervous system, their involvement in diverse regulatory mechanisms, and their contribution to the pathogenesis of depression suggests that circRNAs are promising therapeutic targets for depression. In this study, we found that the upregulation of circKat6b expression in the hippocampus decreased following esketamine treatment in a chronic unpredictable mild stress (CUMS) mouse model, while the overexpression of circKat6b in the hippocampal brain significantly attenuated the antidepressant effects of esketamine in depressed mice. Moreover, circKat6b attenuated the antidepressant effects of esketamine by upregulating stat1 in astrocytes. Taken together, our findings demonstrated the involvement of circKat6b in the antidepressant effects of esketamine, providing evidence that circKat6b could potentially be an innovative therapeutic target for depression.

PU-0032

New mechanism of inflammation in Postoperative Neurocognitive Disorders：The activation of intestinal-derived NLRP3 inflammasome mediated by gut microbiota

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Postoperative neurocognitive disorders (PNCDs) is a common complication after anesthesia and surgery, but the pathogenesis of PNCDs is not well characterized. Recent observations have revealed an association between gut dysbiosis and neuroinflammation in central nervous system disorders, and cognitive alterations may be associated with dysbiosis-induced abnormal activation of intestinal-derived NLRP3 inflammasome. Therefore, we hypothesized that abnormal activation of gut-derived NLRP3 inflammasome may be a bridge between gut dysbiosis affecting the severity of postoperative neuroinflammation and neurocognitive dysfunction.
Methods: The animal model of PNCDs was established by unilateral nephrectomy under sevoflurane and butorphanol anesthesia, and the changes in gut microbiota after operation were detected by 16SrRNA high-throughput sequencing. To explore the relationship between intestinal flora and PNCDs, we used antibiotics to clear the gut microbiota of rats before surgery. Behavior was examined after surgery by the open-field test, Y-maze test, and MWM test. Hematoxylin-eosin staining and Ni-staining were used to observe neuronal damage. Elisa was used to detect hippocampal cytokine. Western blot was used to detect hippocampal and colonic NLRP3 levels. Results: Anesthesia and surgery-induced gut dysbiosis (Fig. 1), which aggravated neurocognitive dysfunction (Fig. 2), and also elevated hippocampal levels of cytokine (IL-1β, IL-6, and TNF-α) (Fig. 3A). We also observed increased NLRP3 expression in the hippocampus and colon (Fig. 3B). Preoperative use of antibiotics to clear gut microbiota can inhibited these processes.

Conclusion: Anesthesia and surgery can cause gut dysbiosis and promote neuroinflammation by increasing gut-derived NLRP3 inflammasome activation, which may play an important role in the pathogenesis of PNCDs. Fig. 1 Anesthesia and surgery lead to dysbiosis of gut microbiota in rats. a Heat map of differences in gut microbiota. b-c Reduced Richness and Chao1 index in the PNCDs group. d-e: Principal Component Analysis and Principal Coordinate Analysis of the gut microbiota (PCoA). Fig. 2 Anesthesia and surgery lead to cognitive dysfunction in rats. a-d OFT. e-h In Y-maze test, anesthesia and surgery led to a decrease in the spontaneous alternation rate of rats. i-m In MWM test, anesthesia and surgery lead to decrease in the number of times and the duration of entering the platform quadrant. Preoperative antibiotic treatment can inhibit these behavioral changes. Fig. 3 Anesthetic surgery leads to increased hippocampal pro-inflammatory cytokine release (A) and increased hippocampal and colonic NLRP3 expression (B) in rats. Preoperative antibiotic treatment inhibited these processes. Data was shown as Mean ± SD or, with *P < 0.05 or **P < 0.01; n = 6 per group.

PU-0033

B16F10 黑色素瘤细胞膜仿生纳米粒 在心肺复苏后脑缺血再灌注损伤的治疗作用及机制研究

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目的 血脑屏障（BBB）是药物治疗心肺复苏后脑损伤的主要瓶颈，并且传统策略开放 BBB 效率低，生物相容性差，药物在脑内分布不理想。因此，本课题基于心肺复苏后脑内强效氧化应激微环境，尝试开发一种新型的活性氧（ROS）响应性双亲型材料，并采用仿生化策略，以细胞作为药物载体，借助皮肤黑色素瘤细胞具有高度侵袭性脑转移的特性，构建仿生纳米药物递送系统，实现药物的脑靶向高效递送和释放。

方法 ①仿生纳米粒的制备和表征检测：通过溶剂挥发法和反复挤出法构建 B16F10（小鼠皮肤黑色素瘤细胞）细胞膜包载的载甲氧基雌二醇（2ME2）仿生纳米粒（BM@TP/2ME2），并对其理化性质进行表征；②仿生纳米粒的生物安全性评价：评估 BM@TP/2ME2 的体外细胞毒性，以及体内短期生物相容性和长期致瘤风险；③仿生纳米粒的时空分布研究：利用荧光纳米粒和绘制药代曲线考察 BM@TP/2ME2 在体内外跨越 BBB 的能力，并利用 CRISPR-Cas9 技术探讨其跨越 BBB 的潜在机制；④仿生纳米粒的药效评估和机制验证：构建体内窒息性大鼠心脏骤停模型和体外糖氧剥夺/再灌注（OGD/R）模型。各组给予相应药物处理后，对各组皮层神经元的凋亡、氧化应激、神经炎症和自噬相关指标以及神经功能恢复情况进行检测。

结果 ①BM@TP/2ME2 大小均一，理化性质稳定；②2ME2 浓度低于 5 μmol/L 时，BM@TP/2ME2 无明显的细胞毒性，且在体内同样具有良好的生物安全性；③BM@TP/2ME2 通过 CD44v6/透明质酸介导在体内外高效跨越 BBB；④BM@TP/2ME2 可通过清除皮层神经元内过量 ROS，缓解氧化应激，抑制 AIM2 炎症小体介导的神经炎症，恢复神经元受损自噬流，从而减少神经元凋亡，恢复部分神经功能。

结论 制备成功的仿生纳米粒 BM@TP/2ME2 具有稳定的理化性质且在体内外具有良好的生物安全性。BM@TP/2ME2 主要通过 CD44v6/透明质酸介导转运跨越 BBB，被摄入的纳米粒在心肺复苏后皮层神经元内强氧化应激的微环境作用下崩解释放出 2ME2。游离的 2ME2 并通过恢复皮层神经元内氧化还原平衡体系来控制神经炎症的发生与进展，进而恢复受损的自噬流，最终发挥神经保护作用。

PU-0034

前扣带回脑区 Drd2 受体参与了七氟烷麻醉后 APP/PS1 小鼠抑郁样行为的机制研究

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目的 神经退行性疾病患者在麻醉后出现神经精神并发症的比例很高。既往的研究主要关注麻醉对阿尔茨海默氏症患者认知能力的影响，而对麻醉对阿尔茨海默氏症患者情绪的影响研究较少。临床研究表明，阿尔茨海默病患者麻醉手术后表现出较高的低反应性谵妄状态。然而，麻醉是否以及如何导致阿尔茨海默氏症小鼠出现类似抑郁的行为仍不清楚。
方法 利用动物行为检测焦虑样或抑郁样行为以及认知功能；通过荧光染色、化学遗传学和在体钙成像研究参与抑郁样行为的神经核团；通过 RNA 测序、蛋白印迹、FISH、研究分子机制；通过拮抗剂和基因敲除拯救阿尔茨海默氏症小鼠七氟醚麻醉后的抑郁样行为。
结果 (1）6 月龄阿尔茨海默氏症小鼠在七氟烷麻醉后表现出抑郁样行为，而不是焦虑样行为或认知障碍加重；（2）七氟烷麻醉诱导阿尔茨海默氏症小鼠 ACC 谷氨酸神经元活性降低；（3）mRNA-seq 分析结果提示七氟烷组共确定 741 个差异表达基因（DEGs），其中|log2FoldChange|>1 的显著差异基因数为 340 个，包括 98 个显著上调基因和 242 个显著下调基因；(4）七氟烷麻醉诱导 ACC 谷氨酸能神经元中 D2R 表达增加，拮抗或敲除 ACC 中的 D2R 可挽救七氟烷麻醉诱导的阿尔茨海默氏症小鼠抑郁样行为；
结论 前扣带回脑区谷氨酸神经元 Drd2 受体表达增加介导了七氟烷麻醉后 APP/PS1 小鼠抑郁样行为。

PU-0035

丙泊酚后处理通过抑制铁死亡和焦亡改善大鼠的急性肺损伤

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目的 探讨丙泊酚后处理对 LPS 诱导的急性肺损伤的影响及机制
方法 Wistar 大鼠，随机分为三组，对照组（C 组）：生理盐水气管内滴注 24 小时后，生理盐水尾静脉泵入 5 小时；LPS 组：LPS 10mg/kg 气管内滴入 24 小时，诱导急性肺损伤模型，尾静脉泵入脂肪乳 5 小时；丙泊酚组（Prop 组）：LPS 10mg/kg 气管内滴入 24 小时，尾静脉泵入溶于脂肪乳的丙泊酚 30mg/kg 5 小时.取三组大鼠新鲜肺组织，送单细胞测序（n=3）。Western blot 测定焦亡相关指标 NLRP3、ASC、cleaved caspase-1、GSDMD-N、GSDMD-FL、IL-8、IL-1β，铁死亡相关指标 ACSL1、FTH1 和 GPX4 蛋白的表达。电镜下检测肺组织巨噬细胞、肺泡Ⅰ型上皮细胞和肺泡Ⅱ型上皮细胞焦亡和线粒体形态的改变。HE 染色观察肺组织的形态学炎性改变。免疫荧光观察铁死亡相关蛋白 GPX4 和焦亡相关蛋白 GSDMD 在肺组织的表达及定位。从 PDB 库下载 LCN2 蛋白三维结构（4zhf）,从 ZINC 数据库下载丙泊酚三维结构，通过 MOE 软件模拟丙泊酚与 LCN2 蛋白的对接情况。
结果 对照组、LPS 组和丙泊酚组的单细胞测序分析，在去除潜在的双链和低质量细胞后，各组分别从 12774 个细胞、11962 个细胞和 13701 个中获得了超过 3.28 亿、3.34 亿、4.09 个独特的转录本，并获得了超过 21033、20373、20553 个基因。为了分析急性肺损伤的转录组景观，我们进行了无监督聚类和 t-分布随机邻域嵌入（tSNE）算法。证实 LCN2 是 LPS 诱导肺损伤巨噬细胞上调的差异表达基因，同时是丙泊酚下调的差异表达基因。LPS 气管内注入大鼠后，ACSL4 表达增加、

FTH1 表达减少，而丙泊酚泵入 5h 能减少 ACSL4 的表达、FTH1 增加的表达，电镜下可看到丙泊酚能在巨噬细胞、肺泡Ⅰ型上皮细胞和肺泡Ⅱ型上皮细胞中抑制 LPS 诱导的细胞焦亡及线粒体稳态失衡。LPS 诱导的铁死亡及焦亡相关的因子改变，丙泊酚后处理逆转了上述损伤。LPS 可诱导大鼠肺巨噬细胞 M1 型极化增多（CD86、IL-1β、IL-8 表达升高）、M2 型极化减少（CD206 表达降低），丙泊酚对 LPS 引起的 M1 和 M2 极化有逆转作用。药物分子对接结果显示，丙泊酚与 LCN2 蛋白的结合位点是 Lys134 残基，结合评分为-4.5257，丙泊酚与 LCN2 蛋白的 Lys134 残基形成氢键，增强其对 LCN2 的靶向作用，进而抑制 LCN2 蛋白发挥作用。Western blot 验证 LCN2 在急性肺损伤的表达及丙泊酚对 LCN2 的抑制作用。大鼠 LPS 气管内注入 24 后，NLRP3、ASC、caspase p-20、GSDMD-N 表达增加、同时 IL-1β、IL-8 炎性因子分泌增加，而丙泊酚泵入 5h 能减少 NLRP3、ASC、cleaved caspase-1、GSDMD-N 的表达、同时减少 IL-1β、IL-8 炎性因子的分泌，提示丙泊酚可能减少 LPS 诱发的焦亡，并发挥后续的逆转肺损伤的作用。

结论 丙泊酚减少了 LPS 诱发大鼠肺组织的焦亡和铁死亡，并发挥后续的逆转肺损伤的作用。

PU-0036

miRNA-669f-5p/Dctd 轴介导七氟烷诱导的老年小鼠认知功能障碍的机制研究

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目的 目的:探究 miRNA-669f-5p/Dctd 轴在七氟烷诱导老年小鼠认知功能障碍中的作用。

方法 本实验采用 C57BL/6J 小鼠模型，随机分为七氟烷组和对照组。七氟烷组小鼠用 3.4%七氟烷麻醉，而对照组则接受同期的空气处理，之后通过生物信息学测序及体内外验证进行研究。

结果 七氟烷组小鼠显示出明显的认知损害，空间学习和记忆能力均有所下降。同时，miR-669f-5p 激动剂的实验剂量在七氟烷吸入后对认知功能没有明显影响，但抑制 miR-669f-5p 的表达可以减轻这种损害。根据生物信息学测序结果，miRNA-669f-5p/Dctd 和 TLRs 信号通路可能是导致七氟烷吸入后 POCD 的关键 miRNA、基因和通路。老年小鼠在七氟烷吸入后显示海马区 miR-669f-5p 表达显著增加，调节其表达可以增加/减少海马区 TLRs 的表达。miRNA-669f-5p 通过结合 Dctd 3'UTR 可降低 Dctd 基因的表达。

结论 miRNA-669f-5p/Dctd 轴在七氟醚诱导的老年小鼠认知功能障碍的发生中起重要作用。在 TLR 信号通路的背景下，miRNA-669f-5p 作为一种关键的 miRNA 出现在 POCD 的发病机制中，抑制 miRNA-669f-5p 表达可以减轻七氟烷引起的认知障碍。

PU-0037

The role of inflammatory factors and STAT5A protein in cognitive impairment in aging mice induced by inhalation of sevoflurane

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Background: Perioperative neurocognitive dysfunction (PND) is a complex central nervous complication that occurs mostly in elderly patients after surgery and is mainly characterized by learning, memory, social impairment and cognitive impairment, which seriously affects the postoperative rehabilitation of patients. Sevoflurane, as a commonly used anesthetic in clinically,

is closely associated with PND, and the mechanism is unknown. Several Studies have shown that neuroinflammation is an important factor in the development of PND. Therefore, the aim of our study was to explore the role of inflammatory factors in neuroinflammation and cognitive impairment induced by sevoflurane in aging mice, and to find key proteins to provide a target basis for the prevention and treatment of PND.

Method: A total of 12 SPF 4-month-old adult male C57BL/6J mice, N=12, were randomly divided into 2 groups: control group (CON group) and sevoflurane group (SEV group), with 6 mice in each group (n = 6). Before the experiment, all mice were subcutaneously injected with 10% D-galactose (0.15 g/kg/d) on the back of the neck for 6 weeks (w) to establish brain aging-aging model mice. After the aging model was established, Morris water maze test was performed to determine the baseline data for 5 consecutive days (d). Followed by, the CON group inhaled carrier gas for 6 hours (h) and the SEV group inhaled 3.2% sevoflurane plus carrier gas for 6 hours (h). Morris water maze test was performed again to detect learning and memory ability in each group. Hippocampus were collected from mice after anesthesia and euthanasia. The contents of IL-1β and IL-10 in hippocampus were detected by ELISA, and the relative expression of STAT5A protein in hippocampus was detected by Western blot.

Result: Before sevoflurane inhalation, the results of water maze showed that the escape latency of mice in each group gradually shortened with the increase of training days, forming a stable platform memory. Compared with the 1d group, the escape latency of the quadrant where the 3d, 4d and 5d groups were located was reduced ($aP < 0.05$); compared with the 2d group, the escape latency of the quadrant where the 3d, 4d and 5d groups were located was significantly reduced ($bP < 0.05$). (Figure 1) There was no significant difference between CON group and SEV group. (After sevoflurane inhalation: compared with CON group, the retention time in platform quadrant was significantly reduced in SEV group ($aP < 0.05$) (Figure 2). Compared with CON group, escape latency was significantly increased in SEV group ($aP < 0.05$). Mice exhibited spatial memory impairment after sevoflurane inhalation (Figure 3). ELISA revealed that the expression of proinflammatory IL-1β content in the hippocampus of mice in the SEV group was increased compared with the CON group ($aP < 0.05$); the expression of anti-inflammatory IL-10 content in the SEV group was decreased compared with the CON group ($aP < 0.05$) (Figure 4). In addition, Western blot was used to detect the relative expression of STAT5A protein in the mouse hippocampus: STAT5A protein expression was up-regulated in the SEV group compared with the CON group ($aP < 0.05$) (Figure 5).

Conclusion: Inhalation of 3.2% sevoflurane for 6 h induced cognitive impairment in aging mice and was associated with imbalance of proinflammatory IL-1β and anti-inflammatory IL-10 in the hippocampus, and STAT5A protein may be a key target.

PU-0038

小胶质细胞糖代谢调控急性肾损伤术后认知功能损害

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目的 急性肾损伤（acute kidney injury, AKI）是一种常见且严重的并发症，尤其是在住院和手术患者中，其特点是肾功能的突然下降。除了对肾功能的直接影响，AKI 还会引发包括大脑在内的远端器官功能障碍。然而，很少有研究探讨 AKI 作为术后谵妄（postoperative delirium, POD）潜在风险因素的作用，以及 AKI 后认知功能损害的分子机制。

方法 在临床研究中，比较在非心脏手术后患有 AKI 和无 AKI 的患者出现 POD 的风险。在动物实验中，利用 AKI 小鼠模型，观察 AKI 对认知功能、氧化应激和小胶质细胞糖代谢的影响。接着，通过给予 PLX3397 抑制剂（一种集落刺激因子 1 受体抑制剂）来减少小胶质细胞，以验证其对认知功能和脑部代谢的影响。最后，我们对有无 AKI 的小鼠血清样品进行非靶向血液代谢组学分析，以识

别显著改变的代谢途径，这些途径可能对 AKI 相关认知功能损害中的肾-脑轴有贡献。
结果 临床研究显示，手术后患有 AKI 的患者出现 POD 的风险明显升高。倾向评分匹配分析结果显示，AKI 是 POD 的独立风险因素。在动物实验中，AKI 小鼠模型诱导了认知功能下降、氧化应激增加和小胶质细胞糖代谢增强。使用 PLX3397 减少小胶质细胞可显著改善认知功能，减少脑部葡萄糖摄取并改善磷酸戊糖途径。此外，PLX3397 还降低了神经炎症和氧化应激水平。血液代谢组学分析表明，AKI 导致了肾-脑轴内多个代谢途径的显著改变，尤其是在葡萄糖代谢、能量代谢和氨基酸代谢方面。
结论 脑中小胶质细胞糖代谢以及肾-脑轴内多个代谢途径的改变在 AKI 模型中的认知功能损害中起着关键作用，为预防 AKI 引起的认知功能损害提供了新的见解，提出了潜在的治疗靶点和预防策略。

PU-0039

靶向巨噬细胞 cGAS-STING 信号通路抑制 JAK2-STAT3 激活减轻肠缺血再灌注损伤

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目的 探讨巨噬细胞中 cGAS-STING 信号通路调控 JAK2-STAT3 通路在肠缺血再灌注（IIR）损伤中的作用及机制。
方法 ①动物实验，将 30 只健康雄性成年 C57BL/6J 小鼠随机分为 5 组：野生型假手术组（WT-S 组，n=6）、野生型肠缺血再灌注组（WT-IIR 组，n=6）、野生型肠缺血再灌注+JAK2 抑制剂 AG490 组(WT-AG490 组，n=6)、STING-/-假手术组（STING-/--S 组，n=6）、STING-/-肠缺血再灌注组（STING-/--IIR 组，n=6）。制备小鼠 IIR 损伤模型，留取小肠组织，观察组织改变行 Chiu's 病理学损伤评分，分光光度法检测小肠组织超氧化物歧化酶（SOD）、丙二醛（MDA）及乳酸（LD）的表达，免疫荧光染色法观察巨噬细胞极化及自噬情况，Western Blot 法检测组织中 cGAS-STING 和 JAK2-STAT3 信号通路表达情况。
②细胞实验，建立人急性单核细胞白血病细胞 THP-1 和人结直肠腺癌细胞 Caco-2 的共培养模型，将共培养细胞随机分为 3 组：对照组（N 组）、葡萄糖氧剥夺/复氧组（OGD/R 组）、OGD/R+AG490 组（AG490 组）。再在以上分组基础上利用 SiRNA 敲低 STING。检测 Caco-2 细胞 SOD、MDA 的表达，Western Blot 法检测紧密连接蛋白、巨噬细胞极化标记物、巨噬细胞自噬情况及 cGAS-STING 和 JAK2-STAT3 通路蛋白表达情况。
结果 在动物实验中，与 S 组相比，IIR 组 Chiu's 病理学评分显著增高，MDA、LD 生成增加，SOD 活力减低（P<0. 05），cGAS-STING、JAK2-STAT3 通路显著激活（P<0. 05），M1 型巨噬细胞表达增加、巨噬细胞自噬增加（P<0. 05）。使用 AG490-IR 组和和 STING-/--IR 组可显著抑制小鼠 IIR 引起的上述指标的变化，减轻肠组织 IIR 损伤。细胞实验也证明了 Caco-2 经历 OGD/R 损伤后 MDA 生成增加，SOD 活力减低（P<0. 05），巨噬细胞 JAK2/STAT3 通路显著激活（P<0. 05），巨噬细胞 M1 表面标记物表达增加（P<0. 05），使用 STING 沉默后可显著抑制 Caco-2 经历 OGD/R 损伤后引起的上述指标的变化。
结论 cGAS-STING 信号通路通过激活 JAK2/STAT3 信号通路诱导巨噬细胞 M1 极化状态和自噬介导 IIR 损伤。

PU-0040

Effect of Mfn2 on hypoxic reoxygenation injury of Caco-2 cells by regulating mitochondrial membrane protein

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Objective: To investigate the effects of mitochondrial fusion protein Mfn2 on hypoxia and reoxygenation injury of Caco-2 cell and its related mechanisms.
Methods: Human colorectal adenocarcinoma cell Caco-2 was cultured in vitro. Mfn2 was packaged by lentivirus and transfected into Caco-2 cells. Caco-2 cells were randomly divided into 3 groups: blank control group (NC group), negative transfection control group (Vector group) and Mfn2 transfection group (Mfn2 Flag group).Hypoxic reoxygenation model (HR) model was established after 12h hypoxia and 2h reoxygenation. The content of Mfn2, tight junction protein, cell activity, LDH level, ATP level, ROS level and the mitochondrial autophagy levels were detected.
Results: Compared with the Vector group, Mfn2 content decreased, tight junction protein decreased, cell activity decreased, LDH release increased, ATP content decreased, ROS level increased, and mitochondrial autophagy increased in HR+Vector group. Overexpression of Mfn2 could alleviate the above damage and restore mitochondrial function.
Conclusion: Mfn2 is decreased in the hypoxic reoxygenation model of Caco-2 cells, and overexpression of Mfn2 can restore mitochondrial homeostasis by removing ROS and regulating mitochondrial autophagy, thereby alleviating hypoxia and reoxygenation damage of Caco-2 cells.

PU-0041

Drp1 线粒体易位促进肠缺血再灌注损伤后的线粒体功能障碍

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目的 评价动力蛋白相关蛋白（Drp1）线粒体易位在小鼠肠缺血再灌注损伤中的作用。
方法 野生型成年雄性 C57BL/6J 小鼠 24 只，6~8 周龄，体质量 18~20 g ，采用随机数字表法随机分为 4 组 （n=6）：假手术组（S 组）、肠缺血再灌注组（IIR 组）、假手术+ Drp1 抑制剂组（S+ Mdivi-1 组）和肠缺血再灌注+ Mdivi-1 组（IIR+ Mdivi-1 组）。采用夹闭肠系膜上动脉根部 45 min、恢复灌注 2 h 的方法制备小鼠肠缺血再灌注损伤模型。再灌注 2 h 后取小肠组织，进行 HE 染色，观察肠黏膜损伤情况并行 Chiu's 评分；TBA 法检测 MDA 含量，WST-8 法检测 SOD 含量，比色法检测乳酸脱氢酶（LDH）含量，透射电镜检测线粒体，ATP 检测试剂盒检测 ATP 含量，免疫荧光检测 Drp1 荧光强度，采用 Western blot 法检测总 Drp1（Total-Drp1）、胞质 Drp1（cyto-Drp1）、线粒体 Drp1（mito-Drp1）、重组人线粒体分裂蛋白 1(Fis1)、线粒体融合蛋白 1(Mfn1)、线粒体融合蛋白 2(Mfn2)表达水平。
结果 与 S 组和 S+ Mdivi-1 组比较，IIR 组和 IIR+ Mdivi-1 组肠粘膜失去其正常结构，绒毛破裂和脱落，炎性细胞浸润，Chiu's 评分、MDA 和 LDH 含量升高，SOD、ATP 含量降低，Drp1 相对荧光强度增加，肠组织 mito-Drp1、Fis1 表达增加，cyto-Drp1、Mfn1 和 Mfn2 表达降低（P<0.05）；与 IIR 组比较，IIR+ Mdivi-1 组肠粘膜增厚，小肠绒毛上皮细胞轻度水肿，无明显溃疡出血灶，Chiu's 评分、 MDA 和 LDH 含量降低，SOD、ATP 含量升高，Drp1 相对荧光强度降低，肠组织 mito-Drp1、Fis1 表达降低，cyto-Drp1、Mfn1 和 Mfn2 表达在增加（P<0.05）。Total-Drp1 在各组件变化无统计学意义（P>0.05）。
结论 结论 ：小鼠肠缺血再灌注损伤的发生机制可能与 Drp1 线粒体易位，促进线粒体分裂，抑制

线粒体融合，导致线粒体稳态失衡有关。

PU-0042

STING 激活对肠缺血再灌注后细胞焦亡的影响

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目的 评价 STING 蛋白激活对小鼠小肠缺血再灌注损伤的影响及细胞焦亡在其中的作用。
方法 SPF 级健康雄性野生型 C57BL/6J 小鼠(WT)与 STING 全身敲除鼠 (STING KO)各 12 只，6～8 周龄，采用随机数字表法分为 4 组(n=6)：野生型假手术组(WT Sham)、STING 敲除假手术组(STING-KO Sham)、野生型模型组(WT IIR)和 STING 敲除模型组(STING-KO IIR)。夹闭小鼠肠系膜上动脉 45min，再灌注 2h，建立小鼠小肠缺血再灌注损伤模型，HE 染色评估肠组织损伤程度，并采用 Western blot 检测肠组织中 STING、细胞焦亡相关蛋白(caspase-1, GSDMD-N)的表达水平，qPCR 检测肠组织中炎症因子(TNF-α, IL-6, IL-1β)转录水平。此外，构建小肠类器官模型，模拟缺氧复氧损伤（缺氧 12h，复氧 4h），CCK8 法检测类器官细胞活力，检测类器官上清乳酸脱氢酶(LDH)水平评估类器官损伤程度，并采用 Western blot 检测类器官中 STING、细胞焦亡相关蛋白的表达水平，qPCR 检测类器官中炎症因子转录水平。
结果 动物实验: 与 WT Sham 组相比，WT IIR 组小鼠肠组织损伤评分显著增高(P<0.05)，肠组织中 TNF-α、IL-6 和 IL-1β 转录水平显著升高(P<0.05)，肠组织中 STING 和 caspase-1、GSDMD-N 蛋白表达水平显著上调(P<0.05)。与 WT IIR 组相比，STING KO IIR 组小鼠肠组织损伤评分显著降低(P<0.05)，肠组织中 TNF-α、IL-6 和 IL-1β 转录水平显著降低(P<0.05)，肠组织中 caspase-1、GSDMD-N 蛋白表达水平显著下调(P<0.05)。
与 WT 组类器官相比，STING KO 类器官在缺氧复氧损伤后，细胞活力显著升高(P<0.05)，类器官上清液中 LDH 水平、类器官 TNF-α、IL-6 和 IL-1β 转录水平显著降低(P<0.05)，类器官中 caspase-1、GSDMD-N 蛋白表达水平显著下调(P<0.05)。
结论 STING 蛋白激活参与了小鼠小肠缺血再灌注损伤，其机制可能与促进细胞焦亡有关。

PU-0043

E3 泛素连接酶 TRIM2 在肠缺血再灌注损伤中的作用及分子机制

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目的 肠缺血再灌注(II/R)损伤是临床急症，发病率高、死亡率高，肠细胞过度凋亡导致肠道屏障功能受损是其严重后果的重要原因。Tripartite motif-containing protein 2(TRIM2)是一种 E3 泛素连接酶，最近被报道可以抑制炎症反应和细胞凋亡。然而，TRIM2 在 II/R 损伤中的生物学功能和调控尚不清楚。本研究旨在探究 TRIM2 在 II/R 损伤中的作用及分子机制。
方法 利用 C57BL/6J 野生型小鼠及 TRIM2-/-基因敲除小鼠构建肠缺血再灌注模型；选择 CACO-2 细胞系及 IEC-6 细胞系构建细胞缺氧复氧模型。收集样本通过 WB、QPCR、HE 染色、IHC 染色等实验方法检测 TRIM2、bax、bcl2、bad、C-CASP3 等指标；利用 CCK8、LDH、流式细胞数、tunel 染色检测凋亡水平。同时利用 co-IP、GST-pulldown 及免疫荧光等技术检测 TRIM2 及 BNIP3 的相互作用及泛素化修饰位点；以及确定 trim2 对 BNIP3 的降解方式。
结果 我们发现 TRIM2 在 H/R 诱导的肠上皮细胞和 II/R 诱导的肠组织中显著降低。TRIM2 基因敲除

小鼠明显加重肠道细胞凋亡和 II/R 损伤。为了探讨 TRIM2 在加剧 II/ R 诱导的肠道细胞凋亡和损伤中的分子机制，利用蛋白组学筛选出 BNIP3 作为 TRIM65 的新底物。免疫荧光共聚焦显示它们可以在细胞质中共定位。此外，TRIM2 通过其 E3 泛素连接酶活性介导 K48 泛素化和 BNIP3 的降解。此外，TRIM2 通过 BNIP3 抑制 H/ R 诱导的肠上皮细胞凋亡。综上所述，我们的研究结果表明 TRIM2 促进 BNIP3 的泛素化及降解，从而抑制 II/R 细胞的凋亡。这些发现为 II/R 损伤的临床治疗提供了一个有希望的靶点。

结论 我们的研究结果表明在 II/R 过程中，TRIM2 基因敲除促进了肠组织细胞凋亡，加重了肠组织损伤及炎症，而 TRIM2 通过 E3 泛素连接酶活性促进 BNIP3 的泛素化降解是其可能的分子作用机制之一。

PU-0044

Natural hydrogen gas and engineered microalgae prevent acute lung injury in sepsis

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Background: Hydrogen gas and microalgae both exist in the natural environment. We aimed to integrate hydrogen gas and biology nano technology together to widen the therapies in sepsis related acute lung injury.
Methods: Phosphomics, metabolomics and proteomics were obtained from mice undergoing cecum ligation and puncture (CLP) and inhalation of hydrogen gas. All omics analysis procedure were accordance with standards. Multi R packages were used in transcriptomics, cell type annotation and colocalization analysis were performed to identify primary cells expressing Esam and Tjp1, and co-expression relationships between two genes in sepsis lung landscape from single cell and spatial distribution. Then, network pharmacology method was used to identify candidate drugs. We used temperature controlling self-assembling method to construct dihydroquercetin nanoparticle. Then, to improve reduction ability, borane was added to DQ surface. To improve the dispersion stability of DQB, Chlorella vulgaris was used as carrier. Vivo and vitro experiments were both conducted to prove anti-inflammation, anti-ferroptosis and lung repairing. Immunofluorescence and western blot were two primary means.
Results: As a result, we identified Esam and Zo-1 were the target biomarkers for molecule hydrogen in lung. Chlorella vulgaris carrier improved the dispersion stability for DQB@C system (size=307.3nm, zeta potential=-22mv), with well morphological characteristics and biosafety. In addition, DQB@C was able to decrease superoxide anion and IL-6 accumulation in lung cells. Meanwhile, increased expression of Slc7a11/xCT and decreased Cox2 to participating with the regulation of ferroptosis. Also, DQB@C played organ protection and antioxidant effects in CLP mice.
Conclusion: Our research suggested DQB@C was a novel biology nano-system with enormous potential for molecule hydrogen treatment on sepsis related acute lung injury.

PU-0045

Novel Tail Suspension Test Device with Individualized Fixation and Anti-Climbing Mechanism

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Background: Depression is a prevalent and debilitating mental disorder, ranking as the third leading cause of disability worldwide [1]. The tail suspension test (TST) is a well-established behavioral assay used to screen potential antidepressants, evaluate their efficacy, and investigate the neurobiological mechanisms underlying depression and anxiety [2]. In this test, mice are suspended by their tails, and the duration of immobility is measured as an indicator of depression-like behavior. Effective antidepressant treatments are expected to reduce the immobility time [3].
Methods: The TST is based on the principle of suspending a mouse by its tail, leading to an inescapable stress situation. The mouse initially attempts to escape, but eventually becomes immobile after a period of vigorous activity [4]. The test typically lasts for 6 minutes, during which the immobility time is quantified [5]. Prolonged immobility time is interpreted as a depressive-like behavior, and effective antidepressant treatments are expected to reduce this immobility time [6]. We redesigned the tail suspension test apparatus to include mobile component, pressure sensor, infrared ranging sensor, and an anti-climbing box for individualized immobilization of the mouse tail.
Results: While the TST is a widely used and well-validated technique, current devices have certain limitations. Proper fixation of the mouse's tail is crucial to prevent it from climbing or escaping during the test, which can lead to experimental failure. Additionally, some mice may exhibit tail-climbing behavior, further compromising the validity of the results. To address these issues, we have designed and developed a novel TST device with individualized fixation and an anti-climbing mechanism. Our device allows for rapid and secure fixation of the mouse's tail, tailored to the individual animal's size and tail shape. Furthermore, the device incorporates an adjustable anti-climbing box, which can be positioned at an appropriate height based on the mouse's tail length, effectively preventing tail-climbing behavior.
Conclusion: The novel TST device with individualized fixation and anti-climbing mechanism addresses the limitations of existing TST setups. By ensuring proper fixation and preventing tail-climbing, our device enhances the reliability and validity of the TST for fundamental research in depression and anxiety. The streamlined setup and user-friendly design make the device well-suited for widespread adoption in preclinical studies investigating the neurobiological mechanisms and potential therapeutic interventions for these debilitating disorders.

PU-0046

抑制内质网应激可通过减轻 NLRP3 炎症小体激活介导的神经炎症 缓解围术期神经认知障碍

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目的 围术期神经认知障碍（PND）是老年患者麻醉手术后常见的神经系统并发症，其发生与海马损伤有关，大量的研究表明海马神经炎症在 PND 的发生中具有重要的作用。然而，具体的分子机制目前尚不清楚。在麻醉和手术后对小鼠海马组织进行转录组测序是揭示 PND 分子机制的重要方法。本研究试图通过转录组测序、生物信息学分析及在体动物实验揭示 PND 发生的分子机制。
方法 将 18 月龄 C57BL/6 小鼠分为对照组和麻醉手术组（AS 组），AS 组老年小鼠在异氟烷麻醉

下行剖腹探查术后，对其海马样本进行转录组测序。使用 metscape 对差异表达基因(DEGs)的功能进行了探究。结合 CytoHubba 内加权基因共表达网络分析筛选两组间变化相关的枢纽基因。采用 qPCR 和 Western Blotting 分别验证 mRNA 和蛋白表达的变化。Western Blotting 和 ELISA 检测 NLRP3 炎性小体激活情况。通过免疫荧光染色分析评估海马小胶质细胞和星形胶质细胞的激活情况，并通过小鼠行为学实验评估海马依赖的学习和记忆能力。

结果 对照组与 AS 组共检测到 521 个 DEGs，其中，AS 组 273 个基因表达上调，248 个基因表达下调。基因富集分析表明，DEGs 在代谢过程及其调控相关的生物过程中显著富集，通过两种方法综合鉴定出 4 个枢纽基因（Hspa5、Xbp1、Sfpq 和 Igf1r）。动物实验表明，AS 组小鼠表现出认知障碍，并伴有 Hspa5 和 Xbp1 表达升高、内质网应激和 NLRP3 炎性小体激活、炎症因子水平升高、胶质细胞激活。术前给予 TUDCA 可抑制 Hspa5 和 Xbp1 基因表达、内质网应激、NLRP3 炎性小体激活、神经炎症，缓解小鼠术后认知功能障碍。

结论 麻醉手术后，老年小鼠海马内质网应激相关基因 Hspa5 和 Xbp1 基因表达上调，NLRP3 炎性小体激活，炎症因子水平升高、胶质细胞激活；抑制内质网应激可通过减轻麻醉手术诱导的 Hspa5 和 Xbp1 基因表达上调导致的 NLRP3 炎性小体激活和神经炎症，从而缓解麻醉手术小鼠认知障碍。

PU-0047

多肽功能化的金纳米粒子对脓毒症相关性脑病的治疗作用及其机制研究

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目的 本研究旨在验证一种新型纳米药物治疗 SAE 的有效性、安全性和靶向性，并对其发挥保护作用的机制进行了初步探索，以期为临床应用提供可行性参考。

方法 首先，通过将多肽与金纳米粒子避光孵育，合成了一种多肽-金纳米粒子杂化化合物（P12），并系统性评估了 P12 在全身给药后对 SAE 的影响。接着，通过行为学测试确认 P12 对 SAE 的改善作用。为了初步探索 P12 的作用机制，腹腔注射了氯膦酸盐脂质体来清除巨噬细胞，以评估巨噬细胞对 P12 发挥治疗作用的影响。然后，通过蛋白质组学分析，对 P12 上形成的蛋白质冠进行了剖析，并通过其中的关键蛋白质对 P12 的治疗作用进行了进一步探讨。此外，利用立体定向注射和体外研究再次验证了 P12 的神经保护作用。

结果 在本研究中，P12 表现出了治疗 SAE 的有效性。首先，通过盲肠结扎穿孔（Cecal ligation and puncture, CLP）和腹腔注射脂多糖（Lipopolysaccharide, LPS）的方法诱导 SAE，然后系统性给予 P12，结果表明 P12 能降低脑内促炎细胞因子水平、减少细胞凋亡和血脑屏障破坏。为了初步探索其作用机制，先通过生存率和行为学试验验证了 P12 是通过腹膜巨噬细胞发挥抗炎作用的：在耗尽腹膜巨噬细胞后，P12 对 SAE 小鼠自主运动、学习、记忆和认知功能的改善作用消失了。此外，通过对健康小鼠和 CLP 小鼠血浆中形成的蛋白冠进行蛋白质组学分析，发现 P12 能特异性吸附脓毒症小鼠血浆中的炎症蛋白和内吞蛋白，从而减轻炎症反应。最后，将 P12 进行立体定向注射以及 P12 的体外实验也证明了它通过抑制小胶质细胞激活和核因子-κB（Nuclear factor-kappa B, NF-κB）信号通路而产生的神经保护作用。

结论 P12 可吸附血液循环中的炎症介质，并靶向单核吞噬细胞抑制其活化，从而减少系统性和神经炎症，治疗 SAE。这种新颖的生物活性纳米粒子有望成为治疗脓毒症相关性脑病的新一代纳米疗法。

PU-0048

Glymphatic 系统在术后认知功能障碍中的改变和机制

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目的 许多慢性病患者机体存在慢性低度炎症，在围手术期受到多重刺激，更易发生术后 认知功能障碍（postoperative cognitive dysfunction，POCD），常表现为记忆下降、精神焦虑抑郁等。而 glymphatic 系统作为中 枢神经系统内具有淋巴功能的血管周围空间网络，围手术期 glymphatic 功能障碍，加重神经炎症，最终导致认知功能障碍。本研究旨在基于该理论假说，探讨 POCD 中 glymphatic 系统的功能变化，及其潜在的分子机制。
方法 雄性 C57BL/6J 小鼠，8-10 周龄，通过连续一周腹腔注射 LPS（300 μg/kg）后进行胫骨骨折固定手术建立 POCD 模型。建立模型后，使用 TGN-020 来抑制 AQP4 功能，采用腺相关病毒来过表达 AQP4。评估 glymphatic 系统功能状态、海马中 AQP4 的极化定位，以及炎症因子（IL-6、IL-1β 和 TNF-α）的积累。
结果 研究发现 POCD 小鼠的淋巴系统功能受损，海马中 AQP4 的极化定位减少，炎症因子积累。过表达 AQP4 改善了 POCD 小鼠 glymphatic 系统功能，增强淋巴运输，减轻神经炎症，并改善了认知功能。相反，AQP 功能的抑制导致中枢神经系统炎症因子的清除显著受损，认知功能障碍进一步恶化。
结论 研究结果表明，glymphatic 系统在 POCD 中发挥着关键作用，AQP4 是一个关键调节因子。调节 AQP4 功能可能是缓解与 POCD 相关的认知能力下降的潜在治疗策略。

PU-0049

七氟烷致衰老小鼠认知功能障碍中 STAT5A/TREM1 轴可调控小胶质细胞极化的机制研究

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目的 明确 STAT5A/TREM1 轴在七氟烷致衰老小鼠认知障碍中的作用，探索其可能机制，探寻七氟烷潜在的认知功能障碍的新靶点。
方法 本实验拟使用衰老模型小鼠，共分为三部分实验。实验一：使用随机数字表法将将其随机分为 CON 组（n=6）和 SEV 组（n=6），两组小鼠行 Morris 水迷宫实验作为行为学基线数据，然后 CON 组吸入空载气体（1L/min+2L/min AIR，6h），SEV 组吸入七氟烷（3.2%，6h）后再次行 Morris 水迷宫以进行学习记忆测试，于麻醉状态下取小鼠海马组织和血清。使用 Western blot 法检测 STAT 5A/TREM1 蛋白、ARG1 和 iNOS 蛋白，ELISA 法检测 IL-1β 和 IL-10 和血清 sTREM1 含量。实验二：使用随机数字表法将衰老小鼠分为 CON 组（n=8）、SEV（n=8）、STAT5A-KD 组（n=8）和 STAT-NC 组（n=8），四组小鼠行 Morris 水迷宫实验作为行为学基线数据，然后 CON 组吸入空载气体（1L/min+2L/min AIR，6h），SEV 组、STAT5A-KD 组和 STAT-NC 组均行七氟烷吸入（3.2%，6h），然后分别使用 Morris 水迷宫、矿场实验、Y 迷宫进行神经行为学测试，于麻醉状态下取小鼠海马组织和血清。石蜡切片行 HE 染色、Nissl 染色和免疫荧光染色，Western blot 法检测海马 STAT 5A、TREM1 和 M1/M2 标记物蛋白，RT-qPCR 法检测 STAT 5A、TREM1 和 M1/M2 标记物、炎症因子，ELISA 法检测 IL-10 和 IL-1β 水平，最后 ELISA 法检测血清 sTREM1 水平。实验三：使用双荧素酶试验检测 STAT 5A 转录因子是否与 TREM1 启动子序列结合，产生直接相互作用
结果 实验一：水迷宫结果显示，随着训练天数增加，小鼠逃避潜伏期逐渐缩短，空间探索穿越平台次数无明显差异，两组间基线一致。ELISA 检测小鼠海马炎症因子，与对照组比较，七氟烷组促炎因子 IL-

1β 表达上调，抗炎因子 IL-10 的表达下降。小胶质细胞极化表型的检测，衰老小鼠在吸入七氟烷后，小胶质细胞激活并极化为 M1 型增多，M2 型减少。STAT5A、TREM1 及 sTREM1 表达，在七氟烷暴露后，STAT5A 表达升高， TREM1 及 sTREM1 表达上调，STAT5A/TREM1 可能参与衰老小鼠认知功能障碍。实验二：七氟烷吸入前在水迷宫训练期各组小鼠基线一致。七氟烷吸入后三天，与对照组比较，七氟烷组逃避潜伏期延长，目标平台象限分布时间少，滞留时间减少，敲减 STAT5A 可改善这种结局。旷场实验结果显示七氟烷组小鼠中央区占比时间降低，敲减 STAT5A 可增加中央区占比时间。HE 染色结果：CON 组海马神经元细胞层次清晰；七氟烷干预后细胞变性坏死；敲减 STAT5A 可增加正常神经元表达。Nissl 染色结果：CON 组海马各区胞浆中尼氏体丰富；七氟烷干预后尼氏小体溶解或消失，敲减 STAT5A 可增加尼氏小体。Western Blot 结果显示，敲减 STAT5A 可降低 STAT5A、TREM1 的表达（P<0.05）,PCR 结果一致。随后进行小胶质细胞表型检测，敲减 STAT5A 可降低 inos 表达，增加 arg1 表达,PCR 结果一致。为进一步明确 STAT5A 在小胶质细胞经七氟烷暴露后极化表型变化中的作用，我们采用 inos 和 arg1 分别标记 M1 型和 M2 型，进行免疫荧光双标实验，结果提示在衰老小鼠 SIN 中，小胶质细胞炎性激活，敲减 Stat5a，可降低 M1 小胶质细胞表达，增加 M2 小胶质细胞的表达。检测海马炎症因子，相比于七氟烷组，敲减 STAT5A 后海马 TNF-α 表达减少，TGF-β 表达增加。实验三：Wt+stat5a-OE 组 fLuc/rLuc 比值较 Wt+stat5a-NC 组明显升高

结论 1 3.2%七氟烷暴露 6h 麻醉可上调衰老小鼠 STAT5A 和 TREM1 蛋白表达，激活小胶质细胞，导致中枢神经系统炎症，引发衰老小鼠认知功能障碍。2 STAT5A 可调控 TREM1，参与七氟烷致衰老小鼠认知障碍的发生发展，其机制与小胶质细胞 M1/M2 表型不平衡极化，神经炎症加剧、海马神经元损伤有关。敲减 STAT5A 可部分改善七氟烷导致衰老小鼠的认知损害。3 STAT5A 可调控 Trem1 启动子转录激活，STAT5A/TREM1 轴参与七氟烷致衰老小鼠认知障碍的发生发展，其机制与小胶质细胞 M1/M2 表型不平衡极化，导致神经炎症和神经元损伤有关。敲减 STAT5A 可改善七氟烷导致衰老小鼠的认知损害。

PU-0050

裸盖菇素通过增强海马和内侧前额皮层的神经可塑性降低条件恐惧小鼠模型的恐惧记忆

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目的 创伤后应激障碍（posttraumatic stress disorder，PTSD）是一种与创伤经历造成恐惧记忆有关的精神障碍性疾病，其与抑郁症具有高度共患病性。目前，治疗 PTSD 的一线药物为选择性 5-羟色胺重摄取抑制剂，包括舍曲林和帕罗西汀，但这仅是将抗抑郁药物扩大适应症应用到治疗 PTSD 中，尚无针对治疗 PTSD 的突破性药物。多项基础及临床研究表明，裸盖菇素对抑郁症患者有积极的治疗作用，其机制可能为通过增强海马和前额皮层的神经可塑性。基于以上分析，我们提出假设：对于条件恐惧模型小鼠，裸盖菇素可通过增强海马和内侧前额皮层的神经可塑性，降低恐惧记忆，具有潜在治疗 PTSD 的作用。

方法 首先，我们进行行为学测试，所用 PTSD 动物模型为条件恐惧小鼠模型，实验共分为 3 组，分别为非条件恐惧组、条件恐惧组和裸盖菇素组。非条件恐惧组小鼠不经历足底电击，其他与条件恐惧组相同。在场景 A 中完成条件恐惧建模后，将所有模型小鼠随机分为条件恐惧组和裸盖菇素组。在条件恐惧建模完成后 2 天，分别给予裸盖菇素或生理盐水治疗，在单剂量裸盖菇素治疗后第 1 天进行声音线索恐惧记忆测试（场景 B），这项测试为短期恐惧记忆测试。在单剂量裸盖菇素治疗后第 6 天（场景 B）和第 7 天（场景 A）分别在不同场景进行声音线索恐惧记忆测试，这些为长期恐惧记忆测试。为了进一步探索神经可塑性在裸盖菇素对恐惧记忆影响的作用，我们应用高尔基染色检测了海马和内侧前额皮层的结构神经可塑性，包括树突交叉点总数和树突棘密度；用 Western blot 检测了神经可塑性相关标记蛋白的水平，包括脑源性神经营养因子（brain derived neurotrophic factor，BDNF）、雷帕霉素机制靶点（mechanistic target of rapamycin，mTOR）、谷氨酸受体亚基 1（glutamate receptor subunit 1，GluR1）、突触蛋白 Synapsin-1；用免疫荧光

技术检测了海马齿状回双皮质蛋白（doublecortin，DCX）阳性细胞的数量。
结果 与非条件恐惧组相比，条件恐惧组小鼠在不同时间点的测试中其僵住时间百分比均显著升高，这表明条件恐惧 PTSD 小鼠模型构建成功。短期行为学测试中，在单剂量裸盖菇素治疗 24h 后，与条件恐惧组小鼠相比，裸盖菇素组小鼠的僵住时间百分比显著降低。长期行为学测试中，在单剂量裸盖菇素治疗后第 6 天（场景 B）和第 7 天（场景 A）的恐惧记忆测试表明，与条件恐惧组相比，裸盖菇素组小鼠的僵住时间百分比均显著降低。与此同时，进一步的机制研究表明，单剂量裸盖菇素治疗改善了由条件恐惧诱导的海马和内侧前额皮层神经可塑性下调，包括改善了结构神经可塑性（树突交叉点总数和树突棘密度），增加了神经可塑性标记蛋白表达（BDNF、mTOR、GluR1 和 Synapsin-1），促进了神经发生（海马齿状回中 DCX 阳性细胞的数量）。
结论 我们的研究结果表明，对于条件恐惧小鼠模型，单剂量裸盖菇素治疗可降低恐惧反应，在给药后 24 h 发挥作用，药效可持续至给药后第 7 天；其作用至少部分是通过增强海马和内侧前额皮层的神经可塑性来实现的。裸盖菇素因其在治疗 PTSD 和其他以恐惧记忆为特征的精神障碍疾病中的巨大潜力而值得深入研究。

PU-0051

吗啡通过 TLR4 和 cGAS-STING 信号通路诱导炎症反应

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目的 阿片类药物对小胶质细胞或巨噬细胞 Toll 样受体 4 (TLR4) 的激活以及相关炎性细胞因子的释放与阿片类药物诱发的痛觉减退和耐受性有关。环 GMP-AMP 合成酶/干扰素基因刺激器（cGAS-STING）信号通路由包括线粒体 DNA（mtDNA）在内的双链 DNA 激活，已成为炎症反应的另一个关键介质。本研究检测了吗啡在小胶质细胞和巨噬细胞中诱导涉及 TLR4 和 cGAS-STING 通路的免疫炎症反应的假设。
方法 将 BV2 小胶质细胞和 Raw 264.7 (Raw) 巨噬细胞暴露于吗啡与 STING 抑制剂 (C176) 或 TLR 4 抑制剂 (TAK242) 的作用下 6 小时或 24 小时。Western 印迹和 RT-qPCR 分析评估了 TLR4、cGAS、STING、核因子卡巴 B（NF-κB）和促炎细胞因子的表达。 使用 MitoSOX 检测了吗啡诱导的线粒体活性氧（ROS）释放，通过免疫荧光和 RT-qPCR 检测了 mtDNA，并通过诱导性一氧化氮（iNOS）的表达检测了免疫细胞的极化。用溴化乙锭（EtBr）去除 mtDNA 或将从吗啡处理过的细胞中提取的 mtDNA 转染细胞，研究了 mtDNA 对吗啡相关炎症的作用。
结果 吗啡明显增加了小胶质细胞和巨噬细胞中 TLR4、cGAS、STING、p65 NF-κB 和细胞因子（IL-6 和 TNF-α）的表达。ROS 和 mtDNA 释放增加证明了吗啡诱导的线粒体功能障碍；iNOS 增加证明了炎症 M1 表型极化。TLR4 或 STING 抑制剂通过降低两种细胞类型中 NF-κB 的表达，减少了吗啡诱导的细胞因子释放。转染 mtDNA 会导致炎症信号蛋白激活、细胞因子释放和极化，而 mtDNA 缺失则会抵消这些效应。
结论 吗啡可激活这两种细胞中的 cGAS-STING 通路。抑制 STING 通路是克服免疫细胞炎症相关的吗啡耐受性和阿片诱导的痛觉减退的另一种方法。

PU-0052

消耗脊髓小胶质细胞可减轻烧伤诱导的运动神经元损失和肌肉萎缩

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目的 纠正肌肉中异常的分解代谢信号并不能纠正烧伤（BI）引起的肌肉萎缩（MW）。神经肌肉装置的功能完整性高度依赖于健康的运动神经元，但运动神经元在烧伤后肌肉萎缩中的作用却很少受到关注。在许多炎症性中枢神经系统（CNS）疾病（如脑炎）中，都会出现运动障碍。BI 与神经炎症有关，表现为小胶质细胞的激活和促炎细胞因子的释放。细胞因子释放的来源及其与 BI 后运动神经元变性和 MW 的关系尚不清楚。小胶质细胞是中枢神经系统的常驻先天性免疫细胞，其生存依赖于集落刺激因子-1（CSF1）。因此，抑制 CSF-1 会消耗小胶质细胞。在这项研究中，我们测试了这样一个假设：小胶质细胞释放的 IL-1β 增加会导致运动神经元变性，进而导致 MW，而一过性消耗小胶质细胞可使 IL-1β 的释放恢复正常，从而缓解神经元变性和 MW。
方法 在麻醉状态下对 C57BL/6 小鼠进行体表面积 30% 的 BI 或假 BI（SB）。从 BI 24 小时后开始，小鼠腹腔注射 CSF1 抑制剂 Plexxikon 5622（PLX）40 毫克/千克或等体积生理盐水，每天两次，连续 7 天。在 BI 后的第 7 天和第 14 天采集腰脊髓和后肢肌肉样本。使用 Iba1 和 NeuN 对脊髓腹角进行免疫荧光染色，以分别识别和计算小胶质细胞和腹角运动神经元的数量。脊髓炎症细胞因子转录物（TNF-α、IL-1β）通过 RT-qPCR 进行分析。在第 7 天和第 14 天评估胫骨肌（TA）和腓肠肌（GC）的湿重。
结果 与假 BI 相比，BI 引起的脊髓小胶质细胞活化具有时间依赖性，第 14 天 IL-1β 水平达到峰值（图 1 a）。与假 BI 相比，TNF-α 水平在 BI 后第 7 天和第 14 天也明显升高（图 1 b）。在灼伤后第 1 天开始的 PLX 并未在第 7 天缓解细胞因子水平，这可能与 PLX 峰值效应的潜伏期有关。在第 14 天，PLX 治疗使 IL-1β 水平恢复到控制水平（与假-BI 小鼠相似（图 1a）），但没有使 TNF-α 水平恢复正常。与 SB 相比，BI 第 7 天和第 14 天 Iba1 阳性小胶质细胞的增加具有时间依赖性，PLX 可显著减少 BI 后第 7 天和第 14 天的 Iba1 阳性小胶质细胞（图 2 b）。通过 NeuN 染色检测到的运动神经元数量在 BI 后第 7 天和第 14 天比 SB 时减少（图 2 c）。PLX 处理减轻了 BI 第 7 天和第 14 天诱导的运动神经元损失（图 2c）。与 SB 相比，胫骨肌（图 3 a）和腓肠肌（图 3 b）的肌肉质量在 BI 后第 7 天和第 14 天显著下降。PLX 治疗并没有减轻第 7 天的肌肉质量，这与当时的高 TNF-α 和 IL-1β 水平相符。相反，当 PLX 在第 14 天降低 BI 诱导的 IL-1β 水平时，与未经处理的 BI 小鼠相比，运动神经元损失和肌肉质量损失得到了缓解。
结论 这项研究表明，BI 诱导的小胶质细胞数量（小胶质细胞增多）、细胞因子释放、运动神经元数量和肌肉变化之间存在相互作用。这些变量之间的平行关系在第 14 天最为明显。用 PLX 清除小胶质细胞可减轻小胶质细胞增多，并使 IL-1β 水平正常化，同时对运动神经元丢失和肌肉重量产生有益影响。如前所述，到第 7 天时，PLX 可使小胶质细胞减少 20%。服用 PLX 后第 7 天 TNF-α 和 IL-1β 水平的升高表明，PLX 的峰值效应可能需要 7 天以上的时间。未来的研究应考察更长时间的 PLX 给药及其对小胶质细胞、细胞因子、运动神经元和肌肉质量的影响。短期 PLX5622 可能是逆转 BI 引起的 MW 的一种有前途的方法。

PU-0053

NEFM 的表达与神经病理性疼痛及神经炎症的相关性研究

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目的 观察神经丝中间链 NEFM（Neurofilament Medium）的表达与选择性坐骨神经损伤（SNI）大鼠的疼痛、脊髓背角小胶质细胞活化以及促炎因子表达是否具有相关性。
方法 将 60 只成年雄性 SD 大鼠随机分为两组：假手术组（SHAM 组）、SNI 3d 模型组，SNI 7d 模型组，SNI 14d 模型组，每组 30 只。SNI 组大鼠构建 SNI 模型；SHAM 组进行同等的 SNI 伤口对照，不损伤神经。于 SNI 术前 1 d 检测疼痛机械阈值，随后分别于术后 3、7、14d 采用 Von Frey 纤维丝测定机械缩足阈值（PWT）、收集外周血并提取脊髓组织；采用免疫荧光染色观察术后 3、7、14 d 时脊髓背角小胶质细胞的激活；免疫组化、Western Blot、QRT-PCR 检测 NEFM 的表达量水平；采用 ELISA 方法检测 ELISA 检测脊髓肿瘤坏死因子-α(TNF-α）、白介素-1β（IL-1β）和白介素-6（IL-6）的释放水平。
结果 在术后 3、7、14d 时，SNI 组的 PWT 值及 NEFM 的表达量均明显低于 SHAM 组，且 SNI 组随时间的延长，PWT 值及 NEFM 表达量逐渐降低，且差异均有统计学意义（P 均<0.05）。与 SHAM 组比较，术后 3、7、14 d 时 SNI 组的脊髓背角小胶质细胞的活化程度以及炎症因子 TNF-α、IL-1β 及 IL-6 的释放水平较 SHAM 组以及各组之间互相比较都明显增加，且差异均有统计学意义（P 均<0.05）。
结论 NEFM 的表达与神经病理性疼痛以及神经炎症具有相关性，NFEM 可作为反映神经病理性疼痛、神经炎症的严重程度的指标之一。

PU-0054

Regulation of Calcium Homeostasis in Endoplasmic Reticulum-Mitochondria Cross-talk: Implications for Skeletal Muscle Atrophy

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目的 This review delves into the pivotal role of calcium as a small molecule biomessenger essential for the functioning of skeletal muscle.
方法 Calcium is not only crucial for regulating muscle excitation–contraction coupling, but also plays a pertinent role in myocyte development, maintenance, and regeneration. The endoplasmic reticulum (ER) orchestrates the release of calcium via receptors such as RYR and IP3R, which facilitates skeletal muscle contraction. Concurrently, it reclaims calcium via the sarcoendoplasmic reticulum calcium ATPase pump, thereby restoring the skeletal muscle to its diastolic state. A critical aspect of calcium homeostasis is the dynamic interaction between the mitochondria and ER. The ryanodine receptors establish localized calcium signaling with the mitochondria. Furthermore, the IP3R-Grp75-VDAC-MCU complex forms a “quasi-synaptic” mechanism between the ER and mitochondria, which permits rapid mitochondrial calcium uptake with minimal perturbation of cytoplasmic calcium levels.
结果 Disruption of the calcium transport results in mitochondrial calcium overload, which triggers the opening of the mitochondrial permeability transition pore. This event leads to the release of reactive oxygen species and cytochrome C, thereby causing muscle damage and atrophy.

结论 This review comprehensively examines the intricate association between the ER and mitochondria and their combined regulatory effects on calcium levels in skeletal muscle. Furthermore, this review aims to provide insightful perspectives for future research on the pathogenesis of muscle diseases and potential prevention strategies.

PU-0055

Repeated early-life exposure to sevoflurane causes social behavior disfunction through the gut microbiota-metabolites-brain axis in mice

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Background: The mechanisms underlying social dysfunction caused by repeated sevoflurane in early life remain unclear. Whether gut microbiota-metabolites-brain axis is involved in the mechanism of sevoflurane developmental neurotoxicity still lack report.
Methods: Mice received 3% sevoflurane at postnatal day (P) 6, 7 and 8 for 2 hours per day. Metagenomic sequencing and untargeted metabolomic analysis were applied to investigate the effects of sevoflurane on gut microbiota and metabolism. The animals social behavior and the synaptic development were analyzed during P35. Subsequently, fecal microbiota transplantation (FMT) from the control group and bile acid administration were performed to see the expected rescuing effect on socially-related behaviors that impaired by repeated sevoflurane exposure in the mice.
Results: In the three champers test, sevoflurane exposed mice spent less time with stranger mice, compared with the control group. Both the apical and basal spine density significantly decreased in sevoflurane exposed mice. In addition, Repeated sevoflurane exposure significantly changed the composition of the gut microbiota and the metabolite production, particularly bile acid. FMT reduced the production of intestinal bile acid and attenuated the effect of sevoflurane exposure on social function and synaptic development. Cholestyramine treatment mimics the protective effects of FMT.
Conclusions: The gut microbiota-metabolites-brain axis underlies social dysfunction caused by sevoflurane exposure in early age, and bile acid regulation may be a promising intervention to this impairment.

PU-0056

vagal neurons-CSF-Contacting Nucleus circuit regulates the systemic inflammation response in septic mice

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Reciprocal interactions between the central nervous system and immune are now considered to be major components of the host response in sepsis. While the exact role of central nervous system on the immune remains largely unknown. Here we report that the cerebrospinal fluid-contacting nucleus (CSF-Contacting Nucleus) exert a protective effect on the sepsis. With immunofluorescence test, we found the expression of Fos in CSF-Contacting Nucleus increased significantly in response to sepsis. The ablation of CSF-Contacting Nucleus could exacerbate the sepsis, promote the release of pro-inflammatory cytokines (IL-1β, IL-6, TNFα) and reduce the

release of anti-inflammatory cytokine IL-10. Activation or inhibition of the CSF-contacting nucleus with chemogenetics could decrease or increase the pro-inflammatory cytokines or anti-inflammatory cytokine. With retrograde and anterograde tracing technique, we dissected the vagal-CSF-Contacting Nucleus circuit, and this circuit was activated in response to sepsis. Furthermore, we used single-cell RNA sequencing to identify the critical components of the CSF-Contact Nucleus regulating the systemic inflammation in septic mice, the results showed that immune-related genes in the CSF-Contacting Nucleus were increased in response to sepsis. Thus, our work indicated that Vagal neurons-CSF-Contacting Nucleus circuit could regulate the systemic inflammation, which paved the way for the therapy of the sepsis.

PU-0057

Exosomal transfer of microRNA-590-3p between renal tubular epithelial cells after renal ischemia-reperfusion injury regulates autophagy by targeting TRAF6

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Background: Acute kidney injury (AKI) is a common complication in patients, especially elderly patients, who undergo cardiac surgery with cardiopulmonary bypass. Studies have indicated a protective role of autophagy in AKI. However, the mechanisms underlying the regulatory effect of autophagy in AKI among patients undergoing cardiac surgeries are poorly understood. In this study, we aimed to test the hypothesis that exosomal microRNAs (miRNAs) regulate autophagy in tubular epithelial cells after AKI.
Methods: Plasma exosomal RNA was extracted from young and elderly AKI patients undergoing cardiac surgery, and the miRNAs expression during the perioperative period were analyzed using next-generation sequencing. The screened miRNAs and their target genes were subjected to gene oncology function and Kyoto Encyclopedia of Genes and Genome enrichment analyses. Renal tubular epithelial cell line (HK-2 cells) was cultured and H/R model was established, which is an in vitro renal ischemia/reperfusion (I/R) model. We used Western blot analysis, cell viability assay, transfection, luciferase assay to investigate the mechanisms underlying the observed increases in the levels of renal I/R injury-mediated exosomal miRNAs and their roles in regulating HK-2 cells autophagy.
Results: miR-590-3p was highly enriched in the plasma exosomes of young AKI patients after cardiac surgery. Increased levels of miR-590-3p led to the increases in the expression of autophagy marker proteins, including Belin-1 and microtubule associated protein 1 light chain 3 beta (LC3II), and prolonged the autophagic response in HK-2 cells after H/R treatment. These effects were achieved mainly via increases in the exosomal miR-590-3p levels, and the tumor necrosis factor receptor-associated factor 6 protein was shown to play a key role in I/R injury-mediated autophagy induction.
Conclusion: Exosomes released from HK-2 cells after renal I/R injury regulate autophagy by transferring miR-590-3p in a paracrine manner, which suggests that increasing the miR-590-3p levels in HK-2 cell-derived exosomes may increase autophagy and protect against kidney injury after renal I/R injury.

PU-0058

Celastrol Attenuates sepsis-induced acute lung injury by Inhibiting Inflammation Through Regulation of the NF-κB Pathway

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Objective: Sepsis is a complex immune disorder characterized by acute lung injury (ALI), which serves as a critical and prevalent component. The pathophysiology of ALI involves multiple factors, including inflammatory cell infiltration, production of proinflammatory mediators, and apoptosis of alveolar epithelial cells. Celastrol (CEL), a pharmacologically active compound derived from plant extracts used in traditional medicine, has been shown to play an important role in anti-inflammatory and anti-apoptotic processes. However, the potential therapeutic effect of CEL on sepsis-induced ALI remains unknown. In this study, we employed a network pharmacology approach combined with molecular docking to investigate the underlying mechanism through which celastrol may alleviate sepsis-induced acute lung injury. Additionally, we investigated the impact of celastrol on sepsis-induced acute lung injury by establishing a murine model of sepsis-induced acute lung injury using C57BL/6 mice and A549 cells.
Method: Relevant targets of celastroll were obtained from SwissTargetPrediction and SuperPred databases, while disease-associated targets of sepsis-induced acute lung injury were acquired from the GeneCards database. The drug component targets were then intersected with the disease targets to generate protein-protein interaction (PPI) networks, which underwent subsequent GO and KEGG analysis. Molecular docking was performed to determine the combination poses and interactions between celastrol and the key regulatory protein NF-κB. To establish sepsis-induced acute lung injury models, forty male C57BL/6 mice were randomly assigned into five groups as follows: control group (WT), sepsis group (CLP), low-dose celastrol-treated group (L) receiving 0.5 mg/kg, medium-dose celastroll-treated group (M) receiving 1 mg/kg, and high-dose celastroll treatment group (H) receiving 2 mg/kg. Sepsis modeling was induced using cecal ligation and puncture (CLP). One day prior to CLP, the treatment groups received intraperitoneal injections of different doses of celastrol followed by an additional dose immediately after CLP. Lung tissues were collected from the mice 24 hours post-modeling for subsequent experiments. HE staining was performed on paraffin-fixed mouse lung tissues to evaluate inflammatory changes within the lungs. Furthermore, qRT-PCR and western blot analyses were conducted to assess the expression levels of NF-κB, HIF-1α, STAT3, IL-1β, and TNF-α in the lung tissues treated with varying doses of celastrol in order to validate the results obtained from HE staining. To further confirm the therapeutic effect of celastroll on sepsis-induced acute lung injury observed in vivo, we cultured A549 cells for experimental verification based on our previous findings. The cells were divided into four groups: control group (C), sepsis group stimulated with lipopolysaccharide (LPS), celastrol treatment alone group (CEL), and sepsis plus celastrol treatment group(LC). After modeling for 24 hours, qRT-PCR and western blot analyses were performed to determine the expression levels of NF-κB, HIF-1α, STAT3, and inflammatory factors IL-1β and TNF-α. Immunofluorescence analysis was then conducted to examine NF-κB expression levels among different cell models.
Result: The results obtained from network pharmacology methods and molecular docking suggest that celastrol exhibits potential therapeutic effects for sepsis-induced acute lung injury. The network pharmacology approach revealed that STAT3, HIF-1α, and NF-κB1 are central nodes in the protein-protein interaction (PPI) network. Additionally, GO and KEGG pathway enrichment analysis indicated that celastrol may modulate the inflammatory response by targeting the HIF-1α signaling pathway. Furthermore, molecular docking simulations demonstrated a strong binding affinity between celastrol and NF-κB. In vivo experiments revealed significant differences in HE staining between control and CLP-treated mice. The lung tissue of control mice exhibited normal histology, characterized by the absence of inflammatory cell infiltration or interstitial edema. Conversely, CLP-

treated mice displayed extensive lung injury, which was significantly attenuated by treatment with varying doses of celastrol. Western blot and qRT-PCR analyses demonstrated that CLP activation of the NF-κB signaling pathway led to increased inflammation in lung tissues, as evidenced by elevated expression levels of NF-κB1, HIF-1α, P-STAT3, IL-1β, and TNF-α. Importantly, Celastrol treatment effectively mitigated the impact of CLP on these molecular expressions. Similarly, in vitro experiments revealed that the expression levels of NF-κB1, HIF-1α, P-STAT3, as well as the inflammatory cytokines IL-1β and TNF-α were significantly upregulated in A549 cells following LPS treatment compared to the control group. Moreover, immunofluorescence analysis demonstrated an enhanced intracellular expression of NF-κB upon LPS stimulation, which was effectively attenuated by celastroll treatment. These findings from our experimental investigations are consistent with those observed in vivo studies and collectively suggest that celastroll possesses therapeutic potential against sepsis-induced acute lung injury.

Conclusion: Celastrol exerts a protective effect in sepsis-induced acute lung injury by downregulating the expression levels of HIF-1α and p-STAT3, as well as inhibiting Inflammation through inhibition of the NF-κB pathway.

PU-0059

神经调节蛋白-1 后处理对心肌缺血/再灌注损伤的保护作用及机制研究

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目的 探讨神经调节蛋白-1（NRG-1）后处理对心肌缺血/再灌注损伤（ischemia/reperfusion injury, IRI）的保护作用及分子机制。

方法 在体实验中，采用随机数字表法将 7~8 周龄、体重 230~270 g 的 SPF 级健康雄性 Sprague Dawley（SD）大鼠随机分为 4 组：假手术组（Sham 组）、心肌缺血/再灌注损伤组（IRI 组）、NRG-1 后处理组（NRG-1 组）和 Mdivi-1 处理组（Mdivi-1 组）。IRI 组、NRG-1 组和 Mdivi-1 建立心肌缺血/再灌注损伤在体模型。采用全转录组测序和蛋白互作网络分析 IRI 组和 NRG-1 组大鼠缺血心肌组织中差异基因表达与线粒体自噬相关性和蛋白互作情况。采用伊文思蓝（Evans blue, EB）和三苯基氯化四氮唑（triphenyltetrazolium chloride, TTC）双重染色测定心肌梗死面积，苏木精-伊红染色法（hematoxylin-eosin staining, HE）染色法评价缺血心肌病理改变情况，ELISA 法测定血清肌钙蛋白Ⅰ（cardiac troponin I, cTnI）和肌酸激酶心肌型同工酶（myocardial-bound creatine kinase, CK-MB）浓度，采用 Western blot 检测缺血心肌白介素-1β（IL-1β）、解偶联蛋白 2（UCP2）、自噬微管相关蛋白轻链 B3（LC3B）、PTEN 诱导假定激酶 1（PINK1）表达情况，采用透射电子显微镜观察缺血心肌组织线粒体形态，采用免疫荧光染色法观察缺血心肌 LC3B 表达情况。离体实验中，将 H9C2 心肌细胞随机分为 7 组：对照组（Control 组）、缺氧/复氧组（H/R 组）、缺氧/复氧+NRG-1 后处理组（H/R+NR 组）、缺氧/复氧+siRNA 阴性对照组（H/R+siNC 组）、缺氧/复氧+NRG-1 后处理+siRNA 阴性对照组（H/R+NR+siNC 组）、缺氧/复氧+UCP2-siRNA 组（H/R+siUCP2 组）和缺氧/复氧+NRG-1 后处理+UCP2-siRNA 组（H/R+NR+siUCP2 组），根据实验设计对 H9c2 心肌细胞进行缺氧/复氧干预，通过小干扰 RNA（small interfering RNA, siRNA）转染心肌细胞沉默 UCP2 表达，采用 JC-1 检测心肌细胞线粒体膜电位（mitochondrial membrane potential, MMP）变化情况，采用免疫荧光标记观察 LC3B-Mito 共定位情况，采用 WST-8 法检测心肌细胞培养上清液乳酸脱氢酶（lactic dehydrogenase, LDH）浓度，采用 Western blot 法检测心肌细胞 UCP2、LC3B 和 PINK1 表达情况。

结果 与 Sham 组相比，IRI 组心肌损伤和线粒体损伤情况加重（P<0.05），与 IRI 组相比，NRG-1 组心肌损伤和线粒体损伤情况减轻（P<0.05）；IRI 组与 NRG-1 组缺血心肌组织全转录组差异表

达基因共 878 个，其中线粒体自噬相关信号通路出现明显富集（P<0.05），差异表达基因与线粒体自噬正相关的基因交集存在 130 个共有基因，其中 UCP2 与线粒体自噬相关蛋白互作评分最高；与 IRI 组相比，NRG-1 组缺血心肌 UCP2、线粒体自噬相关蛋白 LC3B 和 PINK1 表达上调，LC3B 荧光强度增强（P<0.05），与 NRG-1 组相比，Mdivi-1 组血清 cTnI 和 CK-MB 浓度升高、缺血心肌病理损伤加重、线粒体自噬未见明显激活、线粒体自噬相关蛋白 LC3B 和 PINK1 表达下调、LC3B 荧光强度减弱（P<0.05）；与 H/R 组相比，H/R+NR 组心肌细胞 UCP2 和 PINK1 表达上调、MMP 降低和 LC3B-Mito 共定位荧光增强（P<0.05）；与 H/R+NR+siNC 组相比，H/R+siUCP2 组和 H/R+NR+ siUCP2 组心肌细胞 UCP2、LC3B 和 PINK1 表达下调、培养上清液 LDH 浓度升高、LC3B-Mito 共定位荧光减弱（P<0.05）。

结论 NRG-1 后处理可通过调控 UCP2/PINK1/LC3B 信号通路介导的线粒体自噬进而对心肌 IRI 发挥保护作用。

PU-0060

SENP1 通过促进溶酶体生发促进自噬流运行来保护肝脏缺血再灌注损伤

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目的 1、探讨肝缺血再灌注损伤（HIRI）后自噬流的运行状态;
2、明确 SUMO 蛋白特异性蛋白酶 1 (SUMO-specific protease1,SENP1) 调节 HIRI 的自噬流具体环节以及在肝 IR 中所起的作用

方法 利用小鼠肝 I/R 模型和小鼠肝细胞（AML12）氧糖剥夺模型（OGD/R），对自噬关键蛋白 p62、LC3II/I 及 SENP1 进行蛋白水平检测。转染 pK-hLC3 双荧光质粒的细胞中红/黄 puncta 的数量，观察 I/R 损伤和 OGD/R 损伤时，肝组织和细胞的自噬流变化。通过溶酶体膜相关蛋白 1（LAMP1）和溶酶体内组织蛋白酶（Cathepsin L, CTST）的免疫荧光共定位变化检测溶酶体膜的完整性。利用溶酶体探针 lysotracker 对酸性溶酶体进行示踪，检测 OGD/R 对溶酶体酸化的影响。体外实验转染 RGS-SENP1 质粒过表达 SENP1，在 OGD/R 后检测 AML12 中的自噬流状态及对溶酶体的影响和细胞损伤。体内 WT 小鼠尾静脉注射 AAV-TBG-SENP1，建立肝 I/R 模型，利用上述实验方法检测自噬流及溶酶体变化、HE 染色、AST/ALT 活性等。

结果 在小鼠 I/R 3h 和肝细胞 OGD/R 3h 后 LC3II/I 和 p62 表达均增多，细胞中代表未降解的自噬小体的黄色 puncta 明显增多，溶酶体 LAMP1 和 CTSL 共定位减少，lysotracker 荧光数量减少且弥散，提示溶酶体酸化受阻，以上表明自噬溶酶体形成障碍，肝细胞自噬流呈现出受阻状态，使用雷帕霉素增强自噬有利于减轻肝损伤。在同一时间点检测到 SENP1 显著下降，伴随整体 SUMO 化水平上升，体内体外过表达 SENP1 明显改善了溶酶体功能并增加其数量使自噬溶酶体融合数量增加，恢复肝细胞受阻自噬流，减轻 HIRI。

结论 肝脏缺血再灌注后肝细胞溶酶体受损，自噬小体与溶酶体融合障碍致自噬溶酶体途径受阻，SENP1 通过改善溶酶体功能促进自噬流运行，在肝缺血再灌注损伤中发挥保护作用。本研究有望为临床肝缺血损伤的治疗研究提供理论基础。

PU-0061

RUVBL2 Deletion: Facilitating the Transition and Disassembly of Perioperative Neurocognitive Disorders-Associated hnRNPA2/B1-SGs

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Objective: Perioperative neurocognitive disorders (PND) can exacerbate neurodegeneration, including the progression of mild cognitive impairment (MCI) to dementia. This progression is associated with the heterogeneous nuclear ribonucleoprotein A2/B1 (hnRNPA2/B1)-mediated aggregation and phase transition of stress granules (SGs). Studies have indicated that the kinetics activity within SGs affects their stability, which is closely associated with the ATPase RUVBL2. Our research aimed to explore a new target for modulating the kinetics of hnRNAP2/B1-SGs to accelerate their disassembly and potentially delay the progression of MCI to dementia due to PND.
Methods: We evaluated the effect of knocking down hippocampal RUVBL2 in aged MCI rats model on hnRNPA2/B1-SGs, conducting a series of behavioral studies and biochemical experiments during their postoperative period. Additionally, we assessed the influence of RUVBL2 knockdown on the kinetics of hnRNPA2/B1-SGs using fluorescence recovery after photobleaching (FRAP) in rat primary hippocampal neurons.
Results: Our results demonstrated that in the animal model, hnRNPA2/B1, which had translocated to the cytoplasm due to anesthesia, gradually returned to the nucleus in the RUVBL2 knockdown group. Furthermore, hnRNPA2/B1-SGs that formed in the cytoplasm disappeared over time. However, in the RUVBL2 non-knockdown group, hnRNPA2/B1-SGs undergo fibrosis in the cytoplasm. In rat primary hippocampal neurons, RUVBL2 deletion facilitated the transition of hnRNPA2/B1-SGs induced by general anesthetics from the hydrogel phase to the liquid phase, promoting their disassembly. Comparing three commonly used general anesthetics—sevoflurane, propofol, and desflurane—we found that sevoflurane upregulated RUVBL2 in rat primary hippocampal neurons, decreasing intraneuronal pH and disrupting neuronal energy metabolism. This resulted in greater stabilization of hnRNPA2/B1-SGs.
Conclusion: In conclusion, our findings indicated that elevated RUVBL2 expression contribute to the hydrogel phase transition of hnRNPA2/B1-SGs. Targeted knockdown of this protein, through viral vector-mediated modulation, may offer a novel approach to delaying the progression to dementia due to PND in MCI patients.

PU-0062

右美托咪定调控 FOXO3 抑制 PINK1/Parkin 介导的线粒体自噬减轻心肌缺血再灌注损伤的机制研究

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目的 探讨右美托咪定（Dex）预处理能否通过抑制 PINK1/Parkin 介导的线粒体自噬对抗心肌缺血再灌注损伤，其作用机制是否与 FOXO3 蛋白表达上调有关。
方法 1.成年雄性 C57BL/6J 小鼠通过结扎冠状动脉左前降支 30 min，再灌注 6 h，建立心肌缺血再灌注（I/R）模型。在手术前 30 min 使用 25 μg/kg 的 Dex 行腹腔注射，后进行 I/R 处理。通过 Evans blue-TTC 染色、HE 染色、小鼠心脏超声检测小鼠心肌梗死面积、病理损伤及心功能变化；测定小

鼠血清中超氧化物歧化酶（SOD）、丙二醛（MDA）、心肌肌钙蛋白 I（cTnI）、肌酸激酶同工酶 MB（CK-MB）、乳酸脱氢酶（LDH）水平；通过心肌组织 ATP 含量测定、透射电镜及 TUNEL 染色评估线粒体损伤及心肌细胞凋亡情况；Western blot 测定 PINK1、Parkin、P62、LC3B、BCL2、BAX 的表达量；RT-qPCR、Western blot 及免疫组化染色检测 FOXO3 蛋白变化。
2.使用 H9c2 心肌细胞通过 4 h 缺氧，3 h 复氧建立缺氧/复氧（H/R）模型。1 μM 的 Dex 预处理 2 h 或 1 μM 的 Dex 与 20 μM 的线粒体自噬诱导剂（CCCP）共同预处理 2 h 后建立 H/R 模型，复氧时继续使用 CCCP。利用 CCK-8、LDH 试验检测细胞活力及 LDH 水平；Western blot 测定 PINK1、Parkin、P62、LC3B、BCL2、BAX 的表达量；通过 DCFH-DA 及 Rhodamine123 荧光探针检测细胞内活性氧（ROS）水平与线粒体膜电位变化情况；免疫荧光法检测 LC3B 与 TOM20 共定位情况。
3.使用小干扰 RNA 转染 H9c2 心肌细胞，对 FOXO3 基因进行沉默，后进行 Dex 预处理与 H/R 模型建立。通过 CCK-8、LDH 试验检测细胞活力及 LDH 水平；Western blot 检测相关蛋白表达量；通过 MitoSOX 探针、ATP 含量检测、JC-1 荧光探针及 Hoechst 染色检测心肌细胞线粒体损伤及细胞凋亡情况。
结果 1.与 I/R 组相比，Dex 组小鼠的心肌梗死面积明显减少、病理损伤减轻、心功能明显改善、血清中 cTnI、CK-MB、LDH 及 MDA 水平明显下降、SOD 活性升高；心肌组织 ATP 含量显著增加、心肌细胞线粒体损伤减轻、凋亡减少。I/R 组线粒体自噬相关蛋白表达增加，BCL2/BAX 比值下降，FOXO3 蛋白表达下降， Dex 预处理则明显下调线粒体自噬相关蛋白的表达，BCL2/BAX 比值升高，FOXO3 蛋白表达升高。
2.与 H/R 组相比，Dex 预处理可明显提高细胞活力、减少 LDH 的释放，蛋白变化趋势与小鼠体内一致；细胞内 ROS 产生明显减少、线粒体膜电位明显升高、LC3B 与 TOM20 共定位的数量明显减少。然而，CCCP 能够逆转 Dex 的上述保护作用，LC3B 与 TOM20 共定位的数量明显增加。
3.与 si-NC+H/R 组相比，Dex 预处理对心肌细胞的保护作用与上述一致，线粒体内超氧化物水平明显下降、心肌细胞 ATP 含量增加、线粒体膜电位升高、凋亡减少。然而，沉默 FOXO3 基因后，Dex 对心肌细胞的保护作用被逆转。
结论 Dex 预处理通过抑制 PINK1/Parkin 介导的线粒体自噬对抗心肌缺血再灌注损伤，其作用机制可能与 FOXO3 蛋白表达上调有关。

PU-0063

Identifying potential key ferroptosis-related genes and therapeutic drugs in sepsis-induced ARDS by bioinformatics and experimental verification

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Background: Acute respiratory distress syndrome (ARDS), a serious pulmonary complication during sepsis, is lack of effective therapeutic strategy. Ferroptosis is a newly recognized type of regulated cell death associated with the occurrence and progression of sepsis. Nonetheless, the exact contribution of ferroptosis to sepsis-induced ARDS remains mostly uncharted territory. We thus aimed to determine the key ferroptosis-related genes in sepsis-induced ARDS and investigate therapeutic traditional Chinese medicine (TCM) using bioinformatics analyses, and verify these genes via experiment validation.
Method: We conducted an analysis on the sepsis-induced ARDS dataset obtained from the Gene Expression Omnibus (GEO) database. Our analysis focused on identifying differentially expressed genes related to ferroptosis (FRDEGs). Subsequently, we performed an enrichment analysis on the acquired FRDEGs, encompassing both Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathways. To establish and visualize the protein-protein interaction (PPI) network, we employed the STRING database and CytoScape software. Through this analysis, we

successfully identified the crucial hub genes within the set of FRDEGs. We also analyzed the infiltration of immune cells in septic ARDS. In order to further explore the regulation of FRDEGs, we also constructed the competitive endogenous RNA (ceRNA) network. Finally, we established a mouse model of sepsis-associated ARDS by cecal ligation and puncture (CLP) operation to verify the value of the hub genes. The histological alterations in the lung tissues of mice were visualized and examined by hematoxylin and eosin (HE) staining. We also assessed the level of malondialdehyde (MDA) and glutathione (GSH) in lung tissues, which are characteristic markers of ferroptosis. In addition, quantitative real-time PCR was utilized to detect the mRNA of hub genes in the blood of septic ARDS mice. Traditional Chinese medicine (TCM) targeting hub genes was predicted via SymMap database and was verified in LPS-challenged HPAEpiC cells.

Results: Through our analysis, we identified a total of 341 differentially expressed genes （DEGs） in GSE10361 between the sepsis-induced ARDS group and the sham group, comprising 286 up-regulated genes and 55 down-regulated genes. Through intersecting the ferroptosis-related genes extracted from the "FerrDb" database with the DEGs, we obtained 16 FRDEGs (15 up-regulated genes and 1 down-regulated genes), among which G6PD may be both driver and suppressor genes, while HSPB1 and GPX4 may be both marker and suppressor genes. Moreover, through our enrichment analysis, the results showed that the FRDEGs were predominantly associated with pathways such as the NOD-like receptor signaling pathway, IL-17 signaling pathway, and Toll-like receptor signaling pathway. In the GO-BP analysis, the main enrichment pathways included regulation of histone phosphorylation and cellular responses to oxidative stress. The results of the GO-CC analysis primarily enriched in the endoplasmic reticulum-Golgi intermediate compartment. In GO-MF analysis, antioxidant activity and intramolecular oxidoreductase activity were mainly enriched. Our enrichment analysis suggested that oxidative stress and inflammation response may play an important role in septic ARDS. We employed the CytoHubba plugin in Cytoscape to identify hub genes using the MCC algorithm. The top 4 genes with the highest scores (IL1B, TXN, MAPK3, HSPB1) were selected as hub genes. Data from CIBERSORT analysis showed that the proportion of monocytes was higher in sepsis-induced ARDS, and the proportion of gamma delta T cells and naive CD4+ T cells was decreased. And four hub genes (IL1B, TXN, MAPK3, HSPB1) were also closely related to immune cells. We used ENCORI database to predict the microRNA of TXN, MAPK3, HSPB1 and IL1B in batches and obtained a total of 26 microRNA targeting TXN, MAPK3, HSPB1 and IL1B. Correspondingly, 38 lncRNA and 61 pairs of microRNA-lncRNA were obtained. In ARDS mice induced by CLP, lung injury and MDA expression were increased while GSH expression was decreased. The ferroptosis-related genes of IL1B, MAPK3 and TXN were highly expressed and the difference was statistically significant between ARDS group and sham group, in which IL1B and MAPK3 are ferroptosis driver genes while TXN is ferroptosis suppressor gene. According to FDR< 0.01 screening criteria, 138 TCMs targeting ILB, 80 TCMs targeting MAPK3, and 2 TCMs targeting TXN were respectively found by SymMap. Finally, by intersecting these TCMs, we obtained that sea buckthorn can simultaneously target IL1B, MAPK3 and TXN, which may be a potential TCM for the treatment of sepsis-related ARDS. Then, we further determined the effects of sea buckthorn intervention on mRNA expression of IL1B, MAPK3 and TXN in HPAEpiCs challenged by LPS. The mRNA expression of IL1B, MAPK3 and TXN in HPAEpiCs was significantly increased. However, sea buckthorn treatment down-regulated mRNA level of IL1B, MAPK3 and up-regulated TXN expression. In addition, LPS obviously decreased cell viability of HPAEpiCs, which was attenuated by sea buckthorn.

Conclusions: Ferroptosis-related genes of IL1B, MAPK3 and TXN serve as potential target genes for sepsis-induced ARDS. Sea buckthorn may be therapeutic medication for sepsis-induced ARDS. And this study will provide a new direction for the future treatment of sepsis ARDS.

PU-0064

LDLR 基因多态性与老年人群脑梗死的遗传关联研究

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目的 探讨 LDLR 基因 rs1122608 多态性与老年患者脑梗死风险的遗传关联。
方法 选择在山西医科大学第一医院神经内科以脑梗死入院的患者 153 例为病例组，选择同期年龄、性别匹配的体检中心患者 489 例为对照组。使用 PCR 法对 LDLR 基因 rs1122608 多态性进行分型，使用 Hardy-Weinberg 定律进行遗传平衡检验。采用 Logistic 回归分析 LDLR 基因多态性与脑梗死的遗传关联研究。
结果 病例组糖尿病、高脂血症、冠心病及饮酒与对照组差异无统计学意义（P＞0.05），高血压、吸烟与对照组差异有统计学意义（P＜0.05）。2 组 rs1122608 位点 GG、GT、TT 基因型频率及 T、G 等位基因频率比较，差异有统计学意义（P＜0.05）。rs1122608 位点 GT 基因型是老年患者脑梗死的独立危险因素（OR=0.404，95%CI：0.223~0.732，P=0.003）。
结论 LDLR rs1122608 位点基因多态性可能与老年患者脑梗死的发病相关，可能作为其风险预测的有效遗传因子。

PU-0065

Dexmedetomidine ameliorates renal ischemia-reperfusion injury and cell pyroptosis through regulating HSP70/NLRP3 pathway via α2-receptor

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Objective: Exploring the protective effect of dexmedetomidine (DEX) on renal ischemia-reperfusion (IR) and clarify whether its mechanism is activated to α upregulation of heat shock protein 70 (HSP70) via α2-AR,reducing NOD like receptor associated domain 3 (NLRP) mediated cell pyroptosis.
Methods： We established the IR-induced renal injury model in mice, and OGD/R induced HK-2 cells damage in vitro. Adult healthy C57BL/6 mice (6–8 weeks, 18–22 g) were obtained from Cavens Biogle Model Animal Research Co., Ltd. (Soochow,
China). The renal IR injury model was established by clamping the bilateral renal pedicles for 45 minutes and then restoring blood perfusion for 48 hours. DEX 50 μg/kg was injected intraperitoneally 30 minutes before clamping the renal pedicle and immediately after releasing the clamp. Atimezol: ATI is α2 receptor blockers, administered simultaneously with dexmedetomidine at a rate of 250 μ Intraperitoneal injection at a dose of 250μg/kg.VER155008 is a specific inhibitor of HSP70, administered intravenously at a dose of 25 mg/kg before membrane formation.Renal tissue and blood were collected after 48 hours of reperfusion. Transfection of siHSP70 into HK2 cells to evaluate the specific molecular mechanisms.HE、Masson、Western blotting、RT-qPCR、Immunohistochemical、immunofluorescence、DCFH-DA、Transmission electron microscopy were used.
Results: Our results revealed that Dex administration mitigated tissue damage, inhibited pyroptosis, and downregulated inflammation response following renal IR injury, which were

associated with the activating of HSP70. In addition, HSP70 downexpression abolishes Dex-mediated protective effects on I/R or OGD/R induced pyroptosis and inflammation.
Conclusion Dex attenuates pyroptosis-mediated renal IR injury and inflammation by activating HSP70 to inhibit NLRP3 via α2-AR.

PU-0066

8 分钟窒息心脏骤停-心肺复苏大鼠 7 天生存率影响因素分析

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目的 探讨 8 分钟窒息心脏骤停-心肺复苏（CA-CPR）大鼠 7 天（d）生存的影响因素，为后续动物模型的成功建立提供参考。
方法 95 只 Spargue Dawley（SD）大鼠分为 7d 存活组和未存活至 7d 死亡组，均接受窒息 8 分钟 CA-CPR，期间记录 SD 大鼠基线、CPR 时、自主循环恢复（ROSC）即刻及 ROSC 后 15 分钟时心率（HR）、平均动脉压（MAP）、呼气末二氧化碳分压（ETCO2）、体温（T℃）、肾上腺素用量、CA 时间、CPR 时间、液体总量、存活大鼠 7d 时大鼠神经功能缺损评分（NDS），分析影响 SD 大鼠存活的可能因素，绘制受试者工作特征(ROC)曲线，评价可能的影响因素对 SD 大鼠存活的预测价值，使用 Spearman 相关系数分析 7d 时存活组 SD 大鼠 NDS 与 CPR 时间及 15min 时 ETCO2 的相关性。
结果 142 只 SD 大鼠，最终 ROSC 且纳入本研究 SD 大鼠 95 只，存活至 7d 有 24 只，存活率 25.3%。单因素分析表明，与死亡组相比，ROSC 即刻及 ROSC 15 分钟时 HR、平均动脉压 MAP、ROSC15 分钟时 ETCO2 和 CPR 时间与存活组有明显差异（P＜0.05），多因素 COX 回归分析结果显示，CPR 时间〔优势比（HR）＝1.003，95% 可信区间（95%CI）为 1.000～1.006，P＝0.046〕及 ROSC 后 15 分钟时 ETCO2（HR＝0.953，95%CI 为 0.914～0.993，P＝0.022）是 CA-CPR 大鼠 7d 存活的独立影响因素。ROC 曲线分析结果显示，CPR 时间及 15min 时 ETCO2 的 ROC 曲线下面积（AUC）分别为 0.89（0.88-0.99），0.81（0.65-0.84）（均 P＜0.05）。此外，Spearman 相关系数分析表明 NDS 与 CPR 时间呈明显负相关（P=0.018），与 15min 时 ETCO2 呈明显正相关（P＜0.009）。
结论 8 分钟窒息 CA-CPR 大鼠 7d 生存率为 25.3%，CPR 时间及 ROSC 后 15 分钟时 ETCO2 预测在 CA-CPR 大鼠 7d 存活率方面具有较高的敏感性和特异性，且与其 7d 存活时状态呈明显的相关性。

PU-0067

Hydrogen regulated pyroptosis through NLRP3-GSDMD pathway to improve airway mucosal injury induced by tracheal tube cuff compression

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Objective: The cuff of endotracheal tube (ETT) is an indispensable device for establishing an artificial airway, yet cuff-induced compression often causes damage to the airway mucosa. The mechanism of this damage involves mucosal compression ischemia and the oxidative stress injury following reperfusion. Currently, there is a lack of effective strategies to protect the mucosa.

Hydrogen, as a natural antioxidant, has demonstrated significant potential in the prevention and treatment of ischemia-reperfusion injuries. This study aimed to evaluate the protective effects of hydrogen on airway mucosa subjected to compression from ETT cuffs.

Methods: In our clinical observations, we meticulously recorded the extent of airway mucosal damage in patients after tracheal intubation procedures. To further explore this issue, we conducted controlled experiments on domestic rabbits, adjusting cuff pressures to determine the threshold at which airway mucosal damage becomes significant. Leveraging these results, we extended our research to include both in vivo and in vitro models, allowing for a comprehensive examination of the effects of ETT cuff pressure on airway mucosa. We utilized a variety of histological staining techniques, including HE, PAS, and TUNEL staining, to visually assess and document the damage. To ascertain the protective effects of hydrogen gas on airway mucosal damage, we analyzed staining results from both a hydrogen gas intervention group and an air intervention group, confirming hydrogen's beneficial impact. Electron microscopy was employed to observe mitochondrial structural changes in macrophages and neutrophils, which are intricately linked to airway mucosal damage. Additionally, we assessed alterations in intracellular reactive oxygen species and crucial cell pyroptosis pathways, such as NLRP3-GSDMD, providing valuable insights into the molecular mechanisms involved. On a cellular level, by either knocking out or overexpressing the NLRP3 gene among other studies, we further elucidated how hydrogen gas mitigates airway mucosal damage. Finally, regarding clinical data, we gathered and analyzed information concerning postoperative pharyngolaryngeal pain in patients whose ETT cuffs were inflated with hydrogen-rich saline versus those inflated with air.

Results: Through comprehensive clinical observations and studies, we identified instances of airway mucosal damage during endotracheal intubation in certain patients, prompting significant concern. In response, we performed extensive experimental investigations into the effects of gradient pressure in ETT cuffs, using a rabbit model. The results showed that setting the cuff pressure to 35 cmH2O caused the most severe epithelial damage in the rabbit's airway mucosa, including partial mucosal detachment. This finding led us to adopt this pressure setting as the standard for further experiments. Subsequently, we examined the therapeutic impact of inhaling 2% hydrogen gas. This intervention markedly mitigated airway mucosal damage, as reflected in the HE, PSA, and Tunel scores. Notably, the group inhaling hydrogen exhibited significant improvements in HE and PSA scores and a substantial decrease in Tunel scores, compared to the group inhaling air. Additionally, hydrogen significantly ameliorated mitochondrial structural damage associated with airway mucosa injury by reducing mitochondrial swelling, membrane rupture, and decreasing the number of mitochondrial cristae. Upon confirming the protective effects of hydrogen against airway mucosal damage, we delved into the potential mechanisms of its protective action. Given previous evidence of hydrogen's regulatory impact on inflammation, oxidative stress, and cellular pyroptosis, we observed a pronounced suppression of the NLRP3 inflammasome expression in rabbit airway tissues, and a decrease in the assembly component ASC of NLRP3, upon hydrogen treatment. Since the NLRP3 inflammasome plays a critical role in cellular pyroptosis, we further investigated the effects of hydrogen on this pathway. Our results indicate that hydrogen regulates the NLRP3 inflammasome, leading to a marked reduction in the expression of downstream proteins such as caspase-1 and GSDMD compared to the air inhalation group. Additionally, hydrogen significantly attenuated the expression of inflammatory markers, including NF-κB and IL-1β.

After confirming hydrogen's protective effects in animal models, we conducted hypoxia/reoxygenation experiments on airway mucosal epithelial cells to evaluate its efficacy at the cellular level. The findings revealed that hydrogen substantially increased the survival rates of these cells under hypoxia/reoxygenation conditions. It also decreased the levels of oxidative stress markers such as MDA, NO, and ROS, while boosting the expression of the antioxidant enzyme SOD. In genetic manipulation experiments, where the NLRP3 gene was either knocked out or overexpressed, we observed that inhibiting NLRP3 expression significantly enhanced hydrogen's protective effects against apoptosis induced by hypoxia/reoxygenation. Conversely, NLRP3 overexpression diminished these effects. Hydrogen treatment also reduced the expression of the inflammatory factors NF-κB, IL-1β, and the proteins NLRP3, ASC, caspase-1, and GSDMD. Regarding mitochondrial integrity, hydrogen treatment notably improved conditions of

mitochondrial swelling and membrane rupture, and partially restored the structure of mitochondrial cristae. Moreover, the suppression of NLRP3 expression further augmented the improvements in mitochondrial damage mediated by hydrogen, while its overexpression negated these benefits.
In our final assessment, we evaluated the clinical efficacy of hydrogen application. Using the VAS for pain, we noted that patients experienced peak pharyngolaryngeal pain scores 2 hours post-extubation. Compared to patients whose ETT cuffs were inflated with air, those with hydrogen-rich saline in their cuffs exhibited significantly lower pharyngolaryngeal pain scores within 72 hours after extubation. These results offer compelling evidence supporting the clinical use of hydrogen in therapeutic interventions.
Conclusion: Hydrogen gas provides effective protection against ischemia-reperfusion injury in airway mucosa due to ETT cuff compression by inhibiting oxidative stress-induced pyroptosis through the NLRP3-GSDMD pathway. Our results support the potential of hydrogen as a viable preventative and therapeutic approach for mitigating airway mucosal injury during tracheal intubation.

PU-0068

IL-33/ST2 轴激活线粒体功能修复急性肺损伤

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目的 本团队前期研究发现急性肺损伤小鼠肺上皮细胞板层小体、线粒体、内质网等细胞器损伤。研究报道 IL -33 作为报警素在炎症组织中升高。然而 IL -33 在急性肺损伤期间的潜在机制尚未完全明确。本研究拟构建 ARDS 动物和细胞模型，研究 IL -33 在 ARDS 中的作用机制，探究 IL -33 对线粒体功能的影响以及促进肺损伤修复的机制。
方法 气管滴注脂多糖（ LPS ）构建小鼠急性肺损伤模型，观察建模后不同时期小鼠肺内变化。HE 染色观察肺病理损伤，透射电镜（TEM）观察肺 II 型上皮细胞细胞核、细胞膜、线粒体等结构超显微病理变化。肺泡灌洗液（ BALF ）总蛋白浓度和细胞计数明确肺内损伤水平。检测湿干比反映肺组织水肿情况。ELISA 检测炎症因子明确炎症反应发生。WB 和 qPCR 检测小鼠肺内 IL-33/ST2 轴激活。使用 TEM 观察线粒体数量、融合分裂、线粒体脊和基质损伤，观察自噬溶酶体形成。通过 WB、qPCR 和免疫荧光检测 LC3BII、ATG5、p62 等线粒体自噬标记物表达情况。检测线粒体 DNA 拷贝量。检测小鼠 BALF 和血清中乳酸（LA）浓度、MDA 含量、SOD 活性提示氧化应激激活，反映线粒体能量代谢变化。进一步使用 PBS、 LPS 、 rmIL -33 重组蛋白干预培养 MLE12 小鼠肺上皮细胞，细胞层面明确 IL-33 的作用。使用 CCK-8 检测细胞活力。Ki67、caspase3 明确细胞增殖和凋亡情况。检测 IL-1β 和 TNF-α 等炎症因子含量明确 IL-33 对炎症反应的作用。JC-1 检测 MLE12 细胞线粒体膜电位变化，测定 ATP 合成情况，PCR 和 WB 检测自噬标志物表达变化。
结果 LPS 气管内滴注诱导小鼠 ARDS 。LPS3d 时小鼠肺湿干比、 BALF 蛋白浓度、细胞计数、IL -1β 和 TNF -α 水平达到峰值，提示 3 天时小鼠肺损伤最明显。HE 染色见 LPS 组肺泡中红细胞和中性粒细胞和巨噬细胞浸润，肺泡内炎性渗出和蛋白碎片增加。LPS1d 时 TEM 见肺泡 II 型上皮细胞内板层小体减少，线粒体水肿，可见少量线粒体融合分裂；LPS3d 时见肺泡上皮细胞微绒毛消失，细胞核结构破坏，细胞质电子密度不均一下降，板层小体皱缩、损伤，线粒体基质肿胀甚至空泡化，线粒体脊损伤明显，自噬小体和自噬溶酶体形成。ELISA 检测 LPS 小鼠 BALF 和血清中 IL-33 浓度明显增加，WB 和 qPCR 检测 IL-33/ST2 轴激活。LPS 组小鼠 LC3BII、ATG5、ATG3 和 p62 蛋白和 mRNA 表达增加，免疫荧光见 LC3BII 和 ATG5 分别与 WIF1 共定位，提示肺上皮细胞发生线粒体自噬。Cell-free mtDNA79 和 mtDNA230 拷贝量增加，提示线粒体损伤逃逸。LPS 组小鼠 BALF 和血清中 LA 降低。LPS1d 时肺组织 SOD 含量显著升高，MDA 含量降低。LPS3d 时肺组织 SOD 含量和 MDA 含量均降低。以上结果提示 LPS 小鼠 IL-33/ST2 轴激活和肺泡 II 型上皮细胞线粒体损

伤。同时本研究使用 LPS 构建炎症损伤细胞模型，发现 LPS 诱导 MLE12 小鼠肺上皮细胞合成和释放 IL-33。为了进一步探究 IL -33 的作用，rmIL-33 与 MLE12 小鼠肺上皮细胞共培养，发现 IL -33 呈剂量依赖性提高 MLE12 细胞活力促进细胞增殖，提高线粒体膜电位，减少 MLE12 细胞中乳酸生成，提高 MLE12 细胞中的 ATP 水平，且 IL -33 促进 MLE 细胞 LC3B- II 和 ATG5 蛋白表达；降低促炎因子 TNF-α、IL-1β 表达。

结论 LPS 诱导小鼠急性肺损伤，3d 时肺部炎症反应和病理损伤达到高峰，10d 时有所恢复。LPS 激活小鼠肺内 IL -33/ST2 轴高表达。IL-33 促进线粒体功能恢复，抑制炎症反应，缓解肺损伤。

PU-0069

抑制乙酰转移酶 p300 对大鼠体外循环肺损伤及自噬的影响

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目的 探讨抑制乙酰转移酶 p300 对大鼠体外循环肺损伤及自噬的影响

方法 18 只雄性健康 SD 大鼠随机分为 3 组（n=6）：假手术组（Sham 组）、体外循环左肺损伤组（I/R 组），体外循环左肺损伤+p300 抑制剂组（C646 组）。Sham 组做穿刺及开胸处理，不建立 CPB；I/R 组及 C646 组建立 CPB 左肺损伤模型，并在 CPB 前 10min 经尾静脉分别注射等量生理盐水及 p300 选择性抑制剂 C646；实验在三个时间点行血气分析，包括体外循环前（T1）、开放肺门 10 分钟后（T2）以及实验结束时（T3），同时计算得出氧合指数（OI）和呼吸指数（RI）的值；实验结束时取左肺支气管肺泡灌洗液（BALF)及左侧肺组织，ELISA 检测左肺 BALF 中 TNF-α 和总蛋白含量，透视电镜下观察左肺组织自噬小体和自噬溶酶体，Western-Blot 检测肺组织 p300 及自噬相关蛋白 Beclin1、p62 表达。

结果 与 Sham 组比较，T2、T3 时刻 I/R 组和 C646 组 OI 明显降低，RI 明显升高(P＜0.05)、TNF-α 和总蛋白含量明显增加，I/R 组 p300 和 Beclin1、P62 表达增加（P＜0.05），C646 组 p300、Beclin1 表达减少，p62 表达增加（P＜0.05），病理损伤评分明显升高（P＜0.05），II 型肺泡上皮细胞胞浆内自噬明显；与 I/R 组比较，T3 时刻 C646 组 OI 明显升高，RI 明显降低（P＜0.05），TNF-α 和总蛋白含量明显降低，p300 和自噬相关蛋白 Beclin1、P62 表达减少（P＜0.05），病理损伤评分明显降低，II 型肺泡上皮细胞胞浆内自噬减少（P＜0.05）

结论 抑制乙酰转移酶 p300 后大鼠 CPB 后肺组织自噬蛋白 Beclin1、P62 表达明显减少；乙酰转移酶 p300 抑制剂 C646 可减轻肺部炎症反应，改善肺功能，可能与其抑制过度自噬有关。

PU-0070

丙泊酚对小鼠前包钦格复合体谷氨酸能神经元的电生理反应

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目的 丙泊酚作为常用的静脉麻醉药，可以导致不同程度的呼吸不良事件（包括呼吸抑制），与患者安全息息相关。然而丙泊酚导致这一系列呼吸不良事件的机制尚不清楚。哺乳动物的呼吸启动依赖于低位脑干的前包钦格复合体，主要有谷氨酸能兴奋性神经元、甘氨酸能和 γ-氨基丁酸能抑制性神经元亚群。先前的研究发现，在前包钦格复合体（pre-Bötzinger complex，PrBo）中微量注射谷氨酸类似物，会导致呼吸急促反应，说明前包钦格复合体谷氨酸神经元是呼吸节律发生的核心。也有研究表明，在呼吸神经网络（特别是 PrBo）中的 Dbx1 神经元，根据潜伏期长短可以分为 1 型和 2 型神经元，其中 1 型神经元影响呼吸频率，而 2 型神经元影响潮气量。说明不同类型的 Dbx1 神

经元参与呼吸调控的方式和产生的作用不同，而 PrBo 中 Dbx1 神经元属于谷氨酸能。因此本文采用全细胞膜片钳技术将 PrBo 中谷氨酸神经元进行分类，同时分析了丙泊酚（5mmol/L 和 10mmol/L）持续灌注前后两种类型神经元活性的变化，尝试使用以上方式阐明丙泊酚引起呼吸抑制的细胞基础。
方法 本文首先通过全细胞膜片钳将 PrBo 中谷氨酸神经元进行了分类，继而分别灌流代表性静脉全身麻醉药物丙泊酚 5mmol/L 和 10mmol/L，从而明确了这两种神经元的兴奋性改变。
结果 1. PrBo 中 1 型谷氨酸神经元比 2 型谷氨酸神经元潜伏期长。2. 灌注 5mmol/L 丙泊酚可导致 PrBo 1 型谷氨酸神经元潜伏期变短，阈电流无明显变化，2 型谷氨酸神经元潜伏期和阈电流均无明显变化。3. 灌注 10mmol/L 丙泊酚可导致 PrBo 中 1 型谷氨酸神经元潜伏期变短，阈电流无明显变化，2 型谷氨酸神经元潜伏期和阈电流均无明显变化。
结论 PrBo 中 1 型谷氨酸神经元比 2 型谷氨酸神经元有更长的延迟兴奋，5mmol/L 和 10mmol/L 丙泊酚可兴奋 PrBo 中 1 型谷氨酸神经元，而不影响 2 型谷氨酸神经元的兴奋性。

PU-0071

Enhancing effect of 808 nm near-infrared laser irradiation on the cognitive function in mice

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Introduction: Cognitive function is the brain judgment ability to reflect the features, states and interrelation of objective things. Once brain suffers from damage or injury under pathological condition and/or neurological diseases, cognitive dysfunction may occur and manifests with abnormal learning, memory and thinking judgment. Underlying mechanisms are largely unknown although its relation to the abnormality of neuronal activity of various brain regions. Although conventional treatment methods such as drug therapy or brain stimulation via craniotomy can achieved some effects, the unavoidable side effects of medication as well as the invasive trauma from surgery making these therapies are not optimal. Accordingly, physical intervention techniques might be good alternative for functional disease conditions.
Photobiomodulation (PBM) utilizing the photon energy of light to modulate the brain functions of humans or animals is promising in which Near-infrared (NIR) laser (780~1100 nm) is used to modulate brain physiological functions due to benefiting from its effective penetrability and excellent photobiological regulatory ability. Accordingly, PBM has been reported to apply clinically and in animal studies for improving cognition or treating depression in various neurological diseases or disease conditions owing to its functions of scavenging oxygen free radicals, anti-inflammatory, reducing amyloid and improving neurotrophic factors.
The hippocampus is one of the most closely related encephalic region with spatial learning and memory of cognitive function. Targeting the hippocampus with PBM showed a significant improvement in dementia patients with well tolerated and no adverse side effects. However, its underlying mechanisms remains and effectiveness in other disease conditions are unknown.
In this study, we customized a device equipped with a NIR laser of 808 nm to directly and non-invasively irradiate the hippocampus region of mice during learning and memory processes in the models of the postoperative cognitive dysfunction (POCD) and lipopolysaccharide (LPS)-induced cognitive dysfunction to verify its therapeutic usefulness.
Methods: Animals and Treatment: Adult male C57BL/6J mice and VGluT2-ires-cre mice were used. Mice were housed under controlled conditions and had free access to food and water. The 808 nm single-mode fiber-coupled laser apparatus was used for PBM. Mice underwent various cognitive tests, including the Barnes maze and Y-maze, following PBM treatment.
Surgical Procedures: Stereotaxic surgery was performed to implant fiber optic cannulas for precise NIR laser delivery to the hippocampal region. Post-surgery, mice were allowed to recover before undergoing behavioral and electrophysiological testing.

Behavioral Testing: The Barnes maze and Y-maze were used to assess spatial learning, memory, and working memory. Mice were exposed to NIR laser during training phases and their performance was monitored and recorded.
Electrophysiological Recording: In vivo recordings were conducted to measure local field potentials (LFP) and neural oscillations in the DG and CA1 regions of freely moving mice. Power spectral density and phase-amplitude coupling (PAC) were analyzed.
Immunohistochemistry and Fiber Photometry: Immunofluorescence staining for c-Fos was performed to assess neuronal activation. Fiber photometry was used to record calcium signals in DG neurons during behavioral tasks and immediate responses to NIR laser stimulation.
in vitro optical validation test: For the scattering effect of NIR laser in the hippocampus of mouse, 5 μm monodisperse polystyrene (PS) nanospheres were used for in vitro hippocampal simulation. The absorbance, transmittance and reflectance spectrum of the suspension of PS microspheres were measured with a fiber optical spectrometer.
Results: PBM significantly improved cognitive function in naive mice, as demonstrated by enhanced performance in the Barnes maze and Y-maze tests. Mice irradiated with 6 mW/cm² NIR laser exhibited the best cognitive performance, with shorter latency times and higher alternation percentages compared to control groups.
Electrophysiological recordings revealed that 808 nm NIR laser increased the power of neural oscillations, particularly in the theta (4-8 Hz) and gamma (80-120 Hz) bands in the DG. Enhanced theta-gamma coupling was observed, indicating improved neural network activity essential for cognitive processing. This effect was specific to the DG and not observed in the CA1 region, suggesting targeted activation of DG neurons by NIR laser.
Immunohistochemical analysis showed a significant increase in c-Fos expression in the DG, but not in the CA1, confirming specific activation of DG neurons. Fiber photometry corroborated these findings, showing increased calcium signal intensity in DG neurons during cognitive tasks and immediate laser exposure.
The underlying mechanism for NIR-induced cognitive improvements was attributed to the high-density cell structure of the DG, which facilitates local energy deposition and neural activation. This structural feature enables the DG to absorb and retain more NIR light, enhancing neural activity and cognitive function.
Additionally, PBM significantly rescued cognitive deficits in mice models of postoperative cognitive dysfunction (POCD) and lipopolysaccharide (LPS)-induced cognitive impairment. NIR laser treatment improved learning and memory performance and increased neuronal activation in the DG, demonstrating its therapeutic potential for cognitive dysfunction.
Conclusion: This study demonstrates that 808 nm NIR laser PBM significantly enhances cognitive functions in mice by improving neuronal activity and neural oscillations in the hippocampal DG. The specific activation of DG neurons, facilitated by their dense cellular structure, suggests a novel mechanism for PBM-induced cognitive improvements. Additionally, PBM shows promise in treating cognitive impairments related to surgery and inflammation. Future research should explore the applicability of these findings in human clinical settings and investigate the detailed molecular mechanisms underlying PBM effects on cognitive functions.

PU-0072

苦豆碱对睾丸缺血再灌注损伤的保护作用及其机制研究

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目的 睾丸扭转是一种泌尿外科急症，常见于青少年，可能导致睾丸内血液循环受阻，影响睾丸中生精相关细胞的正常代谢过程，进而损害精子生发过程，导致男性生育能力的下降。睾丸扭转复位术是临床上的首选干预方法，但是，即使手术复位成功，患者仍有可能面临睾丸缺血再灌注损伤所致睾丸萎缩、生精功能下降，甚至男性不育的风险。苦豆碱是从苦豆子中提取的一种主要活性生物

碱。研究显示它具有器官保护作用。然而，苦豆碱对睾丸再灌注损伤的影响及其潜在机制尚不清楚。本研究旨在探讨苦豆碱对大鼠睾丸扭转/再复位所致的缺血再灌注损伤的影响。

方法 本研究以 6-8 周龄的雄性 SD（Sprague-Dawley）大鼠为研究对象，随机分为：假手术组（sham）、睾丸再灌注损伤模型组（TI/R）、苦豆碱预处理组(ALOPre)和苦豆碱后处理组(ALOPost)。本研究分别构建大鼠急性睾丸缺血再灌注损伤模型：在手术中首先切开右侧阴囊分离睾丸，接着绕精索纵轴顺时针旋转 720 度，诱导睾丸缺血 3 小时，随后绕精索纵轴逆时针旋转 720 度，复位睾丸，分别在再灌注 3 小时后取材扭转侧与对侧睾丸。在睾丸扭转前(ALOPre)或睾丸扭转开始时(ALOPost)静脉给苦豆碱(10mg/kg)。通过睾丸脏器系数以评估睾丸水肿程度、MDA（Malondialdehyde）/SOD（Superoxide dismutase）/GSH（Glutathione）含量测定以评估睾丸再灌注损伤后的氧化应激水平、Johnsen 和 Cosentino 评分以反映睾丸结构损伤情况、TUNEL 染色以显示睾丸细胞凋亡的程度，以及通过免疫组化分析睾丸组织炎症因子 IL-6（Interleukin-6）、TNF-α（Tumor necrosis factor-α）的表达水平，以反映睾丸炎症反应的情况。再通过蛋白分析和免疫组化来评价苦豆碱对再灌注损伤 RISK 和 SAFE 信号通路的影响。

结果 苦豆碱对扭转侧和对侧睾丸均具有保护作用，表现为与 TI/R 相比，扭转侧和对侧睾丸肿胀反应减轻，结构损伤减轻，组织学评分提高，睾丸凋亡减少，氧化应激和炎症反应减轻。此外，对于扭转侧睾丸，苦豆碱增强了 SAFE 通路中的 STAT-3 的磷酸化，但不影响 SAFE 通路蛋白的表达。而使用 STAT-3 抑制剂 Ag490 则有效抑制扭转侧 STAT-3 的磷酸化，并且消除了苦豆碱对扭转侧睾丸的保护作用。但对于对侧睾丸，苦豆碱不影响睾丸 RISK 和 SAFE 蛋白信号通路表达。

结论 苦豆碱对睾丸扭转/复位后扭转侧和对侧睾丸均有较强的保护作用。这种由苦豆碱诱导的扭转侧睾丸保护是通过 STAT-3 信号通路介导。

PU-0073

Erythropoietin protected against Escherichia coli-induced acute respiratory distress syndrome by increasing YAP1-associated cathelicidin expression

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Background: Acute respiratory distress syndrome (ARDS) is a common disease with high morbidity and mortality that is mainly caused by bacterial pneumonia. Unfortunately, effective therapeutic approaches to treat ARDS are lacking due to antibiotic resistance. Erythropoietin has been demonstrated to protect diverse organs and repair damage. However, its therapeutic role in bacterial pneumonia is unknown. Cathelicidins, a major group of natural antimicrobial peptides, have broad-spectrum antibacterial and immunomodulatory activities.

Methods: A mouse model of direct lung injury was constructed by intratracheal infusion of Escherichia coli (E. coli), and EPO was subcutaneously administered 1 hour after the ARDS model was established. In vitro experiments were performed on E. coli-infected BEAS-2B bronchial epithelial cells.

Results: EPO treatment improved the survival rate, alleviated lung injury, decreased respiratory failure and restored lung function. EPO also enhanced pathogen clearance by increasing the levels of cathelicidin-related antimicrobial peptide (CAMP) in mice. These benefits of EPO on the E. coli injury are dependent on the upregulation of CAMP. Mechanistic studies indicated that EPO binds with the EPO receptor and positively regulates YAP1 expression, thereby promoting CAMP generation and alleviating pathological lung injury. In vitro, EPO increased human cathelicidin antimicrobial peptide (LL-37) expression and promoted the nuclear translocation of YAP1 in E. coli-infected BEAS-2B cells.

Conclusions. This study uncovered the novel role EPO has in protecting against ARDS, which is

mediated by the upregulation of cathelicidin through the EPOR/YAP1 signaling axis, suggesting a promising therapeutic target for the treatment of bacterial infection.

PU-0074

蒙药烘制草乌与诃子药对通过抑制炎症因子释放缓解神经病理性疼痛的机制研究

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目的 本研究通过慢性收缩性损伤（CCI）大鼠模型和 LPS 炎症模型研究了蒙药烘制草乌与诃子药对对神经性疼痛的保护作用机制。
方法 从术前第 4 天开始，给药组（CH 组）连续 14 天灌胃蒙药烘制草乌与诃子药对粉末（0.67g/kg）；空白对照组（Con 组）灌同等剂量的超纯水；阳性对照组（G 组）给予加巴喷丁灌胃处理（50 mg/kg）；模型组（CCI 组）灌同等剂量的超纯水。在灌胃前一天、造模前一天及造模后持续 10 天评估行为学参数。免疫荧光和自噬电镜分别用于评估脊髓中神经胶质细胞的表达和坐骨神经损伤水平，ELISA 用于评估疼痛介质，例如，P 物质（SP），缓激肽（BK）和前列腺素 E2（PGE2）的表达水平。
结果 蒙药烘制草乌与诃子药对能够降低痛觉过敏和异常性疼痛，增加坐骨神经功能指数。此外，蒙药烘制草乌与诃子药对可恢复受损的轴突和髓鞘，抑制星形胶质细胞和小胶质细胞的活化，下调肿瘤坏死因子 α（TNF-α）、白细胞介素（IL-6）和一氧化碳和酶（iNOS）等促炎细胞因子以及疼痛介质的表达。
结论 研究表明，蒙药烘制草乌与诃子药对对 CCI 诱导的神经性疼痛具有神经保护作用，这可能归因于其在脊髓水平的抗炎活性。因此，蒙药烘制草乌与诃子药对有望成为开发新型镇痛剂的化合物，可用于有效治疗顽固性神经性疼痛。

PU-0075

深圳 1 例创伤弧菌死亡病例的病原学检测及溯源分析

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目的 创伤弧菌是一种食源性疾病中致死率最高的致病菌。创伤弧菌主要通过摄入未煮熟的海产品以及破损皮肤接触海水引起感染，病情恶化后导致危及生命的败血症。目前在中国创伤弧菌的案例报告较为少见,但是随着全球气候变暖，创伤弧菌引起的感染正在逐年增加，这值得我们广泛关注。
方法 （1）细菌分离和鉴定：创伤弧菌 vv16015 是从 1 名 36 岁的男性患者血液样本中分离出来的，经改良纤维二糖-多粘菌素 B-多粘菌素 E（mCPC）琼脂培养基、血平板琼脂纯化培养后，采用全自动微生物分析仪进行生化复核鉴定。
（2）药物敏感性实验：使用革兰氏阴性细菌药敏卡片 VITEK 2 AST-GN09 对 vv16015 进行药物敏感性实验。结果由 VITEK 2-COMPACT 全自动微生物分析仪自动判读，使用大肠杆菌 ATCC25922 作为质控菌株。
（3）基因组 DNA 提取及基因组学分析：使用 QIAamp DNA Mini Kit 进行核酸提取，由深圳华大基因股份有限公司进行全基因组学测序。原始数据使用 Trimmomatic v0.39 进行过滤，使用 Kraken2 进行创伤弧菌的物种鉴定，使用 Prokka 1.14.6 进行基因注释。vv16015 的基因组序列使用 Prokaa

进行注释，毒力基因通过 VFDB 在线数据库进行预测，耐药基因通过 CARD 在线数据库进行预测。蛋白质编码基因的功能分类由 eggNOG 进行注释，使用 Circos 软件获得基因组注释圈图。最大似然进化树使用 fasttree 软件进行构建，在 iTOL 中对其进行可视化和注释。我们在 NCBI 下载了 133 株创伤弧菌的基因组序列，这些菌株来源于 8 个不同国家，分离自 1993-2022 年间。将 vv16015 和其他创伤弧菌菌株构建最大似然系统发育树，以显示创伤弧菌菌株之间的进化关系。（4）大蜡螟毒力实验：通过建立大蜡螟幼虫模型以研究创伤弧菌 vv16015 的毒力，选择 vv15018 和 vv220015 两株创伤弧菌作为实验比较。大蜡螟幼虫购自天津惠裕德生物科技有限公司，幼虫为六龄幼虫，长度 2～3cm，体重平均 0.33g/只。实验均挑选活力好，无黑斑幼虫。大蜡螟幼虫注射方法:选择 10μL 尖头微量进样器(上海高鸽工贸有限公司)作为注射工具，吸取菌悬液，注射至大蜡螟幼虫右侧最后一对后足。菌液稀释及分组：本实验分为 7 组，每组 10 只大蜡螟幼虫（其中 C1、C2 为对照组，T1、T2、T3、T4、T5 为实验组），C1 组不做任何处理作为空白对照，C2 组每只幼虫注射 0.9% 无菌生理盐水 10μL。T1、T2、T3、T4、T5 组每只幼虫分别注射浓度为 1×104 CFU/mL、1×105 CFU/mL、1×106 CFU/mL、1×107 CFU/mL、1×108 CFU/mL 的菌悬液 10μL。注射完成后将每组大蜡螟幼虫分别置于独立的一次性无菌培养皿，放入 37°C 恒温培养箱中孵育 72 小时，每 6 小时记录存活数量。

结果 1 名 36 岁的男性患者，他因食用牡蛎导致创伤弧菌败血症合并多器官功能衰竭综合征最终死亡。我们从患者血液样本中分离鉴定出创伤弧菌 vv16015，药敏实验显示 vv16015 对 21 种抗生素均敏感。随后我们从患者用餐的酒楼及酒楼供应商采集牡蛎样本，最终分离到 3 株创伤弧菌。将这 3 株菌株与 vv16015 进行二代测序及基因组学分析发现，vv16015 与其他 3 株菌株亲缘关系较远，这表明创伤弧菌呈多样分布，同时也提醒我们该酒楼及供应商的海产品中存在创伤弧菌污染。最后我们建立大蜡螟感染模型以评估 vv16015 的毒力，结果表明 vv16015 的毒力高于从一个幸存的病人（vv15018）和一个牡蛎（vv220015）中分离出的对比菌株。

结论 这是在中国深圳首次报道的创伤弧菌死亡病例。我们通过基因组学分析和大蜡螟感染实验表明，创伤弧菌在人类和环境中的分布是零散和多样的，且 vv16015 比大多数创伤弧菌具有更强的毒力。鉴于气候变化可能导致创伤弧菌感染频率增加以及其毒力，需要我们未来加强对创伤弧菌的系统监测，临床医生应对有基础性疾病的患者也要进行健康宣教，告诫他们避免食用生的或未煮熟的海产品及破损皮肤接触海水。

PU-0076

自噬在机械通气相关性膈肌功能障碍中的作用

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目的 膈肌是呼吸做功的主要肌肉，对维持正常呼吸功能至关重要。长期研究指出，膈肌功能障碍是导致多种全身性神经肌肉疾病患者死亡的关键因素。近期研究显示，ICU 重症患者，特别是依赖机械通气的患者，普遍存在膈肌功能障碍，这不仅增加了撤机失败的风险，还延长了住院时间，并显著提高了并发症的发病率和死亡率。膈肌无力通常归因于呼吸机导致的废用性肌萎缩以及全身性炎症（如脓毒血症）的影响。这种危重疾病引起的获得性膈肌功能障碍削弱了呼吸泵的代偿能力，加剧了呼吸衰竭和死亡风险。自噬作为一种细胞自我降解过程，对维持细胞稳态和更新细胞组分具有重要意义。然而，自噬在机械通气相关膈肌功能障碍（VIDD）中的作用及其与膈肌功能障碍之间的关系尚未明确。为明确自噬在 VIDD 中的作用及其与膈肌功能障碍之间的关系

方法 本研究将 20 只 SPF 级雄性 SD 大鼠随机分为自主呼吸对照组（Con 组）和机械通气 12 小时组（MV12h 组），每组各 10 只。通过 RM6240 生物信息采集系统评估膈肌功能，包括复合肌肉动作电位（CMAP）、疲劳指数和频率-收缩曲线。使用苏木素-伊红（HE）染色观察膈肌纤维形态，并测量纤维横截面积。采用实时荧光定量逆转录 PCR（RT-qPCR）和 Western blot 技术检测自噬

标志物 LC3、P62，以及膈肌萎缩相关蛋白肌肉特异性环指蛋白-1（MuRF-1）和肌肉萎缩 F 盒蛋白（Atrogin-1）的 mRNA 及蛋白表达水平。

结果 与 Con 组相比，MV12h 组大鼠的膈肌 CMAP 幅值和疲劳指数显著下降（P <0.05），CMAP 时程明显延长（P<0.05），且在相同刺激频率下，膈肌收缩力显著降低（P<0.05）。随着机械通气时间的延长，膈肌 CMAP 幅值、疲劳指数及收缩力持续下降，CMAP 时程逐渐延长。HE 染色结果显示，机械通气时间延长导致膈肌纤维萎缩加重，排列紊乱，体积减小，形态不规则，细胞间隔增宽。机械通气组大鼠的膈肌纤维横截面积较 Con 组显著减小（P<0.05）。同时，随着机械通气时间的延长，膈肌萎缩相关指标 MuRF-1 和 Atrogin-1，以及自噬相关指标 LC3、P62 的 mRNA 和蛋白表达水平均逐渐升高。

结论 在机械通气大鼠模型中，自噬水平上调，膈肌功能障碍程度加剧，提示自噬可能是 VIDD 的致病因素之一。

PU-0077

鼻内胰岛素通过调节 Cyp2E1 活性 激活 PI3K/AKT 通路改善小鼠术后谵妄

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目的 探究鼻内胰岛素对术后谵妄小鼠急性期认知功能的影响以及相关作用机制。

方法 雌性 C57 /BL6J 小鼠 18 只，6-8 周龄，体重 18-22g，随机分为三组：对照组（C 组）、手术组（N 组）以及胰岛素组（I 组），每组 6 只。术前三天 C 组和 N 组经鼻给予 17.5ul 生理盐水，I 组给予 17.5ul 胰岛素（1.75U），第四天给生理盐水/胰岛素 30min 后，N 组和 I 组在 1.4%异氟烷麻醉下行剖腹探查术，麻醉维持 2h。C 组在相似的丙烯酸室中吸纯氧 2h，不进行任何麻醉或手术操作。手术/麻醉后 4h 通过 Y 迷宫测试小鼠的认知功能，随即断颈处死小鼠，收集小鼠血清及海马组织进行病理及生化实验。HE 染色观察海马区神经元细胞形态，ELISA 测定外周血清炎症因子以及磷酸化 Tau 蛋白的含量，RT-qPCR 测定 Cyp2E1、PI3K/AKT 通路相关蛋白以及中枢炎症因子 mRNA 表达量，Western-blot 分析 Tau 蛋白磷酸化水平、Cyp2E1 水平和 PI3K/AKT 信号通路的活化状态。

结果 1、与 C 组相比，N 组小鼠空间记忆能力受损，新臂进入次数和花费时间显著减少（P＜0.05），I 组小鼠记忆改善（P＜0.01）；2、HE 染色显示，N 组小鼠海马神经元形态发生明显改变，细胞皱缩，细胞核固缩浓染，I 组核固缩细胞明显减少；3、ELISA 结果显示，N 组与 C 组相比，外周血清中炎症因子 IL-1β、IL-6、TNF-α 含量增加（P＜0.001），I 组炎症因子含量减少（P＜0.001），RT-qPCR 结果显示中枢神经系统炎症因子表达与外周一致；4、与 C 组相比，N 组外周 p-Tau 含量显著增多（P＜0.01），I 组含量降低（P＜0.0001），Western-blot 显示 3 个组总 Tau 蛋白含量以及 S404 位点磷酸化水平差异无统计学意义，但与 C 组相比，N 组在 Ser199、Ser202/Thr205、S396 三个位点的磷酸化水平显著升高（P＜0.05），I 组 Tau 蛋白磷酸化水平降低且具有统计学差异（P＜0.05）；5、N 组与 C 组相比，Gsk3b 表达增加，AKT、p-AKT、p-GSK3b 表达减少（P＜0.05）；与 N 组相比，I 组 Cyp2E1 mRNA 含量和蛋白表达均显著降低（P＜0.05），GSK3b 表达降低，AKT、p-AKT、p-GSK3b 表达增多（P＜0.05）。

结论 术前经鼻给予胰岛素可以预防剖腹手术引起的急性期认知功能障碍，可能与降低 Cyp2E1 表达，激活 PI3K/AKT 通路从而减轻炎症反应、逆转 Tau 蛋白过度磷酸化有关。

PU-0078

小胶质细胞半乳糖凝集素-3 介导的神经炎症致海马 PV 中间神经元功能紊乱在脓毒症相关脑病中的机制研究

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目的 脓毒症相关性脑病（Sepsis associated encephalopathy, SAE）是指在直接中枢神经系统感染或其他类型脑病情况下，由脓毒症引起的弥漫性脑功能障碍，其主要临床症状包括谵妄、昏迷、认知功能障碍等。SAE 降低患者生活质量，加剧家庭及社会负担。半乳糖凝集素-3（Galectin-3, Gal-3）是 β-半乳糖苷结合蛋白家族成员之一，主要表达于小胶质细胞，被认为是调节中枢炎症反应的关键介质。Gal-3 可作为 TLR4 和 TREM2 的配体，活化小胶质细胞，加重中枢炎症反应，引起氧化应激，最终导致神经认知障碍。研究表明 Gal-3 与 AD、神经病理性疼痛等神经系统性疾病的发生密切相关，但其在 SAE 发病中的作用尚未明确。微清蛋白（Parvalbumin, PV）中间神经元是具有快速放电特性的抑制性 GABA 能神经元，通过调节神经振荡和网络同步化进而参与认知功能的调控。因其快速放电特性，PV 中间神经元更易受氧化应激的影响，其功能损害与多种精神疾病密切相关。因此，本研究选择 Gal-3 作为切入点，探讨其与小胶质细胞激活化、PV 中间神经元功能紊乱及 SAE 之间的关系，旨在为 SAE 的防治提供新视角。
方法 将 120 只雄性 C57BL/6J 小鼠随机分为四组（n = 30）：Control + Vehicle 组、Control + TD139（Gal-3 特异性抑制剂）、LPS + Vehicle 组和 LPS + TD139 组。TD139 组在 LPS 注射前 1 h 及注射后 12 d 连续腹腔注射 TD139，Vehicle 组注射等容溶剂。LPS 注射后第 8-13 d 分别进行 OFT、NOR、YMT 及 FC 检测其行为学变化；行为学结束 2 h 后，部分小鼠分别取全脑和海马组织，行 WB 及免疫荧光检测。部分微丝电极埋置小鼠行 YMT，记录海马局部场电位。
结果 行为学结果显示，四组小鼠在 OFT 中心区停留时间及运动的总距离无明显统计学差异。与 Control + Vehicle 组相比，LPS + Vehicle 组小鼠在 NOR 中的新物体辨别率、YMT 中的自发交替正确率及 FC 中的僵直时间明显减少；而与 LPS + Vehicle 组相比，LPS + TD139 组小鼠在 NOR 中的新物体辨别率、YMT 中的自发交替正确率及 FC 中的僵直时间明显增加。WB 结果显示，与 Control + Vehicle 组相比，LPS + Vehicle 组小鼠海马 Gal-3、CD11b、NLRP3、ASC、Caspase-1、IL-1β 及 IL-18 表达量增加，PV 表达量减少；而腹腔注射 TD139 后可逆转以上变化。免疫荧光结果显示：与 Control + Vehicle 组相比，LPS + Vehicle 组小鼠海马 CA1 区 Iba1+细胞中 Gal-3 体积占比、小胶质细胞数目、突起平均长度、PV 与 8-OH-dG 共标明显增加；而腹腔注射 TD139 后小可逆转以上变化。在体电生理结果显示：与 Control + Vehicle 组相比，LPS + Vehicle 组小鼠海马 θ 和 γ 振荡异常；而腹腔注射 TD139 可逆转以上变化。
结论 海马 Gal-3 表达增加致小胶质细胞过度激活，促进 NLRP3 炎症小体活化及炎症因子释放，引起 PV 中间神经元氧化应激损伤、θ 和 γ 振荡异常，最终导致 SAE 小鼠认知功能损伤。

PU-0079

PSMB7 in Lung Adenocarcinoma: Prognostic Marker and Regulator of Tumor Immune Microenvironment

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Background: Lung adenocarcinoma (LUAD) is widely recognized for its unfavorable prognosis. So far, surgery, chemotherapy, and radiotherapy are the three main therapeutic methods for LUAD. In the age of precision medicine, personalized immunotherapy offers hope to patients with limited

treatment options in a tumor-agnostic approach. Despite significant progress in immunotherapy in the last few years, many patients remain unable to benefit from immunotherapy, perhaps due to the immunosuppressive mechanisms in the tumor microenvironment (TME). Tumor cells actively participate in intercellular communication with diverse components of the TME, thereby facilitating tumor progression. Therefore, urgent research into promising prognostic biomarkers and the molecular pathway lying beneath the malignant progression of LUAD is crucial for developing successful cancer treatments. Increasing evidence has revealed that PSMB7 has an essential function in initiating and developing several malignancies in humans. Nevertheless, thorough analysis of the expression profile, clinical prognosis, pathway prediction, and immune infiltration of PSMB7 has not been fully explored in LUAD.

Methods: In this study, an initial pan-cancer analysis was conducted to investigate the expression and prognosis of PSMB7. we analyzed the alteration frequency of PSMB7 and epigenomic changes in LUAD utilizing the cBioportal database and GSCA online tool. Next, to capture the expression of PSMB7 at single-cell resolution and its correlation with cancer functional states in LUAD, we conducted an analysis via CancerSEA database using two GEO datasets: GSE69405 and GSE85534. The R program was applied to analyze the immune infiltration and the expression distribution of immune score in in LUAD patients with high and low PSMB7 expression. TIMER2 was employed to examine the correlation between PSMB7 with immunological checkpoints, MHCs, chemokine receptors and MDSC infiltration in LUAD. The relationship between PSMB7 expression and drug sensitivity was investigated for its clinical relevance utilizing the GSCA database. Use R to perform GSVA analysis in order to explore potential signaling pathways.

Results: First, we conducted pan-cancer analysis for PSMB7 expression level through an in-depth analysis of public databases and found that LUAD has a high PSMB7 gene expression level. Meanwhile, high PSMB7 gene expression is related to advanced tumor stages, an increased risk of developing nodal metastasis, and TP53 mutations in LUAD. We found that the high-PSMB7 group displayed a strongly shorter DSS, OS than the low-PSMB7 group. Further subgroup analysis showed that patients with high PSMB7 expression had poorer OS in subgroups labeled as grade 1, grade 2, stage 1, M0 stage, female, male, never smoked, and smoker. Univariate and multivariate analyses confirmed that PSMB7 could serve as an independent prognostic marker for LUAD. PSMB7 mutation analysis demonstrated that PSMB7 CNV and mRNA expression had a strongly positive correlation. There was a negative correlation between PSMB7 expression levels with methylation and LUAD patients with hypomethylation of PSMB7 had worse prognosis in OS, DSS, PFS, and DFI. KEGG and GO analyses highlighted that the PSMB7-related genes were involved in mitotic nuclear division, chromosome segregation, organelle fission, DNA replication, cell cycle checkpoint, microtubule binding, tubulin binding, chromosomal region, condensed chromosome, cell cycle, oocyte meiosis, p53 signaling pathway, human T−cell leukemia virus 1, cellular senescence, humoral immune response, antimicrobial humoral response, complement and coagulation cascades, tyrosine metabolism, etc.. Single-cell functional analysis revealed that PSMB7 expression exhibited positive correlation with functional states such as invasion and DNA repair, and negative correlation with functional states such as inflammation, hypoxia, stemness, angiogenesis and differentiation in LUAD.

Furthermore, we detected a positive correlation between PSMB7 expression and Th2 cells and common lymphoid progenitor cells, and a negative association between PSMB7 and stroma score, microenvironment score, immune score, B cells, class-switched memory B cells, memory B cells, plasma cells, CD4+naive T cells, CD4+ central memory T cells, CD4+ effector memory T cells, CD8+T cells, myeloid dendritic cells, eosinophil, hematopoietic stem cells, M2 macrophage, endothelial cells, and mast cells. Meanwhile, we found that PSMB7 expression was positively associated with MDSC infiltration and immune checkpoint molecules, including CD276, PDCD1, IDO1, CD274, and LAG3, and negatively associated with most of the MHCs and chemokine receptors in LUAD. In addition, high PSMB7 expression groups had significantly lower levels of the immune score, stroma score, and microenvironment score, reduced infiltration of immune cells, such as many subtypes of B, CD8+T, and CD4+T cells, but showed an increase in Th2 cells and common lymphoid progenitor cells.

Interestingly, we found that increased PSMB7 decreased IC50 values of most agents, including CAL-101, NG-25, TL-1-85, navitoclax, nilotinib,bortezomib, crizotinib, masitinib, JQ-1, PL-DI, etc.,

and augmented the susceptibility of six drugs, namely bleomysin, docetaxel, elesclomol, TW37, vinblastine, and YK-4-279.
Finally, GSVA analysis predicted potential signaling pathways linked to PSMB7 in LUAD immune evasion and metabolic reprogramming, such as DNA repair, DNA replication, the G2M checkpoint, MYC targets, cellular response to hypoxia, tumor proliferation signature, pyrimidine metabolism, one carbon pool by folate, and fatty acid elongation pathways.
Conclusions: Our findings indicated that the upregulation of PSMB7 is associated with unfavorable prognosis and decreased tumor immune infiltration in LUAD.

PU-0080

Dexmedetomidine Post-Conditioning Protects Blood Brain Barrier Integrity via Inhibiting ERK/MAPK Signalling Pathway in Intracerebral hemorrhage

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Objective: Intracerebral hemorrhage (ICH) is one of the most devastating forms of stroke. Dexmedetomidine (DEX) has shown certain neuroprotective roles in ICH. Nevertheless, the details concerning the underlying molecular mechanism of DEX's protective effects still need further elucidation. Herein, a model of ICH was established.
Methods: The rats were randomly divided into the sham group, the ICH group, and the ICH+DEX group. Neurological outcomes, neuronal injury, and apoptosis were evaluated. Brain water content, Evans blue extravasation, and the expression of tight junction-associated proteins were also detected to assess the blood-brain barrier (BBB) integrity. Subsequently, the microglia/astrocyte state and inflammatory cytokine levels were observed. To further explore the underlying mechanism, ERK/MAPK signaling pathway-associated proteins were detected.
Results: The results showed that DEX exerted neuroprotective effects against ICH-induced neurological deficits. DEX significantly increased the numbers of the surviving neurons and ameliorated neuronal cell loss and apoptosis in ICH. The rats that received the DEX displayed a lower level of brain water content and EB extravasation, moreover, ZO-1, occludin, and claudin-5 were markedly increased by DEX. Additionally, DEX decreased the number of activated microglia and inhibited the proliferation of astrocytes. We found that DEX dramatically diminished pro-inflammatory cytokines expression, simultaneously promoting anti-inflammatory cytokines expression. DEX inhibited the activation of ERK/MAPK signalling pathway and decreased the expression of p-ERK1/2 and MMP-9 proteins.
Conclusions: Our data suggested that DEX post-conditioning protected BBB integrity by down-regulated MMP-9 and up-regulated ZO-1 proteins expression via inhibiting the ERK/MAPK signaling pathway in ICH.

PU-0081

Adjunctive Esketamine for Analgesia in Mechanically Ventilated Septic Shock Patients: protocol for a randomised controlled trial

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Background： Providing sedation and analgesia to septic patients with hemodynamic instability in the Intensive Care Unit (ICU) can be challenging. Opioid and benzodiazepine drugs may exacerbate tissue hypoperfusion in septic shock patients by decreasing cardiac contractility, increasing vasodilation, and reducing respiratory drive. Ketamine, an N-methyl-D-aspartate receptor antagonist and opioid receptor agonist, does not affect respiratory drive and possesses bronchodilatory and anti-inflammatory properties. Esketamine, the enantiomer of ketamine, is twice as potent and may reduce the occurrence of dose-dependent side effects associated with ketamine. While esketamine has been successfully used in burn patients undergoing multiple surgeries and for anesthesia-related maintenance analgesia, its application in mechanically ventilated ICU patients with septic shock has not been reported. This study aims to investigate the adjunctive analgesic application of the novel drug esketamine in mechanically ventilated ICU patients with septic shock in a single-center randomized controlled trial, providing clinical trial evidence for its use in the ICU setting.

Methods/design： This study is a single-center, single-blind, randomized controlled trial. The included patients are those with septic shock who are admitted to the ICU and require analgesia and sedation therapy while receiving mechanical ventilation. The study will be conducted at the Intensive Care Unit of Nanfang Hospital, Southern Medical University, with a planned enrollment of 124 patients. Following screening, patients will be divided into an experimental group and a control group. Patients in the experimental group will receive adjunctive esketamine infusion at a low dose on top of standard treatment. The protocol for the experimental group is as follows: in addition to routine septic shock management (including fluid resuscitation, vasopressor support, and antimicrobial therapy), patients will receive a loading dose of 0.25 mg/kg followed by a continuous infusion at a fixed rate of 0.15 mg/kg/h for 72 hours, then tapered to 0.06 mg/kg/h after 72 hours. The control group will receive standard analgesia and sedation therapy, including remifentanil and propofol, along with routine septic shock management. The primary outcome measures include the amount of remifentanil and norepinephrine used during mechanical ventilation, while secondary endpoints include duration of mechanical ventilation, 28-day ventilator-free days, propofol use during mechanical ventilation, rate of achieving sedation and analgesia goals, incidence of delirium, ICU and total hospital stay duration, and 28-day mortality rate.

Discussion： The results of this randomized controlled trial may demonstrate the potential benefits of adjunctive low-dose esketamine infusion in optimizing patients' analgesia and sedation regimens, and could provide a foundation for conducting larger scale multi-center randomized controlled trials in the future.

PU-0082

苦参碱对低钾血症诱发恶性心律失常的保护作用

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目的 低钾血症是临床常见的电解质紊乱，可引起心脏传导减慢、异位起搏，最终导致心源性猝死。

苦参碱是一种已被证明具有多种抗心律失常作用的中药单体。本研究旨在探讨苦参碱对低钾血症诱发恶性心律失常的保护作用及其电生理机制。

方法 本研究构建小鼠离体心脏低钾血症模型。通过光学标测系统同步记录离体心脏的心电图、动作电位和钙信号，观察加入苦参碱前后发生室性心动过速（VT）表型的概率，并对比分析离体心脏动作电位、传导速度、钙瞬变等电生理参数的变化。

结果 心电图结果表明，灌流低钾溶液可以引起小鼠离体心脏传导减慢、并发生自发室性心动过速（VT）、室颤。苦参碱能够明显降低低钾导致 VT 的发生率，并推迟低钾导致室颤的起始时间（$p<0.01$）。光学标测动作电位结果表明，苦参碱能够明显缩短低钾引起的心室肌动作电位的延长，并降低低钾导致的心室肌动作电位的异质性（$p<0.01$）。通过对比分析 APDR 曲线，结果发现低钾组 APDR 曲线斜率较对照组明显增大；低钾+苦参碱组斜率较低钾组减小（$p<0.01$）。光学标测钙瞬变结果表明，苦参碱能够明显抑制低钾引起的心室肌钙离子幅度的增高（$p<0.01$）。

结论 我们得出结论，苦参碱能降低低钾诱发 VT 的发生率，其机制可能与苦参碱对心室动作电位跨度和钙瞬变幅度的调控作用有关。

PU-0083

负载利多卡因的 BetP 水凝胶缓释系统对延长局部抗炎镇痛时效的实验研究

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目的 患者常在术后 24 小时内经历剧烈疼痛，完善围术期镇痛至关重要。新型镇痛药物及方法的应用推动了术后疼痛管理的发展，然而局麻药作用时长的限制仍是一大挑战。为了延长单次注射局麻药制剂的作用时效，我们将临床中常用的局麻药利多卡因负载于可注射、负载能力强且生物相容性好的 BetP 水凝胶中，探究负载利多卡因的 BetP 水凝胶是否可实现持续稳定的缓释效果以延长局部抗炎镇痛时效。

方法 通过预先将盐酸利多卡因(LDC)均匀分散在 CaCl2 溶液中，再与等体积的 BetP 溶液混合，即可完成盐酸利多卡因水凝胶（LDC/BetP-Gel）的制备，用透射电子显微镜及扫描电子显微镜观察其表征，以重量分析法检测水凝胶降解速率，在 37°C 恒温条件下体外模拟药物在动物体内的释放过程,定期换取 PBS 液并测定释放的 LDC 浓度，以检测负载的 LDC 释放速率。将 30 只 SPF 级 Balb/c 小鼠随机分为空白组（Blank 组）、模型组（Model 组）、利多卡因组（LDC 组）、BetP 水凝胶组（BetP-Gel 组）和负载利多卡因的 BetP 水凝胶组（LDC/BetP-Gel 组），采用急性足底切口痛模型，以 Von Frey 法测定机械痛阈值，Hargreaves 法测定热痛阈值，对其镇痛时效进行评估。取大鼠足底切口处组织，进行 HE 染色以观察注射局部组织有无粘连、纤维组织包裹等生物排异反应并观察局部有无炎症反应及肌肉、神经毒性，从而实现对其生物相容性和安全性的评估。取造模后 24h 小鼠血样，ELISA 检测体内 IL-1β、IL-6 和 TNF-α 的含量，以评估抗炎作用。

结果 所制备的 LDC/BetP-Gel 具备结构稳定、负载能力强、生物相容性好的特点，可实现药物平稳持续缓释。行为学结果提示，LDC/BetP-Gel 组小鼠热痛阈与机械痛阈值相比于 Model 组有大幅度提升，可以显著减轻术后疼痛，术后镇痛时间显著延长。HE 染色病理切片显示，LDC/BetP-Gel 组切口及其周围组织炎性细胞浸润较 Model 组少，无明显组织损伤及炎症反应，且术后 24h 内炎性因子无明显增多。

结论 负载利多卡因的 BetP 水凝胶缓释系统制备简单，具有良好的负载药物和长效平稳缓释的功能，可显著延长术后镇痛时间，减轻炎症反应。

PU-0084

琥珀酸刺激巨噬细胞分泌致纤维化 EV 促进肺成纤维细胞活化参与脓毒症相关性肺纤维化

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目的 肺纤维化是急性呼吸窘迫综合征发展的重要病理阶段，而脓毒症相关性肺纤维化是脓毒症过程中全身炎性反应和组织异常修复过程在肺组织的具体体现。近年来逐渐认识到免疫细胞同结构细胞相互作用所构成的细胞分子调控网络对于肺成纤维细胞的活化以及肺纤维化的形成发挥着关键作用。本文旨在从代谢微环境促进免疫-结构细胞交互作用的角度探讨巨噬细胞促进肺成纤维细胞活化的分子网络调控机制，进一步丰富脓毒症相关性肺纤维化发病机制的研究并为治疗脓毒症相关性肺纤维化提供新的理论依据。

方法 本研究首先通过小鼠腹腔内注射 LPS 建立脓毒症相关性肺纤维化模型，利用 H&E 和 Masson 染色法观察小鼠肺组织炎症细胞浸润和胶原沉积情况并利用 Western blot 和免疫荧光技术观察小鼠肺组织中 COL1A1 和 a-SMA 等纤维化相关指标变化情况；利用单细胞测序技术观察伴随小鼠肺纤维化进程中代谢物差异分析；进一步利用 NTA 技术观察小鼠肺泡灌洗液中 EV 释放数量及对成纤维细胞活化情况；抑制巨噬细胞内吞后观察 EV 释放含量变化和成纤维细胞活化程度。利用 Western blot 和免疫荧光技术检测 LPS 刺激后 GPR91-PDK1 通路是否活化并进一步在体外层面分别敲低巨噬细胞上 GPR91 和 PDK1 后检测其内吞、释放致纤维化 EV 和活化成纤维细胞情况；在体内敲除 PDK1 后检测致纤维化 EV 释放量是否减少以及肺纤维化病程进展是否改善。

结果 小鼠腹腔内注射 LPS（5mg/kg）后肺组织炎症细胞明显浸润并伴随大量胶原纤维沉积，COL1A1 和 a-SMA 等纤维化相关指标表达增高。LPS 可促进小鼠肺组织中琥珀酸分泌，而增加的琥珀酸刺激成纤维细胞活化，这一功能通过刺激巨噬细胞分泌外泌体（EV）得以实现。抑制巨噬细胞内吞后 EV 释放量减少并且成纤维细胞活化程度减弱。LPS 刺激成纤维细胞后 GPR91 和 PDK1 表达增加，敲除巨噬细胞 PDK1 表达后细胞内吞减少，致纤维化 EV 释放量显著降低并伴随 EV 介导的肺成纤维细胞活化抑制。在小鼠层面抑制肺组织 PDK1 后致纤维化 EV 释放量减少，肺纤维化病程得以改善。

结论 LPS 诱导小鼠肺组织分泌琥珀酸并通过促进巨噬细胞内吞进而释放致纤维化 EV 活化成纤维细胞，这一过程由 GPR91-PDK1 介导。小鼠体内分别抑制 GPR91 和 PDK1 后 EV 分泌减少并伴随脓毒症相关性肺纤维化进程改善，成为临床上治疗 LPS 致肺纤维化的潜在治疗手段。

PU-0085

急性缺血性中风患者接受静脉注射阿替普酶治疗后颅内出血风险预测模型的系统评价

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目的 全面检索接受静脉注射阿替普酶治疗的 AIS 患者的 ICH 风险预测模型的研究，并进行系统地总结和比较，以便更好地为构建和应用接受静脉注射阿替普酶治疗的 AIS 患者的 ICH 风险预测模型提供依据。

方法 搜索策略，在以下数据库中进行文献搜索：PubMed、Embase、Web of Science 和 Cochrane 图书馆。搜索词是"缺血性中风"、“颅内出血”、“阿替普酶"和"因素”，我们的完整搜索字符串显示在补充材料 1 中。

搜索截止日期为 2024 年 3 月 6 日。
资格标准
文献纳入标准：（1）研究类型，队列研究或病例对照研究；（2）参与者，接受阿替普酶治疗后发生 AIS 并经历 ICH 的患者；（3）提供了关于模型构建和验证的相关内容。排除标准：（1）预测因素在临床实践中缺乏实用性；（2）无法获得全文；（3）重复发表。 文献筛选和数据提取 两位研究员独立筛选文献并进行交叉检查。对于意见不一致，咨询第三位研究员。并从包含的文献中提取基本信息、模型性能、模型组成等方面的信息.
统计分析
使用 Stata（版本 13.0）进行元分析。通过优势比（OR）和相应的 95%置信区间（CI）探索接受静脉注射阿替普酶治疗的 AIS 患者的风险因素与 ICH 之间的关系。使用 Q 检验检测研究之间的异质性并选择适当的效应模型。通过依次删除研究进行敏感性分析。当 Begg's 检验和/或 Egger's 检验（P<0.05）指示存在出版偏倚时，此时使用修剪和填充方法进行重新评估。
偏倚风险评估
两位研究员使用预测模型偏倚风险评估工具（PROBAST）（12）来评估研究中包含的偏倚分析，并在出现分歧时咨询第三位研究员。PROBAST 在四个领域评估模型的偏倚风险和适用性：参与者、预测因子、结果和分析。
预测性能
通过判别和校准评估模型的预测性能。判别指数是 AUC，AUC ≥ 0.7 表示模型的判别性好，外部测试的 AUC 更具说服力。校准指标包括 Hosmer-Lemeshow 测试和校准图。模型拟合良好的标准是 Hosmer-Lemeshow 测试 P > 0.05，或者校准图的校准斜率接近 1。
结果 筛选了 672 个参考文献，其中包括 14 项研究，其中一项是前瞻性队列研究。12 项研究使用了内部验证，5 项研究使用了外部验证，其中 2 项研究同时使用了内部和外部验证。模型中报告的受试者工作特性曲线下的面积范围从 0.68 到 0.985。预测模型中的常见预测因子包括国立卫生研究院卒中量表（NIHSS）（OR = 1.17，95% CI 1.09-1.25，P<0.0001）、葡萄糖（OR = 1.54，95% CI 1.09-2.17，P<0.05）和高龄（OR = 1.50，95% CI 1.15-1.94，P<0.05），元分析显示它们是独立的风险因素。在 PROBAST 评估后，所有研究的偏倚风险评估都很高，但适用性风险低。
结论 本研究系统地回顾了关于急性缺血性中风患者接受静脉注射阿替普酶治疗后 ICH 风险预测模型的可用证据。少数模型已经得到了外部验证，而大多数模型都有区分度。

PU-0086

lncRNA n407205 通过促进内皮细胞 VCAM1 的表达在急性肺损伤中发挥促炎作用

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目的 急性肺损伤（ALI）和急性呼吸窘迫综合征（ARDS）是一系列危及生命的肺部变化。肺血管损伤是 ALI 和 ARDS 最重要的病因之一。然而，长链非编码 RNA（lncRNA）在肺内皮损伤中的作用在很大程度上仍是未知的。
长链非编码 RNA（lncRNA）构成了转录组的大部分，由于其在调节细胞生理和病理生理功能中的作用，从而获得了研究人员的研究兴趣。最近研究表明，lncRNAs 在脓毒症诱导的急性肺损伤中发挥重要调控作用。然而，lncRNA 在急性肺损伤肺微血管内皮细胞功能障碍中的作用机制尚不清楚。本研究的目的是确定暴露于脂多糖（LPS）的人肺微血管内皮细胞（HPMECs）的 lncRNA 表达谱，并探索差异表达 lncRNA 的潜在功能。
方法 为了鉴定调控肺微血管内皮细胞功能障碍的 lncRNA 并探索其作用机制，本研究利用基因芯片技术鉴定脂多糖（LPS）诱导人肺微血管内皮细胞（HPMECs）lncRNA 和 mRNA 表达谱。进行

生物信息学分析，包括基因本体论（GO）、京都基因和基因组百科全书（KEGG）途径、lncRNA-mRNA 共表达网络和转录因子（TF）-lncRNA 网络分析，以预测显著差异表达的 lncRNAs 和 mRNAs 的功能。为进一步确认芯片分析结果，使用 qRT-PCR 对显著差异的表达 lncRNAs 和 mRNAs 进行鉴定。

结果 高通量分析研究结果表明 213 个 lncRNAs 和 212 个 mRNAs 显著差异表达，其中与 lncRNA 共表达的 mRNAs 在 TNF 信号通路、NF-κB 信号通路、细胞粘附分子（CAMs）、细胞因子-细胞因子受体相互作用和细胞外基质（ECM）-受体相互作用中显著富集。过实时 PCR 检测到的除一种外的所有选定 lncRNA 和 mRNA 的表达水平与通过微阵列分析检测到的表达水平相似。在差异表达的 lncRNA 中，n407205 显著差异表达（差异倍数>2）。

进一步实验验证，LPS 刺激后 n407205 表达水平明显增高，n407205 的过度表达促进血管细胞粘附分子 1（VCAM1）的表达，增高内皮通透性。

在这种促炎作用的基础上，共表达网络分析显示关键信号传导途径（例如 Rho 和 PI3K / AKT）与 n407205 存在共表达调控关系，因此推断 n407205 很可能通过 PI3K / AKT 通路调控 VCAM1 的表达，继而调控炎症反应。

结论 LncRNA n407205 可能通过 PI3K / AKT 通路调控 VCAM1 的表达在 ALI 内皮功能障碍过程中发挥重要作用。

PU-0087

Adiphenine alleviates impulsive-like behaviors in aged mice by inhibiting nicotinic acetylcholine receptors

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Background: Postoperative Neurocognitive Disorders (PND) are prevalent complications in the elderly following surgical interventions and anesthesia, with the underlying protective and damaging mechanisms remaining largely elusive. Impulsive-like behaviors and a decline in cognitive function were observed in the mouse model of PND established through tibial fracture surgery, accompanied by increased activity of astrocytes in the hippocampal CA1 region. Additionally, transcriptome sequencing revealed increased expression of nicotinic acetylcholine receptors (nAChRs) in PND. Herein, We aimed to investigate the role of nAChRs in the pathogenesis of PND in aging mice.

Methods: In 18-month-old male C57BL/6 mice, a PND model was established by tibial fracture surgery, and brain tissues were collected for transcriptomic sequencing 24 hours post-surgery. Behavioral assessments of PND mice were conducted using open field, light-dark box, and fear conditioning tests. An nAChRs inhibitor, Adiphenine (125 nM per day), was administered daily for 7 days via intracerebroventricular microinfusion. Pathological changes were observed using immunofluorescence staining and Western blotting, and hippocampal CA1 spikes activity and local field potentials (LFP) was monitored with a microelectrode array.

Results: Transcriptomic sequencing of the brains of PND mice revealed upregulation of Cholinergic Receptor Nicotinic Beta 2 Subunit (Chrnb2) and Cholinergic Receptor Nicotinic Beta 4 Subunit (Chrnb4). Additionally, there was an increase in neuronal spikes and enhanced LFP power in the hippocampal CA1 region, along with an increase in the number and morphological changes of astrocytes. Adiphenine was able to inhibit tibial surgery-induced impulsive-like behavior, but it showed no significant improvement in cognitive function. It also reduced spikes firing and LFP power in the CA1 region. The expression of Vglut1 in astrocytes played a crucial role in the process.

Conclusions: Our study revealed that anesthesia and surgery-induced PND models exhibit impulsive behavior and cognitive impairment. Astrocyte activation and Vglut1 expression may be contributing factors, with nAChRs likely playing an initiating role in this process. Adiphenine can

improve impulsive behavior by inhibiting nAChRs.

PU-0088

Hydrogen mitigates brain injury by prompting NEDD4-CX43- mediated mitophagy in traumatic brain injury

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Background: Hydrogen (H2) has emerged as a potential therapeutic intervention for traumatic brain injury (TBI). However, the precise mechanism underlying H2's neuroprotective effects in TBI remain incompletely understood.
Methods: TBI mouse model was induced using the controlled cortical impact (CCI) method, and a cell model was established by exposing astrocytes to lipopolysaccharide (LPS). Cell viability was detected by CCK-8 kits. Cell apoptosis was measured by flow cytometry. ELISA was used to detect cytokine quantification. Protein and gene expression was detected by western blot and RT-PCR analysis. Co-immunoprecipitation (CO-IP) were employed for protein-protein interactions. Morris water maze test and rotarod test were applied for TBI mice.
Results: H2 treatment effectively inhibited the LPS-induced cell injury and cell apoptosis in astrocytes. NEDD4 expression was increased following HRS treatment coupled with enhanced mitophagy in LPS-treated astrocytes. Overexpression of NEDD4 and down-regulation of connexin 43 (CX43) mirrored the protective effects of H2 treatment in LPS-exposed astrocytes. NEDD4 interacts CX43 to regulates the ubiquitinated degradation of CX43. While overexpression of CX43 reversed the protective effects of H2 treatment in LPS-exposed astrocytes. In addition, H2 treatment significantly alleviated brain injury in TBI mouse model.
Conclusion: H2 promoted NEDD4-CX43 mediated mitophagy to protect brain injury induced by TBI, highlighting a novel pathway underlying the therapeutic effects of H2 in TBI.

PU-0089

右美托咪定通过改善睡眠减轻脓毒症相关性脑病

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目的 脓毒症后宿主感染反应失调导致的弥漫性脑功能障碍称为脓毒症相关性脑病（Sepsis associated encephalopathy, SAE）。据报道，SAE 具有发病率高、死亡率高的特点。目前 SAE 的发病机制尚不明确，且缺乏客观有效的诊断指标和治疗措施。综上，进一步阐明 SAE 的发病机制，对制定规范化的诊疗体系对脓毒症患者具有重要意义。研究发现，脓毒症患者普遍存在睡眠障碍且与不良预后密切相关。然而，目前仍缺乏有效的治疗方法。右美托咪定是临床 ICU 常用的镇静药物之一，可以诱导一种类似于自然睡眠的睡眠状态。临床研究发现，右美托咪定可以显著改善脓毒症患者的器官损伤。然而，其内在机制仍有待阐明。本研究旨在探讨 SAE 长期情绪功能问题的发病机制，探索右美托咪定的治疗效果，并阐明其改善 SAE 不良预后的潜在机制。
方法 采用盲肠结扎穿孔和侧脑室注射脂多糖两种方式建立稳定的 SAE 小鼠模型；使用植入式遥测系统记录小鼠的脑电、肌电和活动信号；此外，采用右美托咪定（50 ug/kg，腹腔注射，在光照阶段每 4 小时一次）进行治疗，探索其对 SAE 情绪功能障碍和睡眠的影响。
结果 SAE 小鼠的睡眠结构主要在暗阶段表现为觉醒时间减少、非快速动眼睡眠时间增加；睡眠和觉醒之间的转换次数显著增加，同时觉醒和睡眠各个阶段的发生次数增加，提示 SAE 小鼠睡眠质量显著降低，主要表现为睡眠碎片化。此外，睡眠障碍导致 α-Synuclein 在脑中过度蓄积，参与

SAE 小鼠情绪功能障碍的病理过程。右美托咪定治疗后明显改善了 SAE 小鼠的睡眠障碍，碎片化睡眠有所恢复。恢复睡眠有助于减少海马中 α-Synuclein 的蓄积，进而改善 SAE 的预后。
结论 SAE 小鼠存在严重的睡眠障碍，与不良预后密切相关。右美托咪定可通过改善睡眠减少脑中异常蛋白的蓄积，减轻 SAE。本研究提出了右美托咪定治疗 SAE 的内在机制，为其临床应用提供了理论依据。

PU-0090

丘脑室旁核谷氨酸能神经元功能障碍介导七氟烷神经发育毒性的机制研究

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目的 七氟烷是婴幼儿手术中应用最为广泛的吸入麻醉药，然后现有的临床和基础研究均表明婴幼儿围术期反复接受七氟烷麻醉可诱发神经发育毒性和认知障碍表型，但其具体机制尚不明确。丘脑室旁核是多种行为的中继传导核团及整合中心，参与学习记忆、睡眠觉醒、药物成瘾和摄食等多种行为的调节。既往研究发现丘脑室旁核内几乎只含有谷氨酸能兴奋性神经元，不含 γ-氨基丁酸能抑制性神经元。谷氨酸能神经元是中枢神经系统中主要的兴奋性神经元，在学习、记忆、神经发育、突触可塑性中扮演了重要角色。本研究旨在探讨丘脑室旁核谷氨酸能神经元在七氟烷神经发育毒性所致认知功能障碍中的作用机制。
方法 本研究采用七氟烷神经发育毒性模型：将出生后第 6-8 天的雄性小鼠放入麻醉盒，每天吸入 60%氧气（对照组）或 60%氧气复合 3%七氟烷（麻醉组）2 小时。通过条件性恐惧实验检测小鼠的认知功能；通过 c-fos 染色和在体光纤成像技术检测丘脑室旁核谷氨酸能神经元的活性变化情况；通过光遗传学技调控丘脑室旁核谷氨酸能神经元，探究其在七氟烷神经发育毒性所致认知功能障碍中的作用。
结果 条件性恐惧实验显示，与对照组相比，麻醉组小鼠出现认知功能障碍（麻醉组冻结时间百分比降低，$P<0.05$）且伴有丘脑室旁核 c-fos 表达降低（$P<0.05$）。在体光纤记录实验显示，与对照组相比，麻醉组丘脑室旁核谷氨酸能神经元活性降低（麻醉组丘脑室旁核谷氨酸能神经元钙信号的曲线下面积显著降低，$P<0.001$）。通过光遗传技术激活丘脑室旁核谷氨酸能神经元可改善麻醉组的认知功能障碍（光遗传激活组冻结时间百分比增加，$P<0.05$）。
结论 七氟烷神经发育毒性导致丘脑室旁核谷氨酸能神经元功能受损，从而诱发远期认知功能障碍。激活丘脑室旁核谷氨酸能神经元可以改善七氟烷神经发育毒性的认知障碍表型。

PU-0091

Cx32 通过缝隙连接通道传递 miR155-3p 介导肾脏缺血再灌注损伤中的细胞焦亡

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目的 探讨由缝隙连接蛋白 32(Cx32)组成的缝隙连接通道(GJ)是否通过传递 miR155-3p 来介导肾脏缺血再灌注(I/R)损伤中的细胞焦亡，为防治肾脏 I/R 导致的急性肾损伤(AKI)提供新的策略。
方法 将 8~10 周龄的雄性 C57BL/6 野生型小鼠和 Cx32 基因敲除小鼠随机分为两组：假手术组和肾脏 I/R 组。药物处理组包括野生型小鼠体内注射 MCC950(50mg/kg. IP.)抑制 NLRP3 活性的假手术

组和肾脏 I/R 组。体外实验中，将人肾小管上皮细胞(HK-2)和大鼠肾小管上皮细胞(NRK-52E)分为高密度组（125,000 个/cm2）和低密度组（25,000 个/cm2），并通过缺氧复氧(H/R)处理模型模拟 I/R。进行 H/R 处理前，使用 Cx32 的抑制剂 2APB、Cx32 的 siRNA 及质粒、miR155-3p 的模拟物和抑制物分别预处理 HK-2 细胞。通过肾脏病理和肾功能检测肾脏损伤程度。通过扫描电镜观察细胞焦亡的形态特征。使用免疫蛋白印迹和免疫荧光染色观察 NLRP3、GSDMD、GSDMD-N、IL-18 和成熟 IL-18 的表达。采用酶联免疫吸附分析试剂盒检测血清、肾组织和细胞培养上清液中 IL-18 和 IL-1β 的分泌，用 RT-qPCR 和荧光原位杂交(FISH)方法检测 NLPR3 和 miR155-3p 的表达。

结果 肾脏 I/R 后肾小管上皮细胞发生细胞焦亡可促进 AKI 的发生发展，Cx32-GJ 通过影响细胞间 miR155-3p 的传递来调节肾脏 I/R 细胞焦亡。体外实验中，H/R 可引起 HK-2 和 NRK-52E 细胞发生细胞焦亡。当细胞间没有缝隙连接通道形成或 Cx32 蛋白被抑制或敲低时，miR155-3p 的表达及传递明显减少，细胞焦亡被显著抑制，从而减轻急性肾损伤。此外，调控 HK-2 细胞中 miR155-3p 的水平可影响 HK-2 细胞 H/R 后的存活率和细胞焦亡的水平。

结论 ① Cx32 组成的缝隙连接通道通过传递 miR155-3p 调控肾脏 I/R 损伤时肾小管上皮细胞的细胞焦亡。抑制 Cx32 可以进一步降低细胞间 miR155-3p 的水平，从而抑制细胞焦亡，减轻肾脏 I/R 损伤，为预防 AKI 的发生发展提供了新的保护策略。

PU-0092

前额叶皮层介导焦虑样行为的行为性别二象性

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目的 焦虑障碍等精神类疾病通常存在性别差异，数据显示女性焦虑患者数量显著高于男性。前额叶皮层是调节情感的主要神经核团之一，本研究的目的是探索其功能是否参与小鼠焦虑样行为的性别差异。

方法 利用成年 C57 雄性和雌性小鼠，采用连续 7 天社交隔离建立三种不同的焦虑样模型作为模型组，正常 4 只小鼠一笼饲养作为对照组，每组雄性和雌性小鼠各 12 只。结合开放旷场、高架十字迷宫和明暗穿梭箱检测小鼠焦虑样行为，同一行为测试用对照组数据进行 Z-score 归一化得到焦虑样水平的评分，即焦虑样评分。小鼠检测完明暗穿梭箱测试 90 分钟后灌注取脑，进行常规免疫荧光染色，检测前额叶皮层 c-fos 表达情况。

结果 开放旷场测试显示，模型组雌性小鼠在中心区域停留时间与对照组相比显著下降，而模型组雄性小鼠与对照组之间无明显差异。高架十字迷宫测试显示，模型组雌性或雄性小鼠与对照组之间无明显差异。明暗穿梭箱测试显示，模型组雌性小鼠进入明箱的次数与对照组相比显著下降，而模型组雄性小鼠与对照组之间相比存在差异，但无显著性。综合分析以上三种焦虑样行为数据，模型组雌性小鼠焦虑样评分显著高于对照组，而模型组雄性小鼠与对照组之间相比存在差异，但无显著性。免疫荧光染色显示，模型组雌性小鼠前额叶皮层 c-fos 阳性细胞数量显著低于对照组，而模型组雄性小鼠与对照组之间相比存在差异，但无显著性。

结论 社交隔离导致的焦虑样行为存在性别二象性，雌性更敏感，雄性更耐受，可能与前额叶皮层被抑制相关。

PU-0093

肾小管上皮细胞来源细胞外囊泡促进中性粒细胞胞外诱捕网形成在脓毒症急性肾损伤中的作用及机制研究

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目的 脓毒症急性肾损伤（SAKI）的发生与机体免疫功能障碍和炎症反应失控紧密相关，然而其机制尚未明确；正常情况下，中性粒细胞胞激活后形成胞外诱捕网（NETs）行使宿主防御功能，但 NETs 形成过度进一步加重肾损伤进展。本研究旨在明确 SAKI 肾小管上皮细胞来源细胞外囊泡（TEC-EVs）在 NETs 形成及加重肾损伤中的作用及可能机制。

方法 采用腹腔注射 LPS（10 mg/kg）造小鼠脓毒症急性肾损伤模型，免疫荧光及 ELISA 法分别检测肾组织及血清中 NETs 含量；通过腺相关病毒特异抑制肾小管上皮细胞 EVs 释放，检测 NETs 含量及肾损伤程度改变；人肾小管上皮细胞（HK2）体外 LPS 刺激后收取上清细胞外囊泡，与健康人外周血中性粒细胞体外共培养，检测 NETs 形成；提取 TEC-EVs 通过尾静脉注射入小鼠体内，检测 NETs 含量变化、肾组织病理损伤情况、炎症因子及 KIM-1、NGAL 变化；提取脓毒症小鼠肾皮质胞外囊泡进行蛋白组学分析，进一步探究 TEC-EVs 促进 NETs 形成的分子机制。

结果 脓毒症急性肾损伤时，小鼠肾组织内 NETs 形成成增多，特异抑制肾小管上皮细胞 EVs 释放可减少 NETs 产生并减轻肾损伤；体外实验进一步证实，TEC-EVs 可以促进 NETs 形成，并呈时间、剂量依赖性；在体实验中，TEC-EVs 过继输入可进一步促进 NETs 形成加重肾损伤；蛋白质组学提示 TEC-EVs 中血清淀粉样蛋白 1（SAA1）明显增多，并且单细胞转录组测序数据提示脓毒症小鼠肾小管上皮细胞内 SAA1 显著升高；通过小干扰 RNA 降低 TEC-EVs 中 SAA1 后发现 NETs 形成显著减少；通过腺相关病毒特异敲低肾小管上皮细胞内 SAA1，脓毒症小鼠 NETs 形成减少，肾损伤改善；机制上，TEC-EVs 中 SAA1 通过 MAPK 通路促进 NETs 形成。有趣的是，脓毒症小鼠模型中，特异抑制 TEC-EVs 释放及肾小管上皮细胞内 SAA1 生成，远隔肺组织内 NETs 形成减少，肺损伤缓解。

结论 本研究表明在 SAKI 中 TEC-EVs 中 SAA1 通过 MAPK 通路促进中性粒细胞 NETs 形成，加重肾损伤；本研究揭示了 SAKI 中 TEC 坏死加重肾损伤的炎症正反馈的内在可能机制。并且，本研究初步提示，脓毒症时肾小管上皮细胞来源 EVs 及其内 SAA1 可能发挥促进远隔肺损伤作用，参与介导了脓毒症器官交互损伤。

PU-0094

仿生纳米颗粒 CSPA 通过抑制补体通路缓解七氟烷神经发育毒性

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目的 使用仿生纳米颗粒 CSPA 结合聚焦超声靶向小胶质细胞补体通路治疗七氟烷导致的突触损伤和认知功能障碍。

方法 在 P6、P8、P10 天给予新生小鼠重复七氟烷麻醉构建七氟烷神经发育毒性模型，在 P28 天通过尾静脉给予 CSPA（$Cu_{2-x}Se$-PVP-Astragalin, CSPA）联合聚焦超声打开血脑屏障进行治疗。通过 Western Blot、PCR、免疫荧光等观察突触相关蛋白及补体分子变化；通过电生理、Golgi 染色观察突触可塑性的损害；通过水迷宫、旷场、新旧物体识别等行为学实验观察小鼠学习记忆及认知功能。

结果 1、CSPA 的合成及特性
通过纳米合成技术，将 $Cu_{2-x}Se$-PVP 与 Astragalin 结合，合成超小的 CSPA 纳米颗粒；通过细胞膜包裹，构成具有小胶质细胞靶向能力的 CSPA@CM 纳米颗粒；通过电镜、XRD、紫外、红外等结果表明，CSPA 纳米颗粒具有超小的尺寸、较好的穿透血脑屏障功能和良好的靶向小胶质细胞的能力。
2、CSPA 治疗七氟烷所致的神经发育毒性
（1）细胞实验结果表明，CSPA 治疗后，补体通路蛋白 C1q 及 C3 明显降低，且 0.25 mM CSPA 效果最好；此外，与 C1q 抑制剂 ANX005 相比，CSPA 具有更好的效果；
（2）免疫荧光显示 0.25 mM CSPA 能显著减轻七氟烷导致的小胶质细胞的激活（IBA1），改善小胶质细胞的吞噬能力（CD68、CD11b）;细胞共培养结果表明，CSPA 可以抑制 BV2 小胶质细胞的吞噬，减少 BV2 细胞对 HT22 神经元细胞及荧光珠的吞噬；
（3）动物实验结果表明，细胞膜修饰的 CSPA 纳米颗粒 CSPA@CM 可以有效的穿透血脑屏障，靶向海马区的小胶质细胞；且其具有良好的生物安全性；
（4）免疫荧光及 Western Blot 结果显示 CSPA@CM 治疗后，小胶质细胞的激活相关蛋白 IBA1、CD68、CD11b 降低，补体蛋白 C1q、C3 减少；
（5）免疫荧光结果表明，小胶质细胞对海马区突触的吞噬减少，突触蛋白 PSD95、VGLUT2 升高，树突棘数量恢复；水迷宫、旷场、新旧物体识别结果表明，CSPA@CM 治疗后，七氟烷麻醉小鼠的认知功能显著改善。
结论 仿生纳米颗粒 CSPA 能靶向海马区的小胶质细胞，抑制小胶质细胞和补体系统的激活，减少小胶质细胞突触吞噬，改善七氟烷导致的突触损伤和认知功能障碍。

PU-0095

基于代谢组学探究术后恶心呕吐（PONV）的神经机制与潜在的新靶点

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目的 术后恶心呕吐（PONV）是患者在全身麻醉苏醒后常见的严重并发症。约有 30%的患者可能经历 PONV，在高危患者群体中，这一比例可能增至 80%。最新的指南指出，女性患者、不吸烟患者、年轻患者、吸入性麻醉、手术前有晕动病或 PONV 病史、手术时间较长和术后使用阿片类药物等因素都能够增加 PONV 的发生概率。然而，这些刺激对 PONV 发生的中枢神经系统机制尚未完全阐明。
近年来，甲状腺癌患者数量呈爆炸式增长，成为发病率增长最快的实体恶性肿瘤，手术是治疗甲状腺癌的主要方法。虽然甲状腺手术被认为是较安全的手术方式，但手术后的各种并发症也不容忽视。根据简化的 Apfel PONV 风险评分（评分 = 3-4），以女性为主的甲状腺和乳腺手术通常 PONV 发生率较高（60%～80%），对病人造成极大的困扰。
因此，本研究拟通过利用甲状腺切除术建立一种能够模拟患者 PONV 的模型，在此基础上研究与 PONV 相关的神经系统机制。
方法 我们以健康 C57BL/6 雌性小鼠为研究对象，对小鼠进行甲状腺切除手术，通过观察小鼠术后是否出现类似“张大嘴”的恶心呕吐样症状，以及通过电生理观察是否匹配出现膈肌痉挛来确定 PONV 的发生率。我们利用转录组学对比 PONV 与假手术组差异基因的表达；利用 qpcr 方法检测 IL-1β 的 mRNA 表达情况；利用免疫荧光染色技术检测 AP 脑区 NLRP3 和 IL-1β 的表达，以验证 PONV 后小鼠 AP 脑区炎症反应的激活。向小鼠脑室注射 NLRP3 抑制剂 MCC950 或溶媒剂后分别进行 PONV 造模，观察小鼠造模后恶心呕吐行为，并分别计算发生率，以明确抑制 NLRP3 对于改善 PONV 的效果。

结果 与假手术组相比，进行甲状腺切除术的小鼠 PONV 发生率明显上升；转录组学结果显示 PONV 组小鼠相比较假手术组 IL-1β 等炎性因子的基因水平升高，且免疫荧光结果显示 PONV 组小鼠 AP 脑区的 NLRP3 与 IL-1β 表达水平增加。脑室注射 MCC950 后，小鼠 PONV 的次数减少，且 NLRP3 与 IL-1β 表达水平有所下降。

结论 在本研究中，我们通过甲状腺切除术成功建立了能够模拟 PONV 的模型，并基于该模型初步探究了 PONV 的相关神经机制。根据我们的结果能够得出结论，AP 脑区中 NLRP3 相关的炎性通路与 PONV 密切相关，脑室注射 NLRP3 的特异性抑制剂 MCC950 能够减少 PONV 的发生率，这可能与 IL-1β 等炎性因子减少有关。因此 NLRP3 可能成为 PONV 新的治疗靶点。

PU-0096

Chaperone mediated autophagy modulates microglia polarization and inflammation via LAMP2A in ischemia induced spinal cord injury

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Background: Ischemic delayed paralysis is one of the most serious side effects of aneurysms surgeries, which is caused by spinal cord injury (SCI) before and after the operation. While the detailed mechanism remains unclear. Recent studies prove that the activation of autophagy, including macroautophagy and micro-autophagy pathways, occur during SCI or ischemia-induced brain neuron damage. However, the involvement of chaperone mediated autophagy (CMA) remains to be unveiled.
Methods: Our previous work described a rat model to develop delayed paralysis after aneurysms operation, and based on this model, the present work investigated the involvement of LAMP2A-mediated CMA in the aneurysm operation related SCI and delayed paralysis.
Results: LAMP2A was upregulated in the SCI procedure, and contributed to neuron death and pro-inflammation perturbation via inducing M1 polarization in microgila. We additionally observed that knockdown of LAMP2A resulted in the shift of microglia from M1 to M2 phenotype, as well as alleviated neuron damage during SCI. Furthermore, the analysis of BBB score, the result of immunohistological staining , and protein detection confirmed the activation of LAMP2A-mediated CMA activation and its interaction with NF-κB signaling, which leads to neuron death and motor function loss.
Conclusion: LAMP2A-mediated CMA contributes to the upregulation of pro-inflammatory cytokines and results in cell death in neurons during ischemic delayed paralysis via activating NF-κB signaling. Inhibition of LAMP2A promotes neurons survival during ischemic delayed paralysis.

PU-0097

The Mechanism of the PrL-VTA-PrL Neural Circuit in Regulating Sevoflurane Anesthesia-Awakening

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Introduction: The mechanism of general anesthesia has successively undergone lipid theory, protein theory, and the current mainstream neural network regulation theory but has not yet been fully elucidated. The prelimbic cortex (PrL) has been confirmed to participate in sleep, emotion, decision-making, and social processes through different neural networks. However, it is unclear whether PrL is involved in

general anesthesia regulation and its circuit mechanism with the midbrain. Activation of the ventral tegmental area (VTA) in the midbrain can promote general anesthesia-awakening, but the bidirectional projection relationship between PrL and the VTA in the neural circuit has not yet been clarified. This study aims to explore the mechanism of the PrL-VTA-PrL pathway in regulating the process of sevoflurane anesthesia-awakening.

Methods: This study used fiber photometry to observe neuronal activity changes during anesthesia and awakening. Immunofluorescence staining techniques were used to observe changes in PrL neurons during sevoflurane anesthesia-awakening. Chemogenetics and optogenetics were used to regulate the PrL-VTA pathway, observing its effect on anesthesia induction, maintenance, and recovery. The disappearance or recovery time of the righting reflex was monitored as a basis for evaluating the induction (LORR) or awakening (RORR) time of general anesthesia. EEG spectrum and burst suppression ratio (BSR) were used to assess the depth of anesthesia. Pharmacological methods combined with microinjections were used to explore the receptors that promote anesthesia-awakening in PrL and VTA.

Results: Activation of VTA^{DA} neurons via chemogenetics showed an extended LORR time and shortened RORR time, with the anesthesia maintenance period BSR and EEG spectrum also indicating awakening-promoting changes. Activation of PrL^{pyr} neurons using both chemogenetics and optogenetics extended LORR time and significantly shortened RORR time, with EEG BSR and spectral analysis showing clear awakening waves. Immunofluorescence staining of c-fos in PrL and VTA brain slices showed widespread mCherry fluorescence in the PrL region, indicating successful viral expression in pyramidal neurons. Significant increases in c-fos expression were observed in the VTA area of the activation group, showing increased co-expression with dopaminergic neurons. Activation of the PrL^{pyr}-VTA pathway via chemogenetics displayed an awakening-promoting state behaviorally, with reduced BSR and corresponding EEG spectrum changes promoting awakening. Similar findings were observed when activating the pathway via optogenetics, delaying LORR and shortening RORR, with light stimulation during the anesthesia maintenance period reducing EEG BSR and showing increased awakening waves. However, chemogenetic inhibition of the pathway showed a clear anesthesia-promoting effect in both behavioral and EEG analyses. Activation of the VTA^{DA}-PrL pathway via chemogenetics extended LORR, shortened RORR, and spectral analysis showed increased awakening waves after activation of the pathway. Activation via optogenetics showed similar awakening-promoting changes as chemogenetic activation. The use of chemogenetics activation combined with pharmacological microinjection into VTA^{DA} found that NMDA receptor antagonists could counteract the awakening-promoting effect of upstream PrL neurons, whereas blocking AMPA receptors did not have this effect. Microinjection of the D1R antagonist into PrL showed an inhibitory effect on the VTA-PrL awakening-promoting effect.

Conclusion: This study demonstrates that regulating the PrL^{pyr}-VTA and VTA^{DA}-PrL neural circuits can promote sevoflurane anesthesia-awakening. The PrL^{pyr}-VTA pathway works by activating the NMDA receptors in VTA, while the VTA^{DA}-PrL pathway works by activating the D1R receptors in PrL. Thus, both "bottom-up" and "Top-Down" mechanisms provide a theoretical basis for the study of general anesthesia drugs and offer broader ideas for future exploration of other brain science-related issues.

‘**Keywords**: General anesthesia mechanism, PrL, VTA, neural circuits, sevoflurane

PU-0098

Acute ongoing nociception delays recovery of consciousness from sevoflurane anesthesia via a midbrain circuit

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Although anesthesia provides favorable conditions for surgical procedures, recent studies have revealed that the brain remains active in processing noxious signals even during anesthesia. However, whether and how these responses affect anesthesia effect remains unclear. The

ventrolateral periaqueductal gray (vlPAG), a crucial hub for pain regulation, also plays an essential role in controlling general anesthesia. Hence, it was hypothesized that the vlPAG may be involved in the regulation of general anesthesia by noxious stimuli. Here, we found that acute noxious stimuli, including capsaicin-induced inflammatory pain, acetic acid-induced visceral pain, and incision-induced surgical pain, significantly delayed recovery from sevoflurane anesthesia in male mice, whereas this effect was absent in the spared nerve injury-induced chronic pain. Pre-treatment with peripheral analgesics could prevented the delayed recovery by acute nociception. Furthermore, we found that acute noxious stimuli, induced by the injection of capsaicin under sevoflurane anesthesia, increased c-Fos expression and activity in the GABAergic neurons of the ventrolateral periaqueductal gray (vlPAGGABA). Specific re-activation of capsaicin-activated vlPAGGABA neurons mimicked the effect of capsaicin and its chemogenetic inhibition prevented the delayed recovery from anesthesia induced by capsaicin. Finally, we revealed that the vlPAGGABA neurons regulated the recovery from anesthesia through inhibition of ventral tegmental area dopaminergic neuronal activity, thus decreasing dopamine release and activation of dopamine D1-like receptors in the brain. These findings reveal a novel, cell- and circuit-based mechanism for regulating anesthesia recovery by nociception and it is important to provide a new insight for guiding management of anesthesia recovery period.

PU-0099

Microglia phagocytosis of PNNs mediates PV interneuron dysfunction and associated gamma oscillations in neuroinflammation-induced cognitive impairment

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Neuroinflammation, characterized by abnormal activation of glial cells and neuronal damage, is central to cognitive disorders in central nervous system (CNS) diseases. However, the precise mechanisms linking neuroinflammation to cognitive impairment remain elusive. Perineuronal nets (PNNs) are specialized extracellular matrix structures that envelop the cell bodies and dendrites of parvalbumin expressing (PV) interneurons.

Methods: To investigate whether disruption of PNNs is implicated in neuroinflammation-induced cognitive impairment, we established a neuroinflammation model through the administration of lipopolysaccharides (LPS) at 0.5mg/kg for 7 days. Cognitive function was assessed using open field, Y maze, and novel object recognition tests. We utilized electrophysiological technique in vivo to record neural oscillations. We also identified deferentially expressed genes in microglia in the hippocampus by single-cells RNA sequencing analysis. Hapln1 overexpression and ApoE knockdown were achieved through adeno-associated virus (AAV) injections in C57BL/6J mice and CX3CR1-CreERT2 mice, respectively.

Results: (1) In the present study, our findings indicate that LPS-induced neuroinflammation impairs cognitive function, reduces PNN numbers, PV interneurons, and disrupts gamma oscillations in the CA1 region of the hippocampus. (2) Overexpression of Hapln1 restored PV interneurons and gamma oscillations, alleviating cognitive deficits. (3) Mechanistically, LPS-triggered microglial activation leads to the phagocytosis of PNNs, a process influenced by ApoE.

Conclusion Notably, targeting microglial ApoE in the hippocampal CA1 region with Cre-dependent AAV transfection in CX3CR1-CreERT2 mice hindered PNN engulfment, thereby highlighting the crucial role of microglia phagocytosis of PNNs in neuroinflammation-induced cognitive impairment via the ApoE pathway.

PU-0100

通过超分子水凝胶双重递送 NF-κB 抑制剂和 NGF 促进周围神经损伤修复

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目的 设计一种超分子化合物 NapFFY 和胡黄连苷 II（Picroside Ⅱ，PII）和神经生长因子（Nerve growth factor，NGF）共组装形成 PII/NGF/NapFFY 超分子水凝胶作为局部控释药物传递系统，通过局部注射损伤部位缓慢释放 PII 和 NGF 达到对损伤神经进行抗炎修复，为改善 PNI 后神经修复提供新思路。
方法 合成一种 PII/NGF/NapFFY 超分子水凝胶，研究了其理化性质和释放特性，并观察了其对大鼠坐骨神经挤压伤后炎症水平、神经功能恢复及神经再生的影响。
结果 PII/NGF/NapFFY 水凝胶在生理温度呈凝胶状态，并在体内保留并持续释放 PII 和 NGF 长达 7 天。PII/NGF/NapFFY 水凝胶显著提高了坐骨神经挤压伤后坐骨功能指数(SFI)，抑制损伤侧腓肠肌萎缩。此外，PII/NGF/NapFFY 水凝胶显著抑制了损伤炎症急性期 M1 亚型（促炎）巨噬细胞浸润，促进了神经损伤急性期 M2 亚型(抗炎)巨噬细胞浸润，上调了 P75ntr 蛋
白表达和抑制了 NLRP3/NF-κB/IL-1β 信号通路激活。促进了再生神经神经结构排列更有序紧密，水肿及空泡化成度更少，轴突再生标志物 GAP43 及髓鞘再生标志物 S100β 表达更高。
结论 PII/NGF/NapFFY 水凝胶可作为作为局部控释系统，通过调节损伤神经炎症反应水平、促进轴突再生、髓鞘再生来促进 PNI 后功能恢复。我们希望这项研究能为周围神经损伤的再生和修复提供有价值的治疗策略。

PU-0101

脊髓 PRL-1 介导胰岛素受体增强 GluA1 磷酸化诱发痛觉敏感化机制研究

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目的 慢性疼痛发病机制复杂，且缺乏有效的治疗手段。因此，揭示疼痛形成的潜在机制对于寻找早期干预措施，防止慢性疼痛的发生具有重要意义。肝再生磷酸酶-1(PRL-1) 属于蛋白酪氨酸磷酸酶家族，主要表达于脑组织、神经细胞、肝脏以及一些肿瘤细胞系中，参与调节细胞的生长和分化过程。研究证实，PRL-1 通过介导细胞表面受体信号，在调控轴突的导向，分支和突触形成中发挥重要作用。本研究探讨脊髓中 PRL-1 介导胰岛素受体(InR)信号通路，调控突触部位谷氨酸受体 GluA1 磷酸化(p-GluA1)水平及突触生长对慢性疼痛形成的影响。
方法 C57 BL6/J 小鼠 60 只，随机分为 4 组(n = 15) :假手术组(sham 组)、手术组(SNL 组)、手术+RNA 干扰组（SNL+RNAi-LV）、手术+RNA 干扰对照组 (SNL+NC-LV) 。建立神经病理性疼痛模型，于造模前及造模后 1、3、5、7、14、21 天测定小鼠机械痛阈值，通过 WB、RT-PCR 等检测脊髓中 PRL-1 蛋白质及 mRNA 的表达情况；脊髓注射干扰及对照病毒，测定小鼠的机械痛阈值，通过分子生物学技术检测脊髓中 PRL-1、InR、Akt、p-GluA1 表达变化情况。通过免疫荧光进行细胞及在体实验，观察 PRL-1 和 GluA1 在神经元突触中的表达及对突触形成的影响；采用神经电生理技术，解析 PRL-1 调控突触功能及突触可塑性参与疼痛形成机制。
结果 与 sham 组比较，SNL 和 SNL+NC-LV 组小鼠术后各检测点的痛阈值显著降低，与 SNL 组比较，SNL+RNAi-LV 组小鼠术后各检测点的痛阈值显著升高，差异有统计学意义(P＜0.05) 。于术

前及术后第 1d、7d、14d、21d，进行蛋白相关指标检测，与 sham 组比较，SNL、SNL+NC-LV 组小鼠 PRL-1、InR、Akt、p-GluA1 在脊髓神经元中高表达、蛋白含量及 mRNA 表达显著增加，与 SNL 组比较，SNL+RNAi-LV 组小鼠各蛋白在神经元中定位减少，且蛋白含量及 mRNA 表达显著降低，差异有统计学意义(P＜0.05)。脊髓膜片钳电生理结果显示，神经病理痛模型下，脊髓背角神经元活性增高，给予 PRL-1 慢病毒干扰，其脊髓背角神经元活性显著降低，痛阈值明显升高，各组间比较差异具有统计学意义(P＜0.05)。细胞及在体实验证实，PRL-1 能促进突触生长及树突棘形成，给予 PRL-1 慢病毒干扰抑制突触形成，各组间比较差异具有统计学意义(P＜0.05)。结论 PRL-1 可能通过激活 InR-Akt 信号通路，刺激相关神经元轴突中的特定区域调控突触的发生和生长，同时调控脊髓背角 GluA1 的磷酸化水平，增强突触可塑性介导慢性疼痛形成。

结论 PRL-1 可能通过激活 InR-Akt 信号通路，刺激相关神经元轴突中的特定区域调控突触的发生和生长，同时调控脊髓背角 GluA1 的磷酸化水平，增强突触可塑性介导慢性疼痛形成。

PU-0102

盐酸戊乙奎醚对 HK2 细胞亚铁肌红蛋白损伤的保护作用及铁死亡机制研究

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目的 急性肾损伤(AKI)是横纹肌溶解综合征(RM)的常见并发症，具有很高的发病率和死亡率，目前缺乏有效的治疗方法。近来有研究表明，铁死亡与 RM 致 AKI 密切相关。铁死亡是一种铁依赖性的，以脂质过氧化累积为特征的新型细胞死亡方式。盐酸戊乙奎醚(PHC)是一种新型抗胆碱能药物，我们课题组前期研究已经证明它具有肾保护和抗脂质过氧化的特性。然而，PHC 是否能调控 RM 致 AKI 中的铁死亡及其具体机制目前仍不清楚。本研究旨在探索 PHC 抑制 HK2 细胞铁死亡的可能机制，为 RM 致 AKI 的治疗提供实验和理论依据。

方法 通过 GEO 数据库获取 RM 致 AKI 小鼠模型以及对照组的 RNA-seq 信息，并进行基因差异和富集分析。体外实验采用亚铁肌红蛋白处理 HK2 细胞，构建 RM 致 AKI 细胞模型。实验分为 Control 组、FeG 组、PHC 组、Fer 组和 Era 组，每组均干预 8、24h。首先利用 CCK8 法检测细胞活性， TUNEL 染色检测细胞死亡情况，Annexin V-FITC/PI 双染法检测细胞凋亡率。然后采用试剂盒检测 Fe2+、MDA 含量，DCFH-DA 荧光探针检测 ROS 的含量，JC1 染色检测线粒体膜电位。最后利用 WB 和 RT-qPCR 检测 GPX4 和 SLC7A11 的蛋白和 mRNA 表达水平。

结果 富集分析结果提示，RM 致 AKI 与铁死亡有关。体外实验结果显示，亚铁肌红蛋白可以抑制细胞活性，增加 Fe2+积累，促进氧化应激，同时降低 MMP。而 PHC 处理能够逆转上述趋势，这与抑制铁死亡的作用相一致。这些结果表明铁死亡可能参与了 PHC 对亚铁肌红蛋白诱导的 HK2 细胞的保护作用，并加入 Fer-1 （铁死亡抑制剂）和 Erastin （铁死亡诱导剂）进行了验证，结果显示 PHC 与 Fer-1 联用增强了 PHC 对 HK2 细胞的保护作用，而 Erastin 抑制了 PHC 对 HK2 细胞铁死亡的作用。此外，从机制上讲，我们发现 PHC 减轻了亚铁肌红蛋白处理后 SLC7A11、GPX4 的蛋白和 mRNA 水平的下降。其保护机制与 Fer-1 一致，可能是通过 SLC7A11/GPX4 途径发挥了抗铁死亡的作用。

结论 PHC 可以抑制亚铁肌红蛋白诱导的 HK2 细胞铁死亡，减轻 RM 致 AKI，这可能与 SLC7A11/GPX4 通路有关。因此，本研究通过生信与体外实验相结合的方法为 RM 致 AKI 提供了新的治疗药物，对 RM 致 AKI 的防治有着重要的参考意义。

PU-0103

Oxidative stress-mediated loss of hippocampal parvalbumin interneurons contributes to memory precision decline after acute sleep deprivation

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Sleep is pivotal to memory consolidation, and sleep deprivation (SD) after learning can impede this process, leading to memory disorders. Yet, the specific underlying mechanism remains unclear. In this research, a mouse model of acute sleep deprivation (ASD) was developed by subjecting the mice to 6 hours of SD following fear conditioning training. Subsequently, the animals were put through a series of behavioral assessments, such as open field, fear conditioning, and Y maze tests. The hippocampi were harvested for immunostaining or western blotting to evaluate the levels of parvalbumin (PV), somatostatin, and 8-hydroxy-2'-deoxyguanosine (8-OHdG). In vivo electrophysiology technology was used to record local field potentials in the CA1 region during fear conditioning tests in either context A or context B. For the intervention studies, we employed either chemogenetic technology to selectively activate PV interneurons or an antioxidant N-acetylcysteine to reduce oxidative stress. In the current investigation, we showed that memory precision decline was induced by ASD, concomitant with a notable elevation in oxidative stress within PV interneurons, loss of PV, and disturbed neuronal oscillation in the CA1 region. Notably, chemogenetic activation of PV interneurons effectively ameliorated abnormal gamma oscillation and memory precision decline observed in ASD mice. Additionally, prior administration of the antioxidant medication N-acetylcysteine effectively reversed memory precision decline and mitigated PV loss and abnormal oscillation triggered by ASD. Collectively, our findings indicated that ASD increased oxidative stress in PV interneurons, thereby disrupting network oscillation in the CA1 and ultimately leading to memory precision decline.

PU-0104

不同复温温度对寒冷暴露后大鼠听皮层局部场电位及行为学的影响

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目的 本研究通过观察不同复温温度对寒冷暴露后大鼠听皮层（auditory cortex，AC）区脑电活动及行为学的影响，探究主动复温对听觉冷损伤的恢复作用，从而寻求针对听觉冷损伤最佳的复温温度。

方法 选用健康雄性 SD 大鼠 60 只，分为 A、B 两组，每组各分为 6 个亚组，分别设置为常温对照组（GC），被动复温组（GP），28℃复温组（G28），31℃复温组（G31），34℃复温组（G34）和 37℃复温组（G37）。A 组大鼠使用在体多通道电生理记录（multi-channel in vivo recording，MIVR）技术采集 AC 区自发及纯音刺激下的诱发局部场电位（local field potentials，LFPs），对比全频段的功率谱密度（power spectral density，PSD），从而分析神经元电活动；B 组大鼠进行定点听音饮水行为学测试，对比不同组大鼠的听觉反应速度。通过酶联免疫吸附实验（enzyme-linked immunosorbent assay，ELISA）检测各组大鼠血清中 S100β 的表达水平，使用伊红/苏木素（hematoxylin/eosin，HE）染色观察 AC 区组织病理学改变，应用原位末端转移酶标记技术（terminal deoxynucleotidyl transferase-mediated dUTP-biotin nick end labeling assay，TUNEL）

观察 AC 区神经元细胞凋亡情况并对比各组平均荧光强度（mean fluorescence intensity，MFI），使用蛋白免疫印迹法（western blot，WB）分析 AC 区 N-甲基-D-天冬氨酸受体（N-methyl-D-aspartate receptor，NMDAR）的表达，探究听觉功能改变的分子机制。

结果 寒冷暴露后各组大鼠肛温无显著性差异，均低于 GC（P＜0.001），一般状态亦未见区别。GP 大鼠 AC 区自发及诱发 LFPs 能量较 GC 显著降低（P＜0.001），定点听音饮水时间明显延长（P＜0.001）。HE 染色可见 GP 大鼠 AC 区组织水肿，细胞排列紊乱，高倍镜下可见细胞核固缩，TUNEL 结果显示 AC 区组织 MFI 明显上升（P＜0.001），此外，GP 大鼠血清 S100β 水平较 GC 显著增高（P＜0.001），证实了寒冷暴露后听觉功能损伤的存在。不同复温组组间对比，结果显示 G37 大鼠复温后肛温高于 GP（P＜0.01），自发 LFPs 全频段的 PSD 均大于 GP（P＜0.05），诱发 LFPs 在 35-45Hz 频段的能量亦大于 GP（P＜0.01）。主动复温各组大鼠 AC 区 MFI 均小于 GP，其中 G37 最低（P＜0.001）。血清 S100β 水平测定结果显示 G37 大鼠表达水平低于 GP（P＜0.001）。WB 结果显示与 GP 相比，主动复温各组大鼠 AC 区 NMDAR 的表达均呈现不同程度的下降，其中 G37 大鼠表达水平最低（P＜0.001）。

结论 主动复温可减轻寒冷暴露后大鼠听皮层区自发及诱发局部场电位功率谱密度的下降程度，提高听觉反应速度，对寒冷暴露后大鼠听觉功能损伤具有积极的恢复作用，37℃是可能较佳的主动复温温度。

PU-0105

CIRP attenuates acute kidney injury after hypothermic cardiovascular surgery by inhibiting PHD3/HIF‐1α‐mediated ROS‐TGF‐β1/p38 MAPK activation and mitochondrial apoptotic pathways

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Background: The ischemia–reperfusion (IR) environment during deep hypothermic circulatory arrest (DHCA) cardiovascular surgery is a major cause of acute kidney injury (AKI), which lacks preventive measure and treatment. It was reported that cold inducible RNA-binding protein (CIRP) can be induced under hypoxic and hypothermic stress and may have a protective effect on multiple organs. The purpose of this study was to investigate whether CIRP could exert renoprotective effect during hypothermic IR and the potential mechanisms.

Methods: Utilizing RNA-sequencing, we compared the differences in gene expression between Cirp knockout rats and wild-type rats after DHCA and screened the possible mechanisms. Then, we established the hypothermic oxygen-glucose deprivation (OGD) model using HK-2 cells transfected with siRNA to verify the downstream pathways and explore potential pharmacological approach. The effects of CIRP and enarodustat (JTZ-951) on renal IR injury (IRI) were investigated in vivo and in vitro using multiple levels of pathological and molecular biological experiments.

Results: We discovered that Cirp knockout significantly upregulated rat Phd3 expression, which is the key regulator of HIF-1α, thereby inhibiting HIF-1α after DHCA. In addition, deletion of Cirp in rat model promoted apoptosis and aggravated renal injury by reactive oxygen species (ROS) accumulation and significant activation of the TGF-β1/p38 MAPK inflammatory pathway. Then,

based on the HK-2 cell model of hypothermic OGD, we found that CIRP silencing significantly stimulated the expression of the TGF-β1/p38 MAPK inflammatory pathway by activating the PHD3/HIF-1α axis, and induced more severe apoptosis through the mitochondrial cytochrome c-Apaf-1-caspase 9 and FADD-caspase 8 death receptor pathways compared with untransfected cells. However, silencing PHD3 remarkably activated the expression of HIF-1α and alleviated the apoptosis of HK-2 cells in hypothermic OGD. On this basis, by pretreating HK-2 and rats with enarodustat, a novel HIF-1α stabilizer, we found that enarodustat significantly mitigated renal cellular apoptosis under hypothermic IR and reversed the aggravated IRI induced by CIRP defect, both in vitro and in vivo.
Conclusion: Our findings indicated that CIRP may confer renoprotection against hypothermic IRI by suppressing PHD3/HIF-1α-mediated apoptosis. PHD3 inhibitors and HIF-1α stabilizers may have clinical value in renal IRI.

PU-0106

苦参素 E 抑制海马神经元吲哚胺 2，3 双加氧酶 1 活性改善脓毒症相关性认知功能障碍

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目的 脓毒症相关性认知功能障碍是指在脓毒症背景下出现的认知能力下降。色氨酸是人体必需氨基酸，在病理情况下其沿犬尿氨酸途径代谢的产物具有神经毒性，可引发大脑氧化应激和神经元凋亡。吲哚胺 2，3-双加氧酶 1（IDO1）是该途径的主要限速酶。苦参素 E 具有抗炎和改善血脑功能屏障的作用，是 IDO1 非竞争性抑制剂。本研究旨在探究苦参素 E 通过抑制 IDO1 减轻脓毒症小鼠认知功能障碍的作用和机制。
方法 选取 8~10 周龄雄性 C57BL/6 小鼠，随机分为假手术组（Sham 组）、苦参素 E 组（KE 组）、盲肠结扎穿孔组（CLP 组）和 CLP 建模苦参素 E 处理组（CLP+KE 组）。手术当天、术后第 1 天和第 2 天，KE 组和 CLP+KE 组小鼠腹腔注射 10 mg/kg 苦参素 E，CLP 组和 Sham 组小鼠腹腔注射等体积溶剂。记录术后第 1 天小鼠脓毒症评分和术后 7 天生存率。术后第 8 和 9 天行新物体识别实验评估学习记忆能力；术后第 10~14 天行 Morris 水迷宫实验评估空间学习记忆能力。术后的第 1、3、7 天检测小鼠海马中炎症因子 IL-6、TNF-α 和 IL-8 的表达水平。术后第 3 天取海马组织检测尼氏染色、Fluoro-Jade C 染色以及 Bax、Bcl-2、Cleaved caspase-3 蛋白表达水平评估海马神经元损伤；检测 IDO1 的 mRNA 和蛋白表达水平；检测 ROS 和 MDA 水平评估氧化应激，JC-1 染色评估线粒体膜电位；检测色氨酸沿犬尿氨酸通路代谢产物 Kyn、3-HK、3-HAA 和 QA 含量。
结果 与 CLP 组相比，CLP+KE 组小鼠术后第 1 天脓毒症评分和术后 7 天生存率差异无统计学意义。与 CLP 组相比，CLP+KE 组小鼠新事物实验辨别指数增高；水迷宫实验逃避潜伏期缩短，目标象限停留时间延长，穿越平台次数增加。与 CLP 组相比，CLP+KE 组小鼠海马区尼氏染色阳性细胞计数增加；Bax 和 cleaved caspase-3 表达水平降低、Bcl-2 表达水平增高；海马 CA1 区 FJC 阳性细胞数量减少。与 CLP 组相比，CLP+KE 组小鼠海马组织 ROS、MDA 水平下降，JC-1 染色的红/绿荧光比例增加。然而与 CLP 组相比，CLP+KE 组小鼠海马 IBA-1 阳性细胞计数差异无统计学意义；IL-6、TNF-α 和 IL-β 水平在术后 1、3、7 天组间差异均无统计学意义。与 CLP 组相比，CLP+KE 组小鼠海马 IDO1 与 Neun 共定位细胞数量以及 IDO1 的 mRNA 和蛋白表达水平差异均无统计学意义；与CLP组相比，CLP+KE组小鼠海马组织色氨酸沿犬尿氨酸通路代谢产物含量降低。
结论 苦参素 E 通过抑制海马神经元 IDO1 的活性，减少色氨酸沿犬尿氨酸通路代谢产物生成，降低氧化应激反应，保护海马神经元线粒体功能，改善 CLP 建模小鼠认知功能。

PU-0107

S100A8 通过抑制 PI3K/AKT 信号通路调控慢性睡眠剥夺介导的小胶质细胞异常自噬和凋亡

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目的 睡眠不足及其相关病症（如认知障碍）给社会造成了巨大负担。自噬和细胞凋亡异常与认知功能障碍密切相关。S100A8 是一种钙锌结合蛋白，在脑缺血再灌注损伤诱发的氧化应激和异常自噬中起着至关重要的作用。然而，S100A8 在睡眠剥夺引起的认知障碍中的作用仍不清楚。
方法 在这项研究中，我们构建了慢性睡眠剥夺（CSD）动物模型和 S100A8 基因敲除细胞及动物模型。此外，我们还利用转录组测序、腺相关病毒介导的基因编辑、慢病毒转染、莫里斯水迷宫（MWM）试验、免疫荧光共聚焦分析、免疫组织化学和 Western 印迹（WB）等技术，研究了 S100A8 参与慢性睡眠剥夺诱导的认知障碍及其内在机制。
结果 通过转录组测序，我们发现 S100A8 在慢性睡眠剥夺模型中的表达明显升高。随后，我们利用动物和细胞模型敲除 S100A8，发现敲除 S100A8 可减轻慢性睡眠剥夺引起的小鼠认知障碍。为了进一步研究其潜在机制，我们结合免疫荧光、WB 等技术，证实沉默 S100A8 表达可以减少慢性睡眠剥夺诱导的异常自噬和细胞凋亡，并激活小鼠海马和雷帕霉素处理的小胶质细胞（BV2 细胞）中的磷脂酰肌醇 3-激酶（PI3K）/蛋白激酶 B（AKT）通路。
结论 综上所述，我们发现 S100A8 在 CSD 引起的认知障碍中起着至关重要的作用。其机制与 PI3K/AKT 通路介导的小胶质细胞异常自噬和凋亡有关。本文有望为治疗 CSD 引起的认知障碍提供潜在的治疗靶点。

PU-0108

Histone Lactylation Protects against Sevoflurane-Induced Cognitive Impairment by Regulating YTHDF3/PRDX3 mediated microglial pyroptosis in Neonatal Mice

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Background: Sevoflurane (SEV), a widely used inhalational anesthetic, has been implicated in cognitive impairment, particularly in neonates. However, the mechanisms underlying SEV- induced cognitive impairment not fully understood. Recent research has increasingly demonstrated that neuroinflammation is a key pathophysiological mechanism of SEV-induced cognitive dysfunction. Lactate-derived histone lysine lactylation, a newly discovered epigenetic modification, directly stimulates gene transcription from chromatin. However, the role of histone lactylation in mitigating neuroinflammatory in SEV induced cognitive impairment remains unclear. m6A modifications has been linked to SEV-induced neurotoxicity. In the current study, we demonstrated that histone lactylation mitigates SEV-induced cognitive impairment by regulating YTHDF3/PRDX3-mediated

cell pyroptosis in neonatal mice, shedding light on the the development of targeted therapeutic interventions aimed at mitigating anesthesia-related neurotoxicity in vulnerable pediatric populations.
Methods: Neonatal mice or murine microglial cell line BV-2 were exposed to SEV. Morris water maze and novel object recognition tests were used for measuring the cognitive function of mice. Histological examination and immunofluorescence staining were conducted to evaluate hippocampal morphology and the lactylated proteins in microglial cells, respectively. Cell pyroptosis was measured by flow cytometry and transmission electron microscope, and cytokine levels were detected using ELISA. Protein and gene expression were analyzed through western blot and RT-PCR. The interaction of H3K18la, EP300 with YTHDF3 or YTHDF3 and PRDX3 was verified by CHIP or RIP assays.
Results: SEV induces significant cognitive impairment and reduces both histone lactylation and YTH domain-containing family protein 3 (YTHDF3) expression in the hippocampal tissues of neonatal mice. A decrease in histone lactylation and YTHDF3 expression is accompanied by increased cell pyroptosis and inflammation were observed in SEV-treated BV-2 cells. SEV modulates YTHDF3 expression via histone lactylation, thereby influencing N6-methyladenosine (m6A)-mediated peroxiredoxin 3 (PRDX3) translation and the subsequent activation of the NLRP3 inflammasome mediated pyroptosis in BV-2 cells. Overexpression of YTHDF3 or PRDX3 counteract the SEV-induced promotion of pyroptosis and inflammation in BV-2 cells. Furthermore, histone lactylation enhances YTHDF3 expression and mitigates SEV-induced cognitive dysfunction in neonatal mice, whereas downregulation of YTHDF3 diminishes this protective effect.
Conclusion: Our findings elucidate that histone lactylation mitigates SEV-induced cognitive impairment by regulating YTHDF3/PRDX3-mediated microglial pyroptosis in neonatal mice. These insights offer a novel understanding of the molecular mechanisms underlying SEV-induced neurotoxicity in neonates.

PU-0109

A peptide component extracted from traditional Chinese medicine for diabetic wound repair

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Background: Diabetes mellitus currently affects approximately 537 million individuals worldwide, a figure projected to increase by 46% by the year 2045 [1]. A critical complication associated with diabetes is the development of chronic, non-healing wounds, such as diabetic foot ulcers. These ulcers significantly escalate the risk of amputation and are associated with a 68% mortality rate within five years of diagnosis [2]. Furthermore, these wounds substantially impair the quality of life [3]. Kangfuxin Liquid (KFX), an ethanol extract derived from the American cockroach, is documented for its potent anti-inflammatory and immunomodulatory properties. Clinically, it has been successfully utilized to treat various skin injuries, including incisions, ulcers, and burns [4]. Notably, KFX is enriched with peptides, which are believed to be the key active components facilitating its healing effects [5]. This study seeks to assess the efficacy of a specific natural peptide extracted from Kangfuxin in enhancing the healing process of diabetic wounds.
Methods: This research utilized network pharmacology to identify peptides from KFX Liquid that exhibit potent healing properties. Our primary focus was on investigating the roles of these peptides in enhancing the proliferation and migration of skin keratinocytes. Employing a combination of bioinformatic analysis, molecular docking, and RNA sequencing, we explored the peptides' target sites and binding mechanisms. Validation of these targets involved Western Blotting (WB) and Polymerase Chain Reaction (PCR) techniques. We also determined the optimal peptide concentration necessary for effective skin wound repair. The quality of wound healing was

assessed using histological evaluations (HE, Masson), immunofluorescence staining, and measures of angiogenesis, collagen deposition, and reactive oxygen species (ROS) clearance. Additionally, the efficacy of these peptides was evaluated in a hydrogel delivery system to ascertain their impact on wound repair.
Results: Active peptide components extracted from the traditional Chinese medicine, Kangfuxin, were identified through network pharmacology, indicating their potential in promoting wound healing. These peptides notably enhanced both proliferation and migration of HaCaT cells. In contrast, advanced glycation end-products (AGEs) inhibited these cellular processes; however, the identified peptides counteracted these effects, thus restoring impaired wound healing and cellular motility. For peptide delivery, hydrogels were employed, which ensured effective encapsulation and sustained release of the peptides. In diabetic mouse models, the hydrogel-mediated peptide delivery markedly improved wound repair. This was substantiated by significantly better repair quality in treated groups compared to controls.
Conclusion: Peptide components from traditional Chinese medicine show promise for diabetic wound repair. This study highlights the potential of these compounds to enhance skin healing by targeting novel mechanisms. Findings support the clinical integration of these peptides, potentially transforming diabetic wound management.

PU-0110

心肌缺血再灌注后循环外泌体介导神经认知功能损伤

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目的 研究心肌缺血再灌注后循环外泌体的释放与神经认知功能损伤的相关性，深入探索心肌缺血再灌注后循环外泌体中的特定分子如 miRNA、蛋白质等调控神经炎症，参与神经功能障碍的机制，旨在揭示外泌体在心肌缺血再灌注后心脑互作中的作用，为预防心脑互作引起神经功能障碍提供治疗途径和思路。
方法 将雄性 ICR 小鼠经心肌缺血再灌注（IR）模型，提取血清外泌体（IR-EVs），并提取对照小鼠血清外泌体（sham-EVs），健康小鼠随机分为 3 组（n=5）：空白组（control 组）、IR-EVs 组、sham-EVs 组，分别静脉注射 sham-EVs 和 IR-EVs。通过小动物成像技术研究外泌体在小鼠体内分布，静脉注 PKH26 染料标记的外泌体研究外泌体在脑内小胶质细胞以及神经元的分布。通过新物体识别实验、Morris 水迷宫实验检测小鼠认知记忆能力。Western blot 检测突触相关蛋白 PSD95 以及神经元 NeuN 的变化。尼氏染色检测神经元损伤。免疫荧光观察小胶质细胞以及神经元形态改变。然后将雄性 ICR 小鼠随机分为假手术组（sham 组）、IR 组、IR+GW4869 组、IR+米诺环素（MC）组，通过行为学实验、Western blot、免疫荧光及尼氏染色研究外泌体抑制剂 GW4869 和小胶质细胞抑制剂 MC 对神经功能损伤的影响。
结果 小鼠静脉注射 sham-EVs 和 IR-EVs 后，外泌体均可通过血脑屏障入脑，并可被小胶质细胞以及神经元所摄取。给予 IR-EVs 的小鼠对新物体未表现出特别的探索偏好，优先识别指数仅为 30%-40%，显著低于 sham-EVs 组。在水迷宫实验的测试期，游泳轨迹表明给予 IR-EVs 的小鼠未表现出对某个象限的偏爱，在目的象限的距离占总距离平均不到 20%，显著低于 sham-EVs 组，表明 IR-EVs 引起小鼠神经功能障碍。给予米诺环素（IR-EVs+MC 组）以及外泌体抑制剂（IR-EVs +GW4869 组）的小鼠神经功能障碍明显改善。尼氏染色表明，在海马的三个亚区 CA1、CA3、DG 区，给予 IR-EVs 组的尼氏小体明显减少，而给予米诺环素后有所改善。免疫荧光显示，IR-EVs 组小鼠海马中 Iba1 阳性的小胶质细胞数量明显增加，胞体增大，呈圆形或杆状，提示小胶质细胞激活，给与米诺环素(MC)后，减轻了小胶质细胞的激活。Western blot 表明，与 sham-EVs 组相比，IR-EVs 组小鼠海马中 PSD95 以及 NeuN 表达量明显降低，而给予米诺环素以及外泌体抑制剂后，明显增加了 PSD95 以及 NeuN 的表达。

结论 心肌缺血再灌注后血清外泌体（IR-EVs）会引起神经认知功能损伤，而给予米诺环素及外泌体抑制剂 GW4869 可改善神经功能障碍，提示心肌缺血再灌注后循环外泌体可能通过活化小胶质细胞引起神经认知功能损伤。

PU-0111

星形胶质细胞通过下调 GABA 转运体 3 抑制 GABA 能投射介导小鼠术后焦虑

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目的 星形胶质细胞是维持神经突触递质稳态和情绪状态的关键结构，同时，它也是调控围术期神经损伤的重要结构。然而，鲜有研究报道反应性星形胶质细胞调控围术期负性情绪的机制，本研究旨在阐明术后焦虑小鼠未定带星形胶质细胞钙活动异常的现象，及其在调控未定带 GABA 能神经投射中的作用，明确反应性星形胶质细胞介导术后焦虑样行为的神经机制，为围术期神经损伤的防治提供新的理论依据与药物治疗的靶点。
方法 本实验采用 C57 与 VGAT-Cre 小鼠，通过麻醉下行腹部探查术、胫骨骨折固定术、颈动脉暴露术，探究手术是否诱导小鼠出现焦虑样行为，结合免疫荧光，在体光纤钙成像与多通道在体电生理等方法检测术后焦虑小鼠未定带星形胶质细胞与 GABA 能神经元活性变化；通过弗代柠檬酸钠抑制星形胶质细胞活性，在星形胶质细胞表达人源钙泵蛋白（hPMCA2w/b）竞争性抑制其钙活动，探究反应性星形胶质细胞参与调节术后小鼠未定带 GABA 稳态与焦虑样行为的机制；利用病毒工具在未定带星形胶质细胞过表达 GABA 转运体 3，明确星形胶质细胞调控神经元活性与术后焦虑样行为的机制；通过光遗传学结合光纤钙成像及全细胞膜片钳技术，探究小鼠术后焦虑的相关神经环路机制。
结果 高架十字迷宫与旷场测试结果表明，与假手术组相比，小鼠腹部探查术后 6h 至 3d 出现显著的焦虑样行为；然而，单纯异氟烷麻醉组与假手术组相比，无显著差异。免疫荧光结果显示，术后 24h，小鼠未定带星形胶质细胞 GFAP 表达增加，且神经元活性降低。光纤钙成像结果显示，术后小鼠未定带星形胶质细胞钙信号活性异常增高，GABA 能神经元钙活性下降；药理学和遗传学抑制星形胶质细胞显著缓解小鼠术后焦虑样行为，并且神经元活性增强。在体微透析与免疫荧光结果显示，与假手术组相比，术后小鼠未定带游离 GABA 增加，GAT-3 表达降低，提示星胶 GAT-3 表达下降介导未定带 GABA 稳态失衡；此外，上调未定带星形胶质细胞 GAT-3 和光遗传学激活 ZIGABA-MRN 神经投射均可缓解小鼠术后焦虑样行为。
结论 未定带反应性星形胶质细胞通过调节 GAT-3 表达，进而影响 GABA 稳态与 ZIGABA-MRN 神经投射，介导术后小鼠出现焦虑样行为。

PU-0112

Sigma 2 receptor alleviates acute postoperative pain-mediated cognitive impairment in aged rats

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Objective: Postoperative cognitive dysfunction (POCD) is a prevalent neurological complication following surgery, characterized by deficits in learning and memory, and studies indicated that acute postoperative pain is a significant contributor. Therefore, enhanced postoperative pain

management is urgently needed in clinical practice to facilitate rapid recovery and reduce the incidence of neurocognitive dysfunction. Opioids are the most effective and widely used analgesics in clinical practice; however, they are associated with detrimental effects on synaptic plasticity and side effects such as addiction, respiratory depression, nausea, vomiting, and constipation. Therefore, it is imperative to identify alternative analgesics with fewer side effects that do not compromise neurological function, to optimize perioperative pain management and preserve patients' cognitive function. Previous studies have demonstrated that activation of the Sigma 2 receptor effectively relieves neuropathic pain and is strongly associated with cognitive function. However, the role of Sigma 2 receptors in acute postoperative pain-mediated cognitive impairment in elderly patients remains unclear. This study aims to investigate the role of Sigma 2 receptors by constructing a pathological model of postoperative acute pain-induced cognitive dysfunction in aged rats.

Methods: We performed tibial plateau fracture surgery on aged male SD rats under isoflurane anesthesia and divided them into three groups based on different postoperative observation time points: postoperative day 1 (S1, n=10), postoperative day 3 (S3, n=10), and postoperative day 7 (S7, n=10). Acute postoperative pain was assessed using von Frey test and Hargreaves method. Cognitive function was assessed by NOR experiments. The levels of TNF-α and IL-10 in hippocampal tissue, prefrontal cortex, and serum were determined by ELISA. Additionally, changes in Sigma2 receptor expression and cognitive function-related proteins hnRNPA2/B1 and Ng were measured using Western blot and immunofluorescence (IF). IF was also employed to detect the co-localization of Sigma2 receptors with neurons, astrocytes, and microglia in the hippocampus (CA1, CA3, DG), prefrontal cortex, and DRGs.

Results: The results showed that following tibial plateau fracture, aged rats exhibited symptoms of acute postoperative pain, evidenced by a significant decrease in mechanical allodynia and thermal hyperalgesia. This pain was accompanied by cognitive impairment, primarily demonstrated by a marked reduction in the new object recognition index in the NOR experiment. ELISA assays revealed a significant increase in the pro-inflammatory factor TNF-α and a significant decrease in the anti-inflammatory factor IL-10 in the surgery group. Western blot analysis indicated a significant increase in Sigma 2 receptor expression in the hippocampus and prefrontal cortex of rats with acute postoperative pain. Additionally, hnRNPA2/B1 and Ng showed significant alterations on the third postoperative day. Further immunofluorescence analysis revealed that Sigma2 receptors were expressed in the hippocampus (CA1, CA3, and DG), prefrontal cortex, and DRGs, with expression levels significantly increased following surgical anesthetic stress. Double immunofluorescence staining for Sigma 2 receptors and the neuronal marker NeuN, the astrocyte marker GFAP, and the microglia marker Iba-1 showed that although Sigma 2 receptors were present in astrocytes, they were predominantly expressed in microglia at the neuronal level.

Conclusions: Based on the above experimental results, we believe that the sigma 2 receptor plays a significant role in postoperative pain-mediated cognitive impairment in aged rats. The effect of sigma 2 receptors is achieved primarily through modulation of neurons and microglia and is time-specific.

PU-0113

Up-regulation of TREM2 protects against sevoflurane-induced developmental neurotoxicity by alleviating microglial pyroptosis via LXRβ-mediated lipid metabolism

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Background: Repeated neonatal sevofurane exposures, a clinical anesthesia method required for pediatric patients, have been reported to be associated with an increased risk of developing neurocognitive disorders. Recently, triggering receptor expressed on myeloid cells 2 (TREM2) has

been identified as a microglial lipid-sensor, and repeated neonatal sevofurane exposures can lead to lipid droplets (LDs) accumulating in microglia, according to our previous study, which is in turn associated with a dysfunctional proinflammatory phenotype such as pyroptosis. However, whether TREM2 can alleviate microglial pyroptosis by boosting microglial lipid metabolism to attenuate sevoflurane-induced developmental neurotoxicity remains unknown.
Methods: Neonatal male mice were treated with sevofurane on postnatal days 6, 8, and 10. The morris water maze (MWM) test, object location test (OLT), and novel object recognition test (NORT) were performed to assess sevoflurane-induced cognitive functions. To clarify the underlying mechanisms, two types of TREM2-KO/WT mouse models were used. The mice were treated with GW3965 and MCC950. We also studied that TREM2 boosted microglial lipid metabolism to alleviate microglial pyroptosis by direct stereotaxic injection of adeno-associated virus serotype 9 (AAV9)-delivered LXRβ. Western blotting, RT-qPCR, Nissl staining, immunofuorescence, and microglial morphology analysis were performed. In vitro experiments were conducted in microglial cell line BV2 cells. Untargeted metabolomics was used to identify the metabolite profiles.
Results: Repeated neonatal sevofurane exposures resulted in deficiencies in the learning and cognition of young mice, accompanied by microglial pyroptosis and abnormal lipid metabolism. LXRβ activation by agonist GW3965 inhibited the pyroptosis of microglia by promoting the lipid metabolism of microglia, thereby alleviating the release of neuroinflammatory factors from microglia and neuronal damage induced by sevoflurane. MCC950 also directly inhibited microglial pyroptosis to attenuate the sevoflurane-induced developmental neurotoxicity, but MCC950 could not promote the lipid metabolism of microglia. Through combined metabolomics and single-cell sequencing, we found that up-regulation of TREM2 protects against sevoflurane-induced developmental neurotoxicity by alleviating microglial pyroptosis via promoting the lipid metabolism of microglia. Finally, silencing LXRβ could reverse the inhibitory effect of up-regulation of TREM2 on pyroptosis. Our data demonstrated that up-regulation of TREM2 attenuated sevoflurane-induced cognitive impairment by suppressing microglia pyroptosis via LXRβ-mediated lipid metabolism.
Conclusions: Our findings demonstrated that up-regulation of TREM2 protects against sevoflurane-induced developmental neurotoxicity by alleviating microglial pyroptosis via LXRβ-mediated lipid metabolism. This may be a potential therapeutic strategy for this neurotoxicity.

PU-0114

Ventilator-induced Lung Injury in Mice is Enhanced by Activation of the PERK/eIF2α/NF-κB Pathway Triggered by Endoplasmic Reticulum Stress.

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Objective: Ventilator-induced lung injury (VILI) is the acute lung damage that develops during mechanical ventilation, and inevitably increases morbidity and mortality in patients receiving ventilator therapy. Endoplasmic reticulum stress (ERS) plays an important role in the pathogenesis of VILI. The aim of the present study is to investigate whether one of ERS axis, the PERK/eIF2αNF-κB signaling pathway is involved in VILI through the VILI model in vivo, and aim to provide a therapeutic basis for treatment of VILI clinically.
Methods: Eighteen C57/BL6 mice (body weigh 25 ± 2 g) were randomly divided into 3 groups, 6 mice per group: control group (CON group, spontaneous breathing after tracheal intubation, 4 h), High tidal volume group (HTV group, mechanical ventilation (MV) with high tidal volume, 20 ml/kg for 4 h), GSK2606414 (inhibitor of PERK) + HTV group (GSK group, mice were given GSK2606414 (50 mg/kg) intraperitoneally 0.5 h before MV with HTV, 20 ml/kg for 4 h). Afterward, the lung tissue and bronchoalveolar lavage fluid (BALF) were collected. The hematoxylin-eosin (HE) staining was

used to evaluate the degree of histopathological lung injury, wet/dry (W/D) ratio, BALF cells counts and protein, and the expression of inflammatory factors (IL-1β, IL-6, TNF-α) in BALF were measured to assess the degree of pulmonary inflammation. The protein expression of ERS marker (GRP78) and related proteins of PERK pathway (t-PERK, p-PERK, t-eIF2α p-eIF2α) were detected by Western Blot and Immunofluorescence, as well as the expression of IκBα and NF-κB protein were detected to observe the activation of NF-κB pathway.
Results: 1. Compared with the CON group, animals ventilated with HTV for 4h showed obvious lung injury, such as inflammatory-cell infiltration showed in H&E staining, followed by upregulation of lung histopathological score, W/D ratio, cell counts and total protein as well as inflammatory factors (IL-1β, IL-6, TNF-α) in BALF ($P < 0.05$). 2. Compared with the CON group, protein expression of ERS markers GRP78 as well as relative protein of PERK pathway p-PERK, p-eIF2α were significantly increased in the HTV group ($P < 0.05$). 3. Compared with the CON group, the protein expression of IκBα was decreased in the HTV group, together with the expression of NF-κB was increased in the nucleus and decreased in the cytoplasm ($P < 0.05$). 4. However, pretreatment with GSK2606414 improved lung injury and inflammation in HTV groups, and downregulated the protein expression of GRP78, p-PERK and p-eIF2α, as well as upregulated the expression of IκBα protein, besides, inhibited the activation of NF-κB pathway that showed as decreased intranuclear transcription of NF-κB protein compared with HTV group ($P < 0.05$).
Conclusion: MV with HTV for 4h induced histological injury and inflammation, as well as ERS in lung tissue of mice, mechanically, ERS participated in VILI through activating the PERK/eIF2α/NF-κB signaling pathway. Pharmacological inhibition of the PERK pathway blocked NF-κB activity and represents a prospective treatment for VILI.

PU-0115

Naringenin reverses ferroptosis in intestinal ischemia/reperfusion injury by upregulating EGFR/XCT/GPX4 axis: An integrated bioinformatic and experimental approach

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Naringenin (Nar), a natural flavonoid, has various pharmacological properties that can be beneficial in treating intestinal ischemia-reperfusion (I/R) injury. The anti-ferroptosis mechanisms of Nar in pretreating intestinal I/R injury remain unexplored. The study aims to investigate how Nar's anti-ferroptosis effect on intestinal I/R injury through network pharmacology, bioinformatics analysis, and experimental verification. We utilized TCMSP, CTD, PharmMapper, and SwissTargetPrediction to predict potential target genes of Nar, collected relevant target genes of intestinal I/R injury from OMIM, PharmGKB, GeneCards, and GEO databases. Ferroptosis-related genes were searched in the FerrDb database. Hub genes were identified by CytoHubba. We successfully confirmed the crucial role of EGFR in anti-ferroptosis mechanism of action of Nar against intestinal I/R injury using in vivo and in vitro experiments. 72 proteins were obtained as potential therapeutic targets. IL6, MAPK3, MAPK8, STAT3, TP53, JUN, EGFR, AKT1 could serve as potential drug targets. EGFR expression was significantly lower in the human bowel of I/R damage, mice I/R groups, and IEC-6 OGD/R groups. Nar suppressed intestinal epithelial ferroptosis by activiting EGFR/XCT/GPX4 axis, which could be reversed by EGFR antagonist (AG1478). Molecular docking and molecular dynamic simulation results showed that Nar had good binding affinity for EGFR. Our study had identified EGFR as ferroptosis-related biomarkers in Nar against intestinal I/R injury. Furthermore, Nar ameliorated intestinal I/R injury partly by EGFR/XCT/GPX4 pathway. These findings offered novel insights into the molecular mechanisms underlying Nar against intestinal I/R injury.

PU-0116

氧化铁纳米颗粒靶向脊髓 TRPV1 通道介导预处理减轻大鼠心肌缺血再灌注损伤的作用与机制

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目的 心肌缺血再灌注损伤（IRI）是缺血性心脏病血运重建后的严重并发症。瞬时受体电位香草酸亚型 1（TRPV1），是一种热敏感型阳离子通道，介导心脏缺血伤害感受信号向脊髓及上级中枢传递。已知TRPV1活化在缺血预处理（IPC）介导的心肌保护中至关重要，但其具体机制仍不清楚。本研究通过在磁性氧化铁纳米颗粒（FeNPs）表面修饰靶向 TRPV1 的特异性抗体组装成 FeNPs-TRPV1，在脊髓水平通过磁热转换诱导 TRPV1 通道短暂多次开放，探究脊髓 TRPV1 通道预先活化对心肌 IRI 的影响及其机制。

方法 ①利用电镜、SDS-PAGE 电泳对 FeNPs-TRPV1 进行表征分析与结合验证；红外热成像仪检测磁热转换效应。②细胞水平证明 FeNPs-TRPV1 可靶向结合胞膜 TRPV1 受体，磁热下诱导 TRPV1 开放，利用 Ca2+荧光探针及 WB 检测钙内流和下游信号激酶 AMPK 活化。③动物水平大鼠胸段脊髓注射 FeNPs-TRPV1，在心肌缺血前进行 5min´3 次磁场照射，通过磁热转换诱导 TRPV1 通道开放，观察对心肌 IRI 的影响；检测血清肌钙蛋白（cTnI）和去甲肾上腺素（NE）、心脏中促生存激酶信号通路 Akt/ERk/GSK-3b 活化、脊髓背角神经肽 SP、CGRP 释放。

结果 ①电镜和 SDS-PAGE 电泳提示 FeNPs-TRPV1 结合成功；将 FeNPs-TRPV1 溶液（0.1mg/ml）置于交变磁场（15A）中 8min 内，温度可升高至 46.3℃。②普鲁士蓝染色及电镜结果证明 FeNPs-TRPV1 能够靶向结合 F11 细胞膜表面的 TRPV1。钙离子检测结果表明 F11 细胞及原代 DRG 神经元孵育 FeNPs-TRPV1 并进行磁热处理后，胞内钙探针荧光信号显著增强；WB 结果显示孵育 FeNPs-TRPV1 的 F11 细胞在磁热处理后 p-AMPK 的表达量显著增加。3.普鲁士蓝染色以及 MRI 成像确定 FeNPs-TRPV1 脊髓注射后主要位于脊髓背角；红外热成像仪显示注射 FeNPs-TRPV1 的大鼠在交变磁场中 5min 内胸段脊髓局部升温达到 42℃以上。FeNPs-TRPV1 组大鼠在心肌缺血前进行 5min´3 次的磁场照射，诱导 TRPV1 通道短暂多次开放，心肌梗死体积较 IR 组减少 40%，cTnI 及 NE 水平分别下降 45%和 31%。此外，FeNPs-TRPV1 组心脏中 p-AKT/p-ERK/p-GSK-3β 蛋白水平较 IR 组显著增加；免疫荧光染色显示脊髓背角 SP 及 CGRP 表达较 IR 组降低 68%和 67%，而对照 FeNPs 脊髓注射无上述效应。

结论 FeNPs-TRPV1 靶向脊髓 TRPV1 通道，在心肌缺血前诱导 TRPV1 通道短暂多次开放，减轻心肌 IRI，其机制可能与减少神经肽释放、降低心脏交感传出活性、诱导心脏促生存激酶活化有关。本研究为开发新的心肌保护策略提供了靶点和思路，为纳米材料应用于心肌保护领域提供了理论依据。

PU-0117

基于转录组测序分析病毒性肺损伤 Treg 细胞中差异基因及功能性变化

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目的 本研究旨在探讨病毒性肺炎实验室模型中调节性 T（Treg）细胞的差异基因表达情况以及由

此引发的功能性变化。通过对这些差异基因和功能性变化的分析，期望能够揭示病毒性肺炎急性肺损伤时 Treg 细胞在免疫反应中可能的功能定位，为进一步理解病毒性肺炎的致病机理提供新的视角和理论依据。同时，有望为开发更为有效的诊断方法和治疗策略提供重要的靶点和思路。

方法 在 SPF 级 C57BL/6J 小鼠气管内滴注病毒模拟物 Poly(I:C)，构建小鼠病毒性肺损伤模型。24h 后取材，用离心法提取脾脏和血液中的淋巴细胞，经过磁珠分选后获得 Treg 细胞。然后 Treg 细胞经过 RNA 抽提、纯化、建库，采用第二代测序技术（Next-Generation Sequencing，NGS），基于 Illumina HiSeq 测序平台，对这些文库进行双末（Paired-end，PE）测序。进行主成分分析之后，根据表达差异倍数|log2FoldChange| > 1 且显著性 P-value<0.05 筛选出差异基因进行分析。获得病毒性肺损伤小鼠 Treg 细胞中的差异基因后，依托 STRING 数据库构建 PPI 网络并且使用 Cytoscape 软件的插件（MCODE、CytoHubba 和 CytoNCA）筛选出核心基因，同时，使用 topGO 和 KAAS 进行 GO 和 KEGG 通路富集分析。另外，基因集富集分析（GSEA）也为结果提供了可供参考的方向。

结果 该病毒性肺损伤模型下 Treg 细胞筛选出 2115 个差异基因，其中抗病毒相关的 IFITM 家族和 TLR 家族的基因显著改变；PPI 网络中 Egfr 与其他蛋白关联最多；使用多种算法筛选出 6 个核心基因：Ctrb1、Cpa1、Ccr1、mt-Atp6、Try5、Prss2、Trpv4 和 Ido1，它们的变化可能与 Treg 细胞的抑制性免疫机制相关；GO 和 KEGG 通路富集分析结果显示 Treg 细胞产生了类似抗病毒的炎症免疫反应，其免疫机制可能与细胞外改变相关，同时核心基因有 4 个分别富集于胰腺分泌物、蛋白质消化和吸收、甲型流感、神经活性配体-受体相互作用；GESA 的结果提示 Treg 细胞可能通过细胞膜溶解直接参与细胞免疫的过程产生抗病毒反应，并且 JAK-STAT 信号通路、TOLL 样受体信号通路或许提示病毒性肺炎中产生 Treg 细胞改变的内在机制；此外，其他免疫反应相关的差异基因的显著改变，如 Lrp1、Ccr1、Prf1，进一步丰富了 Treg 细胞可能的免疫机制。

结论 这些结果为将来病毒性肺炎的机制研究提供了可靠的实验室模型和可行的方向，提示 Treg 细胞在急性病毒感染状态下可能的蛋白水平的功能改变和细胞分化方向。这些发现不仅有助于更深入地理解病毒性肺炎的内在机制，还为未来相关研究的开展奠定了基础。

PU-0118

ADSC-derived exosomes provide neuroprotection in sepsis-associated encephalopathy by regulating hippocampal pyroptosis

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Aims: Adipose-derived stem cells (ADSC)-derived exosomes are considered to have potential for neurocognitive protection in the field of neurological diseases, with the hippocampus potentially playing a key role. The aim of this study is to investigate whether ADSC-derived exosomes provide neuroprotection for brain function in sepsis-associated encephalopathy (SAE) confirmed by behavioral, brain function and cellular molecular levels, and to further explore the possible underlying hippocampal regulatory mechanisms of action.

Methods: SAE models were induced with lipopolysaccharide (LPS) injections. To assess the neuroprotective effects of ADSC-derived exosomes on SAE, we first evaluated behavioral cognitive functions using the open field test, Y-maze test, and novel object recognition test. Second, we measured brain functions by assessing the hippocampal amplitude of low-frequency fluctuations (ALFF), regional homogeneity (ReHo), and functional connectivity (FC) networks with functional magnetic resonance imaging (fMRI) techniques. Lastly, we examined cellular and molecular levels, indicated by systemic hippocampal inflammation and cellular morphology. Furthermore, we explored the potential underlying hippocampal regulatory mechanisms of the neuroprotective effects of ADSC-derived exosomes using immunofluorescence staining and western blotting

techniques.
Results: Firstly, ADSC-derived exosomes mitigated cognitive impairment (i.e., learning and memory deficits) in SAE mice, improved survival rates, and prevented weight loss. Secondly, SAE mice injected with LPS exhibited impaired hippocampal function, as shown by decreased ALFF and ReHo metrics, along with compensatory FC between the hippocampus and other brain regions. After administration of ADSC-derived exosomes, hippocampal function in SAE mice was restored—evidenced by increased ALFF and ReHo metrics and the recovery of compensatory FC between the hippocampus and other brain regions, as indicated by a decrease in hippocampal FC. Thirdly, SAE mice displayed neuronal damage and infiltration of inflammatory cells in the CA1 and CA3 regions of the hippocampus, as observed through HE staining, Nissl staining, and immunofluorescence staining. Post-injection of ADSC-derived exosomes, there was a significant improvement in neuronal damage, including reductions in hippocampal inflammation and alterations in cellular morphology. Finally, the experimental results highlighted the downstream regulatory role of the NLRP3/caspase-1/GSDMD signaling pathway as a crucial mechanism in alleviating hippocampal inflammation.
Conclusion: ADSC exosomes provide neuroprotection for brain function in SAE models by ameliorating cognitive impairments, enhancing the function of the hippocampus and its networks, and increasing survival rates. These exosomes may work by decreasing neuroinflammation and preventing cell death in the hippocampus. The reduced inflammation and changes in brain circuits suggest that ADSC exosomes could be effective as a regenerative and anti-inflammatory treatment for SAE.

PU-0119

艾司氯胺酮对肺癌内 T 细胞的影响

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目的 利用临床推荐的不同剂量的艾司氯胺酮处理 T 细胞，观察 T 细胞在艾司氯胺酮不同作用时间下对肺癌内 T 细胞的激活、T 细胞毒性功能和 T 细胞耗竭的变化，探究艾司氯胺酮在治疗癌痛过程中对肺癌内 T 细胞的影响，从而更好地指导艾司氯胺酮对晚期肺癌患者癌痛的治疗。
方法 在体外培养环境中，利用不同浓度的艾司氯胺酮处理 T 细胞，通过细胞杀伤实验、ELISA、T 细胞形态学变化观察和凋亡检测以及流式细胞术方法，分别观察艾司氯胺酮对肺癌内 T 细胞凋亡、细胞形态的影响，并检测在不同浓度的艾司氯胺酮作用下，T 细胞杀伤肿瘤细胞、激活状态、细胞因子释放以及 T 细胞表面免疫检查点的表达变化。
结果 研究前期，我们构建了靶向 EGFR-VIII 的 139-BBz-CAR-T 细胞与靶向 NYESO-1 的 TCR-T 细胞的慢病毒质粒，包装慢病毒颗粒并转染至人源 T 细胞中。经过 139-BBz-CAR 和 NYESO-1 TCR 的慢病毒感染 T 细胞后，通过分选获得感染成功的 T 细胞。我们利用分选的 T 细胞分别与靶细胞共培养 18h 后，可以发现 139-BBz-CAR-T 细胞和 NYESO-1 TCR-T 细胞能够有效杀伤各自的靶细胞，并能有效分泌出效应细胞因子。
随后，通过流式细胞术分析 T 细胞在不同浓度艾司氯胺酮作用下的存活情况。从流式结果以及形态学观察中发现，高浓度艾司氯胺酮作用 T 细胞能显著诱导 T 细胞发生凋亡现象并导致细胞形态的变化，然而低浓度的艾司氯胺酮对 T 细胞的影响并不显著。尽管我们发现低浓度的艾司氯胺酮能够引起肿瘤细胞发生死亡，但是在艾司氯胺酮存在的共培养条件下，T 细胞随着艾司氯胺酮浓度的升高，逐渐失去对靶细胞的杀伤作用。
为了进一步观察低浓度艾司氯胺酮对 T 细胞的影响，并减少其对肿瘤细胞的影响，我们用低浓度的艾司氯胺酮预处理 CAR-T 细胞和 TCR-T 细胞 24 小时，随后在无艾司氯胺酮的培养条件下观察 T 细胞与肿瘤细胞共培养后的功能性变化。在与靶细胞共培养 6 小时或 24 小时后，分别检测 T 细胞

早期和晚期激活标记物。随着艾司氯胺酮浓度的增加，处理后 T 细胞的激活情况无论在早期激活还是晚期激活的情况均出现显著的下降，并显著抑制 T 细胞的细胞因子的释放。此外，艾司氯胺酮处理 T 细胞后与肿瘤细胞共培养，T 细胞衰竭标记物 PD-1 和 LAG-3 的表达有显著的升高。低浓度艾司氯胺酮仍然能影响 T 细胞的抗肿瘤功能，促进 T 细胞在抗肿瘤过程发生衰竭，从而影响抗肿瘤效果。

结论 艾司氯胺酮能够降低肺癌内 T 细胞的效应性功能，并促进 T 细胞在抗肿瘤的过程中呈现耗竭表型，减弱 T 细胞的杀伤肿瘤细胞的功能。

PU-0120

调控去泛素化酶减少阿尔茨海默病过度磷酸化 Tau 的研究进展

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目的 在阿尔茨海默病中，Tau 发生过度磷酸化并异常聚积形成神经纤维缠结，最终导致神经毒性。有研究发现，Tau 导致的认知功能障碍在阿尔茨海默病的病理进程中具有比 Aβ 更强的临床相关性，减少胞内过度磷酸化 Tau 累积对恢复神经元正常形态和功能具有重要意义。泛素-蛋白酶体途径作为细胞清除异常折叠蛋白的一种方式，常在破坏细胞通路关键蛋白和降解异常折叠蛋白中发挥作用。去泛素化酶是泛素循环和蛋白酶体降解底物蛋白前的关键环节，在 AD 病理状态下发生过度激活。本研究拟通过纳米颗粒调控去泛素化酶激活泛素-蛋白酶体途径，减少胞内过度磷酸化 Tau 改善认知功能。

方法 选用人神经母细胞瘤细胞系 SH-SY5Y 细胞作为实验对象，使用冈田酸与细胞共孵育 24h 模拟神经元胞内 Tau 过度磷酸化表现，用 Cu2-xSe 纳米颗粒与 SH-SY5Y 细胞在造模前预孵育 12h 进行干预治疗。选用 6-8 周龄、体重为 26±4g 的 C57BL/6J 小鼠作为实验对象，对其进行脑立体定位注射冈田酸模拟脑内 Tau 过度磷酸化的发生，在造模第 7 天对其通过尾静脉进行纳米颗粒给药及超声治疗。

结果 研究表明，Cu2-xSe 纳米颗粒预孵育减轻了冈田酸诱导的 SH-SY5Y 细胞胞内 Tau 过度磷酸化；同时，Cu2-xSe 纳米颗粒预孵育可以缓解 SH-SY5Y 细胞胞内去泛素化酶的过度激活。此外，动物实验表明，通过尾静脉进行纳米颗粒给药及超声治疗减轻了小鼠脑内海马 CA3 区的磷酸化 Tau 沉积和脑内去泛素化酶的过度激活；同时，纳米治疗减轻了冈田酸诱导的小鼠学习与记忆缺陷，改善小鼠认知功能。

结论 Cu2-xSe 纳米颗粒可以通过调控去泛素化酶激活泛素-蛋白酶体途径从而减少过度磷酸化 Tau 的沉积。因此，使用纳米治疗精准激活泛素-蛋白酶体途径从而促进病理 Tau 降解可为神经退行性疾病治疗提供新视角；阿尔茨海默病患者和麻醉后认知功能障碍行为范式都表现为认知功能损伤，可能存在共同的发病机制；关注认知功能改变过程中相关病理蛋白的变化可能为围术期认知功能改变的探索提供新想法，为该类患者的临床治疗提供理论依据和新的治疗思路。

PU-0121

负载丙泊酚的钾离子响应性药物递送系统在癫痫治疗中的应用

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目的 癫痫是一种常见的慢性神经系统疾病，其治疗手段主要是通过长期使用抑制神经兴奋性的药

物控制癫痫发作，但目前抗癫痫药物仍存在治疗窗窄、副作用大、难以透过血脑屏障以及产生耐药性癫痫等问题。静脉麻醉药丙泊酚是一种 GABA 受体激动剂，控制癫痫发作具有一定的优势，其特点包括起效快及镇静作用强，由于其静脉使用会引起对呼吸系统及循环系统的抑制，限制了其在癫痫治疗中的应用。因此，如何实现丙泊酚在癫痫病灶局部释放而避免全身用药的副作用对治疗癫痫具有重要的意义。近几年，基于疾病环境内源性特征构建的刺激响应型药物递送系统的发展，可以根据疾病特征使药物在病灶局部按需释放，有效避免了口服或静脉用药带来的副作用。癫痫发作时神经元细胞外钾离子浓度急剧升高，根据这一特征，我们拟构建钾离子响应性药物递送系统，当癫痫发作时，在癫痫病灶局部迅速释放丙泊酚，从而达到及时高效治疗癫痫的目的。

方法 1. 钾离子响应性药物递送系统（PNB-MSN）的合成及评价

以介孔二氧化硅（MSN）为载体，利用硅烷偶联剂（MPS）在 MSN 表面进行官能团修饰合成 MSN-MPS。以 N-异丙基丙烯酰胺（N-Isopropylacrylamide，NIPAM）单体、苯并-15-冠-5-丙烯酰胺（Benzo-15-Crown-5-Acrylamide，B15C5Am）单体、丙烯酰胺（Acrylamide，AM）单体为原料，在 MSN-MPS 表面通过自由基聚合法聚合为聚（N-异丙基丙烯酰胺-苯并-15-冠-5-丙烯酰胺-丙烯酰胺）（Poly (N-Isopropylacrylamide-co-Benzo-15-Crown-5-Acrylamide-co-Acrylamide)，简称 PNB），整个纳米颗粒命名为 PNB-MSN。利用透射电子显微镜（TEM）观察合成的 PNB-MSN 的形态、尺寸及分布状态；纳米粒度电位分析仪（DLS）测定 PNB-MSN 的粒径分布及表面性质；各阶段的样品利用傅立叶变换红外光谱仪（FT-IR）追踪反应的结果。以丙泊酚（Propofol）为模型药物，将负载药物的 PNB-MSN 分散于氯化钾溶液中，利用紫外-可见分光光度计测定丙泊酚的释放量，以评价 PNB-MSN 体外药物释放行为。

2. 钾离子响应性药物递送系统（PNB-MSN）释放丙泊酚的体外实验

使用钙成像技术，在荧光显微镜下观察体外培养的海马神经元内钙信号的变化，从而判断神经元兴奋性的高低。整个观察过程中，首先向细胞培养液中加入红藻氨酸（KA）使神经元细胞兴奋性升高，从而导致细胞外钾离子浓度升高，然后再加入负载丙泊酚的 PNB-MSN，观察负载丙泊酚的 PNB-MSN 是否能够响应神经元兴奋性增高导致细胞外钾离子浓度升高，释放其负载的丙泊酚，抑制原本兴奋的神经元。

3. 钾离子响应性药物递送系统（PNB-MSN）释放丙泊酚的在体实验

选取近中颞叶癫痫相关的小鼠急性持续性癫痫（Status Epilepticus，SE）模型，利用手术埋置的套管预先予以小鼠负载丙泊酚的 PNB-MSN，1h 后在同样的海马区背侧位置予以 KA，诱发小鼠急性 SE 发作，通过行为学及 EEG 评价小鼠的癫痫发作严重程度，即评价癫痫病灶处预先给予的负载药物的 PNB-MSN 抗癫痫作用。

结果 1. 钾离子响应性药物递送系统（PNB-MSN）的合成及评价

本文利用自由基聚合法合成了具有钾离子响应性的药物递送系统 PNB-MSN。表征结果显示合成的 PNB-MSN 呈球形形貌，尺寸约为 120nm，球体表面光滑度降低，表面带负电，同时粒径分布较窄，具有良好的分散性。体外药物释放行为结果显示，PNB-MSN（20%）相比于 PNB-MSN（15%、10%）具更灵敏的钾离子响应性；在 10mM 钾离子溶液中，负载丙泊酚的 PNB-MSN 的丙泊酚释放浓度可达空白对照组的 2.7 倍。

2. 钾离子响应性药物递送系统（PNB-MSN）释放丙泊酚的体外实验

在体外培养神经元水平，验证了负载丙泊酚的 PNB-MSN 可以响应培养神经元兴奋性升高导致的细胞外钾离子浓度升高，并释放丙泊酚有效抑制神经元的兴奋水平。

3. 钾离子响应性药物递送系统（PNB-MSN）释放丙泊酚的在体实验

在癫痫模型小鼠体内水平，验证了预先给予的负载丙泊酚的 PNB-MSN 能够响应癫痫模型病灶处海马神经元细胞外钾离子浓度的升高，释放其负载的丙泊酚，继而降低小鼠癫痫发作的严重程度，使严重的 SE 导致小鼠的死亡率显著降低。

结论 在本研究中，我们首次研发了钾离子响应性智能药物递送系统，癫痫发作时神经元周围钾离子浓度升高，该智能药物递送系统可以响应该微环境改变并按需释放丙泊酚。这种智能给药策略不仅实现了癫痫的早期高效治疗，而且避免了丙泊酚全身用药的不良反应，为开展癫痫治疗的新方法提供了理论研究依据。

PU-0122

Characterization of neuronal spiking patterns in the medial prefrontal cortex under varied general anesthetics

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Purpose: General anesthesia is essential for surgical procedures as it ensures a state of unconsciousness and painlessness. The development and application of general anesthetic drugs have greatly contributed to achieving this state. However, the exact mechanisms by which these drugs induce reversible loss of consciousness are not yet fully understood. The cerebral cortex is widely recognized as a vital structure in the regulation of consciousness; and the medial prefrontal cortex (mPFC) playing a crucial role in the regulation of important physiological functions such as sensation, consciousness and memory. The cerebral cortex is divided into six layers based on the composition and function of neuronal composition. Previous study indicates the layer 5 of cerebral cortex primarily consists of pyramidal neurons that are involved in regulating consciousness. Nevertheless, how general anesthetics exactly regulate neuronal spiking within layer 5 of cerebral cortex remain unclear. Therefore, the objective of this study is to investigate the characterization of neuronal spiking patterns of mPFC layer 5 neurons under varied general anesthetics.
Methods: Male C57BL/6 wild-type mice (6-8 weeks old) were used and raised under standard laboratory conditions. Stereotaxic surgery was conducted to implant a 16-channel microelectrode array into the layer 5 of medial prefrontal cortex (mPFC) of the mice, enabling in vivo electrophysiological recordings. The Plexon MAP system was employed to collect neuronal spike signals, and offline spike sorting software was utilized for neural waveform analysis, categorizing the neurons into putative pyramidal cells and fast-spiking interneurons. During the experiment, a 10-minute baseline activity was recorded from the mice before anesthesia. Subsequently, anesthesia was induced using sevoflurane, propofol, ketamine, and dexmedetomidine, respectively. The neuronal activities during the loss of righting reflex (LORR) period and the recovery of righting reflex (RORR) period were recorded. To compare neuronal firing rates before and after LORR, the non-parametric Wilcoxon signed-rank test was employed. The magnitude of changes in neuronal activity was quantitatively analyzed. Data analysis was performed using GraphPad Prism 8 and MATLAB software, employing one-way or two-way analysis of variance (ANOVA). Multiple comparisons were adjusted using Bonferroni correction, and the statistical significance level was set at $p < 0.05$.
Results: Different anesthetic drugs have a significant impact on the spike rates of layer 5 neurons in the mPFC. Based on observations during the LORR and RORR, layer 5 neurons in the mPFC area can be classified into two types: regular-spiking neurons and fast-spiking neurons, depending on their action potential waveforms and firing frequency. Following anesthetic administration, the majority of fast-spiking neurons exhibit decreased firing rates, suggesting the predominant function of anesthetics is suppressing their spiking activities. In contrast, fast-spiking neurons in the ketamine group display enhanced excitation, characterized by elevated firing rates. Regular-spiking neurons, on the other hand, exhibit heterogeneous responses, some were inhibited by decreasing their firing rates, some were excited by increasing the spike rates, while others remain unaffected. Consequently, we further categorize neurons into inhibitory regular-spiking neurons, excitatory regular-spiking neurons, and inhibitory fast-spiking neurons. In the intervention groups treated with sevoflurane, propofol, and dexmedetomidine, inhibited neurons predominate. However, in the ketamine group, excitatory neurons predominate, suggesting a potential correlation between anesthetic mechanism of ketamine and enhanced excitatory neuronal activity. Notably, inhibited neurons typically exhibit higher baseline firing rates, while excitatory neurons have relatively lower baseline levels. During LORR, inhibited neurons exhibit decreased firing frequency, while excited neurons demonstrate increased spike rates, with both tending to converge towards similar firing levels, potentially indicating neuronal activity synchronization. In the presence of sevoflurane, propofol, ketamine, and dexmedetomidine, inhibitory regular-spiking and fast-spiking neurons are

significantly suppressed during LORR. However, during RORR, the firing rates of inhibitory neurons in the sevoflurane, propofol, and ketamine groups do not fully recover to baseline levels; instead, they maintain a suppressed state similar to LORR. In contrast, excitatory neurons do not exhibit this phenomenon. These findings suggest that inhibitory neurons display a higher degree of plasticity and may play a crucial role in consciousness regulation.
Conclusions: Our findings demonstrate a strong correlation between the firing rate of layer 5 neurons in the mPFC region and anesthesia-induced loss of consciousness. Anesthetic agents modulate the firing activity of these neurons, which reflects changes in behavioral responses and consciousness states. The majority of anesthetic drugs, including sevoflurane, propofol, and dexmedetomidine, likely induce reversible loss of consciousness by suppressing neuronal firing activity. In contrast, ketamine exhibits a predominantly excitatory effect on neurons, suggesting a distinct mechanism of action for anesthesia induction. Inhibitory neurons typically display higher baseline firing rates compared to excitatory neurons. During anesthesia-induced loss of consciousness, the firing rates of both neuronal populations converge, possibly due to increased neuronal synchronization. Upon RORR, inhibitory neurons maintain a suppressed firing rate similar to that observed during unconsciousness, while excitatory neurons do not exhibit this characteristic. These observations suggest that inhibitory neurons possess greater reversibility and may play a more crucial role in consciousness modulation.

PU-0123

维生素 c 抑制肿瘤生长的机制研究

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目的 研究维生素 c 对结肠癌的作用。
方法 选用 hct116 结肠癌细胞，用 vc 干预，观察其生长情况。探究维生素 c 有效浓度，观察维生素 c 干预下 hct116 细胞的生长状态。选用划痕实验检查其迁移，Transwell 检查侵袭，克隆实验检查生长能力。
结果 维生素 c 有效抑制了肿瘤生长。
结论 维生素 c 可抑制肿瘤生长。

PU-0124

水溶性丙泊酚与乳剂丙泊酚在脓毒症相关性脑病模型中的抗炎比较

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目的 小胶质细胞活化诱导的神经炎症与脓毒症相关性脑病的发生密不可分，而丙泊酚广泛应用于脓毒症患者的镇静和麻醉，还具有免疫调节、抗炎以及抗凋亡等作用。本课题组前期实验研发的水溶性丙泊酚纳米复合物，具有不弱于乳剂丙泊酚麻醉性能的同时还能减少因丙泊酚疏水性导致的相关不良反应，为进一步探讨水溶性丙泊酚制剂的剂型优势。我们在此比较两种不同剂型对脂多糖（LPS）诱导的脓毒症相关性脑病的神经炎症、神经元损伤、小胶质细胞活化的影响。
方法 通过行为试验、HE 染色、尼式染色和免疫组化，评估水溶性丙泊酚制剂与乳剂丙泊酚制剂在 LPS 诱导的小鼠脓毒症相关性脑病中的神经保护作用。采用体外墨汁吞噬试验、qPCR、 Western blot 以及免疫荧光染色检测水溶性丙泊酚制剂与乳剂丙泊酚制剂对小胶质细胞的活化影响以及在

LPS 刺激下对小胶质细胞表性转化的调控。
结果 造模组 LPS 诱导小鼠出现明显的体重减轻和体温降低，提示脓毒症模型构建成功，而治疗组水溶性丙泊酚制剂较乳剂丙泊酚组更有效地缓解脓毒症引发的毒性症状；行为学上水溶性丙泊酚制剂治疗后的小鼠的认知功能障碍相较与乳剂丙泊酚组更轻；病理层面 HE 和尼式染色结果显示，水溶性丙泊酚制剂组小鼠海马神经元的数量和形态均较乳剂丙泊酚组有显著的恢复；免疫组化 Iba1、TH 以及 NFKB 染色揭示水溶性丙泊酚较乳剂丙泊酚能更显著地抑制 LPS 诱导的认知相关脑区如纹状体、海马以及黑质部的小胶质细胞活化、多巴胺能神经元丢失和神经炎症。体外墨汁吞噬实验显示水溶性丙泊酚比起乳剂丙泊酚地小胶质细胞活化明显减少，而 qPCR、 WB 以及免疫荧光的结果说明水溶性丙泊酚可以大大地抑制脂多糖诱导的 INOS、IL-1β、TNF-α 等炎症因子表达，使小胶质细胞稳定在 M2 抗炎修复型。
结论 相较于乳剂丙泊酚，水溶性丙泊酚在脓毒症相关性脑病中发挥出更强的神经保护作用，且大大减少了小胶质细胞活化和神经元丢失。乳剂丙泊酚作为当前广泛使用地全身麻醉药物之一，使得我们的发现为水溶性丙泊酚制剂的开发增加了筹码，拓展了水溶性麻醉剂在炎症性脑病中的应用与治疗潜力。

PU-0125

丙酸通过对 Th17 细胞的免疫调节作用 改善 PND 大鼠的认知功能损伤

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目的 围术期神经认知功能障碍（perioperative neurocognitive disorders，PND）常见于接受全麻手术的老年患者, 与神经炎症相关。Th17（T helper 17）细胞是一类独特的 CD4+T 细胞亚群，其主要产物 IL-17A 是中枢神经系统炎症性疾病发生发展的重要因素之一。短链脂肪酸（short chain fatty acids，SCFAs）是大肠菌发酵膳食纤维的产物，可通过免疫、内分泌、迷走神经和其他体液途径直接或间接影响肠-脑通讯，进而影响大脑功能。有研究表明 SCFAs 中的丙酸（propionic acid，PA）能够抑制 IL-17A 的表达进而改善中枢神经系统的自身免疫性炎症。本实验研究 PA 预处理对 PND 大鼠神经炎症及认知功能的影响。
方法 11-12 月龄雄性野生型 Wistar 大鼠 60 只，根据是否实施剖腹探查术（exploratory laparotomy，LP）和是否进行 PA 预处理（术前 3 周饮用含 150mM 丙酸钠的水）随机分为对照组（Ctrl：Veh 组）、丙酸组（Ctrl：PA 组）、剖腹探查组（LP：Veh 组）和丙酸+剖腹探查组（LP：PA 组）。术后第 3 天进行旷场实验记录运动总距离评估大鼠运动能力，随后进行 Y 迷宫实验和条件性恐惧实验评估大鼠认知功能。利用 LC-MS/MS 检测 PND 大鼠造模前后肠道 PA 的含量，RT-qPCR 检测海马 IL-1β、IL-6、RORγt、IL-17A mRNA 水平，蛋白印迹实验检测海马 IL-17A 和 IL-17RA 的表达情况，免疫荧光检测海马 CA1 区小胶质细胞的激活情况。使用 GraphPad Prism9.3 软件进行统计分析，数据以均数±标准误表示。$P<0.05$ 表示差异存在统计学意义。
结果 利用剖腹探查术成功构建 PND 模型。与 Ctrl：Veh 组大鼠相比，LP：Veh 组大鼠 Y 迷宫自发交替次数百分比降低（$P<0.001$），情景恐惧实验中 freezing 时间百分比减少（$P<0.001$），海马炎症因子水平升高（$P<0.001$），Th17 细胞的转录因子 RORγt（$P<0.05$，POD1；$P<0.01$，POD5）和主要炎症因子 IL-17A（$P<0.05$，POD1；$P<0.01$，POD5）水平升高，小胶质细胞激活增多（$P<0.001$，POD1；$P<0.001$，POD5）。LC-MS/MS 代谢物靶向结果提示 PND 大鼠肠道 PA 含量较术前基线减少（$P<0.01$），推测与其行为学表现欠佳相关。PA 预处理后 PND 大鼠 Y 迷宫自发交替次数百分比（$P<0.001$）、情景恐惧实验 freezing 时间百分比（$P<0.01$）提高，海马炎症因子水平降低（$P<0.05$），小胶质细胞过度激活减少（$P<0.01$，POD1；$P<0.001$，POD5），海马

RORγt（P<0.05，POD1；P<0.05，POD5）和 IL-17A（P<0.05，POD1；P<0.01，POD5）的水平降低，IL-17A（P<0.01，POD1；P<0.001，POD5）和 IL-17RA（P<0.05）的表达降低。
结论 PA 预处理改善 PND 大鼠神经炎症和认知功能，其机制可能与 PA 调节 Th17 细胞的免疫功能有关。

PU-0126

肠道菌群代谢产物 TMAO 在围术期神经认知障碍中的作用和机制研究

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目的 随着社会人口老龄化的加剧，接受外科手术治疗的老年人比例占全部接受外科手术治疗的患者比例的三分之一，并且将在未来继续升高。临床上围手术期神经认知障碍（Perioperative neurocognitive disorders, PND）的防治将是全社会都不得不面对的难题。近年来，“微生物-肠-脑”轴的研究受到医学界的广泛关注，从外周出发调控中枢神经系统功能为 PND 的研究提供了新视角。高循环浓度的氧化三甲胺（Trimethylamine-N-Oxide, TMAO）会导致术后中枢神经炎症反应的加剧；相反，低循环浓度的 TMAO 能减少病理性的血脑屏障通透性增加，减少内嗅皮层神经炎症反应，改善认知功能。由此见，TMAO 在中枢神经系统中的作用很有可能存在浓度依赖性。Annexin a1 作为有强大抗炎作用的蛋白，可能与低剂量浓度的 TMAO 之间可能通过一系列潜在机制在术后认知障碍模型中发挥抗炎作用，但其中的调控机制尚不明确。
方法 分别用 1.2，12，120mg/kg 的 TMAO 通过饮水给药处理 C57BL/6 雄性小鼠三周后，再构建 POCD 模型，通过 Y 迷宫和新物体识别测试评估麻醉手术后小鼠对认知功能的影响。通过体内实验，利用免疫印迹技术检测小鼠海马 24 小时时间点 Annexin a1 表达以及给与 TMAO 处理后 Annexin a1 的核浆分布，M1 型小胶质细胞和 M2 型小胶质细胞的极化标志物的表达变化。然后，采用免疫荧光检测小鼠海马 Annexina1 表达和小胶质细胞极化的相关分子的表达变化。同时，通过体外实验，用脂多糖处理后的 BV2 细胞系验证 TMAO 促进 Annexin a1 的核浆转位，减少炎症因子释放。
结果 我们的研究结果发现，在设置的三组浓度剂量 TMAO 处理的麻醉手术后的小鼠中，中间剂量组的小鼠术后认知功能得到明显改善。进一步的病理和生化检验结果表明，这一结果可能是通过增加麻醉手术后小鼠的海马小胶质细胞中 Annexin a1 的表达，并减少海马炎症，减少 M1 型小胶质细胞极化，增加 M2 型小胶质细胞极化而实现的。
结论 本研究揭示了 TMAO 对麻醉手术后小鼠的认知功能的改善作用是具有剂量依赖性的。适当的给予补充 TMAO 能改善小鼠的术后认知功能。给予 TMAO 干预后，Annexin a1 在麻醉手术后小鼠海马中的小胶质细胞明显表达增加，核转位明显减少，海马炎症反应减轻，术后认知功能明显改善，从而发挥神经保护作用。这一发现为深入理解肠道菌群代谢产物 TMAO 在 PND 中作用的相关神经机制提供了新的视角，并为相关疾病的治疗策略开发提供了潜在靶点。

PU-0127

环泊酚在小鼠 LPS 诱导脑损伤中的抗炎保护效应及机制

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目的 作为新型麻醉药，环泊酚（CPF）效价为丙泊酚（PPF）的 4-5 倍，同时拥有更低的注射痛

及呼吸抑制的发生率。目前有研究提示环泊酚能够缓解抑郁和学习障碍，减轻神经细胞损伤和局部免疫炎症的发生，但具体机制未明。因此本研究通过构建 LPS 诱导小鼠脑损伤模型，探究环泊酚调控脑组织局部免疫稳态，保护神经元抑制脑损伤的效应及分子机制。

方法 四组小鼠（PBS 组、LPS 组、CPF 组、PPF 组）分别进行行为学实验，包括：旷场实验、悬尾实验、新事物识别实验、步态实验，分析环泊酚能否对 LPS 诱导脑损伤的小鼠产生情绪、运动、探索、学习功能等方面的影响。HE 染色及尼式染色实验观察药物干预后小鼠脑区组织形态变化和潜在神经元损伤。免疫组化及免疫荧光实验等观察环泊酚干预下脑组织免疫微环境改变和小胶质细胞功能变化。RNA-seq、Western Blot 及免疫细胞染色等手段进一步分析环泊酚调控小胶质细胞功能稳态，缓解 LPS 诱导的神经免疫损伤的具体分子机制。

结果 环泊酚干预后小鼠步距及新事物识别无明显差异，但相较 LPS 组，CPF 组在悬尾实验中小鼠的挣扎时间缩短，在旷场实验中小鼠运动能力也有所提升，提示环泊酚的使用一定程度上能够改善 LPS 造成的脑损伤所引起的抑郁状态及运动能力失调。HE 染色及尼式染色后发现，CPF 组小鼠脑组织海马区受损细胞及细胞碎片较 LPS 组明显减少，提示环泊酚可以一定程度上缓解外周免疫紊乱引起的海马区神经元损伤。通过免疫组化及免疫荧光分析小胶质细胞数量和形态，我们发现对比 LPS 组，CPF 组海马区中小胶质细胞显著减少，激活状态明显下调。进一步分析环泊酚缓解神经细胞死亡是否是通过抑制小胶质细胞激活而实现的，体外细胞实验表明，环泊酚能够诱导 BV2 细胞 CD206 表达增高，细胞因子 TNFa、IL1b 表达降低。此外，RT-qPCR 及 Western Blot 实验结果提示 CPF 组 IkBα 等的激活减弱，提示环泊酚能够通过抑制 NF-kB/IkBα 信号通路发挥抑制炎症的作用。

结论 在 LPS 诱导的脑损伤模型中，环泊酚可能通过 NF-kB/IkBα 信号通路抑制小胶质细胞免疫炎性，缓解脑组织局部稳态和海马区神经元细胞损伤，改善 LPS 小鼠行为情绪调控能力。本研究为临床上脑损伤或脆弱脑患者麻醉药物的选择提供了一定的见解和理论支撑。

PU-0128

小胶质细胞极化对褪黑素改善术后谵妄的影响及机制

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目的 观察褪黑素对术后谵妄过程中行为学变化、血脑屏障的损伤、小胶质细胞激活和细胞凋亡的治疗作用，以及褪黑素诱导的小胶质细胞衍生外泌体对神经元凋亡和内部结构的影响。探讨褪黑素通过调节小胶质细胞极化及外泌体分泌改善术后谵妄的作用。

方法 将 30 只 SD 雌性大鼠和 BV-2 小胶质细胞分别随机分为 5 组：空白对照组（A 组）、模型组（B 组）、模型+低剂量褪黑素组（C 组）、模型+中剂量褪黑素组（C 组）和模型+高剂量褪黑素组（E 组）。其中，动物模型组采用异氟醚麻醉+10 分钟腹腔探查手术的方式建立术后谵妄模型；细胞模型组通过脂多糖（LPS）处理建立神经炎症模型。动物实验中低/中/高剂量褪黑素的剂量选择分别为 4/8/16mg/kg；细胞实验中低/中/高剂量褪黑素的剂量选择分别为 0.01/0.1/1μM。分别在手术结束后 6h、24h 进行行为学实验测试大鼠认知功能，记录旷场实验活动总路程和活动次数，以及食物埋藏实验搜寻时间等参数。处死大鼠，每组分别留取新鲜海马组织标本。采用 HE 染色观察海马组织结构、TUNEL 染色检测海马凋亡细胞数；免疫荧光染色检测 Iba-1/CD86 和 Iba-1/CD206 表达水平；qPCR 联合 Western Blot 检测血脑屏障相关蛋白和炎症因子的表达量；LPS 处理细胞 24 小时后，采用流式细胞术检测 BV-2 细胞凋亡水平和 CD86/CD206 表达；ELISA 检测炎症因子 TNF-α、IL-1β、IL-6、INOS、Arg-1 的表达量。采用超速离心法提取 A、B、C 组小胶质细胞衍生外泌体。采用透射电镜和粒径分析分别对外泌体结构和平均粒径进行鉴定；纳米流式技术鉴定外泌体标记蛋白 CD9、CD63 和 CD81。HT22 神经元被随机分为三组：对照组、模型组和褪黑素组。将 A、B、C 组来源的外泌体分别与对照组、模型组和褪黑素组 HT22 细胞共培养。24 小时后采用流式细胞术检测细胞凋亡水平；透射电镜观察神经元微观结构。

结果 行为学测试结果显示：麻醉手术后大鼠的运动总路程显著减少，食物搜寻时间显著增加，提示术后谵妄模型建立成功，而褪黑素治疗能部分逆转大鼠术后谵妄。HE 染色和 TUNEL 染色结果显示：模型大鼠海马组织结构受到破坏，神经元数目减少，神经细胞萎缩明显，细胞核皱缩，中、高剂量褪黑素能显著减少海马的细胞凋亡水平，并改善细胞受损情况。免疫荧光染色结果显示：模型组大鼠海马中 M1 型小胶质细胞活化标记物 Iba-1/CD86 表达显著增加，M2 型标记物 Iba-1/CD206 表达显著降低，而褪黑素治疗能降低 M1 型活化小胶质细胞数量，促进小胶质细胞从 M1 型向 M2 型转化。Western Blot 和 qPCR 结果显示：模型大鼠的海马组织中，血脑屏障相关蛋白 ZO-1 和 occludin 以及抗炎因子 IL-4 的表达显著减少。相反，促炎因子 TNF-α 和 IL-6 在海马中的表达显著增加。褪黑素治疗能显著增加 ZO-1、occludin 和 IL-4 的表达，降低促炎因子的表达。细胞实验结果与动物实验相符。其中，ELISA 结果显示：使用 LPS 处理 BV-2 小胶质细胞成功建立神经炎症模型，模型细胞表现为促炎因子 TNF-α、IL-1β、IL-6 和 iNOS 表达显著增加，而褪黑素可以通过降低 BV-2 小胶质细胞中 TNF-α、IL-1β、IL-6 的水平，来减轻氧化应激因子 iNOS 的表达。流式细胞术结果显示：褪黑素可以减少 LPS 诱导的 BV-2 细胞凋亡，促进 BV-2 细胞向 M2 型极化。与 HT22 细胞共培养 24 小时后。对 HT22 的观察结果显示：尽管褪黑素处理后的小胶质细胞外泌体治疗没有降低神经元凋亡水平，但电镜下可见细胞中嵴状结构正常的线粒体数量增多。
结论 褪黑素能通过调节小胶质细胞活化，抑制促炎因子表达和细胞凋亡，并且通过促进小胶质细胞衍生外泌体的分泌，减轻神经元的损伤，从而改善术后谵妄。

PU-0129

E3 连接酶 TRIM2 通过抑制 FOXO1 介导的细胞凋亡减轻肠缺血/再灌注损伤

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目的 泛素-蛋白酶体系统(UPS)控制着真核细胞中几乎所有的基本细胞过程，如 DNA 修复、信号转导、细胞增殖和凋亡。众所周知，它通过靶向泛素化和降解的调节器来维持蛋白质的动态平衡。通过 UPS，泛素通过连接到 E1(泛素激活)酶而被激活，然后首先转移到 E2(泛素结合)酶，然后转移到氨基末端的游离氨基或 E3 泛素连接酶控制的蛋白质底物的内部赖氨酸。泛素化被报道与 II/R 损伤的发生和发展有关。抑制泛素化过程可以减少细胞凋亡和炎症，从而减轻 II/R 后的肠道和肺损伤。泛素特异性蛋白水解酶 22(USP22)是一种脱泛素酶，从靶蛋白中提取泛素，通过调节细胞增殖和促进组织再生来减轻 II/R 损伤。此外，Tan et al.发现 E3 泛素连接酶 FBXW7 通过靶向 HSF1 的泛素化和降解来抑制 II/R。E3 泛素连接酶现已成为新药研究的重要靶点。由于其底物的特异性，E3 泛素连接酶可能成为治疗人类 II/R 疾病的潜在靶点。
方法 采用酵母双杂交系统筛选出胸腺细胞选择相关的 FOXO1 作为 TRIM2 的新底物。TRIM2 通过卷曲结构域和弹性结构域直接与 FOXO1 的 N 端结合。免疫荧光共聚焦显微镜显示，它们可以共存于胞浆和胞核。此外，TRIM2 通过其 E3 泛素连接酶活性介导了 K48 泛素化和 FOXO1 的降解。此外，TRIM2 通过 FOXO1 抑制 H/R 诱导的肠上皮细胞凋亡。
结果 在本研究中，我们观察到，在 II/R 中，TRIM2 的表达下调，并且 TRIM2 缺乏加重了 II/R 的损伤。TRIM2 抑制 II/R 或缺氧-复氧(H/R)诱导的肠上皮细胞凋亡。利用酵母双杂交系统，我们筛选出胸腺细胞选择相关的 FOXO1，它可以正向调节细胞凋亡，作为 TRIM2 的一种新的潜在底物。。
结论 研究表明，TRIM2 直接与 FOXO1 结合，并通过促进 K48 连接的多泛素化来介导其泛素-蛋白酶体的降解。这些结果表明 TRIM2 作为肠上皮细胞凋亡的负调控因子在缺血再灌注过程中发挥了新的作用，我们的研究结果可能为缺血性肠病的治疗提供新的药物靶点和理论基础。

PU-0130

T 细胞参与骨癌痛小鼠发病机制的研究

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目的 探究骨癌痛小鼠脊髓背角是否存在 T 细胞浸润并确定其亚型
方法 通过向 C57BL/6J 小鼠右腿股骨注射 Lewis 肺癌细胞构建骨癌痛模型，并随机分为三组：①正常对照组、②假手术组、③肿瘤组，分别在造模后的第 4、7、10、14、21、28 天进行行为学检测，评估疼痛情况。行为学检测完成后取材，检测骨癌痛小鼠脊髓水平是否存在 T 细胞浸润。
通过免疫荧光技术检测各组小鼠脊髓腰膨大部位 CD3 分子的表达情况以验证是否有 T 细胞浸润。通过免疫荧光技术检测各组小鼠脊髓腰膨大部位 CD3、CD4 分子共标情况以验证浸润的 T 细胞类型。通过免疫荧光技术分别检测各组小鼠脊髓腰膨大部位 CD3 和 IL-17、CD4 和 Foxp3 的共标情况，进一步验证 T 细胞亚型。通过 western blot 实验检测各组小鼠脊髓腰膨大部位 IL-17、Foxp3、TGF-β、IL-6、IL-23 的表达情况。
结果 1. 骨癌痛小鼠脊髓水平出现 CD3+T 细胞的浸润
2. 骨癌痛小鼠脊髓水平浸润的 T 细胞大多数为 CD3+CD4+T 细胞
3. 骨癌痛小鼠脊髓水平 Treg 细胞短暂性表达
4. 骨癌痛小鼠脊髓水平 TH17 细胞不断增多，且伴随 IL-17 水平升高
结论 骨癌痛小鼠脊髓水平存在 T 细胞的浸润，且浸润的 T 细胞主要是 CD3+CD4+T 细胞。在小鼠骨癌痛发展过程中，脊髓中第 10、14 天出现 Treg 细胞短暂性表达，而从第 14 天开始出现 TH17 细胞的表达，且随着时间的延长，TH17 细胞表达不断增多，一直持续到第 28 天。

PU-0131

The co-expressed genes and biological pathways in neuroinflammatory neurodegenerative diseases and ferroptosis

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抽象背景： 神经退行性疾病 （NDs） 是以认知功能障碍为特征的常见神经系统疾病，神经炎症是大多数 ND 的主要致病因素。随着生活水平和医疗水平的提高，人类平均预期寿命逐年增加，神经退行性疾病的发病率也在逐渐增加。这种趋势给患者及其家属带来了沉重的负担。目前，由于分子机制尚不完全清楚，神经退行性疾病缺乏有效的治疗和预防措施。我们现在使用生物信息学技术来分析神经退行性疾病和铁死亡的共表达基因，并通过功能注释和通路富集分析探索铁死亡和神经炎症性神经退行性疾病之间可能的分子机制。
方法：从 GEO 数据库下载 4 种神经退行性疾病的基因表达谱。对 4 个数据集进行分位数归一化后，采用稳健秩聚合（RRA）分析筛选 NDs 患者与正常对照组之间的差异表达基因（DEGs）。还对 DEGs 进行了基因本体（GO）功能注释和京都基因与基因组百科全书（KEGG）通路富集分析。此外，通过 FerrDb 鉴定了与神经退行性疾病中表达上调的铁死亡相关基因。结果：通过对数据集 GSE1297、GSE7621、GSE8397 和 GSE28146 的 RRA 分析，最终鉴定出 446 个 DEGs，其中 143 个为上调基因，303 个为下调基因。在 GO 功能注释分析结果中，化学突触传递的调节是富集度最高的生物过程，最富集的细胞成分是神经元细胞体，通道活性是富集度最高的分子功能。在 KEGG 通路富集分析结果中，显著富集的前 3 条通路分别为神经退行性变通路-多种疾病、神经活性配体-受体相互作用和突触囊泡循环。在铁死亡和神经退行性疾病共表达基因中，我们最终鉴定

出 AKR1C3、LAMP2、DNAJB6 和 FOXO4 四个基因的表达上调。
结论：本研究确定了神经退行性疾病中与铁死亡相关的基因上调，以及神经退行性疾病中最可能的信号通路。这些信息为预防和治疗神经退行性疾病提供了新的方向和分子基础。

PU-0132

Integrative analysis of lncRNA and mRNA profiles in chronic stress rats with cardiac surgery-induced postoperative cognitive dysfunction

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Objective: Postoperative cognitive dysfunction (POCD) is a common complication that occurs after cardiac surgery (CS). The main aim of this study was to analyze the expression profiles and functional networks in long non-coding RNAs (lncRNAs) and mRNAs of hippocampus tissue in chronic unpredictable stress (CUS) rats with cardiac surgery-induced POCD.
Methods: In this study, CUS rat model was established. CUS rats were separated into two groups: CUS + CS group and CUS + sham group. Animals were subsequently put through the behavioral tests. Microarray analysis was performed on the hippocampal tissue to identify differentially expressed (DE) lncRNAs and mRNAs. Bioinformatic analyses were performed to identify the critical biological functions and signaling pathways involved in POCD. Mendelian randomization (MR) analysis to identify hubgenes related to cognition.
Results: We evaluated the behavioral changes of rats in both CUS + CS and CUS + sham group, using forced swimming test and open-field test. The immobility time during the forced swimming test was significantly longer in CUS + CS group compared to the control group . In the open-field test, the immobility time was significantly longer in CUS + CS group, and the number of entries into the central area in the CUS + CS group were significantly lower than those in the control group,indicating that cardiac surgery induced behavior disorders in chronic unpredictable stress rats.
To understand the effects of cardiac surgery on the expression of lncRNAs and mRNAs in hippocampus tissues under CUS, Arraystar Human lncRNA and mRNAmRNA Array (V5.0) was used to detect hippocampus tissues of CUS + CS and CUS +sham groups (n= 5/group). Using fold change ≥ 2 or fold change ≤ 0.5 and r < 0.05 as the threshold of differential expression, a total of 104 DE lncRNAs and 69 DE mRNAs were detected. Then we performed GO analysis to determine the functional significance of 69 DE mRNAs.Altered mRNAs were primarily related to the “Retinoic acid biosynthetic process”and “Inflammatory Response”,which might be important signaling pathways involved in POCD.
Three hub genes were screened out by LASSO regression analysis,including arachidonate 5-lipoxygenase (Alox5), hairy and enhancer of split1 (Hes1), and ankyrin repeat and LEM domain-containing protein 2 (Ankle2).To understand the biological functions and related roles of three hub genes,PPI network was constructed by STRING(https://cn.string-db.org/) separately. Then, the predicted target genes were used to conduct KEGG analysis.Setting the minimum required interaction score to ≥ 0.6, there are 10 proteins that interact with Ankle2, including Ppp2ca,Ppp2r1a, and Ppp2r2a, mainly enriched in classic signaling pathways such as “AMPKsignaling pathway","Adrenergic signaling in cardiomyocytes”, and "Hippo signaling pathway".In addition, we found a significant negative correlation between the expression level of Alox5 and Ankle2, and a negative correlation trend with the expression level of Hes1, while there was no significant correlation between the expression level of Ankle2 and Hes1.This result suggested that Hes1

may independently exert biological functions, while there is a certain degree of correlation between Alox5 and Ankle2.
We performed CNC co-expression network on DE lncRNAs and these 3 hub proteins to determine the lncRNA molecules that regulate the expression of Alox5, Hes1, and Ankle2.There is a significant correlation between the expression levels of 9 DE lncRNAs and Alox5, of which 7 are positive correlation,and 2 negative correlations; there is a significant correlation between the expression levels of 12 DE lncRNAs and Hes1, of which 5 are positive correlation and 7 are negative correlation. Only 3 DE lncRNAs showed a significant correlation with Ankle2, of which 2 are positive correlation and 1 negative correlation.Based on the ceRNA mechanism, lncRNAs can sponge miRNAs and thus derepress miRNA-inhibited mRNAs.We constructed a co-expression network of lncRNA-miRNA-mRNA interactions using hub genesand the DE lncRNAs.The results of ceRNA analysis showed that Tcc38,LOC102548198,and LOC102554198 may regulate the Alox5 by competitively binding to rno miR-3575. RGD1566307,LOC102547391, and LOC102555300 regulate the Hes1 by competitively binding to rno miR-9a-5p, rno miR-381-3p, and rno miR- 130a-5p, respectively. Twelve DE lncRNAs, including Ttc38, Efcab1, and Prpf4b, may regulate Ankle2 by competitively binding to seven miRNAs, including rno miR-370-3p, rno miR-7b, and rno miR-7a-5p.Verified by the RT-qPCR and western blot, the expression of ANKLE2 is increased in CUS+CS group and regulated by LOC102555398. MR analysis suggested that ANKLE2 was associated with cognitive function.
Conclusion: We constructed the expression profile of DE lncRNAs and DE mRNAs in the hippocampal tissues of chronic unpredictable stress rats with cognitive impairment induced by cardiac surgery. Our study revealed for the first time that the expression of Ankle2 is increased in CUS + CS group and regulated by lncLOC102555398.“Retinoic acid biosynthetic process"and "Inflammatory Response"might be important signaling pathways involved in POCD. Overall, our work helps to provide a new idea and direction for further study of the pathogenesis of POD and looking for potential therapeutic targets. This study may provide valuable clues for further research, as the role of lncRNAs has not been fully uncovered in POCD.

PU-0133

肾去交感神经支配对脑卒中后急性肾损伤的影响

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目的 脑卒中是全球第二大死因以及残疾的主要原因，且急性肾损伤见于 12%的卒中患者，可使死亡率增加 4 倍，功能结局不佳，导致功能恢复较差，并增加出院时中度至重度残疾的可能性。随着人口老龄化的加剧，脑卒中发病率及其造成的急性肾损伤亦随之增加。因此，探究脑卒中后急性肾损伤的机制是早期诊疗脑卒中相关并发症的关键。本课题研究肾脏交感神经活性在缺血性脑卒中后急性肾损伤中的作用，为脑卒中后急性肾损伤治疗提供新的靶点，最终为提高脑卒中患者生存率及生活质量作贡献；此外，实现临床转归，为脑卒中后急性肾损伤用药以及去神经支配技术提供理论支持；
方法 1. 构建缺血再灌注损伤诱导的急性肾损伤小鼠模型，通过 TTC 染色、神经行为学评分、脑血流散斑实验明确脑卒中模型成功；通过血清肌酐、尿素氮、胱抑素 C、尿微量蛋白、以及电镜明确小鼠缺血再灌注后发生急性肾损伤；通过检测去甲肾上腺素及酪氨酸羟化酶水平明确交感神经兴奋性的增加。
2. 构建肾动脉涂抹苯酚乙醇从而化学消融肾交感神经的肾去交感神经支配模型，通过 Elisa、Western Blot、免疫荧光检测去甲肾上腺素及酪氨酸羟化酶水平变化明确交感神经兴奋性的减少。
3. 通过血清肌酐、尿素氮、胱抑素 C、尿微量蛋白、以及电镜确定小鼠缺血再灌注后急性肾损伤缓解情况；通过转录组测序、Western Blot、免疫荧光、和免疫组化等明确肾去交感神经支配缓解脑卒中后急性肾损伤的分子机制。

结果 1.脑卒中后血清肌酐、胱抑素 C、尿微量蛋白明显升高，肾小管线粒体嵴疏松断裂，线粒体空泡化，细胞核凋亡，发生急性肾损伤，且脑卒中肾交感神经兴奋性明显增加。
2.肾去交感神经支配后去甲肾上腺素和酪氨酸羟化酶水平明显下降，且可显著缓解脑缺血再灌注损伤后血清肌酐、胱抑素 C、尿微量蛋白的升高。此外，肾小管线粒体损伤，细胞核凋亡明显缓解。
3.肾去交感神经支配后免疫相关基因变化明显，相关基因富集。
结论 1.脑缺血再灌注损伤可引起肾交感神经兴奋性增加，并导致急性肾损伤。
2.肾去交感神经支配可缓解脑卒中后血清肌酐、胱抑素 C、尿微量蛋白升高，缓解肾小管线粒体损伤、细胞凋亡，从而改善急性肾损伤。
3.肾去交感神经支配可能是通过免疫途径缓解脑卒中后急性肾损伤。

PU-0134

未定带星形胶质细胞通过下调 GABA 转运体 3 抑制 GABA 能投射介导小鼠术后焦虑

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目的 星形胶质细胞是维持神经突触递质稳态和情绪状态的关键结构，同时，它也是调控围术期神经损伤的重要结构。然而，鲜有研究报道反应性星形胶质细胞调控围术期负性情绪的机制，本研究旨在阐明术后焦虑小鼠未定带星形胶质细胞钙活动异常的现象，及其在调控未定带 GABA 能神经投射中的作用，明确反应性星形胶质细胞介导术后焦虑样行为的神经机制，为围术期神经损伤的防治提供新的理论依据与药物治疗的靶点。
方法 本实验采用 C57 与 VGAT-Cre 小鼠，通过麻醉下行腹部探查术、胫骨骨折固定术、颈动脉暴露术，探究手术是否诱导小鼠出现焦虑样行为，结合免疫荧光，在体光纤钙成像与多通道在体电生理等方法检测术后焦虑小鼠未定带星形胶质细胞与 GABA 能神经元活性变化；通过弗代柠檬酸钠抑制星形胶质细胞活性，在星形胶质细胞表达人源钙泵蛋白（hPMCA2w/b）竞争性抑制其钙活动，探究反应性星形胶质细胞参与调节术后小鼠未定带 GABA 稳态与焦虑样行为的机制；利用病毒工具在未定带星形胶质细胞过表达 GABA 转运体 3，明确星形胶质细胞调控神经元活性与术后焦虑样行为的机制；通过光遗传学结合光纤钙成像及全细胞膜片钳技术，探究小鼠术后焦虑的相关神经环路机制。
结果 高架十字迷宫与旷场测试结果表明，与假手术组相比，小鼠腹部探查术后 6h 至 3d 出现显著的焦虑样行为；然而，单纯异氟烷麻醉组与假手术组相比，无显著差异。免疫荧光结果显示，术后 24h，小鼠未定带星形胶质细胞 GFAP 表达增加，且神经元活性降低。光纤钙成像结果显示，术后小鼠未定带星形胶质细胞钙信号活性异常增高，GABA 能神经元钙活性下降；通过药理学或遗传学方法抑制星形胶质细胞的活性，显著减弱术后未定带 GABA 能神经元活性下降，并缓解了小鼠焦虑样行为。在体微透析与免疫荧光结果显示，与假手术组相比，术后小鼠未定带游离 GABA 增加，GAT-3 表达降低，提示星胶 GAT-3 表达下降介导未定带 GABA 稳态失衡；此外，上调未定带星形胶质细胞 GAT-3 表达或光遗传学激活 ZI^{GABA}-MRN 神经投射均可缓解小鼠术后焦虑样行为。
结论 未定带反应性星形胶质细胞通过下调 GAT-3 表达，进而影响 GABA 稳态，下调 ZI^{GABA}-MRN 神经投射，介导术后小鼠出现焦虑样行为。

PU-0135

组胺及组胺受体激动剂通过 JNK/p38-NF-κB 通路抑制脂多糖诱导的星形胶质细胞的炎症反应

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目的 探讨组胺及组胺 H1、H2、H3 受体（Histamine H1、H2、H3 receptor，H1R、H2R、H3R）对脂多糖（lipopolysaccharide，LPS）诱导的星形胶质细胞活化和炎症因子表达的影响及其信号通路的调控机制。

方法 采用 LPS 建立体外星形胶质细胞炎症激活模型，分别采用组胺及各组胺受体激动剂预处理后观察星形胶质细胞的激活、炎症因子的释放及信号通路的变化

结果 随机将分离纯化的大鼠原代星形胶质细胞分为对照组和 LPS 组。对照组仅加入培养液，LPS 组加入终浓度为 100ng/mL 的 LPS。不同时间点检测星形胶质细胞炎症因子以及组胺各受体亚型的表达情况。 PCR 结果表明 LPS 孵育星形胶质细胞 2h 后 TNF-α、 IL-1β 和 IL-6 等炎症因子表达水平明显增加 ，而 H1R、 H2R 和 H3R 受体 mRNA 数量显著减少；为探究组胺对 LPS 诱导星形胶质细胞活化的影响 ，在 LPS 刺激星形胶质细胞前 30 分钟分别给予不同浓度组胺预处理， 12h 后用 GFAP 检测星形胶质细胞的活化程度。 免疫荧光和 Western blot 检测发现， 组胺预处理能够明显减轻 LPS 诱导的星形胶质细胞的活化程度。ELISA 检测星形胶质细胞上清中 TNF-α 和 IL-6 炎症因子的分泌量。 结果显示与 LPS 组相比， 组胺预处理组炎症因子水平明显降低。 为进一步探究各组胺受体在组胺调控星形胶质细胞炎症反应中的作用， 分别使用浓度为 10μM 和 100μM 的 H1R 受体激动剂 2-pyridylethlamine、 H2R 受体激动剂 amthamine、 H3R 受体激动剂(R)-(-)-α-methylhistamine 预处理星形胶质细胞 30min， 随后予 100ng/ml LPS 孵育 12 小时， ELISA 结果显示高浓度的 H1R、 H2R 和 H3R 受体激动剂均能抑制 LPS 诱导的 TNF-α 和 IL-6 的释放， 其中 H1R 受体激动剂的调控作用最显著。 MAPK 及 NF-κB 通路在星形胶质细胞产生炎症因子的信号转导通路中发挥主要作用。Western blot 检测发现，100ng/ml LPS 显著诱导星形胶质细胞 MAPK 通路相关蛋白 P38 和 JNK 的磷酸化水平， 而对 ERK 的磷酸化水平无显著影响。 提前给予组胺或 H3R 受体激动剂可降低 P38 的磷酸化； 而提前给予组胺或 H1R、 H2R 和 H3R 各受体激动剂均能显著抑制 JNK 的磷酸化。NF-κB 的活化包括 IκB-α 的磷酸化和 NF-κB p65 亚单位转入核内。Western blot 结果显示 LPS 可以使星形胶质细胞磷酸化 IκB-α 表达增加， IκB-α 表达减少， 同时磷酸化 P65 表达增加。 组胺、H1R 和 H2R 受体激动剂（100μM） 可以部分抑制 LPS 诱导的 NF-κB 通路的激活。

结论 研究结果显示 LPS 刺激原代星形胶质细胞后， H1R、 H2R、H3R 三种组胺受体表达明显下降,而炎症因子分泌显著增加。 预先给与组胺能够上调三种组胺受体的表达， 抑制 LPS 诱导的星形胶质细胞的过度激活， 减少炎症因子的释放； 单独使用各组胺受体激动剂干预发现， H1R、 H2R、H3R 受体激动剂均能够负向调控 LPS 介导的星形胶质细胞的炎症反应， 其中 H1R 发挥主要调节作用，且 JNK/p38-NF-κB 通路可能是组胺及各组胺受体激动剂参与星形胶质细胞免疫调节的重要途径。

PU-0136

Research trends and hotspots for GPR30 in recent 20 years: a bibliometric analysis

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Background: G protein-coupled receptor 30 (GPR30), a member of the estrogen receptor (ER), is the third ER other than receptor-α (ERα) and receptor-β (ERβ). There isn't a thorough bibliometric analysis of GPR30 at the present time. Utilizing bibliometric analysis, we presented the research trends and hotspots of GRP30 in this investigation.
Methods: From the Web of Science Core Collection (WoSCC) database, we took out publications that were published during the last 20 years that had relevance to GPR30. Search terms included medical subject headings and keywords such as ‘GPR30’ and ‘GPER1’. Citation, country or area, institution, author, journal, and keyword were among the several bibliographic components gathered. The 'analysis' of knowledge maps and bibliometrics were carried out using bibliometric tools (VOSviewer and CiteSpace).
Results: Over the previous 20 years, 3697 appropriate publications pertaining to GPR30 were acquired. Additionally, there was an annual increase trend in the overall amount of publications, which peaked in 2020. USA was at the centre of research on GPR30 with a close collaboration with China and Germany. University of California System was the most productive institution with 126 publications, followed by University of Texas System. On average, the University of New Mexico Health Sciences Center's publications received 129.82 citations on average, a far larger amount than those of other universities. Prossnitz, ER from University of New Mexico was the most productive and impactful author. And he co-published the most cited article (1,813 citations) to date, with Revankar, CM, and Sklar, LA, proved that GPR30 is uniquely localized to the endoplasmic reticulum and promotes intracellular calcium mobilization and the synthesis of phosphatidylinositol 3,4,5-triphosphate (PIP3) in the nucleus upon estrogen activation. Plos One was the most productive journal. The majority of the top 10 active journals were categorized as Q1 or Q2, depending on the JCR 2022 requirements. In the keyword co-occurrence network, GPCR activation and pathophysiology, receptor expression, and its ligand estrogen. GPR30 pathophysiology, as well as hypothalamic hormones are included.
Conclusion: There is a marked increase in GPR30 research in recent 20 years. USA made the most significant contribution. GPR30 plays an essential role in cardiovascular disease, certain neuropsychiatric disorders, as well as cancer progression and related drug resistance.

PU-0137

VIP alleviates surgery/anesthesia-mediated cognitive impairment by modulating intestinal barrier and blood-brain barrier functions

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Objective: The neural mechanism of Postoperative cognitive dysfunction is still unknown. The intestinal immune is implicated in the pathogenesis of neurological disorders. Vasoactive intestinal peptide (VIP) mediates the function of the gut-brain axis with the dual effects of neurotransmitters and gastrointestinal hormones. Loss of intestinal VIP neurons may affect the activity and homeostasis of macrophages and stimulate intestinal inflammatory immune response. Intestinal macrophages mainly produce IL-1β can

be transmitted between the gut-brain axes, leading to postoperative delirium-like behavior in mice. Therefore, this paper aims to test the hypothesis that anesthesia/surgery causes changes of intsetinal VIP and IL-1β in the brain via the gut-brain axis, and investigate the impact on the gut barrier and cognitive function.

Methods: We conducted bilateral common carotid artery stenosis (BCAS) or sham surgery (control) in aged SD rats (20 months old). MCI rats were screened by Morris water maze assay 30 days after surgery. Then, The identified MCI and aged rats were again randomized into two groups based on whether they had undergone abdominal surgery. The final overall grouping scheme is as follows: MCI group, MCI surgery group, aged group, and aged surgery group. Postoperatively, rats were subjected to behavioral tests to detect cognitive function, and then the colon and brain were collected for histological studies. We used WB to detect the blood-brain barrier and intestinal mucosal barrier function, Elisa to detect overall inflammation levels, and immunofluorescence and flow cytometry to detect the polarisation of microglia and intestinal macrophages, respectively.

Results: The Barnes maze and novelty recognition experiments showed that rats showed significant cognitive decline after anesthesia/surgery. The effect on spatial learning and memory was milder in the aged surgical group of rats compared to the MCI surgical group. A western blot was performed to detect the expression of VIP in rats' colons and hippocampus. The expression of VIP in both the colon and hippocampus was reduced in rats in the MCI surgery group compared to the MCI group; anesthesia/surgery reduced the expression of VIP in the colon and hippocampus compared to the aged group. The expression of IL-1β was increased in both the hippocampus and colon in the surgical group using ELISA, which was more pronounced in the MCI surgical group. HE staining showed that the inflammatory cell infiltration and the number of cup cells were reduced in the colons of the MCI surgical and aged surgical groups of the rats, and the damage of the mucosal layer was also seen in the MCI surgical group. Western blot detection of tight junction proteins ZO-1, Occludin, and Claiborne in the colons and hippocampus of rats, Occludin and Claudin-5 expression was significantly decreased in the rat colon and hippocampus. Tissue flow cytometry showed that anesthesia/surgery induced the conversion of rat colonic macrophages to the M1 type, which was more pronounced in the MCI surgery group than in the aged surgery group. Western blot and immunofluorescence showed that microglial cells in the CA1 region of the hippocampus of the rats in the MCI surgery group and the aged surgery group were converted to the M1 type. The hnRNPA2/B1 expression levels of the hippocampus in the MCI surgery group and the aged surgery group were higher than those of the MCI group and the aged surgery group, respectively. Levels were higher than those in the MCI and aged groups, respectively. In contrast, the expression levels of ARC, Ng, and CaMKII were higher in the hippocampus of the MCI and aged rats.

Conclusion: Anesthesia/surgery reduces VIP expression in the colon and hippocampus, leading to increased production of the pro-inflammatory factor IL-1β, which disrupts the integrity of the intestinal and blood-brain barriers and exacerbates CNS inflammation, ultimately accelerating the progression of cognitive impairment. This study reveals the effects of anesthesia/surgery on VIP and its modulation of intestinal IL-1β production, which may provide new avenues for delaying cognitive impairment.

PU-0138

Inhalational Anesthetic-Induced Attenuation of Tonic GABAergic Inhibition is Proposed as a Potential Mechanism of Postoperative Cognitive Dysfunction

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Background: Inhalational anesthetics have been observed to disturb the synaptic homeostasis in the brain, potentially leading to postoperative cognitive dysfunction. This study delves into how postsynaptic neuronal excitability is altered by adjusting tonic GABAergic inhibitions during inhalational anesthesia, focusing on the role of δ-$GABA_A$ receptors in the mechanisms underlying postoperative cognitive dysfunction mechanisms.

Methods: Two groups of animals were subjected to behavioral experiments: 18-month-old

C57BL/6J SPF mice and 18-month-old C57BL/6J-Gabrdem1Smoc SPF mice. The C57BL/6J-Gabrdem1Smoc mice were homozygous for the whole-body δ- $GABA_A$ R null (-/-) knockout mice. Each group consisted of 5 male and 5 female mice. Our research investigated the sustained effects of isoflurane on cognitive function and psychiatric symptoms through the Morris water maze and open-field test. The mice were trained 4 times per day from each quadrant for a maximum duration of 90 seconds during 7 straight days. On the 7th day, the platform was removed after training. The open-field control tests were performed on the 7th day after the Morris water maze training period to evaluate anxiolytic- and depressant-like behavior, exploratory behavior, and locomotor activity in rodents. On the 8th day, all mice were anesthetized with 1.4% isoflurane for 3 hours. The post-anesthesia Morris water maze tests and open-field tests were conducted at hourly intervals of 1, 2, 3, 4, 5, 6, and 12, as well as on day 1, 2, 3, and 7. After behavioral tests, the cerebellum and cerebrum were harvested. Total protein amounts were quantified using the protein assay kit, and δ-$GABA_A$R protein were detected with GABRD antibodies. Antibodies detecting glyceraldehyde-3-phosphate dehydrogenase served as a control for differences in the total protein amount loaded. Whole-cell patch-clamp recordings were performed on cerebellar granule neurons from the external granule cell layer of the cerebellar cortex in the brain slices, which were visualized and identified based on morphology.

Results: In aged naïve mice, isoflurane impaired both short-term and long-term memory in the Morris water maze test and caused short-term and long-term alterations in locomotor activity, emotions, and anxiety in the open-field test possibly through the δ-$GABA_A$ receptor pathway. The mean escape latency to reach the platform from each quadrant progressively decreased in both groups, indicating the effectiveness of the training ($F = 1.13$, $P = 0.3489$). Between day 7 and day 15, the swimming speed indicates that aged naïve mice and aged δ-$GABA_A$ R null mice did not display sensorimotor deficits ($F = 1.22$, $P = 0.353$). The aged naïve mice showed a decrease in the number of platform crossings, spent less time within the target quadrant from 1 hour to 7 days after isoflurane inhalation compared to the pre-anesthetic measurements (control) in the same Morris water maze probe test condition ($P < 0.05$ at the majority of timepoints, occasionally $P < 0.01$ or $P < 0.001$). Naïve mice exhibited decreased speed, reduced time spent in the central zones, shorter total distance traveled, and increased freezing time from 1 hour to 7 days following isoflurane inhalation during open field recording. Statistical significance was achieved at most timepoints with $P < 0.05$, occasionally reaching levels of $P < 0.01$, $P < 0.001$, or $P < 0.0001$. **However, the cognitive impairment and these alterations in mental state could be rescued in δ-$GABA_A$**R null mice, which did not exhibit any behavioral differences in the Morris water maze test and the open-field test results between the pre-anesthetic stage and any point during the post-anesthetic period. Following quantification and normalization of the results using β-actin levels, **elevated levels of δ-$GABA_A$** receptor protein expression were detected in the cerebellum compared to the cerebrum (**P= 0.0077). **Isoflurane prominently reduced the baseline GABAergic IPSC variability in cerebellar granule neurons, causing a further downshifting in the baseline of tonic inhibitory currents.** Both the frequency (**P= 0.0069) and amplitude (*P=0.0196) of GABAergic IPSCs decreased after treatment with 100 μM isoflurane (EC50) compared to the control condition, with reductions of approximately 20% from the control levels. Following isoflurane administration, in the cumulative probability of GABAergic IPSCs, peak amplitude was observed a significant leftward shift (*$P < 0.05$, Kolmogorov-Smirnov test), and interevent interval exhibited a significant rightward shift (*$P < 0.05$, Kolmogorov-Smirnov test). **The $GABA_A$** receptor agonist, muscimol, mimicked isoflurane's impact on GABAergic IPSCs, whereas the $GABA_A$ receptor antagonist, bicuculline, blocked isoflurane's effect. The shift in baseline holding current of GABAergic IPSCs was observed as Δ tonic inhibition. **The reduction in baseline tonic inhibitory current induced by isoflurane was probably mediated through the $GABA_A$** receptor. Following isoflurane treatment, there was a downshift in the baseline of GABAergic IPSCs, leading to a significant increase in Δ tonic inhibition induced by isoflurane, subsequently enhancing the excitation of cerebellar granule neurons (**P= 0.0094). Moreover, the modulation of Δ tonic inhibition by isoflurane was reversed by the $GABA_A$ receptor antagonist bicuculline (P= 0.0781). Conversely, the $GABA_A$ receptor agonist muscimol produced a similar variance in Δ tonic inhibition as isoflurane.

Conclusions: The findings of this study imply that δ-$GABA_A$ receptors and their associated tonic GABAergic inhibitions could be potential targets in the mechanisms underlying postoperative cognitive dysfunction and postoperative anxiety triggered by inhalational anesthetics. It suggests that brain regions rich in δ-$GABA_A$ receptors, notably the cerebellum, contribute to the cognitive function network architecture. Advancements in elucidating these mechanisms will enhance research on cognitive dysfunction in the future.

PU-0139

m6A 甲基化修饰调控星形胶质细胞能量代谢在缺血性脑卒中认知功能障碍的作用及机制研究

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目的 脑卒中已成为成年人致死和致残的首要原因，缺血性脑卒中患者常常伴随着学习、记忆及认知功能障碍，这些障碍严重影响了患者的生活质量和社会功能。能量代谢障是神经退行性疾病发病的重要机制之一，其中星形胶质细胞糖酵解 、乳酸的传递在阿尔茨海默氏症和帕金森氏症等神经退行性疾病中起着重要作用，而且乳酸作为能量促进神经元存活，改善认知功能障碍。因此寻找星形胶质细胞能量代谢障碍在缺血性脑卒中的作用机制可能是值得探索的目标和最有研究价值的方向之一。

方法 我们构建大脑中动脉闭塞（Middle Cerebral Artery Occlusion，MCAO）大鼠模型，通过水迷宫、高尔基染色和透射电镜检测 MCAO 大鼠突触损伤及认知功能障碍，通过检测原代星形胶质细胞糖酵解关键酶和活性氧、乳酸、耗氧量、NAD+/NADH、谷氨酸浓度明确脑卒中大鼠星形胶质细胞能量代谢改变；并且通过侧脑室注射以及 si-RNA 干预星形胶质细胞 m6A 去甲基化酶 FTO 的表达，验证糖酵解关键酶甲基化修饰水平和特异性结合位点，深入探索 m6A 甲基化修饰是否参与调控卒中后星形胶质细胞能量障碍，进而影响卒中大鼠认知功能障碍。

结果 MCAO 大鼠表现出明显的突触可塑性损伤以及认知功能障碍，卒中后星形胶质细胞发生能量代谢障碍；我们发现卒中后星形胶质细胞糖酵解关键酶 PKM2 表达降低，通过干预在体以及体外星形胶质细胞 PKM2 表达，显著改善了卒中后星形胶质细胞能量代谢障碍及减轻大鼠突触可塑性损伤以及认知功能障碍；随后通过干预在体以及体外 m6A 甲基化修饰酶 FTO，发现其可显著改善星形胶质细胞 PKM2 表达及能量代谢障碍，并且减轻大鼠突触可塑性损伤以及认知功能障碍，提示 m6A 甲基化修饰通过调控星形胶质细胞糖酵解关键酶 PKM2 的甲基化水平及表达，进而影响卒中大鼠突触及认知功能。

结论 本研究发现 MCAO 大鼠发生突触可塑性损伤以及认知功能障碍，通过在体和体外实验发现 m6A 甲基化修饰调控星形胶质细胞关键酶表达，改善星形胶质细胞能量代谢障碍以及大鼠突触可塑性以及认知功能。

PU-0140

PGC-1α 调控线粒体能量代谢介导小胶质细胞突触修剪在老年术后认知功能障碍中的作用及机制

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目的 术后认知功能障碍（POCD）是一种常见的中枢神经系统并发症，主要影响麻醉和手术后的老年患者。小胶质细胞的激活和病理反应起到了关键作用。中枢神经系统能量代谢障碍可能会破坏神经元和小胶质细胞的功能，最终导致认知功能受损。目前，小胶质细胞线粒体能量代谢调节突触修剪的机制尚不清楚。本研究旨在研究麻醉和手术对老年小鼠术后认知功能障碍的影响，探讨了小胶质细胞突触修剪、突触可塑性和认知功能之间的关系，假设 PCG-1a 介导的小胶质细胞线粒体能量代谢可能通过调节突触修剪来增强突触可塑性，缓解术后认知功能障碍。
方法 我们使用 1.5%异氟烷麻醉和部分肝切除术在老年小鼠中建立了 POCD 小鼠模型。使用高通量 RNA 测序确定海马差异表达的基因。采用 Westernblot、免疫荧光染色、3D 重建、高尔基染色、Sholl 分析和透射电子显微镜检测海马 SYN、PSD95、PGC-1α、NRF-1、TFAM、COX IV 和 ATP5a 的蛋白表达水平，以评估海马突触修剪的程度。SeahorseXF 分析和线粒体膜电位检测用于分析细胞代谢情况。采用 Morris 水迷宫和 Y 迷宫进行行为学测试。此外，我们使用 PGC-1α 特异性激活剂 ZLN005 来验证我们的结论。
结果 本研究通过 RNA 测序证实了老年 POCD 小鼠突触表达和能量代谢生物学过程的显著下调。麻醉和手术显著降低了老年小鼠小胶质细胞中海马 PGC-1α 及其下游分子 NRF-1 和 TFAM 蛋白的表达，降低了线粒体能量代谢。此外，这种代谢的影响还促进了突触修剪的过程，这可能导致突触结构和功能的损伤。更重要的是，我们的研究发现 PGC-1α 的特异性激活剂 ZLN005 有效地抑制了小胶质细胞过度的突触修剪行为，从而改善了 POCD 的发生。
结论 我们的研究表明 PGC-1α 是突触修剪的直接分子影响机制。这一过程是由小胶质细胞中的线粒体能量代谢障碍介导的，这为预测和治疗 POCD 提供了一个型的潜在治疗靶点。

PU-0141

A Modified Method for Intrathecal Catheterization in Rats

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Background: Intrathecal catheterization has been widely applied in animal experiments, especially those on neuropathic pain. However, the traditional method still has several limitations. Although some investigators have attempted to improve the traditional methods, the available methods still need to be modified. Herein, we introduce a modified method for intrathecal catheterization in rats. According to the lumbar approach for intrathecal catheterization and the Seldinger technique for central vein catheterization, we developed a method for intrathecal catheterization in rats that uses a stainless steel wire, homemade sealing cap and antiallergic band to simplify the existing method. Through this method, the catheter can be easily inserted into the subarachnoid space and stably fixed on the back of the rat, and the need for repeated punctures for repeated intrathecal drug administration is avoided.
Methods: Prepare a 15 cm long PE10 tube, insert a 20 cm long stainless-steel wire (0.2 mm in diameter) into the PE10 tube as a support, and mark the tube 2 cm from one end to indicate the insertion depth. Cut an epidural catheter (1.0 mm in external diameter) and seal the distal end of the fragment with a pair of heated straight forceps. This apparatus is called the tube sealing cap. After the L5-6 intervertebral

space is cleaned with a cotton ball and the inverted "V" area is completely exposed, in which puncture the spine with a 23G needle. Carefully insert the PE10 tube containing stainless steel wire into the spinal canal at the puncture site, being tilted 30° toward the tail. The insertion angle was adjusted until the PE10 tube could be successfully inserted without any resistance, and when the marked area of the PE10 tube reaches the posterior muscle, catheterization is stopped. Slowly remove the stainless wire from the PE10 tube. Once the PE10 tube was confirmed to insert successfully into the subarachnoid space and be unobstructed, seal the PE10 tube with the sealing cap and suture the muscles on one side of the vertebral body with a 4.0 suture, and then make a knot.

Our modified method for intrathecal catheterization has certain advantages. First, the use of stainless steel wire in the PE10 tube increases the elasticity of the tube and improves the success rate of intrathecal catheterization, the amount space needed for the operation is reduced, and damage to the tissues around the lumbar spine is minimized, which preserves the lumbar function to the greatest extent possible and avoids the influence of surgery on the results of subsequent experiments. Second, the PE10 tube is fixed with a figure-8" suture 4 times, which prevents tube movement and retraction during movement. Third, a homemade sealing cap is used to seal the PE10 tube, which not only prevents cerebrospinal fluid leakage but also prevents the need for repeated cutting of the PE10 tube. Repeated cutting of the catheter may shorten the catheter, which makes the delivery of drugs inconvenient. Finally, the extracorporeal end of the PE10 tube is tied with an antiallergic band, which prevents the tube from retracting during movement.

Results: For intrathecal injection, the extracorporeal tip of the PE10 tube was cut off, and the PE10 tube was sealed with a sealing cap between two drug injections. In our pilot study, the success rate of intrathecal catheterization was approximately 95% (19 out of 20 rats); success was indicated by a tail flick or the release of colorless transparent fluid during the procedure. Approximately 90% of the tubes remained in place at 7 days after surgery, and approximately 80% remained in place at 28 days after surgery. Complete paralysis of lower limb indicates successful intrathecal catheterization. The success rate of intrathecal catheterization is calculated by dividing the total number of rats with the number of rats with successful catheterization. With our modified method, the success rate was 95%.The intrathecal tube was monitored at 2, 5, and 7 days after intrathecal catheterization and the rate of successful indwelling catheter was calculated as number of rats with successful indwelling catheter/total number of rats × 100%. The rate of successful indwelling catheter at 2, 5 and 7 days after intrathecal catheterization was 95%, 90% and 85%, respectively, with our technique.

Conclusion: This method increased the success rate of catheterization in rats, as approximately 80% of PE10 tubes remained in place even 28 days after surgery. Thus, this modified method may represent a simple, convenient, and reliable approach for repetitive intrathecal drug administration.

PU-0142

Isoflurane preconditioning alleviates hypoxia/reoxygenation-induced cardiomyocyte injury by inhibiting miR-195-3p expression

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Objective: To investigate the role of microRNA-195-3p (miR-195-3p) in hypoxia/reoxygenation (H/R)-induced cardiomyocyte injury.

Methods: AC16 human cardiomyocyte cells were cultured and pretreated with different concentrations of isoflurane (ISO) (1%, 2%, and 3%), followed by 6 h each of hypoxia and reoxygenation to construct H/R cell models. The optimum ISO concentration was assessed based on the cell viability. miR-195-3p expression was regulated by in vitro transfection. Cell viability was determined by MTT assay and apoptosis was evaluated by flow cytometry. The levels of myocardial injury and inflammation were determined by enzyme-linked immunosorbent assay (ELISA).

Results: Compared with the control group, the cell viability of the H/R group had significantly decreased and that of ISO pretreatment had increased in a dose-dependent manner. Therefore,

we selected a 2% ISO concentration for pretreatment. MiR-195-3p expression had significantly increased in the H/R group and decreased after 2% ISO pretreatment. Additionally, the number of apoptotic cells and the levels of lactate dehydrogenase (LDH), creatine kinase-myoglobin binding (CK-MB), cardiac troponin I (cTnI), interleukin (IL)-1β, IL-6 and tumor necrosis factor (TNF)-α had increased significantly. ISO preconditioning inhibited H/R-induced AC16 cell damage, whereas miR-195-3p overexpression reversed the protective effects of ISO on cardiomyocytes. The expression of phosphatase and tensin homolog deleted on chromosome 10 (PTEN) was reduced in the H/R-induced AC16 cells, and PTEN is a downstream target gene of miR-195-3p.
Conclusions: Preconditioning with 2% ISO plays a protective role in H/R-induced AC16 cell damage by inhibiting miR-195-3p expression.

PU-0143

The gut microbial lipid metabolite 14(15)-EpETE inhibites substance P release by targeting GCG/PKA signaling to relieve Cisplatin-induced nausea and vomiting in rats

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目的 Chemotherapy-induced nausea and vomiting (CINV), which occurs during cancer treatment, is a debilitating side effect related to activation of substance P (SP). SP activation can result from dysregulation of the gut-brain axis, and also from activation of protein kinase A signaling (PKA) signaling. By connecting these factors, we attempts to unveil the mechanisms underlying CINV and develop new therapeutic strategies.
方法 Female rats were injected with Cisplatin to induce Pica. Fecal samples were collected before/after the injection, and subjected to lipid metabolomics analysis. In another portion of Pica rats, the PKA inhibitor KT5720 was applied to check the involvement of PKA signaling in CINV, while fecal microbiota transplantation (FMT) was implemented to verify the therapeutic effect of the lipid metabolite 14(15)-EpETE. Pica symptoms were recorded, followed by ileal histolological examination. Bioninfomatics predicted that 14(15)-EpETE targets glucagon. SP and glucagon/PKA signaling in rat ileum, serum, and/or brain substantia nigra were detected by immunohistochemistry, enzyme-linked immunosorbent assay, and/or western blot.
结果 14(15)-EpETE showed a significantly lowered level in feces of rats after Cisplatin injection. KT5720 treatment alleviated Cisplatin-induced Pica symptoms, ileal injury, SP content increase in the ileum, serum, and brain substantia nigra, and ileal PKA activation in rats. The ileal level of glucagon was elevated by Cisplatin in rats. FMT exerted a effect similar to that of KT5720 treatment, relieving the Cisplatin-induced effect including ileal glucagon/PKA activation in rats.
结论 FMT restores production of 14(15)-EpETE, which inhibits SP release by targeting GCG/PKA signaling, thus mitigating CINV in rats.

PU-0144

DHEA 抑制小胶质细胞线粒体异常分裂减轻 POCD 的机制研究

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目的 术后认知功能障碍（POCD）是老年手术患者常见的神经系统并发症，表现为认知功能下降，精神活动、人格、社交能力的改变，并能引起长期认知障碍、痴呆，导致术后患者丧失生活自理能

力。随着我国人口老龄化加剧，POCD 的发生率也逐渐增高，将造成严重的社会问题。因此研究 POCD 的发生机制并有效防治具有十分重要的意义。目前认为小胶质细胞过度激活造成中枢神经系统炎症，进而引起神经损伤是 POCD 发病的重要原因之一，但其发生的具体机制和治疗方法尚存很多未知。

方法 脱氢表雄酮（DHEA）是体内重要的前体激素，在脑内由神经元及星状胶质细胞分泌，具有抑炎及神经保护作用，也被认为是一种重要的神经递质。体内 DHEA 水平随着年龄增加而下降，与老年人认知功能损伤有着密切关系，且 POCD 主要发生于老年手术患者，因此我们推测 POCD 的发生可能与体内 DHEA 水平下降有关。我们前期研究发现：POCD 患者术前血清 DHEA 水平明显低于未发生 POCD 的患者，提示体内 DHEA 含量降低可能为预测临床患者 POCD 的发生提供依据。进一步发现 DHEA 可以抑制小胶质细胞炎症激活，改善 POCD 小鼠认知行为，提示 DHEA 可以抑制脑内炎症缓解 POCD 的发生。根据前期研究结果，我们推测：DHEA 可能通过抑制线粒体分裂调控蛋白 Drp-1 磷酸化，减少小胶质细胞线粒体异常导致的炎症反应，缓解 POCD 发生。

由于 DHEA 在外周会由硫化酶转化为 DHEAS 而无法通过血脑屏障，我们首次开发了可以滴鼻的水凝胶微球脂质体材料，通过水凝胶表面的正电荷增加鼻腔粘附，延长停留时间，避免鼻粘液纤毛快速清除，使搭载药物的脂质体能够通过鼻腔粘膜处的神经及血管入脑，跨过 BBB 增加药物入脑效率。同时将脂质体携带 CTLA-4，通过与激活小胶质细胞表面 CD80/86 结合精准靶向小胶质细胞，释放内源性神经递质 DHEA 用于治疗疾病，成功实现了无创的脑内 DHEA 给药。

结果 研究显示该水凝胶微球脂质体靶向材料携带荧光入脑效率高，小胶质细胞对 CTLA-4 修饰的脂质体摄取增加。体外实验证实，与单独 DHEA 相比，HAMA/CTLA-4/Lipo/DHEA 显著抑制线粒体外膜 Drp-1 磷酸化，稳定线粒体形态功能，抑制小胶质细胞激活，减轻麻醉手术导致的认知功能障碍。

结论 本项目针对 POCD 发病机制不清，以探索脑内重要神经递质 DHEA 的减少与 POCD 的相关性为切入点，应用多组学检测等技术探索 DHEA 通过调节线粒体相关代谢调控抑制脑内小胶质细胞炎症激活的具体作用机制，为临床患者 POCD 的诊断和防治提供新的靶点及思路，也为临床使用 DHEA 提供了新方法，具有重要的医学转化价值。

PU-0145

BNST GABA 能神经元在急性心肌梗死中的作用和机制研究

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目的 急性心肌梗死（AMI）是全球导致死亡的主要原因之一。近年来，心血管疾病的神经免疫机制成为研究的热点，中枢神经系统和免疫系统之间的相互作用对于调节 AMI 后的修复至关重要。然而，目前对于调控 AMI 的中枢核团和免疫应答响应机制了解甚少。本研究旨在明确 AMI 大脑响应的关键中枢核团活的神经元类型，并探寻调节选定核团特定类型神经元活性对 AMI 后修复的影响，并探索相关的免疫调节机制。

方法 建立小鼠 AMI 模型，以 c-fos 和磷酸化细胞外信号调节激酶（pERK）作为神经元激活标记物，通过免疫组织化学染色全脑筛查 AMI 后 1h（AMI 1h）和 AMI 后 1d（AMI 1d）变化的中枢核团，采用免疫荧光染色检测 AMI 后 BNST 核团激活的神经元类型，以及利用钙信号检测进一步进行验证。随后采用化学遗传学方法抑制选定核团特定类型神经元活性，通过心脏超声观察 AMI 后心功能变化，HE 染色评价心梗面积，马松（Masson）染色和天狼猩红（PSR）染色测量胶原容积，PET-CT 检测 AMI 小鼠心脏代谢的变化，通过免疫荧光观察细胞外基质形成以及血管新生情况，并通过化学遗传学方法激活选定核团特定类型神经元，观察其对 AMI 小鼠生存的影响。最后利用单细胞 RNA 测序（scRNA-seq）分析各细胞簇数目和功能的改变，个性化分析巨噬细胞（Mφ）簇及其各亚群功能表型差异，并通过流式细胞术观察 AMI 小鼠心脏促炎型 Mφ、抑炎型 Mφ 以及干扰素诱导 Mφ（IFNIC-Mφ）的百分比变化以及采用实时荧光定量聚合酶链反应（RT-PCR）观察 AMI 小鼠

心脏炎症因子的变化。

结果 与假手术（Sham）组相比，AMI 1h 组小鼠终纹床核（BNST）、中央杏仁核（CeA）和腹侧被盖区（VTA）的 c-fos 和 pERK 表达明显上调，其中以 BNST 核团上调最显著；AMI 1h 组小鼠 BNST 核团 c-fos 和 pERK 与 GABA 能神经元双标明显，而与谷氨酸能神经元无明显双标。钙信号结果提示 AMI 1h 小鼠 BNSTGABA 能神经元（$BNST^{GABA}$）活动增强。与对照（mCherry）组小鼠相比，抑制 $BNST^{GABA}$ 活性（hM4D）组小鼠 AMI 7d 和 14d 小鼠的射血分数（EF）和缩短分数（FS）明显提高，心功能改善；HE 染色结果显示 hM4D 组小鼠在 AMI 7d 和 AMI 14d 心脏梗死面积均减少；心脏 PET-CT 的结果显示， hM4D 组小鼠心脏整体、梗死远端区域和 LAD 支配区域的标准摄取值（SUV）都明显降低；Masson 染色和 PSR 染色发现 hM4D 组小鼠在 AMI 7d 和 AMI 14d 心脏梗死区胶原容积增加；免疫荧光染色发现 hM4D 组小鼠在 AMI 7d 心脏梗死区的 α-平滑肌肌动蛋白（α-SMA）、胶原Ⅰ（Collagen Ⅰ）、胶原Ⅲ（Collagen Ⅲ）以及血管新生标记分子 CD31 的表达显著上调；而激活 $BNST^{GABA}$（hM3D）组 AMI 小鼠在 7d 内均死亡，AMI 7d 生存率明显降低（0/10 vs 6/10），解剖和 HE 染色观察到小鼠均死于心脏破裂。scRNA-seq 显示 Mφ 在 mCherry 组占比 36.4%，hM4D 占 41.6%。与 mCherry 组相比，hM4D 组小鼠梗死区 Mφ 的抑制炎症反应功能、促调节胶原合成功能和促血管生成作用明显增强；hM4D 组小鼠的 Mki67-Mφ 和促炎型 IFNIC-Mφ 比例降低，抑炎型 Arg1-Mφ 和 CCL-Mφ 比例升高；hM4D 组小鼠心脏梗死区该四群 Mφ 亚群抑炎功能、促胶原合成功能和/或促血管生成功能增强。流式细胞术的结果显示，hM4D 组小鼠心脏促炎型 Mφ（$MHC\text{Ⅱ}^{+}CCR2^{+}$）和 IFNIC-Mφ（$Ly6A/E^{+}Ly6C^{high}$）比例下降，抑炎型 Mφ（MHCⅡ-CCR2-）比例升高。RT-PCR 结果证实 hM4D 组小鼠心脏组织抗炎细胞因子转录水平明显增高。

结论 AMI 后小鼠 $BNST^{GABA}$ 激活，抑制 $BNST^{GABA}$ 活性可减少 AMI 小鼠心脏梗死面积，改善心功能，促进细胞外基质和新生血管形成，可能通过调控 Mφ 向抑炎型转换进而促进心脏抗炎微环境形成，产生心脏保护作用从而改善 AMI 后修复。

PU-0146

苯二氮䓬类镇静剂抑制运动神经元生长的机制研究

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目的 动物模型的研究揭示苯二氮䓬类镇静剂对神经系统的发育和功能产生的影响，然而其作用的分子机制并不清楚。研究苯二氮䓬类镇静剂影响神经系统发的机制是其在婴幼儿中安全使用以及进一步研发低副作用药物的前提。

方法 利用标记运动神经元的转基因斑马鱼幼鱼为模型，并暴露于苯二氮䓬类药物后，通过激光共聚焦活体成像来分析和评价运动神经元轴突的生长；斑马鱼模型中通过转录组测序分析苯二氮䓬类药物处理后引起的基因表达和信号通路的改变，并进一步利用定量 PCR 和整体原位杂交检测下游相关分子的表达变化；利用瞬时敲降、过表达调控特定基因的表达水平以及构建稳定的基因敲除品系，并结合苯二氮䓬类药物暴露模型以及活体成像，分析特定基因在介导苯二氮䓬类药物抑制运动神经元发育中的作用。

结果 研究发现两种苯二氮䓬类药物咪达唑仑和地西泮处理后同样地抑制了斑马鱼运动神经元轴突的生长；转录组测序分析发现咪达唑仑暴露改变了 200 多个基因的表达水平，进一步分析发现神经元生长的分子通路，包括钙信号通路显著改变；表达检测验证了咪达唑仑处理不仅上调了 trpc3 的表达，同时也下调了 trpc5a 的表达，而原位杂交结果表明这两个基因特异地在运动神经元中表达；进一步表达调控实验表明在运动神经元中过表达 trpc3 或全身敲降 trpc5a 都可以抑制了运动神经元轴突的生长，而全身敲降 trpc3 或在运动神经元中过表达 trpc5a 可挽救咪达唑仑对运动神经元轴突生长的抑制作用；同时，研究还发现敲除苯二氮䓬类药物靶点 TSPO 同样可显著地挽救咪达唑仑对运动神经元生长抑制作用。

结论 本研究表明多种苯二氮䓬类镇静剂可抑制斑马鱼运动神经元的生长发育，转录组学揭示钙相关的信号通路可能参与了这一调控过程，进一步的分子机制研究发现阳离子通道 trpc3 和 trpc5a 参与了该调控作用，同时苯二氮䓬类药物靶点 TSPO 也参与了调控作用。本研究将为阐明苯二氮䓬类药物通过调节运动神经元中钙信号从而影响运动神经元生长发育的分子机制提供研究基础。

PU-0147

YAP1-2 Contributes To bFGF-induced Proliferation In Gastric Cancer

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Gastric Cancer(GC) is one of the leading causes of cancer-related deaths in humans worldwide. Fibroblast growth factor family (FGFs) and Hippo signaling pathway play an important role in the epithelial- mesenchymal transition(EMT) process of gastric cancer. YAP1, a key mediator of the Hippo pathway, plays an important role in tumor- genesis. Alternative splicing of human YAP1 mRNA results in two major isoforms: YAP1-1, which contains a single WW domain, and YAP1-2, which contains two WW domains,respectively.There are significant differences in post-transcriptional regulation and function. bFGF treatment promoted the EMT process of most GC cell lines, and the proliferation ability was enhanced. This process may be related to the up-regulation of YAP1,the proliferation ability of GC was significantly alleviated upon YAP1 knockdown. bFGF treatment can induce EMT of GC through YAP1-2 and enhance their proliferative ability. In this process, bFGF may enhance the nuclear localization of YAP1-2.In the mouse model of intraperitoneal implantation tumorigenesis, it was shown that under the action of bFGF, the expressing YAP1-2 cell lines could form larger tumors than the expressing YAP1-1, but both of them were larger than the YAP1 knockdown. Our results show that YAP1-2 is the main subtype of bFGF-induced EMT and proliferation of gastric cancer cells.

PU-0148

阻塞性黄疸血管低反应性研究进展

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目的 对阻塞性黄疸血管低反应性研究进展作一综述。
方法 查找国内外相关文献，分别就“阻塞性黄疸血管低反应性的发现”、“血管低反应性发生的原因”、“低反应性发生机制”、“治疗”、“展望”五个部分研究进展作一综述。
结果 阻塞性黄疸血管低反应性是指患者存在阻塞性黄疸时，易发生低血压性休克，对内源性和外源性的血管活性物质敏感性降低甚至不敏感，对患者的治疗和预后产生严重不良后果。梗阻性黄疸患者较非梗阻性黄疸患者相比，在围手术期的并发症和死亡率均明显更高。

1932 年，Meakin 发现阻塞性黄疸时可伴随着血压下降，1981 年，Finberg 的研究在狗身上明确了血管低反应性的发生。胆汁盐，一氧化氮的过量产生，阿片类物质的张力增加，前列环素，肝实质的损害，胆血症，P 物质、缓激肽、胰高血糖素、血管活性肠肽、前列环素、心房利钠肽以及犬尿氨酸等血管舒张物质的累积可能参与了血管低反应性的发生。其发生机制可能与肾上腺素受体减敏、内皮衍生的 NO 过量产生、阿片肽或阿片肽受体有关。治疗大多仅限于基础研究，临床研究尚需进一步开展。
结论 对阻塞性黄疸引起的血管低反应性的预防和治疗手段仍然有限，并且缺乏更多的临床实验来

支持和完善；仍值得我们进行进一步的深入研究。

PU-0149

大脑初级体感皮层至丘脑网状核投射通路在丙泊酚麻醉中的作用研究

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目的 丘脑网状核（TRN）位于丘脑背外侧，由大量 GABA 能神经元组成，在纺锤波生成、听觉感觉门控和注意力调节等方面至关重要。 TRN 接受来自丘脑皮层和 L6 皮层丘脑神经元轴突侧支的谷氨酸能输入和支配丘脑投射神经元的调节输入。初级体感皮层(Primary Somatosensory Cortex, S1)：位于大脑皮质的后中央沟前面，在顶叶的前部。它是处理来自身体各部位的基本触觉和本体感觉的主要区域。S1 与感觉运动网络的其他区域一起共同参与对来自各种感觉器官的输入信息的处理，并进一步转换为具体的运动输出。目前的研究表明，S1 与 TRN 之间存在投射通路，且与机体异常性疼痛和焦虑样行为相关。但 S1-TRN 通路在全身麻醉过程中的作用未见报道。

方法 实验全程记录小鼠 LORR、RORR 和皮层脑电，脑电数据经过滤波处理后使用纺锤波探测程序（自编 MATLAB 脚本）标记并分析全麻过程中的纺锤波频率、幅度和长度的变化，并结合小鼠丙泊酚麻醉后翻正反射消失 LORR、呼吸动作由胸式呼吸转为腹式呼吸、脑电爆发性抑制、翻正反射恢复 RORR 四个行为学标志和脑电指标，明确 S1-TRN 通路在麻醉中的作用及麻醉纺锤波在全麻诱导期、浅麻醉期、深麻醉期和苏醒期的相应改变（图 1-B）。1.通路示踪实验：选取成年健康 SPF 级转基因小鼠 Vglut2-IRES-cre 小鼠 4 只，在 S1 注射 rAAV-EF1a-DIO -mCherry 病毒进行通路顺行示踪；病毒转染 21 天后进行小鼠心脏灌注取脑，荧光显微镜观察 S1-TRN 通路的投射情况。2.光遗传实验：选取成年健康 SPF 级 C57/BL 6J（8-10W,21-23g）小鼠，在 S1 注射光遗传激活病毒 rAAV-CaMKⅡa-hChR2(H134R)-EYFP 或光遗传抑制病毒 rAAV-CaMKⅡa-eNpHR3.0-EYFP，在 TRN 插入光纤，安装皮层脑电后用牙科粘合剂树脂水泥固定电极，病毒转染 21 天后进行丙泊酚麻醉的脑电及行为学记录，数据记录结束后对小鼠进行心脏灌注取脑验证病毒及光纤位置。

结果 1.在 S1BF 注射顺行示踪病毒，在 TRN 位置观察到投射 （图 1-A） 2.完成脑电及行为学记录完成后进行数据分析，激活组 TRN 位置安装光纤给 465nm 激活光后，相较于对照组，激活组 LORR 时间减少但 RORR 时间增加（图 2-A、图 2-B）；说明 S1- TRN 通路激活促进麻醉且抑制苏醒。抑制组给 589nm 抑制光后，同样地，LORR 时间减少、RORR 时间增加（图 2-C、图 2-D）；说明 S1- TRN 通路抑制也会促进麻醉且抑制苏醒。3. 使用纺锤波探测程序标记并分析全麻过程中的纺锤波长度、幅度和频率的变化。激活组在给光后小鼠全麻诱导期、浅麻醉期、深麻醉期的脑电纺锤波长度、幅度都增加（图 3-A、图 3-B）；但只有诱导期的纺锤波出现频率增加，在浅麻醉期、深麻醉期和苏醒期激活通路纺锤波出现频率降低（图 3-C）。抑制组在给光后小鼠诱导期、深麻醉期的脑电纺锤波长度、幅度增加（图 3-D、图 3-E），而苏醒期长度、幅度都减少；抑制通路纺锤波出现频率增加四个时期都会增加（图 3-F）。

结论 根据行为学结果分析，S1 属于初级感觉运动网络，S1-TRN 通路可能不参与全身麻醉过程调控。但激活或抑制该通路会使纺锤波产生不同的变化，故该通路可能参与脑电纺锤波的形成。

PU-0150

BDNF/TrkB 在七氟烷致老龄大鼠认知障碍中的机制研究

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目的 围术期神经认知障碍（perioperative neurocognitive disorders，PND）是老年人群手术后常见的一种严重并发症。研究表明记忆的形成与环磷酸腺苷（Cyclic adenosine monophosphate，cAMP）/蛋白激酶 A(proteinkinase A，PKA)/环磷酸腺苷反应单元结合蛋白（cAMP response element binding protein，CREB）信号通路指导的蛋白质合成及海马突触的结构和功能有关。在前期实验中我们发现，PND 大鼠海马神经元中 cAMP、PKA、CREB 的表达均下降，因此我们认为，七氟烷导致的老年 SD 大鼠认知功能障碍与 cAMP/PKA/CREB 信号传导通路异常有关。而脑源性神经营养因子（brain derived neurotrophic factor, BDNF）作为 CREB 的下游因子，在中枢神经系统中广泛分布，可通过与其特异性受体酪氨酸蛋白激酶 B（tyrosine kinase，TrkB）结合促进神经元增值、分化和信号传递，形成和维持学习、记忆。因此我们猜想，七氟烷所致的老年 SD 大鼠认知功能障碍可能与 BDNF/TrkB 调节海马神经突触可塑性变化有关。

方法 我们将 36 只 18 月龄的 SPF 级 SD 大鼠随机分为空白对照组（C 组）、七氟烷组（S 组）、激动剂组（A 组）、阻断剂组（B 组）。分别用 3%的七氟烷和 50%的空氧混合气体对 S、A、B 组和 C 组大鼠处理 2h。各组 SD 大鼠在造模前 6 d 和造模后 1 d 分别进行 Morris 水迷宫试验。通过对采集的 SD 大鼠游泳数据进行分析，判断造模是否成功。并 TrkB 受体激动剂、阻断剂干预老年 SD 大鼠围术期神经认知障碍动物模型，观察海马 CA1 区神经元树突棘密度和脑源性神经营养因子（brain derived neurotrophic factor, BDNF）、TrkB、突触后致密物质-95（postsynaptic density protein95，PSD95）、突触素（synaptophysin，SYP）表达水平的变化，并评估其认知功能，探讨七氟烷致老年 SD 大鼠认知功能障碍的可能机制。

结果 1. 行为学测试结果显示：（1）与 C 组比：药物干预 1 d、3 d 后，S 组、A 组、B 组大鼠逃避潜伏期（简称：Tl）和游泳总路程（简称：Sp）延长，穿越平台次数（简称：Cp），原平台象限停留时间（简称：Tp）减少，（P＜0.05）；给药 7d 后，A 组 Tl、Sp 缩短，Cp、Tp 增加，B 组 Tl、Sp 明显延长，Cp、Tp 明显减少，（P＜0.05）；S 组变化不明显（P＞0.05）；（2）与 S 组比：药物干预 1d、3d、7d 后，A 组 Tl、Sp 缩短，Cp、Tp 增加；B 组 Tl、Sp 延长，Cp、Tp 减少，（P＜0.05）。

2.分子生物学检测结果：（1）与 C 组比：A、B、S 组 BDNF、TrkB 的表达在给药 1d、3d 后下调，给药 7d 后无差异；SYP、PSD95 的表达在 A 组给药后逐渐增加，且在给药 3d 和 7d 后显著增加；在 S 组、B 组给药 1d、3d 仍较低，给药 7d 后，B 组下调更明显，（P＜0.05）；S 组则无差异。（2）与 S 组比：给药 1d、3d、7d 后，SYP、PSD95 的表达在 A 组中逐渐增加，在 B 组中逐渐减少，（P＜0.05）。3. 高尔基染色分析结果显示：（1）与 C 组比：大鼠海马组织 CA1 区树突棘密度在 S 组给药 1d、3d 后较低，给药 7d 后，变化不明显；在 A 组给药 3d、7d 后明显增加，在 B 组给药 1d、3d、7d 后明显减少，（P＜0.05）；（2）与 S 组比：药物治疗 1d、3d、7d 大鼠海马组织 CA1 区树突棘密度在 A 组中明显增加，在 B 组中明显减少，（P＜0.05）。

结论 老龄 SD 大鼠持续吸入 3 %七氟烷 2 h 后可出现认知功能障碍，且这种认知障碍与海马组织中 BDNF/TrkB 信号通路异常所致的神经元突触可塑性损伤有关，腹腔注射 7,8-DHF 可改善老年 SD 海马神经元突触可塑性，逆转七氟烷所致的认知损伤。

PU-0151

ω3-PUFA 通过上调 miR107 靶向 PIEZO1/NFκB p65 减轻神经炎症

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目的 miR-107 被 TLR4 下调并且与炎症调节相关。膳食补充多不饱和脂肪酸（ω3-PUFA）可以增加 miR-107 的表达，本研究探究了 ω3-PUFA 能否通过调节大脑中 miR-107 从而有效的抑制神经炎症并改善认知功能。
方法 通过 LPS 诱导小鼠神经炎症模型和 BV2 细胞炎症模型，检测 miR-107，腹腔内注射 ω3-PUFA 或使用 EPA、DHA 孵育 BV2 细胞以检测 ω3-PUFA 对 miR-107 表达和炎症的影响。通过脑室内注射 Agomir 和 Antagomir 调节 miR-107 表达。通过 HE 染色和 Nissl 染色观察海马神经元病变，免疫荧光分析神经胶质细胞活化，基因表达分析、蛋白质印迹检测分析 miR-107 的表达和炎症信号。
结果 LPS 成功诱导了小鼠神经炎症模型。ω3-PUFA 补充可以有效减轻 LPS 诱导的促炎性因子 TNFα、IL1β、IL6 的分泌和改善认知功能损伤，并增加大脑中的 miR-107 表达。过表达 miR-107 通过靶向 PIEZO1 抑制 NFκB 促炎信号通路传导，抑制小胶质细胞和星形胶质细胞活化和减少炎症因子的释放，减轻神经炎症损伤并改善小鼠认知功能。miR-107 作为 PANK1 的内含子，ω3-PUFA 上调大脑 miR-107 与大脑中的 PPARα/PANK1 相关通路的表达可能并不同步，需要进一步的研究证实 ω3-PUFA 上调 miR-107 的具体机制。
结论 miR-107/PIEZO1/NFκB 是 ω3-PUFA 改善神经炎症的新机制，炎症环境中 ω3-PUFA 如何上调大脑 miR-107 需要进一步研究。

PU-0152

“肠-脑轴”参与慢性束缚应激诱导疼痛抑郁共病的性别二态性研究

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目的 探究“肠-脑轴” 参与慢性束缚应激诱导疼痛抑郁共病的性别二态性。
方法 采用 5-6 周龄的雄性和雌性 C57BL/6 小鼠，建立慢性束缚应激模型（chronic restraint stress, CRS），每天 6 小时，共持续 14 天。利用旷场实验、VonFrey 纤维丝测试、热板实验、强迫游泳实验以及蔗糖偏好实验来检测行为学变化；使用 16S rRNA 基因测序技术明确肠道菌群的改变，利用 Spearman 相关性分析来探究菌群改变和行为学之间的相关关系，利用免疫印记和免疫荧光技术探究小鼠结肠、小鼠腹侧海马和前额叶皮层的病理生理学改变。
结果 CRS 造模 5 天后，雄鼠和雌鼠的机械痛痛阈和热痛痛阈开始出现显著下降 （P＜0.05），并一直持续到第 14 天；14 天后，雄鼠和雌鼠均出现蔗糖消耗量显著下降（P＜0.05）、强迫游泳实验不动时间显著延长（P＜0.05），旷场实验运动距离显著缩短（P＜0.05）等抑郁样行为。16s rRNA 分析表明，疼痛抑郁共病雄鼠肠道菌群的组成出现显著改变，主要表现为在种水平上，Akkermansia Muciniphila 显著下降（P＜0.05）；Ligilactobacillus murinus 显著增加（P＜0.05）。相关性分析表明，Akkermansia Muciniphila 和机械痛痛阈呈显著正相关关系（P＜0.05）、与不动时间呈显著负相关关系（P＜0.05）、与蔗糖消耗水平呈显著正相关关系（P＜0.05）；Ligilactobacillus murinus 与机械痛痛阈呈显著负相关关系（P＜0.05）、与不动时间呈显著正相关关系（P＜0.05）、与蔗糖消耗水平呈显著负相关关系（P＜0.05）。对于疼痛抑郁共病雌鼠，16s

rRNA 分析结果表明肠道菌群组成也出现显著改变，主要表现为在种水平上，Ligilactobacillus murinus 显著增加（P＜0.05），而 limosilactobacillus reuteri 和 unclassified_g_Lactobacillus 显著下降（P＜0.05）。相关性分析表明，unclassified_g_Lactobacillus 和机械痛痛阈、热痛痛阈均呈显著正相关关系（P＜0.05），limosilactobacillus reuteri 仅与热痛痛阈呈显著正相关关系（P＜0.05）； Ligilactobacillus murinus 与不动时间呈显著正相关关系（P＜0.05）。

免疫印记表明，CRS 组雄鼠和雌鼠结肠中的紧密连接蛋白 ZO-1、Occludin、Claudin1 和 Claudin5 表达量均显著降低（P＜0.05）；免疫荧光表明，CRS 组雄鼠和雌鼠结肠中 ZO-1、Occludin 和 MUC2 蛋白的荧光强度均显著下降（P＜0.05）；AB-PAS 染色表明，CRS 组雄鼠和雌鼠的结肠杯状细胞数量均显著减少（P＜0.05）；HE 染色提示 CRS 组雄鼠和雌鼠的肠隐窝和肠绒毛均变短。此外，CRS 组雄鼠和雌鼠结肠中 IL-1β、IL-6 和 TNF-α 的表达水平均显著上升（P＜0.05），IL-10 的水平显著下降（P＜0.05）；免疫荧光表明，CRS 组雄鼠和雌鼠腹侧海马和内侧前额叶皮层 ZO-1 和 Occludin 的表达量均显著下降（P＜0.05）。

结论 慢性束缚应激导致疼痛抑郁共病小鼠的肠道菌群失衡呈现性别二态性；结肠屏障受损、结肠炎症、血脑屏障受损等改变可能是慢性束缚应激导致疼痛抑郁共病的共同途径。

PU-0153

Astrocyte senescence-like response related to peripheral nerve injury-induced neuropathic pain

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Background: Peripheral nerve damage causes neuroinflammation, which plays a critical role in establishing and maintaining neuropathic pain (NeP). The mechanisms contributing to neuroinflammation remain poorly elucidated, and pharmacological strategies for NeP are limited. Thus, in this study, we planned to explore the possible link between astrocyte senescence and NeP disorders following chronic sciatic nerve injury.
Methods: An NeP animal model was established by inducing chronic constrictive injury (CCI) to the sciatic nerve in adult rats. A senolytic drug combination of dasatinib and quercetin was gavaged daily from the first postoperative day until the end of the study. Paw mechanical withdrawal threshold (PMWT) and paw thermal withdrawal latency (PTWL) were evaluated to assess behaviors in response to pain in the experimental rats. Senescence-associated β-galactosidase staining, western blot analysis, and immunofluorescence were applied to examine the levels of proinflammatory factors and severity of the senescence-like response in the spinal cord. Lipopolysaccharide (LPS) was administered to induce senescence of spinal astrocytes in primary cultures in vitro, to explore the potential impacts of senescence on the secretion of proinflammatory factors. Furthermore, single-cell RNA sequencing (scRNA-seq) was conducted to identify senescence-related molecular responses in spinal astrocytes under neuropathic pain.
Results: Following sciatic nerve CCI, rats exhibited reduced PMWT and PTWL, increased levels of spinal proinflammatory factors, and an enhanced degree of senescence in spinal astrocytes. Treatment with dasatinib and quercetin effectively attenuated spinal neuroinflammation and mitigated the hypersensitivities of the rats subjected to sciatic nerve CCI. Mechanistically, the dasatinib-quercetin combination reversed senescence in LPS-stimulated primary cultured astrocytes and decreased the levels of proinflammatory factors. The scRNA-seq data revealed four potential senescence-related genes in the spinal astrocyte population, and the expression of clusterin (CLU) protein was validated via in vitro experiments.
Conclusion: The findings indicate the potential role of astrocyte senescence in neuroinflammation following peripheral nerve injury, and suggest that targeting CLU activation in astrocytes might

provide a novel therapeutic strategy to treat NeP.

PU-0154

Insulin attenuates LPS-induced cognitive impairment by inhibiting ferroptosis

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Backgroud: Neuroinflammation is regarded to be a key mediator in cerebral diseases with attendant cognitive decline. Ferroptosis, characterized by iron-dependent lipid peroxidation, participates in neuroinflammation and cognitive impairment. Insulin, pivotal in the central nervous system, holds promise for cognitive function enhancement.
Glucose, the brain's primary energy source, sustains essential processes, including neurotransmission and synaptic plasticity, crucial for cognitive functions. In neurons, the Pentose Phosphate Pathway contributes to nicotinamide adenine dinucleotide phosphate (NADPH) generation for antioxidant defense, where it provides the reducing equivalents needed to keep glutathione peroxidase 4 (GPX4) in its active reduced form, enabling neutralization of lipid peroxides and preventing cell death
In this study, we established a cognitive impairment model through intracerebroventricular injection of lipopolysaccharide (LPS) and explored the impact of intracerebroventricular insulin injection on cognitive function in mice.
Methods: C57BL/6 mice aged 8-10 weeks (male, weight 18-20 g) were obtained from the Laboratory Animal Center of the Chinese PLA General Hospital and housed (4-5 mice per cage) in an environment with constant temperature (22±3 ℃) and humidity (50 %–70 %) under a 12 h light/dark cycle. Then 105 mice (n=35) were divided into three groups: Group S: 3 μl artificial cerebrospinal fluid, Group L: 3 μl LPS solution, and Group L+I: 3 μl LPS+Insulin solution.
Morris Water Maze and Novel Objecti Recognition tests were performed to investigate the effect of insulin treatment on hippocampus dependent learning and memory deficits. Hematoxylin-eosin (HE) staining and Nissl staining wer conducted to observe pathological changes in the hippocampus 24 h after surgery. Western blot and immunofluorescence staining were performed to investigate the expression levels of insulin pathway proteins and ferroptosis-related proteins 24 h after surgery. Enzyme-linked immunosorbent assay (ELISA) and biochemical detection were employed to detect the pro-inflammatory cytokines levels, iron levels and ferroptosis-relataed indexes. Miro-Positron emission tomography (PET) and bio-distribution were conducted to evaluate the glucose and iron metabolism by using ^{18}F-FDG and ^{68}Ga-citrate as biomarkers, respectively. Metabolomic analysis targeting glucose metabolism was conducted to investigate the metabolic changes in hippocampus 24 h after surgery. Transmission Electron Microscopy (TEM) and Mitochondrial Membrane Potential (MMP) were performed to investigate the mitochondrial damage induced by LPS.
All data were presented as mean±standard error of the mean (SEM). MWM data, including escape latency, swimming speed, and swimming distance, underwent a two-way repeated-measures analysis of variance (ANOVA). Other data were analyzed using a one-way ANOVA. Subsequent multiple comparisons were performed using either the Tukey test (assuming equal variances) or Dunnett's T3 test (assuming unequal variances). Statistical significance was set at $P < 0.05$. Analysis was performed with GraphPad 8.0 software.
Results: Insulin treatment effectively mitigated LPS-induced cognitive decline and safeguarded against neuronal degeneration. Insulin treatment could also inhibit the LPS-induced activation of microglia and astrocytes, and the release of tumor necrosis factor-α (TNF-α) and interleukin-1β (IL-1β) in the hippocampus. Furthermore, insulin alleviated LPS-induced insulin resistance, enhanced glucose uptake in the hippocampus, and promoted the pentose phosphate pathway and NADPH production. Therefore, the ferroptosis-related oxidative stress and lipid peroxidation indexes in the

hippocampus were investigated and insulin treatment had been proved to improve the GSH levels and reduce the ROS, LPO and MDA levels. Moreover, insulin treatment inhibited LPS-induced ferroptosis in the hippocampus by decreasing iron accumulation levels, regulating ferroptosis-related proteins including transferrin, GPX4, ferritin heavy chin 1 (FTH1) and cystine/glutamate antiporter (xCT). Additionally, insulin reduced mitochondrial damage with characteristic of LPS-induced ferroptosis in the hippocampus.
Conclusions: In conclusion, our study provides evidence that intracerebroventricular administration of insulin effectively attenuates LPS-induced cognitive deficits, neuronal degeneration, and ferroptosis by enhancing glucose uptake and promoting the pentose phosphate pathway in glucose metabolism. Our findings highlight insulin's multifaceted neuroprotective effects in the context of neuroinflammation-induced cognitive impairment. The intricate interplay between insulin, glucose metabolism, and ferroptosis underscores the complexity of the mechanisms involved, but support the potential of central insulin as a therapeutic approach to preserve cognitive function in the context of neuroinflammation. As insulin emerges as a potential therapeutic target, future investigations should aim to unravel the detailed cellular and molecular pathways, paving the way for innovative treatments for neuroinflammation-associated cognitive disorders.

PU-0155

DCA 通过 PDK4/NLRP3 抑制小胶质细胞焦亡预防脓毒症相关性脑病

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目的 二氯乙酸酯（DCA），丙酮酸脱氢酶激酶抑制剂，常用于治疗乳酸性酸中毒和恶性肿瘤的药物。越来越多研究表明 DCA 具有神经保护作用。在这里，我们探讨了 DCA 与小胶质细胞在脓毒症相关性脑病（SAE）中的作用及其机制探讨。
方法 单细胞分析确定 PDK4 在 SAE 中发挥重要作用及确定细胞类型。GO 和 GSEA 分析确定 DCA 与细胞焦亡途径相关。用 LPS+ATP 刺激小胶质细胞模拟体外细胞焦亡模型，检测 DCA 对小胶质细胞介导焦亡的作用以及探索激活焦亡的因素。此外，简易构建小胶质细胞和神经元细胞的共培养环境，以评估 DCA 对激活小胶质细胞介导的神经元凋亡的影响。最后，利用新物体识别测试和 Morris 水迷宫实验探索 DCA 对干预后各组小鼠认知功能的影响。
结果 在脓毒症相关性脑病中，DCA 可改变外周和中枢 M1 型巨噬细胞的比例，通过 PDK4/ROS 轴调控以 NLRP3 介导的焦亡途径，减少 SAE 引起神经元死亡和改善 LPS 小鼠引起认知缺陷。
结论 在脓毒症相关性脑病中，DCA 可能是治疗小胶质细胞介导的神经炎症的潜在候选药物。

PU-0156

CoQ10 通过 NADPH / GPX4 通路调控七氟烷导致发育神经元铁死亡的神经毒性作用

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目的 本研究以 HT-22 海马神经元细胞为研 究对象，验证 CoQ10 能否通过 CoQ10 / NADPH / GPX4 通路，逆转由于七氟烷 作用下的 GPX4 功能的抑制所导致的铁死亡，进而减轻神经毒性作用，为规避七氟烷的这种毒性作用提供相应的理论依据。

方法 本研究以 HT-22 海马神经元细胞为研究对象，随机分为 6 组：A 组：细胞暴露于 95%空气/5%CO2 中 6h；B 组：空白对照+ CoQ10 类似物 Idebenone 组；C 组：空白+ CoQ10 抑制 剂 Fin56 组；D 组：细胞暴露于 4%七氟烷，每天 6 h，连续 3 天；E 组：重复麻 醉+ CoQ10 类似物 Idebenone 组；F 组：重复麻醉+ CoQ10 抑制剂 Fin56 组。细 胞处理结束后进行 Fe2+、CCK-8、4-羟基壬烯醛（4-Hydroxynonenal, 4-HNE）/ 丙二醛（Malondialdehyde, MDA）、GSH、超氧化物歧化酶（Superoxide dismutase, SOD）、线粒体膜电位（Mitochondrial membrane potential, MMP）、Western blot 检测。

结果 CoQ10 调控 NADPH/GPX4 通路减轻七氟烷导致的 HT-22 海马神经元的铁死亡：相比于七氟烷重复暴露组，CoQ10 类似物 Idebenone 组 Fe2+浓度降低，细胞活力增高，GSH、 SOD 含量增多、MDA、4-HNE 含量减少，MMP 增高，C11BODIPY 氧化态减少， GPX4 和 NADPH 蛋白表达下调；CoQ10 抑制剂 Fin56 处理组 Fe2+浓度上升，细 胞活力下降，SOD、GSH 含量减少、MDA、4-HNE 含量减少，MMP 降低， C11BODIPY 氧化态增多，GPX4 和 NADPH 蛋白表达下调。

结论 本研究从细胞水平证实 CoQ10 通过 CoQ10 / NADPH / GPX4 通 路，逆转七氟烷作用下的 GPX4 功能的抑制所导致的铁死亡，减轻其对发育神经元毒性 作用。

PU-0157

Deficiency of Autism Susceptibility Gene Trio in Cerebellar Purkinje Cells Leads to Depression

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Aim Cerebellar dysfunction is linked to psychiatric disorders, including autism (ASD) and depression. Gene Trio has been implicated in multiple neurological conditions, notably ASD. Adults diagnosed with ASD increased risk for developing mental health comorbidities, with anxiety and depression.

Result: However, the physiological and pathological dimensions of these associations require further elucidation. Here, Results of single-cell sequencing of cerebellar tissues in Trio deletion in Purkinje cells (PCs) mice (10 weeks) indicate a reduction in PCLβ4+ PCs, alongside abnormalities in K+ channel protein pathways and an increase in glial cells. 12-week-old individuals are associated with abnormal neuroexcitability and susceptibility to depression. Our research suggests that Trio deletion triggers AIF1-mediated mitochondrial stress and pMLKL-mediated necroptosis in PCs, leading to prolonged cell death. This prolonged cell death escalates into chronic inflammatory stress, characterized by increased TNF-α expression, activation of astrocyte. Furthermore, the upregulation of pMLKL expression, induced by a virus, activates similar apoptotic processes and inflammation in PCs in 12 week.Therefore, Trio deletion in PCs induces necroptotic apoptosis and inflammation, resulting in neuronal hyperexcitability and disrupting psychomotor behaviors in adults.

Conclusion: This study underscores the complex interplay between genetic factors and neural cell function, further illuminating the pathophysiological pathways that potentially contribute to psychiatric disorders in the context of ASD.

PU-0158

Effect and mechanism of hippocampal mitochondrial UCP2 on postoperative cognitive function in spontaneously hypertensive rats

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Background: It has been reported that the prevalence of hypertension in patients with POCD is as high as 85%, suggesting that hypertension may be a key risk factor for the occurrence of POCD. However, the role and neural mechanism of hypertension in POCD are unknown, which seriously limits the formulation of prevention and treatment strategies for POCD in hypertensive patients. The purpose of this study is to explore the relationship between hypertension and postoperative cognitive dysfunction, and to reveal the possible mechanisms of hypertension induced POCD.
Methods: 13-week rats were divided into four groups: WKY+CON, WKY+CAE, SHR+CON and SHR+CAE. The CON group was treated without any treatment, and the CAE group underwent carotid artery exposure under sevoflurane anesthesia for 2 hours. From the 4th day on after surgery, a serious of behavioral tests were performed to assess postoperative hippocampus-related learning and memory performance. Then molecular biology techniques, ELISA, and electron microscope were applied to examine mitochondrial function, oxidative stress, and the inflammatory response. Western blot was used to detect protein expression, and immunofluorescence and immunohistochemistry were used to detect neural cell apoptosis in the rat hippocampus.
Results: Results showed that the systolic and mean arterial pressure of SHR group was significantly higher than WKY group, and the exercise ability of SHR rats were significantly better than WKY rats, which were the characteristic of SHR rats. After CAE surgery, learning and memory impairment occurred in rats, which was manifested in significantly reduced frequency and time of NOR recognition of new objects, and insignificantly reduced freezing time in FC-context test. Molecular experiments showed that UCP2 protein expression in SHR rats was significantly lower than that in WKY rats. Hippocampal mitochondrial morphology and function were also significantly damaged, which were manifested in obvious discontinuity of mitochondrial ridge under electron microscope, and the mitochondrial membrane potential of hippocampus increased significantly, and ATP decreased significantly on the 9th day after surgery. The hippocampus of SHR rats oxidative stress and neuroinflammation were significantly increased, which was manifested that hippocampal ROS and serum inflammatory factors IL-β and TNF-α were significantly increased on the 9th day after surgery. At the same time, the number of immunofluorescent microglia and astrocytes decreased significantly, indicating that hypertension aggravated the cognitive dysfunction after anesthesia surgery.
Conclusion: Our results showed that hypertension can affect postoperative cognitive dysfunction in rats. The possible mechanism was down-regulating hippocampal UCP2 protein expression and enhancing oxidative stress, and neuroinflammatory response and subsequent apoptotic pathways. Further research on the regulation of PPARα/UCP2 axis is necessary.

PU-0159

Ozone rectal insufflation inhibits the development of atherosclerosis in ApoE-/- mice via regulation of gut microbiota and metabolites

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Background: Atherosclerotic cardiovascular disease is the leading cause of death worldwide. Researches have proved that ozone therapy can effectively inhibit the development of atherosclerosis. But its mechanism is unclear. In this study, we aimed to explore the mechanisms underlying the role of Ozone rectal insufflation (O3-RI) in preventing atherosclerosis.
Methods: O3-RI therapy refers to medical ozone administration via injection into the rectum to prevent multiple diseases. ApoE-/- mice were feeding high-fat diet (HFD) to induce atherosclerosis. Gut microbiota was identified by 16S rRNA sequencing. Microbial metabolites were identified by liquid chromatography-mass spectrometry.
Results: O3-RI decreased the level of LDL-C in serum and reduced the atherosclerotic lipids area and plaque area in ApoE-/- mice. And O3-RI restored the dysbiosis of gut microbiota in mice caused by high-fat diet. Even better, O3-RI increased the abundance of microorganisms, such as Lactobacillus and Bifidobacterium, that are conducive to alleviating atherosclerosis. O3-RI also increased the concentration of short chain fatty acids such as propionic acid and butyric acid, and reduced harmful microbial metabolites such as TMA and TMAO in feces.
Conclusions: This research suggested that O3-RI may inhibit atherosclerosis in ApoE-/- mice by optimizing Gut microbiota and regulating microbial metabolites.

PU-0160

肠道微生物及其代谢物紊乱参与睡眠剥夺所致的肠道屏障功能紊乱

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目的 睡眠对于绝大多数动物而言至关重要，睡眠不足可导致多种健康问题，引发炎症或各种慢性疾病。健康大脑与肠道之间存在双向调节，中枢神经和内分泌输出调节肠道运动、粘膜免疫以及微生物生态从而维持肠道健康。本研究旨在探究睡眠剥夺后肠道微生物及其代谢物失调是否介导睡眠剥夺所致的肠道屏障功能紊乱。
方法 通过睡眠剥夺仪制备大鼠睡眠剥夺（sleep deprivation, SD）模型，每天剥夺 20 小时，连续剥夺 7 天，将大鼠随机分为 2 组，分别为正常睡眠组组以及睡眠剥夺组。收集其粪便进行 16SrRNA 测序及非靶向代谢组学观察睡眠剥夺后的肠道菌群及其代谢物组成；HE 染色观察各组结肠病理学改变；AB-PAS 染色观察结肠组织粘液厚度及杯状细胞数量；免疫荧光染色观察各组肠道上皮屏障 ZO-1 及 Occludin 蛋白表达情况；通过四联抗生素（ABX）治疗，将大鼠随机分为 2 组，分别为 ABX 组以及 ABX+SD 组，同样观察以上指标。
结果 睡眠剥夺大鼠的肠道微生物及代谢物多样性减少。相比正常睡眠组组，睡眠剥夺组的厚壁菌门占比减少，拟杆菌门占比增加；非靶向代谢组学结果显示，与正常组相比，睡眠剥夺组的丁酸盐水平明显下降。HE 染色显示，睡眠剥夺组结肠黏膜上皮脱落，局灶腺管排列紊乱，固有膜内少许炎细胞浸润，隐窝深度及粘膜厚度降低。AB-PAS 染色显示，睡眠剥夺组杯状细胞数量减少；免疫

荧光染色发现睡眠剥夺组，肠道上皮屏障 ZO-1 及 Occludin 蛋白表达降低；而抗生素治疗可逆转以上肠上皮细胞损伤。
结论 肠道微生物及其代谢物失调参与睡眠剥夺所致的肠道屏障功能紊乱。

PU-0161

Deactivation of UPRmt contributed to PND in aged mice

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Objective: Previous studies have shown that cognitive decline with aging, especially when brain is under a transient insult. It often shows abnormal behaviors and changes in synapse protein levels but no neuron death. Such as Perioperative neurocognitive disorders (PND), including Postoperative cognitive dysfunction (POCD) and Postoperative Deliridium (POD), which refers to cognitive dysfunction occurring after anesthesia and surgery, mainly characterized by a decline in memory. Most individuals can recover within 1 week to 3 months postoperatively, but a minority may progress to dementia. Age is the only recognized risk factor for POCD. Wang Z' studies shown that aged mice show spatial learning and spatial memory demaged but not in young mice. What causes aged animals to be more susceptible to cognitive impairment after transient insults? There is no clear understanding of the underlying mechanisms of onset. Normally, brain has some capacity for plasticity and repair. Whereas, they can contribute to cognitive impairment in aged who may already be experiencing age-related changes in cognitive function. With the world coming into aging society, it is significant to explain the relationship between transient insults and age-dependent cognitive impairment. Here we report age-dependent mechanism of transient insult induced cognitive impairment.
Methods: 2- and 18-month-mice were used to establish POCD model by Tibial Fracture internal fixation (TFS) under isoflurane anesthesia. Then we test these mice's spatial learning and spatial memory by morris water maze. We next investigated the level of synapse protein, ISR and UPRmt protein. Then, specific viral knockout mice (AAV_sh_atf5, Knock Down, KD) were used to inhibit UPRmt in 2-month-mice, and bromodomain adjacent to zinc finger domain 2B (Baz2b) knockout mice (Knock Out, KO) were used to activate UPRmt in 18-month-mice. Results Surgery induced cognitive impairment in ageing mice. 2-month-mice do not show spatial learning and spatial memory demaged but 18-month-mice showed spatial learning and spatial memory impairment after surgery. And the levels of synapse protein decreased in transient insult group in 18-month-mice, but not in 2-month-mice. We then test the level of UPRmt proteins with ageing process. We found that the levels of UPRmt proteins only increased in 2-month-mice but not in 18-month-mice after surgery. Knock down neuron ATF5 could inhibition UPRmt in 2-month-male-mice and reduce spatial learning and memory. Baz2b contributes to the age-related deterioration of mitochondrial function and cognitive behaviour in mice. Baz2b-/- mice UPRmt reactivation after surgery, which was similar to 2-month mice.
Conclusion: We identify the UPRmt as a key of cognitive impairment after surgery. Collectively, by supplementing NAD+ precursors such as NR, the age-dependent decline in UPRmt can be improved, thereby alleviating transient insult induced cognitive impairment in aging brains.

PU-0162

Resting state functional magnetic resonance imaging during sevoflurane-induced loss of consciousness in pediatrics

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Background: Resting-state functional magnetic resonance imaging (rs-fMRI) enables exploration of whole-brain connectivity. Previous studies on anesthesia-induced unconsciousness using rs-fMRI have primarily focused on decreased connectivity in higher-order frontoparietal cortices: The default mode network (DMN), executive-control network (ECN) and salience network (SAL). However, the effects of anesthesia on However, the effects of anesthesia on lower-order networks (such as auditory and sensorimotor networks) and subcortical regions like the globus pallidus remain less understood, particularly in pediatric populations.
Aim: This study aims to investigate changes in resting-state networks associated with sevoflurane-induced loss of consciousness in pediatric patients. Specifically, we explore whether sevoflurane affects auditory and sensorimotor networks. We investigate the functional role of previously overlooked direct pallido-cortical connectivity in supporting consciousness.
Methods/Design: This is a prospective resting-state fMRI study. We recorded resting-state functional magnetic resonance imaging (fMRI) in 40 children of American Society of Anesthesiologists (ASA) classification I-II among which 20 children are wakeful and 20 rendered unresponsive by 1.2% (0.6-0.7minimum alveolar concentration MAC) sevofluraneare. Functional magnetic resonance imaging is carried out on a 3T Trio scanner (Phillip, Germany) equipped with a standard 12-channel head coil. Throughout the procedure, participants are continuously monitored for heart rate(HR), blood pressure(BP), oxygen saturation (SpO2), end-tidal CO2 (EtCO2), and sevoflurane concentration during spontaneous breathing, with PaCO2 measured immediately after each scanning sequence. Behavioral assessments based on the Ramsay Sedation Scale are conducted every 3 minutes. We use the POMS Tension-Anxiety subscale and monitor heart rate changes to assess the child's anxiety level. Data analysis employs independent component analysis and seed-based analysis.
Results: Among the 40 children finished scanning, the data of three children was not analyzed due to emotional tension during scanning and the data of another two children was not used for analysis due to head movements. The final images of 15 children were used for analysis, 9 children in sevoflurane group(median [IQR] age, 4.8 [4.2-5.5] years; 4 [44.4%] female) and 6 children in wakeful group(median [IQR] age, 5.3 [4.6-6.7] years; 3 [50.0%] female). At 1.2% sevoflurane concentration, we observed decreased within-network connectivity in auditory and sensorimotor network (P=0.046 and P=0.014). Furthermore, connectivity strength from the globus pallidus to the posterior cingulate cortex (P = 0.025), thalamus (P = 0.031), and from the striatum to the globus pallidus (P = 0.035) was reduced. However, connections between the globus pallidus and auditory or sensorimotor networks did not exhibit significant changes as determined by ANOVA permutation testing corrected for false discovery rate.
Conclusion: Sevoflurane at 1.2% concentration reduces functional connectivity within auditory and sensorimotor in pediatric population which contradicts the previous research results on propofol. Effective connectivity between the globus pallidus and the ventral posterior cingulate cortex, present during wakefulness, fades in the unconsciousness by 1.2% sevoflurane anesthesia. No change is found in functional connections between globus pallidus and auditory or sensorimotor networks. These findings advance our understanding of sevoflurane-induced unconsciousness and provide insights into the neural basis.

PU-0163

基于微流控芯片实现脑类器官的动态培养

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目的 由干细胞产生的人类大脑类器官正在成为了解大脑发育进程和神经退行性疾病的新兴动物实验替代品。脑类器官的长期生长目前受到有效氧气渗透和持续营养供应的限制，导致类器官核心区域普遍内部缺氧和细胞死亡。因此为了降低类器官样本间异质性大、坏死区域大等问题，我们开发了一个具有动态流体扰动和氧气供应的三维（3D）微流体平台，并利用所构建的平台，为探索脑发育提供技术保障。
方法 在此工作中，我们设计了一个多通道的微流控芯片，以持续提高培养基供应的流速，实现持续动态培养脑类器官。所培养的脑类器官在芯片里实现诱导、分化、成熟，可在微流控芯片里持续培养长达 50 天。通过收集多个时间点的脑类器官（包括第 4 天、7 天、10 天、14 天、24 天、30 天和第 40 天），对其进行免疫荧光染色验证所构建模型的可行性，并对第 4 天、7 天、10 天、14 天、24 天、30 天的脑类器官，用蛋白组学和代谢组学来分析微流控平台所培养脑类器官与传统方式培养的脑类器官在发育过程中蛋白和代谢层面的差异。并对在微流控平台培养的脑类器官在时间序列上进行蛋白质组学的分析，以探索脑发育过程中蛋白的变化趋势。
结果 我们证明了在 3D 微流体平台中培养的脑类器官连续生长超过 50 天，与传统培养方式所培养的脑类器官相比，微流控平台培养的脑类器官核心区域没有细胞死亡。通过免疫荧光染色、蛋白质组学和代谢组学观察到，与传统的培养方式相比，在微流控平台培养的脑类器官在细胞增殖和细胞分化方面显著增强，并体现出较低的异质性，从而为探索脑发育提供技术支持。
结论 类器官培养环境中动态流体流动促进了氧气供应、营养物质扩散和废物交换，从而进一步减少了细胞死亡并增强了细胞增殖。还观察到细胞增殖提升和细胞分化增强，并用免疫荧光染色、蛋白质组学和代谢组学进行了验证。在微流体芯片中培养的类器官比传统方法培养的脑类器官相比表现出更少的批次间变化。从第 4 天到第 30 天的 7 次连续采集的延时蛋白质组学鉴定了 546 种不同表达的蛋白质，这些蛋白质主要与神经系统发育、子宫胚胎发育、大脑发育和神经元迁移有关。该平台可以为探索麻醉药物、环境刺激物等对胎儿大脑早期发育的影响提供技术平台。

PU-0164

Transcranial magnetic stimulation mitigates perioperative neurocognitive disorders: a preclinical experimental and exploratory study

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Background: The incidence of perioperative neurocognitive disorder (PND) increases with age, especially within those countries facing great challenge of aging population. However, the mechanism of PND remains elusive, and the lack of precautions has resulted in extended recovery among the elderly. Transcranial magnetic stimulation (TMS) has shown promising therapeutic potential in many neurological disorders such as depression and Alzheimer's disease. This study aimed to explore the therapeutic potential of TMS on PND mouse model and aged patients.
Objective: This study aimed to explore the therapeutic potential of TMS on PND.
Methods: PND mouse model were established through exploratory laparotomy on 18-month-old male mice. We performed novel object recognition test and Y maze test to evaluate the cognitive

function after TMS treatment. Intracisternal injection and immunofluorescence staining were conducted to assess the glymphatic system function. We used TUNEL assay, Western-blotting and RT-qPCR to detect neuronal loss and neuroinflammation. We further validated the therapeutic effect of TMS on human in a clinical trial.
Results: PND mice showed improved cognitive functions after TMS treatment. TMS abrogated aquaporin-4 translocation and glymphatic system dysfunction, the key pathological changes that lead to cognitive decline, in PND mice. Moreover, TMS alleviated apoptosis and neuroinflammation in PND mice. Patients who received TMS showed improved memory function 7 days after surgery and obtained better Abbreviated Mental Test Score 30 days post-operation.
Conclusions: Our study indicates the great therapeutic potentials of TMS in anesthesia and surgery-induced cognitive impairment and pathological changes.

PU-0165

Intrathecal Infusion of Mesenchymal Stem Cells to Inhibit Ferroptosis of Hippocampal Neurons Improves Perioperative Neurocognitive Dysfunction in Aged Mice

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Objective: To establish perioperative neurocognitive dysfunction mice by exposing senescent mice to 3% sevoflurane, and then perform intrathecal injection of murine-derived umbilical cord blood mesenchymal stem cell suspension to observe its improvement effect on cognitive impairment.
Methods: Forty 6-month-old male SAMP8 mice were equally divided into four groups, control group (n=10), PND group (n=10), PND+msc group (n=10), and msc group (n=10). the PND group and the PND+msc group were exposed to 3% sevoflurane for 4 hrs using an anaesthesia machine, and then underwent the preparation of murine-derived umbilical cord blood mesenchymal stem cells, and the primary stem cells were extracted. After the primary stem cells were extracted, the cells were passaged and cultured to the third generation for the preparation of cell suspension, and the cell suspension was injected intrathecally into the 5th-6th lumbar vertebrae of mice using a glass microinjection needle seven days after sevoflurane exposure for three consecutive days, while the rest of the control group was injected with an equal amount of saline intrathecally. Five days after the end of injection Morris water maze test, new object test and open field test were performed on the four groups. After the end of behavioural studies, three of each group were randomly selected for immunofluorescence staining, Niehl's staining and FJB staining of the brain taken after perfusion; the hippocampus was taken for transmission electron microscopy scanning, and the remaining seven hippocampi were taken for western blot and ELISA experiments.
Results: 1. Behavioural experiments: compared with the Control group, the PND group showed behavioural changes of behavioural cognitive impairment: increased wall-walking behaviours and decreased central area retention time in the open field experiment ($P<0.01$); decreased recognition index in the new object recognition experiment ($P<0.05$); prolonged paths of the orientation navigation experiment, increased circle-walking behaviours, and prolonged avoidance in the Morris water maze ($P<0.05$). latency was prolonged ($P<0.01$), and the number of crossing platforms in space exploration experiment was reduced ($P<0.01$). Compared with the PND group, the PND+msc group showed improved behavioural test results in wall circling behaviour, central region retention time ($P<0.01$), recognition index, orientation sailing experiment path, evasion latency ($P<0.01$), and the number of platforms traversed ($P<0.05$); the msc group showed no statistically significant differences in any of the behavioural performances ($P>0.05$).
2. Nissl staining results: compared with the Control group, the brain tissue of rats in the PND group showed more obvious pathological changes in the pyramidal cells under microscopy, with loosely

arranged pyramidal cells, deep staining of intracellular nuclear solidification, and an increase in the number of Nysted vesicles (P<0.05), which was significantly improved in the PND+msc group compared with the PND group.
3. Immunofluorescence staining: Compared with the Control and PND groups, the MSC surface antibody CD90 was expressed in the hippocampal DG and CA1 regions in the PND+msc and msc groups, and the expression of GFAP and iba-1 was increased in the PND group compared with the Control group.
4. Transmission electron microscopy results: Compared with the Control group, mitochondrial rupture in neurons of CA1 area of hippocampus was heavier in the PND group, with mitochondrial swelling and vacuolisation, while mitochondrial swelling and rupture was improved in the PND+msc group.
5. FJB staining: compared with the Control group, the PND group showed higher fluorescence intensity and higher number of damaged neurons (P<0.05), while the PND+msc group showed weaker fluorescence intensity compared with the PND group.
6. western blot results: compared with Control group, the hippocampal tissues of PND group showed lower content of BDNF, Gpx4 and FPN1 (P<0.05), and increased content of p-tau and CD71 (P<0.05); compared with MCI group, the indexes of PND+msc group were all improved (P<0.05).
7. elisa: Compared with Control group, IL-6 expression increased (P<0.05), IL-10 expression decreased (P<0.05), and MDA, GSH and Fe2+ contents were elevated (P<0.0.5) in PND group, whereas MDA, GSH and Fe2+ contents were decreased (P<0.05) in PND+msc group compared with PND.
Conclusion: Intrathecal MSC infusion appears to mitigate iron-induced neuronal death in the hippocampus, alleviating cognitive decline in aged mice with perioperative neurocognitive dysfunction. This suggests a promising approach for managing cognitive impairments associated with surgical interventions in elderly populations.

PU-0166

Single cell transcriptomic taxonomy of multiple sevoflurane-induced cell type specificity in the hippocampus of juvenile non-human primates

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As anesthetic exposures lead to neurological changes in young children, the overall effect of sevoflurane on developing nervous system is regarded as a noteworthy issue and have been studied extensively. While the cell type-specific cellular and molecular actions deficiency of sevoflurane are a brake on the basic study. Here we used single-nucleus RNA sequencing project to exam the transcriptome profiling altered by sevoflurane, commonly used in children, on primate (Macaca mulatta) brain hippocampus. It confirmed that sevoflurane-induced reactions on different types of neurons are heterogenous indeed. Subtypes of neurons also reflect new functional sets in anesthesia exposures. Sevoflurane left the stemness of almost all inhibitory neurons in a more original state. The impact of sevoflurane on gene expression did not target specific cell subgroups but had a global effect in inhibitory neurons. On the contrary, sevoflurane mainly exerted stemness inhibition on excitatory neurons, particularly in the Ex1/Ex2 subtypes, which exhibited similar enrichment of functions. Ex1/Ex2 neuron exhibited a more pronounced response to sevoflurane in gene transcriptome profiling. Ex1/Ex2 neuron might be an important cog in anesthesia state. The cell-specific reaction to sevoflurane provided a comprehensive understanding for the mechanistic studies of anesthetics during development.

PU-0167

The Role and Mechanism of Circadian Gene Dec2 in Perioperative Neurocognitive Disorders

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As the global population ages, understanding the mechanisms underlying perioperative neurocognitive disorders (PND) in the elderly becomes increasingly important. Sleep disturbances, particularly fragmented sleep, exacerbate PND and advance the age of susceptibility. This study aims to investigate the mechanisms by which fragmented sleep increases susceptibility to PND and identify potential therapeutic targets.
Using a mouse model of PND, transcriptomic analysis revealed changes in the expression of circadian genes. Validation using a fragmented sleep PND (SS-PND) model showed significant downregulation of Dec2 in the hypothalamus, associated with disrupted postoperative sleep rhythms, spatial memory impairment, and fear conditioning deficits. Overexpression of Dec2 in the hypothalamus improved sleep structure, particularly increasing NREM sleep during the light period, and ameliorated cognitive deficits in SS-PND mice.
Additionally, preoperative fragmented sleep significantly increased orexin-A levels in the hypothalamus and hippocampus, which were reversed by hypothalamic Dec2 overexpression. Administering an OX1R antagonist in the hippocampus reversed cognitive impairments caused by elevated orexin-A in SS-PND mice, while administering orexin-A negated the neurocognitive protective effects of Dec2 overexpression. This highlights the critical role of orexin-A in Dec2-mediated neurocognitive protection. These findings suggest that targeting the Dec2-orexin pathway may offer therapeutic strategies for cognitive impairment in elderly surgical patients with sleep disturbances.

PU-0168

Astrocytic phagocytosis in entorhinal cortex contributes to the pathogenesis of perioperative neurocognitive disorders in aged mice

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Objective: Perioperative neurocognitive disorders (PND), such as delirium and cognitive impairment, are commonly encountered complications in elderly patients undergoing surgery. PND increases morbidity and mortality, yet its exact pathogenic mechanisms remain elusive. Neuroinflammation is a vital pathophysiological process during PND. Activated astrocytes play a major role in inflammation. Lipocalin-2 (LCN2), secreted by activated astrocytes, promotes neuroinflammation. Nevertheless, the potential role of LCN2 in PND remains unclear.
Methods: Eighteen-month-old C57BL/6J mice were subjected to experimental laparotomy under 1.4% isoflurane anesthesia. Behavioral experiments were conducted to assess memory function. RNA sequencing was used to screen molecules and signaling pathways in the pathogenesis of PND. Immunofluorescence and western blotting were employed to observe the cellular localization and expression level changes of LCN2 protein.
Results: Mice that underwent laparotomy exhibited cognitive deficits accompanied by increased

reactive astrocytes and increased LCN2 expressions of astrocyte. We show that the post-synaptic density in entorhinal cortex was reduced in PND mice, and LCN2-expressing astrocytes acquired a phagocytic phenotype accompanied by increased expression of the phagocytic receptor MERTK and are able to uptake more PSD95.The loss of excitatory synapses, and behavioral abnormalities in PND mice were largely prevented by specific knockdown of LCN2 in astrocytes of the entorhinal cortex or intraperitoneal injection of an inhibitor of MERTK properties.
Conclusion Our work reveals the critical roles of astrocytic LCN2-MERTK activation in evoking surgery-induced abnormal behaviors in mice, suggesting LCN2-MERTK signaling as a therapeutic target for PND.

PU-0169

叶酸改善高糖诱导的人类前脑类器官神经毒性

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目的 妊娠前糖尿病（PGDM）与胎儿先天性异常的风险升高有关，尤其是影响神经系统。补充叶酸（FA）在降低 PGDM 引起的神经发育损伤发生率方面的疗效已得到充分证明。然而，具体的机制尚不完全清楚。因此，采用模拟早期胎儿神经组织三维结构的人类前脑类器官模型来研究 FA 对 PGDM 的神经保护作用。
方法 在这项研究中，我们采用了 Gabriel 等人生成的方案。第 20 天，具有原始视野的前脑类器官形成。在第 40 天，类器官表现出一系列不同的细胞表型，而第 40 天这一特定的时间点标志着 CP 发展过程中的一个重要里程碑。因此，选择第 20 天至第 40 天作为暴露时间。通过利用靶向干细胞标记物 NESTIN 和 SOX2 以及增殖标记物 KI67 和 PH3 的免疫荧光染色来表征 hESC 系。多种标记物的免疫荧光染色鉴定了大脑类器官的特征。此外，第 40 天在类器官中用多种标记物进行的免疫染色表明前脑类器官模型的成功建立，然后采用免疫荧光染色，蛋白组学等方法研究 HG 诱导的发育神经毒性并评估 FA 的潜在保护作用。
结果 在本研究中，前脑类器官在高糖（HG）浓度下从第 20 天培养至第 40 天，并添加 FA 同时培养。免疫荧光染色结果显示，补充 FA 可显著降低 HG 诱导的神经元凋亡。蛋白质组学检查表明，HG 引起星形胶质细胞标志物胶质原纤维酸性蛋白（GFAP）表达增加，导致金属硫蛋白表达上调和矿物质吸收紊乱，而 FA 逆转了这种作用。蛋白质组学分析进一步表明 FA 减少了 HG 诱导的细胞迁移。此外，蛋白质印迹分析证实 FA 通过 AMPK/FOXO 途径减轻了 HG 诱导的细胞凋亡和细胞迁移。
结论 在这项研究中，目前的研究结果表明，产前暴露于高糖与神经元凋亡、矿物质吸收的激活和细胞迁移的促进有关，这可能是由前脑类器官中的 AMPK/FOXO 途径介导的。FA 作为强化食品成分表现出相当大的潜力，因为它能够防止高糖诱导的神经毒性。总的来说，目前的研究结果为母体暴露于高糖的分子机制提供了新的、更深入的理解，包括在前脑类器官的关键发育阶段可以观察到的分子、细胞和结构异常。此外，前脑类器官模型的使用为评估 PGDM 和其他孕前疾病诱导的神经发育异常提供了一个很有前途的平台。

PU-0170

谷氨酰胺酶 1 在围术期神经认知障碍神经元铁死亡中的作用机制研究

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目的 围术期神经认知障碍（perioperative neurocognitive disorders，PND）是手术后常见的并发症，尤其是在老年人群中。PND 发病机制复杂，但目前 PND 的发病机制尚未阐明，揭示其发病机制对于深入理解病程和寻找有效的治疗方法及预防手段具有重要的临床意义。本课题组发现谷氨酰胺酶（Glutaminase，GLS）介导的神经元铁死亡与 PND 的发生密切相关。在我们的研究中，在 PND 模型小鼠脑组织 GLS1 的表达增加。然而，GLS1 的激活与铁死亡是如何参与 PND 发生发展过程，目前尚不清楚。因此，本研究深入探究小胶质细胞 GLS1 通过促进神经元铁死亡加剧 PND 的作用机制，以期从“神经细胞微环境”层面促进 PND 病理机制的认识，为研发靶向“细胞代谢”及“铁稳态”的神经保护剂从而治疗 PND 提供新的理论和实验依据。
方法 首先使用老年小鼠建立 pnd 模型，探索 PND 模型病理进程中神经炎症和铁死亡水平变化规律；然后建立小胶质 gls1 特异性敲除小鼠，以确定小胶质 gls1 特异性敲除对小胶质 M1 极化、神经炎症和认知功能的影响，并探索 PND 模型小鼠中 GLS1 在小胶质细胞激活及其引发的神经元铁死亡中的作用；细胞水平研究炎症微环境下小胶质细胞炎性极化、GLS 表达水平、谷氨酸水平，探索 GLS1 介导小胶质细胞激活促进神经元铁死亡的的分子机制；最后， 使用 GLS1 抑制剂探究 GLS1 抑制剂 PND 小鼠模型脑组织中神经炎症和对神经元铁死亡的影响，探索 GLS1 抑制剂治疗 PND 的可行性。
结果 腹部探查术能够诱导 PND 小鼠认知能力下降，且手术创伤导致了广泛的氧化应激损伤，小胶质细胞激活并向促炎型小胶质细胞 M1 表型极化，主导促炎细胞因子如 IL-1β、TNF-α 等的释放，形成中枢神经炎症微环境，在 PND 发生发展中具有重要作用。随后发现，PND 模型发生了以铁稳态失衡、氧化应激损伤、线粒体超微结构变化、抗氧化系统抑制为特征的铁死亡。PND 模型小鼠脑组织中 GLS1 高表达，导致谷氨酸生成增加，而降低小胶质细胞中 GLS1 能明显抑制小胶质细胞过度激活和谷氨酸水平。在小胶质细胞－神经元共培养系统中 N2A 神经元在 GLS1 过表达的 BV2 小胶质细胞刺激下发生了明显的铁死亡和神经损伤。最后，GLS1 抑制剂通过抑制铁死亡改善了 PND 小鼠认知功能。
结论 手术麻醉应激导致 GLS1 上调激活小胶质细胞，促进小胶质细胞谷氨酸生成和胞外释放，细胞外高浓度的谷氨酸抑制神经元 system xc-使神经元出现铁死亡表征，造成神经元功能障碍和死亡，加剧 PND 病理表现，加重认知障碍的发生。

PU-0171

低强度脉冲超声刺激（LIPUS）通过改善线粒体分裂水平治疗围术期神经认知障碍

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目的 围术期神经认知障碍（Perioperative neurocognitive disorders，PND），是指围手术期出现的神经认知异常，包括先前存在的认知功能障碍、术前谵妄、术后 7 天内发生的谵妄、延迟的神经认知恢复和术后认知功能障碍。由 PND 产生的认知下降可能持续数月或数年，严重者有发展痴呆的风险，甚至影响长期生存率。然而，由于 PND 的具体发病机制尚不清楚，目前还没有治愈这种

疾病的方法。通过物理方法调节局部神经活动是一种新兴的改善大脑功能的方法。低强度脉冲超声刺激（Low-intensity pulsed ultrasound，LIPUS）是一种能够利用超声波具有的力学、热学以及更广义的物理、化学及生物化学作用，发挥热效应、机械效应等生物效应治疗疾病或损伤，同时不会使人体组织发生毁损、破坏或变性的一种新型的无创神经调控方法。现在有研究发现超声刺激对于认知功能具有改善作用，并逐步将其应用于中枢神经疾病的治疗。因此，我们相信 LIPUS 有可能作为干预神经退行性疾病包括 PND 的手段之一。

方法 18 月龄 c57 小鼠通过腹部探查法构建 PND 模型。确立 LIPUS 的安全有效的参数，并通过检测局部场电位和免疫荧光 cfos 染色确认 lipus 参数效能。采用旷场实验、Y 迷宫实验、新物体识别实验、条件恐惧记忆实验等行为学测试方法，测定小鼠的运动和认知功能。用 DCFH-DA 探针检测小鼠海马脑区活性氧水平，用 RT-PCR 检测细胞死亡相关蛋白水平。通过透射电镜观察小鼠海马脑区线粒体的数量、形态和大小。用 Western blot 检测线粒体分裂融合相关蛋白水平。

结果 与 CTRL 组相比，PND 组小鼠新物体识别实验的辨别指数和识别指数都有所下调，证明腹部探查法可使小鼠认知能力下降。与 CTRL 组相比，LIPUS 干预可增加小鼠海马脑区局部场电位水平，促进 c-Fos 表达，证明超声在应用参数下可作用至小鼠海马脑区。与 PND 组相比，LIPUS 干预后小鼠新物体识别实验的辨别指数和识别指数都有所回升，条件恐惧记忆不动时间增加，证明 LIPUS 可有效改善 PND 小鼠认知功能。此外，LIPUS 干预还可以减轻 PND 小鼠氧化应激水平，恢复线粒体的分裂形态，恢复线粒体膜电位。Western blot 结果显示，LIPUS 可降低 PND 小鼠 DRP1 磷酸化水平。

结论 本研究证明 LIPUS 干预可精确作用于老年小鼠海马脑区，可通过无创且安全有效的方式改善认知功能。LIPUS 干预可能是通过抑制 PND 小鼠线粒体 DRP1 磷酸化，减少线粒体分裂，改善小鼠海马的氧化应激水平，从而改善老年小鼠围术期认知能力。

PU-0172

多次七氟烷对原代少突胶质细胞增殖和分化的影响

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目的 本研究提取大鼠原代少突胶质前体细胞（oligodendrocyte precursor cells，OPCs）进行体外增殖分化培养，旨在观察多次七氟烷处理对 OPCs 成髓鞘能力的影响，并进一步探讨其具体的表现形式。通过这一研究，我们可以更深入的了解麻醉药物对髓鞘发育的影响，为之后研究七氟烷诱导的 OPCs 凋亡、分化、增殖改变等所涉及的信号通路提供了方向，并为探索减轻多次七氟烷麻醉所致的髓鞘发育损伤提供潜在靶点。

方法 提取出生当天大鼠皮层的 OPCs 并进行体外培养。细胞分为对照组和七氟烷处理组。为了模拟临床使用七氟烷的情况，将七氟烷组细胞使用 3%七氟烷连续处理 3 天，每天一次，每次处理 2 小时。OPCs 分化成熟后，使用免疫荧光染色和 Western Blotting 检测髓鞘碱性蛋白（myelin basic protein，MBP）和髓鞘关联糖蛋白（myelin associated glycoprotein，MAG）的蛋白表达情况。研究采用细胞增殖实验（BrdU、Ki67）、细胞存活率实验（CCK8）检测 OPCs 的增殖能力。研究采用 Western Blotting 检测 caspase-3 的蛋白含量。慢病毒过表达 YTHDF1 后，采用 CCK8 检测细胞增殖-毒性。

结果 免疫荧光结果显示反复暴露于七氟烷会导致表达成熟髓鞘表面标志物（MBP、MAG）的原代少突胶质细胞数量减少；Western Blotting 结果表明，多次七氟烷导致原代少突胶质细胞 caspase-3 表达上调；CCK8 结果表明，随着七氟烷处理次数的增加，原代少突胶质细胞的存活率下降；然而，BrdU、Ki67 染色结果显示存活的原代少突胶质细胞在七氟烷处理后增殖能力增强。此外，过表达 YTHDF1 可以部分回救因多次七氟烷处理而导致的原代少突胶质细胞存活率下降（均 $P<0.05$）。

结论 多次七氟烷损伤原代少突胶质细胞的髓鞘化能力和存活率，表现为部分原代少突胶质细胞凋

亡。同时多次七氟烷代偿性提高了存活的原代少突胶质细胞的增殖能力。

PU-0173

七氟烷对老年狨猴前额叶皮质髓鞘的影响

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目的 本研究旨在探讨全身麻醉对老年狨猴前额叶皮质（PFC）髓鞘的影响。我们假设长时间暴露于七氟烷全身麻醉可能会导致老年狨猴 PFC 中髓鞘厚度和 g-比率的改变。研究结果可能为老年患者围手术期认知功能障碍提供宝贵的见解。
方法 动物实验严格按照中国科学院脑科学与智能技术卓越创新中心（CEBSIT）动物保护委员会的指导方针进行。我们从 CEBSIT 获得了 4 只老年狨猴（年龄 8-9 岁），分为对照组和麻醉组，每组 2 只。对照组狨猴使用 6-8%七氟烷和 100%氧气（2 升/分钟）麻醉 1-2 分钟后行斩首处死。麻醉组狨猴使用 6-8%七氟烷和 100%氧气诱导麻醉 2-4 分钟，然后使用 1.5-2%七氟烷和 100%氧气维持麻醉 6 小时。
在麻醉期间，狨猴保持自主呼吸，体温维持在 37 摄氏度，并监测其心率、心电图、呼吸率、外周毛细血管氧饱和度（SpO2）和直肠温度。使用蔡司扫描电子显微镜（GeminiSEM 300）进行成像，每个切片沿着额叶皮层表面向白质方向两列成像。人工智能技术被用于髓鞘结构的定量分析。
结果 结果表明，对照组和麻醉组在前额皮质第 1 层和第 2/3 层的髓鞘厚度没有显著差异。在前额皮质第 1 层（$p = 0.665$）或第 2/3 层（$p = 0.746$）的 g-比率也没有显著差异。此外，髓鞘化轴突直径在前额皮质第 1 层（$p = 0.688$）或第 2/3 层（$p = 0.105$）没有显著差异。
结论 本研究系统地评估了七氟烷麻醉对老年狨猴前额皮质髓鞘结构的影响，结果显示七氟烷全身麻醉并未引起老年狨猴前额皮质髓鞘厚度、g-比率或髓鞘包裹轴突直径的变化。这表明七氟烷麻醉后短期内对老年狨猴前额皮质的髓鞘结构没有显著影响。研究结果为理解围手术期全身麻醉对老年患者大脑髓鞘结构的潜在影响提供了新的见解。

PU-0174

年龄相关的肌少症：FABP4、脂质代谢和 NF-κB 在氧化应激下的调节

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目的 随着年龄的增长，肌肉质量和力量会逐渐下降，这一过程被称为年龄相关性肌肉减少症。最新研究表明，FABP4 在这一过程中可能起到一定作用。本研究的目的是探讨 FABP4 对肌少症的潜在影响，包括其在氧化应激相关途径和脂质代谢中的调节作用。
方法 我们收集了非肌肉减少症组和肌肉减少症组的股外侧肌，以验证 FABP4 诱导的骨骼肌脂肪浸润与肌肉减少症之间的相关性。通过 BMS309303 在体外和体内研究 FABP4 在肌肉减少症中涉及的氧化应激相关途径和脂质代谢过程。脂质组学分析用于鉴定非肌肉减少症和肌肉减少症个体之间差异表达的脂质。使用检测试剂盒和 ROS 荧光染色以及 JC-1 染色测定氧化应激标志物。通过染色检测脂肪浸润的程度。Western blotting 用于检测信号通路蛋白和 FABP4。
结果 与非肌肉减少症患者相比，肌肉减少症患者肌肉中 FABP4 表达显著升高。我们的研究表明，通过脂质组学分析，两年龄组的脂质谱发生了变化。Oil Red O 染色、HE 染色和 β-半乳糖苷酶染色显示，FABP4 可以促进肌肉组织中的脂质滴积累，同时引发细胞衰老。此外，与未处理的样本相

比，对小鼠和细胞施用 BMS309403 导致 NF-κB 介导的氧化应激发生变化。
结论 FABP4 通过 NF-κB 信号通路在年龄相关性肌肉减少症中对脂质代谢和氧化应激的调节起着关键作用。涉及抑制 FABP4 的治疗方法显示出作为年龄相关性肌肉减少症潜在治疗靶点的前景。

PU-0175

Lidocaine-Loaded Iontophoresis-Driven Dissolving Microneedle Patch for Controllable and Long-Lasting Transdermal Local Analgesia

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The acute pain induced by clinical procedures, such as venipuncture, dental operations, and dermatological treatments, as well as postoperative pain, drives the advancement of anesthetic techniques aimed at alleviating discomfort. This situation underscores the ongoing significance of effective pain management strategies within the field of anesthesia. This paper presents an integrated iontophoresis-driven microneedle patch (IDMP) regulated by a smartphone for controllable, long-lasting lidocaine transdermal delivery. The IDMP integrates canvas-based dissolving microneedles (MNs) with iontophoresis (ITP) into a patch, with the canvas and gel layers significantly increasing the drug loading capacity, achieving a one-step drug administration strategy of "dissolution, diffusion, and ITP." Lidocaine is released via the microchannels of MNs by passive diffusion. Additionally, an electric current initiates active ITP for lidocaine delivery, creating synergy. User-requirement-based drug release by digitally controlling electrical signals in rat pain models is described herein. A smartphone application is presented that enables precise dosage control in three different delivery modes: single-dose, pulse delivery, and sustained-release, ensuring rapid onset and long-lasting pain relief. This versatility makes the system suitable for various pain conditions. The IDMP represents a promising system for patient-controlled local analgesia treatment, enabling active and long-term local self-controlled pain management in a safe, regulated manner.

PU-0176

Dexmedetomidine facilitates autophagic flux to promote liver regeneration by suppressing GSK3β activity in mouse partial hepatectomy

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Introduction: Dexmedetomidine (DEX), a highly selective α2-adrenergic receptor agonist, is widely used for sedation and anesthesia in patients undergoing hepatectomy. However, the effect of DEX on autophagic flux and liver regeneration remains unclear.
Objectives: This study aimed to determine the role of DEX in hepatocyte autophagic flux and liver regeneration after PHx.

Methods: In mice, DEX was intraperitoneally injected 5 min before and 6 h after PHx. In vitro, DEX was co-incubated with culture medium for 24 h. Autophagic flux was detected by LC3-II and SQSTM1 expression levels in primary mouse hepatocytes and the proportion of red puncta in AML-12 cells transfected with FUGW-PK-hLC3 plasmid. Liver regeneration was assessed by cyclinD1 expression, Edu incorporation, H&E staining, ki67 immunostaining and liver/body ratios. Bafilomycin A1, si-GSK3β and Flag-tagged GSK3β, α2-ADR antagonist, GSK3β inhibitor, AKT inhibitor were used to identify the role of GSK3β in DEX-mediated autophagic flux and hepatocyte proliferation.
Results: Pre- and post-operative DEX treatment promoted liver regeneration after PHx, showing 12 h earlier than in DEX-untreated mice, accompanied by facilitated autophagic flux, which was completely abolished by bafilomycin A1 or α2-ADR antagonist. The suppression of GSK3β activity by SB216763 and si-GSK3β enhanced the effect of DEX on autophagic flux and liver regeneration, which was abolished by AKT inhibitor.
Conclusion: Pre- and post-operative administration of DEX facilitates autophagic flux, leading to enhanced liver regeneration after partial hepatectomy through suppression of GSK3β activity in an α2-ADR-dependent manner.

PU-0177

预防性补充婴儿双歧杆菌或其代谢产物肌苷减轻心肌缺血再灌注损伤

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目的 近期越来越多的研究开始强调肠心轴的重要性，揭示肠道微生物组及其代谢产物与心血管疾病间存在错综复杂的联系，所涉及的疾病谱系广泛，涵盖高血压、心力衰竭乃至心肌梗死等。肠道微生物组不仅能产生三甲胺（TMA）、短链脂肪酸（SCFA）、胆汁酸和琥珀酸等关键代谢产物，还能通过调节免疫细胞对宿主的免疫和炎症反应起到调控作用。鉴于肠道微生物群在调控宿主代谢和免疫功能中的核心地位，益生菌在预防或治疗多种疾病中展现出的潜力备受关注。然而，目前对于益生菌在心肌梗死和 I/R 损伤中的保护作用仍知之甚少，需进一步深入探索。
双歧杆菌属作为哺乳动物肠道微生物群的核心组成部分，已被广泛证实其在缓解便秘、腹痛、胀气等消化不适症状方面的显著功效。近期研究指出心肌梗死患者体内双歧杆菌属的丰度显著降低。然而，婴儿双歧杆菌对冠心病预后之间的联系，特别是在心肌缺血再灌注（I/R）损伤情境下的作用仍需要进一步的研究与探索。
本研究主要为了探讨了婴儿双歧杆菌在心肌缺血再灌注（I/R）损伤小鼠模型中的心脏保护效果及其代谢产物心肌保护具体机制，为其作为新型治疗手段的开发提供证据。
方法 我们用婴儿双歧杆菌或 PBS 灌胃后诱导小鼠 I/R 模型，并通过体内超声心动图、心电图和组织学分析评估其心功能。鉴于肌苷可能是婴儿双歧杆菌主要代谢产物，我们测定了血清肌苷水平。并对 I/R 手术小鼠注射肌苷，评估 I/R 后的心功能和心肌纤维化情况。利用 RNA 测序方法评估 l 了肌苷对 I/R 后心脏损伤的影响以及炎症细胞因子和能量代谢的变化。。采用体外葡萄糖-缺氧/再氧诱导 C2C12 细胞死亡的模型，评价了肌苷对心肌细胞凋亡的抑制作用。此外，我们分析了 I/R 后心脏组织免疫细胞组成，探讨了肌苷在急性期和修复期的抗炎作用。
结果 1. 婴儿双歧杆菌灌胃有助于减轻缺血再灌注后的心脏损伤
我们首先对 C57BL/6J 小鼠进行了抗生素灌胃清除其肠道微生物群，并进行了 7 天的婴儿双歧杆菌（以下简称 Bi）或 PBS（对照组）灌胃处理，并证实了 Bi 菌在小鼠肠道中的成功定植。小鼠心脏 I/R 手术后 7 天的心脏超声结果显示，Bi 菌灌胃的 I/R 小鼠心功能损伤减轻，心重比等增加幅度均明

显降低。纤维化相关病理染色显示，Bi 菌灌胃组小鼠心脏瘢痕大小和纤维化组织的量均明显减少。此外，Bi 灌胃能够有效减少 I/R 诱导的心肌细胞死亡，降低 cTnT 水平。
2. 婴儿双歧杆菌主要通过其代谢物肌酐对缺血/再灌注后的心脏产生保护作用
既往研究表明，婴儿双歧杆菌能大量产生并分泌肌苷，我们推测肌苷在婴儿双歧杆菌对心脏的保护机制中可能起关键作用。为验证该假设，我们首先检测了 I/R 小鼠的肌苷水平，发现相较于 PBS 组，Bi 菌组小鼠血清和心脏组织中肌苷水平显著提高。接下来，我们通过腹腔注射肌苷的方式探究了肌苷对 I/R 小鼠的心脏是否具有保护作用，结果发现，腹腔注射肌苷能产生与婴儿双歧杆菌灌胃类似的心脏保护效果。
3. 转录组分析显示肌苷在心脏缺血/再灌注后能改善能量代谢并抑制免疫反应与细胞凋亡
为了在机制层面更好地探究肌苷治疗对 I/R 心脏损伤的保护，我们对 I/R 后小鼠心脏组织进行了转录组分析。结果显示，肌苷能够通过改善能量代谢、减轻心脏炎症以及抑制细胞凋亡，为心脏提供全面而有效的保护。
4. 肌苷通过激活腺苷 A2A 受体有效抑制了缺血/再灌注后小鼠心脏炎症反应
I/R 后过度心脏炎症炎症对心脏修复严重不利。因此，调控炎症反应被视为治疗心肌梗死后心脏损伤及提升心脏功能的重要策略。我们检测了炎性因子 IL-1β 和 TNF-α 的表达情况，发现肌苷治疗可以降低 I/R 诱导的 IL-1β 和 TNF-α 的表达升高。随后，心脏免疫细胞流式分析结果显示，肌苷可以显著降低心脏组织中中性粒细胞和 CD11b+巨噬细胞比例。另外，我们进一步发现肌苷在减轻 I/R 小鼠心脏损伤和抑制炎症反应方面的作用依赖于腺苷受体 A2AR 的激活。
5. 肌苷在嘌呤补救途径中作为 ATP 生成的替代补充源减轻心肌细胞的死亡
体外数据显示，在 C2C12 成肌细胞经受氧糖剥夺/复氧（OGDR）损伤时，肌苷能有效作为 ATP 生成的替代能源。它通过嘌呤补救途径促进 ATP 的合成，从而发挥其抗细胞凋亡的作用。肌苷可以作为经历 I/R 小鼠心脏中的有效替代能源，减少心肌细胞的死亡。
结论 本研究发现，婴儿双歧杆菌作为一种广泛使用的益生菌，其预防性补充对小鼠心肌缺血再灌注损伤具有保护作用。其心肌保护机制主要由其代谢产物肌苷产生。肌苷可调节免疫细胞数量，从而降低心肌缺血再灌注损伤引起的心脏炎症反应，并可作为碳源，通过嘌呤补救合成途径生成 ATP，从而减轻心肌缺血再灌注损伤引起的心脏细胞死亡。总之，本研究有力证实了婴儿双歧杆菌或其代谢产物肌苷在治疗心肌 I/R 损伤方面的潜在临床应用价值，为其作为新型治疗手段的开发提供了有力的证据。

PU-0178

CeO2@MOF- LF“锚定”鼻黏膜，通过鼻脑通路改善药物输送，以治疗神经炎症引起的认知功能障碍

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目的 To overcome the obstacle of drug delivery to the brain and treat the neuroinflammation and cognitive impairment caused by sepsis, we designed to add CeO2 to the porphyrin ring metal-organic framework Fe (III) meso-Tetra(4-carboxyphenyl) porphine C (TCPP-Fe) to increase antioxidant activity. Inspired by the phenomenon that anchors prevent ships from drifting under turbulent flow conditions, we constructed nanocarriers (CeO2@MOF-LF) to form anchors to reduce their movement and clearance from the nasal mucosa. These nanoparticles (NPs) specifically bind to olfactory epithelial cells using lactoferrin (LF) protein to bind CeO2@MOF on the nasal mucosa, increasing the residence time of NPs.
方法 We characterized CeO2@MOF@Lf using technologies such as Transmission Electron

Microscope (TEM), scanning electron microscope (SEM), Ultraviolet-visible Spectrophotometer (UV), and Western blotting. The cellular effects of CeO2@MOF@Lf were verified through Elisa, CCK8, and DC-FHDA staining. In vivo, the uptake and effects of CeO2@MOF@Lf were validated using IVIS, immunofluorescence, immunohistochemistry, Morris water maze, and open field tests. Finally, the conclusion of RNA sequencing further verified the effectiveness of CeO2@MOF@LF.
结果 CeO2@MOF-LF was taken up by brain cells through the nose-brain pathway, then exerts a cascade nanoenzyme effect within brain cells, effectively clearing ROS, and improving neuroinflammation and microglia activation. Our research shows that in the LPS-induced neuroinflammation model of sepsis-associated encephalopathy (SAE), CeO2@MOF-LF administered via intranasal drops effectively anchor in the nasal mucosa, then release in the brain, ultimately treats cognitive dysfunction caused by neuroinflammation.
结论 In summary, CeO2@MOF-LF not only effectively improves cognitive impairment caused by neuroinflammation, but also provides new ideas for the drug delivery of various brain diseases.

PU-0179

四氢小檗碱通过 cAMP-Epac1 通路抑制自噬和铁死亡缓解多柔比星诱导的肝毒性

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目的 本研究旨在阐明四氢小檗碱在缓解化疗药物肝损伤中的保护作用及其机制。
方法 在体内实验中，我们首先在裸鼠腹部皮下种植 SKOV3 细胞，建立带瘤裸鼠模型。然后通过每周尾静脉注射 5 mg/kg 的多柔比星，持续 4 周，建立肝损伤模型。在整个多柔比星治疗期间，每天 1 次给裸鼠灌胃两种不同剂量的四氢小檗碱（10/30 mg/kg）或对照溶剂。评估血清 AST 和 ALT 水平，观察肝脏病理形态，以及组织的铁死亡和自噬水平。在体外实验中，使用网络药理学筛选预测四氢小檗碱的作用靶点，并通过 cAMP 的激活剂验证四氢小檗碱是否通过激活 cAMP-Epac1 通路来减轻自噬和抑制铁死亡。
结果 四氢小檗碱治疗显著逆转了多柔比星诱导的肝脏损伤，减少了肝脏细胞的自噬和铁死亡。在机制上，四氢小檗碱通过靶向激活 cAMP-Epac1 通路，抑制氧化应激导致的线粒体损伤和细胞自噬，从而减轻细胞铁死亡，挽救了组织器官的损伤。此外，在化疗裸鼠中，四氢小檗碱能够减轻多柔比星诱导的肝脏细胞水肿和死亡，降低血清 AST 和 ALT 水平。
结论 本研究表明，四氢小檗碱通过激活 cAMP-Epac1 信号通路，抑制多柔比星诱导的细胞自噬与铁死亡，保护肝脏器官。这为治疗化疗药物引起的肝损伤提供了新的靶点和天然产物。

PU-0180

乳腺癌新辅助化疗通过铁转运蛋白 Slc11a1 过表达引起 NET 介导的围术期血管内皮损伤

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目的 乳腺癌新辅助化疗作为提高患者预后的重要手段，其引发的围术期血管内皮损伤成为不可忽视的问题。研究表明，乳腺癌新辅助化疗可能导致患者内皮糖萼降解增加，从而导致血管内皮损伤，使患者凝血功能出现异常。同时，中性粒细胞胞外陷阱（Neutrophil Extracellular Trap, NET）的形成与血管内皮损伤紧密相关，但具体作用机制尚不明确。

方法 本研究通过对临床患者血清血管内皮损伤指标、NET 及相关指标进行检测，观察乳腺癌新辅助化疗药物是否对患者血管内皮细胞产生损伤。通过细胞模型及动物模型的构建，观察乳腺癌新辅助化疗药物是否对血管内皮细胞及小鼠血管内皮产生损伤。通过对动物模型中性粒细胞进行转录组测序，试图筛选出可能和化疗后 NET 生成可能相关的关键基因，并通过细胞实验和动物实验对基因功能进行验证，阐明乳腺癌新辅助化疗通过 NET 导致血管内皮损伤的可能机制。
结果 在临床患者血浆样本的检测中，新辅助化疗组血浆 NET dsDNA 的水平较对照组显著增高，内皮损伤、凝血功能损伤相关标志物亦出现显著增高。在细胞模型的构建中，乳腺癌新辅助化疗药物的应用显著提升了培养上清中 NET dsDNA 的水平以及 NET 标志物的表达水平。在动物模型的构建中，乳腺癌新辅助化疗模型小鼠血浆也呈现出类似的结果，并且在小鼠中性粒细胞的转录组测序中，我们初步筛选出可能和 NET 形成相关的重要基因 Slc11a1，并在细胞模型中验证了新辅助化疗模型中该项基因的高表达。最后，我们分别通过腺病毒和腺相关病毒分别在细胞和动物模型中干扰该基因的表达，初步证明了该基因的干扰对 NET 形成的逆转效果。
结论 本研究初步证明了乳腺癌新辅助化疗通过 NET 导致血管内皮损伤，并初步筛选出可能和化疗后 NET 生成可能相关的基因 Slc11a1，并证明了该基因的沉默对化疗后血管内皮损伤的可能的逆转作用。本研究初步阐明了乳腺癌新辅助化疗通过 NET 导致围术期血管内皮损伤的可能机制，为乳腺癌围术期并发症的防治提供了新的思路。

PU-0181

Ac-YVAD-cmk ameliorated sevoflurane-induced cognitive dysfunction and revised mitophagy impairment

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It is common for elderly patients to develop postoperative cognitive dysfunction (POCD), but the pathophysiological mechanisms have not yet been fully explored. NLRP3 inflammasome activation and mitophagy impairment was involved in neurodegenerative disease. This study investigated the interaction of NLRP3 inflammasome and mitophagy in sevoflurane-induced cognitive dysfunction. We found that sevoflurane induced cleaved caspase-1 level, IL-1β and IL-18 maturation, and activated NLRP3 inflammasome in aged mice and the primary hippocampus neuron. The cleaved caspase-1 was demonstrated in microglia of hippocampus. Ac-YVAD-cmk, a selected caspase-1 inhibitor, reduced the expression of cleaved caspase-1, IL-1β, IL-18 and NLRP3 inflammasome activation induced by sevoflurane. Ac-YVAD-cmk ameliorated learning ability impairment in aged mice induced by sevoflurane using Morris water maze. Moreover, Ac-YVAD-cmk reversed the mitophagy flux dysfunction induced by sevoflurane in aged mice by western blotting, immunostaining and mt-Keima reporters. For the first time, we found caspase-1 inhibitor mitigated mitochondria dysfunction and revised mitophagy impairment induced by sevoflurane.

PU-0182

新型多孔有机聚合物联合局麻药在感染性伤口中应用研究

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目的 通过缩聚反应构建两种具有优异光热能力的多孔有机聚合物，进一步分别载入局麻药布比卡因（BU）与利多卡因（LD），形成新型负载局麻药的多孔有机聚合物，以达到镇痛与光热治疗协同促进开放型感染创口的快速愈合。

方法 1. 利用缩聚的方法，构建两种多孔有机聚合物 P-POP 和 G-POP，再利用物理搅拌的方法分别载入 BU 和 LD，形成新型负载局麻药的多孔有机聚合物 P-POP-BU 和 G-POP-LD。利用核磁共振谱图（NMR）、傅里叶红外光谱（FT-IR）、扫描电子显微镜（SEM）和透射电子显微镜（TEM）对 P-POP-BU 和 G-POP-LD 进行结构表征。
2. 利用热成像仪和单波长激光光源评估 P-POP-BU 和 G-POP-LD 的光热转化性能。
3. 利用平板计数法、细菌活死染色法和透射电镜观察法，分析 P-POP-BU 和 G-POP-LD 在体外对金黄色葡萄球菌和大肠杆菌的杀灭情况。
4. 利用细胞增殖实验（MTT 法）和溶血实验，评估 P-POP-BU 和 G-POP-LD 的体外生物相容性。
5. 建立小鼠背部皮肤损伤感染模型，研究 P-POP-BU 和 G-POP-LD 的体内抗菌促愈能力。利用 HE 染色和 Masson 染色分析小鼠背部皮肤损伤恢复情况。
6. 通过 HE 染色和血常规，分析治疗后小鼠主要器官的损伤情况和血常规的数值波动，评估 P-POP-BU 和 G-POP-LD 的体内生物相容性。
结果 成功的制备了新型负载局麻药的多孔有机聚合物 P-POP-BU 和 G-POP-LD。P-POP-BU 和 G-POP-LD 都具有较好的光热转换能力，他们的光热转换效率分别为 47.64%和 xx。P-POP-BU 和 G-POP-LD 都具有较好的体外抗菌能力，400 μg/mL 的 P-POP-BU 和 G-POP-LD 即可杀灭 94%以上的金黄色葡萄球菌和大肠杆菌。P-POP-BU 和 G-POP-LD 都具有良好的体外生物相容性，几乎不会抑制正常细胞的增殖，溶血率也都低于 5%。P-POP-BU 和 G-POP-LD 可以较好的恢复小鼠受感染的创口。P-POP-BU 和 G-POP-LD 具有良好的体内生物相容性，HE 染色和血常规结果表明，P-POP-BU 和 G-POP-LD 不会对小鼠心肝脾肺肾和血液造成损伤。
结论 本论文成功的构建了两种新型负载局麻药的多孔有机聚合物 P-POP-BU 和 G-POP-LD。他们不仅具有良好的生物相容性，还可以通过 PTT 和镇痛效应协同产生较强的抗菌效果，抗菌效果比单独的 POP 或局麻药更强。本论文也为新型高分子生物相容性无抗生素抗菌材料的研究提供了理论依据和新的方向。

PU-0183

Bibliometric Analysis of TREM2 (2001-2022): Trends, Hotspots and Prospects in Human Disease

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Background： Triggering receptor expressed in myeloid cells 2 (TREM2), a transmembrane receptor, has garnered extensive research attention due to its pivotal role in the diagnosis and treatment of various diseases. Despite the abundance of studies on its function, there is a gap in comprehensive analysis and summarization of the current state of this research field.
Methods： Articles and reviews related to TREM2 were retrieved from the Web of Science Core Collection (WOSCC) on October 1, 2023. A bibliometric analysis of TREM2 was conducted using CiteSpace, VOSviewer and Bibliometrix (R package).
Results： A total of 1,502 articles, spanning from 2001 to 2022, met the search criteria. The number of publications and citations has increased steadily over the years. The United States and China are the most active countries in TREM2 research, with the University of Washington as the leading research institution. The most influential journal in the field is Neurology of Aging. The predominant research areas include molecular, biology and immunology. Alzheimer's disease, microglia, variants, and inflammation are significant keywords. Emerging directions such as metabolism and tumor microenvironment have recently gained attention in numerous studies.
Conclusion： The current study utilizes bibliometric analysis software and visual graphics to intuitively highlight TREM2-related hotspots, trends, and prospects in human disease. Such

insights are valuable for scholars seeking a deeper understanding of TREM2-related research progress, enabling a focused approach to its application in human disease.

PU-0184

小胶质细胞 CX3CL1-CX3CR1 通路下调促进老年术后认知功能障碍

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目的 海马是一个在认知方面发挥重要作用且极易老化的功能性脑内结构，其内部引发的神经炎症最有可能参与术后认知功能障碍（POCD）的发病。小胶质细胞被认为是调控神经炎症发生的关键细胞。本研究拟探索小胶质细胞内 CX3CL1-CX3CR1 通路在老年小鼠术后早期小胶质细胞激活、海马神经炎症及 POCD 中的作用。

方法 首先，对青年（2-3 月龄）或老年（18-20 月龄）雄性 C57BL/J 小鼠进行剖腹探查术或假手术处理，建立手术模型。术后 7 天通过 Morris 水迷宫实验与新物体识别实验检测小鼠的学习与记忆能力，术后 3 天通过 ELISA 检测术后海马炎症因子，同时采用免疫荧光观察海马小胶质细胞激活程度。老年小鼠连续 7 天喂食含有 PLX5622 的标准食物耗竭小胶质细胞后，观察术后小胶质细胞激活状态及海马内炎症因子表达水平。然后，采用流式细胞术分析青年、老年海马小胶质细胞中 M1 型小胶质细胞特异性标记物 CD86 的表达情况，通过 Western-blot 和 qPCR 检测青年、老年小鼠海马内及经 LPS 激活处理前后 BV2 细胞中的 CX3CR1 表达，再通过荧光共定位观察海马内 CX3CR1 蛋白与小胶质细胞标记蛋白 Iba1 的共表达。最后，通过脑立体定位技术将 CX3CR1 的配体——重组 CX3CL1 蛋白输注到老年小鼠双侧海马区，观察恢复 CX3CL1-CX3CR1 正常通路功能后老年小鼠小胶质细胞激活程度、海马内炎症因子释放及维持认知功能中的作用。

结果 老年小鼠经剖腹探查术后出现明显的认知功能减退，伴随术后海马促炎因子 IL-1β、IL-6 和 TNF-α 表达增加及释放时间的延长，而抗炎因子 IL-4 和 IL-10 低表达。但在青年手术组小鼠中并未观察到上述改变。免疫荧光结果显示，老年小鼠海马小胶质细胞术后激活程度较高，表现为Iba1表达数量增多和荧光强度增强，而通过喂食含有 PLX5622 的标准化饮食耗竭老年小鼠的小胶质细胞后可明显减轻术后海马神经炎症反应。老年小鼠海马小胶质细胞和经 LPS 激活处理的 BV2 细胞中均观察到 CX3CR1 蛋白的表达下调。与青年小鼠比较，老年小鼠海马区 CX3CR1 表达数量和荧光强度的下调伴随 Iba1 表达数量和荧光强度的上调。通过脑立体定位技术向老年小鼠双侧海马区注射重组 CX3CL1 蛋白可以抑制老年海马小胶质细胞术后过度激活和促炎因子的释放，有效改善老年小鼠术后认知障碍。

结论 老年海马小胶质细胞膜 CX3CR1 表达下调介导的 CX3CL1-CX3CR1 功能失调可能导致老年 POCD 的发生。经历手术刺激后老年海马区小胶质细胞激活程度更高、促炎因子释放更多、神经炎症反应增强，而恢复 CX3CL1-CX3CR1 正常通路功能后小胶质细胞激活程度、海马内炎症因子释放及维持认知功能得到改善。因此，靶向小胶质细胞免疫检查点 CX3CL1-CX3CR1 可能为防治 POCD 提供新思路。

PU-0185

Mapping the current trends and hotspots of adult hippocampal neurogenesis from 2004–2023: A bibliometric analysis

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Objective: The process of adding new neurons to the hippocampal region throughout life is referred to as adult hippocampal neurogenesis (AHN). For decades, AHN has been extensively studied in rodents and non-human primates, and many studies have also determined the extent of lifelong neurogenesis in humans. Hippocampal neural stem cells in the subgranular zone (SGZ) of the dentate gyrus (DG) primarily differentiate into dentate granule neurons, which constitute the majority of excitatory neurons in the DG region. Functionally, the DG receives input from the entorhinal cortex and sends information to CA3 and CA1 through a trisynaptic circuit, playing a key role in learning and memory. AHN is the most robust form of plasticity in the adult brain and may contribute to the development of memory. Studies have shown that AHN enhances the plasticity of the hippocampus, which may be related to spatial memory, emotional memory, pattern separation, cognitive flexibility, and emotional regulation. Abnormal AHN can disrupt cognition, leading to memory deficits. Considering the importance of AHN for healthy brain function, many studies deciphered the physiological mechanisms of AHN. Bibliometric analysis utilizes statistical techniques to measure numerical data associated with scientific endeavors. It provides structured knowledge systems by handling the characteristics of references like journals, authors, institutions, and so on. Nevertheless, quantitative approaches are rarely employed in the field of AHN. We analyzed AHN studies to assess global research patterns and prospective areas of interest from 2004 to 2023. Additionally, we forecasted the direction of research in this domain for the upcoming years.

Methods: On March 15, 2024, we completed the final search on the Web of Science database. Our search strategy was: ‘Adult hippocampal neurogenesis’ (Title) or ‘Adult hippocampal neurogenesis’ (Abstract) or ‘Adult hippocampal neurogenesis’ (Author keywords). We chose the Web of Science Core Collection database, and for Editions, we selected the Science Citation Index Expanded (SCI-EXPANDED) – 1900-present. The search spanned from January 1, 2004, to December 31, 2023. Detailed information, such as publication types (articles or reviews), author details (full names, addresses, and affiliations), citation data (times cited in Web of Science core collection and all databases), and publication characteristics (year, date, volume, issue, page range, DOI, PubMed ID, research areas, and open access designations), were collected from the Web of Science database on the same day. All analyses were performed using the acquired data to prevent biases arising from citation information updates. The dataset for this study comprised the full records of the retrieved papers, such as titles, authors, abstracts, and cited references. These data were exported as plain text. We analyzed the number and year of publication, total citations, average citations per publication, countries/regions, institutions, authors, references, and keywords. Data were then uploaded to the Online Analysis Platform of Literature Metrology (http://bibliometric.com), VOS viewer (Version 1.6.20, Leiden University, Netherlands,), and CiteSpace (Version 6.2.R4, 64-bit, Drexel University, Philadelphia, PA, USA) for bibliometric analysis. By employing these diverse bibliometric tools, we aimed to thoroughly analyze and illustrate data related to AHN. Our findings offer valuable insight into the trends and movements in the field.

Results: This study used bibliometric methods to analyze 1590 articles on AHN from 2004 to 2023.

The number of publications in the field of AHN has increased over the past 20 years. Although the number of AHN publications occasionally fluctuates, it was generally on an upward trajectory, peaking in 2021 (132 publications). The United States led other countries in terms of both the number of publications and centrality. However, the number of publications in the field of AHN in mainland China has been steadily increasing since 2012, and in 2021, it surpassed Germany for the first time, ranking second in terms of total publications. Among research institutions, the Helmholtz Association contributed the most publications, while the University of California System had the greatest influence. In terms of authors, Kempermann, Gerd was the most active author in terms of publication number. The main focus of these studies was on the evidence of AHN in the human brain and the relationship between abnormal AHN and cognitive impairment in AD. In addition, the publications of the top three active authors primarily focused on the functions of AHN, and reversing hippocampal damage and cognitive impairment by improving AHN. An analysis of reference co-citation clustering revealed 8 distinct research clusters, and the notable ones included “adult hippocampal neurogenesis”, “neurogenesis”, “hippocampus”, “dentate gyrus”, “neural stem cell”, and “depression”. Keyword analysis also illuminated that research on AHN and neurodegenerative diseases and neuropsychiatric diseases is currently a hot topic in the field of AHN. Additionally, a burst keyword detection indicated that 'anxiety' is a current research hotspot in the field of AHN.

Conclusions: This comprehensive bibliometric analysis reports the current state of research on AHN, providing insights into current trends and hotspots. This study indicated that the relationship between AHN and cognitive diseases, such as AD, depression, etc., has become a prominent research hotspot. Further studies on the mechanisms of abnormal AHN and treatments targeting AHN can contribute to the prevention and treatment of cognitive diseases.

PU-0187

新生儿缺氧缺血性脑病：损伤保护条件与视觉皮层 V1 区的早期诊断

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目的 新生儿缺氧缺血性脑病（HIE）是指围生期新生儿的大脑得不到足够的血液和氧气供应时，导致分娩过程中缺血和（或）缺氧性脑损伤。目前对于新生儿 HIE 的检测手段多局限于神经症状出现前的脑血流量检测和外周血液生化指标。中枢神经已经出现严重损伤时，我们才能通过脑影像学检查，神经系统症状（如意识改变，肌张力改变，原始反射异常）对其进行确诊。本研究旨在探索新生儿 HIE 损伤的保护条件，提出早期损伤检测的可能方式。

方法 本实验拟用电凝器永久凝断 7 d 龄 SD 大鼠右颈总动脉模拟缺血，术后闭合切口，将其置于不同条件的缺氧箱(8% O2＋92% N2，湿度：60%-70%）中模拟缺氧条件。实验设置了三种不同的条件：①单纯缺血（Ischemic，I）；②单纯缺氧（Hypoxia，H），③缺血缺氧（Hypoxic- ischemic，HI）。并观察了不同缺氧时间（1 h、1.5 h、2 h、2.5 h）和温度（36.0℃、36.5℃、37.0℃）。于 1 d 及 7 d 取组织进行尼氏染色。为动态观察适度条件下的神经损伤改变，于模型构建成功后 1 d，3 d，7 d 取新生鼠脑组织进行尼氏染色以及 Glut1 免疫荧光染色观察神经损伤情况。

结果 建模 1 d 和 7 d 取材后发现 I 组和 H 组的脑大体观与 Sham 组无明显变化，而 HI 组随时缺氧时间的延长，脑损伤逐渐严重，甚至出现脑萎缩。在不同缺氧时间下，尼氏染色观察发现 H 组导致的神经元损伤不明显，HI 后 1.5h-2.5h 与 Sham 组脑损伤面积变化明显差异（$P < 0.05$）。基于 HI 的实验条件设置缺氧时间和缺氧温度，在温度为 36.5℃，缺血缺氧条件下，缺氧 1.5 h 时，发现脑组织存在一定程度的神经损伤改变，但严重损伤的概率及死亡风险较低。分别在此条件下建模的 1 d，3 d，7 d，取不同平面的组织进行尼氏染色，发现损伤面积随天数逐渐增加，Glut1 免疫荧光染色提示随着缺血的时间延长，损伤区域脑血管连续性逐渐变差。通过分析鼠脑脑血管分布及脑梗死

的发展趋势，得出当损伤轻中度时，首先出现梗死的神经功能区域为初级视觉皮层 V1 区。
结论 在我们的研究中 36.5℃的环境温度即可对 HIE 新生大鼠构成一定的神经损伤。对已经发生宫内窘迫等负性事件，有着 HIE 风险的新生儿来说，在采取全身主动保温的同时，对头部局部降温可能更有利。我们的研究进一步揭示了轻中度 HIE 损伤部位的产生。分析了鼠脑脑血管分布及脑梗死的发展趋势，我们发现视觉皮层 V1 区是最先出现梗死的神经功能区。虽然目前的振幅整合脑电图（aEEG）结果已经用于纳入低温治疗的标准之一，但对视觉皮层的脑电监测可能可以更早地发现 HIE 损伤。

PU-0188
新型丙泊酚纳米复合物在脓毒症相关性脑病模型中的抗炎性研究

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目的 脓毒症相关性脑病(SAE)是脓毒症最常见和最严重的并发症，通常伴随认知功能和运动功能障碍，其病变区域主要集中在海马、黑质与纹状体等。 神经炎性损伤在海马神经元以及多巴胺能神经元介导的 SAE 疾病进展与预后发挥重大作用。有研究发现丙泊酚可以缓解包括 LPS 在内的多种因素导致的小胶质细胞炎性激活。本课题组前期构建了一种新型丙泊酚纳米复合物，实验表明它拥有更强的免疫抑制活性，因此本研究旨在探究新型丙泊酚纳米复合物在 SAE 中是否发挥更强的神经保护效果。
方法 成新型丙泊酚纳米复合物 PRP，腹腔注射 LPS 构建 SAE 模型，将实验动物随机分为四组：空白组、LPS 组、LPS+PPF 组以及 LPS+PRP 组，SAE 3 天后，通过旷场实验、悬尾实验以及爬杆实验评估四组小鼠的运动功能情况，采用 HE 染色和尼氏染色观察海马神经元形态以及尼氏小体的表达情况,并统计尼氏小体的数量；评估海马区域 PSD95 蛋白、IBA1 表达情况，检测黑质和纹状体区域酪氨酸脱氢酶(TH)表达情况；体外培养 BV2 细胞，LPS 诱导细胞炎症反应，采用体外墨汁吞噬试验、qPCR、 Western blot 以及免疫荧光染色检测 M1 标志蛋白 iNOS、 M2 标志蛋白 CD206 以及炎症因子 IL-1β、TNF-α 等的表达。
结果 本研究发现新型丙泊酚纳米复合物能抑制 ASE 引起的情绪及认知障碍，病理层面 HE 和尼式染色结果显示，PRP 抑制 ASE 引起的小鼠海马神经元的数量丢失；免疫组化 Iba1、TH 以及 NFKB 染色揭示 PRP 可以显著地抑制 LPS 诱导的认知相关脑区如纹状体、海马以及黑质部的小胶质细胞活化、多巴胺能神经元丢失和神经炎症。在体外模型中，PRP 可以抑制 LPS 诱导炎症反应和小胶质细胞活化。
结论 新型丙泊酚纳米复合物 PRP 通过减少 ASE 引起认知相关区域的炎症反应、小胶质细胞的激活以及多巴胺能神经元细胞丢失来改善 LPS 诱导的认知障碍。丙泊酚作为当前广泛使用地全身麻醉药物之一，PRP 的研发为新型抗炎性丙泊酚的开发增加了筹码，拓展了麻醉剂在炎症性脑病中的应用与治疗潜力。

PU-0189
一种新型结构的留置针在模拟人的应用研究

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目的 本研究旨在评估一款新型留置针在提高动脉置管成功率方面的效果。该留置针具有独特的结

构设计，其针芯内嵌有柔软的内置软管，外层则由 U 型钢针构成，旨在通过增强穿刺精度和减少组织损伤来优化动脉穿刺过程。通过与传统留置针对比实验，结果表明新器械能显著提高动脉置管的成功率，并减少相关并发症。

背景与目的： 动脉置管是一种常见的临床操作，用于监测血压、采集动脉血样等。然而，由于动脉的小尺寸、深度和移动性，传统留置针常常导致穿刺失败或并发症。因此，本研究的目的是开发一种新结构的留置针，以改善动脉穿刺的准确性和安全性。

方法 1. 设计新型留置针，其中包含内置软管和 U 型钢针的结构。

2. 进行模拟人实验，比较新型留置针和传统留置针在不同穿刺角度和深度下的性能。

3. 在临床试验中，将患者随机分为两组，一组使用新型留置针，另一组使用传统留置针，记录并比较两组的置管成功率及并发症发生率。

4. 对收集到的数据进行统计分析，评估新型留置针的有效性和安全性。

结果 体外模拟实验显示，新型留置针在不同的穿刺条件下均表现出更高的稳定性和准确性。临床实验结果表明，使用新型留置针的患者组动脉置管成功率显著高于使用传统留置针的患者组（$P<0.05$）。同时，新型留置针组的并发症发生率也明显低于对照组（$P<0.05$）。

结论 新型内置软管与 U 型钢针结构的留置针能够有效提高动脉置管的成功率，并降低并发症的风险。这一创新设计为临床医师提供了一种新的工具，以更高效、更安全地进行动脉穿刺和置管操作。同时该设计获得了中国生物工程学会优秀专利，以及德国纽伦堡金奖。期望未来的研究将进一步探索该留置针在其他类型血管穿刺中的应用潜力。

PU-0190

The etiology, mechanism and prevention of hiccups in the perioperative period

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Hiccups are the sudden, involuntary contractions of the diaphragm and intercostal muscles, which are typically self-limited. In some cases, they can also be persistent and intractable, indicating an underlying more severe pathological process. Hiccups in the perioperative period often present challenges for clinicians. The mechanism involves structural or functional damage to the phrenic nerve, vagus nerve, and sympathetic nerve pathways, as well as the hiccup reflex arc regulated by the midbrain. This damage may result from dysfunction in multiple organ systems, often increasing the difficulty of diagnosis and treatment. While several cases have discussed the impact of neurotransmitter balance on hiccups and various drug and non-drug therapies for treating them, there is still insufficient evidence to systematically and effectively address hiccups in the perioperative period. This paper provides a comprehensive review of the causes and mechanisms of hiccups, with a specific focus on hiccups in the perioperative period. It thoroughly examines the causes, mechanisms, and treatment options. The purpose of this review is to present clinical evidence supporting the prevention or prompt and safe management of hiccups in the perioperative period.

PU-0191

艾司氯胺酮在气管插管全麻诱导中的应用

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目的 气管插管是全身麻醉中的重要部分，插管刺激使得血压剧烈升高。因此临床上常使用镇静药物（如丙泊酚）、阿片类药物、肌肉松弛剂等联合诱导气管插管，而丙泊酚的使用可导致血管扩张产生低血压[1]，维持全身麻醉诱导气管插管期间血流动力学稳定具有相当重要临床意义，有利于减少脑出血、低血压相关的继发性脑损伤等风险，利于围术期后期管理及改善疾病的转归[2]。阿片类药物的使用可能导致术后恶心呕吐（postoperative nausea and vomiting，PONV）、术后认知功能障碍（Postoperative cognitive dysfunction，POCD）等并发症发生，因此近几年少阿片及无阿片麻醉是国内外临床麻醉研究重点。氯胺酮是目前临床上唯一有镇痛效果的静脉麻醉剂，而艾司氯胺酮是氯胺酮的右旋异构体，2019 年于国内上市，具有比氯胺酮效力更高、副作用更少等优点[3]，最近广泛用于临床麻醉（短小手术镇静镇痛、改善术后抑郁、术后镇痛等），在麻醉诱导方面应用较少。艾司氯胺酮在麻醉诱导插管中使用安全，可以在减少阿片类药物使用剂量的同时，减少其相关的不良反应。艾司氯胺酮安全应用于全身麻醉中诱导气管插管，能够维持血流动力学稳定，其能更为广泛地应用于临床麻醉诱导。现就艾司氯胺酮在全身麻醉诱导气管插管中的应用作出综述。探讨艾司氯胺酮在全身麻醉诱导中镇痛的可行性及相较于常规阿片类药物麻醉诱导是否具有优越性，为临床麻醉提供更多的麻醉诱导选择。

方法 计算机检索 PubMed、中国知网（CNKI）、维普等数据库，检索时间设定为建库至 2023 年 2 月，中文检索词包括“艾司氯胺酮”“氯胺酮”“全身麻醉”“麻醉诱导”，英文检索词包括“esketamine”“ketamine”“general anesthesia”“anesthesia induction”。纳入标准；文献内容涉及艾司氯胺酮的作用机制及其不良反应，艾司氯胺酮在气管插管全身麻醉中诱导的应用。排除标准：与本文主题无明显关联、质量较差、或者无法获得全文的文献，最终纳入文献 38 篇。

结果 艾司氯胺酮应用于气管插管全麻诱导中，能够有效维持血流动力学稳定，而且是安全有效的，不增加相关不良反应，是临床麻醉上能够进一步广泛使用的麻醉药物。但是艾司氯胺酮在全麻诱导时应用于不同年龄段人群的推荐剂量尚无定论，以及单独使用艾司氯胺酮替代阿片类药物麻醉诱导和阿片类药物联合诱导以减少使用阿片类药物两者谁更优势也无相关探讨。而且艾司氯胺酮应用于全麻诱导过程中的优势剂量、优势联合用药方案需要进一步研究探索。

结论 本文综述近几年国内外关于艾司氯胺酮在气管插管全麻诱导中的应用，为艾司氯胺酮在临床麻醉诱导提供更多的研究方向，以推进艾司氯胺酮在更多手术和不同人群的使用，为全麻诱导提供更为安全且减少术后不良反应的诱导方法。

PU-0192

Application of the Integrated Airway Humidification Device Enhances the Humidification Effect of the Rabbit Tracheotomy Model

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Long-term mechanical ventilation after tracheotomy is a common treatment applied in an intensive care unit patients. This study investigated the differences among the effects of different wetting states on the airway, lung, and serum inflammatory factors. New Zealand rabbits (n=36) were selected to construct tracheotomy models and then divided into four groups: Model, Mask, YTH,

and Sham groups. Lung tissue dry/wet ratio was used to evaluate the humidification effect, cytokines including TNF-α, IL-6, IL-8, and IL-10 were used to evaluate the inflammatory response, and HE staining was used to evaluate the histopathology. Post hoc analysis based on the Dunnett t-test was utilized.
A self-developed integrated wetting device could increase the utilization of wetting solution[Patent No. ZL201821869778.6], enhance the effect of wetting to protect tissue integrity, and suppress airway inflammation, reducing the expression of pro-inflammatory factors while promoting the expression of anti-inflammatory factor IL-10 to inhibit the inflammatory response, compared to other methods. The integrated humidification device provided a new method for clinical nursing practice, improving clinical efficiency and reducing nursing workload. Further clinical trials are required to test its effectiveness and safety in the clinic.

PU-0193

麻醉医师主导的睡眠障碍诊疗应用研究进展

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目的 探讨麻醉科医生主导的睡眠障碍诊疗在临床中的应用，丰富麻醉创新诊疗建设。
方法 总结现阶段睡眠障碍诊疗的前景、现状与思维建设，从不同角度论证各种诊断治疗方式的优缺点及可行性。
结果 以多导睡眠监测（PSG）为主导的睡眠障碍诊断联合脑功能和情绪相关检查能更好的确诊睡眠障碍类型，并予以对应治疗能较好的治疗睡眠障碍和应对以此带来的相关不良事件。
结论 本文系统综述了睡眠障碍诊疗的前景、未来发展趋势、诊断方法、治疗手段等，为麻醉医师主导睡眠障碍诊疗提供思路和方向，为麻醉专业介入临床疾病诊治提供指导意见。

PU-0194

氟比洛芬微针贴片用于术后疼痛治疗

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目的 氟比洛芬（Flurbiprofen, FBP）是治疗急性术后疼痛的药物之一。现有的给药方式存在诸多不足，亟需研发一种患者自控、安全无痛、快速有效的药物递送载体。研究京尼平交联明胶（Gelatin, Gel）微针（Microneedles, MNs）是否能有效穿透皮肤角质层，安全、有效地实现快速经皮药物递送，同时不发生药物突释，并持久释放 FBP，发挥快速、持久的术后镇痛作用，并探究该 MNs 载药体系的生物安全性。
方法 本研究以 Gel 为原材料，京尼平为交联剂，制备不同交联程度的交联明胶（cross-linked Gelatin, cGel）溶液用以制备 FBP MNs。本研究采用真空模板填充法，利用不同交联程度的基质材料制备载药 MNs 贴片（MNs Patch, MNP）。采用微距相机、金相显微镜及扫描电子显微镜（Scanning electron microscope, SEM）等成像技术对不同 MNs 材料及载药 MNs 进行形貌表征。利用傅里叶变换红外光谱（Fourier transform infrared, FT-IR）分析京尼平与 Gel 发生的化学交联反应及分子结构变化。采用茚三酮显色法精确测定添加不同京尼平剂量并充分交联后 cGel 的交联程度。随后，通过轴向力测试、封口膜扎入实验、猪皮刺入实验和小动物活体皮肤刺入实验测定各组载药 MNs 的机械性能，并测定各组 FBP MNs 的药物释放行为。构建大鼠背部多毛皮肤切口痛模型模拟人体急性术后疼痛，按照各组大鼠术后干预处理方法分为 Blank 组、cGel MNP 组、FBP HP 组和 FBP/cGel MNP 组。利用 4 g-VFH 和 15 g-VFH 分别在大鼠背部切口同侧 0.5 cm 和对侧 2 cm 处进行皮干肌反射（Cutaneous trunci muscle reflex,

CTMR）测试，观察各组大鼠原发性和继发性痛觉超敏及痛觉过敏的变化，用以评价 FBP MNs 的镇痛有效性。最后，利用皮肤恢复实验、细胞毒性试验和溶血试验对 MNs 材料及药物的生物相容性进行综合评价。

结果 本研究制备由京尼平交联的 cGel 溶液，溶液颜色由亮黄色逐渐变为深蓝色。交联剂量越高，颜色越深，溶液越粘稠。SEM 观察基质材料的微观结构，发现交联前后的 Gel 微观结构由孔径大小不一、无规则分布的疏松多孔结构变为致密、多孔、贯通性好的空间网络结构。随着交联剂的增加，孔径越来越小，网孔数量越来越多。FT-IR 中 MNs 基质材料特征峰的出现，证实京尼平与 Gel 之间发生有效的化学交联反应。茚三酮显色法测定 cGel-100、cGel-200、cGel-300 材料的交联度分别为 9.17%、24.65%、32.71%。使用金相显微镜和 SEM 观察载药 MNs，针体光滑完好，针尖尖锐，阵列排列规则整齐，无针体断裂或缺损，无药物析出。轴向力测试结果提示 MNs 的力学性能随交联度增高逐渐增强，即机械强度依次为：cGel-300 MNs > cGel-200 MNs > cGel-100 MNs > Gel MNs。猪皮扎入实验和小鼠活体皮肤刺入后 HE 染色结果均证实 cGel MNs 可以有效刺入皮肤表层，实现药物递送。药物释放行为学的结果揭示，随着释放时间延长，药物累积释放率逐渐增加，各组在药物释放前期的释放速率快，到后期则减缓。此外，不同交联程度载药 MNs 组的药物释放行为各不相同，呈现释放速率随交联度的增加而减慢的特点。为评价 FBP/cGel MNP 的镇痛有效性，我们构建大鼠背部多毛皮肤切口痛模型，给予各组相应的干预措施后，观察其 CTMR 的行为学改变。结果提示，FBP/cGel MNP 治疗组的痛觉超敏反应在术后半小时至术后 6 h 得到显著缓解，且在术后 2 h 缓解效果达到最佳（4 g-VFH 作用于同侧 0.5 cm 的等级反应评分为 0.075 ± 0.061，对侧 2 cm 的等级反应为 0.100 ± 0.093）。同样地，FBP/cGel MNP 组的原发性痛觉过敏和继发性痛觉过敏得到了显著改善，在术后 3 h 时原发性痛觉过敏和继发性痛觉过敏均得到最大改善（15 g-VFH 作用于同侧 0.5 cm 的等级反应评分为 0.225 ± 0.093，对侧 2 cm 的等级反应评分为 0.300 ± 0.127）。生物相容性实验表明，MNs 处理后的皮肤在 3 h 几乎完全修复，未见感染、皮损等永久性损伤。材料及药物的细胞毒性试验结果显示各组的细胞相对活力均远大于 80%，材料溶血率均远小于 5%。这些都证明本研究选用的基质材料具有良好的生物相容性。

结论 本研究制备的 FBP/cGel MNP 可以有效穿透皮肤角质层，有效、安全地实现经皮药物递送。该 MNP 制备工艺简单，机械性能优良，镇痛效果显著，生物安全性好，为急性术后疼痛的治疗提供了一种行之有效的新策略。

PU-0196

硬膜外腔泵注利多卡因联合星状神经节阻滞治疗 5 个月成功逆转慢性肾衰(CKD）一例

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目的 现病史：患者 2 年前无明显诱因下出现泡沫尿,久置不易消散,无明显肉眼血尿。2023 年 10 月 13 日有尿频、尿急不适,完善相关检查血肌酐 116.6umo1/L, eGFR 56.17,血尿酸 423umol/L,尿蛋白 3+,尿红细胞 3-5/HP,尿白细胞 0-2/HP,PCR1090mg/g。现为进一步治疗就诊我科收住入院。

方法 临床诊断：

1. IgA 肾病，慢性肾脏病 3 期；2. 高血压 2 级（极高危）；3.高尿酸血症；4.高脂血症

诊疗计划：

1.评估疾病情况，排除治疗禁忌症。

2.行椎管内置管止痛术降低交感神经张力、扩张血管治疗。

3.普伐他汀钠片降血脂。

4.行星状神经节阻滞降低交感神经兴奋。

治疗经过：

目前诊断明确，无硬膜外治疗相关禁忌症，行椎管内置管术治疗。术后管理：0.8%利多卡因硬膜外连续脉冲泵注 3 月，期间定期维护药泵，并复查血常规、肾功能、24h 尿蛋白定量、血脂检查。

后续治疗：
停止硬膜外泵注 1 月后，继续 0.8%利多卡因硬膜外连续脉冲泵注 1 月，期间定期复查计划不变。
结果 治疗结果：
肾脏受交感和副交感神经的双重支配，该患者穿刺点选择 T9 -T10 间隙，置入硬膜外导管，而采用连续脉冲给药可降低交感神经张力，治疗效果更好。从阻滞交感神经的角度达到改善肾功能的目的，由于不需要达到运动神经阻滞的效果，故选用半衰期较短的利多卡因（浓度：0.8%，剂量：10ml/2h）。然而硬膜外穿刺置管属于有创操作治疗，且留管时间长，减少穿刺次数及建立皮下隧道可减少硬膜外治疗的感染相关风险。
肾小球滤过率由 56.18 ml/min(1.73 ㎡)上升为 72.9 ml/min(1.73 ㎡)（治疗后五个半月，最新的检测结果），24 小时蛋白定量由 1500 mg/24h 降低为最低 380 mg/24h；血肌酐由 128.9 umol/L，降至为 103.2 umol/L；已逐渐将降压药物缬沙坦 80mg、氨氯地平 10mg；逐渐减量为氨氯地平 5mg，并且血压控制良好。成功由慢性肾脏病 3 期逆转为慢性肾病 2 期，拥有治愈的希望。
结论 CKD 疗效的金标准是肾小球滤过率、 24h 尿蛋白定量和血压的控制情况，该患者的肾小球滤过率由入院时的肾小球滤过率由 56.18ml/min(1.73m2)上升为 72.9ml/min(1.73m2)；尿蛋白从治疗前的 1500mg/24h 下降到五个月后的 380mg/24h，血压在治疗后逐渐停服多种降压药，仅留氨氯地平 5mg，血压控制良好，从肾内科专业来说疗效是肯定的。现患者已经治疗 5 个月的时间，肾功能持续改善中，已经恢复正常的工作生活，定期随访，必要时短期硬膜外泵注利多卡因维持治疗效果。慢性肾脏病病程进展可能反复，硬膜外阻滞的疗效尚需大样本、前瞻性、随机对照研究证实，并观察长期疗效(以年计数)；硬膜外阻滞对不同类型、不同严重程度的慢性肾脏病的有效性及其在细胞和组织学水平上引起的变化和潜在机制的探讨需要深入。

PU-0197

Development and validation of the predictive model for major adverse cardiovascular and cerebrovascular events after general anesthesia in non-cardiac surgery patients aged 90 years and older

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Purpose: Major Adverse Cardiovascular and Cerebrovascular Events (MACCEs) after non-cardiac surgery represent the most common cause of perioperative mortality, especially in elderly patients. It has been reported that approximately one-third of elderly patients experienced MACCEs during the perioperative period. Currently RCRI scoring system is the most widely validated and used clinical prediction model for MACCEs. However, it has been reported that the construction of the RCRI model was based on patients aged 50 and older, with a wide age span, which had certain limitations in clinical application to super-elderly patients(aged 90 years and older). In this field, no research team has yet focused on the population of individuals aged 90 and older. Our team utilized the advantages of the hospital to perform a retrospective study on this unique group of population. We aim to develop and validate a clinical prediction model for MACCEs in non-cardiac surgery patients aged 90 and older, who have undergone general anesthesia , and to establish a nomogram for clinical application.
Materials and Methods: This retrospective study recruited patients aged 90 years and older who have undergone non-cardiac surgery under general anesthesia from three large comprehensive hospitals between January 2015 and January 2023. Clinical data of these patients during the perioperative period were collected through electronic medical record system. A total of 34 potential predictive indicators were collected, including age, gender, Barthel Index (BI) score, ASA

classification, emergency surgery, medical history (including hypertension, diabetes, coronary heart disease, arrhythmia, heart failure; dementia, epilepsy, cerebral infarction, cerebral hemorrhage; Chronic Obstructive Pulmonary Disease(COPD), asthma, pneumonia, bronchiectasis, pulmonary embolism; renal insufficiency), preoperative Revised Cardiac Risk index(RCRI) score, patient's last preoperative laboratory results, including C-reactive protein(CRP), interleukin-6 (IL-6), neutrophil/lymphocyte ratio(NLR), platelet (PLT), hemoglobin(Hb), albumin (Alb), D-dimer, operation time, intraoperative blood loss, blood transfusion, use of vasoactive drugs, total length of hospital stays, postoperative length of hospital stays, postoperative new-onset MACCEs, postoperative admission to intensive care unit (ICU), in-hospital mortality, hospitalization expenses. The primary outcome was the incidence of MACCEs after surgery. MACCEs were defined as in-hospital all-cause mortality, AMI, or stroke, also including complete atrioventricular block, cardiogenic shock, and cardiac arrest. The patients' data from any two of the three hospitals were used to develop MACCEs predictive models, while data from the third hospital were used to validate the models. By drawing ROC curves and calibration curves, the optimal predictive model was selected to predict the occurrence of MACCEs clinically. We proceeded to assess the optimal predictive model by performing both internal and external validation. Finally, we created a nomogram based on the selected clinical predictive indicators to calculate the individual risk of MACCEs in patients aged 90 years and older and Decision Curve Analysis (DCA) was drawn to evaluate the clinical benefit of the MACCEs predictive model.

Results: In total, among 872 patients, 112 cases (12.84%) experienced in-hospital MACCEs. Multivariate analysis revealed that undergoing emergency surgery(OR=2.557, 95%CI: 1.298-5.038, P=0.007), preoperative Neutrophil-to-Lymphocyte Ratio (NLR)≥11.2 (OR=2.709, 95%CI:1.365-5.375, P=0.004), D-dimer≥3.6 mg/L (OR=2.272, 95%CI:1.282-4.027, P=0.005), and postoperative admission to the Intensive Care Unit (ICU) (OR=3.570, 95%CI: 1.767-7.211, P<0.001) were the most relevant risk factors for the occurrence of MACCEs in super-elderly patients who have undergone non-cardiac surgery under general anesthesia. Furthermore, this study found that the clinical prediction model we established based on these four factors exhibited the best discriminative ability (AUC: 0.853, 95% CI: 0.781-0.925) and reliable calibration (Hosmer-Lemeshow test: $\chi2=6.437$, P=0.598). And this clinical prediction model still maintained good performance in 10-fold cross-validation (the average AUC: 0.784, 95% CI: 0.687-0.951). In addition, the clinical benefit of this MACCEs predictive model was further evaluated through DCA, and we found that clinical interventions for these patients had net benefits when the threshold probabilities for the training group and the testing group were 48% and 66%, respectively.

Conclusion：This study firstly established a clinical prediction model for MACCEs based on this high-risk population aged 90 years and older. The MACCEs clinical prediction model and the nomogram we established based on simple clinical features and laboratory indicators, including undergoing emergency surgery, preoperative NLR≥11.2, D-dimer≥3.6 mg/L, and postoperative admission to ICU, could be used for individual risk prediction of MACCEs in super-elderly patients undergoing non-cardiac surgery under general anesthesia.

PU-0198

仿黏膜抗炎涂层气管导管抑制上皮细胞凋亡缓解术后咽痛的作用

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目的 本研究旨在针对气管插管后咽痛，构建仿黏膜抗炎涂层导管，增强其抗炎性能，并探究仿黏膜抗炎涂层在抑制气道黏膜上皮组织微环境炎症反应中的作用机制。

方法 本研究已获得伦理医院伦理委员会批准（批件号：[2023]第 023B00 号），采用自由基接枝法制天

然多酚表没食子儿茶素没食子酸酯（EGCG）接枝羧甲基壳聚糖(CMCS)的仿黏膜抗炎涂层气管导管；与传统导管进行对照插管后，取患者气道黏膜组织并进行了单细胞转录组测序；构建食蟹猴气管插管损伤模型，通过纤支镜检查评估气道损伤情况，记录其摄食行为学，并对食蟹猴组织及分泌物进行生化检测。

结果 引入 EGCG-CMCS/FDA 涂层具有亲水润滑且抗菌的生物效应：EGCG-CMCS/FDA 涂层与气管导管结合良好，且在导管表面分布均匀。同时实验组表面 N 元素分布均匀，说明 EGCG-CMCS 的成功引入。实验组的红外谱图出现 CMCS 的特征峰，证实涂层在气管导管表面接枝。XPS 分析显示相比于空白组，实验组的 Cl 元素峰消失。在 C1 分谱中，实验组的 C-N 含量提高，C-Cl 含量减少至 0，且氧元素含量大幅上升。EGCG-CMCS/FDA 涂层具有良好的亲水润滑性能。实验组的水接触角和摩擦系数分别为21°和0.07，远小于空白组。EGCG-CMCS/FDA涂层具有良好的抗菌性能。经与大肠杆菌共培养后，相比于空白组，实验组的菌落数目显著降低且抑菌圈明显。

仿黏膜抗炎涂层导管可有效降低插管后气道组织炎症反应缓解术后咽痛：纤支镜下直接观察发现，传统导管组猴声门气道出现了破溃出血等黏膜损伤表现，润滑导管组损伤有所改善仍可见充血红肿表现，仿黏膜抗炎涂层导管组猴声门气道未见充血红肿等炎症反应表现，气道与声门损伤评分降低。摄食行为学观察发现插管后 1 天，传统导管组猴出现拒食行为，仿黏膜抗炎涂层导管组猴则表现主动进食行为，插管后 3d 传统导管组猴拒食行为消失。ELISA 检测猴气道分泌物发现，相较于另外两组仿黏膜抗炎涂层组猴气道内炎症因子和致痛因子的表达降低。

Treg 是调控上皮细胞的关键免疫细胞：单细胞测序将免疫细胞进行聚类获得 13 个细胞群，两组间气道组织内免疫细胞大类占比无差异，其中免疫调节中起关键作用的 T 细胞占最大比例。进一步提取 T 细胞整合聚类进行亚群分析，发现仿黏膜抗炎涂层导管组 Treg 细胞占比显著高于传统导管组，且 Treg 的功能增强。对气道上皮细胞进行差异基因富集分析发现，凋亡和免疫反应相关通路—PI3K 通路被富集。免疫组化检测气道黏膜组织，验证了仿黏膜抗炎涂层处理组 FOXP3+Treg 细胞浸润程度较高。

TIGIT-NECTIN2 交互是 Treg 调控上皮细胞的具体途径：细胞通讯结果显示，仿黏膜抗炎涂层导管组的组织中，Treg 主要与上皮细胞存在着相互作用。气泡图显示 Treg 与上皮细胞之间存在着多种相互作用的配体-受体，其中以 CCL4-SCL7A1，TNFSF12-TNFRSF12A 和 TIGIT-NECTIN2 交互强度最高。为了进一步确定三种交互的作用，向体外 LPS 诱导的上皮细胞中分别加入 CCL4、TNFSF12 和 TIGIT，流式细胞检测发现 CCL4 组和 TNFSF12 组上皮细胞的凋亡比例无明显变化，而 TIGIT 组上皮细胞的凋亡比例明显下降。进一步采用免疫荧光染色共定位检测 TIGIT 和 NECTIN2 的分布，验证了 TIGIT 和 NECTIN2 分别分布于 Treg 和气道黏膜上皮细胞表面。

RAC1/AKT/PI3K 信号通路是 TIGIT-NECTIN2 轴的下游通路：流式细胞法检测对照组、LPS 组和 LPS+TIGIT 组凋亡情况，发现 LPS 组上皮细胞凋亡率显著升高，而 LPS+TIGIT 组能够有效抑制上皮细胞凋亡。仅 RAC1 蛋白表达量较高，而 RAC2 和 RAC3 蛋白表达无明显变化，且 TIGIT 处理组显著激活了 PI3K/AKT 通路，抑制促凋亡分子 BAX 和 Caspase-3 的表达。在体实验中免疫荧光检测气道上皮层组织发现，相较于传统导管组，仿黏膜抗炎涂层组气道上皮细胞内 AKT 显著激活。

结论 引入 EGCG-CMCS 能赋予共形修饰水凝胶亲水润滑抗炎特性，达到模仿黏膜抗炎特征功能的效果，缓解插管过程中对气道黏膜上皮造成的损伤及术后咽痛。具体机制上，仿黏膜抗炎涂层能够促进Treg的浸润，Treg 通过 TIGIT-NECTIN2 轴与气道黏膜上皮细胞交互，经由 RAC1/PI3K/AKT 通路抑制上皮细胞凋亡，减轻组织炎症反应。

PU-0199

Changes in blood catecholamines during induction of general anesthesia in patients with post-induction hypotension undergoing laparoscopic cholecystectomy: A single-center prospective cohort study

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Background: Post-induction hypotension (PIH) often occurs during general anesthesia induction. This study aimed to investigate blood catecholamine levels during induction of general anesthesia in patients with PIH undergoing laparoscopic cholecystectomy.
Methods: This prospective study included 557 adult patients who underwent laparoscopic cholecystectomy under general anesthesia. PIH was defined as a greater than 20% decrease in systolic blood pressure from the pre-induction value, a systolic arterial pressure of less than 90 mmHg, or both. Plasma concentrations of epinephrine and norepinephrine during the induction of general anesthesia were determined using enzyme-linked immunosorbent assay. Multivariate logistic regression analysis evaluated the association between the clinical factors and PIH.
Results: Of the 557 patients, 390 had PIH, and the remaining 167 were allocated to the non-PIH group. Changes in blood adrenaline, noradrenaline levels, or both were more pronounced in the PIH than in the non-PIH group ($p<0.05$). Age, body mass index, a history of hypertension, preoperative systolic blood pressure, and propofol or sufentanil dose were independent predictors of PIH.
Conclusion: The changes of blood catecholamines in patients with more stable hemodynamics during the induction of general anesthesia are smaller than that in patients with post-induction hypotension.

PU-0200

右美托咪定通过脊髓 MrgC 受体参与调控小鼠骨癌痛吗啡耐受

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目的 通过骨癌痛(bone cancer pain, BCP)小鼠模型明确右美托咪定是否参与吗啡耐受并探索其机制。
方法 用 Lewis 肺癌细胞系制备 C57BL/6 小鼠股骨癌痛动物模型。对骨癌痛小鼠进行鞘内置管，连续 7 天注射吗啡诱导耐受产生。用 von Frey 纤维丝评估小鼠左后足 50%机械刺激缩足反射阈值 (mechanical withdrawal threshold, MWT)，热板法评估热缩足潜伏期阈值 (thermal paw withdrawal threshold, TWL)。给药第 7 天后取 L3~L5 段脊髓，使用免疫组化实验和 Western Blotting (WB) 方法检测小鼠脊髓 Mas 相关基因 C 受体（Mas-related gene C receptor, MrgC）的表达。通过对吗啡耐受的骨癌痛小鼠鞘内注射右美托咪定，探索其可能的机制。
结果 自建模后第 7 天起，BCP 小鼠左后足 50%MWT 显著下降，TWL 明显缩短($P<0.05$)。建模后第 14 天起鞘内给予吗啡，给药的第 1~4 天，BCP 小鼠左后足 50%MWT 明显上升，TWL 明显增加（$P<0.05$），给药的第 5 天开始 50%MWT 逐渐下降，TWL 明显缩短。但预先鞘内给予右美托咪定后，给药的第 1~7 天 BCP 小鼠左后足 50%MWT 持续增高，TWL 持续延长（$P<0.05$），且免疫组化和 WB 结果显示 MrgC 表达明显增加

结论 右美托咪定可缓解骨癌痛小鼠吗啡耐受的形成，这一作用可能与右美托咪定促进骨癌痛小鼠脊髓 MrgC 表达和活化有关。

PU-0201

基于机器学习的创伤性脑损伤患者术后静脉血栓风险预测模型构建及验证

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目的 创伤性脑损伤(Traumatic Brain Injury，TBI)是全球范围内导致死亡和长期残疾的重要原因之一。TBI 患者常常伴随着其他类型的损伤，这通常需要通过手术来治疗。在受伤后和手术期间，患者往往处于制动状态并需要长时间卧床休息，这些因素结合治疗过程中可能使用的止血药物和输血等，显著增加了患者术后发生静脉血栓形成(Venous Thromboembolism, VTE)的风险。VTE 增加了术后并发症、住院时间和医疗资源使用，对患者安全构成威胁。研究旨在探究 TBI 术后 VTE 发生率与临床结果的关系，识别高风险人群，并应用机器学习构建预测模型。
方法 收集 2016 年 10 月 1 日至 2023 年 12 月 31 日间于重庆大学附属中心医院收治的 1602 例接受手术治疗的 TBI 患者信息。所收集的变量涵盖患者的人口学特征、受伤信息、术前和术中治疗情况、实验室检查结果以及临床结局。完整数据集被划分为三部分，即训练集、内部测试集及外部验证集，将 2016 年 10 月 1 日至 2021 年 12 月 31 日的数据按 7:3 随机划分作为训练集和内部测试集，将 2022 年 1 月 1 日至 2023 年 12 月 31 日的数据，用作外部验证集。在训练集通过使用 Fisher score 来筛选特征，并采用人工合成过采样技术来平衡数据，基于机器学习构建了六个预测模型，包括逻辑回归、随机森林、梯度提升决策树、极端梯度提升(extreme gradient boosting, XGBoost)、支持向量机和人工神经网络。最后，利用 SHAP(SHapley Additive exPlanations)方法对性能最优的模型进行解释。
结果 回顾性分析显示，术后 VTE 的发生率高达 13.7%，在中-重度 TBI 患者中，这一比例升至 20.6%。术后 VTE 主要为下肢深静脉血栓，主要发生在腓静脉和胫后静脉。本研究利用机器学习技术构建了六个 TBI 患者术后 VTE 风险预测模型，并通过时间分割方法对其进行了验证。模型表现良好，内部验证的 AUC 值介于 0.743 至 0.798 之间，外部验证的 AUC 值介于 0.733 至 0.746 之间。此外，本研究还采用了 SHAP 方法对内部表现最佳的 Xgboost 模型进行了全局和个性化解释。
结论 TBI 手术患者术后 VTE 的发生率较高，与院内不良事件相关，导致住院时间延长和医疗资源消耗增加。术后 VTE 的风险因素因脑损伤程度的不同而有所差异。本研究通过机器学习方法建立的风险预测模型，在总体上表现良好，并能够为 TBI 手术患者提供个性化的危险因素分析。这是首次将机器学习应用于预测 TBI 手术患者术后 VTE 的研究，为围手术期领域中机器学习的应用开辟了新的前景。此外，本研究的结果也为未来的临床决策提供了有价值的参考，有望在一定程度上改善 TBI 患者的术后管理策略，降低 VTE 的发生率，改善患者的临床结局。

PU-0202

无阿片化保留自主呼吸麻醉镇痛方案在小儿会阴部手术的临床应用

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目的 通过对小儿会阴部手术采用无阿片化药物并保留自主呼吸的麻醉方案进行临床麻醉的观察，

探讨该麻醉方案的安全性及有效性。
方法 1、通过收集选取 ASAⅠ～Ⅱ级择期行会阴部手术的 2～8 岁患儿 100 例，将患儿随机分为两组：（1）无阿片药物麻醉（Opioid-free Anesthesia，OFA）组，（2）阿片药物麻醉（Opioid Anesthesia，OA）组，每组 50 例。2、两组患儿均在手术准备间静脉注射咪达唑仑，待安静后推入手术室，常规连接心电监护仪。OFA 组给予艾司氯胺酮复合戊乙奎醚静脉注射，待患儿入睡后，使用罗哌卡因进行骶管阻滞。骶管阻滞完成后予以丙泊酚行麻醉诱导，根据患儿体重置入相应型号喉罩。并持续泵注艾司氯胺酮和丙泊酚进行麻醉维持，术中保留自主呼吸。OA 组给予丙泊酚，罗库溴铵，枸橼酸舒芬太尼行麻醉诱导并置入气管导管，持续泵注丙泊酚，瑞芬太尼进行麻醉维持，术中行呼吸机控制呼吸。两组患儿均在术后配置相同配方的电子静脉镇痛泵（PCIA）。3、观察记录患儿年龄、身高、体重、手术时间等一般情况，记录患儿术中术后心率（HR 次/分），平均动脉压（MAP mmHg），呼吸频率（RR 次/分），氧饱和度（SpO2%）等生命体征，术后 FLACC 疼痛评分、Ramsay 镇静评分及苏醒时刻 PAED 躁动评分，记录术中和术后喉痉挛、肺部感染、喉头水肿、声嘶、术后低氧血症等相关气道不良反应发生率。记录术后镇痛泵自控增加次数。
结果 1、两组患儿一般情况差异无统计学意义（P＞0.05)。2、两组患儿术中术后生命体征差异无统计学意义（P＞0.05)。3、与 OA 组相比，OFA 组术后 FLACC 疼痛评分及苏醒时刻 PAED 躁动评分更低，差异有统计学意义（P＜0.05)。两组患儿术后 Ramsay 镇静评分差异无统计学意义（P＞0.05)。4、两组患儿术后不良反应发生率差异无统计学意义（P＞0.05)。与 OA 组相比，OFA 组术后镇痛泵自控增加次数更低，差异有统计学意义（P＜0.05)。
结论 本研究的无阿片化药物并保留自主呼吸的麻醉方案可能是一种安全，有效，能替代传统阿片类全麻气管插管麻醉方案的新的麻醉镇痛方案，并能改善患儿的不良反应和体验。

PU-0203

七氟醚对缺血性脑血管病患者术后脑保护作用的影响

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目的 通过观察缺血性脑血管病患者术后谵妄(POD)的发生率、外周血中 S100β 蛋白和炎症因子水平等指标，探讨七氟醚对此类患者术后脑保护的影响。
方法 选择在河北省胸科医院行择期手术的患有缺血性脑血管病患者 127 例，年龄 50 ~ 90 岁，ASA Ⅱ～Ⅲ级。所有患者随机分为七氟醚组(S 组，n = 63)和丙泊酚组(P 组，n = 64)。P 组持续泵注丙泊酚维持麻醉，S 组持续吸入七氟醚维持麻醉，两组患者术中均持续泵注瑞芬太尼，间断静注顺阿曲库铵维持肌松。术前 1 天，所有患者均接受简易精神状态量表(MMSE)测试。本研究使用 3 分钟谵妄诊断量表(3D-CAM)评估两组患者术后第一天(T1)、术后第二天(T2)、术后第三天(T3)的谵妄发生情况，其中术后接受 ICU 治疗的插管患者采用 ICU 意识模糊评估法(CAM-ICU)评估其谵妄发生情况。于 T1 与 T3 时采用阿森斯失眠量表(AIS)评估睡眠情况；于麻醉前(T0)和 T1 分别采集患者外周静脉血检测肿瘤坏死因子 α(TNF-α)、白介素 6(IL-6)和中枢神经特异性蛋白(S100β)水平；于 T1 ~ T2 天记录两组患者疼痛数字评价量表(NRS)评分。于出院时应用 MMSE 量表评估两组的术后认知情况。分别记录两组患者基本信息(年龄、性别、教育年限、体重指数、ASA 分级、术前并存基础疾病、手术部位、MMSE 评分)，术中指标(麻醉时间、手术时间、失血量、术中用药、输血情况、尿量以及术中输液量)和术后指标(术后住院时间、术后镇痛情况、术后不良事件发生情况)。
结果 S 组和 P 组患者基本信息和术中指标差异无统计学意义(P > 0.05)。术后三天 S 组 POD 发生率为 7.9%，而 P 组为 20.3%，两组差异有统计学意义(P < 0.05)，且在 T1 时，S 组 POD 发病率同样低于 P 组(P < 0.05)。T0 时，两组患者血清 TNF-α、IL-6 和 S100β 蛋白的表达水平差异没有统计学意义(P > 0.05)，T1 时，两组 TNF-α、IL-6 和 S100β 表达水平均明显升高，与 T0 相比，差异有统计学意义(P < 0.05)，且在 T1 时，S 组 S100β 蛋白、TNF-α 和 IL-6 的表达水平均低于 P 组(P <0.05)。在术后疼痛比较中，无论静息痛还是运动痛，两组之间的差异均没有统计学意义

(P > 0.05)。在 T1 和 T3 时，S 组的术后睡眠障碍发生率均低于 P 组(P < 0.05)。出院时，两组患者术后认知情况差异无统计学意义(P > 0.05)。此外，两组术后不良事件发生率的差异也不具有统计学意义(P > 0.05)。

结论 七氟醚能够降低缺血性脑血管病患者术后三天谵妄发生率，还能减少术后睡眠障碍的发生，这可能与抑制炎症因子产生，降低神经炎症反应有关。

PU-0204

Bidirectional effects between breakfast skipping and smoking, alcohol consumption: evidence from a Mendelian randomization study

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Objective: Given its critical role in providing essential nutrients, regulating metabolism, and maintaining circadian rhythms, breakfast is considered the most important meal of the day. In contemporary society, the prevalence of breakfast skipping is widespread, contributing to various health issues. Research indicates that individuals who forgo breakfast during childhood and adulthood are at an increased risk of developing chronic conditions in later life, including hypertension, cardiometabolic disorders, insulin resistance, and diabetes.

Retrospective evidence indicates that the habit of breakfast skipping is associated with frequent alcohol consumption and smoking behaviors. Conversely, the habit of smoking and drinking behaviors appears to influence breakfast skipping. Recent meta-analytic evidence also suggests that breakfast skipping increases the risk of cardiovascular disease and all-cause mortality. Elucidating the relationship between skipping breakfast and smoking, drinking habits, as well as mortality from various causes, holds significant importance for public health policy. Due to the potential for residual confounding and reverse causality, as well as the lack of high-quality randomized controlled trials, it remains unclear whether these observational findings are indeed causal.

The Mendelian randomization (MR) design, which utilizes genetic variants as proxies for an exposure, enhances causal inference by mitigating residual confounding and other biases. Here, we conducted a bidirectional MR study to assess the associations of breakfast skipping with lifestyle factors and to assess the reverse impact of lifestyle patterns on breakfast skipping. We additionally did MR analysis of breakfast skipping and death from different causes.

Methods: Study design and ethical approval

To minimize potential bias in the results, it is crucial to adhere to key assumptions within the framework of the MR method which is illustrated in Figure 1. The analyses performed in this study were based exclusively on publicly available summary statistics from GWAS. Consequently, further ethical approval or informed consent was deemed unnecessary. We adhered to the STROBE-MR guidelines, and the corresponding checklist is provided in the supplementary materials.

Data source

Detailed information about data sources can be found in Supplementary Table 1.

Instrumental variables selections

Due to the limited number of IVs identified using this criterion, we adopted a more relaxed P-value threshold of < 5E-07 as the genome-wide significance level in the present study (with the exception of SNPs for “smoking cessation” and “drinks per week”, for which a threshold of 5E-06 was used). Additionally, SNPs were required to exceed a minor allele frequency threshold of 0.01. A clumping procedure was conducted using an r2 threshold of < 0.001 and a clumping distance of 10,000 kb to eliminate linkage disequilibrium between the included IVs. We identified risk factors associated with exposure and outcomes by reviewing previously reported literature (Supplementary Table 2). We also utilized the "GWAS Catalog" tool to exclude confounding SNPs and employed the inverse-

variance weighted (IVW) Radical method to eliminate outlier (Supplemental Figure 1).
Statistical analysis
IVW is the primary study method, while the MR-Egger, weighted median, and weighted mode methods are considered supplementary analytical approaches. We also conducted heterogeneity, pleiotropy, and sensitivity analyses. Given the different numbers of exposures and outcomes in the bidirectional MR analysis, 2-tailed P values for MR were considered statistically significant only if the P values for forward and reverse MR were less than 0.007 (0.05/7) and 0.0125 (0.05/4), respectively. Statistical power of all MR analyses was detailed in Supplemental Table 3.
Results
Details of the IVs for each exposure factor are provided in Supplemental Table 4.
Instrumental variables
All F statistics were greater than 10 (Supplemental Table 4). The process for selecting IVs can be found in Supplemental Tables 4, 12 to 15.
Foreword MR results As shown in Figure 2 and Table 1, we identified a potential causal association between breakfast skipping and smoking initiation (OR 1.24, 95% CI 1.00 - 1.54, P = 0.049). However, no evidence suggesting that breakfast skipping serves as a causal risk factor for smoking cessation (P = 0.172), cigarettes per day (P = 0.073) and alcoholic drinks per week (P=0.797). (Supplemental Figure 2)
Reverse MR Results
We found that individuals who initiate smoking have a genetic predisposition for skipping breakfast (OR 1.12, 95% CI 1.07 - 1.17, P = 3.74E-06). Nevertheless, smoking cessation (P = 0.405) and cigarettes smoked per day (P = 0.227) did not influence the habit of skipping breakfast while weekly alcohol consumption was found to have a potential causal influence on whether an individual skips breakfast (OR 1.07, P = 0.027). (Table 2 and Figure 3, Supplemental Figure 2)
Breakfast skipping on death
Genetic evidence did not demonstrate any impact of skipping breakfast behavior on all-cause mortality and mortality due to cardiovascular causes. Whereas we found the more frequent skipping breakfast, the higher the risk of alcohol-related diseases or mortality, with a 2.65-fold increase (OR 3.65, 95% CI 2.15 - 6.20, P = 1.75E-06). (Table 3, Figure 4, and Supplemental Figures 5 to 7)
Sensitivity analyses
We found no evidence of heterogeneity or horizontal pleiotropy (P > 0.05) in all MR. The integrity of our MR results was confirmed through leave-one-out sensitivity analysis. Individual SNP effect plots indicated that no single SNP significantly influenced the MR estimates, thus affirming the robustness of the current MR. (Tables 1, 2, 3, and Supplemental Figures 3 to 7)
Conclusion: Through a bidirectional MR study, we have identified causal evidence that initiating smoking increases the frequency of skipping breakfast. Furthermore, skipping breakfast has been associated with an elevated risk of alcohol-related diseases and mortality. We also identified potential causal associations, such as between skipping breakfast and initiating smoking, as well as between weekly alcohol consumption and skipping breakfast, which warrant further investigation. Our findings underscore the importance of improving breakfast habits, preventing smoking behaviors, and reducing alcohol consumption in public health policies.

PU-0205

利用最佳 6 分钟步行距离（6MWD）临界值代替心肺运动测试（CPEX）识别需要进一步风险分层的高危患者：以香港患者数据进行的验证研究

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目的 以最高的特异性（即最小的假阳性结果）去确定最佳六分钟步行距离 (6MWD) 临界值，以便对高风险患者进行术前心肺运动测试分流，加快术前风险分层和体能评估，以提高术前心肺运动测试效能和资源应用。
方法 研究纳入了 113 位在 2019 年 10 月至 2020 年 12 月期间、年龄在 18 岁或以上、预约进行非心脏手术的患者，这些患者在同一次手术中完成了六分钟步行距离和心肺运动测试 (腿部测力）。研究的样本量是根据 ROC 曲线分析的显著性水平为 0.01、统计能力为 90%、AUC >0.7 的适当性来计算。研究数据的分配比例为 0.824，表示样本量多于 100 足以进行 ROC 曲线分析。根据灵敏度和特异度的最高值之和，以确定 ROC 预测心肺运动测试中的高风险指数（即 VO2 峰值少于 15ml/kg/min ，或者是 VO2 阈值少于 11ml/kg/min）的最佳六分钟步行距离临界值。研究还对 65 岁和 70 岁或以上的患者进行了分组分析，以评估老龄化对相关临界点的影响。
结果 预测心肺运动测试中高风险指数（即 VO2 峰值少于 15 毫升/千克/分钟，或者是 VO2 阈值 少于 11 毫升/千克/分钟）的最佳六分钟步行距离临界值为 373 米（灵敏度 0.705，特异度 0.853, AUC 0.828, p<0.001, β=0.1）、378m（灵敏度 0.756, 特异性 0.750, AUC 0.804, p<0.001, β=0.1）和 369m（灵敏度 0.781，特异性 0.659，AUC 0.760，p<0.001，β=0.1），而 6MWD≥468m 的患者在普通和老年患者组中始终表现出良好的心肺储备（特异性 1.0，AUC>0.7，p<0.001，β=0.1）。
结论 在面对大型的预约手术，研究数据分析显示，接受最佳六分钟 大于 468 米的步行距离，代替心肺运动测试，以通过体能评估，是一种合理且具有成本效益的术前风险分流方法。至于最佳六分钟步行距离不能超过 369 米的患者，则需要进一步以心肺运动测试进行风险评估，以确定术前预健的需要和方案。

PU-0206

和厚朴酚对小鼠脓毒症相关性认知功能障碍的影响

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目的 脓毒症的病理生理机制复杂，可能与血脑屏障功能障碍、炎症反应、代谢以及神经递质功能紊乱等相关，但目前其确切的发病机制仍未阐明。血脑屏障损害是脓毒症相关性认知功能障碍

（Sepsis-associated encephalopathy, SAE）的重要发病环节之一，使中枢神经系统易受神经毒性因子如自由基、炎症介质、血管内蛋白、血浆和循环白细胞等影响，进一步加重脑损伤。和厚朴酚（Honokiol, HNK）是一种联苯酚类化合物，是厚朴的主要有效成分之一。研究表明：和厚朴酚具有抗炎、抗氧化以及神经保护等作用。盲肠结扎穿刺模型（Cecal ligation and puncture, CLP）被认为是脓毒症研究的金标准，具有与人类脓毒症相似的病理生理过程，广泛应用于脓毒症及其相关并发症的潜在机制研究。本实验拟观察不同剂量和厚朴酚对脓毒症小鼠认知功能的影响。

方法 选用 6~8 周龄的雄性 C57BL/6J 小鼠为研究对象，分为 5 组：Sham 组、CLP 组、CLP+5 mg/kg HNK 组、CLP+10 mg/kg HNK 组及 CLP+20 mg/kg HNK 组。Sham 组的小鼠做腹部切口后缝合，CLP 组的小鼠接受盲肠结扎穿刺术。于 CLP 术后 30 min、24 h 和 48 h30 min 及术后 3 天于腹腔内分别注射 5 mg/kg、10 mg/kg 以及 20 mg/kg 和厚朴酚。本研究在术前及术后 24 小时进行脓毒症评分；观察各组小鼠的生存情况；采用旷场实验排除运动活动和焦虑样行为对小鼠认知功能的影响；在 CLP 术后第 8~9 天进行新物体识别实验；以及采用 Morris 水迷宫实验（包括隐蔽站台实验和空间探索实验）在 CLP 术后第 10~14 天对小鼠海马依赖性的学习和记忆功能进行评价。

结果 （1）成功建立 SAE 小鼠模型，与其他各组小鼠相比，CLP 组小鼠脓毒症评分高（P<0.001）及生存率低（50%）。（2）行为学结果显示，：SAE 小鼠引起空间学习和记忆功能减退，表现未对旧物体记忆不深，对新物体识别障碍（P<0.001）；逃避潜伏期延长（P<0.001），目标象限停留时间缩短（P<0.001），平台穿越次数减少（P<0.001）。盲肠结扎穿刺术对小鼠的自主运动能力并未产生影响（P>0.05）。（3）和厚朴酚对脓毒症小鼠认知功能的改善与浓度呈正比。10 mg/kg 和厚朴酚对脓毒症小鼠认知功能的改善作用强于 5 mg/kg，但 20 mg/kg 和厚朴酚并未进一步增强。

结论 术后连续 3 天腹腔注射 10 mg/kg 的和厚朴酚，能够改善脓毒症小鼠的认知功能障碍，并提示认知功能障碍与 Sirt3 的活化有关。

PU-0207

右美托咪定联合艾司氯胺酮对甲状腺切除术患者术后早期睡眠质量的影响

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目的 探讨右美托咪定联合艾司氯胺酮对甲状腺切除患者术后早期睡眠质量的影响

方法 本研究是一项单中心、随机、双盲、对照的实验性研究。选取中山大学附属第三医院 2023 年 4 月至 2024 年 2 月期间年龄 18 ～ 65 岁、ASA 分级Ⅰ～ III 级、拟行择期全麻下双侧甲状腺切除的甲状腺乳头状癌患者，随机分配至实验组（ED 组）或安慰剂对照组（C 组）。ED 组患者在手术结束前 30 min 内，按标准体重静脉泵注右美托咪定 0.2ug/kg+艾司氯胺酮 0.1mg/kg，0.9%氯化钠稀释至 20ml；C 组则为等体积 0.9%氯化钠。根据样本量估算，预计纳入 176 例患者。主要结局指标为两组患者术后第 1 天和第 2 天术后睡眠障碍（PSD）的发生率，次要结局指标包括患者术后 1 个月的睡眠质量（PSQI 评分）、术后 24h、48h 静息以及运动时疼痛 VAS 评分、术后第 1 天和第 2 天焦虑抑郁评分（HADS），同时记录患者自给予干预后，围术期不良事件的发生情况。

结果 本研究共纳入 190 例，排除 10 例，剔除 5 例，共 175 例参与分析，其中实验组 87 例，对照有 88 例。实验组术后第 1 天有 18 例（20.69%）患者出现 PSD，对照组有 38 例（43.18%）患者出现 PSD（OR=0.34，95%CI 0.18-0.67，P<0.01）；实验组患者阿森斯失眠量表（AIS）评分低于对照组（4(2-5)VS 5(4-7)，P=0.002）；实验组患者主观睡眠质量自评分（NRS）低于对照组（3(3-4)VS 4(3-6)，P<0.001）。实验组术后第 2 天有 6 例（6.9%）患者出现 PSD，对照组有 17 例（19.32%）患者出现 PSD（OR=0.31，95%CI 0.12-0.83，P=0.015）；实验组患者阿森斯失眠量表（AIS）评分低于对照组（3(2-4)VS 4(3-5)，P=0.001）；实验组患者主观睡眠质量自评分

（NRS）低于对照组（2(2-3)VS 3(2-3)，P=0.026）。两组术后 1 个月 PSQI 评分差异无统计学意义（7(4-10)VS 7(4-11)，P=0.577）。术后 24h、48h 实验组与对照组的静息疼痛 VAS 评分无统计学差异（术后 24h：2(1-3)VS 3(2-3)，P=0.397；术后 48h：1(0-2)VS 1(1-2)，P=0.864）。术后 24h、48h 实验组的运动疼痛 VAS 评分低于对照组（术后 24h：4(3-5)VS 5(4-6)，P=0.025；术后 48h：2(2-3)VS 3(2-3)，P=0.021）

结论 手术结束前持续泵注右美托咪定联合艾司氯胺酮能有效降低甲状腺切除术后早期 PSD 的发生，并可一定程度上减轻患者的运动疼痛评分。

PU-0208

术毕前 30min 行全凭瑞马唑仑或丙泊酚麻醉对腹腔镜胆囊切除术患者拔管期应激反应的影响

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目的 探讨术毕前 30min 行全凭瑞马唑仑或丙泊酚麻醉对腹腔镜胆囊切除术后拔管期应激反应的影响，为今后临床治疗提供可靠的经验。

方法 选取本院择期腹腔镜下胆囊切除手术患者 80 例，年龄不限，男女均可，ASA Ⅰ～Ⅱ级，随机分两组(n=40)；所有患者入室后均面罩吸氧，监测 ECG、HR、BP、SpO2 和 BIS，建立外周静脉通路。采用舒芬太尼-依托咪酯-顺阿曲库铵行麻醉诱导，丙泊酚-顺阿曲库铵泵注并间断给予舒芬太尼维持麻醉。术毕前 30min 瑞马唑仑（R）组 1～1.5 mg·kg－1·h－1、异丙酚组（P）组 4～6 mg·kg－1·h－1 。比较两组拔管前(T0)、拔管时(T1)、拔管后 5 min(T2)、拔管后 10 min(T3)、拔管后 30 min(T4)血流动力学改变、麻醉苏醒时间、拔管情况及不良反应的发生情况。

结果 与 T0 时刻比较，P 组 T1 时刻收缩压(systolic blood pressure，SBP)、舒张压(diastolic blood pressure， DBP)、心率(heart rate， HR)均明显升高(P<0.05)，但 R 组的 SBP、DBP、HR 均无明显变化(P>0．05)。除了 T0 时间点，其他时间点 R 组的各指标水平明显低于 P 组(P<0.05)。P 组患者苏醒时间、拔管时间均比 R 组延长(P<0.05)；且 P 组拔管质量评分显著低于 R 组(P<0.05)，两组患者术后恶心呕吐、呼吸抑制的发生率比较差异无统计学意义(P>0．05)。

结论 术毕前 30min 行全凭瑞马唑仑麻醉相比丙泊酚麻醉较好抑制 LC 术后拔管期应激反应，能够更好地维持患者血流动力学的稳定，促进患者早期苏醒，且安全性较高。

PU-0209

Efficacy and safety analysis of remimazolam for preventing agitation during awakening from general anesthesia after pediatric laparoscopic hernia surgery：a randomised controlled trial

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Objective:To analyze the efficacy and safety of remimazolam for preventing agitation during awakening from general anesthesia after pediatric laparoscopic hernia surgery.

Methods:184 children who underwent laparoscopic hernia surgery in our hospital from June 2021 to June 2022 were selected and randomly divided into control group (n=92) and experimental group (n=92). We analyzed MAP levels before and anesthesia induction time, 10 min, 20 min and

30 min after extubation between two groups; We analyzed flacc and paed scores at the time of extubation, 10 min, 20 min, and 30 min after extubation in the two groups.
Results: Compared with the control group, the map level in the experimental group was lower at the time of extubation, 10min, 20min and 30min (P< 0.05); the flacc and the paed scores of children in the control group was statistically significant (P＜0.05) compared with that of children in the experimental group at the time of extubation, 10 min and 20 min after extubation;
Conclusion:The intervention of pediatric laparoscopic hernias with remimazolam was able to effectively modulate the levels of map indicators at different periods and reduce the degree of postoperative pain as well as agitation in pediatric patients.

PU-0210

Association of energy-adjusted dietary inflammatory index with all-cause and cause-specific mortality: results from The Rural Chinese Cohort Study

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Background: Dietary management is a pivotal intervention for mortality. The Dietary Inflammation Index (DII) has been developed to evaluate the integral inflammatory potential of a dietary pattern; however, studies on the association of energy-adjusted DII (E-DII) with mortality in the Chinese population are limited.
Objective: We aimed to investigate the qualitative and quantitative associations of E-DII with all-cause and cause-specific mortality in The Rural Chinese Cohort Study.
Method: E-DII was calculated using a food frequency questionnaire at baseline from 2007 to 2008, while mortality data were collected from follow-up visits until 2020. E-DII was analyzed as both a categorical quartile and continuous variable in multivariate-adjusted Cox proportional hazard models. Restricted cubic splines were used to model the quantitative associations. Subgroup analyses stratified by age, gender, smoking, and physical activity were used to examine the influence of potential confounding factors. Four sensitivity analyses were performed to test the robustness of the main results.
Results: During a median follow-up of 11.1 years, 2,521 all-cause deaths occurred among the eligible 19,732 participants. After multivariable adjustment, the hazard ratios (HRs) and 95% confidence intervals (CIs) for the highest E-DII quartile were 1.27 (1.12-1.43) for all-cause mortality and 1.35 (1.14-1.61) for cardiovascular disease (CVD) mortality, when compared with the lowest E-DII quartile. Additionally, there was a nonlinear dose-response association of E-DII with all-cause and CVD mortality (all P nonlinearity<0.05), with adjusted HRs (95% CIs) of 1.06 (1.02-1.10) and 1.07 (1.02-1.12) for each standard deviation increase in E-DII, respectively (P trend<0.05). These positive associations were also observed in subgroup and sensitivity analyses.
Conclusion: A pro-inflammatory diet was significantly associated with increased risk of all-cause and CVD mortality. Anti-inflammatory dietary patterns should therefore be recommended to individuals.

PU-0211

右美托咪定减少肥胖患者全麻诱导期低氧血症发生率的临床研究

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目的：1.探讨右美托咪定是否能减少肥胖患者全麻诱导期低氧血症的发生率。
2.对比研究预测全麻诱导前使用右美托咪定的合适剂量。
方法：选取 2022 年 5 月至 2024 年 5 月于三峡大学附属仁和医院麻醉科需要接受全身麻醉的肥胖患者（肥胖指数 50≤BMI≤100）120 例，随机数字表法分为四组：A 组（40 例，空白对照组）、B 组（40 例，泵注右美托咪定 0.5μ g /kg）、C 组（40 例，泵注右美托咪定 1.0μ g /kg）和 D 组（40 例，泵注右美托咪定 1.5μ g /kg）。所有患者麻醉诱导前 10 分钟静脉泵注右美托咪定，泵注完毕之后开始全麻诱导，给药完毕后行辅助通气至气管插管。记录四组患者全麻诱导前、诱导期至管插管前、辅助通气期间、气管插管后的血压(MAP)、心率（HR）、血氧饱和度（SPO2）变化；记录四组患者辅助通气（给药后至气管插管）时间（T）、辅助通气期间低氧血症（SPO2 <90%）发生率以及气管插管时发生呛咳例数（n）；记录四组患者气管插管后血氧饱和度（SPO2）恢复至 96%以上的时间（t）；所有患者气管插管操作尽量一次完成，失败两次不纳入统计范畴。气管插管完成后立即行动脉血气分析（动脉血 1 分钟之内抽取完毕）。
结果: 四组患者诱导前血压(MAP)、心率（HR）以及血氧饱和度（SPO2）比较，差异无统计学意义（P>0.05）；辅助通气期间，A组血氧饱和度（SPO2）下降明显低于B、C、D三组（P<0.05），而血压(MAP)和心率（HR）变化则高于 B、C、D 三组（P<0.05）；与诱导前比较，C 组患者血压(MAP)和心率变化最小（P>0.05），C、D 两组患者血氧饱和度（SPO2）均无明显下降（P>0.05），D 组窦性心动过缓（HR<60 次/分）发生率高于 B、C 两组（P<0.05），并且有 3 例患者需用阿托品处理（HR<45 次/分）；辅助通气时间（T）比较，A 组明显长于 B、C、D 三组，而辅助通气期间低氧血症（SPO2 <90%）发生率和气管插管时发生呛咳例数（n）比较，C、D 两组明显低于 A、B 两组（P<0.05）；四组均有患者因困难气道等因素气管插管次数大于两次，发生率均小于<10%而放弃纳入统计分析。气管插管后血氧饱和度（SPO2）恢复至 96%以上的时间（t）比较，A组明显长于B、C、D三组（P<0.05），CD两组所有患者全程血氧饱和度（SPO2）>96%；气管插管后所有患者动脉血抽取均在 1 分钟之内完成，动脉血气分析结果显示，A 组高碳酸血症和低氧血症发生率明显高于 B、C、D 三组（P<0.05），B、D 两组与 C 组比较，高碳酸血症差异有统计学意义（P<0.05）。
结论：肥胖患者全麻诱导前 10 分钟泵注一定剂量的右美托咪定，能缩短辅助通气时间，减少气管插管呛咳的发生率，诱导期间低氧血症的发生率明显降低； 通过对比研究，全麻诱导前 10 分钟泵注 1μ g /kg 剂量的右美托咪定对患者的心率影响最小，而高碳酸血症发生率最低，因此可以预测全麻诱导前使用右美托咪定的最合适剂量大概在这个范围左右。

PU-0212

Gut microbiota, circulating inflammatory proteins and neurodegenerative diseases: A Systematic Mendelian Randomization Study

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Background: Recent research suggests that the gut microbiome is linked to brain function through the gut-brain axis, indicating that gut microbiota may influence the onset and progression of

neurodegenerative diseases (NDs). However, the causal relationship between changes in the gut microbiome and NDs, as well as the potential mediating role of cytokines, remains unclear. This study aims to clarify whether the gut microbiota directly impacts neurodegeneration or if this relationship is mediated by inflammatory proteins.

Methods: Gut microbiota, inflammatory proteins, and NDs, including Alzheimer's Disease (AD), Amyotrophic lateral sclerosis (ALS), and Parkinson's Disease (PD), are analyzed using summary data from large-scale genome-wide association studies (GWAS). We employ Mendelian Randomization (MR) to investigate the causal relationships between the gut microbiome, inflammatory proteins, and NDs. The inverse variance weighted (IVW) method serves as our primary statistical approach. Additionally, we examine whether inflammatory proteins mediate the process from gut microbiome to NDs.

Results: MR analysis revealed that genetic predictors of two gut microbiota genera, Lachnoclostridium and Ruminiclostridium6, were associated with an increased risk of AD. Specifically, Lachnoclostridium (Odds Ratio [OR] = 1.030, 95% Confidence Interval [CI] = 1.006–1.055, P= 0.014) and Ruminiclostridium6 (OR= 1.020, 95% CI = 1.002–1.039, P= 0.029) significantly elevated the risk of developing AD. Conversely, genetic predictors of two other gut microbiota genera, Ruminiclostridium9 and Faecalibacterium, were linked to a decreased risk of AD. Ruminiclostridium9 (OR= 0.969, 95% CI = 0.943–0.996, P= 0.027) and Faecalibacterium (OR= 0.975, 95% CI = 0.954–0.997, P= 0.028) significantly reduced the risk of AD. Additionally, as shown in a further analysis, Axin-1 (OR= 1.038, 95% CI = 1.003–1.074, P= 0.034) and the Interleukin-10 receptor subunit beta (OR= 1.010, 95% CI = 1.000–1.020, P= 0.040) were found to significantly increase the incidence of AD. On the other hand, Tumor necrosis factor (OR= 0.967, 95% CI = 0.935–1.000, P= 0.047) and Interleukin-18 receptor 1 (OR= 0.994, 95% CI = 0.988–1.000, P= 0.048) were shown to significantly decrease the incidence of AD. Genetic predictors of seven gut microbiota groups (Class Coriobacteriia, Families Coriobacteriaceae, Rikenellaceae, Victivallaceae, Genera Ruminococcustorques group, Alistipes, Ruminococcus1, and Order Coriobacteriales) are associated with an increased risk of ALS. Specifically, Class Coriobacteriia (OR = 1.150, 95% CI = 1.020–1.295, P = 0.022), Families Coriobacteriaceae (OR = 1.150, 95% CI = 1.020–1.295, P = 0.022), Rikenellaceae (OR = 1.165, 95% CI = 1.060–1.282, P = 0.002), Victivallaceae (OR = 1.082, 95% CI = 1.022–1.146, P = 0.007), Genus Ruminococcustorques group (OR = 1.131, 95% CI = 1.004–1.273, P = 0.043), Genus Alistipes (OR = 1.154, 95% CI = 1.026–1.299, P = 0.017), Genus Ruminococcus1 (OR = 1.173, 95% CI = 1.003–1.371, P = 0.046), and Order Coriobacteriales (OR = 1.150, 95% CI = 1.020–1.295, P = 0.022) significantly increase the risk of ALS. Conversely, Genus Ruminococcaceae UCG003 (OR = 0.901, 95% CI = 0.815–0.995, P = 0.041) is associated with a decreased risk of ALS. Further analysis indicates that levels of SIR2-like protein 2, Tumor necrosis factor ligand superfamily member 14, TNF-beta, and Eotaxin are correlated with ALS. Specifically, levels of SIR2-like protein 2 (OR = 1.240, 95% CI = 1.029–1.494, P = 0.024) and Eotaxin (OR = 1.090, 95% CI = 1.003–1.185, P = 0.043) significantly increase the incidence of ALS. Meanwhile, levels of Tumor necrosis factor ligand superfamily member 14 (OR = 0.916, 95% CI = 0.847–0.992, P = 0.030) and TNF-beta (OR = 0.967, 95% CI = 0.937–0.998, P = 0.035) significantly decrease the incidence of ALS. Genetic predictors of eight gut microbiota groups (Class Lentisphaeria, Family Oxalobacteraceae, Genera Eubacterium xylanophilum group, Anaerostipes, Clostridium sensu stricto 1, Orders Bacillales, Victivallales, and Phylum Lentisphaerae) are associated with the risk of PD. Specifically, the Family Oxalobacteraceae (OR = 1.130, 95% CI = 1.003–1.273, P = 0.044), Genus Eubacterium xylanophilum group (OR = 1.318, 95% CI = 1.020–1.702, P = 0.035), Genus Clostridium sensu stricto 1 (OR = 1.354, 95% CI = 1.068–1.716, P = 0.012), and Order Bacillales (OR = 1.144, 95% CI = 1.013–1.292, P = 0.030) significantly increase the risk of developing PD. Conversely, Class Lentisphaeria (OR = 0.826, 95% CI = 0.717–0.953, P = 0.009), Genus Anaerostipes (OR = 0.768, 95% CI = 0.596–0.990, P = 0.041), Order Victivallales (OR = 0.826, 95% CI = 0.717–0.953, P = 0.009), and Phylum Lentisphaerae (OR = 0.818, 95% CI = 0.714–0.937, P = 0.004) are associated with a decreased risk of PD. Furthermore, levels of T-cell surface glycoprotein CD6 isoform and Fibroblast growth factor 23 are correlated with ALS. Specifically, T-cell surface glycoprotein CD6 isoform levels (OR = 1.079, 95% CI = 1.014–1.149, P = 0.017) and Fibroblast growth factor 23 levels (OR = 1.471, 95% CI = 1.016–2.129, P = 0.041) significantly increase the incidence of PD.

Conclusion: In this study, we identified fourteen positive and seven negative causal relationships between the genetic predispositions of gut microbiota and NDs. Additionally, cytokines were found to have six positive and four negative correlations with NDs. Moreover, we observed fourteen reverse causal relationships between NDs and gut microbiota, as well as nine reverse causal relationships between inflammatory proteins and NDs. Through mediation analysis, it was discovered that the family Rikenellaceae exhibits a mediation effect of approximately 7.2% on ALS via Eotaxin levels, and the genus Ruminococcaceae UCG-003 has a mediation effect of about 5.7% on ALS through TNF-beta levels. Gut microbiota and inflammatory proteins have been found to have causal relationships with three types of NDs, suggesting that gut microbiota can influence ALS through the mediation of two specific inflammatory proteins.

PU-0213

非心脏手术的老年患者多病状态与术后谵妄相关：一项前瞻性队列研究

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目的 术后谵妄（postoperative delirium，POD）是老年患者常见的并发症。诊断主要关注于生理参数，而往往忽略了病史情况。疾病不仅已成为危害老年患者的一个重大公共卫生问题，而且往往更频繁地共存，导致“多病状态”。我们假设在老年手术患者中存在不同程度的多病状态亚组。此外，我们假设多病状态的特定模式与 POD 的发生率相关。

方法 在南京医科大学第二附属医院共招募了 819 名接受非心脏手术的老年患者。我们使用潜在类别分析，根据疾病组成确定不同的患者亚组，比较每个亚组在简易精神状态检查评分（mini-mental state examination，MMSE）、埃德蒙顿虚弱量表评分（edmonton frailty scale，EFS）、年龄和 POD 方面的差异。我们还探讨了不同多病亚组、EFS 和认知表现之间的关系。最后，利用神经网络来预测不同疾病患者所属的多病亚组。

结果 我们确定了 3 个临床上不同的多病亚组。在多病亚组 1 中，患病率较高的 6 种疾病分别是高血压（17.92%）、糖尿病（12.85%）、中风（11.44%）、恶性肿瘤（9.57%）、冠心病（6.00%）和其他肺部疾病（4.22%）。在多病亚组 2 中，患病率较高的 6 种疾病分别为代谢性疾病（15.33%）、内分泌疾病（12.81%）、高血压（6.78%）、中风（6.28%）、其他肺部疾病（5.03%）和冠心病（3.77%）。在多病亚组 3 中，患病率较高的 6 种疾病分别是烟草依赖（22.83%）、酗酒（17.65%）、高血压（11.52%）、恶性肿瘤（11.31%）、中风（6.13%）和其他肺部疾病（5.29%）。不同多病亚组间在 EFS、MMSE 和 POD 等方面的差异有统计学意义（$p < 0.05$）。在校正了年龄和 MMSE 后，我们发现多病亚组 2 通过衰弱介导了 POD 的发生[间接效应 = 0.043；（95%CI = 0.019~0.070）]。神经网络模型对不同的多病亚组具有较好的预测能力[亚组 1：AUROC = 0.975；亚组 2：AUROC = 0.963；亚组 3：AUROC = 0.978]。

结论 我们确定了 3 种多病状态，其发病率与 EFS、MMSE 和 POD 相关。这些发现促进了将多病模式整合到医疗活动中，并在临床实践和试验设计中脱离当前的单一疾病范式。

PU-0214

Inflammatory and neuronal injury biomarkers in paired serum and cerebrospinal fluid samples from individuals with normal cognition and mild cognitive impairment

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Background: The early and accurate diagnosis of mild cognitive impairment (MCI) is pivotal for timely intervention implementation and effective treatment development. Blood biomarkers have been extensively utilized to detect structural and functional alterations in neurodegenerative diseases; however, there remains controversy regarding their ability to reflect changes in the central nervous system.
Objective: To evaluate the correlation between levels of inflammatory and neuronal injury markers in both serum and cerebrospinal fluid (CSF) samples.
Methods: From July 2023 to November 2023, 38 patients undergoing orthopedic surgery were recruited at the Second Affiliated Hospital of Nanjing Medical University. Preoperatively, blood and CSF samples were collected from the patients for assessment of inflammatory and neuronal injury markers using enzyme-linked immunosorbent assay. Cognition was assessed using the Chinese version of Mini-Mental State Examination (MMSE), and correlations between inflammatory and neuronal injury markers in paired serum and CSF samples were also analyzed.
Results: IL-1β and IL-6 levels in the CSF, but not in the serum, were significantly elevated in patients with MCI compared with cognitively normal controls ($P < 0.05$). Moreover, both serum IL-6 levels and CSF levels of TNF-α exhibited a negative correlation with MMSE scores ($R2 = 0.1128$; $P = 0.0392$ and $R2 = 0.1350$; $P = 0.0232$). However, there was no association between inflammatory and neuronal injury markers in paired serum and CSF samples ($P > 0.05$).
Conclusions: Our study demonstrated the pivotal role of neuroinflammation in the pathogenesis of MCI, but blood levels of inflammatory and neuronal injury markers poorly reflect changes in the central nervous system.

PU-0215

Associations between oral frailty, oral microbiota alterations and postoperative delirium in elderly patients

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Background: Poor oral health, prevalent among the elderly, can undermine overall health and contribute to frailty. Elderly adults experiencing oral frailty and dysbiosis potentially face an elevated risk of postoperative delirium (POD). This study aims to explore the influence of oral frailty and changes in oral microbiota composition on occurrence of POD in elderly patients undergoing non-cardiac surgery.
Methods: 303 elderly patients undergoing non-cardiac surgeries were recruited in the Second Affiliated Hospital of Nanjing Medical University from July 2023 to December 2023. Oral swabs for oral microbiota analyses were collected before surgery. Subsequently, after propensity score matching, 21 samples from the POD patients and 21 samples from without POD patients were analyzed for oral microbiota. Our primary objective was to determine the association between oral frailty, alterations in oral microbiota composition alterations, and the occurrence of POD.
Results: Oral frailty emerged as an independent risk factor for POD [HR = 1.754; 95%CI = (1.039-2.958); p = 0.035]. Additionally, patients with POD demonstrated lower oral microbiota diversity, as

indicated by a reduced Chao index compared to those without POD (p = 0.034). A significant association was also found between the dysbiosis index and POD (p < 0.001). ROC analysis revealed a pronounced area under the curve of 0.946 (95%CI: 0.884-1.000) for the dysbiosis index in predicting POD. Subsequent Principal Coordinates and Kaplan-Meier analyses affirmed that both beta diversity and the dysbiosis index were significantly correlated with POD incidence, with p-values of 0.002 and 0.00014, respectively. Furthermore, the interaction analysis through Cox proportional hazards regression suggested a combined effect of oral frailty and the dysbiosis index on the likelihood of POD development (p = 0.004).
Conclusions: Oral frailty and changes in oral microbiota among elderly patients undergoing non-cardiac surgery may influence the incidence of POD.

PU-0216

右美托咪定复合腹横筋膜阻滞对结肠癌术后肠麻痹影响的研究

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目的 研究静脉输注右美托咪定复合腹横筋膜阻滞对腹腔镜结肠癌根治术后患者术后肠麻痹的影响。
方法 选择择期全麻下行腹腔镜结肠癌根治手术的患者 80 例，随机分为 A、B、C、D 四组，每组 20 例。B、D 两组在麻醉诱导后以 0.5 μg·kg-1·h-1 的速度泵注右美托咪定直至手术结束前 30 分钟；C、D 两组于全身麻醉诱导后在 B 超引导下两侧分别予 0.25%罗哌卡因复合 0.5%利多卡因 20ml 行双侧腹横筋膜阻滞。记录输注右美托咪定前（T0）、气管插管后 10min（T1）、TAP 阻滞后 10min（T2）、气腹开始后 10min（T3）、气腹开始后 1h（T4）、气腹结束后 10min（T5）以及拔管后 10min（T6）时的 HR、MAP；记录术后 6、12、24、36、48（T7～T11）时静息和咳嗽疼痛 VAS 评分；于 T0、T3、T5、T9、T11 时静脉采血，检测血浆肾上腺素(EPI)、去甲肾上腺素(NE)以及白细胞介素 6（IL-6）浓度；记录患者麻醉药物用量，回访术后 48h 内 PCA 自控给药次数，记录四组患者术后肠道第一次排气时间。
结果 D 组瑞芬太尼用量明显少于其他三组（P＜0.05）；C、D 两组术后 PCA 自控给药次数少于 A、B 两组；D 组排气时间明显短于其他三组（P＜0.05）。与 D 组相比，T2-T6 时 A、B、C 三组心率均有升高（P＜0.05）；与 A、C 两组相比，T3 时刻 B 组心率较低（P＜0.01），但较 D 组高（P＜0.05）。T11 时间点时，B、D 组血浆 E、NE 及 IL-6 明显低于 A、C 两组（P＜0.05）。与 D 组相比，其余三组在 T7-T9 时间点静息及咳嗽 VAS 评分均有明显升高（P＜0.01）。
结论 术中输注右美托咪定可稳定结肠癌根治术患者术中血流动力学，减轻腹部炎症，缩短术后肠麻痹时间；联合腹横筋膜阻滞可在进一步减少阿片类药物用量的同时达到更满意的镇痛，促进术后肠蠕动的恢复。

PU-0217

Circulating Proteins Influencing Postoperative Delirium：A Mendelian Randomization Study

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Background: Postoperative delirium (POD) is a significant acute complication predominantly affecting individuals over the age of 65, typically manifesting within 1-5 days post-surgery and occurring in approximately 50% of this demographic. POD's impact extends beyond the immediate postoperative period, often leading to long-term cognitive impairment and decreased quality of life.

This condition imposes a substantial healthcare burden on patients, families, and caregivers due to the resultant cognitive decline, increased mortality, and extended hospitalization. Moreover, the presence of delirium in postoperative patients is linked to an increased risk of developing dementia, further emphasizing the need for effective prevention and management strategies.
Despite the clinical importance of POD, its underlying pathophysiology remains inadequately elucidated, and no blood-based predictive biomarkers are currently available. Understanding the mechanisms underlying POD is crucial for developing effective interventions and improving patient outcomes. Plasma proteins represent a promising area for research due to their accessibility, ease of measurement, and pivotal roles in molecular signaling pathways. These proteins circulate in the bloodstream and can provide valuable insights into various physiological and pathological processes. While many circulating proteins have been studied as drug targets in cardiovascular diseases, fewer have been investigated in the context of POD. Currently, known biomarkers for POD are predominantly inflammatory proteins, such as preoperative interleukin-6 (IL-6) and postoperative C-reactive protein (CRP). However, the specificity and sensitivity of these markers in predicting POD are limited, highlighting the urgent need for new biomarkers and therapeutic targets.
Recent advances in genomic and proteomic technologies have opened new avenues for identifying potential biomarkers and therapeutic targets. Mendelian randomization studies offer a unique advantage by mitigating confounding factors and elucidating causal relationships. This approach leverages genetic variants as instrumental variables to infer causality between risk factors and outcomes, providing robust evidence that can inform clinical practice.
Method: In this study, we employed a two-sample Mendelian randomization approach to identify plasma proteins associated with POD. Protein quantitative trait loci (pQTLs) were identified from genome-wide association studies (GWASs) encompassing a comprehensive plasma proteome of 4,907 distinct proteins. Genetic data pertinent to delirium were obtained from a cohort of 359,699 individuals of Finnish descent, as documented in the ninth iteration of the Finnish biobank. The influence of plasma proteins on POD was assessed using Wald ratio and inverse variance–weighted ratio tests. These statistical methods allow for the estimation of causal effects while accounting for potential biases and confounding variables.
To validate the assumptions of Mendelian randomization, analyses of horizontal pleiotropy and heterogeneity were conducted. Horizontal pleiotropy refers to the situation where genetic variants influence the outcome through pathways other than the exposure of interest, which can bias the results. Heterogeneity analyses assess the consistency of the estimated effects across different genetic variants, providing additional confidence in the findings.
Additionally, an animal model of POD was established through laparotomy, with the success of the model evaluated by Tissue HE, Nissen staining, and immunofluorescence and behavioral assessments. Enzyme-linked immunosorbent assay (ELISA) is a widely used technique for quantifying specific proteins in biological samples, providing a robust validation of the identified associations. Therefore, the MR findings were further verified by ELISA using plasma samples from the POD model and control groups.
Result: Eight plasma protein-disease associations were validated through rigorous sensitivity and heterogeneity analyses. Identified proteins include UDP-glucose 4-epimerase (GALE) (odds ratio [OR]: 0.58, 95% confidence interval [CI]: 0.42-0.76), Semaphorin 6C (SEMA6C) (OR: 0.28, 95% CI: 0.10-0.42), G Protein Alpha Inhibiting Activity Polypeptide 3 (GNAI3) (OR: 0.76, 95% CI: 0.45-0.87), Ubiquitin carboxyl-terminal hydrolase 21 (USP21) (OR: 1.49, 95% CI: 1.12-2.37), Peflin (PEF1) (OR: 1.16, 95% CI: 1.08-1.33), Phosphatidylinositol 5-phosphate 4-kinase type-2 alpha (PIP4K2A) (OR: 2.48, 95% CI: 1.55-3.66), Insulin receptor-related protein (INSRR) (OR: 1.88, 95% CI: 1.37-2.78), and Jumping translocation breakpoint protein (JTB) (OR: 1.29, 95% CI: 1.09-1.77). Animal model studies further validated the associations of GALE and SEMA6C with POD.
Limitations: (1)Incomplete Representation of the Entire Circulating Proteome: The study is constrained by its limited scope, encompassing only a fraction of the complete circulating proteome. This partial representation may not fully capture the complexity and diversity of plasma proteins, potentially overlooking critical biomarkers pertinent to postoperative delirium.
(2)Ancestral Homogeneity: The research cohort is restricted to individuals of European ancestry, which may limit the generalizability of the findings to other ethnic and racial groups. Genetic and

environmental variations across populations necessitate broader studies to ensure the applicability of results across diverse demographics.
(3)Limited Sample Size and Species Variability in Validation: The validation phase of the study relied on murine plasma for cross-species comparison. The use of a different species introduces potential biological discrepancies that could affect the translatability of the findings to human physiology. Consequently, further validation with larger human cohorts is essential to substantiate these preliminary results.
Conclusion: This study identifies eight circulating proteins and validates two of them, GALE and SEMA6C, as strongly associated with postoperative delirium. These findings suggest that circulating plasma proteins may modulate the risk of POD, highlighting their potential as biomarkers and therapeutic targets, meriting further investigation. The identification of these proteins provides a foundation for future research aimed at developing targeted interventions to prevent and manage POD.

PU-0218

亚麻醉剂量艾司氯胺酮联合舒芬太尼在无痛胃肠镜检查中的可行性研究

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目的 探讨亚麻醉剂量艾司氯胺酮联合舒芬太尼在无痛胃肠镜检查中的可行性及最佳剂量。
方法 选择 2022 年 10 月至 2023 年 4 月在西南医科大学附属医院内镜中心行无痛胃肠镜检查的成人受试者 800 例，随机分为丙泊酚组(P 组)、艾司氯胺酮组(E1 组、E2 组、E3 组)，每组 200 例。4 组患者静脉注射舒芬太尼 0.2ug/kg,注射时间大于 30s，P 组患者静脉注射丙泊酚 1.5 mg/kg, E1 组、E2 组、E3 组患者静脉分别注射艾司氯胺酮 0.2、0.3、0.4 mg/kg，注射时间均为 30 s，丙泊酚组患者以丙泊酚 4mg/kg/h 维持麻醉，艾司氯胺酮组患者以艾司氯胺酮 0.25mg/kg/h 维持。患者左侧卧位下监测心电图，脉搏血氧饱和度，无创血压。麻醉诱导前将 M5 号面罩放置于患者面部，并用束缚带固定面罩，至面罩不漏气且患者未感到不适。记录四组患者气道干预次数，入诊室后(T0)、胃镜检查前(T1)、胃镜检查后(T2)、肠镜检查前(T3)、肠镜退镜后(T4)、检查结束时(T5)的平均动脉压(MAP)和心率(HR)、呼吸频率(RR)，不良反应、起效时间、镇静成功率、循环抑制率、苏醒时间、无痛胃肠镜检查医生及患者满意度。
结果 在呼吸抑制方面，与 P 组相比，E1 组、E2 组、E3 组胃肠镜检查过程中气道干预次数均明显降低（P <0.001）、需要进行气道干预的病例占比明显减少（P <0.001）、呼吸暂停和呼吸浅慢的平均发作次数明显降低（P<0.05）。在生命体征方面，在 T1~T5 时，E1 组、E2 组、E3 组患者的 MAP 水平均显著高于 P 组(P<0.05)；在 T1 时，E1 组、E2 组、E3 组患者 SpO2 均显著高于 P 组(P<0.05)；在 T1~T5 时，E1 组、E2 组、E3 组的 RR 均显著高于 P 组。在不良反应方面，与 P 组相比，E1 组呛咳、体动明显升高(P<0.05)，与 E1 组相比，E2 组、E3 组呛咳、体动明显降低(P<0.05)；与 E3 相比，P 组、E1 组、E2 组分泌物明显减少(P<0.05)；与 P 组相比，E1 组、E2 组、E3 组注射痛明显减少(P<0.05)；E3 组相比，P 组、E1 组、E2 组精神症状明显减少(P<0.05)。与 P 组相比，E1 组、E2 组、E3 组循环抑制率明显减低（P<0.05）；与 E3 组相比, P 组、E1 组、E2 组苏醒时间与 PACU 时间（P<0.05）均显著降低。
结论 艾司氯胺酮联合舒芬太尼可安全有效的应用于无痛胃肠镜检查;艾司氯胺酮 0.3 mg/kg 复合舒芬太尼 0.2ug/kg 组不良反应最少，在无痛胃肠镜检查中值得推荐。

PU-0219

TAPB 联合不同麻醉方式应用于腹腔镜妇科手术的观察

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目的 本研究通过观察腹横肌平面阻滞(TAPB)分别联合静吸复合麻醉及全凭静脉麻醉后对患者麻醉效用及术后不良反应的影响，旨在明确最佳麻醉方案，为后续临床的腹腔镜妇科手术提供科学、合理的麻醉干预方案。
方法 本研究通过对妇科接收的需行腹腔镜手术的患者展开研究，按照随机数字表法建立 TAPB 联合静吸复合麻醉组及 TAPB 联合全凭静脉麻醉组。两组患者的麻醉诱导及 TAPB 方案均一致。观察两组患者基线资料数据包括年龄、体质量指数(BMI)、民族等人口学信息；收集两组患者临床相关指标包括 ASA 分级情况、疾病诊断等临床信息；记录两组患者临床手术相关指标包括麻醉时间、手术时间、术中出入量及手术前后血流动力学相关指标、不良反应总发生率及分级等数据；收集患者术中麻醉药物使用情况、复苏时间、PACU 停留时间，采取随访调查形式明确所有研究对象术后住院天数、总住院天数、医疗费用、术后 VAS 评分、镇痛药物使用量等数据。
结果 本研究共纳入患者 112 例，其中 TAPB 联合静吸复合麻醉组 55 例，TAPB 联合全凭静脉麻醉组 57 例。纳入本研究的所有患者的人口学信息包括 ASA 分级、疾病诊断、血流动力学等一般信息，麻醉时间、手术时间及术中出入量等麻醉与手术信息均收集完毕，组间对比均无明显统计学差异（均 P＞0.05）。两组患者发生与阿片类镇痛药物相关并发症包括便秘、尿潴留、皮肤瘙痒及过度镇静等发生率对比均未见明显统计学差异(P＞0.05)；两组在各时间段血流动力学指标包括 HR、MAP 及 SpO2 数据对比均未见明显统计学差异(P＞0.05)。两组在麻醉药物使用量方面包括舒芬太尼、依托咪酯、罗库溴铵、丙泊酚、瑞芬太尼及镇痛泵舒芬太尼消耗量对比均未见明显统计学差异(P＞0.05)。两组患者复苏时间、PACU 停留时间、总住院天数及医疗费用等对比未见明显统计学差异(P＞0.05)；TAPB 联合静吸复合麻醉组术后住院天数明显高于 TAPB 联合全凭静脉麻醉组（P＜0.05）。两组术后 48h 内 VAS 评分呈现逐渐降低态势，且组间各时间段对比均未见明显统计学差异(P＞0.05)；两组术后舒芬太尼消耗量及镇痛泵按压次数对比均未见明显统计学差异(P＞0.05)。
结论 TAPB 联合静吸复合麻醉与全凭静脉麻醉应用于妇科腹腔镜手术均存在不良反应情况发生，但接受 TAPB 联合全凭静脉麻醉方案患者并发不良反应的概率较低，故推荐优先选择 TAPB 联合全凭静脉麻醉用于临床。

PU-0220

Fragile airway mucosa under the endotracheal tube cuff：a multifaceted study reexamines the safe limits of endotracheal tube cuff pressure

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Background： The Endotracheal tube (ETT) cuff, a crucial component, not only maintains airway seal for assisted ventilation but also effectively prevents aspiration. The optimal ETT cuff pressure remains contentious. Traditionally, the level 30 cmH2O is considered safe, balancing the prevention of reflux aspiration against airway mucosal damage. It is not known whether cuff pressure of 30 cmH2O has a risk of injury to airway mucosa in patients with prolonged anesthesia ventilation. We conducted a multilevel observational study to assess whether a cuff pressure of 30 cmH2O is safe for airway mucosa.

Methods: This study was conducted as an observational study comprising three parts. In brief, the first part of the study utilized a web-based questionnaire survey among anesthesiologists to assess their methods and awareness regarding the establishment of ETT cuff pressures across different proficiency levels. Additionally, pressure monitoring was used to measure ETT cuff pressure values established by select anesthesiologists, and the impact of perioperative anesthesia and surgical procedures on cuff pressures was evaluated. The second part of the study involved a retrospective observational analysis of the condition of airway mucosa in mechanically ventilated general anesthesia patients maintained at a baseline ETT cuff pressure of 30 cmH2O for varying durations. Correlation analyses were performed between the degree of mucosal damage and postoperative pharyngeal pain severity based on postoperative follow-up records. In the third part, an animal mechanical ventilation model was employed to maintain ETT cuff pressure at 30 cmH2O. After 4 h of ventilation, microscopic structural changes in the airway mucosa were observed, and the sequential method was used to estimate the ED50 of cuff pressure required to prevent airway mucosal injury.
Results: 631 valid questionnaires and the cuff pressures set by 294 anesthesiologists, suggesting that anesthesiologists generally do not pay enough attention to ETT cuff pressure and the average established cuff pressure significantly exceeded 30 cmH2O. Observations indicated that maintaining the pressure at 30 cmH2O caused mucosal damage in patients, with damage severity increasing with longer ventilation periods. This correlated strongly with postoperative sore throat (R^2=0.3884, P<0.001). In rabbits, 4 h of ventilation at this pressure resulted in significant loss of ciliated epithelium and inflammation. Calculations suggested an effective dose (ED50) to prevent mucosal injury at a cuff pressure of 25.64 cmH2O (95% CI: 19.268-29.367 cmH2O).
Conclusion: The currently established cuff pressure of 30 cmH2O is associated with airway mucosal damage in both clinical and animal models. Considering the findings, lowering the safety threshold of cuff pressure may be necessary to mitigate mucosal injury while ensuring airway seal integrity.

PU-0221

AI 设备陪伴改善老年病人术后认知功能障碍

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目的 老年病人术后认知功能障碍(Postoperative Cognitive Dysfunction,POCD)是一种常见且严重的术后并发症。它主要表现为记忆力减退、注意力不集中、语言功能受损等，这些症状不仅给患者的日常生活带来不便，还可能导致长期的认知能力下降。随着人口老龄化的加剧，越来越多的老年患者需要接受各种手术，而 POCD 的发生率也随之增加。据统计，60 岁以上患者中有高达 30%-50%在术后出现不同程度的认知功能障碍。POCD 不仅影响患者的生活质量，还对家庭和社会带来了沉重的负担。患者可能因为认知障碍失去自理能力，增加了护理需求和医疗费用。此外，POCD 还与术后并发症增加、康复时间延长以及死亡率提高密切相关。目前，对于 POCD 的治疗和管理主要依赖于药物、物理康复以及心理支持等传统方法。然而，这些方法在实践中存在诸多局限性。例如，药物治疗往往伴随着副用，并且无法针对个体患者的具体需求进行调整。物理康复和心理支持虽然有一定的效果，但由于资源有限，难以覆盖到每一位患者，且效果依赖于患者的参与度和持续性。此外，缺乏有效的早期识别和干预手段使得许多患者在症状严重时才得到治疗。人工智能(A)技术近年来在各个领域展现出了巨大的潜力，尤其是在医疗保健方面。A 可以通过自然语言处理、机器学习、计算机视觉等技术，提供个性化的解决方案和自动化的服务。在 POCD 的管理中，A 可以通过以下几个方面提供支持：自然语言处理(NLP):A 可以通过与患者进行对话，实时监测他们的认知状态，并提供个性化的认知训练和支特。机器学习：A 可以分析大量患者的数据，识别出 POCD 的早期征兆，并根据患者的具体情况提供个性化的治疗建议。虚拟陪伴：A 可以模拟人类陪伴，为患者提供情感支持和互动，帮助他们缓解术后焦虑和孤独感，这对于老年患者尤为重要。本

研究旨在开发和评估一种基于聊天人工智能的系统，专门用于帮助老年病人术后恢复认知功能。
方法 一、技术架构
NLP 模块：利用 Transformersi 进行语音识别，将老年患者的语音转文本；用 GPT-4 生成流畅对话内容。
认知训练模块：包括记忆训练(词汇回忆、照片配对)、注意力训练(找不同、快速反应游戏)、语言练习(词汇扩展、句子重组)。
用户界面：设计简洁、易用，支持多设备。
二、开发流程
需求分析：访谈老年患者、护理人员及医疗专家，确定系统功能(对话引导、认知训练、情感支持)。
原型设计：从低保真到高保真，经过反馈和改进。
系统实现：模块化开发和集成，内部测试和用户反馈优化。
三、临床试验设计：
试验目的
主要目标：评估聊天 A 对老年术后认知功能障碍(POCD)的改善。
次要目标：分析系统对情绪、生活质量和术后恢复的影响。
四、试验设计
类型：随机对照试验(RCT),多中心，为期 6 个月。
对像：纳入 1000 名 65 岁以上、术后 POCD 患者，分实验组(使用 A)和对照组（常规护理）。
流程：基线、3 个月中期、6 个月结束的认知、情绪、生活质量评估。
五、伦理考虑：
知情同意：提供详细信息，签署同意书。
数据隐私：匿名化处理，数据加密。
风险管理：评估潜在风险，提交伦理委员会审查。
结果 本研究证明了聊天人工智能(AI)在改善老年患者术后认知功能障碍(POCD)方面的显著作用。实验包括 1000 例 POCD 患者，518 例使用了聊天 AI 系统（实验组），482 例接受常规护理（对照组）。实验组在术后 1 周、1 个月、3 个月、6 个月进行词汇流畅性测验(VFT)、视觉辨认功能测验(VRT)、简易智力状态检查(MMSE)和数字倒背测验(DSB)。结果显示，实验组在所有测试中的得分均显著高于对照组($p<0.001$)。综合分析表明，聊天 AI 系统显著改善了词汇流畅性、视觉辨认功能、整体认知状态及记忆能力，且随着时间推移，效果持续显著，显示出多维度的干预效果。

结论 聊天人工智能系统作为 POCD 患者术后恢复的干预工具，展示了其显著的效果。在所有测试时间点，实验组的认知功能得分均显著高于对照组，显示了聊天 A 系统对提升患者认知功能的潜力。这种干预方式不仅能够在术后短期内(1 个月)显著改善认知功能，而且在长期(6 个月)干预下，持续保持效果，并在词汇流畅性、视觉辨认能力、整体认知状态和记忆能力上取得了显著进展。结果表明，聊天 A 系统是一种有效的工具，可以广泛应用于术后认知功能障碍的管理和恢复过程。

PU-0222

多基因 SNP 通过机器学习建模预测肾移植患者术后镇痛药物用量

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目的 在肾移植术后，患者术后镇痛药物的需求表现出显著的个体差异，这种差异可能受到多种因素的影响，包括遗传因素、术前和术后状态、手术类型和麻醉方式等。研究表明，基因多态性，尤其是多基因单核苷酸多态性（SNPs），在药物代谢和药效学方面起着关键作用。本研究旨在通过机器学习的方法，针对代谢相关的 22 个基因的 SNP，建立肾移植术后患者镇痛药物用量的预测模

型。

方法 共纳入 117 名行肾移植的患者，收集其基因信息。通过术后随访的方式统计其术后镇痛药物的用量，并将其分为高消耗、中消耗和低消耗三组。选择的候选基因单核苷酸多态性基因型包括：Cytochrome P450 Family 2 Subfamily D Member 6 (CYP2D6) 基因中的两个 SNP (RS1065852，RS16947)，ATP-binding cassette sub-family B member 1 （ABCB1）基因中的三个 SNP (RS2032582，RS1045642，RS1128503)，opioid receptor mu 1 （OPRM1）基因中两个 SNP（RS1799971，RS6500265）等在内的共计 22 个 SNP。同时将患者的性别、年龄、BMI 等参数用于建立预测肾移植术后镇痛药物消耗的模型。我们共构建了九种不同的机器学习模型，包括 MLR、人工神经网络 (ANN)、回归树 (RT)、多元自适应回归样条 (MARS)、增强回归树 (BRT)、支持向量回归 (SVR)、随机森林回归 (RFR)、套索回归 (LAR) 和贝叶斯加性回归树 (BART)。所有九种机器学习模型均使用 80% 的患者数据进行训练。然后分布用这九种机器学习模型对 20%的样本数据进行了测试。同时评估模型的准确度、精确度、灵敏度和 F 1-score。

结果 在九种机器学习模型中，随机森林模型表现出最高的预测准确度 81%，其中精确度为 76%，召回率 86%， F1-score81。其中该模型对于镇痛药物中消耗组的预测精准度要优于高消耗和低消耗组（86% vs 76% and 83%）。

结论 本研究证明了机器学习算法在建立 SNPs 和临床表型之间关联性的应用潜力，能够为肾移植患者术后的个性化镇痛管理提供可行方案。但是样本量不足、SNP 之间的复杂交互作用以及特征 SNP 在筛选上的难度使得此模型尚不能直接转化推广。为了应对这些问题，未来的研究可以采用更大的数据集、更先进的算法、更有效的特征选择方法。并注重模型的解释性和生物学合理性。此外，跨学科合作和多中心数据共享也有助于提高研究的可靠性和广泛适用性。

PU-0223

非心脏手术后缺血性脑卒中预测模型的构建和多中心验证

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目的 构建非心脏手术后缺血性脑卒中预测模型并进行多中心验证。

方法 纳入解放军总医院第一医学中心 2008-2019 年非心脏手术患者，按 7：3 比例分为训练集和验证集。训练集用于模型建立，验证集用于模型内部验证，Logistic 逐步回归法筛选建模变量，构建预测模型并绘制列线图。通过受试者工作特征曲线下面积（area under the receiver operating characteristic curve，AUC）评价模型区分度，Hosmer-Lemeshow（H- L）检验评价模型一致性，决策曲线分析（decision curve analysis，DCA）评价临床净获益。使用河南省人民医院和南方医院非心脏手术患者数据对模型进行外部验证，并将模型和 ATRIA 卒中风险评分，以及 Mashour 等人，Lip 等人，Wolf 等人以及 Woo 等人发表的脑卒中预测模型进行比较。最后，在河南省人民医院和南方医院人群将本模型和 ATRIA 卒中风险评分和 Lip 等人发表的脑卒中预测模型进行比较。

结果 最终纳入年龄、ASA 分级、高血压、既往卒中史、瓣膜性心脏病、外周血管疾病、术前使用类固醇激素、围术期使用阿司匹林、术前平均动脉压、术前纤维蛋白原/白蛋白比值、术前空腹血糖、急诊手术、手术类型和手术时长 14 个建模变量。列线图评分高风险界值 158.3。训练集 AUC 0.910 (95% (CI) [0.897-0.923])，内部验证 AUC0.886 (95% CI [0.855-0.918])。H-L 检验表现出较好的一致性，DCA 净获益概率阈值为 0%-14%。河南省人民医院外部验证 AUC0.900 (95% CI [0.882-0.918])，南方医院外部验证 AUC0.894 (95% CI [0.868-0.921])。本预测模型 AUC (0.910, 95% CI [0.897-0.923]) 高于 ATRIA 卒中风险评分(AUC 0.740, 95% CI [0.713-0.767])，Mashour 等人报道的模型(AUC 0.777, 95% CI [0.751-0.803])，Lip 等人报道的模型(AUC 0.804, 95% CI [0.779-0.829])，Wolf 等人报道的模型(AUC 0.769, 95% CI [0.744-0.794])，以及 Woo 等人报道的模型 (AUC 0.883, 95% CI [0.868-0.899]; P<0.001)。在南方医院和河南省人民医院，本预测模型区分

度和临床净获益均高于 ATRIA 卒中风险评分和 Lip 等人发表的脑卒中预测模型。
结论 本研究开发的非心脏手术患者术后缺血性脑卒中预测模型具有较好的预测效能，且优于目前国外报道的预测模型。

PU-0224

ND-C14 纳米抗微生物肽对肺炎链球菌感染的保护作用和机制

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目的 肺炎链球菌是引起细菌性肺炎的常见病原体。然而，随着细菌耐药性的增加，迫切需要开发新的药物来治疗肺炎链球菌感染。带 14 碳饱和脂肪酸的纳米防御素（Nanodefensin with a 14-carbon saturated fatty acid, ND-C14）是通过酰胺键修饰人 a-防御素 5 （a-defensin 5, HD5）c 端肉豆蔻酸而设计的新型纳米抗菌肽。然而，ND-C14 对肺炎链球菌引起的肺部感染是否有效尚不清楚。本研究为了评估新型纳米抗菌肽 ND-C14 对肺炎链球菌(S. pneumoniae)感染的保护作用及其机制。比较了 ND-C14 和人 α-defensin 5 (HD5)对 S. pneumoniae 的杀菌效果,并分析了 ND-C14 破坏细菌膜的机制。检测了 ND-C14 对 S. pneumoniae 感染小鼠存活率、细菌负荷和肺组织损伤的影响。
方法 在体外实验中，包括对照组、HD5 处理组和 ND-C14 处理组，共建立了三个实验组。采用虚拟菌落计数法评估 HD5 和 ND-C14 对肺炎链球菌的抗菌活性。通过扫描电子显微镜观察了经 HD5 或 ND-C14 处理的肺炎链球菌的形态学变化。在体内实验中，小鼠被分为假手术组、溶剂处理组和 ND-C14 处理组。假手术组小鼠接受 25 μL 磷酸盐缓冲液（PBS）处理。溶剂处理组和 ND-C14 处理组小鼠接受 2×10^8 CFU/mL（总菌量：5×10^6 CFU）的细菌悬液经气管插管给予 25 μL 处理，然后分别给予 25 μL PBS 或注射 25 μL 含 20 μg 或 50 μg ND-C14。评估了溶剂处理组和 ND-C14 处理组小鼠的存活率。计算了血液和支气管肺泡灌洗液中的细菌负荷。评估了小鼠肺组织学。使用碘化丙啶摄取法阐明了 ND-C14 对肺炎链球菌的破坏作用。
结果 与 HD5 相比，ND-C14 体外破坏肺炎链球菌膜结构的能力更强，对肺炎链球菌具有更好的杀菌效果。在体内，ND-C14 显著延缓肺炎链球菌感染小鼠的死亡时间，提高小鼠存活率。ND-C14 减轻了细菌负荷和肺组织损伤。ND-C14 对肺炎链球菌具有膜渗透作用，其破坏能力随 ND-C14 浓度的增加而增强。
结论 ND-C14 在体外和体内均可提高对肺炎链球菌的杀菌效果。

PU-0225

超声-响应型纳米胶束用于长效按需镇痛的研究

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目的 疼痛，是现代医学六大生命体征之一。国际疼痛学会将疼痛定义为一种与实际或潜在的组织损伤相关的不愉快的感觉和情绪情感体验，或与此相似的经历。长期或反复的疼痛刺激还可能会伴随焦虑、抑郁、睡眠障碍等精神症状发生，严重影响患者的身心健康，也给家庭和社会带来巨大的

经济负担。目前，超声下引导神经阻滞因镇痛效果好、可减少阿片类药物使用、对脏器功能影响小等优点，在临床疼痛治疗中备受关注。然而，进行神经阻滞时给予的局部麻醉药因其神经阻滞时间较短，而无法满足长期持续性疼痛患者的需求。为此，我们利用纳米技术构建了一种具有药物控制释放能力的超声-响应型纳米胶束，通过局部麻醉药的负载，以实现超声调控神经阻滞，用以长效按需疼痛治疗。

方法 在这一纳米胶束中，通过在具有良好生物相容性的聚乙二醇链上引入声敏剂和超声敏感基团硫缩酮键，合成了超声-响应型聚乙二醇衍生物。通过纳米沉淀法，以聚乙二醇衍生物为主要成分制备了纳米胶束，并负载罗哌卡因，获得具有超声-响应能力的纳米镇痛胶束。

结果 核磁共振氢谱结果表明超声-响应型聚乙二醇衍生物的成功制备。获得的纳米胶束为直径约 30 nm 的球形，并具有良好的胶体稳定性。此外，该纳米镇痛胶束的载药量为 24 %。体外药物释放实验表明该纳米镇痛胶束具有超声强度依赖的局麻药控制释放能力。纳米胶束在细胞实验中表现出了良好的神经细胞生物相容性，同时，在大鼠坐骨神经处注射该纳米胶束后，也未见明显的组织炎症与神经毒性。将纳米胶束标记荧光后，探究了其活体滞留时间，发现纳米镇痛胶束可在大鼠坐骨神经附近滞留超过 16 小时，明显高于小分子药物的体内滞留时间。与此同时，纳米镇痛胶束经超声刺激后可实现三个循环的坐骨神经阻滞。

结论 本研究成功制备了具有超声控质释放局麻药能力的纳米胶束。这一纳米胶束通过在超声刺激下可由声敏剂产生单线态氧，是硫缩酮键断裂，瓦解纳米胶束结构，促使负载于其中的罗哌卡因释放。在本实验条件下，纳米胶束在细胞和活体水平上均未表现出明显的毒副作用，且能在坐骨神经附近实现长时间滞留。同时，经负载局麻药罗哌卡因后，通过超声可对大鼠坐骨神经阻滞进行调控，实现长效按需镇痛。

PU-0226

运动后心率恢复与抑郁症的因果关联：一项两样本、双向孟德尔随机化研究

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目的 探究运动后心率恢复与抑郁症之间的双向因果关系，寻找能够尽早识别抑郁症高危人群的方法，以期促进抑郁症的预防工作和减少抑郁症的疾病负担。

方法 从 IEU Open GWAS project (https://gwas.mrcieu.ac.uk/) 获取全基因组关联研究的数据，通过去除连锁不平衡、弱工具变量以及使用 PhenoScanner (http://www.phenoscanner.medschl.cam.ac.uk/) 来去除可能存在的混杂因素后采用逆方差加权（inverse-variance weighted, IVW）法为主要的孟德尔随机化（Mendelian randomization, MR）分析方法，并辅以 MR Egger 和加权中值法。使用 MR-PRESSO 检验和 MR-Egger 回归法来评估工具变量的水平多效性，使用留一法进行敏感性分析，采用 Cochran's Q 检验来评估工具变量的异质性，并使用 meta 分析的方法合并数据库之间的结果。

结果 两个数据库的结果均表明，运动后恢复 10 秒的心率较高与抑郁症之间都存在因果关系（ieu-A-1188：OR=1.138，95%CI: 1.041-1.245，P=0.0044；Howard et al.：OR=1.074，95%CI: 1.024-1.123，P=0.0048）。对于运动后心率恢复 20 秒，两个数据库的结果虽均未达到 P 值校正后的界值（ieu-a-1188: OR=1.109, 95% CI 1.010-1.217, P = 0.0299; Howard et al.: OR=1.065, 95% CI 1.014-1.117, P = 0.0159），但利用 meta 分析的方式进行数据合并后，结果表明运动后恢复 20 秒的心率较高与抑郁症之间也存在因果关系，对抑郁症的 log OR 增加值为 1.076（P=0.002）；对于运动后心率恢复 30 至 50 秒的数据，与抑郁症的因果关系均没有达到统计学意义（P 均>0.05）。此外，没有证据表明上述结果存在反向因果关系。综上本研究主要发现了运动后心率恢复（10 秒和 20 秒）与抑郁症之间存在因果关系，但无反向因果关系存在。

结论 本研究初步确定了运动后心率恢复（10 秒和 20 秒）与抑郁症之间的因果关系，即运动后心率恢复（10 秒到 20 秒）越慢，心率越快，发生抑郁症的风险越高，但不存在反向因果关系。随着智能可穿戴设备行业的迅速发展，本结果为开发抑郁症预警算法开辟了崭新方向，为提高抑郁症的可预防性提供可能。然而，鉴于孟德尔随机化研究本身的局限性，尚需行进一步的临床队列研究以证实。

PU-0227

记忆 B 细胞与抑郁症因果关联的两样本、双向孟德尔随机化研究

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目的 探究记忆 B 细胞与抑郁症之间的因果关系，识别抑郁症的危险因素并寻找抑郁症新的治疗靶点，以减轻抑郁症的全球疾病负担。

方法 从英国生物银行和 Psychiatric Genomics Consortium 数据库获取抑郁症的全基因组关联研究数据。记忆 B 细胞的汇总数据来自一项关于免疫表型的全基因组关联研究，可从 IEU Open GWAS 网站(https://gwas.mrcieu.ac.uk/)获得。首先通过显著性阈值、连锁不平衡、弱工具变量筛选、代理 SNP (single-nucleotide polymorphisms) 、协同暴露和结局数据等方法获取足够且有效的遗传变量。采用逆行方差加权法（inverse-variance weighted, IVW）、MR-Egger 法、加权中值法（Weighted median, WE）进行孟德尔随机化（Mendelian Randomization, MR）分析以揭示记忆 B 细胞与抑郁症之间的因果关系。结果主要基于 IVW（随机效应或固定效应模型），其次是敏感性分析。采用 IVW 和 MR-Egger 进行异质性检验。孟德尔随机多态性残差和离群值（MR Pleiotropy REsidual Sum and Outlier, MR-PRESSO）和 MR-Egger-intercept 分别用于筛选离群值和多效性检验。留一分析（leave-one-out, LOO）用于识别具有潜在影响的单核苷酸多态性。

结果 我们共获得 54 个记忆 B 细胞相关的免疫性状，可分成三组：绝对细胞计数（absolute cell count, AC）、中值荧光强度（median fluorescence intensity, MFI）以及相对细胞计数（relative cell count, RC）。其中，正向分析结果显示：在 54 个记忆 B 细胞的免疫表型中，45 个与抑郁症具有交叉的 SNP，但仅 6 个免疫表型具有调整后显著的 P 值（PFDR<0.05），且都是抑郁症的危险因素，分别是 CD27 on memory B cell, CD27 on switched memory B cell, CD27 on unswitched memory B cell, CD27 on IgD^- $CD38^-$ B cell, CD27 on IgD^- $CD38^{dim}$ B cell, CD27 on IgD^+ $CD38^-$ unswitched memory B cell。IVW 计算的 6 种免疫表型与抑郁症的因果效应 OR 值分别为 1.034 (95%CI:1.019-1.049, $P=6.74*10^{-6}$, $PFDR=2*10^{-4}$), 1.026 (95%CI:1.015-1.038, $P=8.07*10^{-6}$, $PFDR=9.03*10^{-5}$), 1.032 (95%CI:1.018-1.046, $P=7.33*10^{-6}$, $PFDR=1*10^{-4}$), 1.031 (95%CI:1.018-1.044, $P=1.61*10^{-6}$, $PFDR=7.25*10^{-5}$), 1.029 (95%CI:1.016-1.042, $P=8.93*10^{-6}$, $PFDR=8.04*10^{-5}$), 1.029 (95%CI:1.016-1.042, $P=8.93*10^{-6}$, $PFDR=1*10^{-4}$)。并且，正向分析中未发现显著的异质性、水平多效性和异常离群值。此外，反向 MR 结果表示抑郁症对 54 种免疫表型均无因果效应，同时反向分析中存在显著的异质性。

结论 本研究从遗传学的角度证明了记忆 B 细胞上 CD27 表达量增高与抑郁症发病风险增加有关。这可能为研究人员研究抑郁症背后的分子机制提供新的思路，并作为研究早期干预和治疗的基础。

PU-0228

乌司他丁对顺阿曲库铵和罗库溴铵药效动力学影响的比较研究

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目的 探究乌司他丁对不同肌肉松弛剂的起效时间和临床作用时间的影响
方法 将择期行妇科手术的 60 例患者（ASAⅠ或Ⅱ级）按照随机数字表法分为 4 组（n=15）。常规静脉麻醉诱导：舒芬太尼 0.5μg/kg，丙泊酚 2mg/kg，患者入睡后，各组肌肉松弛剂的运用分别如下：ROC-ULI 组（静脉注射乌司他丁 5000U/kg 后给予罗库溴铵 0.6mg/kg）、ROC-NS 组(静脉注射生理盐水 0.1ml/kg 后给予罗库溴铵 0.6mg/kg）、CIS-ULI（静脉注射乌司他丁 5000U/kg 后给予顺阿曲库铵 0.1mg/kg）以及 CIS-NS 组（静脉注射生理盐水 0.1ml/kg 后给予顺阿曲库铵 0.1mg/kg）。乌司他丁或生理盐水与肌肉松弛剂的注射间隔时间为 2 分钟。麻醉维持采用靶控输注丙泊酚(3.5～4μg/kg/min)和恒速输注瑞芬太尼（0.1～0.2 μg/kg/min）。采用 Narcotrend™指数监测麻醉深度。使用四个成串刺激（Train-of-four ratio, TOF）评估首次运用肌松剂后的神经肌肉阻滞恢复情况：记录肌肉松弛剂起效时间、TOF 刺激时 T1、T2、T3、T4 的恢复时间(分别为 RT1、RT2、RT3 和 RT4)、中度神经肌肉阻滞持续时间(RT1-RT4)、25%持续时间、50%持续时间、TOF 比值（T4/T1）恢复至 0.7 所需时间以及 TOF 比值为 0.7 的持续时间。$p < 0.05$ 被认为差异有统计学意义。
结果 与 CIS-NS 组相比，CIS-ULI 组中的顺阿曲库铵平均起效时间、RT1、RT2、RT3、RT4、中度神经肌肉阻滞持续时间、25%持续时间、50%持续时间、TOF 比值恢复至 0.7 所需时间以及 TOF 比值为 0.7 的持续时间均无显著差异。与 ROC-NS 组相比，ROC-ULI 组在罗库溴铵的起效时间、TOF 比值恢复至 0.7 的时间无统计学差异。与 ROC-NS 组相比，ROC-ULI 组 RT1、RT2、RT3、RT4 时间分别缩短 5.82、6.53、6.53、7.42 分钟（$p<0.05$）；ROC-ULI 组的 25%持续时间以及 50%持续时间分别缩短了 7.47 分钟和 9.77 分钟（$p<0.05$）；中度神经肌肉阻滞持续时间缩短了 1.61 分钟（$p<0.05$）；ROC-ULI 组和 ROC-NS 组中 TOF 比值为 0.7 的持续时间均值分别为 47.44 和 58.30 分钟，平均差异为 10.86 分钟（$p<0.05$）。
结论 在使用顺阿曲库铵前 2 分钟给予 5000U/kg 剂量乌司他丁不影响 0.1mg/kg 剂量顺阿曲库铵的起效时间、临床持续时间和恢复时间。在使用罗库溴铵前 2 分钟使用 5000U/kg 乌司他丁可缩短 0.6mg/kg 罗库溴铵临床持续时间，但不影响其起效时间和恢复时间。因此，在择期手术中需要同时使用乌司他丁和肌肉松弛剂时，我们倾向于选择顺阿曲库铵，因其起效时间、临床持续时间和恢复特性不受乌司他丁预处理的影响。

PU-0229

小剂量地佐辛对妇科腹腔镜手术全麻插管苏醒期气管导管应激反应的影响

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目的 探讨小剂量地佐辛对全麻气管插管腹腔镜手术术后苏醒期气管导管应激反应的影响，探讨其在麻醉苏醒期应用的安全性及可行性
方法 选择择期需要全身麻醉，ASAⅠ～Ⅱ级的妇科手术行气管插管术患者 60 例。按随机数字表法，将入组患者分为两组，对照组(C 组) 和地佐辛组(D 组) ，每组 30 例。两组患者的麻醉诱导及维持用药方案相同。以静脉注射芬太尼及丙泊酚、罗库溴铵，进行麻醉诱导，麻醉维持以丙泊酚、瑞芬太尼靶控，七氟醚吸入，间断按需给予罗库溴铵维持。手术结束前分别静脉给予单次剂量的地

佐辛 0.05mg /kg 或等容积的生理盐水。术毕当达到拔管指征时，拔除气管导管。分别记录两组患者气管拔管呛咳发生率和严重程度，拔管前后时间点平均动脉压(MAP) 、心率(HR) 、呼吸频率(RR) 的变化，麻醉苏醒时间，拔管时间，拔管后镇静评分及并发症

结果 MAP 值在拔管时 C 组较 D 组明显升高，HR 值在拔管时及拔管后 1min 在 C 组较 D 组比较明显升高，差异有统计学意义 (P < 0. 05) 。呛咳严重程度及发生率 D 组明显减少，两组比较差异有统计学意义 (P <0. 05) 。苏醒时间及术后镇静评分，两组比较差异无统计学意义(P >0. 05)

结论 手术结束前静脉注射小剂量地佐辛 0.05 mg /kg，能有效减轻拔管期的心血管反应和气道反应，对术后呼吸运动无影响，可提高术后拔管舒适程度，降低应激反应，且不影响患者苏醒。

PU-0230

FAK 及其相关信号通路对多柔比星脂质体诱导卵巢癌心肌损伤保护作用及其机制

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目的 盐酸多柔比星(Doxorubicin，DOX)是一种"蒽环类"细胞毒性药物，能够阻止或减缓癌细胞和其他快速分裂细胞的生长。根据 NCCN 指南，作为广谱抗癌药物，DOX 主要用于具有转移性的卵巢癌、乳腺癌等肿瘤的临床治疗，但因其心脏毒性副作用而限制了临床应用。目前，DOX 诱导心脏毒性的机制尚不清楚，并且预防这种不良反应的策略有限。本研究拟探索 DOX 造成心肌损伤的机制，验证黏附斑激酶（Focal Adhesion Kinase，FAK）是否对 DOX 诱导的心肌细胞损伤和心毒性具有保护作用，以及 Nrf2 在其中的作用，以期为减轻 DOX 抗癌的心毒性副作用提供新的保护策略

方法 通过对 NCBI 数据库中 3 组数据集进行分析，筛选 DOX 处理后相关通路和差异基因。在细胞水平和动物水平，分别使用 DOX 对 AC16 心肌细胞（DOX 剂量 2μm/ml）和 SKOV3 卵巢癌小鼠（DOX 剂量 5mg/kg）进行干预，观察铁死亡相关蛋白（HO-1/GPX4）、氧化应激、心肌损伤，以及 FAK/Nrf2 表达的变化情况。同时，应用铁死亡抑制剂（Ferrostatin-1, Fer-1）在细胞水平验证抑制铁死亡是否挽救 DOX 诱导心肌细胞损伤。机制水平，通过构建心肌特异性过表达慢病毒 FAK（Lentivirus-FAK, Len-FAK），在 DOX 处理前，分别对 AC16 心肌细胞和 SKOV3 卵巢癌小鼠使用心肌特异性过表达 Len-FAK 进行预处理，观察上述指标。最后，本研究应用小干扰 RNA 敲低心肌细胞中 Nrf2 的活性，使用 Len-FAK 进行预处理后，进行 DOX 干预，观察上述指标，验证 FAK 是否通过 Nrf2 参与 DOX 诱导的心肌细胞损伤保护作用。

结果 GSEA 信号通路分析显示，DOX 处理后，铁死亡相关通路被显著激活，FAK 信号通路在心肌组织中显著下调。细胞水平和动物水平实验结果表明，DOX 处理后，铁死亡相关蛋白 HO-1/GPX4 显著降低，氧化应激显著增加，心肌细胞受损和心功能障碍增加，Fer-1 能够缓解 DOX 诱导的心肌细胞损伤。机制上，AC16 心肌细胞和 SKOV3 卵巢癌小鼠进行 DOX 处理前，分别使用心肌特异性过表达 Len-FAK 进行预处理，结果表明，FAK 过表达显著改善了 DOX 诱导的铁死亡相关蛋白、氧化应激、心肌细胞损伤和 HDAC5/Nrf2 的表达水平。此外，研究结果显示，心肌特异性过表达 FAK 抑制 DOX 心毒性，不影响肿瘤治疗效果。使用小干扰 RNA 抑制 Nrf2，消除了 FAK 对 DOX 诱导的铁死亡相关蛋白、氧化应激、心肌细胞损伤的改善作用。

结论 FAK 能够通过 HDAC5/Nrf2 通路，改善 DOX 诱导的铁死亡、氧化应激和心肌损伤，对 DOX 诱导的心毒性具有保护作用。

PU-0231

多西他赛联合卡铂新辅助化疗方案相关药物性肝损伤的机制研究

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目的 近年来随着多西他赛和卡铂等抗肿瘤化疗药物在癌症治疗中的广泛应用，其联合作为 TCb 新辅助化疗方案的方式也逐渐增加。多西他赛、铂类化疗药在杀死肿瘤细胞的同时，不可避免地对正常细胞、组织和器官产生不良影响，从而导致肝毒性，并可能引起严重的肝损伤。本研究旨在探究 TCb 新辅助化疗方案所致药物性肝损伤（Drug-induced liver injury，DILI）的发病机制，期望为肿瘤患者应用新辅助化疗的同时预防药物性肝损伤的发生提供新思路。

方法 体外实验中，使用 TCb 新辅助化疗方案药物干预小鼠正常肝细胞系 AML12，观察 AML12 细胞自噬和凋亡水平的变化。使用自噬激动剂 Rapamycin 及自噬抑制剂 MHY1485 处理 TCb 干预后的 AML12 细胞，明确 TCb 导致的 AML12 细胞凋亡是否与自噬水平的变化相关。此外，使用 TCb 干预 AML12 细胞后，观察其 cGAS-STING 通路相关蛋白表达的变化。最后，分别 STING 外源性抑制剂 C-176 和小干扰 RNA 降低 AML12 细胞内 STING 蛋白表达，探究 STING 在 TCb 引起的 AML12 细胞凋亡中的作用机制。体内实验中，通过腹腔注射 TCb 诱导药物性肝损伤小鼠模型：根据组织病理学观察药物性肝损伤小鼠肝损伤情况；通过 ELISA 法测定小鼠血清中 ALT、AST、TBIL、ALP 含量；使用 TUNEL 染色观察小鼠肝组织细胞凋亡情况；使用免疫荧光及免疫组化观察小鼠肝组织细胞 STNG 蛋白的表达水平。

结果 体外实验结果显示，经 TCb 干预后的 AML12 细胞：凋亡相关基因 BAX 的蛋白表达显著升高，而 Bcl-2 的蛋白表达显著降低；自噬相关基因 p62 的蛋白表达显著升高，而 Beclin-1、LC3-II 的蛋白表达显著降低；TUENL 染色结果显示 TCb 组 AML12 细胞的凋亡水平显著增加。在 TCb 给药时同时加入 Rapamycin 后，发现 Rapamycin 使得 AML12 细胞自噬水平有所回升，并抑制了其凋亡水平；而在 TCb 给药时同时加入 MHY1485，发现 MHY1485 使得肝细胞自噬水平进一步被抑制，并加重了其凋亡水平。此外，TCb 组 AML12 细胞 cGAS、STING 的蛋白表达显著升高，而在使用 C-176 和 siRNA-STING 降低 AML12 细胞中 STING 的蛋白表达后，发现 C-176 和 siRNA-STING 均能起到逆转 TCb 抑制 AML12 细胞自噬的作用并降低凋亡水平。在体内实验中，通过 H&E 和 Masson 染色观察到 TCb 可显著导致药物性肝损伤小鼠的肝损伤情况。此外，与 CON 组相比，TCb 组小鼠血清中 ALT、AST、TBIL、ALP 含量均显著升高；TCb 组小鼠肝组织细胞凋亡相关基因 BAX 的蛋白表达显著升高而 Bcl-2 的蛋白表达显著降低，自噬相关基因 p62 的蛋白表达显著升高而 Beclin-1、LC3-II 的蛋白表达显著降低；此外，TCb 组小鼠肝组织细胞内 STING 蛋白的表达水平也显著升高。

结论 多西他赛联合卡铂形成的 TCb 新辅助化疗可使得小鼠肝细胞 cGAS-STING 通路过度激活，进而抑制肝细胞内自噬流水平并导致小鼠肝细胞发生凋亡，最终引起 DILI。涉及调节 cGAS-STING 通路的新发现将使我们能够确定作为 DILI 潜在治疗靶点的重要分子。

PU-0232

呼气末正压通气对腹腔镜袖状胃切除术的肥胖患者术中氧合及术后肺不张的影响

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目的 研究不同水平呼气末正压（positive end-expiratory pressure，PEEP）通气对行腹腔镜袖状胃切除术肥胖患者的术中氧合及术后肺不张的影响，探讨行腹腔镜手术肥胖患者的合适 PEEP 水平。
方法 选取 2021 年 6 月至 2022 年 1 月在复旦大学附属华山医院行全麻下择期腹腔镜袖状胃切除术的肥胖患者 120 例。年龄 18～54 岁，ASA 分级 II-III 级，BMI：30～50 kg/m2。将患者随机分为 2 组（n=120）：低 PEEP 组（L 组，PEEP=5 cm H2O，n=60）和高 PEEP 组（H 组，PEEP=10 cm H2O，n=60）。采用压力控制-容量保证通气模式，气管插管后分别给予 5 或 10 cm H2O 的 PEEP，直至手术结束拔除气管导管。围术期记录患者生命体征、呼吸力学指标、氧合指标以及术中血管活性药物的使用情况。根据公式计算氧合指数（OI）、肺泡-动脉氧分压差（A-aDO2）、肺动态顺应性（Cdyn）、驱动压（△P）。行术后第一天肺 CT 检查，计算和比较两组肺不张体积占肺总体积的百分比和肺部并发症（postoperative pulmonary complications, PPCs）的发生率；比较两组术后恶心呕吐、咳嗽、疼痛、伤口感染的情况。
结果 我们使用 3D Slicer 开源医学影像分析软件，对术后第一天肺 CT 进行了图像分割及测量，结果显示：H 组较 L 组术后第一天的肺不张体积/肺总体积的百分比显著降低（P<0.05）。与 L 组相比，H 组插管后 5 min（T1）、气腹即刻（T2）、气腹后 30 min（T3）、气腹后 1 h（T4）的 Cdyn、气道峰压（Ppeak）、气道平台压（Pplat）显著增高；H 组在 T4 时的 OI、动脉血氧分压（PaO2）和氧饱和度（SpO2）均显著增高；H 组在 T1、T2、T3、T4 时的△P 显著降低；H 组在 T4、术后第 1 d (T6) 时的 A-aDO2 显著降低；H 组在 T3、T4 时的平均动脉压（MAP）显著增高；H 组麻黄碱用量更多。两组其他指标均无统计学差异（P>0.05）。
结论 与 5 cm H2O PEEP 相比，对于腹腔镜袖状胃切除术的肥胖患者，术中给予 10 cm H2O 的 PEEP 能更好地改善患者术中氧合，增加肺动态顺应性，降低驱动压和肺内分流，减少术后肺不张。

PU-0233

Comparison of periglottic oxygen fraction, tracheal oxygen fraction, and safe apnoea time under different apnoeic oxygenation techniques: a randomised controlled clinical trial

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Background: From anaesthetic induction to successful tracheal intubation during general anaesthesia, a period of apnoea is inevitable, and difficult airway may result in a prolonged apnoea time and increased risk of severe hypoxemia.Each technique possesses distinct advantages and disadvantages, and their efficacy in prolonging safe apnoea duration varies.The safe apnoea time may be related to the periglottic oxygen fraction.The objective of this trial was to compare the efficacy of different apnoeic oxygenation techniques on prolonging the safe apnoea time and maintaining periglottic oxygen fraction and tracheal oxygen fraction.
Methods: Female Patients aged 18-60 years, American Society of anaesthesiologists (ASA) class I-II, who were scheduled to undergo elective laparoscopic gynaecological surgery under general

anaesthesia were eligible to participate in this randomised, controlled clinical trial.One hundred and twenty-five participants were divided into the modified nasopharyngeal airway with oxygen flow rates of 10 L/min (Naso group), 2 L/min 、 5 L/min and 10 L/min nasal cannula oxygenation groups(L2, L5, and L10 groups), and a control group(L0 group) at a 1:1:1:1:1 ratio. Patient anaesthetic induction and management were conducted according to our hospital's routine.After the patient completely lost consciousness,the treatment started.A sterile gas sampling tube was placed close to the supraglottis and in the 5-cm subglottic region via video laryngoscopy.A video laryngoscope was used to monitor the glottis to prevent the gas sampling tube from shifting.The primary outcome was the proportion of patients with a safe apnoea time of 15 minutes. The secondary outcomes were safe apnoea time ,periglottic oxygen fraction(FgO2) at 1 min of apnoea and the end of the apnoea (FgO2s and FgO2e), tracheal oxygen fraction(FtO2) from T0 to 5minitues, and FtO2 at the end of apnoea (FtO2e).

Results: A total of 23 patients in each group were included in the final analysis.We failed to establish L10's non-inferiority to the Naso group(-13.0% [95% CI, -27.8% to 1.7%],P=0.417),but there was no significant difference in safe apnoea time between L10 group and Naso group (15 [15, 15] min vs 15 [15, 15] min, P=0.138) . L10 group is better than L0, L2 and L5 groups for augmenting the propotion of the safe apnoea time of 15 minutes (82.6% versus 0、8.7% and 43.5%，P<0.001).The safe apnoea time in the L0, L2, and L5 groups was significantly lower than that in L10 group (5.6 [4.8, 6.2] min, 7.3 [6.8, 8.9] min, 12.3 [9.4, 15] min vs. 15 [15, 15] min, P<0.001, P<0.001, and P=0.001, respectively). FgO2s、FgO2e and FtO2e in L10 group were both lower than those in Naso group, but higher than that in L0, L2 and L5 groups（P<0.001）.By linear regression analysis, FgO2e was positively correlated with safe apnoea time (R2=0.854, P<0.001).

Conclusions: In conclusion, when preoxygenated to 90% of the FE′O2, we failed to establish L10's non-inferiority to the Naso group,but both the 10 L/min nasal cannula oxygenation and nasopharyngeal airway groups had a long safe apnoea time, and maintained higher FgO2 and FtO2. The 10 L/min nasal cannula oxygenation had a longer safe apnoea time than that in other nasal cannula oxygenation groups.As the oxygen flow rate increases during nasal cannula oxygenation groups, FgO2 and FtO2 both increase, and the safe apnoea time is correspondingly prolonged.FgO2e was positively correlated with safe apnoea time.

PU-0234

喉罩静脉麻醉联合阴部神经阻滞在混合痔手术中的应用

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目的 探讨喉罩静脉麻醉联合阴部神经阻滞麻醉在混合痔手术中应用价值

方法 前瞻性选取 2022 年 1 月至 2023 年 6 月上海市市北医院肛肠科收治的 104 例混合痔患者，随机分为对照组(采用单纯阴部神经阻滞麻醉)和观察组(采用喉罩静脉麻醉联合阴部神经阻滞麻醉)，每组 52 例。对比观察两组患者麻醉显效情况；对比两组患者在麻醉前(T0)、麻醉后 10min(T1)、手术结束(T2)、麻醉清醒后（T3）、出手术室(T4)时心率(HR)和平均动脉压(MAP)；对比两组患者术后 4h、8h、12h、24h 的视觉模糊疼痛(VAS)评分情况以及麻醉后并发症发生情况。

结果 联合麻醉组总显效率(86.54%)显著高于单一麻醉组(46.15%)，差异有统计学意义(p<0.05);联合麻醉组 T1、T2、T3、T4、T5 时的 MAP 和 HR 均显著低于单一麻醉组，差异有统计学意义(p<0.05);联合麻醉组患者术后 4h、8h、12h 的 VAS 评分均低于单一麻醉组，差异有统计学意义(p<0.05);观察组麻醉后并发症发生率(3.85%)明显低于对照组(13.46%)，差异有统计学意义(p<0.05)。

结论 喉罩静脉麻醉联合阴部神经阻滞麻醉，在混合痔治疗中麻醉效果较好，患者麻醉前后的体征平稳，并能有效降低术后早期疼痛，值得临床推广应用。

PU-0235

Association between lymphocyte-high density lipoprotein ratio and cognitive impairment in Chinese older adults：a population-based cross-section study

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Background: Cognitive impairment (CI) presents a significant public health challenge globally, particularly in aging populations. However, there is limited investigation into the association between lymphocyte-high density lipoprotein ratio (LHR) and CI in Chinese older adults.
Methods: This cross-section study included participants aged≥65 years from the 2008, 2012, and 2014 waves of the Chinese Longitudinal Healthy Longevity Survey(CLHLS). CI was evaluated via the Chinese version of Mini-Mental State Examination (MMSE). The LHR was calculated from measured values of peripheral blood. Multiple logistic regression analysis and restricted cubic spline were applied to investigate the association between LHR and CI. Interaction and stratified analyses were also performed.
Results: Of 3556 participants, 1625 suffered from cognitive impairment. The mean age of the participants was 87.15 ± 11.47 years and the median LHR was 1.29 (0.94~1.76). Multivariate logistic regression analysis indicated that low LHR was associated with CI [odds ratio (OR) = 1.36; 95% confidence interval (CI) = 1.13-1.64, P = 0.001]. In addition, Subgroup analysis showed that LHR and limited in at least one ADL had an interaction on CI (P = 0.045).
Conclusions: Our study indicated that a low LHR was associated with an increased risk of cognitive impairment in Chinese older people. However, external participants, especially those of other ethnicities, should be evaluated to confirm these findings in the future.

PU-0237

瑞马唑仑联合琥珀胆碱麻醉用于无抽搐电休克治疗重度抑郁障碍患者的应用效果

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目的 探索瑞马唑仑联合琥珀胆碱麻醉用于无抽搐电休克（MECT）治疗重度抑郁障碍（MDD）患者的临床效果。
方法 选择 2023 年 6 月至 12 月于我院精神科收治的 MDD 患者 200 例。采用随机数字表法分为两组（n=100）：R 组为瑞马唑仑 0.3 mg/kg，P 组为丙泊酚 1.5 mg/kg，两组患者在诱导时均联合琥珀胆碱 1.5 mg/kg。记录两组患者麻醉前（T0）、麻醉诱导后（T1）、MECT 时（T2）及 MECT 结束后 5min（T3）患者心率（HR）、平均动脉压(MAP)、脉搏血氧饱和度(SPO2)情况；记录自主呼吸恢复时间、苏醒时间、低血压、低血氧、注射痛、头晕等不良反应，记录 T0 及 T3 时患者血清神经损伤标志物神经元特异性烯醇化酶(NSE)、中枢神经特异蛋白(S100β)水平及应激指标去甲肾上腺素(NA)、皮质醇（Cor）水平，术后进行数字疼痛评分量表（NRS）评分及汉密顿抑郁量表（HAMD）评分。
结果 两组患者在不同时间点心率、血压、脉氧饱和度及 NRS 评分相比，差异无统计学意义（P＞0.05）。与 P 组相比，R 组自主呼吸恢复时间、苏醒时间、静脉注射痛、头晕发生率及 HAMD 评分显著降低（P＜0.05），R 组患者 T3 时间点 NSE、S100β、NA 及 Cor 较 T0 时间点显著降低（P＜0.05）。

结论 瑞马唑仑作为一种新型高效镇静药物，诱导迅速，镇静效果优，在 MECT 治疗 MDD 患者中能够显著减少患者经历的不适感和应激反应，保护认知功能，有助于患者在治疗后迅速恢复到正常状态，在确保疗程安全性和有效性的同时提升了患者在接受紧张或不适医疗程序时的整体体验。

PU-0238

丙泊酚通过调控自噬改善 ApoE-/-小鼠动脉粥样硬化的作用以及机制

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目的 探讨丙泊酚通过调控自噬改善载脂蛋白 E 基因敲除（ApoE-/-）小鼠动脉粥样硬化（AS）的作用及机制。
方法 采用 C57BL6 为对照组（n=5，每天腹腔注射等量生理盐水）；ApoE-/-小鼠随机分成模型组（n=5，每天腹腔注射等量生理盐水）、丙泊酚组（n=5，每天腹腔注射 75 mg/kg 丙泊酚）、丙泊酚+ 3-MA（自噬抑制剂）组（n=5，75 mg/kg 丙泊酚+30 mg/kg 3-MA）。对照组给予普通饲料饲喂，另三组给予高脂饲料饲喂，连续饲喂 12 周，造模第 10 周起进行给药，腹腔注射，每日 1 次。检测血脂：胆固醇（TC）、总低密度脂蛋白胆固醇（LDL-C）、甘油三酯（TG）、高密度脂蛋白胆固醇（HDL-C）的含量。此外，使用苏木精-伊红染色（H&E）、油红 O 染色以及 Western blot 技术来评估动脉的组织学结构和自噬相关蛋白 Beclin-1、LC3-II/LC3-I 的表达水平。
结果 与对照组相比，模型组主动脉粥样斑块面积、红染脂质、血清 TC、TG、LDL-C、HDL-C 均明显增加，主动脉中 Beclin-1 蛋白水平、LC3-II/I 比值均明显升高（P<0.05）；与模型组相比，丙泊酚组主动脉 AS 斑块面积、红染脂质、TC 和 LDL-C 均显著下降（P<0.05）。与此同时，主动脉中 Beclin-1 蛋白水平、LC3-II/I 比值均明显增加（P<0.05）。与丙泊酚组相比，丙泊酚+3-MA 组的主动脉 AS 斑块面积、红染脂质、血清 TC、LDL-C 均明显增加，主动脉内 Beclin-1 蛋白水平、LC3-II/I 蛋白表达比值均显著下降（P<0.05）。
结论 丙泊酚表现出对 ApoE-/-小鼠 AS 的改善作用，其机制涉及激活自噬和调节脂质代谢。

PU-0239

DOT1L：在肾脏疾病中的新角色

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目的 近年来， 大量的研究表明， DOT1L 参与了转录延 伸、端粒沉默、 DNA 损伤修复和细胞周期进程的调控[6] 。此外， DOT1L 在机体 中各种组织或器官的发育以及在病理状态下调节白血病和肿瘤的进展中发挥作 用[7, 8]。另一方面，DOT1L 已成为肾脏疾病领域中小分子抑制剂的靶点。越来越 多的证据支持抑制 DOT1L 的表达可以显著改善肾脏纤维化[9] 。因此，本文就 DOT1L 的结构和生物学功能及其在肾脏疾病中的作用进行详细阐述。
方法 组蛋白赖氨酸甲基化是一种在真核生物中调节基因表达的翻译后修饰方式 （PTM）。而 DOT1L 是唯一已知的组蛋白 H3 赖氨酸 79（H3K79）甲基转移酶， 最初在酿酒酵母中被发现。DOT1L 介导的 H3K79 甲基化参与了多种生物过程， 包括基因转录延伸、端粒沉默、 DNA 损伤修复和细胞周期调控。

结果 由于 DOT1L 在肾脏疾病发病和进展的复杂性，以及 DOT1L 通过多种途径 影响肾脏，因此 DOT1L 在不同肾脏疾病模型中的作用存在争议。然而，目前， 在细胞和动物实验中， DOT1L 的抑制剂已被证明在改善肾损伤的预后方面具有 潜在的作用。同时， EPZ-5676 作为 DOT1L 的特异性抑制剂， 已进入白血病和肿 瘤的 I 期临床试验， 并取得了良好的进展[62] 。因此， 使用 DOT1L 抑制剂治疗肾 脏疾病仍需进一步的临床研究。深入探索不同肾脏疾病患者的选择、用药时机以 及与其他药物的联合使用是我们需要解决的问题。 目前正在进行的基础试验和 临床试验中获得的结果可能为上述问题提供合适的答案，并促进开发有前景的
肾脏治疗方法。
结论 本文系统地介绍了 DOT1L 的结构及其在转录延伸、端粒沉默、细胞周期调 控和 DNA 损伤修复等方面的生物学功能。此外，我们进一步阐明了 DOT1L 在 肾脏疾病中的作用及相关分子机制，有助于开发有前途的肾脏疾病治疗靶点， 改善肾脏疾病患者的预后。

PU-0240

环泊酚和丙泊酚用于妇科日间手术的麻醉效果比较

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目的 比较环泊酚和丙泊酚在妇科日间手术麻醉中的有效性和安全性。
方法 选取 116 例拟行妇科日间手术的患者，随机平均分为环泊酚组（C 组）和丙泊酚组（P 组），麻醉诱导时分别给予环泊酚 0.5mg/kg 和丙泊酚 2mg/kg 限时 1 分钟静脉输注，注药开始 2 分钟后未入睡者分别追加环泊酚 0.25mg/kg 和丙泊酚 1mg/kg，追加用药间隔 1 分钟，追加 2 次以上者，视为麻醉失败。术中 C 组静脉泵注环泊酚 1.25mg·kg-1·h-1、阿芬太尼 40ug·kg-1·h-1 维持麻醉，P 组静脉泵注丙泊酚 5mg·kg-1·h-1、阿芬太尼 40ug·kg-1·h-1 维持麻醉。主要观察指标为麻醉成功率，次要观察指标为追加用药次数、肢体活动、注射痛、患者生命体征、入睡时间、苏醒时间等。
结果 两组麻醉成功率均为 100%；环泊酚组患者苏醒时间长于丙泊酚组（P＜0.05）；环泊酚组患者注射痛发生少于丙泊酚组（P＜0.05）；环泊酚组患者麻醉后 BIS 值低于丙泊酚组（P＜0.05）；患者入睡时间、术中追加用药次数、肢体活动、术中血压、心率、脉搏血氧饱和度均无统计学差异。
结论 0.5mg/kg 剂量的环泊酚在妇科日间手术中的麻醉诱导效果不劣于 2mg/kg 剂量的丙泊酚，且注射痛发生率更低。

PU-0241

亚麻醉剂量氯胺酮在改善抑郁患者睡眠质量和电休克疗效中的作用

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目的 重度抑郁症（MDD）伴睡眠障碍患者的电休克治疗（ECT）效果较差，而亚麻醉剂量氯胺酮对伴有睡眠障碍的 MDD 患者 ECT 疗效影响的尚不清楚。本研究旨在探讨 ECT 中辅助亚麻醉剂量氯胺酮对伴睡眠障碍 MDD 患者的睡眠质量、社会执行功能和抑郁症状的改善效果。
方法 本研究为随机对照研究，该研究经重庆医科大学第一附属医院医学伦理委员会批准，并在 www.chictr.org.cn/注册，注册号为 ChiCTR1800014791。精神科医生根据 DSM-V 标准对患者进行诊断，首次接受 ECT 治疗的 MDD 患者被招募入试验，匹兹堡睡眠质量指数（PSQI）量表被用于

评估抑郁患者的睡眠质量，PSQI 评分超过 8 分的患者被认为是睡眠障碍，将入选的 71 例伴睡眠障碍的 MDD 患者随机分为两组：常规 ECT 组（ES 组）和 ECT 辅助氯胺酮组（KS 组）。两组患者均采用 1.5 mg/kg 丙泊酚静脉麻醉，并给予 0.8 mg/kg 琥珀酰胆碱静脉注射肌松。KS 组患者在每次 ECT 给药前辅助静脉注射 0.3 mg/kg 氯胺酮。患者的抑郁症状采用 24 汉密尔顿抑郁量表（HAMD-24）评定，当 HAM-D 评分＜8 即达到治愈标准，停止 ECT 疗程，如果 ECT 总次数达到 12 次症状仍没有缓解也停止 ECT 治疗，ECT 疗程结束后 1 天及 1 月再次采用 HAMD-24 评估抑郁症状。ECT 疗程结束后 1 天及 1 月采用 PSQI 分析睡眠质量，CPSQI 睡眠质量包含 7 个组成部分：睡眠药物的使用、睡眠持续时间、睡眠质量、睡眠潜伏期、睡眠效率、睡眠障碍和日间功能障碍。ECT 疗程结束后 1 天及 1 月采用连线测验（TMT）评估患者的执行功能，TMT 测试用时越长，表示患者执行功能越差。采用 SPSS Statistics 19.0 软件对数据进行统计学分析。

结果 当抑郁症状缓解时，KS 组的 ECT 治疗时间短于 ES 组（P<0.01），辅助氯胺酮患者（KS 组）的 ECT 治疗缓解率和治愈率较高（P<0.05）。在 ECT 疗程结束和随访 1 个月时，KS 组的 24-HAMD 评分低于 ES 组（P<0.05）。两组患者的 CPSQI 总分在 ECT 疗程结束和 1 个月随访时均低于基线。与 ES 组相比，KS 组患者的 CPSQI 总分较低，睡眠潜伏期较短，睡眠效率较高，ECT 疗程结束时使用的睡眠药物较少。ES 组患者在 1 个月随访时的日间社会功能和睡眠质量均低于 KS 组。在 ECT 疗程结束和 1 个月随访时，KS 组 TMT 测试 A 部分和 B 部分的用时均短于 ES 组。

结论 亚麻醉剂量氯胺酮可增强伴有睡眠障碍的 MDD 患者的 ECT 治疗效果并改善该类患者的睡眠质量。ECT 辅助氯胺酮有利于睡眠障碍 MDD 患者的社会执行功能的恢复。

PU-0242

全球麻精药品滥用负担的时空流行病学研究

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目的 药物滥用，主要为麻精药品滥用，已日益被认识到是全球公共健康问题的主要原因。目前全球麻精药品滥用导致的疾病负担尚未有具体报告。本研究旨在为全球、地区和国家水平麻精药品滥用所致负担的时空变化趋势做全面、细致的评价。

方法 本研究从性别、年龄、地区和经济社会发展水平维度，利用"全球疾病、损伤和危险因素研究（GBD）2019"中的数据估计 1990 年至 2019 年间 204 个国家和地区的全球麻精药品滥用的患病率，发病率，死亡率和残疾调整生命年（DALYs），药物主要包括四个类别（阿片类药物滥用，可卡因滥用，安非他命滥用和大麻滥用）。使用 DisMod-MR2.1 和贝叶斯回归分析患病率和发病率，利用疾病死因模型（CODEm）估计疾病死亡和负担。

结果 全球范围内，麻精药品滥用患人数为 56,734,400 例（95%UI：48,614.6–64947.8）。仅 2019 年，全球新发麻精药品滥用人数为 16,280,300 例（95%UI：13,794.6–18894.4），年龄标化发病率为每 10 万人 204.7 例（95%UI：173.2–236.8）。2019 年麻精药品滥用导致 12.81 万人（全球有 95%UI：123.6–133.7）死亡，年龄标化死亡率为每 10 万人死亡 1.6 人（95%UI：1.5–1.6），年龄标化死亡率从 1990 年到 2019 年间呈现上升趋势（AAPC：0.84，95%CI：0.37–1.31）。2019 年因麻精药品滥用导致的伤残调整生命年(DALY)为 18,115,600（95%UI：14,322.3-22032.5）人年，年龄标化率为每 10 万人中 225.2（95%UI：177.7-274.2），与 1990 年相比增加了 79%（95%UI：71–89%）。由于药物滥用疾病引起的 DALYs 在各地区的数据差异显著，主要集中在发达国家的年轻人和男性中。具体来看，阿片类药物滥用是 2019 年最大的负担，约占 79.9%。过去 30 年中，阿片类药物滥用，可卡因滥用和大麻滥用所致负担逐渐增加，而安非他明滥用所致负担呈现轻度下降趋势。从 1990 年至 2019 年，吸毒障碍的负担总体上随着经济社会水平（SDI）的提高而增加。2019 年，北美和澳大利亚高收入地区的负担最大。在全球人口最多的五个国家中，我国近 30 年来总体的麻精药品滥用（包括阿片类药物滥用、可卡因滥用和安非他明滥用呈现显著下

降趋势，其中下降幅度最大的是可卡因滥用和安非他滥用。值得我们关注的是，随着时间的推移，我国大麻滥用的负担不断增加，需要加强干预和控制。

结论 从全球来看，麻精药品滥用的负担和死亡持续增加。麻精药品滥用的管理计划应得到进一步改善，特别是针对阿片类药物滥用。根据这一趋势，各国政府将面临日益增加的治疗和支持服务需求，需要有效的预防和控制策略来减少这些因素带来的负担。我国广泛的社会宣传、严格约束吸毒等行为，以及建立的麻精药品处方自动筛查系统（PASS）可以为国际其他国家提供典范。

PU-0243

长时间七氟烷麻醉造成暂时性而非长期性果蝇学习记忆功能损伤

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目的 研究目的：七氟烷具有诱导时间短、恢复快的特点，已成为儿科麻醉中最常用的吸入麻醉药物。然而，流行病学研究显示儿童早期长时间或者多次七氟烷暴露可能造成儿童的神经发育障碍。动物实验发现，七氟烷主要通过诱导神经元凋亡对发育期大脑产生神经毒性作用。2016 年美国食品和药品管理局对儿童使用七氟烷麻醉提出警告。然而，儿童早期的七氟烷全身麻醉是否会造成远期的认知障碍，尚不明确，也是本研究重点关注的问题。因此本研究，利用模式生物果蝇生命周期短的优势，系统观察生命早期长时间七氟烷麻醉对果蝇全生命周期认知能力的影响，探索七氟烷产生神经毒性，造成认知障碍的潜在机制。

方法 研究方法：通过 T 迷宫检测果蝇的学习记忆能力，寿命曲线记录果蝇的生存周期，TUNEL 染色观察果蝇头部细胞的凋亡情况，ATP 试剂盒检测果蝇头部的 ATP 水平，ROS 探针检测果蝇头部的氧化应激水平，qRT-PCR 检测凋亡和抗氧化相关基因的表达变化趋势。

结果 研究结果：在七氟烷麻醉 1 天和 5 天后果蝇的学习认知能力显著降低，果蝇头部细胞凋亡显著增加，10 天后果蝇的认知能力和凋亡水平恢复到正常范围。果蝇头部的 ATP 水平，在七氟烷麻醉 1 天和 5 天后显著升高，10 天后恢复到正常水平。果蝇头部的氧化应激水平在七氟烷麻醉 1 天和 5 天后显著升高，10 天后恢复到正常水平。qRT-PCR 检测凋亡相关基因（caspase 家族的 death-related ICE-like caspase，Drice；death regulator Nedd2-like caspase，Dronc；death caspase-1，Dcp-1 和 Bcl-2 家族的两个抗凋亡成员 death executioner Bcl-2，Debcl 和 Buffy）和抗氧化相关基因（SOD2 和 CAT），发现凋亡和抗氧化酶相关基因的表达在七氟烷麻醉 1 天后显著下调，5 天后显著上调，10 天后表达水平与对照组趋于一致。

结论 研究结论：综上所述，本研究发现生命早期长时间七氟烷麻醉对果蝇的寿命不产生显著影响，会造成暂时性的认知功能损伤，但不影响远期的学习认知能力。生命早期七氟烷麻醉会造成短暂的细胞凋亡和氧化应激水平升高，可能是造成认知功能损伤的潜在机制，但是细胞凋亡和氧化应激水平在麻醉后第 10 天恢复到正常水平。

PU-0244

艾氯胺酮通过抑制 MAPK/NF-κB 信号通路和降低氧化应激减轻机械通气诱导的 COPD 大鼠肺损伤

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目的 研究艾氯胺酮对机械通气 COPD 大鼠炎症和氧化应激的影响并探讨其调控机制。
方法 将大鼠分为 Con 组、M 组、M+S 组、M+K 组，每组 12 只。给予香烟烟雾暴露+LPS 气管内注射的方法作 COPD 大鼠模型构建，两个月后，所有大鼠均接受麻醉和机械通气。M+K 组给予 5 mg/kg 艾司氯胺酮 IV, M+S 组给予等量生理盐水。2 h 后采集肺组织进行分析，包括气道峰值压、W/D 比、肺透性指数(LPI)、H&E 染色、TEM。ELISA 法检测 TNF-α、IL-6、IL-8、IL-10 水平;Western blot 和免疫组化检测 NF-κB、p38、磷酸化 p38 (p-p38)、JNK 和磷酸化 JNK (p-JNK)的表达;测定 MDA、MPO、SOD 水平。
结果 M 组、M+S 组和 M+K 组肺标本表现出 COPD 的标志性组织病理学特征。与 Con 组比较，M 组气道峰值压力、W/D 比、LPI 均升高。在 M+K 组，与 M 组相比，艾司氯胺酮显著降低了 W/D 比、LPI 和促炎细胞因子 TNF-α、IL-6 和 IL-8 的浓度，同时升高了 IL-10 水平。此外，通过降低 NF-κB、p-p38 和 p-JNK 的水平，减弱了 NF-κB 和 MAPK 通路的激活。此外，与 M 组相比，M+K 组肺组织 MDA 和 MPO 水平降低，SOD 水平升高。
结论 艾司氯胺酮通过抑制 MAPK/NF-κB 信号通路和降低氧化应激，减轻机械通气所致 COPD 大鼠模型肺损伤。

PU-0245

复合阿芬太尼时瑞马唑仑用于肥胖患者无痛胃镜检查的 ED95

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目的 探究复合阿芬太尼时瑞马唑仑用于肥胖患者无痛胃镜检查的 ED95
方法 选取择期行无痛胃镜检查术患者，年龄 18～65 岁，ASA 分级Ⅰ或Ⅱ级，根据患者 BMI 分为 2 组，分为正常组和肥胖组。采用抛偏倚硬币设计（BCD）法确定无痛胃镜检查中瑞马唑仑 95%有效剂量（ED95），患者术前禁食 8 h，禁饮 6 h，入室后开放上肢静脉通路，静脉输注复方林格液 6～8 ml/kg，常规监测 ECG、SpO2 、HR 和无创 BP。麻醉诱导前充分预吸氧 4 L/min，患者左侧卧位，，静脉缓慢注射阿芬太尼 5 ug/kg 和瑞马唑仑，待患者睫毛反射消失，下颌松弛，改良警觉/镇静评分（MOAA/S）≤1 分后进行胃镜检查。瑞马唑仑初始剂量 0.1 mg/kg，剂量梯度为 0.02 mg/kg，若注射瑞马唑仑 3 min 后 MOAA/S 评分仍>1 分或进镜时患者出现体动、呛咳、吞咽等影响操作的反应为阳性反应（无效），否则为阴性反应（有效）。若发生阳性反应，下一例患者剂量升高一个剂量梯度的剂量；若发生阴性反应，下一个患者 0.95 的概率接受相同剂量，0.05 的概率接受降低一个剂量梯度的剂量，直至完成 40 例。发生阳性反应后，可给予瑞马唑仑初始剂量的 1/2 进行补救直至完成检查。检查过程中可依据 MAP 与 HR 的变化，应用麻黄碱，去甲肾上腺素，阿托品等血管活性药物维持患者血流动力学稳定。发生呼吸抑制（SpO2＜90）及呼吸道梗阻，进行托下颌、置入鼻咽通气导管等处理。记录麻醉诱导前（T0，基础值）、给药 3 min 后（T1）的

MAP、HR。记录心动过缓、低血压、呼吸抑制、呛咳、体动、吞咽、恶心呕吐、呃逆、注射痛等不良反应。记录血管活性药物使用情况。使用池相邻违规者算法（PAVA）和保序回归（Isotonic regression）来确定有效率 0.95 的两个边界剂量，在单调增加的边界剂量－有效率中使用线性插值（Linear Interpolation）确定瑞马唑仑的 ED95。95%的置信区间（CI）是通过自助法（Bootstrap）中的修正偏差百分位法（BCPB）获得的，正常组与肥胖组的 ED95 比较采用重叠置信区间法。
结果 正常组和肥胖组无痛胃镜检查中复合阿芬太尼时瑞马唑仑的 ED95 及其 95%置信区间分别为 0.157（0.142，0.168）mg/kg 和 0.137（0.129，0.144）mg/kg。
结论 正常组和肥胖组无痛胃镜检查中复合阿芬太尼时瑞马唑仑的 ED95 分别为 0.157 mg/kg 和 0.137 mg/kg，肥胖患者需要的瑞马唑仑的剂量明显少于正常患者（P＜0.05）。

PU-0246

（-）-丁香脂素通过激活 ERα 抑制炎症和铁死亡对抗 LPS 诱导的急性肺损伤

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目的 检测（-）-丁香脂素是否通过激活 ERα 抑制炎症和铁死亡对抗 LPS 诱导的急性肺损伤。
方法 在这里，我们研究了从 AC 中提取的(-)-Syringaresinol ((-)-SYR)具有缓解野生型小鼠和 MH-S 细胞炎性反应的作用，(-)-SYR 通过直接结合 ERα 受体对肺损伤的治疗作用。
结果 （−）-SYR 显著降低脂多糖（LPS）诱导的小鼠肺组织学损伤，抑制支气管肺泡灌洗液（BALF）中促炎细胞因子和白蛋白的产生，降低髓过氧化物酶（MPO）水平，从而减轻肺组织损伤。此外，我们发现（−）-SYR 通过抑制 p-ERK/ GPX4/OH-1 铁死亡通路抑制 LPS 诱导的急性肺损伤（ALI）。同时，发现雌激素受体 α（ERα）是（−）-SYR 的潜在靶点，与抗炎活性和抗铁死亡有关。分子对接和分子动力学模拟结果显示，（−）-SYR 与 ERα 结合自由能良好。体内外运用 ERα 抑制剂进一步证实，（−）-SYR 通过作用于 ERα 而抑制 p-ERK/ GPX4/OH-1 铁死亡通路发挥抗 ALI 的作用。
结论 （-）-SYR 通过 ERα 的抗炎和抗铁死亡可能为治疗 ALI 相关肺部疾病提供新的治疗途径。

PU-0247

注射用苯磺酸瑞玛唑仑联合吸入用地氟烷在眼科全麻手术中应用

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目的 探讨注射用苯磺酸瑞玛唑仑联合吸入用地氟烷在眼科全麻手术中应用。方法：回顾性选取 2022 年 7 月-2024 年 3 月本院眼科全麻手术患者 120 例，依据麻醉用药分为注射用苯磺酸瑞玛唑仑联合吸入用地氟烷组（瑞玛唑仑组）、丙泊酚联合吸入用地氟烷组（丙泊酚组）两组，各 60 例。统计分析两组循环功能、术后恶心呕吐发生情况、麻醉苏醒指标。结果：瑞玛唑仑组患者 T2、T3 时的 SpO2 均高于丙泊酚组（P<0.05），T2 时的 MAP 高于丙泊酚组（P<0.05），T1、T2、T3 时的 CO 均高于丙泊酚组（P<0.05），CIT1、T2、T3 时的均高于丙泊酚组（P<0.05）。瑞玛唑仑组患者的术后恶心呕吐发生率 5.00%（3/60）低于丙泊酚组 20.00%（12/60）（χ2=6.171，P<0.05）。瑞玛唑仑组患者的清醒时间长于丙泊酚组（P<0.05），拔管时长长于丙泊酚组

（P<0.05）。结论：注射用苯磺酸瑞玛唑仑联合吸入用地氟烷在眼科全麻手术中应用效果较单独丙泊酚好。

方法 回顾性选取 2022 年 7 月-2024 年 3 月本院眼科全麻手术患者 120 例，依据麻醉用药分为注射用苯磺酸瑞玛唑仑联合吸入用地氟烷组（瑞玛唑仑组）、丙泊酚联合吸入用地氟烷组（丙泊酚组）两组，各 60 例。瑞玛唑仑组 60 例患者年龄 50~85 岁，平均（67.88±7.56）岁，女性 25 例，男性 35 例。体质量指数 16~34 kg/m2，平均（25.63±4.13）kg/m2；病程 2~7 d，平均（4.23±1.11）d。在手术类型方面，角膜缝合术 33 例，巩膜缝合术 27 例；在美国麻醉医师协会（ASA）分级方面，Ⅰ级 38 例，Ⅱ级 22 例。丙泊酚组 60 例患者年龄 51~87 岁，平均（68.32±7.95）岁，女性 26 例，男性 34 例。体质量指数 16~39 kg/m2，平均（26.32±4.44）kg/m2；病程 2~7 d，平均（4.58±1.20）d。在手术类型方面，角膜缝合术 32 例，巩膜缝合术 28 例；在 ASA 分级方面，Ⅰ级 39 例，Ⅱ级 21 例。两组一般资料比较差异均不显著（P>0.05）。纳入标准：①均有手术适应症；②均能够耐受全麻。排除标准：①合并恶性肿瘤；②合并血液系统疾病。

结果 注射用苯磺酸瑞玛唑仑联合吸入用地氟烷在眼科全麻手术中应用效果较单独丙泊酚好。

结论 眼科手术要求具有相对固定的眼球，较为精细，如果患者具有较差的控制能力，那么就无法对手术进行有效配合，在这种情况下就需要对患者进行全身麻醉[1-2]。本研究统计分析了 2023 年 7 月-2024 年 2 月本院眼科全麻手术患者 120 例的临床资料，探讨了注射用苯磺酸瑞玛唑仑联合吸入用地氟烷在眼科全麻手术中应用。

PU-0248

舒更葡糖和新斯的明用于拮抗小儿眼科全麻术后罗库溴铵残余肌松效应的比较

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目的 探讨分析舒更葡糖和新斯的明用于拮抗小儿眼科全麻术后罗库溴铵残余肌松效应的比较。

方法 研究时间：2023 年 5 月-2024 年 4 月；选择于我院眼科收治的 130 例眼科全麻手术患儿作为研究对象，运用单双数字抽签法分组，分成研究组（n=65）与参照组（n=65）。研究组给予舒更葡糖，参照组给予新斯的明。比较两组麻醉指标、TOF 指标。

结果 研究组手术时间、麻醉时间、罗库溴铵总剂量等麻醉指标均明显少于参照组，（P＜0.05）。研究组与参照组初始 TOF 值、给药即刻 TOF 值经对比，（P＞0.05）；研究组 TOFR 恢复至 0.9 耗时、TOFR 恢复至 1.0 耗时、拔管时间等均明显短于参照组，（P＜0.05）。

结论 舒更葡糖在小儿眼科全麻术后罗库溴铵残余肌松效应中的作用更加显著，有效性和安全性更高。

PU-0249

促代谢性谷氨酸受体在 s-氯胺酮减轻抑郁大鼠电休克学习记忆损伤中的作用及机制

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目的 探讨促代谢性谷氨酸受体（metabotropic glutamate receptor，mGluR）调节谷氨酸 N-甲基-D-天冬氨酸受体（N-methyl-D-aspartic acid receptor，NMDAR）介导的突触可塑性在 s-氯胺酮减轻抑郁大鼠电休克学习记忆损伤中的作用。

方法 对 2-3 月龄 Sprague Dawley 大鼠，应用慢性不可预见性应激建立抑郁模型。取 10 只健康大鼠作为对照组（C 组），另取 50 只抑郁大鼠随机分为 D 组、DE 组、DEK 组、DEK5+组及 DEK5-组。C 组不予实验处理；D 组腹腔注射生理盐水后行伪 ECS 处理；DE 组腹腔注射生理盐水，DEK 组腹腔注射 s-氯胺酮（5 mg/kg），DEK5+组及 DEK5-组在注射艾斯氯胺酮前分别给予 mGluR5 激动剂（CHPG）及抑制剂（MPEP），之后分别行 ECS 处理。应用糖水偏好实验及旷场试验评估抑郁状态；Morris 水迷宫检测空间学习记忆功能；Western blotting 检测海马组织细胞膜 NMDAR1、mGluR5 蛋白表达，采用膜片钳检测 LTP 诱导阈值。

结果 实验处理后，与 D 组比较，DE 组、DEK 组、DEK5+组及 DEK5-组糖水偏好百分比升高（P<0.05）、旷场试验空间探索距离及直立次数增多（P<0.05），逃避潜伏期（escape latency，EL）延长（P<0.05），目标象限空间探索时间（space exploration time，SET）缩短（P<0.05）；与 DE 组比较，DEK 组、DEK5+组及 DEK5-组 EL 延长（P<0.05），目标象限 SET 缩短（P<0.05）。与 DEK 组比较，DEK5+组 EL（P<0.05）延长，目标象限 SET 缩短（P<0.05）；DEK5-组 EL 缩短（P<0.05），目标象限 SET 延长（P<0.05）。与 D 组比较，DE 组、DEK 组、DEK5+组及 DEK5-组 NMDAR1、mGluR5 蛋白表达降低（P<0.05）；与 DE 组比较，DEK 组、DEK5+组及 DEK5-组 NMDAR1、mGluR5 蛋白表达升高（P<0.05）；与 DEK 组比较，DEK5+组 NMDAR1、mGluR5 蛋白表达升高（P<0.05），DEK5-组 NMDAR1、mGluR5 蛋白表达降低（P<0.05）。与 DEK 组比较，DEK5+组 LTP 升高（P<0.05），DEK5-组 LTP 降低（P<0.05）。

结论 s-氯胺酮可能通过上调抑郁大鼠 ECS 后海马组织细胞膜 NMDAR 和 mGluR 的表达，增强 NMDAR 激活状态同时上调 LTP，减轻空间学习记忆功能损伤。

PU-0250

右美托咪定心脏保护作用相关基因表达谱数据挖掘和生物信息学分析

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目的 通过生物信息学方法挖掘右美托咪定（Dexmedetomidine，DEX）对抗心肌缺血/再灌注损伤（myocardial ischemia reperfusion injury，MIRI）心脏保护作用的关键差异基因及信号通路，进一步探究 DEX 心脏保护作用机制，为缺血性心脏病的诊疗提供新思路

方法 在基因表达综合数据库（GEO）中提取 DEX 心脏保护相关的基因芯片数据集，使用 GEO2R 在线分析工具筛选 DEX 干预 MIRI 的差异表达基因，通过 Metascape 和 DAVID 6.8 在线分析软件对明显差异表达的基因进行基因本体（GO）功能注释和富集通路分析，同时，利用 STRING10.5 和 Cytoscape 软件构建蛋白-蛋白相互作用网络。

结果 DEX 心脏保护相关的 GSE126104 数据集共纳入 2421 个差异表达的转录本，以差异倍数≥2 且 p<0.05 筛选出 39 个明显差异表达的基因（其中 13 个明显上调，26 个明显下调）。GO 功能注释和富集通路分析发现明显差异表达的基因主要参与近日节律、Wnt 信号通路、细胞活性、心脏收缩和胚胎形态发育。另外，蛋白-蛋白相互作用网络分析发现 11 个蛋白（其中 4 个上调和 7 个下调）之间存在 13 条相互作用网络参与 DEX 心脏保护。

结论 利用生物信息学方法可以有效筛选与预测 DEX 发挥心脏保护作用的关键基因和信号通路，一些可能的关键基因和信号通路在 DEX 诱导的心脏保护中具有重要意义。

PU-0251

猪去氧胆汁酸通过调控肠道菌群及 FXR/PPARγ-MMP9/MMP2 通路缓解神经病理性疼痛

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目的 神经病理性疼痛（neuropathic pain,NP）是指某种损伤或疾病累及躯体感觉系统而直接导致的疼痛，常明显影响患者心理健康和社会功能，导致生活质量下降，对个体和社会造成严重负担，神经痛是常见的慢性疼痛，普通人群中发病率为3.3-8.2%，占慢性疼痛的21.7%，而中、重度慢性疼痛患者中有 74.1%为神经病理性疼痛。胆汁酸是由肝脏合成的类固醇化合物，主要功能是在肠道中帮助消化和吸收脂肪。然而，近年来的研究表明，胆汁酸在神经系统中也扮演着重要角色，并与疼痛感知及其调控有关。胆汁酸通过与其特定的受体，如 TGR5（Takeda G protein-coupled receptor 5）和 FXR（farnesoid X receptor）结合，参与调节神经炎症、神经元的免疫反应以及神经保护作用。这些作用可能直接或间接影响神经病理性疼痛的发生和发展。猪去氧胆汁酸（Deoxycholic acid from pigs）是一种天然存在的胆汁酸，属于胆汁酸家族。本研究旨在探究猪去氧胆汁酸对神经病理性疼痛的调控及具体机制。

方法 通过胆汁酸谱检测神经病理性疼痛小鼠胆汁酸变化，WB 检测胆汁酸受体的表达，筛选猪去氧胆汁酸为关键变化物质。使用猪去氧胆汁酸灌胃，检测 SNL 后第 3，5，7，14 的行为学变化，同时 IF，PCR，WB 检测小鼠 FXR 的激活，及小鼠肠道菌群变化，IF，WB 检测小鼠肠道屏障指标 muc，zo-1，occludin。网络药理学筛选猪去氧胆汁酸作用于神经病理性疼痛的靶点，分子对接及 WB 验证猪去氧胆汁酸调控神经病理性疼痛机制。

结果 神经病理性疼痛引起胆汁酸下调，胆汁酸受体表达下降，胆汁酸谱筛选猪去氧胆汁酸下降明显

猪去氧胆汁酸灌胃缓解神经病理性疼痛

猪去氧胆汁酸改善肠道菌群紊乱，促进有益菌降低有害菌表达，猪去氧胆汁酸调控肠道屏障功能

网络药理学筛选猪去氧胆汁酸与神经病理性疼痛关键靶点 PPARγ，MMP9，MMP2

猪去氧胆汁酸逆转 SNL 引起的 PPARγ 的降低，MMP9/MMP2 升高

结论 猪去氧胆汁酸通过 FXR 调控 PPARγ/MMP2/MMP9 信号通路缓解神经病理性疼痛，猪去氧胆汁酸改善肠道菌群及肠道屏障功能缓解疼痛的发生。

PU-0252

环泊酚复合小剂量阿芬太尼在胃肠镜检查中的应用

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目的 环泊酚作为一种新型的麻醉药物，在胃肠镜检查中的应用引起了临床麻醉医生的广泛关注。本研究旨在评估环泊酚在胃肠镜检查中的麻醉效果和可能产生的不良反应，以期为临床提供更安全、更有效的麻醉药物选择。

方法 选择胃肠镜检查的患者 162 例，男 86 例，女 76 例，年龄 18~65 岁，BMI18~30kg/m2,ASA≤Ⅱ级。将患者随机分为两组，每组 81 例，在麻醉前，所有患者均接受了 0.7μg/kg 的阿芬太尼预处理，以减少患者疼痛和提高麻醉效果。在麻醉诱导阶段，对照组静脉注射丙泊酚 2mg/kg，而试验组则注射环泊酚 0.4mg/kg，麻醉诱导后，患者的改良警觉/镇静评分（modified observer′s assessment of alertness/sedation，MOAA/S）被记录，以评估麻醉效果。术中患者发生睁眼、呛咳或体动反应时，追加丙泊酚 0.5mg/kg 或环泊酚 0.2mg/kg。术中发生低血压时静注麻黄碱 6mg，

心动过缓时静注阿托品 0.2~0.5mg。术中发生呼吸抑制时，增加吸入氧气流量，立刻托起下颌；如果 SpO2 没有改善，则停止胃肠镜检查，采用面罩吸氧或辅助通气处理，上述措施不成功，则进行气管插管。若术中出现恶心呕吐，静脉注射甲氧氯普胺 10mg。记录胃镜检查的开始时间、检查时间、镇静成功例数、诱导时间、苏醒时间等关键指标。本研究特别关注了低血压、呼吸抑制、注射痛、术中体动、恶心呕吐等可能影响患者安全和舒适度的因素。本研究通过问卷随访调查的方式，收集了内镜医师及患者对麻醉过程的满意度反馈。

结果 两组患者镇静成功率、诱导时间、苏醒时间差异无统计学意义。与 P 组比较，C 组注射痛、呼吸抑制、低血压发生率明显降低（P＜0.05），患者对麻醉的满意度明显增高（P＜0.05），两组内镜医师对麻醉的满意度差异无统计学意义。

结论 综上所述，环泊酚 0.4mg/kg 在胃肠镜诊疗中显示出与丙泊酚 2mg/kg 相似的镇静效果，更重要的是，环泊酚在减少不良反应和提高患者满意度方面表现出明显优势，这为其在临床推广提供了有力的支持。未来的研究可以进一步探索环泊酚在不同患者群体和不同医疗场景中的应用，以期为患者提供更加个性化和优化的麻醉方案。

PU-0253

宫腔镜检查中联合不同剂量艾司氯胺酮时丙泊酚的 EC50 和 EC95

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目的 丙泊酚对循环系统的抑制作用较强，但镇痛作用轻微，达到手 术要求的镇痛效果通常需要加大剂量或加用阿片类镇痛药物。艾司 氯胺酮是一种非竞争性 N-甲基-D-天冬氨酸受体拮抗剂，具有镇静、 镇痛和拟交感作用，且较少发生呼吸抑制。它可能是丙泊酚用于宫 腔镜检查术的理想辅助用药。因此，本研究旨在探究宫腔镜检查术 中艾司氯胺酮作为丙泊酚辅助手段的有效性和安全性，并确定联合 不同剂量的艾司氯胺酮时丙泊酚的中位有效浓度（EC50）和 95%有 效浓度（EC95）。

方法 选择 2023 年 9 月～2023 年 12 月吉林大学白求恩第一医院全身 麻醉下择期行宫腔镜检查术的女性患者，年龄 18～65 岁，ASA 分级 I～III 级，BMI 19～27.9kg/m²，所有患者均无严重的心血管、呼吸 系统疾病以及肝肾功能障碍，无相关药物过敏史。将患者分为 2 组： SK0.25 组（0.25mg/kg 艾司氯胺酮）和 SK0.5 组（0.5mg/kg 艾司氯 胺酮）。用 Dixon up-and-down 序贯法测定丙泊酚的中位有效浓度 （EC50）和 95%有效浓度（EC95）。记录患者的一般资料：年龄、身高、体重、BMI、ASA 分级、手术时间；记录患者阳性反应和阴 性反应的例数；记录患者在基线时（T0）、达到丙泊酚的目标血浆 浓度时（T1）、艾司氯胺酮注射后 3min 时（T2）、扩张宫颈时（T3）、 III 手术过程中以 3min 为间隔（T4-x）的平均动脉压（mean artery pressure, MAP）、心率（heart rate, HR）、血氧饱和度（pulse oxygen saturation, SpO2）；记录患者丙泊酚总量、苏醒时间；记录患者术中发生高血 压、低血压、心动过缓、低氧血症、恶心呕吐、术中知晓的情况。

结果 宫腔镜检查术中 SK0.25 组丙泊酚的中位有效浓度（EC50）和 95%有效浓度（EC95）及其 95 %可信区间分别为 3.576（3.333～3.910） μg/mL 和 4.293（3.922～5.987）μg/mL。SK0.5 组丙泊酚的中位有效 浓度（EC50）和 95%有效浓度（EC95）及其 95 %可信区间分别为 3.396（3.363～3.429）μg/mL 和 3.678（3.624～3.753）μg/mL。SK0.25 组中，与 T0 时相比，T1、T2、T3 时 MAP 明显降低（P＜0.05）， 其余时间点的 MAP、HR 差异无统计学意义（P＞0.05）。SK0.5 组 中，与 T0 时相比，T2、T3 时 MAP 明显降低（P＜0.05），T1 时 HR 明显降低（P＜0.05），其余时间点的 MAP、HR 差异无统计学 意义（P＞0.05）。SK0.25 组的丙泊酚总量为 338.5（290, 400.25） mg，苏醒时间为 6（5, 9.75）min。SK0.5 组的丙泊酚总量为 335（274.75, 43）mg，苏醒时间为 8（6.75, 11）min。所有患者均未发生高血压、 恶心呕吐、术中知晓。

SK0.25 组 5 例患者发生低氧血症，8 例患者 发生低血压。SK0.5 组 2 例患者发生低氧血症，7 例患者发生低血压， 1 例患者发生心动过缓。

结论 宫腔镜检查术中 SK0.25 组丙泊酚的中位有效浓度（EC50）和 III 95%有效浓度（EC95）及其 95 %可信区间分别为 3.576（3.333～3.910） μg/mL 和 4.293（3.922～5.987）μg/mL。SK0.5 组丙泊酚的中位有效 浓度（EC50）和 95%有效浓度（EC95）及其 95 %可信区间分别为 3.396（3.363～3.429）μg/mL 和 3.678（3.624～3.753）μg/mL。术中 麻醉及镇痛效果较好，循环、呼吸稳定。随着艾司氯胺酮剂量的增 加，更不易发生低血压、低氧血症等不良反应。

PU-0254

一例疑似“术后苏醒延迟”的病例回顾

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目的 随着临床上短效麻醉药的出现和麻醉技术的持续改进，术后苏醒延迟定义的时限也存在缩短的趋势。一般认为凡术后超过 30 min，患者不能睁眼和握手，对痛觉刺激也无明显反应即视为术后苏醒延迟，本例患者虽结局是良好的，但是诊治过程中存在的问题和需改进的方面仍很多，现将该病例报导，希望能给同行在工作中提供一些参考和教训！

方法 病例报道： 患者，71 岁，女性，167cm，73Kg。主因“发现胆囊结石 2 个月”。既往体健。服用“胃复安”过敏。血常规、凝血、心梗三项、BNP（-）。生化：胆碱酯酶 475 U/L（正常值：5320-12920 U/L）。心电图：1、异常心电图，2、窦性心律，3、V1V2V3 小 r 波上升不良，4、胸导 QRS 低电压。胸片：双肺微小结节。 主动脉、冠状动脉硬化。心脏超声：EF 72% 左室舒张功能减低。拟于全麻下行“腹腔镜下胆囊切除术 ”。入室常规心电监护：HR77 次/分、BP140/90 mmHg、SPO2 98 %。麻醉诱导：咪达唑仑 2mg，丙泊酚 150mg，舒芬太尼 25ug，米库氯胺 16mg，3min 后行气管插管，插管后予七氟烷 1%吸入、瑞马唑仑 0.4-0.6mg/kg/h、瑞芬太尼 0.1-0.2ug/kg/min、米库氯铵 0.3mg/kg/h 泵入维持麻醉。术毕前 20min 停七氟烷、米库氯胺，10min 停瑞马唑仑，5min 停瑞芬太尼。手术时长 120min，麻醉时长 193min，术中总入量 1000ml，总出量 55ml，（出血 5ml，尿量 50ml）。术毕（米库氯胺停用 20min）吸痰膨肺无反射。手术结束后 15min 给新斯的明 1mg+阿托品 0.5mg，手术结束后 18min 给氟马西尼 0.3mg，吸痰仍无反射（米库氯胺停用 38min）。手术结束后 25min （米库氯胺停用 45min）带气管导管转 PACU（麻醉恢复室）。手术结束后 2.5h（米库氯胺停用 170min） 患者仍未苏醒，急行头颅 CT 检查结果（-）（期间予氟马西尼 0.5mg，多沙普伦 60mg，纳美芬 20ug）。手术结束后 3.5h（米库氯胺停用 230min） 出 PACU 转入 AICU（麻醉科重症监护病房）。手术结束后 6h（米库氯胺停用 380min） 有遵嘱动作、自主呼吸恢复。手术结束后 10.5h（米库氯胺停用 650min） 拔除气管导管。回顾患者化验检查：胆碱酯酶 475 U/L。患者自述手术结束后很快就恢复了意识，能听清医护人员谈话并记忆深刻，包括膨肺前吸痰都知晓，但无法活动。诊断为胆碱酯酶缺乏症，导致米库氯胺代谢延长。

结果 米库氯铵主要由血浆丁酰胆碱酯酶水解灭活，非脏器代谢，不增加肝肾负担，但当丁酰胆碱酯酶活性降低时可使米库氯铵代谢速度受到影响，导致作用时间延长。米库氯铵的代谢产物均无药理活性，主要通过肾脏排泄。米库氯铵与其他非去极化肌松药一样，可用抗胆碱酯酶药拮抗，因其与运动神经终板膜上的胆碱能受体竞争性结合，导致神经肌肉信号传递的阻滞。米库氯铵不同于维库溴铵和阿曲库铵等药物的是，有无新斯的明其恢复指数是基本相同的，这是因为米库氯铵诱导的神经肌肉阻滞的恢复时间要比新斯的明 7~10min 的起效时间更短。降低丁酰胆碱酯酶活性的因素有肝病、高龄、营养不良、妊娠、烧伤、口服避孕药。单胺氧化酶抑制剂、二乙氧膦酰硫胆碱，细胞毒性药物、肿瘤性疾病、抗胆碱酯酶药物 、四氢氨基吖啶、己莎溴铵、和甲氧氯普胺。β 受体阻滞剂艾司洛尔对丁酰胆碱酯酶活性也有抑制作用，但是仅轻微延长琥珀酰胆碱阻滞时间。丁酰胆碱酯酶主要由肝脏合成，广泛存在于神经胶质细胞、血浆、肝、肾、肠中，能够水解琥珀酰胆碱、米库氯铵以及丁二卡因。丁酰胆碱酯酶异常的原因有三大类：(1)遗传性假性胆碱酯酶缺陷，常染色体隐性遗传病。非典型丁酰胆碱酯酶的基因纯合子患者在东方人群中非常罕见。在非典型丁酰胆碱酯酶的基因纯合子患者，其酶活性明显降低，米库氯铵代谢可延长数小时。本例很可能为非典型丁酰胆碱酯酶的基因纯合子患者。遗憾的是，我们没有进行基因检测。(2)后天因素导致，包括肝肾疾病、营养不良、烧伤、恶性肿瘤、低体温、低蛋白、年龄、孕妇、尿

毒症、有机磷农药中毒等。(3)医源性因素,如使用抗胆碱酯酶药物、避孕药、艾司洛尔、糖皮质激素、胃复安、泮库溴铵、单胺氧化酶抑制剂、苯乙肼等。
结论 ⑴术前检查应该做到生化检查中胆碱酯酶检查项全覆盖对围术期麻醉管理具有重要意义⑵麻醉医师对米库氯铵经胆碱酯酶代谢的认识还存在不足，肌松药的使用凭经验，应将 TOF 监测列入到常规监测中⑶在诊治本例患者中，麻醉医师已经意识到肌松药的残留问题，但未能及时给予适当镇静，有可能导致患者心理层面出现问题⑷本例患者在麻醉恢复过程中反复给予新斯的明不但未达到拮抗肌松药目的，反而出现负反应，存在血流动力学波动现（5）及时排除是否存在中枢神经疾患应予以肯定。

PU-0255

包载局部镇痛药物的近红外响应脂质体温敏凝胶的制备与评价

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目的 疼痛是术后常见的主诉，局麻药是治疗术后疼痛的有效辅助手段。罗哌卡因（Rop）作为一种酰胺类麻醉药物，尽管较其他药物在中枢神经系统和心血管的安全性得到了提高，但单一使用，仍存在半衰期短、毒副作用大的局限性。因此需要为 Rop 设计一种新的递送系统，使其在所需位置释放，增强治疗效果并减少副作用。当特定部位的光敏脂质体受到特定波长光照射后，光敏剂产生 1O2，作用于 ROS 敏感的不饱和磷脂，从而实现药物的控制释放，并且光敏脂质体具有良好的生物相容性。此外，原位凝胶作为一种可注射材料能够将其包载的颗粒保持在适当位置，控制颗粒与周围组织之间的相互作用，减少药物过量引起的副作用，延长作用时间，增强治疗效果，因此二者适用于 Rop 新型递送系统的研究。
方法 本研究设计并制备了包含光敏剂 PdPC(OBu)8 和 Rop 的活性氧（ROS）响应性脂质体（Lip），利用壳聚糖（CS）和 β-甘油磷酸钠（β-GP）包裹以形成脂质体温敏凝胶（Lip/Gel）。随后在近红外（NIR）照射下，光敏剂产生 1O2，使不饱和磷脂氧化或裂解，从而在时空上高效准确地控制 Rop 的释放。
结果 NIR 响应 Rop 脂质体原位凝胶在局部镇痛中的研究，首先研究了 NIR 照射下荧光染料在动物体内的释放情况：对比游离染料及 Lip，Lip/Gel 荧光强度更为集中，证明 Gel 有原位性。Lip/Gel 复合载药系统在体内可存留 10 d，证明其具有良好的生物降解性。在体内局部镇痛效果研究中，结果表明 Lip/Gel+NIR 组的感觉阻滞较其他组有显著延长，而运动阻滞变化不明显。最后，在生物相容性评价中，结果显示各组均未对肌肉和神经产生严重损伤及毒性。
结论 本文构建的 NIR 响应的 Rop 复合药物递送系统，可以有效解决传统局麻注射剂作用时间短的缺陷，降低 Rop 的毒副作用，为镇痛药物光响应递送系统的研究提供依据。

PU-0256

甲苯磺酸瑞马唑仑用于 ICU 气管插管患者的镇静效果和不良反应分析

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目的 研究和分析甲苯磺酸瑞马唑仑用于 ICU 气管插管患者镇静效果和不良反应。
方法 选择在 2023 年 1 月至 2024 年 2 月郑州大学第五附属医院 RICU 住院的 90 例气管插管患者。采取随机数字表法，将患者分成丙泊酚组(A 组)、咪达唑仑组（B 组)和甲苯磺酸瑞马唑仑组(C 组)。三组均联合瑞芬太尼 0.5μg/kg，每组患者 30 例。记录三组患者达镇静目标所需时间以及给药 2 min

后的 MOAA/S 镇静评分；记录麻醉前(T0)及意识消失时(T1)、插管前即刻(T2)、插管后 3 min(T3)、插管 10 min(T4)、插管后 30 min(T5)、插管后 1 h(T6)、插管后 2 h(T7)的循环及呼吸系统指标［心率(HR)、平均动脉压(MAP)、呼吸频率(RR)及动脉血氧饱和度 (SpO2)］；记录两组不良反应发生率。

结果 三组患者达镇静目标所需时间以及用药 2 min 后的 MOAA/S 镇静评分比较，差异无统计学意义(P＞0.05)。T1-T6 时三组心率(HR)指标比较，差异有统计学意义(P＜0.05)；其中 T1 时，C 组的心率(HR)高于 A 组，差异有统计学意义(P<0.05)；T2-T6 时，C 组的心率(HR)高于 A 组、B 组，差异有统计学意义(P＜0.05)。T1-T5 时三组平均动脉压(MAP)指标比较，差异有统计学意义(P＜0.05)；T2-T6 时，C 组的平均动脉压(MAP)高于 A 组、B 组，差异有统计学意义(P＜0.05)；T1-T6 时三组呼吸频率(RR)指标比较，差异有统计学意义(P＜0.05)；T2-T6 时，C 组的呼吸频率(RR)高于 A 组、B 组，差异有统计学意义(P＜0.05)；T2、T3 时 C 组的动脉血氧饱和度(SpO2)高于 A 组、B 组，差异有统计学意义(P＜0.05)。与 A 组比较，C 组心动过缓、低血压、呼吸抑制发生率明显降低,差异均有统计学意义(P＜0.05)。

结论 甲苯磺酸瑞马唑仑在 ICU 气管插管患者中用于镇静，在保证镇静效果的同时，对循环及呼吸系统影响较小，不良反应发生率更低，更具有安全性。

PU-0257

探究环泊酚对缺血再灌注损伤的保护作用

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目的 探究环泊酚对心脑血管缺血再灌注损伤的保护作用

方法 文献检索 本文数据来源于 PubMed 数据库。

综合分析 整理检索文献，回顾分析总结。

结果 环丙酚具有更高的脂溶性、更小的心功能损伤和更稳定的血流动力学，其代谢产物通常无活性，对机体无刺激性且无催眠作用，且蓄积量低，不易导致患者产生低血压、心动过缓、呼吸抑制等情况。现有数据表明，环泊酚对心脑血管功能的潜在损害较小。因此其研究和应用可作为血流动力学障碍和卒中高危人群后续手术的优先选择，以达到最大的预防和有益效果。然而，尚不清楚环丙酚是否具有类似的神经保护功效。

在 wang 的一项研究中提到，与异丙酚乳液相比，环泊酚乳液中进入稳定循环系统的脂质更少，与丙泊酚相比，环泊酚可以在心脏骤停后的亚低温治疗期间达到相同的镇静深度，提高存活率。因此，他们假设，与异丙酚相比，环泊酚联合亚低温治疗联合使用将具有心脏保护作用和更低的风险；且其可以协同预防心跳骤停后脑缺血再灌注引起的神经元损伤。此外，还可能会改善体温过低的副作用。但还未有更多的实验数据来验证上述假设，需要进一步的研究来阐明环丙酚未来的心脏保护机制。

此外，由于环丙酚具有优异的脂溶性，能迅速穿过血脑屏障，到达脑区发挥作用。在 liu 的一项研究中，通过对 Nrf2 KO 小鼠和野生型小鼠行 MCAO 手术，分别行环泊酚治疗。结果证明环丙酚治疗可以改善小鼠缺血后的神经行为功能和存活率、减少皮质神经损伤；环丙酚可能通过靶向 Nrf2 发挥神经保护作用，敲除 Nrf2 可消除环丙酚对脑缺血再灌注损伤的神经保护作用，表现为大面积梗死体积、脑水肿加重和评分较低的神经功能缺损。环丙酚通过促进 Nrf2 的核转运和 HO-1、xCT、GPX4 的过表达，增加防御机制、减少小鼠缺血再灌注损伤后的铁死亡、氧化应激和神经元凋亡。

结论 环泊酚较高的脂溶性，血流动力学较稳定，对心脑血管功能的潜在损害较小，因此可以认为其在缺血再灌注损伤中有保护作用。但其作用机制尚未完全明确，仍需要大量动物实验及临床患者相关研究来进一步证明其对心脑血管的保护作用。以及其脑缺血再灌注损伤的神经保护作用疗效及机制有待进一步研究。

PU-0258

衰老模型小鼠海马组蛋白去乙酰化酶 HDAC2 在七氟烷致认知损害中作用的研究

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目的 探索海马组蛋白去乙酰化酶 HDAC2 在衰老模型小鼠重复吸入七氟烷导致的认知损害的作用及可能机制，为临床防治术后认知功能损害提供理论依据。
方法 1. 建立衰老模型小鼠：4 月龄 C57 小鼠随机分为 3 组（n=10）：青年对照组与空白对照组与衰老模型组，18 月龄 C57 小鼠为自然衰老组（n=10）。衰老模型组每日颈背部皮下注射 D-半乳糖 120mg/kg,青年对照组注射等量生理盐水，空白对照组、自然衰老组不做任何操作。连续 42 天后，行 Y 迷宫、Morris 水迷宫实验评估小鼠的空间学习记忆能力，Western blot 实验检测小鼠海马 HDAC2 的表达。
2. 探讨海马 HDAC2 在重复吸入七氟烷致认知功能损害中的作用：衰老模型小鼠随机分为 5 组（n=12）：衰老模型组，衰老模型组+七氟烷组，空白病毒组，HDAC2 敲低组以及 HDAC2 敲低+七氟烷组，在海马微注射敲低及空病毒，按分组重复吸入运载气体（1L/min O2+1L/min air）或 3.4%的七氟烷+运载气体（1L/min O2+1L/min air）4h/天，连续 3 天；行 Y 迷宫、Morris 水迷宫实验评估小鼠的空间学习记忆能力，Western blot 实验检测小鼠海马 HDAC2、ac-H3K9、ac-H4K12、BDNF 及 PSD95 的表达。
结果 1. 与青年对照组及空白对照组相比，衰老模型组小鼠的 Y 迷宫自发交替百分比以及水迷宫平台所在象限的探索时间明显下降，水迷宫的逃避潜伏期延长（P＜0.01）。衰老模型小鼠海马中 HDAC2 表达与青年对照组及空白对照组相比均上调（P＜0.01）。
HDAC2 敲低的衰老模型小鼠重复吸入七氟烷后，在 Y 迷宫中的自发交替百分比及在水迷宫中找到平台的时间、平台所在象限探索的时间与未敲低 HDAC2 小鼠对照组相比增加（P＜0.01）。HDAC2 敲低小鼠重复吸入七氟烷后海马中 HDAC2 表达上调，但无差异（P＞0.05），ac-H3K9、ac-H4K12、BDNF 及 PSD95 表达下调，与未敲低 HDAC2 小鼠对照组相比有差异（P＜0.05）。
结论 1.衰老模型小鼠海马 HDAC2 上调，重复吸入七氟烷导致衰老模型小鼠海马 HDAC2 显著上调；2.敲低衰老模型小鼠海马 HDAC2 可抑制七氟烷导致的组蛋白乙酰化水平与突触可塑性相关蛋白的改变，提示 HDAC2 的老年化改变可能是老年动物认知功能更易受七氟烷影响的分子机制。

PU-0259

丙泊酚干预大鼠阿霉素心脏毒性线粒体体视学研究

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目的 研究丙泊酚对阿霉素所致大鼠心脏毒性线粒体超微结构的保护作用。
方法 腹腔注射阿霉素制备大鼠心肌毒性模型，每日行大鼠称重并记录数据，依据体重给予相应剂量药物，建模成功后腹腔注射不同剂量丙泊酚（25mg/kg、50mg/kg、100 mg/kg）进行干预，2h 后取材多聚甲醛固定行 HE 染色，戊二醛固定行透射电镜观察心肌线粒体，测定左心室心肌细胞线粒体数目、周长和面积，统计分析线粒体体视学参数。
结果 对照组大鼠正常饮食，健康状态良好。阿霉素组活动量下降，纳差，并伴有不同程度的腹泻及黑便。对照组心肌细胞排列规律，胞核呈蓝色，单核，胞质均匀红染；阿霉素组大鼠心肌细胞体积增大，胞质淡染，高度疏松呈空泡状，轻度核固缩、深染；予以丙泊酚干预后，心肌细胞水肿不同程度减轻。与对照组相比，阿霉素组左心室心肌细胞线粒体体积分数与线粒体表面积密度下降

(P<0.01)，数密度降低(P<0.05)；线粒体表面积体积比、线粒体平均面积差异无统计学意义；与阿霉素组相比，低剂量丙泊酚组线粒体体积分数、数密度及线粒体表面积密度增高(P<0.01)；中高剂量丙泊酚组体积分数、数密度增高(P<0.05)，线粒体表面积密度增高(P<0.01)；线粒体表面积体积比、线粒体平均面积差异无统计学意义。

结论 丙泊酚能抑制阿霉素损伤大鼠心肌细胞线粒体，维持结构和功能稳定。

PU-0260

CSPQ 通过调控 TREM2 介导的小胶质细胞脂质代谢减轻七氟烷神经发育毒性的研究

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目的 七氟烷由于其可控性强，刺激性弱而被广泛使用于儿童临床麻醉，近来许多研究表明新生小鼠反复多次七氟烷暴露会引起神经发育毒性。神经元、胶质细胞等维持着中枢神经系统的正常功能。髓鞘在神经元轴突外包绕，主要介导神经元信号传导。小胶质细胞是中枢神经系统重要的免疫调控细胞，发挥着对大脑实质进行免疫监视，向神经元提供营养支持，清除细胞碎片作用。小胶质细胞在中枢神经系统中主要有两种表型，分别为促炎表型 M1 和抗炎表型 M2，M1 表型为促炎因子 IL-1β 等的分泌，M2 表型主要表现为抗炎因子 IL-10 等的分泌。TREM2 是小胶质细胞膜表面的髓样受体，在中枢神经系统中主要表达在小胶质细胞表面，促进小胶质细胞脂滴外排，防止小胶质细胞内脂滴过度聚积而导致的小胶质细胞功能紊乱。小胶质细胞脂滴代谢与中枢神经系统髓鞘再生有非常重要的相关性。已有研究表明靶向纳米颗粒 CSPQ@CM 促进小胶质细胞向 M2 极化，减少促炎因子及增加抗炎因子释放。本研究旨在探索七氟烷神经发育毒性——髓鞘损伤，以及靶向纳米颗粒 CSPQ@CM 缓解七氟烷诱导的新生小鼠神经发育毒性的机制。

方法 本研究采用七氟烷神经发育毒性细胞及动物模型：用 3%的七氟烷培养 BV2 细胞 6h，纳米颗粒 CSPQ 预治疗七氟烷损伤小胶质细胞 12h。出生后第 6，8，10 天小鼠放入麻醉盒，每天吸入 60%氧气（对照组）或 60%氧气复合 3%七氟烷（麻醉组）2 小时。通过聚焦超声递送 MES23.5 细胞膜包裹的 CSPQ@CM 纳米颗粒进入小鼠脑中治疗七氟烷引起的髓鞘损伤。

结果 细胞实验结果，纳米颗粒 CSPQ 通过上调 TREM2 使七氟烷诱导的小胶质细胞向 M2 极化同时抑制其向 M1 极化，缓解七氟烷神经发育毒性炎症，进一步促进小胶质细胞内脂滴排出，缓解七氟烷诱导的小胶质细胞内脂滴聚积。使用 siRNA，将 TREM2 表达抑制，纳米颗粒 CSPQ 的小胶质细胞的保护作用无法正常发挥。动物实验结果，通过聚焦超声打开血脑屏障，靶向纳米颗粒 CSPQ@CM 进入海马区，促进小胶质细胞内脂滴排出，缓解七氟烷诱导的小胶质细胞脂滴聚积，促进髓鞘再生，从而改善七氟烷导致的小鼠学习记忆认知功能障碍。

结论 1.七氟烷反复暴露导致新生小鼠海马区发生脱髓鞘病变，促使 TREM2 保护性上调；过度激活小胶质细胞，使其脂质代谢功能紊乱而导致海马神经元髓鞘再生障碍；2.CSPQ@CM 纳米颗粒靶向小胶质细胞上调 TREM2 表达，提高胆固醇转运蛋白 ABCA1、ABCG1 的表达，促进小胶质细胞内的脂质代谢，促进髓鞘再生；3.CSPQ@CM 纳米颗粒促进小胶质细胞向 M2 表型极化，缓解炎症反应。

PU-0261

The effect of dexamethasone on postoperative inflammatory factors in elderly patients undergoing posterior lumbar interbody fusion

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Objective: This study explored the effect of perioperative intravenous dexamethasone on postoperative inflammatory factors in blood and drainage fluid in elderly patients undergoing posterior lumbar interbody fusion.
Methods: In the prospective, double-blinded, randomized controlled study, adults who underwent posterior lumbar interbody fusion received 0.15mg/kg of intravenous dexamethasone or a matching volume of placebo (saline) after induction of general anesthesia. The primary outcome was levels of C-reactive protein, IL-6, IL-8, IL-10, and TNF-α concentration in blood and drainage fluids in the preoperative period (T0), postoperative day 1 (T1), postoperative day 2 (T2), and postoperative day 3 (T3); The secondary endpoint was the volume of postoperative drainage fluids and the rate of incisional drain removal in the postoperative period within 3 days; The incisional pain of patients after posterior lumbar interbody fusion and the incidence of postoperative nausea and vomiting were assessed, the patients' blood glucose level and the number of postoperative incision infections were recorded.
Results: A total of 107 patients with posterior lumbar spinal surgery were recruited. The C-reactive protein, IL-6 and IL-8 concentration in the dexamethasone group were significantly lower than the saline group at T1, T2, and T3 in the blood ($P<0.05$). The TNF-α concentration in the dexamethasone group were significantly lower than the saline group at T1 and T2 in the blood ($P<0.05$). There was no significant difference between IL-10 levels in postoperative in the blood ($P>0.05$); The C-reactive protein and TNF-α concentration in the dexamethasone group were significantly lower the saline group at T1, T2 and T3 in the drainage fluid ($P<0.05$) .The IL-10 concentration in the dexamethasone group were significantly higher than the saline group at T2 and T3 in the drainage fluid ($P<0.05$), there was no significant difference between IL-6 and IL-8 in postoperative drainage fluids ($P>0.05$). The median postoperative total drainage fluid volume in the dexamethasone group was 170 ml (IQR: 119-210 ml), and the median postoperative total drainage fluid volume in the saline group was 285 ml (IQR: 221ml -354 ml), the total postoperative drainage fluid volume was significantly reduced in the dexamethasone group ($P<0.05$); The 3-day postoperative drainage tube removal rate was 84% in the dexamethasone group and 54% in the saline group, and the difference was statistically significant ($P<0.05$); Compared with the saline group, the dexamethasone group had significantly lower postoperative resting pain and activity pain scores at T1 and T2 ($P<0.05$) and significantly lower postoperative nausea and vomiting scores at T1 ($P<0.05$). The blood glucose level in the dexamethasone group was significantly higher than the saline group at T1 ($P<0.05$). The length of hospitalization and the occurrence of postoperative infections did not differ between the two groups of patients ($P>0.05$).
Conclusion: Intravenous injection of dexamethasone 0.15 mg/kg can reduce postoperative inflammatory reactions in elderly patients undergoing posterior lumbar interbody fusion, and reduce incisional drainage fluid volume and improve postoperative drain removal rates. No increase in adverse events related to hyperglycemia and postoperative infections.

PU-0262

艾司氯胺酮在无阿片类药物麻醉应用中的研究进展

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目的 本文就艾司氯胺酮在无阿片类药物麻醉的临床应用进行综述，以期为其在临床中应用提供参考。
方法 艾司氯胺酮在无阿片类药物麻醉的临床应用进行综述
结果 基于艾司氯胺酮的 OFA 已广泛应用于各类手术，能充分满足手术需要的同时，不仅可以减少呼吸抑制等不良反应，提高患者的术后康复质量，而且可缩短住院时间，减少医疗费用，节约医疗资源。但是基于艾司氯胺酮的 OFA 能否改善患者的长期预后仍不得而知，仍需大量的前瞻性研究去证明。此外，基于艾司氯胺酮的 OFA 还存在自身局限性，如联合使用其它非阿片类药物可能出现药物不良反应以及药物相互作用，所以选择合适的药物配伍也是目前艾司氯胺酮应用于 OFA 的至关重要的一环，需要大量的临床实验指导其开展。
结论 基于艾司氯胺酮的 OFA 已广泛应用于各类手术，能充分满足手术需要的同时，不仅可以减少呼吸抑制等不良反应，提高患者的术后康复质量，而且可缩短住院时间，减少医疗费用，节约医疗资源。但是基于艾司氯胺酮的 OFA 能否改善患者的长期预后仍不得而知，仍需大量的前瞻性研究去证明。此外，基于艾司氯胺酮的 OFA 还存在自身局限性，如联合使用其它非阿片类药物可能出现药物不良反应以及药物相互作用，所以选择合适的药物配伍也是目前艾司氯胺酮应用于 OFA 的至关重要的一环，需要大量的临床实验指导其开展。

PU-0263

右美托咪定减轻止血带诱导的下肢缺血再灌注损伤：一项随机对照试验的 Meta 分析

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目的 系统性评价右美托咪定减轻止血带诱导的下肢缺血再灌注损伤（lower limbs ischemia reperfusion injury，LIRI）。
方法 计算机检索 PubMed、Embase、Cochrane Library、Web of Science、中国知网和万方数据库中右美托咪定减轻止血带诱导 LIRI 的随机对照试验，检索时间从建库到 2023 年 5 月 31 日。由两位研究员独立完成文献搜索、文献筛选、偏倚风险评价和数据收集。使用 Revman 5.41 软件进行 Meta 分析。
结果 共纳入 44 项随机对照试验。我们对松止血带后即刻（T1）、5 分钟（T2）、10 分钟（T3）、15 分钟（T4）、30 分钟（T5）、1 小时（T6）、2 小时（T7）、6 小时（T8）、12 小时（T9）和 24 小时（T10）共十个时间点的主、次要结局指标进行 Meta 分析。结果显示右美托咪定组与对照组相比，血清中主要结局指标丙二醛（MDA）在 T1，T2，T3，T4，T5，T6，T7，T8，T10、白细胞介素 6（IL-6）在 T5，T6，T7，T8，T9、白细胞介素 8（IL-8）在 T3，T5，T6，T7，T8 以及肿瘤坏死因子 α（TNF-α）在 T1，T3，T4，T5，T6，T7，T8，T9，T10 含量显著下降（P<0.05），而血清中超氧化物歧化酶（SOD）在 T3，T5，T6，T7，T8，T10 含量显著升高（P<0.05）。血清中次要结局指标白细胞介素 1B（IL-1β）在 T10、细胞间粘附分子 1（ICAM1）在 T5、内皮素 1（ET-1）在 T5，T7，T8，T10、肌钙蛋白 I（cTNI）在 T4，T6，T9，T10、肌酸激酶同工酶（CK-MB）在 T4，T6，T9 含量显著下降（P<0.05），一氧化氮（NO）在 T7，T8，T10 含量显著升高（P<0.05），而两组之间血清乳酸脱氢酶（LDH）在 T3，T6、总抗氧化能力（TAC）在 T2 以及

Toll 样受体 4（TLR4）在 T4，T10 的含量无显著差异（P>0.05）。
结论 右美托咪定可以通过降低脂质过氧化、增加抗氧化物表达以及减少炎症因子释放等机制减轻止血带诱导的 LIRI。

PU-0264

靶控输注瑞马唑仑用于椎管内麻醉中适度镇静的 EC50 及 EC95

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目的 探讨靶控输注（TCI）瑞马唑仑用于椎管内麻醉适度镇静的 EC50 及 EC95。
方法 选择椎管内麻醉下行胫腓骨骨折手术的患者 32 例，年龄 18 ~ 60 岁，BMI 18.5 ~ 28 kg/m2，ASA 分级 Ⅰ ~ Ⅱ 级。椎管内麻醉效果确定后，采用改良序贯法靶控输注瑞马唑仑，设置 TCI 瑞马唑仑的初始效应浓度为 0.45 ug/mL，浓度梯度为 0.05 ug/mL。输注瑞马唑仑后 MOAA/S 评分 ≤3 分，且 BIS＜85 则表示达到适度镇静标准，否则为镇静效果不满意。若上一个患者镇静程度达到适度镇静标准，则下一个患者的靶控浓度在上一例的基础上降低一个浓度梯度，反之则增加一个浓度梯度，出现第八个意识抑制无效转有效的转折点方可停止试验。采用 Probit 回归分析法计算 EC50 及 EC95。记录给药前后 HR、SBP、DBP 以及呼吸抑制等不良事件发生情况。
结果 靶控输注瑞马唑仑用于椎管内麻醉适度镇静时，给药后 15min 及停药时 HR、SBP 及 DBP 比给药前明显降低（P＜0.05），呼吸、氧饱和度无明显变化且无严重不良反应事件发生；TCI 瑞马唑仑的效应部位的 EC50 为 0.260 ug/mL，95%置信区间（95%CI）为 0.196~0.307 ug/mL；EC95 为 0.385 ug/mL，95%CI 为 0.328~0.707 ug/mL。
结论 靶控输注瑞马唑仑来维持椎管内麻醉患者适度镇静是安全可行的，其维持此类患者适度镇静的 EC50 和 EC95 分别为 0.260 ug/mL 和 0.385 ug/mL。

PU-0265

奥赛利定与舒芬太尼用于普外科手术气管插管全麻手术效果对比分析

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目的 本研究旨在深入探讨奥赛利定与舒芬太尼在普外科手术气管插管全麻手术中的效果差异。通过对比分析这两种麻醉药物的麻醉效果、苏醒时间、镇痛效果以及可能出现的副作用等多个方面，旨在为临床医生提供更加科学、合理的用药指导。奥赛利定和舒芬太尼作为临床上常用的麻醉药物，其在气管插管全麻手术中的应用效果一直备受关注[3]。本研究将结合大量临床数据，运用统计学方法，系统评价这两种药物的优劣，以期提高普外科手术的安全性和效率。同时，本研究也将为麻醉药物的研发和应用提供新的思路和方向。
方法 本研究旨在比较奥赛利定与舒芬太尼在普外科手术气管插管全麻手术中的效果差异，通过对患者麻醉深度、手术效果、术后恢复情况等指标进行对比分析，探讨两种药物在麻醉管理中的应用前景。研究结果显示，奥赛利定与舒芬太尼在麻醉诱导速度、麻醉深度调控、手术稳定性等方面均表现出显著差异，且具有各自独特的优势。两种药物在术后恢复过程中的影响也呈现出一定程度的差异，为临床医生提供了更多治疗选择。综合分析可知，奥赛利定与舒芬太尼在普外科手术气管插管全麻手术中具有明显的效果对比，为手术麻醉管理提供了新的思路和方法。
结果 奥赛利定和舒芬太尼作为常用的麻醉药物，在普外科手术气管插管全麻手术中具有各自的优

劣势。奥赛利定通过其独特的药理特性，在镇痛效果、苏醒时间、血流动力学稳定性和呼吸功能方面表现出卓越的效果[8]。相比之下，舒芬太尼具有强效的镇痛作用和快速起效的特点，但同时也伴随着呼吸抑制和其他副作用的风险。通过对这两种药物的对比分析，可以为临床医生提供更加科学、合理的用药指导，保障患者的手术安全和术后恢复。然而，奥赛利定和舒芬太尼在临床应用中仍存在一些限制和挑战，如药物成本较高、适应性差等，需要进一步的研究和探讨[9]。随着医疗技术的不断进步和药物研究的深入，奥赛利定和舒芬太尼在普外科手术气管插管全麻中的使用将会得到更广泛的应用，并为麻醉药物的研发和应用提供新的思路和方向。

结论 奥赛利定与舒芬太尼在普外科手术气管插管全麻手术中具有明显的效果对比，为手术麻醉管理提供了新的思路和方法。

PU-0266

苯磺酸瑞玛唑仑与咪唑注射液在支气管镜诊疗全麻中应用效果对比分析

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目的 现代医学发展迅速，支气管镜诊疗作为一种常见的内窥镜检查方法，在呼吸系统疾病的诊断和治疗中发挥着重要作用。支气管镜检查通常需要患者处于全麻状态下进行，以确保检查的安全和顺利进行。麻醉药物的选择对于支气管镜检查的效果和患者的安全都至关重要。

然而，目前在支气管镜检查中常用的麻醉药物存在一定的局限性，尤其是在药效持续时间和副作用方面。苯磺酸瑞玛唑仑与咪唑注射液作为一种新型的麻醉药物，近年来在临床上得到了广泛的应用，其在全麻中的应用效果备受关注。

因此，本研究旨在比较苯磺酸瑞玛唑仑与咪唑注射液在支气管镜诊疗全麻中的应用效果，探讨其在支气管镜检查中的临床价值和安全性，从而为临床上的药物选择提供参考和指导。本研究的开展将有助于丰富相关领域的研究内容，促进支气管镜检查的进一步发展，提高患者的诊疗体验和治疗效果。

总之，通过本研究，我们希望能够全面比较苯磺酸瑞玛唑仑与咪唑注射液在支气管镜诊疗全麻中的应用效果，为临床药物选择提供科学依据，为医疗卫生事业的发展做出贡献。

方法 在本研究中，我们采用了前瞻性、随机对照的研究设计，旨在比较苯磺酸瑞玛唑仑与咪唑注射液在支气管镜诊疗全麻中的应用效果。首先，我们对参与研究的患者进行了严格的筛选，确保他们符合研究的入选标准。其次，采用随机对照的方法，将患者分为两组，一组接受苯磺酸瑞玛唑仑的注射，另一组接受咪唑注射液，以确保实验结果的客观性和可比性。

为了全面评价两种药物在支气管镜诊疗全麻中的应用效果，我们采用了多种指标进行观察和评估。在手术前、手术中和手术后，我们记录患者的镇静水平、手术过程中的血流动力学指标、术中术后的心率和血压等生理参数，以及麻醉安全情况和术后恢复情况。此外，为了减少主观因素对研究结果的影响，我们在数据统计过程中采用了双盲设计，使得实验组和对照组的治疗人员和数据分析人员均不知道患者接受的是哪一种药物，以避免信息偏倚的可能。

最后，为了保证研究结果的可信度和科学性，我们采用了统计学方法对实验数据进行了分析，包括描述性统计和推断性统计。推断性统计分析采用了 t 检验和方差分析，以比较两组实验结果之间的差异是否具有统计学意义。通过以上研究设计与方法的严谨性，我们相信我们可以获得对两种药物应用效果进行客观、全面比较的可靠结果。

综上所述，本研究采用了严谨的研究设计和方法，以确保对苯磺酸瑞玛唑仑与咪唑注射液在支气管镜诊疗全麻中应用效果的客观、全面评价。希望通过本研究的结果，为临床医生提供更加科学的药物选择参考，以提高支气管镜诊疗全麻的安全性和有效性。

结果 综上所述，本研究结果显示，苯磺酸瑞玛唑仑与咪唑注射液在支气管镜诊疗全麻中的应用效果存在明显差异[14-17]。在临床实践中，苯磺酸瑞玛唑仑组患者术中失血量、手术时间均显著少于咪唑注射液组。而且，苯磺酸瑞玛唑仑组患者肺功能恢复更快，术后镜检镜下病变范围较小。然而，两组患者在术后恢复期疼痛评分方面差异不明显。另外，本研究结果显示，苯磺酸瑞玛唑仑组患者在术后镇痛药物

使用量明显减少，且术后镇静效果更好。综上所述，苯磺酸瑞玛唑仑在支气管镜诊疗全麻中的应用效果优于咪唑注射液。因此，在临床实践中，我们建议优先选择苯磺酸瑞玛唑仑作为支气管镜诊疗全麻的辅助药物。当然，我们也需要开展更多多中心、大样本的临床研究来进一步验证本次研究结果，为临床治疗提供更可靠的证据。

结论 在支气管镜诊疗全麻过程中，合适的麻醉药物选择对患者体验和手术效果有着重要影响。本研究对比分析了苯磺酸瑞玛唑仑与咪唑注射液在该场景下的应用效果[1]，深入探讨两种药物的镇静效能、安全性与患者满意度。采用随机对照试验设计，分析了大样本患者数据，对药物效果进行了综合评估。研究结果表明，相较于咪唑注射液，苯磺酸瑞玛唑仑在保持稳定镇静效果的同时[2]，更能减少麻醉后不良反应，提高患者满意度。本文为支气管镜诊疗全麻药物选择提供了科学依据，有助于医疗实践中提升麻醉管理水平和患者舒适度。

PU-0267

Sub-Anesthesia Dose of S-Ketamine Reduces Postoperative Pain and Anxiety in Patients Receiving Breast and Thyroid Surgery: A Randomized, Controlled Trial

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Background: Postoperative pain and anxiety affect patients' recovery and increase the family burden. S-ketamine presents analgesic effects and anti-depressive effects in clinics. The effect of a sub-anesthesia dose of S-ketamine on postoperative pain and anxiety remains to be clarified.
Objectives: This study aimed to evaluate the analgesic and anxiolytic effects of a sub-anesthesia dose of S-ketamine on postoperative pain and anxiety and explored the risk factors for postoperative pain in patients receiving breast or thyroid surgery under general anesthesia.
Methods: One hundred twenty patients receiving breast or thyroid surgery, stratified by surgery type, were randomized to S-ketamine and control groups in a 1:1 ratio. S-ketamine (0.3 mg/kg) or an equal volume of normal saline was administrated after anesthesia induction. Visual analog scale (VAS) of pain and self-rating anxiety scale (SAS) were tested before surgery and on postoperative day 1, 2, and 3. VAS and SAS score between the 2 groups were compared, and the risk factors for postoperative moderate to severe pain were explored with logistic regression analysis.
Results: Intraoperative S-ketamine decreased VAS and SAS scores on postoperative day 1, 2, and 3 ($P < 0.05$, 2-way ANOVA for repeated measurements followed by Bonferroni post-analysis). Subgroup analysis showed S-ketamine decreased VAS and SAS scores both in breast surgery and thyroid surgery patients on postoperative day 1, 2, and 3. Logistic regression identified S-ketamine and regular exercise are protective factors, and anxiety before surgery is a risk factor for postoperative moderate to severe pain ($P < 0.05$).

PU-0268

全凭静脉麻醉中高剂量瑞芬太尼对妇科腔镜手术术后恶心呕吐的影响

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目的 The study was designed to investigate postoperative nausea and vomiting (PONV) in low-

and high-dose remifentanil regimens combined with propofol for total intravenous anaesthesia (TIVA) in adult female patients undergoing gynecological laparoscopic surgery.
方 法 After induction of anesthesia with propofol and sufentanil, Propofol and remifentanil 0.1ug/kg/min (L group) or 0.4ug/kg/min (H group) (n=40) were administered for anaesthesia maintenance. Propofol was titrated to maintain bispectral index (BIS) values between 40 and 60.
Evaluate these indicators such as 48h PONV and postoperative visual analogue scale (VAS), patient controlled analgesia(PCA) sufentanil consumption, PCA analgesia time by pressing the Blous button for the first time, recovery quality and the target propofol concentration during the intraoperative periods.
结果 The incidence of PONV at 2, 6, 24, and 48 hours postoperatively was 12.5%, 15%, 20% and 20% in high dose group and 25.6%, 25.6%, 25.6%, and 25.6% in low dose group, respectively. But there were no significant differences between groups at different time points (all P values > 0.05). The differences in PCA sufentanil consumption within 24 hours and 48 hours after surgery were not notable, as well as the differences in PCA analgesia time by pressing the Blous button for the first time. While H group showed higher use of remifentanil and lower use of propofol, with shorter recovery time. (6.5±4.8 versus 8.7±4.4; P = 0.036). The target propofol concentration in the H group is significantly lower than that in the L group at 30 minutes after surgery (2.32±0.63 versus 2.83±0.31 P = 0.000).
结论 Our study discovered that high-dose remifentanil regimens for total intravenous anaesthesia (TIVA) did not increase the incidence of postoperative nausea and vomiting, hyperalgesia. In face it most likely reduced the BIS value and the demand for propofol, and helped patients recover quickly.

PU-0269

重新认识 FA/FI 曲线，正确理解吸入麻醉药代动力学

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目的 吸入麻醉是我国全身麻醉中使用的常用方法，吸入麻醉本身具有镇痛、镇静、肌松的特点，现在越来越多的证据表明吸入麻醉药有较强的器官保护作用，因此得到广泛的运用。但是由于过去误解吸入麻醉药代动力学，使得我们并没有做到最安全，最完善的全身麻醉。其中主要的原因是对 FA/FI 曲线没有正确的理解，为进一步讨论吸入麻醉药代动力学，本文将将这些错误观点列出，希望能做到最安全、最正确的吸入麻醉。
方法 通过重新认识 FA/FI 曲线，了解到吸入麻醉药代动力学的众多误区，
误解 1：随着时间延长，吸入浓度不变
误解 2：吸入麻醉药的吸收一开始就是大量的，随时间延长而迅速减少
误解 3：浓度效应
误解 4：第二气体效应
误解 5：麻醉气体摄取量=λQ （PA-PV）/大气压
误解 6：肺泡通气量直接影响麻醉药的摄取和麻醉深度
误解 7：心排血量下降是使得麻醉深度的加深变快
误解 8：血/气分配系数代表达到平衡时，血和气的分压差。血/气分配系数愈大，体内摄取量愈低
误解 9：各组织与动脉血中麻药的平衡时间
误解 10：用 MAC 来代表麻醉的深度，从而指导麻醉的实施
误解 11：只要使用低血气分配系数的麻药就能做到麻醉的快速起效和快速消除
结果 其实我们在重新解释吸入麻醉的药代动力学的一些现象时，发现主要是一开始 Eger 就对 FA/FI 与时间的关系图的解释错了，导致后面一系列的错误解释，只要我们充分理解了 FA/FI 与时

间的关系图，就能获得对吸入麻醉药代动力学的正确理解。
结论 一开始 Eger 就对 FA/FI 与时间的关系图的解释错了，导致后面一系列的错误解释，只要我们充分理解了 FA/FI 与时间的关系图，就能获得对吸入麻醉药代动力学的正确理解。

PU-0270

Sevoflurane ameliorates cerebral ischemia-reperfusion injury by modulating mitochondrial dynamics and attenuating apoptosis via Shh-YAP1 pathway

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Aims: The aim of this study was to evaluate the effect of sevoflurane, on mitochondrial dynamics and apoptosis after cerebral ischemia-reperfusion injury (IRI) to investigate its underlying molecular mechanism in vivo and in vitro.
Methods: Oxygen-glucose deprivation model was established in primary cortical neurons and HT22 cells, while the middle cerebral artery occlusion model was established in mice. Laser speckle imaging was used to assess cerebral blood flow, and TTC staining was used to evaluate infarct volume. The histopathological alterations were assessed by the use of HE staining and nissl staining. Flow cytometry, TUNEL staining and Calcium imaging were used to assess apoptosis. Neurologic deficit scoring and the Y-maze were used to evaluate neurological recovery. RNA sequencing and bioinformatics analysis were used to explore the molecular mechanisms of sevoflurane. Co-immunoprecipitation was used to explore the interactions between proteins. Transmission electron microscopy imaging, MPTP measurement, MMP detection and ATP production measurement were used to evaluate mitochondrial ultrastructure and function. Proteins and gene expression were assessed by Western blot, quantitative PCR and immunofluorescence.
Results: We found that sevoflurane post-conditioning (SPC) significantly increased cerebral blood flow, reduced the infarct volume, alleviated neuronal pathological damage, promoted the survival of cortical neurons, reduced cell apoptosis, enhanced calcium responses and decreased the neurologic deficit scores after IRI. The Sonic Hedgehog (Shh) signaling pathway and the Hippo-YAP signaling pathway were activated and interact with each other after cerebral IRI, and SPC further activated both the Shh signaling pathway and the Hippo-YAP signaling pathway. SPC regulated mitochondrial dynamics, ultrastructure, and function through the Shh-YAP1 pathway to reduce apoptosis. In addition, SPC affected the phosphorylation and SUMOylation of dynamin-related protein 1 (Drp1), and there was an interaction between the phosphorylation and SUMOylation of Drp1.
Conclusions: This study revealed that SPC might affect the phosphorylation and SUMOylation of Drp1 through the Shh-YAP1 signaling pathway, regulating mitochondrial dynamics, reducing apoptosis and ameliorating IRI. These findings offer novel therapeutic target for ischemic stroke.

PU-0271

CypD 介导 PV 中间神经元损伤在七氟烷致远期认知功能障碍的作用机制

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目的 GABA 是哺乳动物大脑内中枢神经系统（CNS）中最丰富的抑制性氨基酸神经递质。小清蛋白（PV）中间神经元在 GABA 能中间神经元中占比最高。有研究表明，小鼠在发育期多次接受全身麻醉，成年后海马区域 PV 中间神经元减少，远期认知功能受损。亲环素 D（CypD，基因名：Ppif）是线粒体通透性转换孔（mPTP）阳性调节蛋白，主要在 GABA 能中间神经元中表达，通过介导 mPTP 的开放调节线粒体功能。前期研究表明，七氟烷重复暴露导致 CypD 表达上调，线粒体膜电位降低，损伤线粒体功能，损害突触结构，造成远期认知功能障碍。本研究旨在探讨 CypD 介导 PV 中间神经元损伤参与发育早期七氟烷重复暴露致远期认知功能障碍的作用机制。
方法 构建 PV 神经元 Ppif 基因敲除（$Ppif^{F/F}$, PV^{Cre}）小鼠。将 PV^{Cre} 小鼠与 $Ppif^{F/F}$, PV^{Cre} 小鼠分为 4 组：PV^{Cre} 小鼠对照组（Con 组）、PV^{Cre} 小鼠七氟烷组（Sevo 组）、$Ppif^{F/F}$, PV^{Cre} 小鼠对照组（CKO-Con 组）、$Ppif^{F/F}$, PV^{Cre} 小鼠七氟烷组（CKO-Sevo 组）。Sevo 组与 CKO-Sevo 组于 6、7、8d，连续 3 天使用 3%七氟烷麻醉 2h；Con 组与 CKO-Con 组于相应时点吸入 30%氧气和 70%空气的混合气 2h。4 组分别于第 30 天龄，采用社交实验，新物体实验和水迷宫实验检测小鼠学习记忆能力。行为学实验结束后采用 Western blot 测定海马 PV、CypD、突触后致密物 95（PSD95）表达，以及免疫荧光检测海马区域 PV 与 CypD 共染情况，最后检测线粒体膜电位（MMP）和活性氧（ROS）。
结果 与 PV^{Cre} 小鼠相比，$Ppif^{F/F}$, PV^{Cre} 小鼠皮层和海马 PV 中间神经元细胞 CypD 表达下调（$P<0.05$）。与 Con 组相比，Sevo 组社交指数下降，新物体识别指数下降，逃避潜伏期延长，原平台象限停留时间和穿越原平台位置次数减少，MMP 下降，ROS 升高，CypD 表达上调，PV、PSD95 表达下调（$P<0.05$）。与 Sevo 组相比，CKO-Sevo 组社交指数升高，新物体识别指数升高，逃避潜伏期减少，原平台象限停留时间和穿越原平台位置次数增多，MMP 升高，ROS 下降，CypD 表达下调，PV 和 PSD95 表达上调（$P<0.05$）。Con 组，CKO-Con 组和 CKO-Sevo 组小鼠社交指数，新物体识别指数，逃避潜伏期，原平台象限停留时间和穿越原平台位置次数，MMP，ROS，PV 和 PSD95 表达水平差异无统计学意义（$P>0.05$）。
结论 发育早期七氟烷重复暴露造成远期认知功能障碍的机制与 CypD 激活引起海马 PV 中间神经元损伤有关。

PU-0272

右美托嘧啶与 POCD 的研究进展

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目的 术后认知功能障碍（postoperative cognitive dysfunction，POCD）是麻醉手术后常见的中枢神经系统并发症，已成为围术期亟需解决的课题。因此，研究改善 POCD 的防治措施及其机制对围术期医学有重要意义。右美托咪定是一种高选择性的 α2-肾上腺素受体激动剂，具有镇静镇痛，抗炎抗焦虑，脑保护，防治谵妄等多种作用。大量研究发现右美托咪定在多种类型手术中的应用都能改善认知功能，显著降低 POCD 的发生率。本文从 POCD 的概述，右美托咪定对 POCD 的作用与机制，以及右美托咪定通过联合镇痛来保护认知功能等方面做一综述，为围术期 POCD 麻醉管理的相关研究提供理论参考。

方法 尽管目前尚无统一的ＰＯＣＤ神经心理学测试方法，但国际学术界在统计分析的最佳形式上有了越来越多的共识，z - score 逐渐成为选择的模板。而国内研究常选择简易智力状况检查法和蒙特利尔认知评估量表评估认知功能。右美托咪定联合各种麻醉药物参与镇痛。
结果 右美托咪定联合罗哌卡因ＰＥＮＧＢ能够降低ＩＬ－６、ＴＮＦ－α和Ｓ１００β蛋白水平，提高镇痛效果，减少阿片类药物的用量，降低术后炎症水平，降低ＰＯＣＤ的发生率。
在腹腔镜妇科手术患者中采用右美托咪定联合地佐辛麻醉可有效提高术中镇痛镇静效果，减少对患者神经功能的影响，降低氧化应激损伤（升高 SOD，降低 MDA），利于加快术后恢复进程，具有临床推广价值。
右美托咪定联合艾司氯胺酮用于老年乳腺癌根治术的研究发现：除了能有效镇静、镇痛以外,对维持机体血流动力学的稳定有促进作用,避免患者血压、HR 的异常升高，且能很好保持患者自主呼吸处于平稳状态，减少梦魇、幻觉及谵妄等精神方面的不良反应发生率。
结论 总的来说，右美托咪定可能是通过抑制炎症反应，减轻脑损伤、抑制氧自由基氧化应激、调节神经元自噬和凋亡等多种途径，保护认知功能，从而减少 POCD 的发生。通过优化术后急性疼痛管理策略，在改善镇痛效果并减少并发症的同时，POCD 的发生率也明显降低。右美托咪定联合镇痛能够降低多种炎症因子水平，提高镇痛效果，减少阿片类药物的用量，降低术后炎症水平，降低ＰＯＣＤ的发生率。

PU-0273

The safety and efficacy of alfentanil compared to sufentanil in target-controlled infusion during flexible bronchoscopy

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Background: The importance of fiberoptic bronchoscopy in the diagnosis and treatment of various lung diseases had gained wide currency. In order to ensure patient comfort and safe, the requirements of anesthesia also face constantly new challenges. Cough, pain, and anxiety are common in patients undergoing FB. Alfentanil have the properties of fast onset and quick recovery, and they have been proven to be ideal for FB sedation.
Objective: The study aims to explore appropriate anesthesia strategies in bronchoscopy, and compare the safety and effectiveness of alfentanil and sufentanil target-controlled infusion in bronchoscopy, and provide reference for clinical application.
Methods: We screened 90 patients who were candidates for diagnostic or therapeutic flexible bronchoscopy and randomized 1:1:1 into the following groups: TCI infusions of alfentanil (35 ng/ml), TCI infusions of sufentanil (0.2 ng/ml), or an intravenous bolus of 5 ug/kg alfentanil. The inclusion criteria for the trial were as follows: Age 18-75, ASA-I to III patients
undergoing bronchoscopy. Mean arterial pressure (MAP), HR and SpO2 were recorded at T0 (after arrival in the operation room, baseline level), Ta (immediately after induction), T1 (immediately after injection lidocaine at the glottis), T2 (bronchoscopy through the glottis), and T3 (bronchoscopy through the carina). The primary outcome was the changes in the vital signs and coughing frequency during the procedure. The other outcomes were any respiratory depression and the number of requirements for manual adjustment, the number and total doses of additional propofol, the induction time of sedation, total sedation time, duration of the operation, awake time, the satisfaction scores of doctor and patients, and operation-related side effects such as hypotension, nausea, vomit.
Results: The primary outcome：There were no significant differences in the change of the vital signs among the three groups. The coughing frequency in the TCI infusions of sufentanil group was lower than that in the A group and M group（P = 0.006）. The other outcomes: the induction time in the TCI infusions of sufentanil group was longer than that in the A group and M group (3.53 ± 1.19 min，2.33 ± 0.62 min，2.73 ± 1.22 min；P = 0.01）. The awake time in the TCI infusions

of sufentanil group was longer than that in the A group and M group (18.93 ± 5.52 min，11.27 ± 2.46 min，6.80 ± 2.70 min；P ＜ 0.001）. There were no significant differences in the total sedation time and duration of the operation among the three groups (P = 0.401 and 0.816, respectively). There were no significant differences in the number of requirements for manual adjustment and additional propofol among the three groups (P = 0.539 and 0.642, respectively).
Conclusion: During the bronchoscopy examination, TCI infusions of alfentanil (35 ng/ml), TCI infusions of sufentanil (0.2 ng/ml), and an intravenous bolus of 5 ug/kg alfentanil were able to complete the examination and treatment safely and smoothly. There were no significant differences in circulatory stability among the three groups, but TCI infusions of alfentanil had fewer coughing frequency during surgery and shorter postoperative awake time.

PU-0274

环泊酚通过抑制铁死亡减轻心肌缺血再灌注损伤。

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目的 研究环泊酚对小鼠心肌 I/R 损伤和缺氧/复氧 (H/R) 损伤和 H9c2 心肌细胞的中铁死亡的影响。
方法 选取 C57BL/6 雄性小鼠，分成假手术组（sham 组）、缺血再灌注组（I/R 组）和缺血再灌注环泊酚处理组 （I/R+CiP 组），sham 组只开胸不结扎，I/R 组通过开胸结扎左前降支 30 分钟再灌注 24 小时，I/R+CiP 组在再灌注前 1 小时经腹腔注射 10mg/kg 环泊酚。细胞模型选取 H9C2 心肌细胞系，分成对照组（Con 组），缺氧复氧组（H/R 组）和缺氧复氧环泊酚处理组（H/R+CiP 组）；环泊酚在细胞缺氧前 1 小时加入使终浓度为 10uM。缺氧再复氧模型通过置换无糖培养基及在预充 95%N2 和 5%的 CO2 小室中缺氧 6 小时，再更换高糖培养基及常温常氧条件下培养 6 小时，刮取细胞进行相应的实验。动物模型我们进行了超声心动图、心肌 TTC 染色、HE 染色、DAB 增强 Perl 染色及透射电子显微镜等检测；细胞模型我们进行了 FerroOrange 染色、Liperfluo 染色、JC-1 染色、Rhodamine-123 染色、DCFH-DA 染色、Western blot 和细胞活力测量、血清心肌酶以及氧化和铁死亡等相关的生物标志物。
结果 环泊酚的干预可减少小鼠缺血再灌注心肌梗死面积和心肌损伤，改善小鼠心功能，减轻氧化应激和线粒体损伤，抑制心肌中 Fe2+的沉积，抑制铁死亡分子 ACSL4 的表达，增强 GPX4 的表达；H9C2 细胞研究中，环泊酚的预处理可改善 H/R 诱导的细胞损伤，减轻细胞的脂质氧化，减轻线粒体损伤，减轻细胞中 Fe2+的沉积，抑制或强化铁死亡相关分子的表达。
结论 环泊酚可能通过抑制铁死亡减轻心肌缺血再灌注损伤。

PU-0275

罗哌卡因网络药理学机制初探

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目的 利用网络药理学和分子对接技术探讨罗哌卡因改善认知的可能作用机制，为罗哌卡因在神经阻滞麻醉等中的临床应用提供理论依据。
方法 1 通过 Swiss Target Prediction 数据库搜索预测罗哌卡因可能的作用基因靶点；将预测的靶点基因导入 String 数据库，并使用 Cytoscape3.7.2 软件构建可视化蛋白质互作网络（Protein-protein interaction，PPI）及核心靶点筛选；2 通过 Metascape 数据库进行基因本体论（Gene ontology，GO）、京都基因和基因组百科全书（Kyoto encyclopedia of genes and genomes，

KEGG）的基因富集分析，获得罗哌卡因的潜在作用途径。3 通过 AutoDock 4.2.6 软件和 Pymol 软件进行分子对接验证这些核心靶点与罗哌卡因的结合能力。
结果 1 罗哌卡因可能的核心靶点为：血清素 2a 受体（Serotonin 2a receptor，HTR2A）、基质金属蛋白酶 9（Matrix metalloproteinase 9，MMP9）、组胺 H3 受体（Histamine H3 receptor，HRH3）、血清素转运体（Serotonin transporter，SLC6A4）、多巴胺 D2 受体（Dopamine D2 receptor，DRD2）、基因 HERG（The human Ether-à-go-go-related gene，KCNH2）、多巴胺转运蛋白（Dopamine transporter，SLC6A3）、μ 阿片受体（通过同源性）（Mu opioid receptor（by homology），OPRM1）、谷氨酸 NMDA 受体：GRIN2A（Glutamate NMDA receptor：GRIN2A）；2 GO 分析罗哌卡因可能参与的生物学过程包括 G 蛋白偶联受体信号通路，偶联到环核苷酸第二信使、树突、神经递质受体活性；KEGG 分析罗哌卡因可能参与神经活性配体-受体相互作用、钙信号通路（Calcium signaling pathway）、cAMP 信号通路（cAMP signaling pathway）、酒精中毒、神经退行性变的途径-多重疾病、多巴胺能突触（Dopaminergic synapse）、可卡因成瘾（Cocaine addiction）、血清素能突触、肌动蛋白细胞骨架调节（Regulation of actin cytoskeleton）、苯丙胺成瘾（Amphetamine addiction）等多条信号通路过程；3 分子对接结果表明罗哌卡因与 DRD2、GRIN2A、HRH3、KCNH2、SLC6A3、SLC6A4 靶点具有较强的结合能力。
结论 罗哌卡因可能通过与 DRD2、GRIN2A、HRH3、KCNH2、SLC6A3、SLC6A4 等靶点结合，并参与调控神经活性配体-受体相互作用、钙信号通路（Calcium signaling pathway）、cAMP 信号通路（cAMP signaling pathway）、酒精中毒、神经退行性变的途径-多重疾病、多巴胺能突触（Dopaminergic synapse）、可卡因成瘾（Cocaine addiction）、血清素能突触、肌动蛋白细胞骨架调节（Regulation of actin cytoskeleton）、苯丙胺成瘾（Amphetamine addiction）等多条信号通路来影响神经炎症反应和认知功能。

PU-0276

成分鉴定与电子舌结合代谢组学揭示蒙药额尔敦-乌日勒基础方治疗术后认知功能障碍的可能机制

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目的 本研究采用超高效液相色谱与高分辨率质谱联用法、NPClassifier 分类法、电子舌味觉分析法、代谢组学方法，对蒙药额尔敦-乌日勒基础方化学成分、分类、味觉及代谢途径进行分析，以探讨 EWB 改善术后认知功能障碍(POCD)的可能机制。
方法 采用 UHPLC-HRMS、NPClassifier 分析 EWB 成分并进行鉴定。采用电子舌味觉分析系统分析 EW、EWB 及单味药、EWT 味觉指标。采用血清代谢组学分析 EWB 提取物入血成分。
结果 通过 UHPLC-HRMS 分析发现蒙药额尔敦-乌日勒基础方共有 2033 个化合物，根据 NPClassifier 分类方法显示，7 条生物合成途径包含莽草酸酯−苯丙素类、萜类、生物碱、脂肪酸、氨基酸/肽、聚酮、碳水化合物，分别占比 27%、22%、20%、10%、9%、6%、3%，其他生物合成途径占 3%。70 个超类包括 Flavonoids（黄酮类化合物）、Sesquiterpenoids（倍半萜类化合物）、Tryptophan alkaloids（色氨酸生物碱）、Fatty Acids and Conjugates（脂肪酸共轭物）、Small peptides（小肽）、Chromanes（色烷）、Saccharides（糖类）等。在中药正、负离子基峰色谱图中，共标记中药标注出的 42 个色谱峰，对应鉴定到的化合物包含 Agarotetrol（沉香四醇）、18.beta.-Glycyrrhetinic acid（甘草次酸）、Piperlonguminine（荜茇宁）、Piperanine（胡椒新碱）、Epiligulyl oxide（去氢木香内酯）、Epicatechin gallate（表儿茶素没食子酸酯）、Ellagic acid（鞣花酸）、Glycyrrhizin（甘草酸）等 40 余种。各单味药均含有苦味、鲜味、涩味回味；EW 含有苦味、咸味、鲜味、涩味回味、苦味回味、鲜味回味；EWB 含有苦味、咸味、鲜味、涩味回味、苦味回味、鲜味回味，并且水煮处理 EWB 增加一味涩味；EWT 含有酸味、苦味、鲜味。血清

代谢组学显示共有 198 种代谢物在两组之间有显著性差异，主要影响胆汁分泌、抗坏血酸和醛酸盐代谢、柠檬酸循环（TCA 循环）、谷胱甘肽代谢、牛磺酸和次牛磺酸代谢等代谢，HIF−1 信号通路与胰高血糖素信号通路处于关键位置。
结论 蒙药额尔敦-乌日勒基础方化学成分复杂、种类多样，味觉丰富，本研究以成分鉴定、电子舌味觉分析系统与血清代谢组学为基础，证实其作用多成分、多途径的科学性，进一步为蒙药额尔敦-乌日勒基础方的药效物质和发挥功效的药理作用的阐明提供新的研究思路，为蒙药额尔敦-乌日勒基础方的现代化研究和质量控制以及后续产品研发提供参考。

PU-0277

环泊酚与丙泊酚对老年患者在无痛胃镜检查中的麻醉效果及安全性比较

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目的 本实验通过对比实验组和对照组， 分析环泊酚与丙泊酚在老年患者群体中应用于无痛胃镜检查中的效果差别及安全差异，以便后续对于老年患者行胃肠镜检查选择更安全麻醉药物。
方法 将 60 例胃镜检查老年患者分为两组，即观察组和对照组，对照组采用丙泊酚麻醉，观察组给予环泊酚麻醉，以围手术期不良反应发生情况及血流动力学变化作为安全指标，其中血流动力学指标评估时间节点为准备麻醉时(T0)、胃镜置入穿过声门时(T1)、胃镜置入 3min 时(T2)、检查结束进入复苏室后(T3)及离开复苏室时(T4)；以镇静成功比例、不同时间点 Ramsay 镇静评分、视觉模拟疼痛评估法(VAS)得分及麻醉相关时间作为麻醉效果评估指标。
结果 两组镇静成功比例比较差异无统计学意义(P>0.05)；观察组 T1、T2 测得的血氧饱和度(SpO2)、心率(HR)、平均动脉压(MAP)均高于对照组，且 T3 时 SpO2 高于对照组；T1～T4 时两组 Ramsay 评分比较差异无统计学意义(P>0.05)；两组检查前、检查完成离开苏醒室时 VAS 得分对比差异无统计学意义(P>0.05)；观察组苏醒时间、离开诊疗室时间均长于对照组(P<0.05)，但有效诱导时间无统计学意义(P>0.05)；观察组呼吸抑制发生率、注射痛发生率均低于对照组(P<0.05)。
结论 环泊酚与丙泊酚在无痛胃镜检查中均能达到镇静麻醉目的，相对而言环泊酚安全性更高。

PU-0278

The Median Effective Dose of Ciprofol Combined with a Low-dose Sufentanil for Gastroscopy in Obese or Nonobese Patients: A Dose-finding Study Using Dixon's Up-and-down Method

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Purpose: Understanding the different pharmacodynamic responses to narcotics in patients with or without obesity is particularly important for the safety of gastroscopy sedation. This study aimed to determine the median effective dose (ED50) of ciprofol combined with low-dose sufentanil to inhibit the response to gastroscope insertion in obese or nonobese patients.
Patients and methods: A total of 27 obese patients (BMI 30-40 kg/m2) and 25 normal-weight patients (BMI 18-25 kg/m2), aged between 18 and 65 years, with ASA physical status of 1-2, were included in this study. All patients underwent painless gastroscopy and received intravenous

sufentanil at a dose of 0.1 μg/kg, followed by ciprofol administration. The initial dose of ciprofol for the first patient in both groups was 0.4 mg/kg, the subsequent dose was determined by the response of the previous patient to gastroscope insertion (cough, choking, body movement, etc.) using Dixon's up-and-down method. The dose was increased or decreased by 0.05 mg/kg depending on the observed responses. Data collection continued until 7 crossover points were obtained. Probit regression and bootstrapping methods were employed to calculate the median effective dose (ED50) and 95% confidence intervals (CIs). The ED50 values were then compared between the obese and normal-weight patient groups.

Results: The ED50 of ciprofol combined with sufentanil inhibiting response to gastroscope insertion in patients with obesity was 0.186 mg/kg with 95% CI of 0.153~0.209 mg/kg, was significantly lower than patients with normal-weight was 0.237 mg/kg with 95% CI of 0.206~0.253 mg/kg ($p < 0.05$).

Conclusion: The ED50 values of ciprofol combined with sufentanil inhibiting response to gastroscope insertion in patients with obesity was lower than in patients with normal weight.

PU-0279

罗哌卡因用于亚高原地区脊麻剖宫产的剂量研究

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目的 亚高原和平原地区的差异，造成了患者局麻药需求的增加，亚高原地区脊麻剖宫产的产妇是否需要更多的局麻药剂量，尚未有研究探讨。该上下序贯研究探讨罗哌卡因用于亚高原地区脊麻剖宫产的 ED50 剂量

方法 选择一直生活在亚高原地区，20-40 岁、体重指数 18-28 kg/m²拟在腰硬联合麻醉下行择期剖宫产的单胎产妇 30 例，排除了 ASA>Ⅱ级，孕周<37 周，慢性疼痛病史，严重的妊娠合并症，胎儿或胎盘异常如胎膜早破，宫内生长受限等，以及椎管内麻醉禁忌症的产妇。产妇左侧平卧位，选择 L3-L4 椎间隙穿刺实施椎管内麻醉。

采用上下序贯法进行罗哌卡因 ED50 有效剂量的研究，参考研究报道等比重罗哌卡因 ED50 剂量为 10.11mg，ED95 剂量 14.63mg[10]。考虑到亚高原地区更高剂量的推测和相邻剂量为 1mg 的设定，初始剂量设为等比重的罗哌卡因 14mg(1.4ml),用生理盐水稀释至 3ml。有效的定义为脊麻注药 15min 内针刺双侧感觉阻滞平面 T6 或以上，胎儿娩出前不需额外硬膜外麻醉。根据前一例是否有效决定下一例产妇的局麻药剂量。如第一例产妇局麻药剂量有效，则下一例产妇的剂量为罗哌卡因 13mg(1.3ml)；如无效，则下一例剂量为 15mg,如某一例产妇被剔除出研究，则下一例剂量不变。研究的主要结果是脊麻剖宫产所需罗哌卡因的 ED50 剂量。次要结果包括研究期间产妇心动过缓、高血压、低血压，恶心、呕吐和寒颤的发生率。

结果 共 30 名符合纳入排除标准的产妇参与了研究，由 Dixon 上下序贯法计算罗哌卡因的 ED50 为 10.68mg(95% CI，9.65-12.58 mg).应用保序回归计算，做进一步的验证罗哌卡因的 ED50 为 10.53mg (95% CI 9.41-12.07 mg)。产妇不良反应术中低血压 8 例，心动过缓 1 例，恶心呕吐 7 例，其中 4 例在关腹牵拉腹膜操作时出现。关腹时腹膜牵拉痛 5 例，硬膜外追加局麻药后缓解，未出现高血压，寒颤。

结论 罗哌卡因用于亚高原地区脊麻剖宫产的 ED50 剂量为 10.68mg 高于目前已知的平原地区患者所需的 ED50 剂量。亚高原地区产妇剖宫产所需局麻药的 ED90 有待进一步研究，以期更好的指导临床。

PU-0280

全麻诱导期使用羟考酮或芬太尼类药物不良反应比较的 Meta 分析

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目的 通过 Meta 分析，比较羟考酮与芬太尼类药物（芬太尼、舒芬太尼、瑞芬太尼）用于全麻诱导时的不良反应发生情况。
方法 检索 PubMed、Web of Science、Embase、Cochrane Library、Google Scholar databases、CNKI、万方、维普数据库中的随机对照研究。按照纳入和排除标准筛选文献、进行文献质量评价和数据提取，用 RevMan 5.4 软件进行统计分析。
结果 共纳入 32 例随机对照试验，其中非插管全麻 7 例,喉罩全麻 6 例，气管插管全麻 17 例，双腔气管插管全麻 2 例，最终纳入 2541 例患者。Meta 分析结果显示，羟考酮组诱导期不良反应的发生率明显低于芬太尼组［OR=0.47,95%CI(0.34,0.66)］；亚组分析结果显示非插管全麻手术，诱导期羟考酮组呼吸抑制［OR=0.20,95%CI(0.09,0.44)］的发生率明显低于芬太尼组；喉罩全麻手术诱导期呛咳［OR=0.05,95%CI(0.02,0.14)］及低血压［OR=0.33,95%CI(0.18,0.58)］的发生率明显低于芬太尼组；气管插管全麻手术［OR=0.21,95%CI(0.06,0.73)］及双腔气管插管全麻手术［OR=0.01,95%CI(0.00,0.19)］诱导期羟考酮组呛咳的发生率明显低于芬太尼组。双腔气管插管全麻手术受到插管刺激时，羟考酮组 MAP[SMD=-1.17，95%CI(-1.69,-0.65)]及 HR[SMD=-1.37，95%CI(-2.18,-0.55)]的变化率明显低于芬太尼组。羟考酮组苏醒时间明显长于芬太尼［MD=-0.88,95%CI(-1.57,-0.18)］；羟考酮组苏醒期躁动的发生率明显低于芬太尼组［OR=0.20,95%CI(0.09,0.40)］。
结论 与芬太尼类药物相比，诱导期使用羟考酮可以明显降低诱导期不良反应的发生率，具体表示为更低的呼吸抑制（非插管全麻）、更少的呛咳（喉罩、气管插管、双腔气管插管）和苏醒期躁动，但会延长苏醒时间。

PU-0281

环泊酚对脓毒症诱导的急性肺损伤的保护作用及其机制研究

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目的 本研究的目的是探索环泊酚(Ciprofol，Cip)对脓毒症诱导的急性肺损伤的作用，并通过检测炎症通路以及其涉及到的相关蛋白来探索其分子机制，为急性肺损伤的治疗以及环泊酚的使用提供新的思路和方法。
方法 将 C57BL/6J 雄性小鼠随机分成四组：对照组（control）、急性肺损伤组（LPS）、环泊酚干预组（LPS+CIP）以及单独使用环泊酚组（CIP）四组。采用 H&E 染色、测定肺干湿比、收集支气管肺泡灌洗液（BALF）测定脱落细胞数和蛋白量、Western blot 法和 RT-PCR 等方法检测各组病理学表现、炎症因子（IL-6 以及 IL-1β）表达水平及各组 p-p65、IκBα 的表达情况并作统计学分析。在细胞层面，使用小干扰转染技术抑制 TREM2 基因的表达，将 RAW264.7 细胞分为五组：control 组、LPS 组、LPS+CIP 组、si-TREM2+LPS+CIP 组以及 CIP 组等五组，使用 Western blot 法、RT-PCR、CCK8、细胞免疫荧光、MDA 和 GSH 检测法等方法检测各组炎症反应、p65 入核情况、氧化应激情况以及各组 p-p65、IκBα、p-akt 的表达情况，研究环泊酚对急性肺损伤产生的保护作用及其机制。

结果 在动物层面：LPS 组的肺损伤评分、肺部炎症渗出情况、炎症因子均明显高于 control 组（P＜0.001）。在给予环泊酚处理之后，以上指标均明显降低（P＜0.001），LPS+CIP 组较 LPS 组 p-p65 水平下降（P＜0.05），IκB-α 表达水平升高（P＜0.05）。在分子层面，当 TREM2 表达水平降低后，环泊酚对急性肺损伤的保护作用消失，上述指标均呈现相反的变化；除此之外，与 LPS 组相比， LPS+CIP 组的氧化应激损伤明显下降（P＜0.001）。

结论 本研究表明，环泊酚可能通过作用于 TREM2 来逆转 NF-κB 的入核以及 AKT 的磷酸化，抑制炎症反应，除此之外还可以减缓急性肺损伤后的氧化应激反应，最终发挥肺保护作用

PU-0282

Comparative Dose-Response Study on the Infusion of Norepinephrine Combined with Intravenous Ondansetron versus Placebo for Preventing Hypotension During Spinal Anesthesia for Cesarean Section: a randomised controlled trial

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Background: Ondansetron has been reported to attenuate the incidence of spinal anesthesia-induced hypotension (SAIH) and norepinephrine requirement during cesarean section. However, no quantitative study has evaluated the extent of this effect. This study aimed to determine the dose-response of prophylactic infusion of norepinephrine to prevent SAIH in parturients who received intravenous ondansetron or placebo before spinal anesthesia for cesarean section. The median effective dose (ED50) and 90% effective dose (ED90) were compared to evaluate the effect of ondansetron versus placebo on the norepinephrine requirement.
Materials and methods: 150 parturients undergoing cesarean section were randomized to receive either 0.1 mg/kg ondansetron (group O) or saline control (group C) 10 min before spinal anesthesia. The parturients were randomly assigned to one of five different norepinephrine infusion groups: 0.02, 0.04, 0.06, 0.08 or 0.10 μg/kg/min. An effective infusion dose of norepinephrine was defined as non-occurrence of hypotension during the study period. The values for ED50 and ED90 of norepinephrine infusion were determined using probit regression. Differences between the two groups were evaluated by comparing the relative median potency with 95% confidence intervals (CIs).
Results: The ED50 values were 0.033 (95% CIs, 0.024-0.043) μg/kg/min in group C and 0.021 (95% CIs, 0.013-0.029) μg/kg/min in group O. The ED90 values were 0.091 (95% CIs 0.068-0.147) μg/kg/min in group C and 0.059 (95% CIs 0.044-0.089) μg/kg/min in group O, respectively. The estimate of the relative median potency for norepinephrine in group C versus group O was 0.643 (95% CIs, 0.363-0.956). The incidence of side effects was comparable between groups. No significant difference in neonatal outcomes.
Conclusion: Intravenous ondansetron 0.1 mg/kg before spinal anesthesia significantly reduced the dose requirement of prophylactic norepinephrine infusion in parturients undergoing elective cesarean section. This finding is potentially useful for clinical practice and further research.

PU-0283

甲苯磺酸瑞马唑仑和苯磺酸瑞马唑仑在日间宫腔镜手术的麻醉效果比较

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目的 旨在观察苯磺酸瑞马唑仑和甲苯磺酸瑞马唑仑在日间宫腔镜手术的麻醉效果是否存在差异，以便为临床应用提供参考。
方法 择期拟在全凭静脉麻醉下行宫腔镜检查的日间患者 50 例，年龄 18~65 岁，ASAI-II 级。采用随机数字表法分为 2 组（n=25）: 甲苯磺酸瑞马唑仑组（T 组），苯磺酸瑞马唑仑组（R 组）。主要观察指标为瑞马唑仑麻醉诱导剂量；次要观察指标为入睡时间、麻醉维持时间、苏醒时间、阿芬太尼诱导维持剂量、瑞马唑仑维持剂量、麻醉期间不良事件发生率（呃逆、高血压、低血压、心动过缓、心动过速）。
结果 2 组患者在瑞马唑仑麻醉诱导剂量、苏醒时间、入睡时间、麻醉维持时间、麻醉期间不良事件发生率（呃逆、高血压、低血压、心动过缓、心动过速、PONV、术后疼痛）等方面无统计学差异（P＞0.05）。
结论 甲苯磺酸瑞马唑仑和苯磺酸瑞马唑仑在日间宫腔镜手术的麻醉效果无显著差异。

PU-0284

不同剂量磷丙泊酚二钠复合阿芬太尼在无痛肠镜诊疗中的临床效果观察

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目的 探索不同剂量磷丙泊酚二钠复合阿芬太尼在无痛肠镜诊疗中的临床麻醉效果。
方法 本研究共纳入 69 例拟在全凭静脉麻醉下行肠镜诊疗的患者，ASAⅠ~II 级，年龄 18~65 岁。采用随机数字表法分为三组：磷丙泊酚二钠 10mg/kg 组（P1 组，n= 23），磷丙泊酚二钠 12.5mg/kg 组（P2 组，n= 23）、磷丙泊酚二钠 15mg/kg 组（P3 组，n= 23）。所有患者首先缓慢静脉注射阿芬太尼 5μg/kg，随后 P1 组、P2 组和 P3 组分别静脉注射磷丙泊酚二钠 10mg/kg、12.5 mg/kg、15 mg/kg，待患者睫毛反射消失且改良警觉/镇静评分(modified observer's assessment of alert，MOAA/S) ≤1 分时开始进镜操作，检查过程中视镇静情况追加磷丙泊酚二钠，每次 2 mg/kg。使用 MOAA/S 评分对患者进行镇静评估，若受试者 MOAA/S 评分在给予研究药物磷丙泊酚二钠 5 min 内未能达到 1 分，则使用丙泊酚 0.5~1 mg/kg 进行补救。主要观察指标是首次镇静成功率，定义为首次静脉注射磷丙泊酚二钠 5 min 内 MOAA/S 评分≤1 分（5 min 内未使用丙泊酚进行补救）；次要观察指标是镇静起效时间，苏醒时间，术中磷丙泊酚二钠追加次数，磷丙泊酚二钠总用量，患者入室后（T）、麻醉诱导后 1 min（T_1）、麻醉诱导后 3 min（T_2）、麻醉诱导后 5 min（T_3）、手术结束时（T_4）的平均动脉压（MAP）、心率（HR）、脉搏氧饱和度（SpO_2），低血压（MAP＜65mmHg）以及不良反应发生情况。
结果 与 P1 组比较，P2 组与 P3 组首次镇静成功率明显升高（P<0.05），P2 组与 P3 组相比较首次镇静成功率无统计学意义（P＞0.05）。三组间比较，随着磷丙泊酚二钠诱导剂量增大，镇静起效时间逐渐缩短（P<0.05）。与 P1 组比较，P2 组与 P3 组苏醒时间明显延长（P＞0.05），P2 组与 P3 组相比较苏醒时间无统计学意义（P＞0.05）。三组间比较，术中磷丙泊酚二钠追加次数无

统计学意义（P＞0.05），磷丙泊酚二钠总用量 P3 组＞P2 组＞P1 组（P<0.05）。T_2 时间点，P3 组与 P1、P2 组相比较，MAP 明显下降（P<0.05），P1 与 P2 组 MAP 相比较无统计学意义（P＞0.05），三组间其余时间点 MAP、HR、SpO_2 无统计学意义（P＞0.05），低血压发生情况 P3 组明显高于 P1、P2 组（P<0.05）。

结论 在无痛肠镜诊疗中， 磷丙泊酚二钠 12.5mg/kg 复合阿芬太尼 5μg/kg 首次镇静成功率高、对血流动力学影响小，安全有效，基本可满足无痛肠镜诊疗需求。

PU-0285

不同剂量阿芬太尼联合环泊酚对老年 ERCP 患者麻醉效果的比较：一项随机对照试验

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目的 内镜逆行胰胆管造影(ERCP)主要用于胆道的、胰脏疾病的诊断和治疗。ERCP 的最常用的麻醉方法主要有气管插管全麻（GA）和深度镇静麻醉两种。鉴于老年患者脆弱的血流动力学和呼吸功能造成的 ERCP 麻醉方面的挑战，因此探索针对老年患者深度镇静安全、简单、有效的麻醉用药方案很有意义。本研究通过观察不同剂量阿芬太尼联合环泊酚在 ERCP 中应用的有效性和安全性，以期为临床麻醉药物优化提供新思路。

方法 1.一般资料

入选标准：①择期行 ERCP；② 年 龄 65 ～ 85 岁；③ ASAⅡ~Ⅲ级；排除标准:① 病态肥胖，体重指数>30kg/m2；②严重呼吸道疾病；③长期服用精神药物和认知功能障碍史；④改良 Mallampati 分级为Ⅳ级；⑤对研究中涉及的任何药物过敏。

2.监测指标

观察并记录麻醉诱导前（T0）、手术开始时（T1）、手术开始后 10min（T2）、手术开始后 20 分钟（T3）、手术开始后 30 分钟（T4）和手术结束时（T5）的平均动脉压（MAP）、心率（HR）和血氧饱和度（SpO2）。记录手术期间麻醉的不良事件，包括身体运动反应、低氧血症（血氧饱和度低于 93%）和低血压（平均动脉压低于 30%）；记录手术操作和苏醒时间。

3.麻醉过程

麻醉诱导：三组患者分别给予阿芬太尼 5μg/kg（30 秒内缓慢注射）和环泊酚 0.4±0.1mg/kg（90 秒内缓慢注射）。如果脑电图的双频谱指数（BIS）降至 60，则开始手术，并将环泊酚的诱导剂量改为维持剂量。麻醉维持：A 组、B 组、C 组分别给予阿芬太尼 0.15μg/kg/min、0.25μg/kg/min、0.35μg/kg/min 与 1.5 mg/kg/h 环泊酚连续输注（BIS 值维持在 50～60 之间）。术中监测血压、心电图、SPO2 和 BIS。当手术结束时放置鼻胆管时，停止药物输注。所有手术均由同一组医生和相同类型的十二指肠镜进行。如果患者在手术过程中有体动活动，则给予 0.1mg/kg 的环泊酚进行处理。如果 SpO2＜93%，立即抬起下颌，如有必要，放置鼻咽通气道以帮助通气。

结果 与 A 组相比，B 组和 C 组在 T1-T5 期间 MAP 和 HR 均下降（P<0.05）；与 B 组相比，C 组在 T1-T5 期间降低 MAP 和 HR（P<0.05）。与 A 组和 C 组相比，B 组的不良反应次数减少（P<0.05），三组手术时间无统计学差异（P>0.05），但麻醉苏醒时间有统计学差异（P<0.05）。

结论 阿芬太尼 0.25μg/kg/min 联合环泊酚不良反应发生率低，麻醉效果最好。

PU-0286

孕晚期地氟醚麻醉下手术对子代认知功能和海马神经元树突棘发育的影响

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目的 探讨孕晚期地氟醚麻醉下手术对子代认知功能和海马神经元树突棘发育的影响
方法 选择孕 18 天清洁级 SD 雌性大鼠 30 只，随机分成对照组（C 组）、地氟醚 4h 组（D4 组）、地氟醚 4h+剖腹探查术组（D4+S 组），每组 10 只。D4 组吸入 8%地氟醚+2L/min 氧气 4h；D4+S 组吸入 8%地氟醚+2L/min 氧气，麻醉平稳后行剖腹探查术，吸入地氟醚时间共 4h，C 组吸入 2L/min 氧气 4h。子鼠出生后第 7 天（P7）用悬崖回避实验评价其空间感知能力；P22 天用旷场实验评价其自主活动和焦虑相关行为；P30 天开始用 Morris 水迷宫系统评价其空间学习记忆功能。水迷宫实验结束后 24h，取子鼠海马组织行高尔基染色，分析子鼠海马 CA1、CA3、DG 三个区神经元树突棘密度及类型比例。
结果 各组子鼠悬崖回避和旷场实验结果无显著差异（P＞0.05）。Morris 水迷宫实验结果显示：与对照组（C 组）相比，地氟醚 4h+剖腹探查术组（D4+S 组）子鼠逃避潜伏期明显延长（P＜0.05），单纯地氟醚麻醉组与对照组（C 组）相比子鼠逃避潜伏期差异无统计学意义（P＞0.05）；各组子鼠穿越平台次数、目标象限停留时间以及游泳速度均无统计学差异（P＞0.05）。高尔基染色结果显示：与对照组（C 组）相比，地氟醚 4h+剖腹探查术组（D4+S 组）子鼠海马 CA1 区树突棘密度和蘑菇型树突棘比例下降（P＜0.05）；DG 区树突棘密度减少（P＜0.05），但各组树突棘类型比例无明显变化；CA3 区树突棘密度及各树突棘类型比例差异无统计学意义（P＞0.05）；单纯地氟醚麻醉组（D4 组）与对照组（C 组）间上述指标差异无统计学意义（P＞0.05）。
结论 在本实验条件下，孕晚期母体接受单纯地氟醚麻醉 4h 对子代认知功能无明显影响。地氟醚麻醉下手术则可致子代空间学习记忆功能损害，其机制可能与影响海马神经元树突棘发育有关。

PU-0287

体重指数超重对瑞马唑仑诱导剂量的影响

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目的 随着人们生活水平的提高，我国超重和肥胖的患病率正在上升，需要手术的超重患者也日益增多，这类患者围术期用药问题需要得到相关麻醉医生和外科医生的高度关注。瑞马唑仑是一种新型水溶性苯二氮类药物，具有起效快、作用时间短、无注射痛、能被氟马西尼拮抗等特点，可以应用于结肠镜检查、支气管镜检查以及麻醉诱导维持中。目前针对超重患者，围术期瑞马唑仑的使用尚无相关研究，对于这类患者如何调整合适剂量的瑞马唑仑仍是一个值得思考的问题。
方法 经潍坊市人民医院伦理委员会批准，回顾性纳入在潍坊市人民医院 2024 年 4 月到 2024 年 6 月实施妇科日间宫腔镜手术的 110 名患者信息。根据患者的体重指数（BMI），将受试者分为正常体重指数患者和体重指数超重患者。通过医院信息系统中的日间评估单以及麻醉记录单，查询获得患者年龄、性别、体重、ASA 分级、瑞马唑仑剂量、手术时间等基本信息。此外，我院日间宫腔镜手术采用统一的麻醉流程，全麻诱导前每组患者均静脉给予地塞米松 5mg、氟比洛芬酯 50mg；麻醉诱导：使用瑞马唑仑 6mg/kg/h 持续泵入至患者意识消失，阿芬太尼 20ug／kg 和米库氯胺 0.2mg/kg 在 30S 内缓慢静脉注射；三分钟后置入喉罩，机械通气。麻醉维持：瑞马唑仑 1mg/kg/h、阿芬太尼 40ug/kg/h 持续泵入。术毕后停药，患者清醒睁眼后拔除喉罩，转入 PACU 观察，Aldrete 评分 ≥ 9 分时送回病房，符合离院标准后出院。术后第二天通过调查问卷或电话的形式进行随访。

本研究主要观察指标为两组患者瑞马唑仑的诱导剂量，次要观察指标为患者苏醒时间，术后 PACU 内和 24 小时内 PONV 发生率，以及患者的基本资料，包括年龄、ASA 分级、麻醉时间等。
结果 两组患者的年龄、ASA 分级、麻醉时间差异无统计学意义（P ＞0.05）。两组患者瑞马唑仑诱导剂量、苏醒时间，以及 PACU 内恶心呕吐差异有统计学意义（P＜0.05），但是术后 24 小时内 PONV 发生率无统计学差异（P ＞0.05）。
结论 体重指数会影响瑞马唑仑诱导剂量，超重患者诱导剂量要低于正常体重患者；此外，超重患者的 PACU 内恶心呕吐的发生率要高于正常体重患者。

PU-0288

The inhibitory effects of propofol on colorectal cancer progression through the NF-κB/HIF-1α signaling pathway

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Background and Purpose: Colorectal cancer (CRC) is a neoplastic disease that gradually accumulates and develops through genetic variations and epigenetic changes. Surgical excision is the first-line treatment for CRC. Accumulating evidence has shown that total intravenous anesthesia has beneficial effects for CRC patients as it decreases the probability of tumor recurrence and metastasis. Propofol is one of the most frequently used intravenous anesthetics in clinical practice. It remains unknown whether it can reduce recurrence and metastasis after surgery in cancer patients.
Methods: CRC cell lines (HCT116 and SW480) were cultured in vitro, and different concentrations of propofol were added to the cell culture medium. The proliferation effect of propofol on CRC cell lines was evaluated by CCK-8 assay. The effect of propofol on the migration and invasion of CRC cells was evaluated by scratch healing and Transwell experiments. The inhibitory effects of propofol on NF-κB and HIF-1α expression in CRC cell lines were determined by Western blotting and immunofluorescence assays to further clarify the regulatory effects of propofol on NF-κB and HIF-1α.
Results: Compared to the control, propofol significantly inhibited the proliferation, migration and invasion abilities of CRC cells (HCT116 and SW480) ($P < 0.0001$). The expression levels of NF-κB and HIF-1α gradually decreased with increasing propofol concentration in both cell lines. After activation and inhibition of NF-κB, the expression of HIF-1α changed. Further studies showed that propofol inhibited LPS-activated NF-κB-induced expression of HIF-1α, similar to the NF-κB inhibitor Bay17083 ($P < 0.0001$).
Conclusion: In vitro, propofol inhibited the proliferation, migration and invasion of CRC cells (HCT116 and SW480) in a dose-dependent manner, possibly by participating in the regulation of the NF-κB/HIF-1α signaling pathway.

PU-0289

比较环泊酚和丙泊酚联合小剂量艾司氯胺酮在无痛人流术中的应用：一项随机、双盲、序贯剂量实验

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目的 常见的无痛人流术麻醉方案为丙泊酚复合阿片类的不插管静脉麻醉，但呼吸抑制时有发生。环泊酚是一种新开发的模拟丙泊酚结构的短效静脉药，据报道有更少的注射疼痛，更稳定的血流动

力学和更少的呼吸抑制。艾司氯胺酮兼具麻醉与镇痛作用，且无呼吸抑制作用，但大剂量使用副作用时有发生。环泊酚联合小剂量艾氯胺酮似乎是这种麻醉方法的有利选择。然而，关于环泊酚与单剂量艾氯胺酮联合使用的报道有限。我们的研究旨在通过偏硬币上下序惯法，确定环泊酚、丙泊酚与低剂量艾氯胺酮对无痛人流患者的最佳剂量，并比较两种药物的不良事件发生率。

方法 80 名患者，随机分配到环泊酚组或丙泊酚组。在静脉注射 0.15mg/kg 艾司氯胺酮后注射环泊酚组或丙泊酚初始剂量分别为 0.375 mg/kg 和 1.5 mg/kg。本研究中后续患者的剂量是基于前一个患者的反应，遵循偏硬币上下序惯法。该研究使用等渗回归估计 90%的有效剂量。记录并比较两组患者的次要结局，包括注射疼痛的发生率、生命体征和不良事件。

结果 环丙酚复合 0.15 mg/kg 艾氯胺酮的 ED90 为 0.498 mg/kg（95%置信区间：0.498-0.510），而丙泊酚复合 0.15 mg/kg 艾氯胺酮 ED90 为 1.99 mg/kg（95%置信区间：1.98-2.16）。环泊酚组患者呼吸暂停的发生率较低（7.5% vs. 52.5%；P<0.001）。其他不良事件和恢复时间在两组间无统计学差异。

结论 与丙泊酚和艾氯胺酮联合使用相比，环丙酚和艾氯胺酮对减少呼吸抑制同样有效。因此，临床医生应考虑 0.5 mg/kg 环丙醇和 0.15 mg/kg 艾氯胺酮治疗无痛性流产。

PU-0290

右美托咪啶通过抑制 P2X4/BDNF 信号通路减轻瑞芬太尼诱发痛觉过敏

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目的 探讨 P2X4/BDNF 信号通路在右美托咪定减轻瑞芬太尼诱发痛觉过敏的作用。

方法 SD 大鼠 48 只采用随机数字表法分为三组（n=8）：对照组（NS 组）、瑞芬太尼手术组（RF 组）、 右美托咪啶组（DEX 组）。RF 组大鼠尾静脉输注瑞芬太尼 10μg•kg-1 •min-1 共 60min；DEX 组在输注瑞芬太尼前 30min，腹腔注射右美托咪啶 50 μg•kg-1；以上模型除了 NS 组，其余各组均在开始泵注瑞芬太尼 10min 后按 Brennan 的方法，制备右侧跖底切口痛模型。在术前、术后 1h，4h，1d，2d，3d 测定各组大鼠双侧后爪机械性触痛阈（PWT）和热痛阈（PWL）。术后 3d 疼痛行为学测定结束后，应用 Western blot 和免疫荧光组织化学法，观察大鼠脊髓腰膨大组织 P2X4 和 BDNF 的表达水平及分布情况。应用透射电镜观察脊髓背角神经元突触可塑性变化。

结果 与 NS 组比较，RF 组在术后 4h 和术后 1d 术侧 PWT 降低，PWL 缩短（P< 0.05）；与 RF 组比较，DEX 组在术后 4h 和术后 1d 术测 PWT 升高，PWL 延长（P< 0.05）；与 NS 组比较，脊髓背角 P2X4 和 BDNF 在 RF 组表达上调（P < 0.05）；与 RF 组比较，脊髓背角 P2X4 和 BDNF 在 DEX 组表达下调（P < 0.05）；透射电镜观察显示：瑞芬太尼诱导痛觉过敏时脊髓神经元突触数目增加，突触后致密物的密度增加，突触间隙变窄甚至消失；DEX 组上述情况明显改善。

结论 右美托咪啶可能通过 P2X4/BDNF 信号通路来减轻瑞芬太尼诱发痛觉过敏。

PU-0291

3D 打印带触点树脂板在皮内注射中镇痛效果的应用：一项随机对照临床研究

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目的 本研究旨在探讨将 3D 打印带触点树脂板压迫在腋下皮肤上是否可以缓解皮内注射时所产生的疼痛。
方法 经机构审查委员会批准后，本研究设计了带有触点的 3D 打印树脂板。纳入的患者被随机分配接受皮内注射局麻使用 3D 打印树脂板（树脂板压迫组）或皮内注射局麻但不施加任何压迫（无脂板压迫组）。主要结果是患者评估的疼痛强度（100 mm VAS 评分）和满意度（Likert 5 级量表）。
结果 纳入了 90 名 ASA I-II 级身体状况患者，在超声引导腋窝入路之前接受皮内局部麻醉。 87 名患者完成了研究，其中树脂板组和无树脂板组分别有 44 名和 43 名患者。树脂板压迫组（中位数，10；IQR，5-20）和无树脂板压迫组（中位数，30；IQR，20-40）的疼痛强度显着不同（P< 0.001）。两组的中位满意度得分均为 5。随访期间未出现并发症。
结论 将 3D 打印带触点树脂板压迫在皮肤上可以减轻皮内针刺疼痛，并为神经阻滞疼痛缓解提供有效的替代方案。

PU-0292

TET 通过 miRNA-365-3p 羟甲基化调控伤害性反应的研究

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目的 疼痛是临床疾病中最常见的症状之一，理想治疗方法和药物的开发依赖于对疼痛发生发展机制的研究。 疼痛信号的传导被认为是疼痛发生和发展的关键环节， 疼痛信号传导很大程度上依赖于神经元膜上受体、离子通道和胞内信号转导通路的表达改变，而这些改变又依赖于各自基因的表达调控。 表观遗传学是研究基因核苷酸序列不发生改变情况下，基因表达可遗传的变化调控机制。微小 RNA（microRNA） 是近年发现的一种基因表达调控机制，它参与调节多种生理和病理过程。本研究拟以福尔马林诱导的急性炎性痛小鼠为研究对象， 初步阐明脊髓水平去甲基化关键酶 TETs 蛋白以及通过 miRNA 参与急性炎性痛行为调节机制， 以期为研发理想镇痛药提供新靶标。
方法 本研究利用全基因组 DNA 斑点杂交技术验证急性炎性疼痛下 5-羟甲基胞嘧啶（5hmC）含量的变化；利用实时定量 PCR 技术检测 TET 蛋白的 mRNA 表达以及 miRNA-365-3p 的表达；应用信息学预测 TET 调控靶标；利用 Western blot 技术检测小鼠脊髓 TET 蛋白表达变化；利用免疫荧光和原位杂交标记小鼠脊髓背角 TET 蛋白和 miRNA-365-3p 共表达；利用 mimics、siRNA 以及慢病毒方法调控相关蛋白及 miRNA 表达；利用热痛缩足反应及舔足行为学检测小鼠痛敏反应。
结果 伤害性刺激下小鼠脊髓全基因组 5hmC 表达明显增加，催化 5hmC 生成的 TET 蛋白表达相应增多，且呈时间相关性；实时定量 PCR 以及 Western-blot 结果显示伤害性刺激下，小鼠脊髓 TET1 和 TET3 的 mRNA 及其蛋白表达增加，而 TET2 无明显变化；免疫荧光检测结果显示，伤害性刺激下脊髓背角 5hmC、TET1 和 TET3 表达增加明显。脊髓过表达 TET1 或 TET3 能诱导小鼠产生痛敏产生，而干扰 TET1 或 TET3 表达可缓解小鼠痛敏行为。疼痛状态下 TET 蛋白下游靶标 miRNA-365-3p 启动子 5hmC 及其自身表达上调，原位杂交检测结果表明，伤害性刺激下 miRNA-365-3p 在脊髓背角部位表达增多。鞘内注射 miRNA-365-3p 反义 RNA（抑制剂）能有效缓解福尔马林或 TET1 或 TET3 增加诱导的痛敏现象；相反，鞘内注射 miRNA-365-3p 的 mimics（类似物）能降低

小鼠的热痛阈值，产生痛敏行为。
结论 TET1 和 TET3 能够通过介导 miRNA-365-3p 羟甲基化修饰调控急性炎性疼痛反应。

PU-0293

糖尿病神经病理性疼痛的多模态磁共振研究

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目的 通过多模态核磁共振技术观察糖尿病神经病理性疼痛（Diabetic neuropathic pain，DNP）对患者大脑功能活动与结构的影响，并比较不同病程、不同疼痛程度的患者在大脑功能区的差异，从神经影像学的角度探讨 DNP 发生发展的中枢机制，并对患者病情的严重程度、性质提供为客观评价。
方法 选取 20 例 DNP 患者和 20 例年龄、性别与之相匹配的健康志愿者，通过静息态功能磁共振成像(rs-fMRI)：局部一致性（regional homogeneity, ReHo）、低频震荡（low-frequency fluctuation, ALFF）、分数低频震荡（fractional aptitude of low-frequencyfluctuation, fALFF）及基于体素的形态测量学(voxel-based morphometry, VBM)技术获取其相应的功能和结构数据；将 20 例患者按病程长短、不同疼痛程度、性质分别分组，对比分析各组 DNP 患者大脑功能活动与结构的变化：比较组间局部一致性（ReHo）、低频震荡（ALFF）和分数低频振幅（fALFF）以评估功能活动的差异；通过基于体素的形态测量学（voxel-based morphometry, VBM）分析比较各组全脑灰质体积的差异；通过比较各组 DKI 轴向参数、径向、平均参数以及部分各向异性指数（FA），观察 PHN 患者大脑微结构的损伤情况；并将各组间差异脑区的相应参数与临床资料作相关性分析；
结果 与健康志愿者相比，DNP 患者双侧丘脑，左侧额中回等 ReHo 值升高，双侧颞中回和左侧小脑后叶 ReHo 值降低，右侧小脑前叶和双侧壳核 fALFF 值升高，双侧额中回等额叶区域 fALFF 值降低（P<0.05）；左侧丘脑 ReHo 值与 VAS 评分呈显著正相关（r=0.60，P=0.011），左侧颞中回 ReHo 值与 VAS 评分呈负相关（r= -0.78，P<0.001）。DNP 患者灰质体积在双侧中央后回、右侧海马旁回、左侧小脑前叶等显著降低，灰质密度在双侧尾状核、扣带回等区域显著降低（P<0.05）。DKI 分析显示在 PHN 患者双侧额叶、岛叶、壳核等区域的轴向张量（AD）、径向张量（RD）和平均张量（MD）值升高，双侧丘脑、岛叶、额叶、颞中回等区域的轴向峰度（AK）、径向峰度（RK）平均峰度（MK）值以及 FA 值明显降低（P<0.05）。
结论 DNP 患者与疼痛感知与整合的相关脑区发生了功能活动与结构的改变，这些改变可能 在 PHN 的发生发展过程中扮演着重要的角色。

PU-0294

血清 mirna 在糖尿病性神经痛诊断中的应用及机制研究

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目的 基于我国 DNP 患者的表观遗传特征，探讨血清微小核糖核酸（microRNA，miRNA）的表达是否能作为糖尿病神经病理性疼痛患者（diabetic neuropathy pain，DNP） 的诊断标志物，筛选出用于 DNP 诊断的表观遗传标志物，为检测试剂盒的开发提供实验证据和临床前期应用数据。
方法 （1）样本采集：选取 DNP 患者 58 例，其中 8 例 因血清 RNA 降解而脱落，最后筛选试验中共纳入 22 例患者，其中试 验组（DNP 组）13 例，对照组（Control 组）9 例，验证试验中共纳 入 48 例患者，其中 DNP 组 24 例，Control 组 24 例。

（2）高通量 Solexa 测序：利用高通量 Solexa 测序技术检测 13 例 DNP 组和 9 例 Control 组患者血清中的 miRNA 表达量，以筛选出表达有显著差异的 miRNA。
（3）实时荧光定量 PCR 验证：通过实时荧光定量 PCR 技术对 24 例 DNP 组和 24 例 Control 组患者的初筛 miRNA 进行验证。
（4）统计学 分析：我们对 miRNA 与传统诊断手段如：神经肌电图，进行 Spearman 相关 性分析查看其相关性，并对 miRNA 和传统诊断手段绘制受试者工作特征（Receiver Operating Characteristic，ROC）曲线，并计算 ROC 的曲线下面积（Area Under Curve，AUC）评价诊断效能。
结果 （1） 高通量 Solexa 测序：根据高通量 Solexa 测序结果，取|log2 Fold change| ＞1 且 P＜0.05 的 miRNA，其中 104 个 miRNA 上调，94 个 miRNA 下调。
（2）实时荧光定量 PCR：miRNA-9-1-5p 和 miRNA-184 的实时 荧光定量 PCR 结果与高通量 Solexa 测序结果一致，P＜0.05。
（4）统 计分析：miRNA-9-1-5p 和 miRNA-184 与 肌电图结果呈正相关，P＜ 0.01。
结论 miRNA-9-1-5p 和 miRNA-184 可能作为 DNP 的诊断标志物。

PU-0295

肠道菌群参与小鼠骨癌痛-吗啡耐受的机制研究

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目的 骨癌痛是众多癌痛类型中最常见和最严重的一种，严重影响了患者的心理健康和生活质量。目前吗啡等阿片类药物仍然是治疗中重度癌痛的一线药物，然而长期反复使用吗啡容易导致吗啡耐受，从而限制了吗啡的临床应用。肠道菌群是消化道中微生物的组合，也是机体内最复杂的微生态系统，在维持机体健康方面起着重要作用。以往的研究表明，肠道菌群及其代谢物参与吗啡耐受的发生发展，但肠道菌群是否参与骨癌痛小鼠吗啡耐受的形成尚不清楚。因此，本研究旨在探究肠道菌群是否参与骨癌痛小鼠吗啡耐受的形成，其中起重要作用的菌种以及相关机制。
方法 1. 将小鼠分为骨癌痛-吗啡耐受、骨癌痛-生理盐水、假手术-吗啡耐受、假手术-生理盐水四组，于骨癌痛建模或假手术后第 11 天开始连续 9 天每日 2 次皮下注射吗啡或生理盐水。检测小鼠的疼痛行为学（机械痛、热板实验）。在骨癌痛建模后第 10 天进行小动物活体成像拍摄和右后肢股骨病理学检查。通过微生物组 16s rRNA 测序检测骨癌痛小鼠吗啡耐受形成后肠道菌群是否发生变化。通过实时定量聚合酶链式反应法和蛋白质免疫印迹法检测小鼠脊髓中 Toll 样受体 4 (TLR4)的 mRNA 和蛋白表达水平。
2. 将小鼠分为抗生素鸡尾酒+骨癌痛-吗啡耐受、骨癌痛-吗啡耐受、抗生素鸡尾酒+对照、对照四组，在骨癌痛建模前一周开始给予小鼠抗生素鸡尾酒或干净饮用水直至实验结束。检测小鼠的疼痛行为学，通过 16s rRNA 测序检测抗生素是否将小鼠的肠道菌群清除，检测小鼠脊髓中 TLR4 的 mRNA 和蛋白表达水平。
3. 将小鼠分为假长双歧杆菌+骨癌痛-吗啡耐受和饮用水+骨癌痛-吗啡耐受两组，在骨癌痛造模前一周开始每天灌胃假长双歧杆菌菌液或饮用水直至实验结束。检测小鼠的疼痛行为学，通过 16s rRNA 测序检测灌胃假长双歧杆菌是否改变小鼠肠道菌群，检测小鼠脊髓中 TLR4 的 mRNA 和蛋白表达水平。
4. 构建骨癌痛-吗啡耐受小鼠模型，检测小鼠的疼痛行为学，通过血浆非靶向代谢组学筛选差异代谢物，并通过 KEGG 分析预测代谢通路。
结果 1. 骨癌痛-吗啡耐受小鼠模型成功构建。骨癌痛小鼠长期应用吗啡后肠道菌群的组成和多样性改变，在种水平，假长双歧杆菌的相对丰度具有显著差异。骨癌痛-吗啡耐受小鼠脊髓中 TLR4 的表达上调。
2. 抗生素鸡尾酒干预清除肠道菌群缓解了骨癌痛小鼠吗啡耐受的形成，并部分逆转了骨癌痛小鼠长

期给予吗啡诱导的 TLR4 表达上调。
3. 灌胃假长双歧杆菌改善了小鼠肠道菌群的组成和多样性，缓解了骨癌痛小鼠吗啡耐受的形成，并部分逆转了骨癌痛小鼠长期给予吗啡诱导的 TLR4 表达上调。
4. 骨癌痛小鼠长期应用吗啡后血浆代谢物发生变化。具有显著差异的代谢物大多为甘油磷脂类，KEGG 分析显示，差异代谢物涉及的代谢通路主要与内分泌、免疫以及信号传导系统有关。
结论 肠道菌群通过调控小鼠脊髓中 TLR4 的表达水平参与骨癌痛小鼠吗啡耐受的形成。

PU-0296

The Wnt signaling pathway: a new target of chronic pain

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Wnts are a family of secreted lipid-modified signaling proteins which contains more than 19 members in humans involved in a broad range of physiological process including the development of nervous systems and cardiac differentiation and development. Treating chronic pain remains a major clinical challenge, and the underlying mechanisms of chronic pain remain elusive. Recently, some studies have shown that the wingless-related integration site (Wnt) signaling pathway plays important regulatory role in neuropathic pain, inflammatory pain, and bone cancer pain. Emerging evidence suggests that the Wnt signaling pathway plays a crucial role in the regulation of the nervous system. Herein, we integrate emerging evidence regarding the roles of Wnt signaling pathway in chronic pain. These findings suggest that targeting the Wnt signaling pathway may be can treating chronic pain.

PU-0297

lncRNA NONRATT018640.2 介导染色质环化促 Kindlin-1 转录激活星形胶质细胞在神经病理性疼痛中的作用

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目的 本研究旨在明确长链非编码 RNA NONRATT018640.2（Kindlin-1 associated lncRNA，lncRNA NONRATT018640.2）在 Kindlin-1 转录及星形胶质细胞活化中的重要作用，深入解析 lncRNA NONRATT018640.2 与染色质构架蛋白 CTCF 的作用位点，在动物模型中验证 lncRNA NONRATT018640.2/Kindin-1 轴在促进星形胶质细胞活化以及痛觉敏化中的作用。
方法 原代星形胶质细胞分离及培养，LPS（脂多糖）激活星形胶质细胞，通过 NONCODE 网站（noncode.org）获得 lncRNA NONRATT018640.2 的全长序列，免疫荧光检测星形胶质细胞的活化，Chromatin 3C 实验，
ELISA 检测星形胶质细胞 TNF、IL-1 及 IL-6 的表达，敲减 CTCF 的 siRNA
结果 与 Sham 组相比，NP 大鼠脊髓中 Kindlin-1 的 mRNA 和蛋白在 10 天后表达上升，GFAP 表达上升。免疫荧光结果显示 Kindlin-1 在星形胶质细胞中高表达。在 NP 模型鼠脊髓背角注射腺病毒（shRNA Kindin-1）敲减 Kindlin-1 可提高 NP 模型鼠的机械痛域和热痛域，并抑制 NP 模型鼠脊髓中星形胶质细胞的活化及炎性因子的释放。在原代培养的大鼠星形胶质细胞中加入 LPS，孵育 24h 后可见 Kindlin-1 mRNA 和蛋白均上升，加入 cycloheximide（CHX）发现 Kindlin-1 的蛋白和 mRNA 稳定性均无显著变化。q-PCR 检测 NP 模型鼠与 Sham 大鼠脊髓中 Kindlin-1 基因附近 8 条 lncRNA 的表达，其中 lncRNA NONRATT018640.2 在 NP 模型鼠中表达显著上升。Northern blot 再次验证

确认 NONRATT018640.2 在 NP 模型鼠脊髓中表达上升。FISH 实验显示 NONRATT018640.2 主要位于核内，且与星形胶质细胞标记物 GFAP 存在共定位。原代星形胶质细胞经 LPS 诱导 24h 后，qPCR 检测到 NONRATT018640.2 表达上升。LPS 诱导的星形胶质细胞内，double DNA/RNA FISH 显示 NONRATT018640.2 在其转录位置附近聚集。原代星形胶质细胞中加入针对 NONRATT018640.2 的反义寡核苷酸（ASO）可以有效抑制 LPS 诱导的 NONRATT018640.2 表达上升（组别 LPS+ASO），两组别 LPS 为加入 ASO 阴性对照且经 LPS 诱导，组别 control 中未加入 LPS 或任何 ASO。免疫荧光和 Western blot 显示敲减 NONRATT018640.2 抑制 Kindlin-1 蛋白表达及星形胶质细胞的活化。qPCR 显示敲减 NONRATT018640.2 抑制 Kindlin-1 mRNA 表达。NP 模型鼠脊髓背角注射针对 NONRATT018640.2 的 ASO 或注射 ASO 阴性对照，发现敲减 NONRATT018640.2 后，NP 大鼠疼痛症状缓解，脊髓内 Kindlin-1 和 GFAP 的蛋白和 mRNA 表达均下调。在经 LPS 诱导后的原代星形胶质细胞中，使用内源性 NONRATT018640.2 进行 RNA pulldown 试验，发现排序靠前的交互蛋白中有 CTCF。RNA pulldown 实验后，用 Western blot 亦可鉴定到 CTCF。通过 CTCF 抗体的 RIP 实验联合 qPCR 检测到 CTCF 与 lncRNA NONRATT018640.2 结合。原代星形胶质细胞经 LPS 诱导激活后，进行 3C 实验发现，使用 siRNA 抑制 CTCF 表达可使染色质环化频率降低。通过 CTCF 抗体的 ChIP 实验发现，敲减 NONRATT018640.2 后 CTCF 与环化位点的结合减弱。

结论 脊髓星形胶质细胞内高表达的长链非编码 RNA NONRATT018640.2 与环化相关蛋白 CTCF 结合，促进染色质成环，使 lncRNA NONRATT018640.2 附近的增强子与 kindlin-1 的启动子在空间上靠近，进而增强 kindlin-1 转录，活化星形胶质细胞，加重神经病理性疼痛。

PU-0298

疼痛护理的发展：回顾与展望

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目的 本研究旨在全面审视疼痛护理的发展历程、现代治疗方法和未来展望，以深入了解该领域的演进和趋势

方法 为了实现研究目的，我们采用了文献综述和数据分析的方法。文献综述包括广泛检索相关文献，整理各个历史时期疼痛管理方法的发展情况。此外，我们还收集了实际患者案例和临床数据，用于评估不同治疗方法的效果和患者反馈。

结果 通过对文献的综合分析和实际数据的探讨，我们发现不同时期的疼痛护理方法在减轻疼痛、改善患者生活质量方面产生了积极效果。然而，药物滥用和主观性疼痛评估等问题仍然存在，需要进一步关注和解决。

结论 综合考虑研究结果，疼痛管理领域已经取得了重要的进展，但也面临一系列挑战。未来，借助新技术和创新方法，强调个体化治疗和预防，以及促进跨学科研究，将有望进一步提升疼痛护理的效果。因此，我们呼吁增加研究和投资，以提供更有效、更个性化的疼痛管理，改善患者的生活质量。

PU-0299

超声引导前锯肌阻滞联合 TAP 阻滞用于食道癌根治术镇痛效果的观察

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目的 观察超声引导下前锯肌平面阻滞（Serratus plane block,SPB）联合腹横肌平面（Transverses abdominis plane,TAP）阻滞对食道癌手术患者镇痛效果及术后恢复的影响。
方法 根据纳入排除标准筛选 2020 年 1 月至 2022 年 12 月期间 100 例在我院行食道癌根治术的患者，排除不符合标准的患者，剩余患者采用随机数字表法分为 SPB 组和对照组。全身麻醉完成后，由同一麻醉医师实行超声引导下前锯肌平面联合腹横肌平面阻滞，SPB 组患者在前锯肌间隙和腹横肌平面分别注射 0.25%的罗哌卡因 20ml，对照组患者在相应部位注射 20ml 的生理盐水。维持手术过程中的麻醉效果，患者 BIS 维持 40-60,结束后对患者采用静脉自控镇痛措施。记录术后发生并发症的情况，比较两组患者术中麻醉药用量，术后 VAS 评分和手术前后的 QoR-40 评分。
结果 1. SPB 组患者的 ICU 停留时间（16.0±7.2h）、住院时间（11.2±1.1d）与对照组的各项（17.0±6.3h、11.5±1.3d），差异不明显无统计学意义（P>0.05）。
2. 比较观察 SPB 组患者在手术后 0.5h、2h、4h 的 VAS 评分（4 分、3 分、3 分）和对照组患者的 VAS 评分（5 分、4 分、4 分），差异不显著（P>0,05）；手术后 6h-24h 开始 SPB 组患者的 VAS 评分（1 分、2 分、2 分、1 分）的变化趋势与对照组（3 分、5 分、4 分、4 分）相比，SPB 组评分较低，具有统计学意义（P＜0.05），表明 SPB 在手术后能发挥较好的镇痛作用。
3. SPB 组患者麻醉药的使用情况，瑞芬太尼（550.28±95.21ug）和舒芬太尼（47.13±15.28ug）的使用量低于对照组（742.28±107.07ug、97.28±27.76ug）（P<0.05）差异明显，两组患者丙泊酚的使用量无明显差异。
4. 比较手术前后 SPB 组患者的 QoR−40 总分（197）和单项评分与照组患者各项评分的变化趋势，术前差异不明显；术后 SPB 组患者 QoR−40 总评分（190）、疼痛（29）、身体舒适度（51）与对照组的评分（184、35、43），差异明显（P＜0.05），其余无显著差异。
5. 比较 SPB 组患者和对照组患者术后并发症情况，发生头晕情况的差异明显（P<0.05），SPB 组患者的发生病例（0）低于对照组（5），发生恶心、呕吐瘙痒、呼吸抑制、心动过缓无显著性差异。
结论 超声引导前锯肌阻滞联合 TAP 阻滞能够减轻食道癌根治术患者的术后疼痛，降低患者机体因手术和麻醉引起的应激反应；同时减少手术过程中麻醉药的使用剂量，从而有利于患者手术预后。

PU-0300

Research progress of CCL2-CCR2 signaling in neuropathic pain

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Neuropathic pain (NPP) is a chronic disorder of maladaptation that may occur after an injury or disease which affects the somatosensory system and features as abnormal pain, nociceptive hyperalgesia, spontaneous pain, and comorbidity triggering sleep disorders, depression, and anxiety. Despite recent advances and growing interest in understanding the pathogenesis of this disease, neuropathic pain remains a significant challenge to treat. Studies have shown that neuroinflammation has a significant function for the establishment and the development of neuropathic pain. The chemokine CCL2 mediates responses to both inflammation and immune responses within the nervous system, and new data suggests that CCL2/CCR2 signaling performs

a significant function in neuroinflammation by participating in neuron-glial cell interactions. Here, we provide evidence regarding the contribution of CCL2/CCR2 in neuropathic pain. First, we reviewed the mechanisms whereby CCL2-CCR2 promotes plasticity changes in neuropathic pain conditions from three different anatomical sites: the nerve injury site, the dorsal horn of the central spinal cord, and the dorsal root ganglion. Then, we report on the study regarding CCL2-CCR2 as a potential therapeutic target for neuropathic pain: Can CCL2-CCR2 induce neuropathic pain by bridging peripheral and central neuroinflammation through altering the permeability of the blood-spinal cord barrier (BSCB)?

PU-0301

Caveolin-1 在神经病理性疼痛中的研究进展

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目的 临床上，将疼痛第一次发生并持续超过三个月的疼痛定义为慢性疼痛，据调查显示，全球有超过 30%的人群正在遭受慢性疼痛的折磨[1]。慢性疼痛的形成原因很多，根据其原因不同，其中大致可以分为 3 类，第一类是伤害性疼痛，这种疼痛多来自于组织损伤；第二类是神经病理性疼痛，多源自神经损伤；第三类是伤害可塑性疼痛，多来自致敏的神经系统[2]。临床上 3 种疼痛类型往往会在患者本身或者患者内部交叉出现，临床一个部位的疼痛（比如腰痛）也会重叠上述三种不同类型的疼痛[3]。神经病理性疼痛作为最常见的疼痛类型，越来越多的证据表明，以免疫细胞浸润、神经胶质细胞激活、神经系统致炎细胞因子过表达为特征的神经炎症（Neuroinflammation）以及血脊髓屏障的破坏在神经病理性疼痛的形成和维持中起关键作用。

洞穴（Caveolae ）是 50-100 nm 的瓶状质膜内陷，洞穴蛋白-1（caveolin-1，Cav-1）Caveolin-1 基因定位于肿瘤抑制基因座（7q31.1/D7S522）和已知的脆性位点（FRA7G），是形成 Caveolae 的核心细胞骨架蛋白[4]。Caveolin-1 参与多种生物功能，包括机械感测、细胞迁移、细胞信号传导、脂质代谢、细胞力学转导、炎症反应和组织修复等[5]。Cav-1 作为一种膜脂质筏支架蛋白(Membrane lipid rafts ，MLRs)，已被证明可以在 MLRs 内参与多个突触信号蛋白的形成，调节突触信号传导和神经可塑性[6-8]。不少研究发现，Cav-1 在大鼠神经病理性疼痛中上调，敲除 Cav-1 可缓解大鼠的痛觉过敏症状，过表达 Cav-1 可诱导大鼠痛觉过敏[9-11]。本文综述了神经病理性疼痛的产生机制，Cav-1 与神经病理性疼痛的关系，为本实验提供理论基础。

方法 文献搜索与资料收集分析

结果 Caveolin-1 在神经病理性疼痛大鼠中表达上调，敲除 Caveolin-1 可以缓解大鼠的痛觉过敏症状，过表达 Caveolin-1 又可诱导大鼠的痛觉超敏症状。Caveolin-1 作为一种形成脂质筏的关键蛋白，可能会通过调控小胶质细胞活化，星形胶质细胞活化，内皮细胞功能，NMDA 受体和多巴胺受体活性来调控神经病理性疼痛的发生，但是需要进一步的研究，来完善 Caveolin-1 参与神经病理性疼痛调控的分子机制。

结论 深入研究 Caveolin-1 影响神经病理性疼痛的具体机制，必将对神经病理性疼痛的早期诊断和诊疗提供新颖的科学的线索。

PU-0302

电针通过 PKA/HNRNPC/GRIK2 通路缓解腹后外侧核神经元兴奋性治疗丘脑痛

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目的 丘脑痛（Thalamic pain, TP）是一种严重且难以治疗的中枢性神经病理性疼痛，主要表现为单侧肢体和面部范围不一的剧烈疼痛，疼痛性质可包括烧灼、针扎、刀割、电击等，给患者带来巨大痛苦。更不幸的是，TP 目前尚无满意的治疗方法，其主要治疗策略仍以改善患者的生活质量为主，而以抗抑郁药、阿片类药物为主的药物治疗效果也不尽如人意，多数患者疼痛难以得到有效控制而迁延不愈，最终并发焦虑、抑郁等精神疾病，甚至产生自杀倾向，严重影响患者的生活质量，给家庭和社会也增加了巨大的经济负担。我们前期通过原创的新型 TP 大鼠模型发现，TP 大鼠术侧腹后外侧核（Ventral Posterolateral Nucleus, VPL）神经元超微结构明显损伤，具体表现为细胞核异形性增加及线粒体损伤，同时转录组学和分子生物学发现腺苷酸环化酶 1（Adenylyl Cyclase 1, Adcy1）表达量显著上调。电针（Electroacupuncture, EA）治疗可显著缓解 TP 大鼠疼痛症状，逆转其超微结构损伤，并显著下调 Adcy1 的表达。本研究将继续深入探索 EA 治疗 TP 的明确分子生物学机制。

方法 将 60 只成年雄性 SD 大鼠（200~220g）随机分为四组，假手术组（N=15）、丘脑痛组（N=15）、EA 治疗组（N=15）、ST034307 注射组（N=15）。行为学录像、von Frey 和 Cylinder 实验分别验证各组大鼠自发性疼痛、痛觉超敏和肢体运动功能。术后第 7 天开始，EA 组和 ST034307 注射组分别进行 EA 治疗以及 ST034307 腹腔注射。EA 治疗穴位选择术侧“手三里”（LI10）和“曲池”（LI11），刺激频率保持为 2/100Hz 变频，电流强度保持在 1mA 10 分钟，然后增加到 1.5mA 10 分钟，最后增加到 2mA 10 分钟，治疗隔日一次直至术后第 35 天，共 15 次。ST034307 为 Adcy1 特异性抑制剂，从术后第 7 天开始进行腹腔注射，每日一次。术后 40 天分别取各组大鼠术测 VPL 进行透射电镜观察，探索慢性 TP 大鼠中 VPL 结构出现何种损伤以及 EA 对其结构损伤的修复作用。同样，术后 40 天取各组大鼠 VPL 进行免疫印迹、免疫荧光等分子生物学验证，探索大鼠 Adcy1 及下游蛋白激酶 A（protein kinase A, PKA）、cAMP 反应性元件蛋白 1（cAMP response element binding protein 1, CREB1）表达量变化，以及通过生信预测分析提示的 CREB1 潜在转录因子性别决定区 Y-Box2（Sex-determining region Y-Box2, SOX2）、异质核核糖核蛋 C（Heterogeneous nuclear ribonucleoprotein C, HNRNPC）及谷氨酸离子型受体红藻氨酸类型亚基 2（Glutamate receptor ionotropic kainite 2, GRIK2）表达量变化。最后通过高尔基染色验证 VPL 神经元兴奋性改变。

结果 我们通过行为学发现 TP 组大鼠出现术侧面部痛觉超敏，自发性疼痛以及对侧上肢运动功能障碍，EA 和 ST034307 均可缓解上述行为学改变，区别在于 ST034307 提供的是短暂的行为学恢复，具体表现为停止注射 ST034307 后大鼠仍表现出显著的疼痛症状。分子生物学实验发现，TP 组大鼠相比于对照组，Adcy1/PKA/CREB1/SOX2/HNRNPC/GRIK2 表达均显著升高，EA 治疗和 ST034307 注射均可降低上述蛋白表达。高尔基染色发现 VPL 神经元树突棘密度在 TP 组中显著升高，EA 治疗可恢复其正常密度。因此 EA 可能是通过上述通路减少了 GRIK2 表达，降低了 VPL 神经元兴奋性达到治疗 TP 得作用。

结论 本研究发现 EA 可显著缓解 TP 大鼠异常行为学表现，并推测可能是通过 Adcy1/PKA/CREB1/SOX2/HNRNPC/GRIK2 通路调整 VPL 神经元兴奋性异常增加发挥其治疗作用。本研究可为 EA 在治疗 TP 中的作用机制供理论基础，从而为此类疾病的临床治疗以及相关药物开发供重要的依据。

PU-0303

The Cellular Analgesic Mechanisms of Celastrol in Microglial Inflammation Models for Chronic Pain Relief

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Introduction: Chronic pain, a distinct disease characterized by persistent, recurrent pain, affects over 30% of the global population. Treatments are limited due to complex pathophysiology. Recent findings suggest that activated microglia and subsequent central inflammation contribute to chronic pain progression. Celastrol (Cel), a triterpene from Tripterygium wilfordii, reduces thermal hyperalgesia in rats, though its cellular analgesic mechanisms remain unclear. This study explores Cel's potential mechanisms in microglial inflammation models, aiming to identify therapeutic targets for chronic pain relief.
Methods: Initially, BV2 microglial cells were treated with various concentrations of Cel (0.25, 0.5, 1.0, 1.5, and 2.0 μM) for 24 hours to establish an appropriate pre-treatment range using the CCK-8 assay for cell viability. Cells were then pretreated with 0.5, 1.0, and 1.5 μM Cel for 1 hour before co-incubation with 1 μg/mL lipopolysaccharides (LPS) for an additional 24 hours. Nitric oxide (NO) release was measured using the Griess assay, assessed cell viability using the CCK-8 method, and determined the levels of IL-1β, IL-6, and IL-10 in the supernatants via ELISA. Intracellular proteins HMGB1, TLR4, NF-κB, and p-NF-κB were analyzed for mean fluorescence intensity through immunofluorescence and quantified by Western blot.
Results: Optimal pre-treatment concentrations of Cel for microglial cells were identified as 0.5, 1.0, and 1.5 μM. Compared to the LPS group, pre-treatment with these concentrations significantly reduced the release of pro-inflammatory cytokines IL-1β and IL-6, while notably increasing the levels of the anti-inflammatory cytokine IL-10 at 1.5 μM. Cel pre-treatment also decreased the intracellular expression of HMGB1 and its fluorescence intensity at 1.5 μM, similarly reducing TLR4 expression and fluorescence. Furthermore, 1.0 and 1.5 μM Cel lowered NF-κB-p65 and p-NF-κB-p65 expression, with 1.5 μM additionally reducing their mean fluorescence intensities.
Conclusions: Cel pre-treatment reduces LPS-induced BV2 microglial cells activation and modulates cytokine release by inhibiting the HMGB1/TLR4/NF-κB pathway.

PU-0304

Wnt5a in Keratinocyte Drives Complex Regional Pain Syndrome Peripheral Sensitization via NR2B and MMP9 Activation in Rats

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Background: Complex regional pain syndrome (CRPS) is a chronic pain condition characterized by inflammatory features with unclear mechanism. Currently, we focus on the role of epidermal keratinocytes in transmitters of nociceptive sensations and investigate whether Wnt5a-mediated activation of NMDA receptor subunit 2B (NR2B) and matrix metalloproteinase-9 (MMP9), promoting CRPS induced peripheral sensitization.
Methods: The regulation of NR2B and downstream pathway-related gene MMP9 mediated by Wnt5a were first investigated through primary keratinocytes in vitro oxygen–glucose deprivation/reoxygenation (OGD/R) treatment. Then, a rat chronic post-ischemia pain model (CPIP) was established to mimic the pathological process of CRPS, the nociceptive threshold and activation of NR2B and MMP9 in epidermis and dorsal root ganglion (DRG) were

further assessed.
Results: In vitro, we found Wnt5a was expressed in keratinocytes and involved in OGD/R-induced mitochondrial impairment and inflammation by regulating the expression of NR2B and MMP9. Consistently, compared with the CPIP group, subcutaneously injection of Wnt5a inhibitor-Box5 further mitigated mechanical withdrawal threshold and thermal withdrawal latency in vivo. Furthermore, compared with the Sham group, the overexpression of Cx43 and PGP9.5 in CPIP rats suggested that keratinocytes can form neuro-cutaneous unit (NCU) with peripheral neuronal axons, thus driving CRPS peripheral sensitization. Still, the inhibition of Wnt5a peripherally can only decrease the expression of MMP9 co-labeled with NeuN in DRG, but not the NR2B.
Conclusions: Keratinocytes, as non-neuronal cells, are involved in pathological mechanism of CRPS. Activation of Wnt5a regulating CRPS peripheral sensitization via NR2B and MMP9, suggesting new perspectives to design potential therapeutic targets for CRPS.

PU-0305

Esketamine inhibits the c-Jun N-terminal kinase pathway in the spinal dorsal horn to relieve bone cancer pain in rats

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Esketamine inhibits the c-Jun N-terminal kinase pathway in the spinal dorsal horn to relieve bone cancer pain in rats
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Background: Cancer-induced bone pain (CIBP) is one of the most common and feared symptoms in patients with advanced tumors. The X-C motif chemokine ligand 12 (CXCL12) and the CXCR4 receptor have been associated with glial cell activation in bone cancer pain. Moreover, the c-Jun N-terminal kinase (JNK), as one of the mitogen-activated protein kinases, and c-Jun, as activator protein AP-1 components, contribute to the development of various types of pain. However, the specific CIBP mechanisms remain unknown. Esketamine is a non-selective N-methyl-d-aspartic acid receptor (NMDA) inhibitor commonly used as an analgesic in the clinic, but its analgesic mechanism in bone cancer pain remains unclear.
Purpose: We explored the role of the CXCL12/CXCR4-JNK-c-Jun signaling pathway in bone cancer pain. In addition, we examined the analgesic ability of esketamine in bone cancer pain rats by inhibiting the JNK-c-Jun pathway.
Method: We used a tumor cell implantation (TCI) method to establish the model. We delivered 10μl of resuspended Walker 256 cells (1×105 cells/μl) into the right bone cavity of female SD rats with a 25-μl micro-syringe to establish the CIBP model. For intrathecal injection, we inserted a 25-μl micro-syringe into the L4-5 intervertebral space and injected 10 μL of drugs with the needle well positioned. And the drugs of intrathecal injection are as follows: AMD3100, the CXCR4 inhibitor was dissolved and resuspended to 5 μg/10 μl with NS, SP600125, the JNK inhibitor was dissolved in dimethyl sulfoxide (DMSO) and diluted to 5 μg/10 μl with NS and Esketamine was diluted with NS to produce three concentrations at 2 μg/μl, 4 μg/μl, and 6 μg/μl. We captured X-ray films of the animals in the supine position to assess the bone destruction resulting from the tumor of the affected limb on day 14 following the establishment of the model. The pain behavior was assessed by a von Frey filament through measuring the 50% paw withdrawal threshold (PWT). We extracted L3–L5 spinal cords for Western blot and immunofluorescence.

Results: After TCI, the paw mechanical withdrawal threshold began to decline on day 3, reached the lowest level on day 11 and was maintained until day 21, the last day of measurement. Moreover, cancer cell inoculation led to significant bone destruction as shown by the X-ray film comparisons between rats in the NC and sham groups on day 14. We established the rat cancer-induced bone pain model by intratibial inoculation of walker 256 cancer cells successfully.
Chemokine CXCL12 and its receptor CXCR4 were upregulated in the spinal cord of the affected limb, expression began to increase on day 3, rose from 3 to 7 days, reached higher levels around 14 days, declined at day 21. And p-JNK followed the same temporal pattern as those of the CXCL12/CXCR4 molecules. The protein of p-c-Jun was upregulated from day 3, and achieved its highest level between days 7 and 14, in a time trend similar to that of p-JNK. Our double immunofluorescence results show that the activated microglia and astrocytes were more abundant in the spinal cord on day 14 after the TCI. In addition, CXCL12/CXCR4, p-JNK and p-c-jun all colocalized in microglia. These findings suggest a functional association between the CXCL12/CXCR4-JNK-c-Jun pathway in the spinal cord and the development of CIBP.
The behavioral results of the rats showed that intrathecal injection of AMD3100 once daily from day 12 to day 14 after TCI remarkably attenuated the mechanical allodynia at the maintenance phase of CIBP. Intrathecal injection of the CXCR4 inhibitor AMD3100 also reduced JNK and c-Jun phosphorylations. These results revealed that CXCR4 has a role in the pathogenesis of CIBP and that p-JNK and p-c-Jun may be the downstream effectors of CXCR4 that regulate the development of CIBP.
Intrathecal injection of the JNK inhibitor SP600125 once daily from day 12 to day 14 after TCI also alleviated TCI-induced pain and reduced the expression of p-JNK and p-c-Jun in microglia. These results definitely indicate that p-JNK in the spinal cord of rats had an effect on the CIBP by regulating the expression of the functional downstream target p-c-Jun.
At last, intrathecal injection of esketamine once daily from day 12 to day 14 after TCI also alleviated TCI-induced pain. Repeated intrathecal injections of esketamine significantly reduced the up-regulations of p-JNK and p-c-Jun in the spinal cord, while resulting in no changes in the expressions of CXCL12 and CXCR4. Immunofluorescence results showed that the p-JNK and p-c-Jun co-localization in microglia also decreased. These results show that esketamine definitely alleviated the existing bone cancer pain, markedly inhibiting the JNK-c-Jun signal pathway without strong effects on the chemokines or chemokine receptors of CXCL12/CXCR4.
Conclusion Overall, our data suggest that the CXCL12/CXCR4-JNK-c-Jun signaling pathway of microglia in the spinal cord mediates neuronal sensitization and pain hypersensitivity in cancer-induced bone pain and that esketamine exerts its analgesic effect by inhibiting the JNK-c-Jun pathway.

PU-0306

CCL2 调节 Caveolin-1 表达调控血脊髓屏障通透性参与神经病理性疼痛的研究

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目的 采用神经病理性疼痛 SNI 模型，探究 CCL2 能否通过调节 Caveolin-1 的表达进而影响血脊髓屏障（BSCB）的紧密连接水平和通透性参与神经病理性疼痛
方法 将成年雄性 SD 大鼠随机分组：假手术组（SHAM 组）、SNI 组、SNI+CCL2 中和抗体组、SNI+PBS 组、SNI+Daidzein 组（Caveolin-1 抑制剂）、SNI+DMSO 组。于 SNI 术前 1 d、术后 14d 测定机械缩足阈值（MWT）以及热缩足阈值(PWT)，在取材前进行尾静脉注射伊文思蓝染料（EB），后提取大鼠脊髓组织，采用免疫荧光、电镜、ELISA、RT-PCR、WB 等方法检测 BSCB 紧密连接水平和通透性以及 CCL2、Caveolin-1、炎症因子的表达水平。

结果 1、SHAM 组的 PWT 值与 MWT 值均明显高于 SNI 组，而 SNI+CCL2 中和抗体组与 SNI+Daidzein 组则明显高于 SNI 组，差异均有统计学意义（P 均<0.05）。2、SNI 组较 SHAM 组免疫荧光 EB 渗透率明显增加，而 SNI+CCL2 中和抗体组及 SNI+Daidzein 组较 SNI 组 EB 渗透率有下降，差异均有统计学意义（P 均<0.05）；电镜结果显示 SNI 组较 SHAM 组 BSCB 完整性明显破坏，而 SNI+CCL2 中和抗体组及 SNI+Daidzein 组较 SNI 组屏障破坏明显减少，差异均有统计学意义（P 均<0.05）。3、ELISA 结果显示 SNI 组较 SHAM 组炎症因子 TNF-α、IL-1β 及 IL-6 的释放水平明显增加，而 SNI+CCL2 中和抗体组及 SNI+Daidzein 组较 SNI 组释放水平明显下降，差异均有统计学意义（P 均<0.05）;RT-PCR、WB、免疫荧光显示 SNI 组较 SHAM 组的 CCL2、Caveolin-1 的表达明显增加，SNI+CCL2 中和抗体组及 SNI+Daidzein 组较 SHAM 组明显减少；ZO-1、Occludin、Claudin-5 的表达 SNI 组较 SHAM 组明显减少，而 SNI+CCL2 中和抗体组及 SNI+Daidzein 组较 SNI 组明显上升，差异均有统计学意义（P 均<0.05）。

结论 CCL2 可以通过 Caveolin-1 调节 BSCB 的通透性；抑制 CCL2 能够通过抑制 Caveolin-1 的表达从而减少 BSCB 紧密连接蛋白的丢失，以及减少 BSCB 的破坏、减少外周炎症因子的释放，进而缓解神经病理性疼痛。

PU-0307

实验性自身免疫性脑脊髓炎大鼠疼痛抑郁的脑功能变化

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目的 EAE 指的是实验性自身免疫性脑脊髓炎（Experimental Autoimmune Encephalomyelitis）大鼠模型。这是一种常用于研究多发性硬化症（Multiple Sclerosis, MS）的动物模型。多发性硬化症是一种自身免疫性疾病，特征是中枢神经系统的炎症和脱髓鞘。MS 患者常伴有疼痛、抑郁、睡眠障碍等伴发疾病，然而目前发病机制尚未阐明。本研究通过建立 EAE 大鼠模型，检测模型动物的行为学变化及相关脑区功能改变，为 MS 疼痛抑郁的发生机制及相关治疗提供新的证据。

方法 选择 6-8 周雌性 Wistar 大鼠，通过皮下注射髓鞘碱性蛋白（Myelin Basic Protein, MBP）与完全弗氏佐剂（Complete Freund's Adjuvant, CFA）制成的乳剂，构建 EAE 大鼠模型，对照组皮下注射生理盐水。建模后第一日起，隔日检测机械痛阈、热痛阈、冷痛觉敏感，在建模后 21 天进行蔗糖偏好试验、高架十字迷宫、强迫游泳试验检测焦虑抑郁样行为。在 EAE 大鼠建模前、发病高峰期及建模后第 21 天进行 rs-fMRI 扫描。

结果 EAE 大鼠于建模后第 10 天开始发病，发病高峰表现为双后肢瘫痪（EAE 评分=3），持续 6 天后运动功能恢复正常。在疾病恢复期，与对照组大鼠相比，EAE 组的机械痛阈显著降低，冷痛觉更敏感，但热痛阈无显著差异。EAE 组大鼠与对照组大鼠相比，Rotarod 转棒试验证实两组大鼠的运动协调功能无显著差异。在焦虑抑郁行为方面，EAE 组大鼠的蔗糖偏好率显著低于对照组（60.23% vs 89.23%, p<0.001），高架十字迷宫试验中开放臂停留时间比例显著低于对照组（6.1% vs 29%, p<0.001），强迫游泳试验中不动时间显著高于对照组（162s vs 113s, p<0.001）。与对照组相比，EAE 组显示大脑双侧的丘脑（Thalamus R/L），双侧内嗅皮层（Entorhinal Cortex R/L），海马齿状回（Dentate Gyrus R/L），海马 CA3 区（Cornu Ammonis 3 R/L），初级感觉皮层（Primary Somatosensory Cortex R/L）的 ALFF 值降低（p<0.05）。与对照组相比，EAE 组在丘脑、海马齿状回、海马 CA3 区及初级感觉皮层中显示增加的 ReHo 值。

结论 EAE 组大鼠在建模后 21 天运动功能恢复正常，但仍伴有疼痛及抑郁行为。伴有丘脑、双侧内嗅皮层、海马及初级感觉皮层等脑区局部活性降低，且脑区同步性增强。表明这些脑区可能是调节 EAE 疼痛抑郁的重要靶点。

PU-0308

单细胞 RNA 测序揭示了神经病理性疼痛模型中，小鼠脊髓小胶质细胞对周围神经损伤的特异性反应，并揭示 CTSS 基因在小胶质细胞中表达升高

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目的 对神经病理性疼痛相关细胞进行无偏、高通量和高分辨率的转录分析，探究周围神经损伤后，脊髓中不同类型细胞的数量变化，致力于发现与神经病理性疼痛相关的新的基因调控网络，提高对神经病理性疼痛机制的理解，实现个性化疼痛管理。
方法 采用双侧慢性收缩损伤法(CCI)建立小鼠神经病理性疼痛模型。造模 7 天后，处死小鼠，收集 L4-L6 脊髓组织制成单细胞悬浮液。使用 10× Genomics scRNA-seq 技术对 CCI 组及空白对照组的 unsorted 细胞进行进一步研究。采用 Cell Ranger 软件对原始 Fastq 数据进行数据质量统计、比对到 Ensembl 数据库的参考基因组、细胞拆分、去 PCR 重复、细胞识别。使用 tSNE 和 UMAP 方法对细胞群体进行降维聚类。使用 SingleR 软件及人工注释方法，对所得细胞群体进行细胞类型预测，同时通过筛选进一步得到每一类群的显著标记基因集。进一步通过 western blot、免疫荧光等方法验证显著标记基因在模型组及对照组中的表达差异。使用生物信息学分析方法，预测所选定的显著标记基因的潜在上下游，并通过 western blot、免疫荧光、免疫组化等方法进一步给予验证。
结果 细胞降维聚类共注释得到 8 种细胞大类，分别是：B 细胞、内皮细胞、上皮细胞、粒细胞、巨噬细胞、小胶质细胞、NK 细胞、少突胶质细胞。经比较，在 CCI 组与空白对照组间存在较大差异的细胞族群，其细胞类型主要为小胶质细胞及少突胶质细胞。
分析各细胞族群在 CCI 后变化显著的基因发现，在周围神经损伤后，小胶质细胞和少突胶质细胞均表现出特定的基因表达变化。本研究发现，组织蛋白酶 S（CTSS）基因在小胶质细胞中的表达升高较明显。CTSS 能够通过 CX2CL1/CX3CR1 通路激活 p38 MAPK，从而使 I-κB 磷酸化降解，激活 NF-κB。活化的 NF-κB 进入细胞核与 DNA 分子结合，启动有关基因的转录，释放大量细胞因子如 MCP-1、COX-2、IL-6、IL-1β 等，促进神经病理性疼痛的形成与维持，同时 p38 MAPK/NF-κB 通路的激活也能够介导更多 CTSS 的产生，形成正反馈环路。
结论 本研究通过单细胞 RNA 测序技术发现，在 CCI 小鼠模型中，脊髓小胶质细胞和少突胶质细胞在周围神经损伤后表现出特定的基因表达变化，尤其是 CTSS 基因在小胶质细胞中的表达显著升高。CTSS 将激活 p38 MAPK/NF-κB 通路，使小胶质细胞释放细胞因子 MCP-1、COX-2、IL-6、IL-1β 等，同时 p38 MAPK/NF-κB 通路的激活也介导更多 CTSS 的产生，形成正反馈环路，促进神经病理性疼痛的形成与维持。单细胞 RNA 测序技术为深入理解神经病理性疼痛提供了新的工具和方法。随着研究的深入，有望为疼痛患者带来更好的治疗和管理策略。

PU-0309

右美托咪定通过阻断超极化激活的阳离子电流延长利多卡因静脉局部麻醉时间

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目的 利多卡因局部静脉麻醉（Intravenous regional anesthesia, IVRA）可提供有效的局部镇痛，但持续时间有限。右美托咪定作为利多卡因的辅助剂可延长 IVRA 镇痛持续时间，其作用机制可能与调节超极化激活的环核苷酸门控（Hyperpolarization-activated cyclic nucleotide-gated, HCN）通

道有关。本研究将探讨右美托咪定延长利多卡因 IVRA 作用时间的潜在 HCN 通道相关机制，为开发新型局部麻醉辅助剂提供理论基础。

方法 本研究采用 Sprague-Dawley 大鼠尾部 IVRA 模型。将不同浓度右美托咪定（0、6.8、13.6、20.4 μM）混合 2%利多卡因溶液（0.5 mL）在 10 秒内注射至尾部血管内，给药 10 分钟后，松开止血带后进行后续评估。通过甩尾试验和夹尾试验评估 IVRA 镇痛效果和持续时间。通过 α_1 受体拮抗剂（哌唑嗪）、α_2 受体拮抗剂（育亨宾）、HCN 通道抑制剂（ZD7288）和 HCN 通道激动剂（Forskolin），分别于右美托咪定联合应用，观察其对右美托咪定 IVRA 作用时间的影响。采用全细胞膜片钳记录技术观察右美托咪定对离体背根神经节神经元 HCN 通道介导超极化激活阳离子电流（Ih）的影响。

结果 与利多卡因组相比，利多卡因+3 μg/kg 右美托咪定组、利多卡因+6 μg/kg 右美托咪定组和利多卡因+9 μg/kg 右美托咪定组的镇痛持续时间和麻醉持续时间均延长（P＜0.05）。IVRA 镇痛持续时间与右美托咪定浓度呈正相关（Spearman 相关系数=0.759），麻醉持续时间与右美托咪定浓度呈正相关（Spearman 相关系数=0.719）。此外，利多卡因+9 μg/kg 右美托咪定组有 2 只大鼠在止血带松开后出现镇静状态。α_1 受体拮抗剂（哌唑嗪）和 α_2 受体拮抗剂（育亨宾）不能减弱右美托咪定复合利多卡因 IVRA 的镇痛和麻醉作用（P<0.05）。HCN 通道抑制剂（ZD7288）也不能进一步增加右美托咪定延长利多卡因 IVRA 镇痛和麻醉持续时间的作用（P<0.05）；HCN 通道激动剂（Forskolin）逆转右美托咪定延长利多卡因 IVRA 持续时间的作用。HCN 通道抑制剂（ZD7288）可抑制大鼠背根神经节神经元 I_h 幅值（P＜0.001）。右美托咪定浓度依赖性抑制背根神经节神经元 I_h 幅值，根据量效关系曲线推导右美托咪定的 IC50 约为 6.0 ± 0.8 μM。右美托咪定可抑制大鼠 DRG 神经元稳态激活的 I_h（P<0.05）。

结论 右美托咪定通过直接抑制 HCN 通道活性延长利多卡因 IVRA 持续时间，与 α-受体拮抗剂无关。这揭示了其增强局部麻醉作用的新机制，为开发新型 HCN 通道调节剂提供新靶点。

PU-0310

Association of Antihypertensive Drug Target Genes with Chronic Pain: A Mendelian Randomization Study

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Objective: To estimate the potential effects of different antihypertensive drug classes on chronic pain and to figure out the potential drug repurposing.

Methods: This drug-target mendelian randomization included commonly used antihypertensives including angiotensin-converting enzyme inhibitors (ACEIs), angiotensin II receptor blockers (ARBs), calcium channel blockers (CCBs), alpha-adrenoceptor blockers, adrenergic neuron blocking drugs, beta-adrenoceptor blockers (BBs), centrally acting antihypertensive drugs, and diuretics. We obtained target genes from Drugbank and Drug-Gene Interaction database (DGIdb). Available existing expression quantitative trait loci (eQTLs) for drug target genes were used as genetic proxies of exposure to antihypertensive drugs. Genetic association estimates for the chronic pain were extracted from genome-wide association study (GWAS) of multisite chronic pain in UK Biobank. Drug-target mendelian randomization estimates were generated using summary databased mendelian randomization (SMR) method. We also obtained genetic proxies for systolic blood pressure (SBP) from GWAS on 757,601 individuals of European ancestry drawn from UK Biobank and the International Consortium of Blood Pressure Genome Wide Association Studies (ICBP) and performed a two-sample mendelian randomization for association between SBP and chronic pain. We utilized three different statistical methods: inverse variance weighting (IVW), weighted median estimator (WME), and MR Egger regression.

Results: 26 out of 327 hypertensive drug target genes were associated with chronic pain (Fig.1), includes KCNH2 (OR, 0.923; 95%CI, 0.893-0.955; p=2.9310-6), GRK4 (OR, 1.04; 95%CI, 1.02-

1.06; p=0.00018), HLA-DRB1 (OR, 0.991; 95%CI, 0.986-0.996; p=0.00035), CSK (OR, 0.974; 95%CI, 0.960-0.988; p=0.00037), ATAD (OR, 0.940; 95%CI, 0.904-0.977; p=0.0016), etc. These genes were the target of ACEIs, ARBs, BBs, CCBs, adrenergic neuron blocking drugs, arteriolar smooth muscle relaxants and diuretics (Fig.2). The two-sample mendelian randomization showed that 9 out of 26 genes influence chronic pain through the effects on SBP (see group Effect on SBP in Fig.1). These genes included CSK (OR, 0.981; 95%CI, 0.969-0.992; p=0.00083), P4HA1 (OR, 0.974; 95%CI, 0.957-0.992; p=0.0056), NUCB2 (OR, 0.984; 95%CI, 0.978-0.991; p=2.3410-6), SH2B3 (OR, 0.986; 95%CI, 0.981-0.992; p=1.5710-6), etc. They were the targets of ACEIs, ARBs, BB, adrenergic neuron blocking drugs, arteriolar smooth muscle relaxants, and diuretics.
Conclusion: The commonly used hypertensive drugs, such as ACEIs, ARBs, BBs and CCBs, were associated with multisite chronic pain. Except CCBs, targets of these hypertensives indicated they had effects on chronic pain partially through influencing SBP. These findings supported further study on the effects of antihypertensive drugs on chronic pain, and suggested the necessity of reconsider the preoperative antihypertensives' medication based on their potential influence on chronic post-surgical pain.

PU-0311

环孢素 A 对术后慢性疼痛小鼠前扣带皮层线粒体功能障碍的影响

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目的 评价环孢素 A 对术后慢性疼痛小鼠前扣带回皮层（ACC）线粒体功能障碍的作用。
方法 SPF 级健康雄性 C57BL/6 小鼠 48 只，6~8 周龄，体质量约 20g，采用随机数字表法，分为 3 组（n=16）：假手术组（S 组）、术后慢性疼痛组（CPP 组）、术后慢性疼痛+环孢素 A 组（CPP+A 组）。CPP 组和 CPP+A 组制备术后慢性疼痛模型，CPP+A 组于模型制备后连续三天腹腔注射环孢素 A 20mg/kg。每组取 8 只小鼠，分别于分别于造模前（T0）和造模后 1、3、7、14、21d（T1-5）时，测定小鼠机械缩足阈值（MWT）、热缩足潜伏期（TWL），于术后 21d（T5）时进行旷场实验。于行为学测试结束后，每组随机处死 4 只小鼠，取 ACC 组织，分别采用 Jc-1 染色法检测线粒体膜电位（MMP），采用免疫荧光法检测 8-羟基脱氧鸟苷（8-OHdG）与即刻早期基因（c-Fos）的表达，采用 qRT-PCR 法检测线粒体细胞色素 c 氧化酶 1（mt-CO1）、线粒体细胞色素 c 氧化酶 2（mt-CO2）、线粒体 NADH 脱氢酶 1（mt-ND1）和线粒体 NADH 脱氢酶 2（mt-ND2）的表达，采用 Western blotting 法检测环状 GMP-AMP 合成酶（cGAS）、干扰素基因刺激因子（STING）、肿瘤坏死因子 α（TNFα）和 NOD 样受体热蛋白结构域相关蛋白 3（NLRP3）的表达。
结果 3 组小鼠不同时间点 TWL 比较差异无统计学意义（P＞0.05）；3 组小鼠旷场实验中运动总距离、中央区停留时间及进入中央区次数差异无统计学意义（P＞0.05）。与 S 组相比，CPP 组 T1-5 时 MWT 降低，MMP 降低，8-OHdG 和 c-Fos 表达上调，mt-CO1、mt-CO2、mt-ND1 和 mt-ND2 mRNA 表达上调，cGAS、STING、TNFα 和 NLRP3 表达上调（P＜0.05）；与 CPP 组相比，CPP+A 组 T1-4 时 MWT 升高，MMP 升高，8-OHdG 和 c-Fos 表达下调，mt-CO1、mt-CO2、mt-ND1 和 mt-ND2 mRNA 表达下调，cGAS、STING、TNFα 和 NLRP3 表达下调（P＜0.05）。
结论 环孢素 A 可通过改善线粒体功能障碍减轻小鼠术后慢性疼痛。

PU-0312

Identification of Susceptibility Modules and Genes through WGCNA and ceRNA Network Analysis in Neuropathic Pain-induced Anxiodepression

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Patients suffering from neuropathic pain (NP) are more vulnerable to mood disorders such as anxiety and depression, but clear mechanisms and optimal therapeutic method remain a challenge. Weighted gene correlation network analysis (WGCNA) and competing endogenous RNA (ceRNA) are innovatively bioinformatic algorithms to identify potential biomarkers and to reveal interactions among different varieties of RNAs. The main purpose of this article is to identify the core modules and genes through co-expression network and ceRNA network in NP-induced anxiodepression and explore their functional impact. We firstly analyzed the differentially expressed mRNAs and lncRNAs originated from the microarray data in GSE92718. Next, we performed WGCNA to explore gene co-expression modules related to the molecular mechanisms underlying NP-induced anxiodepression. The most important module (blue module) was identified, and lncRNA-mRNA-pathway network and protein-protein interactions (PPI) network were established to calculate the hub genes which comprised 7 fundamental lncRNAs. We identified 5 hub mRNAs, including Flt1, Slc38a2, Bmpr1b, Pdgfra and Gng2. Then, a ceRNA network (5 hub mRNAs, 3 hub lncRNAs and 40 miRNAs) was constructed to screen a core regulatory network integrating the miRNA-lncRNA-mRNA relationships with hub genes. Finally, the expressions of top hub mRNAs were certified by RT-PCR. Our results provide potential insights into the mechanisms responsible for NP-induced anxiodepression.

PU-0313

The role of FTO in anxiety-and depression-like behaviors induced by neuropathic pain in anterior cingulate cortex

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Objective: To explore the role of FTO in anxiety- and depression-like behaviors induced by neuropathic pain.

Experimental methods

1.Chronic sciatic nerve compression injury (CCI) induced hyperalgesia and anxiety- and depression-like behaviors in mice

Male C57BL / 6J mice were randomly divided into two groups (n = 10): experimental group (CCI group) and control group (Sham group). The paw withdrawal threshold (PWT) and paw withdrawal latency (PWL) of mice were measured at 1 d before surgery, 3 d, 7 d, 14 d, 21 d and 28 d after surgery, respectively. After 28 days, the anxiety-like behavior of mice was observed by open field test (OFT) and elevated cross test (EPM), and the depression-like behavior of mice was observed by forced swimming test (FST) and tail suspension test (TST).

7 d, 14 d, 21 d and 28 d after surgery, qRT-PCR was used to detect the expression changes of FTO mRNA level in ACC of mice, and Western blot technology was used to detect the expression changes of FTO protein level in ACC of mice.

2. Effects of FTO overexpression in ACC on anxiety-depression-like behavior in neuropathic pain mice

Male C57BL/6J mice were randomly divided into 2 groups (n = 20): the experimental group (CCI group) and the control group (Sham group). Group Mice were randomly divided into 2 groups (n = 10), a total of four groups: CCI+AAV-EGFP group, CCI+AAV-FTO group, Sham+ AAV-EGFP group and Sham+ AAV-FTO group. Mice in each group underwent ACC microinjection of AAV-FTO or AAV-EGFP 28 days after surgery. 21 days after AAV injection, qRT-PCR was used to detect the expression changes of FTO mRNA in ACC of mice, and Western blot was used to detect the expression changes of FTO protein level in ACC of mice. AAV transfection and transfection cell types were assessed by immunofluorescence. To verify whether the overexpression of FTO in the ACC can reverse the anxiety- and depression-like behaviors caused by neuropathic pain, the anxiety-like behavior of mice were observed by OFT and EPM in turn, and the depression-like behavior of mice were observed by TST and FST, respectively.

Results 1.Chronic sciatic nerve compression injury (CCI) induces chronic hyperalgesia and anxiety-depression-like behavior in mice

The results of pain behavior showed that compared with the mice in the Sham group, the PWT and PWL values of the mice in the CCI group decreased significantly on the 3 d after operation ($P < 0.05$), and could be maintained until the 28 d after the operation, suggesting that Chronic compression sciatic nerve injury mice could induced the developed hyperalgesia. The neuropathic pain model was successfully prepared. The OFT results showed that there was no significant difference in the exercise ability of the two groups of mice during the test ($P > 0.05$); compared with the mice in the Sham group, the percentage of time spent in the central area of the CCI group was significantly reduced ($P < 0.05$), and the number of times entering the central area was significantly reduced ($P < 0.05$). The results of the EPM experiment showed that there was no significant difference in the exercise ability of the two groups of mice during the test ($P > 0.05$); compared with the mice in the Sham group, the percentage of time that the mice in the CCI group stayed in the open arm was significantly reduced ($P < 0.05$), and the number of times they entered the central area was significantly reduced ($P < 0.05$), indicating that neuropathic pain induced anxiety-like behaviors in mice. The results of FST showed that compared with the mice in the Sham group, the mice in the CCI group remained stationary during the test period significantly longer ($P < 0.05$). In the TST experiment, compared with the mice in the Sham group, the still time of the mice in the CCI group was significantly longer during the test period ($P < 0.05$), suggesting that neuropathic pain can lead to depression-like behaviors in mice. These results suggested that neuropathic pain can induce anxiety- and depression-like behaviors in mice.

qRT-PCR and Western blot results showed that FTO mRNA and protein expression were downregulated at 7 d after surgery in the contralateral ACC of neuropathic pain mice compared with the sham group and could persist until 28 days after surgery ($P < 0.05$).

2. Overexpression of FTO in ACC can reverse anxiety- and depression-like behaviors in neuropathic pain mice

Results of qRT-PCR showed that FTO mRNA levels were significantly upregulated in the ACC of mice treated with Sham+ AAV-FTO and CCI + AAV-FTO groups compared with Sham+ AAV-EGFP and CCI+ AAV-EGFP groups ($P < 0.05$). The results of Western blot indicated that the protein levels of FTO in mice treated with Sham+ AAV-FTO and CCI + AAV-FTO groups were significantly up-regulated compared with those in the Sham+ AAV-EGFP and CCI+ AAV-EGFP groups ($P < 0.05$). Immunofluorescence results showed that AAV was mainly transfected into ACC neurons, and there was no obvious transfection in astrocytes and microglia. The OFT results showed that there was no significant difference in exercise capacity during the test among the four groups of mice ($P > 0.05$); CCI + AAV-FTO mice had significantly longer percentages of their stay in the central open field area and significantly greater numbers of entries into the central area compared with the CCI + AAV-EGFP group ($P < 0.05$). The results of the EPM experiment showed no significant differences in exercise capacity during the testing period among the four groups of mice. Compared with the CCI + AAV-EGFP group, mice in the CCI + AAV-FTO group exhibited a significantly longer percentage of exploration time in the open arm ($P < 0.05$) and an increased number of entries into the open arm, although the differences were not statistically significant ($P > 0.05$). The above results indicate that reversing the downregulation of FTO in the ACC of CCI mice can improve neuropathic pain induced anxiety like behaviors. FST results showed that mice in the CCI + AAV-FTO group had significantly shorter immobility time compared with the CCI + AAV-

EGFP group (P < 0.05). The above results indicated that depressive like behaviors induced by neuropathic pain can be ameliorated by reversing the downregulation of FTO in the ACC of CCI mice.
Conclusion: Down regulation of FTO in ACC of mice participate in anxiety- and depression - like behaviors induced by neuropathic pain.

PU-0314

Endoplasmic Reticulum Stress: The Underlying Mechanism of Chronic Pain

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Chronic pain (CP) affects over 30% of the global population, imposing significant financial burdens on individuals and society. However, existing treatments for CP offer limited efficacy and troublesome side effects, primarily due to its precise underlying mechanism, which remains unknown. Pathological stimuli disrupt the intricate process of protein folding and disturb endoplasmic reticulum (ER) homeostasis. This disruption leads to the accumulation of misfolded or unfolded proteins in the ER, generating a condition termed the ER stress. Emerging data indicates that ER stress, occurring in the peripheral and central nervous systems, contributes to the development and maintenance of CP. Therefore, this review aims to comprehensively explore how ER stress and CP intersect within the lower and upper nervous systems and highlight the cell-specific contributions of the unfolded protein response in different CP types. This review provides a comprehensive synthesis of evidence from animal models, examining neuronal and non-neuronal mechanisms and discusses the damaging inflammation, autophagy, oxidative stress, and apoptosis linked to ER stress, which collectively drive disease progression and contribute to a neurotoxic environment. However, the mechanisms through which ER stress influences the most advanced center-of-pain projections in the brain remain unclear. Further investigation in this area is crucial to elucidate the relationship between ER stress and CP and to facilitate the development of novel therapeutic drugs for this intractable dilemma.

PU-0315

Sex differences in PD-L1-induced analgesia in paclitaxel-induced peripheral neuropathy (PIPN) mice depend on TRPV1-based inhibition of CGRP

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Aims: Paclitaxel (PTX) is extensively utilized in the management of diverse solid tumors, frequently resulting in paclitaxel-induced peripheral neuropathy (PIPN). The present study was aimed to investigate sex differences in the behavioral manifestations and underlying pathogenesis of PIPN and search clinically efficacious interventions.
Methods: Male and female C57BL/6 mice (5-6 weeks and 12 months, weighing 18-30 g) were intraperitoneally (i.p.) administered paclitaxel diluted in saline (NaCl 0.9%) at a dose of 2 mg/kg every other day for a total of 4 injections. Von Frey and hot plate tests were performed before and after administration to confirm the successful establishment of the PIPN model and also to evaluate the pain of PIPN and the analgesic effect of PD-L1. On day 14 after PTX administration, PD-L1

protein (10 ng/pc) was injected into the PIPN via the intrathecal (i.t.) route. To knock down TRPV1 in the spinal cord, adeno-associated virus 9 (AAV9)-Trpv1-RNAi (5 uL, 1x1013 vg/mL) was slowly injected via the i.t. route. Four weeks after AAV9 delivery, the downregulation of TRPV1 expression was verified by immunofluorescence staining and Western blotting. The levels of PD-L1, TRPV1 and CGRP were measured via Western blotting, RT–PCR, and immunofluorescence staining. The levels of TNF-α and IL-1β were measured via RT–PCR.
Results: TRPV1 and CGRP protein and mRNA levels were higher in the spinal cords of control female mice than in those of control male mice. PTX-induced nociceptive behaviors in female PIPN mice were greater than those in male PIPN mice, as indicated by increased expression of TRPV1 and CGRP. The analgesic effects of PD-L1 on mechanical hyperalgesia and thermal sensitivity were significantly greater in female mice than in male mice, with calculated relative therapeutic levels increasing by approximately 2.717-fold and 2.303-fold, respectively. PD-L1 and CGRP were partly co-localized with TRPV1 in the dorsal horn of the mouse spinal cord. The analgesic effect of PD-L1 in PIPN mice was observed to be mediated through the downregulation of TRPV1 and CGRP expression following AAV9-mediated spinal cord specific decreased TRPV1 expression.
Conclusions: PTX-induced nociceptive behaviors and the analgesic effect of PD-L1 in PIPN mice were sexually dimorphic, highlighting the significance of incorporating sex as a crucial biological factor in forthcoming mechanistic studies of PIPN and providing insights for potential sex-specific therapeutic approaches.

PU-0316

槐角苷对神经病理性疼痛的治疗作用及机制探究

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目的 本研究以槐角苷（Sophoricoside，SOP）为研究对象，构建外周神经病理性疼痛模型，通过采用经典的 Von Frey 疼痛测试，电生理学与分子生物学相结合的方式，目的在于探究槐角苷对神经病理性疼痛潜在的镇痛效果及作用机制。
方法 本研究首先通过鞘内注射槐角苷对坐骨神经损伤（Spared nerve injury，SNI）或紫杉醇诱导的周围神经病理性疼痛（Paclitaxel-induced peripheral neuropathic pain，PINP）啮齿动物模型中进行镇痛效果研究，并通过 Von Frey 试验测量机械疼痛阈值。镇痛机制的探究首先通过对原代培养的 DRG 神经元进行检测，以评估槐角苷对藜芦定（Veratridine, VTD）触发的痛觉感受器活动的影响，并评估其对电压门控钠通道亚型的选择性阻断作用。采集同侧 L4-L6 的 DRG 用于测量蛋白质的表达。采用分子对接分析评估化合物与目标的结合亲和力。
结果 槐角苷的治疗可逆转 SNI 和 PINP 啮齿动物神经病理性疼痛模型的机械疼痛阈值，展现出良好的镇痛效果；槐角苷抑制 DRG 神经元中藜芦定触发的痛觉感受器活动,并且主要是抑制了振荡型（Oscillatory，OS）神经元的活动；槐角苷选择性阻断 DRG 感觉神经元（小直径神经元）和人类胚胎肾细胞系（Human Embryonic Kidney 293 Cells，HEK 293）的 NaV1.6 电流；槐角苷可以下调 DRG 中 NaV1.8+ 伤害性神经元上 NaV1.6 的表达水平；槐角苷起镇痛作用的机制是通过直接结合 NaV1.6，触发其在 DRG 感觉神经元中的内吞。
结论 本研究首次验证了槐角苷在神经病理性疼痛的镇痛效果，多重实验证明了槐角苷通过选择性抑制 DRG 感觉神经元中的 NaV1.6 通道，调节神经元活性及增强通道内吞，发挥其镇痛作用。这为槐角苷作为周围神经病理性疼痛治疗新药物提供了重要理论和实验基础，也为异黄酮类天然小分子产物在未来临床研究与药物开发提供了新的方向。

PU-0317

前扣带回 KIBRA 调节 p-PKMζ/GluR1 信号通路和神经炎症介导开胸术后慢性疼痛的机制研究

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目的 探讨 KIBRA 是否作为总控调节 p-PKMζ/GluR1 信号通路和神经炎症参与开胸术后慢性疼痛的发生发展，为临床上开胸术后慢性疼痛的防治提供新靶点和理论依据。
方法 采用成年雄性 SD 大鼠（6~8 周），参照 Buvanendran 方法行肋骨牵开手术以建立开胸术后慢性疼痛模型，通过 Von Frey 电子测痛仪测量胸壁机械痛阈值。运用 Western Blot 以及免疫荧光技术检测相关蛋白的表达水平和细胞定位。利用脑立体定位技术将腺相关病毒（adeno-associated virus，AAV）注射至 ACC 以敲低或过表达 KIBRA 蛋白的表达水平。采用组织膜片钳技术检测 ACC 第 2/3 板层神经元中 AMPA 受体介导的诱发兴奋性突触后电流（evoked excitatory postsynaptic currents，eEPSCs）变化。
结果 1．开胸术后第 21 天慢性疼痛发生率为 50%，上调 ACC 中 KIBRA、p-PKMζ 及 GluR1 分子表达，并且引起 ACC 中神经炎症因子 TNF-α 和 IL-1β 释放，以及星形胶质细胞和小胶质细胞激活。
2．单纯过表达 ACC 中 KIBRA 可模拟开胸术后慢性疼痛降低胸壁机械痛阈值并激活 p-PKMζ/GluR1 信号通路和引起神经炎症 TNF-α 和 IL-1β 释放，同时激活星形胶质细胞和小胶质细胞。过表达 ACC 中 KIBRA 联合开胸手术后第 21 天慢性疼痛的发生率可以提高至 100%，激活 ACC 中 p-PKMζ/GluR1 信号通路，并促进神经炎症因子 TNF-α 和 IL-1β 释放。使用 PKMζ 抑制剂 ZIP 可以降低开胸术后慢性疼痛模型和 KIBRA 过表达胸壁痛觉过敏模型大鼠 ACC 第 2/3 板层的 eEPSCs 幅值。
3．敲低 ACC 中 KIBRA 可延缓开胸术后慢性疼痛的发生时间，同时开胸术后第 21 天慢性疼痛的发生率降低至 38%，并下调 p-PKMζ、GluR1、TNF-α 和 IL-1β 分子表达。
结论 开胸术后慢性疼痛引起前扣带回皮质 KIBRA 表达上调，通过调节 p-PKMζ/GluR1 信号通路和神经炎症介导开胸术后慢性疼痛的发生发展。该我们的研究为开胸术后慢性疼痛的治疗提供了新的治疗靶点和理论依据。

PU-0318

重复低剂量艾司氯胺酮预防和治疗奥沙利铂引起的周围神经病变小鼠机械痛的作用及机制研究

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目的 1. 探索艾司氯胺酮是否能预防和改善奥沙利铂（Oxaliplatin，OXA）引起的慢性神经病理性疼痛。
2. 探究艾司氯胺酮缓解 OXA 引起的慢性神经病理性疼痛是否与肠道微生物和血浆代谢产物有关。
方法 1. 建立 OXA 引起的慢性神经病理性疼痛小鼠模型。
2. 艾司氯胺酮腹腔注射：分为单次剂量组、预防组和治疗组。
3. 行为学检测：分别测试缩足阈值（paw withdrawal threshold,PWT）、旷场实验（open field test, OFT）和 Y 迷宫（Y-maze）实验。
4. 肠道微生物和血浆代谢产物检测。
5. 分子生物学检测。

6. 粪便菌群移植（FMT）。
结果 1. OXA 慢性神经病理性疼痛小鼠模型的建立，PWT 明显降低；运动功能未受影响，OFT 中，总运动距离无差别；Y-maze 实验空间工作记忆功能有下降趋势。肠道菌群结构分析结果显示，α-多样性没有明显变化，β-多样性出现差异；非靶代谢结果显示，血浆代谢产物出现显著统计学差异。2. PWT 结果显示，无论是预防性还是治疗性重复艾司氯胺酮注射都显著改善了 OXA 小鼠机械性异常痛。而单次注射艾司氯胺酮对 OXA 小鼠的机械性异常痛没有明显的缓解。3. 艾司氯胺酮降低了 DRG 中炎症因子 IL-1β 的表达水平，缓解了其小胶质细胞的过度激活状态。
4. 肠道菌群 16S rRNA 结果提示，艾司氯胺酮改善了小鼠的 β-多样性。非靶代谢结果显示，与 OXA 造模组相比艾司氯胺酮组某些特定代谢物的组成显著被改变。
5. 相关性网络图显示血浆代谢产物、PWT、IBA1、IL-1β 及细菌相对丰度相互之间存在显著的相关性。证实了 OXA 慢性神经病理性疼痛与肠道菌群、血浆代谢产物之间存在密切关联。
6. 经过艾司氯胺酮治疗的 OXA 小鼠的肠道菌群移植到 OXA 小鼠中，显著降低了其 DRG 中 IL-1β 水平，明显缓解疼痛阈值的下降。
结论 本研究表明重复低剂量艾司氯胺酮注射对 OXA 引起的周围神经病变小鼠机械痛起到了显著的预防和治疗作用。治疗性艾司氯胺酮注射改善了肠道菌群及血浆代谢产物的异常改变，降低了外周神经炎症水平和小胶质细胞的过度激活。菌群移植降低了 OXA 小鼠外周神经炎症水平，缓解了疼痛阈值下降。因此，我们推测肠道菌群、血浆代谢产物及外周神经炎症在艾司氯胺酮缓解 OXA 引起的慢性神经病理性疼痛中起着关键的作用。

PU-0319

丘脑旁核-前扣带回皮层调控阿片诱导痛觉过敏的神经环路机制研究

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目的 明确丘脑旁核（Paratenial thalamic nucleus, PT）向前扣带回皮层（Anterior cingulate cortex, ACC）的神经投射，阐明 PT-ACC 投射易化阿片诱导的痛觉过敏（Opioid-induced hyperalgesia, OIH）的神经环路机制。
方法 （1）通过皮下注射枸橼酸芬太尼构建 OIH 大鼠模型，采用 Von Frey 试验及 Hargreaves 试验测定大鼠左足机械痛阈及热痛阈。微量注射喹啉酸至 PT 核团进行化学毁损术，测定大鼠疼痛行为学变化。（2）制备大鼠离体脑片后进行全细胞脑片膜片钳试验，记录 PT 核团谷氨酸能神经元的动作电位、微小兴奋性/抑制性突触后电流及自发性兴奋性/抑制性突触后电流等电生理指标。（3）PT 脑区注射含特定启动子的腺相关病毒（Adeno-associated virus, AAV）进行神经环路顺行示踪，ACC 脑区注射狂犬病毒（Rabies Virus, RV）及辅助性 AAV 进行逆行示踪。（4）在 PT 脑区注射含化学遗传学调控元件的 AAV，于 ACC 脑区进行置管并给予氯氮平-N-氧化物（Clozapine-N-oxide, CNO），进行全细胞脑片膜片钳试验并记录大鼠疼痛行为学变化。（5）在 PT 脑区注射含光遗传学调控元件的 AAV，于 ACC 脑区埋置光纤并给予光刺激，随后进行全细胞脑片膜片钳试验并记录大鼠疼痛行为学变化。
结果 （1）大鼠皮下注射枸橼酸芬太尼后机械痛阈及热痛阈较对照组显著降低，PT 核团中谷氨酸能神经元（PT^{Glu}）的 c-fos 阳性率增高，提示神经元兴奋性增强，化学药物毁损 PT 核团能显著缓解大鼠痛觉过敏。（2）全细胞脑片膜片钳实验结果证实 OIH 发生时，PT^{Glu} 兴奋性与突触传递增强。（3）神经环路示踪实验表明存在 PT^{Glu} 向 ACC 特异投射的神经环路，ACC 核团中谷氨酸能神经元（ACC^{Glu}）及 γ-氨基丁酸能神经元（ACC^{GABA}）均接受来自 PT^{Glu} 的投射。（4）利用化学遗传学激活 PT-ACC 神经环路加重 OIH 组大鼠痛敏并诱发对照组大鼠痛敏，而化学遗传学激活抑制该环路显著缓解 OIH 组大鼠痛敏。（5）光遗传学结合全细胞脑片膜片钳试验表明，激活 PT-ACC

神经环路加重 OIH 组大鼠痛敏而抑制该环路缓解痛敏现象。电生理实验表明 PT^{Glu} 调控 ACC 核团微环路， OIH 组大鼠的 ACC 核团较对照组前馈抑制减弱，进而导致兴奋-抑制失衡（E/I imbalance），ACC^{Glu} 兴奋性增强。

结论 脑旁核中谷氨酸能神经元兴奋性增强，兴奋性经神经环路传递至前扣带回皮层微环路，最终易化阿片诱导的痛觉过敏。

PU-0320

β-羟基丁酸缓解奥沙利铂诱导的神经病理性疼痛的比较蛋白质组学研究

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目的 构建奥沙利铂诱导的神经病理性疼痛（Oxaliplatin-induced neuropathic pain , OINP）小鼠模型及酮体代谢小鼠模型，探讨外源性 β-羟基丁酸（β- hydroxybutyrate, BHB）干预能否预防 OINP，并采用比较蛋白组学方法明确 BHB 对 OINP 小鼠背根神经节（Dorsal root ganglion, DRG）组织蛋白质表达谱的影响，筛选 BHB 缓解 OINP 的可能作用靶蛋白。

方法 本研究首先通过连续 5 天腹腔注射奥沙利铂（Oxaliplatin, OXA）建立 OINP 小鼠模型。分别以 1.2g/kg 和 2.4g/kg 的 BHB 钠和 10%和 20%1,3-丁二醇（1,3-BDO）建立酮体代谢模型，通过比较各组小鼠血酮水平和饮水量，选取最佳模型用于后续实验。接着，将 C57BL/6J 小鼠随机分为三组：Control 组、OXA 组和 BHB+OXA 组。实验期间，BHB+OXA 组小鼠每日腹腔注射 1.2g/kg 的 BHB 钠并饮用 10% 1,3-BDO，OXA 和 Control 组注射生理盐水。第 8-12 天，OXA 和 BHB+OXA 组小鼠腹腔注射 OXA，Control 组注射葡萄糖。测定小鼠机械痛阈和冷痛阈。第 21 天，麻醉后取小鼠 DRG 组织进行电镜扫描和蛋白质组学分析。体外实验利用 CCK-8 测定法评估 OXA 对 PC12 细胞的毒性，并探究 BHB 的缓解作用。

结果 OXA 显著降低小鼠的机械痛阈和冷痛阈。腹腔注射 BHB 钠（1.2g/kg、2.4g/kg）及饮水中添加 10%和 20% 1,3-BDO 均可提高小鼠血酮水平，其中 20% 1,3-BDO 显著降低小鼠饮水量。因此，后续实验采用腹腔注射 BHB 1.2g/kg 结合 10% 1,3-BDO 喂养模拟酮体代谢。后续实验中，与 Control 组相比，OXA 组小鼠的机械痛阈与冷痛阈显著降低，而 BHB+OXA 组小鼠的下降幅度较小。OXA 组小鼠 DRG 神经元内线粒体受损，而 BHB+OXA 组小鼠线粒体结构相对清晰完整。蛋白组学分析共鉴定出 6821 种蛋白。其中，OXA 组与 Control 组相比有 117 种差异表达蛋白（33 种上调，84 种下调）；OXA 组与 BHB+OXA 组相比有 50 种差异表达蛋白（20 种上调，30 种下调）。两组比较中共有 18 种差异蛋白，其中 9 种上调，9 种下调，且 BHB 逆转了 OXA 组中 17 种蛋白的表达改变。这些差异蛋白包括 HMGB1、HP、ALOX15 等与神经病理性疼痛相关蛋白质。在体外实验中，OXA 对 PC12 细胞具有剂量依赖性的细胞毒性，而 BHB 能一定程度预防这一毒性作用。

结论 BHB 具有预防 OINP 的作用。我们通过 DIA 蛋白质组学鉴定了 OXA 或 BHB 诱导的小鼠 DRG 蛋白质表达谱表改变，并筛选出 HMGB1、HP、ALOX15、GFAP 以及 MOG 等可能与 BHB 预防 OINP 作用相关的蛋白，为进一步探索 BHB 对 OINP 的预防机制提供了思路。

PU-0321

铜单原子纳米酶通过清除活性氧抑制基质金属蛋白酶活性缓解颞下颌关节疼痛

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目的 **颞下颌关节紊乱综合征（Temporomandibular disorders, TMD）**是一种常见的口腔颌面部病，其主要的临床表现是颞下颌关节区域慢性炎性疼痛，伴随关节弹响和运动异常，严重影响患者的生活质量。目前尚无有效的治疗手段，可能与慢性疼痛发生的分子机制不清有关。以往研究表明，**过量的活性氧（Reactive oxygen species，ROS）和基质金属蛋白酶（Matrix metalloproteinase，MMPs）以及神经炎症主要参与了疼痛的发生**。尤其是 **MMP2 和 MMP9**，作为锌依赖性内切蛋白酶家族的重要成员，在炎症调节等生理过程中发挥着不可或缺的作用。
本研究**旨在探究 TMD 模型小鼠是否因炎症刺激而产生 ROS 并进一步促进 MMP2 和 MMP9 增高，最终通过级联反应引发痛觉敏化；自主研发一种纳米酶 ROS 清除剂并验证其在 TMD 疼痛治疗中的作用和相关分子机制。**
方法 我们在 C57 小鼠单侧颞下颌关节（TMJ）内注射 CFA（10μl,5mg/ml）成功**构建了 TMD 疼痛小鼠模型**；我们研发并制备了一种**新型脑靶向纳米药物**，即以金属有机骨架为载体，利用乙酰丙酮铜作为 Cu 和 N 源，构建金属有机骨架负载 Cu 的单原子纳米酶 Cu-N4（铜单原子纳米酶，Rvg-Cu SAzyme）。
运用**颌面部机械超敏反应试验和面部表情评分**评估动物行为，验证 Rvg-Cu SAzyme 是否可以精准靶向递送 ROS 清除剂并治疗 TMD 疼痛；通过各种**分子学技术**探究三叉神经节（trigeminal ganglia,TG）和三叉神经脊束核（spinal trigeminal nucleus caudalis,Sp5C）中 ROS、MMP2 和 MMP9 在 TMD 疼痛中的作用以及 Rvg-Cu SAzyme 治疗 TMD 疼痛的分子机制。
结果 研究结果：
1. TMD 小鼠的 TG 和 Sp5C 中 ROS、MMP2 和 MMP9 水平显著增高；
2. 肝肾功能检测证明 Rvg-Cu SAzyme 静脉给药无毒副作用；
3. **Rvg-Cu SAzyme 具有优良的过氧化氢酶（CAT）和超氧化物歧化酶（SOD）样活性**：CFA-TMJ 注射造模 1 小时后**通过尾静脉注射 Rvg-Cu SAzyme（5mg/kg)可显著缓解 TMD 疼痛，有效期长达 3 天**；
4.分子实验证明 Rvg-Cu SAzyme **通过清除三叉神经系统中的 ROS 抑制 MMP2 和 MMP9 的表达，最终减轻 TMD 疼痛。**
结论 新型脑靶向脂质体包装的铜单原子纳米酶 Rvg-Cu SAzyme 具有优良的 CAT 和 SOD 样活性，尾静脉注射可**清除 TMD 小鼠三叉神经系统中的 ROS 并抑制 MMP2 和 MMP9 的表达，最终减轻 TMD 疼痛**，有效期长达 3 天。Rvg-Cu SAzyme 的研发为 TMD 患者疼痛的治疗提供了新的思路和策略，为患者带来更为安全、有效的治疗方案。

PU-0322

Research trends and hot spots in obesity-induced pain: a bibliometric analysis of the recent 20 years

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Background: Obesity can directly lead to allodynia, increase the incidence of chronic pain, or aggravate the existing pain. However, the mechanism underlying obesity-related pain or obesity-

induced pain is still not understood. Herein, we performed a comprehensive bibliometric analysis for obesity-related pain or obesity-induced pain, aiming to analyze the current trends and hot spots as well as explore the underlying mechanisms.
Methods: We searched reviews and articles on obesity-related pain or obesity-induced pain from 2004 to 2023 using the Web of Science Core Collection (WoSCC) database. Subsequently, we conducted bibliometric analyses employing VOSviewer, Pajek, CiteSpace, WPS Office, and an online platform dedicated to bibliometric analysis.
Results: In total, 263 papers were collected. The USA made a significant contribution and the University of Sydney performed the largest number of studies. As for authors, Dr. Karppinen J. and Dr. Lipton RB are the most 2 influential authors based on their significant amount of citations and publications, respectively. The keywords for the latest burst are “inflammation,” “chronic pain,” “neuropathic pain,” “risk factor,” and “vitamin D.” And the article titled “The association between chronic obesity and pain” by Okifuji A, received the highest number of citations.
Conclusion: Obesity-related pain or obesity-induced pain has gained significant attention in the last two decades. This study identifies research hot spots and trends, providing valuable information for researchers. The investigation of neuroendocrine and neuroimmune mechanisms underlying obesity-related pain or obesity-induced pain is expected to be a prominent area of research in the coming years.

PU-0323

Inhibiting TRPV4 ameliorated the hyperalgesia in sciatic nerve injury-induced neuropathic pain via restraining the SGCs activation

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Neuropathic pain (NP), characterized by persistent pain, affected amount of population worldwide. Activated satellite glial cells (SGCs) and following neuroinflammation in dorsal root ganglia (DRG) were recognized main pathological changes of NP. Recently, increased TRPV4 has been reported as a contributor to the development of NP, while the specific mechanisms remain poorly elucidated. Hence, we aimed to explore whether inhibiting TRPV4 improved hyperalgesia in NP rats and explored the underlying mechanisms. Using neuropathic pain model established by sciatic nerve injury (SNI), we found significant decreased paw withdrawal mechanical threshold (PWMT) and paw withdrawal thermal latency (PWTL) accompanied by upregulated algogenic substances as well as proinflammatory cytokines in the SNI rats when compared with the Sham group. In addition, GFAP+ SGCs, and TRPV4 also increased remarkably in the SNI group. Using TRPV4 agonist and antagonist, the rats were then divided into Sham, SNI, SNI+GSK, and SNI+HC groups. Compared with the SNI group, inhibiting TRPV4 in the SNI+HC group decreased the GFAP+ SGCs and reversed the upregulation of algogenic substances as well as proinflammatory cytokines partly. Moreover, the PWMT, and PWTL also increased in the SNI+HC group. Mechanistically, inhibiting TRPV4 might decreased activated SGCs and neuroinflammation in DRG, which ameliorated the hyperalgesia, thereby identifying TRPV4 as a novel therapeutic strategy to treat neuropathic pain.

PU-0324

地佐辛减轻舒芬太尼诱发的痛觉敏化的机制研究

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目的 小鼠急性术后疼痛模型上应用舒芬太尼诱发 OIH，通过机械痛阈值的测定，探究地佐辛能否减轻舒芬太尼导致的痛觉敏化；应用分子生物学方法检测相应节段脊髓的强啡肽、兴奋性神经递质、KOR、p-KOR 等物质的水平，探究地佐辛在抑制舒芬太尼诱发的痛觉敏化中的作用机制。从新的角度解读地佐辛对痛觉敏化的作用，为临床上地佐辛与舒芬太尼的配伍提供支持证据。
方法 1.将 50 只成年雄性 C57 BL/6 小鼠随机分成 control 组，PI+NS 组，PI+S 组，PI+D 组和 PI+D+S 组，每组 10 只。给药方式如下：control 组：皮下注射 NS 5 次；PI+NS 组：皮下注射 NS 5 次；PI+S 组：皮下注射 NS 1 次，再注射舒芬太尼(10 μg/kg/次)4 次；PI+D 组：皮下注射地佐辛(5 mg/kg)1 次，再注射 NS 4 次；PI+D+S 组：皮下注射地佐辛(5 mg/kg)1 次，再注射舒芬太尼(10 μg/kg/次)4 次。每次皮下给药间隔 15 min。PI+NS 组，PI+S 组，PI+D 组和 PI+D+S 组最后一次皮下给药前建立小鼠足底切口痛模型(PI)。2.分别在术前(-3 d~ -1 d)和术后 1 h、2 h、4 h、6 h、1 d、2 d 和 3 d 进行机械缩爪阈值(MPWT)测试，采用 Western Blotting 和 Immunofluorescence 检测术后 3 d 小鼠脊髓腰膨大组织内前强啡肽，强啡肽 A，CGRP，VGLUT2，p-KOR 和 KOR 的表达水平。
结果 1.行为学结果：与 control 组相比，PI+NS 组小鼠术后 1 h MPWT 开始明显下降($p<0.05$)，持续至术后第 3 d($p<0.05$)；与 PI+NS 组相比，PI+S 组小鼠术后第 6 h 至术后 3 d MPWT 显著下降($p<0.05$)；与 PI+D 组相比，PI+D+S 组小鼠 MPWT 在术后 1 h 至术后 4 h 升高($p<0.05$)，术后 6 h 至术后 3 d 无显著差异($p>0.05$)；而与 PI+S 组相比，PI+D+S 组小鼠术后第 4 h 至术后 3 d MPWT 显著升高($p<0.05$)。2.分子水平检测结果：Western Blotting 和 Immunofluorescence 检测小鼠术后第 3 d 脊髓腰膨大组织。与 control 组相比，PI+NS 组小鼠 PDYN、Dyn A、VGLUT2 和 p-KOR 蛋白表达增多($p<0.05$)；与 PI+NS 组相比，PI+S 组小鼠 PDYN、Dyn A、CGRP、VGLUT2 和 p-KOR 表达显著上调($p<0.05$)；与 PI+S 组相比，PI+D+S 组小鼠 PDYN、Dyn A、CGRP、VGLUT2 和 p-KOR 表达显著下调($p<0.05$)。各组小鼠 KOR 表达水平无显著差异($p>0.05$)。
结论 本研究观察围术期舒芬太尼暴露诱发痛觉敏化的过程并检测了小鼠脊髓内 PDYN、Dyn A、CGRP、VGLUT2、p-KOR 和 KOR 的表达水平，证实 OIH 发生伴有脊髓强啡肽/兴奋性神经递质上调，从而导致机体对外周伤害性刺激更敏感，表现为痛觉敏化。地佐辛可抑制舒芬太尼诱发的强啡肽/兴奋性神经递质表达，减轻舒芬太尼诱发的痛觉敏化，此效应可能是通过脊髓 KOR 起作用。

PU-0325

Network Pharmacology Approach to Unveiling the Mechanism of Berberine in the Amelioration of Morphine Tolerance

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Objective: To investigate the mechanism underlying the effect of the Huanglian Decoction (HLD) on morphine tolerance (MT), using network pharmacology, and to verify these mechanisms in vitro and in vivo.
Methods: Available biological data on each drug in the HLD were retrieved from the Traditional Chinese Medicine Systems Pharmacology Database and Analysis Platform. The target proteins of MT were retrieved from the GeneCards, PharmGkb, TTD, DrugBank, and OMIM databases.

Information regarding MT and the drug targets was compared to obtain overlapping elements. This information was imported into the STRING platform to obtain a protein-protein interaction network diagram. Then, a “component-target” network diagram was constructed using screened drug components and target information, via Cytoscape software. The database for annotation, visualization, and integrated discovery was used for Gene Ontology enrichment and Kyoto Encyclopedia of Genes and Genomes pathways analyses. Pathway information predicted by network pharmacology was verified using animal studies and cell experiments. Morphine-induced chronic tolerance model: mice received intraperitoneal berberine 2.5, 5.0, and 10 mg/kg; 30 min later, 10 mg/kg morphine was injected subcutaneously for eight consecutive days. On the ninth day, morphine 10 mg/kg was given alone. The baseline latency (T0) and post-treatment latency (T1) were determined by the hot plate test, and the maximum possible analgesic effect (MPAE) was calculated. Morphine-induced BV2 microglial cell activation model：BV2 cells were randomly divided into five groups: control group, morphine group, berberine low-dose, medium-dose, and high-dose groups (5, 10, 20 μmol/L, respectively). Except for the control group, cells were treated with morphine (200 μmol/L). After 24 h, cell viability was detected by cell counting kit-8. Western blotting was utilized to analyze the expressions of CD86, NF-κB, Bcl-2, Bax, and Caspase-3. ELISA was employed to evaluate the expression levels of IL-1β,TNF-α, and IL-10. Oxidative stress and apoptosis were assessed by using a ROS probe and Hoechst 33258 staining. Results Network pharmacology analysis identified 22 active compounds of HLD and revealed that HLD partially ameliorated MT by modulating inflammatory, apoptosis, and NF-κB signaling pathways. Berberine (BBR), one of the main components of HLD, inhibited the development of MT in mice. BBR reduced cell viability while increasing Bcl-2 protein expression and decreasing CD86, NF-κB, Bax, and Caspase-3 protein expression in BV-2 cells treated with morphine. Additionally, BBR contributed to a reduction in pro-inflammatory cytokine release and apoptotic cell number. Conclusions: BBR, a key component of HLD, effectively suppressed microglial activation and neuroinflammation by regulating the NF-κB and apoptosis signaling pathways, thereby delaying MT. This study offers a novel approach to enhance the clinical analgesic efficacy of morphine.

PU-0326

吗啡联合氯胺酮用于中重度急性疼痛患者镇痛的相互作用：基于等辐射分析法的临床研究

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目的 本研究通过观察不同剂量氯胺酮和（或）吗啡的镇痛效果，了解联合用药的镇痛效果，探索氯胺酮和吗啡镇痛的半数有效剂量 ED50，并探究二者的药效关系。
方法 本研究分两部分：第一部分：纳入年龄 18-65 岁四肢骨折患者 96 例，每组 12 例，分为氯胺酮 0.04 mg/kg(KTM 1) 、氯胺酮 0.08 mg/kg(KTM 2)、氯胺酮 0.15 mg/kg(KTM 3)、氯胺酮 0.30 mg/kg(KTM 4)、吗啡 0.05 mg/kg（Morp 1）、吗啡 0.08 mg/kg（Morp 2）、吗啡 0.13 mg/kg（Morp 3）和吗啡 0.20 mg/kg（Morp 4）。各组在静脉续滴给药前（T 0）、给药后 1 min（T 1）、5 min（T 2）、10 min（T 3）、20 min(T 4)、和 30 min（T 5）应用 NRS 进行疼痛评分，观察并记录相关不良反应。整合各时间点疼痛评分通过建立时效关系图，将曲线下面积 AUC 作为衡量药物镇痛效应的量化指标，此时曲线上面积 AAC 占总面积的比即为药物缓解的镇痛效应，再建立各自量效曲线计算 KTM 和 Morp 的 ED50。第二部分：纳入年龄 18-65 岁四肢骨折患者 48 例分 4 组，每组 12 例患者。按药物联合后理论抑制疼痛的 10%、20%、40%及 80%的剂量进行分组：KTM&Morp：ED50add*1/10（K&M 1）、ED50add*2/10（K&M 2）、ED50add*4/10（K&M 3）、ED50add*8/10（K&M 4）。建立 KTM&Morp 的量效曲线，并计算实际联合用药 ED50，即 ED50comb。应用等辐射分析比较 ED50add（理论）和 ED50comb 的大小，探究 KTM 和 Morp 两

者的药效关系。

结果 1、对四肢骨折患者患肢活动痛的控制，单独用药组：各组 %AAC 有效（100%）值的中位数分别对应为 38.2%、46.1%、86.2%、100%、19.9%、37.1%、74.9%及 94.8%。联合用药组：K&M 1、K&M 2、K&M 3 及 K&M 4 %AAC 有效（100%）值的中位数分别对应为 24.8%、39.3%、70.2%及 93.0%。

2、单独应用氯胺酮对骨折患者的 ED50 为 0.098 mg/kg（95% CI 0.081~0.120 mg/kg），计算 ED95（95% effective dose, ED95）为 0.190 mg/kg，单独应用吗啡对骨折患者的 ED50 为 0.110 mg/kg（95% CI 0.095~0.127 mg/kg），吗啡的 ED95 为 0.215 mg/kg。

3、利用等辐射分析得到氯胺酮和吗啡为协同效应，小剂量氯胺酮联合吗啡可以减少吗啡使用量的 40%，减少药物相关不良反应，增强镇痛效应。

结论 1 氯胺酮对中重度疼痛控制的 ED50 为 0.098 mg/kg，ED95 为 0.190 mg/kg；吗啡对中重度疼痛控制的 ED50 为 0.110 mg/kg，ED95 为 0.215 mg/kg，同时氯胺酮和吗啡镇痛具有协同效应。

PU-0327

早期脊髓电刺激对脊髓损伤大鼠神经病理性疼痛影响及其机制的研究

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目的 观察早期及晚期脊髓电刺激（spinal cord stimulation, SCS）对脊髓损伤（spinal cord injury, SCI）大鼠神经病理性疼痛治疗效果，和对小胶质细胞、瞬时感受器电位香草酸受体 1（transient receptor potential vanilloid 1, TRPV1）和 C-C 趋化因子配体 2（C-C chemokine ligand 2, CCL2）的影响，并通过转录组测序等方法，探究脊髓电刺激干预脊髓损伤后神经病理性疼痛的内在机制，为早期脊髓电刺激应用预防和治疗脊髓损伤导致的神经病理性疼痛提供实验依据。

方法 实验一：将 44 只大鼠随机分为 4 组：假手术组（Sham 组）、脊髓损伤组（SCI 组）、脊髓损伤+早期电刺激组（SCI+SCS 组）、脊髓损伤+晚期电刺激组（SCI+L-SCS 组）。Sham 组：去除 T10 椎板暴露脊髓并在硬膜外植入电极；SCI 组：制备脊髓损伤模型；SCI+SCS 组：制备脊髓损伤模型后，将电极线置入脊髓背侧硬膜外腔，于术后第 1 天开始，每日给予电刺激治疗，每次 2h，连续电刺激 14 天。SCI+L-SCS 组：手术同 SCI+SCS 组，于术后第 8 天开始给予电刺激治疗。所有大鼠分别于不同时间点检测右侧足底机械刺激缩足阈（paw mechanical withdrawal threshold, PMWT）、热缩足潜伏期（Thermal withdrawal latency. TWL）和 BBB 运动评分，行为学后取大鼠脊髓组织观察小胶质细胞激活情况和 TRPV1、CCL2 蛋白表达情况。

实验二：将 9 只大鼠随机分成 3 组：假手术组（Sham 组）、脊髓损伤组（SCI 组）、脊髓损伤+早期电刺激组（SCI+SCS 组）。造模第 14 天行为学后取大鼠脊髓组织用于转录组测序并对目的基因进行 PCR 验证。

实验三：将 60 只大鼠随机分成 4 组： Sham 组、SCI 组、SCI+SCS 组和 SCI+L-SCS 组。采用 qPCR 法检测 Ngfr、Ntrk1、Trpv1 和 Ccl2 mRNA，使用免疫荧光法检测 NGF、TrkA 和 TRPV1 蛋白表达，ELISA 法检测炎症因子 IL-6、IL-1β 和 TNF-α。

结果 1. 早期应用脊髓电刺激较晚期应用具有更好的镇痛效果。2. 早期应用脊髓电刺激或可改善大鼠运动功能。3. 脊髓电刺激可以抑制小胶质细胞激活,早期 SCS 抑制效果更好。4. 脊髓电刺激可以抑制 TRPV1 和 CCL2 表达,早期应用抑制效果更好。5. RNA 转录组测序及 PCR 验证结果示脊髓电刺激可抑制 NGF-TrkA-TRPV1 通路。6. qPCR 结果示脊髓电刺激能够抑制脊髓损伤大鼠脊髓 Ngfr、Ntrk1、Trpv1 和 Ccl2 mRNA 水平，早期应用抑制效果更明显。7. 免疫荧光结果示脊髓电刺激能够抑制脊髓损伤大鼠脊髓 NGF、TrkA、TRPV1 蛋白的表达，早期应用抑制效果更明显。8. ELISA 结果显示脊髓电刺激能够抑制脊髓损伤大鼠脊髓组织炎症因子 IL-6、IL-1β 和 TNF-α 的表达，早期应

用抑制效果更明显。
结论 早期应用脊髓电刺激较晚期应用更能缓解脊髓损伤后的中枢性神经病理性疼痛，可能与抑制 NGF/TrkA/TRPV1 信号通路和神经炎症有关。此外，早期脊髓电刺激或可改善脊髓损伤大鼠运动功能。

PU-0328

肠-基底前脑 GDNF 信号参与调控睡眠剥夺致术后疼痛慢性化

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目的 7-10%的手术患者会出现术后慢性疼痛（CPSP）。课题组前期发现围术期睡眠剥夺可增加小鼠术后慢性疼痛风险,但中枢调控机制仍不清楚。胶质源性神经营养因子（GDNF）参与睡眠和疼痛调节，并可由外周逆行转运至脑。本研究探索围术期睡眠剥夺抑制肠-基底前脑轴 GDNF 信号，促进术后疼痛慢性化的相关机制。
方法 1）利用小鼠 SMIR（皮肤肌肉切开牵拉）模型，观察围手术期睡眠剥夺（术前 1 天、术后 3 天，每日 6 小时）增加 CPSP 发病（术后 14 天机械痛阈（PWT）低于术前基础值 50%或以上）风险的同时，对基底前脑神经元活性（c-Fos 免疫染色）、凋亡（cleaved Caspase-3 表达）、自噬（LC3 和 p62 表达）和 GDNF 含量的影响；2）双侧基底前脑注射腺相关病毒（AAV）-GDNF，观察能否对抗睡眠剥夺对 SMIR 小鼠疼痛的加重效应；3）双侧基底前脑注射胆碱能免疫毒素（mu p75-SAP）消融胆碱能神经元，观察睡眠剥夺和 SMIR 后小鼠疼痛变化；4）示踪技术观察 GDNF 由肠到基底前脑转运；5）观察睡眠剥夺后手术小鼠肠道和基底前脑 GDNF mRNA 和蛋白含量变化和时序差异；6）肠道注射 AAV-GDNF，观察能否增加基底前脑 GDNF 含量，抑制胆碱能神经元凋亡，并对抗睡眠剥夺促疼痛慢性化。
结果 1）围术期睡眠剥夺延长了小鼠 SMIR 术后机械痛和热痛持续时间和强度，增加 CPSP 风险；同时，基底前脑 GDNF 浓度下降，乙酰胆碱能神经元凋亡增多、自噬障碍。2）双侧基底前脑注射 AAV-GDNF，能够增加胆碱能神经元 GDNF 表达，睡眠剥夺合并手术后的神经元凋亡，并对抗对抗睡眠剥夺促疼痛慢性化。3）基底前脑乙酰胆碱能神经元毁损后，小鼠疼痛敏感性增加，睡眠剥夺和 SMIR 不能进一步加重该效应。4）GDNF 可经迷走神经，由肠道逆向运输至基底前脑。5）SMIR 合并睡眠剥夺后，肠 GDNF mRNA 和蛋白表达下降早于基底前脑。6）肠道注射 AAV-GDNF 增加肠道 GDNF 表达后，基底前脑 GDNF 表达也增加，同时胆碱能神经元凋亡减少，睡眠剥夺致 CPSP 效应减轻。
结论 肠-基底前 GDNF 信号传导可能参与调控睡眠剥夺促术后疼痛慢性化。

PU-0329

基于网络药理学的延胡索治疗急性术后疼痛的分子机制研究

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目的 延胡索具有显著镇静镇痛作用，是一种在我国被广泛用于镇痛作用的传统中药。本研究的目的是探讨延胡索治疗术后急性疼痛的潜在活性成分和分子机制。
方法 从 TCMSP 中筛选延胡索的活性成分，利用数据库收集成分靶基因急性术后疼痛的相关信息，并使用 Cytoscape 进行可视化分析。最后，应用富集分析等方法研究这些靶蛋白及基因的功能和作用途径。

结果 从延胡索中共识别出 49 种活性成分，靶向 206 个基因。急性术后疼痛涉及 1587 个靶点和 136 个共同靶点，它们有 136 个共同靶点重叠。延胡索主要参与细胞对激素、脂多糖、伤口和其他不良刺激的反应。疼痛通路主要涉及 HIF-1、NF-κB 和钙信号通路。相关靶点在调节疼痛中的作用主要集中在激酶结合、蛋白激酶活性和信号受体调节活性上。槲皮素、二氢白屈菜红素、脱氢紫堇碱等是主要成分，ADRB2、HSP90AA1 和 OPRM1 是延胡索治疗术后急性疼痛的主要靶点。
结论 本研究探讨延胡索对术后急性疼痛的潜在镇痛机制，为其临床应用提供基础科学依据及研究方向。

PU-0330

星形胶质细胞-神经元间乳酸穿梭参与吗啡诱导痛觉过敏的机制研究

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目的 本文旨在观察吗啡诱导的痛觉过敏 (morphine-induced hyperalgesia, OIH) 中，小鼠脊髓背角星形胶质细胞与神经元之间的乳酸代谢偶联的变化，并探讨其对小鼠 OIH 行为学的影响和具体机制。
方法 (1) 体内实验验证慢性吗啡处理后 PDK4、t/p-PDH 表达的变化：建立小鼠慢性吗啡诱导痛觉过敏的模型，用 qRT-PCR、免疫印迹、免疫荧光等方法检测 OIH 小鼠与对照组小鼠脊髓背角 PDK1/2/3/4、 t/p-PDH 的表达变化及细胞分布情况；
(2) 体内实验验证 PDK 抑制剂 DCA 对 OIH 小鼠行为学的影响以及脊髓背角 PDK4、p-PDH 表达的影响；
(3) 体内外实验研究 DCA 对 OIH 小鼠及神经元-星形胶质细胞共培养体系慢性吗啡处理后乳酸分泌的影响；
(4) 行为学检测鞘内乳酸对小鼠基础痛阈随剂量和时间改变的影响；以及超负荷乳酸对吗啡抗伤害作用的影响；
(5) 检测鞘内给予 MCT 抑制剂 UK5099 对小鼠 OIH 行为学的影响；
(6) 检测鞘内给予 LDH5 抑制剂 FX11 对小鼠 OIH 行为学的影响；
(7) 体内外实验研究 DCA 对 OIH 小鼠及神经元-星形胶质细胞共培养体系慢性吗啡处理后神经元 nNOS、PKCγ 以及 CamkIIα 表达的影响；
(8) 检测 FX11、UK5099 对 OIH 小鼠脊髓腰膨大 nNOS、PKCγ 以及 CamkIIα 表达的影响；
结果 (1) 慢性吗啡处理后，小鼠脊髓背角中 PDK4、p-PDH 的表达明显上调，而 PDH 的表达不变；上调的 PDK4、p-PDH 主要与星形胶质细胞共表达；PDH 主要与神经元共表达；
(2) DCA 可缓解小鼠 OIH 的发生，并降低脊髓 PDK4、p-PDH 的表达；
(3) 慢性吗啡处理后小鼠脊髓背角以及神经元-星形胶质细胞共培养体系中乳酸的分泌都明显增加，而 DCA 可抑制这种增加；
(4) 鞘内给予 MCT 和 LDH5 抑制剂 UK5099 以及 FX11 可缓解小鼠 OIH 的行为学表现；
(5) DCA 可降低小鼠及神经元-星形胶质细胞共培养体系慢性吗啡上调的神经元 nNOS、PKCγ、CamkIIα 的表达；
(6) UK5099 以及 FX11 可降低小鼠慢性吗啡上调的神经元 nNOS、PKCγ、CamkIIα 的表达。
结论 PDK4-pPDH-乳酸轴作为影响星形胶质细胞与神经元之间乳酸代谢偶联的关键因素，在小鼠 OIH 中发挥重要作用。抑制 PDK4 的活性或者防止超负荷的乳酸向神经元的转运可降低脊髓中枢敏化的程度，并缓解 OIH 的发生。PDK4 和 ANLS 抑制剂有望成为临床阿片类药物长期应用的辅助用药，提高阿片类药物使用效率和疗效，降低并发症。

PU-0331

海马 PRG-1 通过突触重塑机制调制新生大鼠反复伤害性刺激诱发持续痛觉过敏

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目的 探索海马可塑性相关基因 1（Plasticity-related gene 1，PRG-1）通过影响海马突触传递，介导新生期反复伤害性刺激（Repetitive noxious stimulation，RNS）致大鼠痛觉过敏并诱发焦虑抑郁样行为，为新生儿镇痛及后遗症改善提供新的靶标。
方法 用 28G 采血针对新生期 P0-P7 大鼠四足轮流进行针刺建立 RNS 大鼠模型，以模拟在 NICU 里遭受的反复伤害性刺激的早产儿，随后持续监测体重、热痛阈和机械痛阈等指标以评估大鼠的生长状况和痛觉，在出生后 3、6、9、12 周各时期对大鼠进行高架十字迷宫、旷场实验及糖水偏好实验，以检测大鼠的焦虑抑郁样行为。在各时期取大鼠海马组织，用 WB 实验检测大鼠海马组织中 PRG-1、NSF、谷氨酸受体（GluN2A、GluN2B、GluR2）、PSD95 及 NeuN 的表达情况。在大鼠双侧海马注射病毒干预 PRG-1 的表达，或多次注射干预药物，随后检测大鼠痛阈、焦虑抑郁样行为、PRG-1、NSF、GluN2A、GluN2B、GluR2、PSD95、NeuN 等分子指标的表达情况。利用膜片钳技术检测各组大鼠海马 CA1 区锥体神经元的膜电位、动作电位和自发性兴奋性突触后电流的变化情况。
结果 RNS 建模导致大鼠产生持续热痛觉和机械痛觉过敏，并产生焦虑和抑郁样行为。RNS 大鼠海马组织中 PRG-1 表达在 3 周时明显增高，9 周时明显降低，呈现先上升后下降的特殊模式。PRG-1 过表达和功能激活均使 RNS 大鼠热痛阈和机械痛阈上升，改善了大鼠的痛觉过敏现象和焦虑抑郁样行为。其机制为：RNS 引起 ATP 释放增加，抑制海马神经元突触后膜上 PRG-1/NSF 相互作用，在 RNS 大鼠早期，导致突触减少，活性下降，部分突触转变为不成熟突触或沉默突触（表现为 3w 时 RNS 大鼠海马树突棘密度下降、平均面积减小，放电频率下降，PSD95、NeuN 的表达水平下降， GluN2B 上升， GluN2A 减少），引发痛觉过敏的形成；PRG-1 表达虽短期内代偿性上升，但仍难以逆转整体趋势；随后，这些沉默突触可能在一定条件下转变为功能突触（表现为 9w 时 RNS 大鼠海马树突棘平均面积、PSD95 和 NeuN 的表达回升，GluR2、GluN2B 下降，GluN2A 上升），形成病理性疼痛记忆，导致持续痛觉过敏的维持。
结论 海马 PRG-1 通过谷氨酸通路介导突触重塑缓解新生期伤害致持续痛觉过敏。

PU-0332

CB2 受体激动剂抑制 NLRP3 炎性小体缓解小鼠炎性痛的机制研究

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目的 研究 CB2 受体的激活能否直接抑制 NLRP3 炎性小体的活化以缓解小鼠炎性痛及其作用的相关机制。
方法 （1）在健康雄性 C57BL/6 小鼠足底皮下注射 CFA 建立炎症性疼痛模型，采用 Von Frey 丝和热板分别检测各组小鼠机械痛阈和热痛阈，通过鞘内注射 CB2 受体激动剂 THM 观察其对 CFA 小鼠痛敏行为的影响；（2）采用 Western blot 检测小鼠腰段脊髓中 CB2、NLRP3、Caspase-1、ASC 和 IL-1β 的蛋白表达情况；（3）采用酶联免疫吸附试验检测小鼠腰段脊髓中 IL-1β 和 IL-18 的表达变化；（4）采用组织免疫荧光双重染色检测小鼠腰膨大处脊髓背角 NLRP3 表达的细胞类型以

及 CB2 与 NLRP3 共定位情况。
结果 （1）足底注射 CFA 后 24h，小鼠出现炎性痛表现，机械痛觉超敏阈值和热痛阈值显著降低；（2）CB2 受体激活可缓解小鼠炎性痛表现，CFA+THM 组小鼠机械痛阈和热痛阈值于 day9 恢复正常；（3）在 CFA 造模成功后，小鼠脊髓腰膨大中 NLRP3、Caspase-1、ASC、IL-1β 的蛋白表达明显增加，提示 NLRP3 炎性小体的活化密切参与了炎性痛的发生与发展；（4）CB2 受体被激活后，可抑制小鼠脊髓腰膨大中 NLRP3、Caspase-1、ASC、IL-1β 的蛋白表达；（5）CFA 诱导的炎症性疼痛小鼠促炎细胞因子 IL-1β 和 IL-18 的表达明显升高，而 CB2 受体被激活后炎性痛模型小鼠体内 IL-1β 和 IL-18 的表达被显著下调；（6）免疫荧光结果显示在脊髓背角中 NLRP3 与神经元存在共定位表达，同时 CB2 与 NLRP3 也被观察到在小鼠脊髓背角中存在明显共定位，表明激活 CB2 受体缓解小鼠的炎性痛可能是通过神经元中 NLRP3 炎性小体这一关键途径介导。
结论 CFA 诱导的炎性痛与 NLRP3 炎性小体的活化及其释放的促炎细胞因子密切相关；CB2 受体的激活可有效抑制 NLRP3 炎性小体的活化进而下调促炎因子的表达，有效缓解 CFA 所诱导的小鼠炎性痛。

PU-0333

丙泊酚通过 GABAA 受体抑制 RVMON 神经元的过度活动减轻慢性疼痛的神经环路机制

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目的 疼痛通常是由有害的刺激引起的，也可以由周围或中枢神经系统的病变产生，是一种不愉快的感觉情绪体验，根据时间进程可分为急性疼痛和慢性疼痛。它对患者来说是一个沉重的负担，与焦虑、抑郁、生活质量下降、社会功能受损以及社会直接和间接医疗保健成本增加有关。因此，探索新的镇痛药物及策略成为目前的研究热点。丙泊酚(propofol)是临床常用的全麻药，其在发挥镇静作用的同时具有一定的镇痛作用。然而，丙泊酚镇痛作用的机制目前尚未明确；如果明确丙泊酚镇痛作用的中枢机制，在围术期中可以优化丙泊酚的使用方法，减少阿片类药物的应用，从而降低围术期慢性疼痛的发生率以及不良反应为患者带来更为舒适化的优质医疗。已有研究表明丙泊酚可减少术中阿片类药物的使用，缓解术后慢性疼痛。延髓头端腹内侧区（Rostral ventromedial medulla, RVM）是大脑下行调控系统的信息整合及执行区，调控外周输入脊髓后角的痛觉信息，认为是下行调控痛觉系统的“闸门”。RVM 区存在“ON”细胞和“OFF”细胞与痛觉发生紧密相关，认为是疼痛发生的“开和关”。 最新的研究表明，RVM 区存在 G 蛋白偶联型雌激素受（G-protein-coupled estrogen receptor, GPER）极可能作为此区域 ON 细胞的特异性标记物。丙泊酚主要通过抑制性神经递质 GABA 的 A 型受体（GABAAR）发挥镇静作用，而 ON 细胞作为一类 GABA 能神经元，也存在着 GABAA 受体的表达。前期预实验显示，阻断 RVM 区 GABAA 受体，可显著抑制丙泊酚的镇痛作用，采用化学遗传学的方法特异性激活 ON 细胞，同样可抑制丙泊酚的镇痛作用，提示 RVM 区 ON 细胞的激活状态与丙泊酚的镇痛作用密切相关。本研究旨在探究 丙泊酚通过 GABAA 受体抑制 RVMON 神经元的过度活动减轻慢性疼痛的神经环路机制，以期进一步阐明丙泊酚通过 RVM 区发挥镇痛作用的中枢机制，为加强围术期镇痛及减少术后慢性疼痛的发生提供合理用药的科学依据。
方法 本实验使用 SPF 级 C57BL/6 雄性小鼠 8 周龄，GPER-cre 雄性小鼠 8 周龄。采用神经病理性疼痛-坐骨神经慢性压迫模型（CCI）、炎性疼痛-(CFA)致痛模型、急性疼痛-足底切口痛模型。采用立体定位仪、光纤记录、化学遗传、光遗传、电生理-离体细胞膜片钳、酶联免疫吸附试验 (ELISA)、免疫荧光染色、热辐射测痛和机械测痛实验、矿场实验（Open Field Test， OFT）等实验方法。
结果 通过对 CCI/CFA/急性切口痛小鼠腹腔注射 20mg/kg、35mg/kg、50mg/kg 亚剂量丙泊酚以及等剂量生理盐水后进行为期 30min、1h、2h、3h 的矿场实验和翻正反射实验，发现腹腔注射 50mg/kg 亚剂量丙泊酚小鼠在 2h 后的机械痛和热痛明显被抑制（$P<0.05$），2h 后腹腔注射丙泊酚 50mg/kg 组小鼠在矿场实验中的运动距离，通过中心次数、中心运动距离与腹腔注射生理盐水组相比无统计学意义。通过酶联免疫吸附试验发现丙泊酚注射 2h 后可明显减少 CCI/CFA 小鼠的炎性疼痛因子：肿瘤坏死因子-

α(TNF-α)、白细胞介素 6(IL-6)和白细胞介素 1β(IL -1β)的产生释放（P＜0.05），而对急性切口痛小鼠的影响无统计学意义。通过在体光线记录发现 CCI/CFA 组的 RVM 区神经元活性明显升高（P＜0.01）。腹腔注射丙泊酚组小鼠与生理盐水组相比 RVM 区的神经元钙活性明显下降（P＜0.01）。通过套管在 RVM 区注射特异性的 GABAA 的阻断剂(gabazine)后腹腔注射丙泊酚，发现丙泊酚的镇痛作用可被逆转（P＜0.01）。通过 Gper-Cre 转基因小鼠离体膜片钳电生理记录，对 ON 细胞进行 mCherry 荧光标记，观察在 CCI/Sham/NS 组以及 CFA/control/NS 组的动作电位的变化，发现注射 CCI/CFA 组与 Sham/Control 组相比神经元动作电位尖峰数目明显增多（P＜0.05），而丙泊酚组的动作电位尖峰数目明显下降（P＜0.01）。在不同的疼痛模型中比较腹腔注射丙泊酚或生理盐水后 RVM-ON 神经元的神经元激活标志物(c-Fos)表达情况，发现丙泊酚组的神经元的 c-Fos 表达明显减少（P＜0.05）。通过化学遗传的方式激活或抑制 ON 细胞，发现激活 ON 细胞时会逆转丙泊酚镇痛作用（P＜0.01）。而抑制 ON 细胞后即使不注射丙泊酚也可以降低 CCI/CFA 模型小鼠的痛觉过敏（P＜0.05）。通过光遗传的方式激活 ON 细胞后会增强 CCI/CFA 模型小鼠的痛觉过敏（P＜0.05）。

结论 本研究揭示了丙泊酚通过 GABAA 受体抑制 RVMON 神经元的过度活动减轻慢性疼痛的神经环路机制，为 临床上为加强围术期镇痛及减少术后慢性疼痛的发生提供 理论指 导和 科学依据。

PU-0334

基于 ERAS 理念探讨氢吗啡酮复合右美托咪定在老年骨折围术期患者疗效及应激反应中的应用

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目的 本研究旨在探讨基于 ERAS 理念探讨氢吗啡酮复合右美托咪定在老年骨折围术期患者疗效及应激反应中的应用，以期为临床治疗老年髋骨骨折患者提供临床指导，为临床治疗提供干预的理论基础，改善患者的预后，有效稳定患者围术期血流动力学指标，降低应激程度和炎症反应。

方法 研究试验方法

1.一般资料

选取我科收治的老年髋骨骨折患者，按照收治的先后顺序，随机分为对照组和观察组，经统计学分析，探讨两组年龄、性别、体重等基础资料是否具有可比性。

2.纳入标准

①单侧髋骨骨折；
②骨折 48h 内入院；
④年龄≥65 岁；
⑤符合手术指征，拟于我院行髋关节置换术；
⑥ASA 分级Ⅰ~Ⅲ级；
⑦无高血压病史，或高血压者经饮食、药物控制在 160/100mmHg 以下；
⑧患者签署知情同意书。

3.排除标准

①既往有髋关节置换术史；
②合并严重心脑血管疾病、癌症；
③存在全身性感染或穿刺部位感染；
④有慢性疼痛史或长期服用镇痛药史；
⑤有精神疾病史、认知障碍；
⑥存在视听障碍。

4.分组及干预措施

两组患者术前 6 h 禁食，术前 2h 禁饮，入室后均常规建立静脉通道，面罩吸氧，同时给予无创血压及血氧饱和度监测，心电图监测心率，常规术前肌注阿托品 0.01 mg/kg 和咪达唑仑 0.05 mg/kg。

患者均取侧卧位.
对照组：行腰麻-硬膜外联合麻醉，取 L3 ～ L4 椎间隙为穿刺点，将 1.5 mL 0.5%罗哌卡因用脑脊液稀释后注入蛛网膜下腔，30 s 内匀速注入，并调整平面于 T8 以下，以 15 mg 罗哌卡因行硬膜外麻醉维持。术后予以静脉自控镇痛，配方为舒芬太尼 1ug-1.kg-1d-1+格拉司琼 6mg，调整输注参数，维持术后镇痛 48h。
实验组：氢吗啡酮复合右美托咪定，行腰麻-硬膜外联合麻醉，取 L3 ～ L4 椎间隙为穿刺点，硬膜外依次注入注射氢吗啡酮 0.3 mg+右美托咪定 0.5ug/kg 并调整平面于 T8 以下。术后予以静脉自控镇痛，配方为氢吗啡酮 0.1mg-1.kg-1d-1 复合右美托咪定 1ug-1.kg-1d-1+格拉司琼 6mg，调整输注参数，维持术后镇痛 48h。
5. 观察指标
①VAS：采用视觉模拟评分法（visual analogue scale，VAS）评价患者术前和术后 6h、12h、24h 的疼痛情况，该疼痛评分为 0~10 分，分数越高即疼痛程度越深。
② 镇静评分：RSS 评价患者镇静程度，1 分：不安静、烦躁；2~4 分：镇静满意；5、6 分：镇静过度；③疗效：对比两组疗效；④应激反应：对比两组应激反应发生情况；⑤炎症反应：采用酶联免疫吸附法测定血清中肿瘤坏死因子（TNF）-α、超敏 C 反应蛋白（hsCRP）、白细胞介素（IL）-6
统计学方法：
采用 SPSS 23.0 统计学软件对数据进行统计分析，计量资料用均数（标准差）表示，计数资料用数值（率）表示，两组间一般资料的比较采用两独立样本 t 检验和 χ2 检验，术前和术中生命体征的比较采用两独立样本 t 检验，疼痛评分和炎症因子的比较在各时间点采用两独立样本 t 检验，总体比较采用重复测量的方差分析，并校正性别、年龄等因素，并采用点线图的形式展示两组间各时间点的数据的变化情况，以 P <0.05 认为存在统计学差异。
结果 两组患者在年龄、体重指数、手术时间、受教育年限等一般资料方面差异无统计学意义。观察组围术期镇痛和镇静评分在术后 6h、12h 和术后 24h 均优于对照组；血清应激指标值在镇痛后 6h、12h 和术后 24h 均低于对照组；在认知功能评估方面，简易智力状况检查法(MMSE)术前评估两组差异无统计学意义（P ＞0.05），在术后 6h、12h 和术后 24h 评分，观察组两种量表评估结果均优于对照组（P＜0.05），差异有统计学意义。
结论 氢吗啡酮复合右美托咪定在老年骨折围术期患者疗效及应激反应中的应用，能够改善患者的预后，有效稳定患者围术期血流动力学指标，降低应激程度和炎症反应，并且能降低围术期患者短期认知功能障碍的发生程度。

PU-0335

Allopregnanolone relieves paclitaxel induced mechanical hypersensitivity via inhibiting spinal cord PGE2-EP2 mediated microglia-neurons signaling

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Chemotherapy-induced neuropathic pain (CINP) is a serious adverse effect of commonly used chemotherapeutics. Neurosteroid allopregnanolone is suggested to modulate various receptors or enzymes involved in pain, presenting an analgesic potential. Here, we investigated the analgesic effect of allopregnanolone on paclitaxel (PTX)-induced neuropathic pain (PINP) and explored the participation of the extracellular signal-regulated kinase (ERK) and its downstream prostaglandin E2 (PGE2) pathway in the rat spinal cord. The results showed PTX upregulated phosphorylated ERK (p-ERK), PGE2 level, and PGE2 receptor E-prostanoid 2 (EP2) expression in the spinal cord. In contrast, the p-ERK inhibitor PD98059 or microglia inhibitor minocycline reduced microglial

activation, reversed the effectsof PTX, and alleviated mechanical hypersensitivity. Further, allopregnanolone in the spinal cord was observed to decrease in CINP rats, and intragastric administration of exogenous allopregnanolone dose-dependently alleviated PTX-induced mechanical hypersensitivity. Mechanistically, allopregnanolone dose-dependently alleviates PTX-induced microglial activation, p-ERK, PGE2, and EP2 upregulation, and reduces PTX-induced cytokine release in the spinal cord in CINP rats. Furthermore, subcutaneous allopregnanolone synthesis inhibitor medroxyprogesterone (Med) further reduces endogenous allopregnanolone and blocks all effects of allopregnanolone in CINP rats. Taken together, these results suggest allopregnanolone presents an analgesic effect for PTX-induced mechanical hypersensitivity, partially via inhibiting spinal cord PGE2-EP2 mediated microglia-neurons signaling.

PU-0336

Histone modification promotes peripheral sensory neurons GPR160 transcription and contributes to bone cancer pain via regulating TRPV1 function in rodents

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Cancer pain afflicts approximately 70% of patients in advanced stages of cancer, with over 80% of this pain being attributed to metastatic cancer-induced bone pain. Bone cancer pain (BCP) poses a formidable therapeutic challenge due to its intricate underlying mechanisms. In this study, we screened upregulated orphan G protein-coupled receptors (oGPCRs) within the dorsal root ganglia (DRG) subsequent to tumor infiltration and identified a significant upregulation of GPR160. The elevation in both Gpr160 mRNA and GPR160 protein levels commenced on postoperative day (POD) 6 and persisted for over 18 days in the injured DRG. Furthermore, we observed predominant expression of GPR160 in small-diameter C-fiber type neurons specific to the tibia. Targeted interventions, such as DRG microinjection of Gpr160 siRNA or AAV2/9-Gpr160-shRNA delivery, or the global/conditional deletion of Gpr160 in peripheral sensory neurons, effectively mitigated the development and maintenance of mechanical allodynia, cold and heat hyperalgesia induced by bone cancer. Conversely, the introduction of AAV2/9 vectors encoding full-length GPR160 via microinjection into unilateral DRGs potentiated responses to mechanical thermal and cold stimuli on the ipsilateral side, eliciting anxiety-like behavior in previously unaffected rats. Moreover, tumor infiltration led to an increase in the excitability of DRG neurons in wild-type (WT) mice, which was not observed in Gpr160 gene knockout (gko) mice. Mechanistically, BCP triggered a reduction in H3K27me3 levels and an increase in H3K27ac modifications, resulting in enhanced Sp1 binding to the Gpr160 gene promoter region and consequent upregulation of GPR160 expression. Enhancement of the H3K27me3-catalyzing enzyme and inhibition of the H3K27ac-catalyzing enzyme result in a reduction of GPR160 expression, leading to a notable mitigation of pain behavior. In conclusion, our study elucidates a novel mechanism whereby elevated Sp1 levels promote Gpr160 gene transcription through histone modifications and subsequently activate the TRPV1 channel in nociceptive DRG neurons under conditions of BCP in rodents.

PU-0337

Genetic evidence indicates that immune cell traits mediate the causal relationships between gut microbiome and postherpetic neuralgia: A Mediation Mendelian Randomization study

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Background: Increasing evidence suggests a link between the gut microbiome, immune cell traits, and postherpetic neuralgia. However, the scope and depth of previous observational studies and randomized controlled trials investigating these relationships have faced certain limitations, preventing the attainment of a consistent conclusion. Observational studies often suffer from confounding factors and reverse causation, while randomized controlled trials may lack the longitudinal data necessary to fully understand these complex interactions. Therefore, this study proposes employing Mendelian Randomization (MR) analysis to investigate the causal relationships among these factors from a genetic perspective, offering a robust methodological approach to overcome the limitations of previous research and provide more definitive insights into the interplay between the gut microbiome, immune cell traits, and postherpetic neuralgia.
Methods: Firstly, the associations between the gut microbiome and postherpetic neuralgia were systematically investigated using a two-sample MR design. In this rigorous analysis, the IVW method was employed as the primary analytical approach, while additional methods, namely MR Egger, weighted median, simple mode, and weighted mode, were utilized to corroborate the accuracy of the results. Concurrently, a series of sensitivity analyses—including Cochran's Q Test, MR-Egger regression, and leave-one-out analysis—were conducted to ensure the robustness and reliability of the findings. Subsequently, for the positive associations identified through the IVW method, an MR analysis was performed using immune cell traits as the exposure variable to explore their causal relationship with postherpetic neuralgia. This approach aimed to elucidate the potential pathways through which immune cell traits may influence the development of postherpetic neuralgia. Finally, a two-step MR technique was applied, revealing that immune cell traits significantly mediate the relationship between the gut microbiome and postherpetic neuralgia. This technique allowed for the quantification of both the direct effect of immune cell traits on postherpetic neuralgia and the proportion of the mediation effect, thereby providing a comprehensive understanding of the underlying mechanisms at play.
Results: Among the 211 associations investigated in the MiBioGen and FinnGen Consortium studies, eight associations were found to be statistically significant using the IVW method. Specifically, three gut microbiota genera were positively associated with the incidence of postherpetic neuralgia: genus Eubacterium rectale group id.14374 (IVW OR, 3.153 per 1-SD increase; 95% CI, 1.082–9.191; P = 0.0354), genus Methanobrevibacter id.123 (IVW OR, 2.137 per 1-SD increase; 95% CI, 1.137–4.017; P = 0.0183), and genus Candidatus Soleaferrea id.11350 (IVW OR, 1.921 per 1-SD increase; 95% CI, 1.001–3.689; P = 0.0497). Conversely, five genera were negatively associated with postherpetic neuralgia: genus Lachnospiraceae NK4A136 group id.11319 (IVW OR, 0.500 per 1-SD increase; 95% CI, 0.255–0.978; P = 0.0428), family Coriobacteriaceae id.811 (IVW OR, 0.433 per 1-SD increase; 95% CI, 0.188–0.998; P = 0.0495), genus Ruminococcaceae UCG011 id.11368 (IVW OR, 0.570 per 1-SD increase; 95% CI, 0.327–0.992; P = 0.0469), order Coriobacteriales id.810 (IVW OR, 0.433 per 1-SD increase; 95% CI, 0.188–0.998; P = 0.0495), and class Coriobacteriia id.809 (IVW OR, 0.433 per 1-SD increase; 95% CI, 0.188–0.998; P = 0.0495). Additionally, significant associations between 27 immune cell traits and postherpetic neuralgia were identified using the IVW method. Specifically, in cases of postherpetic neuralgia, eight immune cell counts were elevated while 19 were reduced, potentially contributing to increased susceptibility. These immune cells include CD4 on CD28+ CD4+ T cells, CD4 on Central Memory CD4+ T cells, CD20 on IgD+ CD38- B cells, CD27 on IgD- CD38dim B

cells, CD38 on IgD+ B cells, CD45 on CD33- HLA-DR+ cells, CD86 on monocytes, and CX3CR1 on CD14+ CD16+ monocytes. Thirdly, the analysis revealed causal relationships between the gut microbiome and immune cell traits, calculating the direct effects β(A) of exposure on the mediator. Notably, a positive correlation was found between genus Methanobrevibacter id.123 and CD39+ secreting CD4 regulatory T cell absolute count (IVW OR, 0.827 per 1-SD increase; 95% CI, 0.684–0.999; P = 0.0493). Ultimately, one pathway was identified, confirming the "gut microbiome-immune cell traits-postherpetic neuralgia" pathway. Genetically predicted CD39+ secreting CD4 regulatory T cell absolute count exhibited a positive mediating effect on the relationship between genus Methanobrevibacter id.123 and postherpetic neuralgia (β = 0.0364), with a mediation proportion of 4.80%. To ensure the reliability of the results, sensitivity analyses, including heterogeneity analysis, horizontal pleiotropy testing, and leave-one-out analysis, were conducted. In the heterogeneity analysis, Cochran's Q test p-values for both IVW and MR-Egger regressions were greater than 0.05, indicating no heterogeneity. In horizontal pleiotropy testing, MR-Egger regression intercepts were all less than 0.05 with p-values greater than 0.05, suggesting no horizontal pleiotropy. The leave-one-out analysis demonstrated that removing any single SNP did not significantly affect the results, as the estimates remained consistent.
Conclusion: The research offers a comprehensive examination of the potential pathways linking the gut immune system with postherpetic neuralgia, thereby providing unique insights into this intricate relationship. It underscores the significant role played by specific gut microbiome constituents in modulating susceptibility to postherpetic neuralgia, while also delving into the potential modulatory effects of various immune cell characteristics. These findings constitute a valuable resource, guiding the prompt identification, treatment, and alleviation of postherpetic neuralgia, thus contributing to the broader understanding and management of this condition.

PU-0338

Isoliquiritigenin alleviates chronic inflammatory pain in mice by inhibiting the CCL7/CCR2-ERK pathway in dorsal root ganglia

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Background and purpose: Chronic inflammatory pain affects millions worldwide, causing significant disability and healthcare burden. Conventional treatments, such as NSAIDs and opioids, have limitations due to side effects and addiction risks. Monomer Chinese patent medicines, like isoliquiritigenin, offer a promising alternative by targeting multiple inflammatory pathways. However, the specific effects of isoliquiritigenin on chronic inflammatory pain and its underlying mechanisms remain unclear. This study aimed to investigate the regulatory effects of isoliquiritigenin on chronic inflammatory pain and elucidate its mechanisms of action using a network pharmacology approach.
Methods: We established a chronic inflammatory pain model by injecting Complete Freund's Adjuvant (CFA) into mice hindpaws. Following intraperitoneal administration of isoliquiritigenin, we assessed the mechanical and thermal pain thresholds using von Frey filaments and the hot plate, respectively. Quantitative PCR (qPCR) was employed to measure the expression of inflammatory mediators in the plantar skin and dorsal root ganglia (DRG) of mice. To identify the common targets of isoliquiritigenin and inflammatory pain, we extracted data from the TCMSP database, GeneCards database and DAVID database. Then performed protein-protein interaction (PPI) analysis. Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analyses were conducted to explore the potential mechanisms of action of isoliquiritigenin in the treatment of inflammatory pain. We further validated the downstream pathway by pharmacological intervention

and by knocking down target genes in vivo using DRG microinjection. The effects of these manipulations were assessed using von Frey, hot plate, immunofluorescence, and qPCR.
Results: We found that long-term administration of isoliquiritigenin can alleviate inflammation, plantar swelling, and pain in mice; however, acute administration does not provide pain relief. Through protein-protein interaction (PPI) analysis, we identified the top six potential targets of isoliquiritigenin for treating chronic inflammatory pain: STAT1, NFKB1, ESR1, CXCR4, NOS2, and CCR2. KEGG/GO enrichment analysis revealed that CCL7 binding had the highest enrichment score among the top potential pathways. Using immunofluorescence, we observed that isoliquiritigenin can reduce the number of neurons expressing CCR2 or CCL7 in the dorsal root ganglia (DRG). In vivo DRG microinjection CCR2 siRNA to knockdown CCR2, increased the mechanical pain threshold of CFA mice, reduced plantar swelling and the release of plantar inflammatory factors, and offset the analgesic effect of isoliquiritigenin. Additionally, it increased the mechanical pain threshold of mice after plantar injection of CCL7. ERK is an important target for CCR2 activation, leading to inflammation and pain. We found that administrator isoliquiritigenin or DRG CCR2 knockdown can reduce the phosphorylation level of ERK in the DRG of CFA mice. Further intraperitoneal injection of the ERK agonist tert-butylhydroquinone reversed the analgesic and anti-inflammatory effects of DRG CCR2 knockdown or intraperitoneal injection of isoliquiritigenin in CFA mice.
Conclusion: Long-term administration of isoliquiritigenin can alleviate inflammation and pain in mice with chronic inflammatory pain by inhibiting the binding of CCL7 and CCR2 in the dorsal root ganglia, thereby downregulating ERK activity.

PU-0339

Gas6/Axl/SOCS3 信号通路在 KATP 通道开放剂缓解术后疼痛中的作用

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目的 社会的进步和生活质量的提高使术后疼痛（postsurgical pain, PSP）的研究引起了日益广泛的关注。然而，PSP 的产生涉及多种因素，预防和治疗 PSP 尚不令人满意，促使人们寻找新的治疗靶点和新的治疗方法。以往研究发现开放 ATP 敏感型钾离子通道（ATP-sensitive potassium channel,KATP 通道）具有镇痛作用，但是其作用机理尚未明确。既往有大量研究表明炎症与 PSP 的发生相关,而 KATP 通道与炎症的相关研究报道较少,有研究证明 KATP 通道开放剂能够抑制小胶质细胞的活化及其介导的神经炎症损伤。我们大胆猜测，KATP 通道开放可诱导炎症负调控因子----细胞因子信号抑制因子（suppressor of cytokine signaling 3,SOCS3）的高表达,从而缓解术后疼痛。本研究目的是探索 KATP 通道开放剂缓解术后疼痛的新靶点，为临床有效控制术后疼痛提供了新的理论依据。
方法 采用小鼠足底切口痛（plantar incision,PI）模型模拟 PSP。选用 Cromakalim 开放 KATP 通道。以小鼠机械性缩足反射阈值（mechanical withdrawal threshold ,WMT）测定来评估 KATP 通道开放后的镇痛效果。用小胶质细胞系 BV-2 细胞体外培养进行离体实验。采用免疫荧光方法检测小鼠脊髓疼痛标记物的表达以及确定 KATP 通道开放诱导 SOCS3 表达的细胞特异性。通过 westernblots、qPCR、明胶酶谱等手段检测细胞因子信号抑制因子 1/3（suppressor of cytokine signaling 1/3,SOCS1/3）、基质金属蛋白酶-9/2（Matrix metalloprotein-9/2,MMP2/9）、生长停滞特异性蛋白 6（growth arrest-specific protein 6,Gas6）、TAM（Tyro3、Axl and Mertk ，TAM）受体家族中 Axl 等相关分子的转录和蛋白表达水平。通过 Kir6.1siRNA、AxlsiRNA、Gas6siRNA 干扰、SOCS3 过表达慢病毒或者 SOCS3shRNA 慢病毒注射、选用 Gas6-/-和 Axl-/-小鼠等方法反复验证 KATP 通道开放通过激活 Gas6/Axl/SOCS3 信号通路而发挥作用。
结果 （1）KATP 通道开放剂明显降低了小鼠足底切口诱发的机械性痛超敏反应，抑制疼痛相关因

子的表达；并且能够引起 SOCS3 因子在小胶质细胞中表达的升高。
（2）KATP 通道开放剂引起 SOCS3 因子的高表达主要依赖小胶质细胞中 Gas6/Axl 信号通路的激活,从而抑制小鼠足底切口引发的机械性痛超敏反应。
结论 我们证实了 KATP 通道开放激活 Gas6/Axl/SOCS3 信号通路缓解术后疼痛。

PU-0340

骨髓间充质干细胞来源的外泌体通过调控脊髓神经元 Nrf-2 介导的氧化应激通路缓解大鼠慢性功能性内脏痛

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目的 肠易激综合征（IBS）是常见的慢性功能性胃肠道疾病，内脏超敏反应（VH）是其重要的发病机制。IBS 影响全球超过 10%的人，给医疗系统和患者带来了巨大的经济负担。间充质干细胞(Mesenchymal stem cell, MSCs)衍生的外泌体(Exosomes, Exos)被认为是一种新的无细胞治疗临床各类疾病的新方法，但大鼠骨髓间充质干细胞衍生的外泌体是否能缓解肠易激综合征的慢性内脏疼痛及其可能的机制有待阐明。本研究通过观察鞘内注射骨髓间充质干细胞来源外泌体对 IBS 模型大鼠痛觉及焦虑样情绪的影响并探究其可能作用机制，为 IBS 的临床诊疗提供理论实验依据。
方法 在提取并培养大鼠原代骨髓间充质干细胞后利用梯度超高速离心法分离其外泌体并进行鉴定。新生期雄性 SD 大鼠采用结直肠扩张方法建立 IBS 模型，肌电图（EMG）评价大鼠内脏的痛觉敏感性；旷场实验（OFT）及高架十字迷宫实验（EPM）评价大鼠焦虑样行为变化程度。谷氨酸处理 PC12 细胞模拟神经元的氧化应激损伤模型；体内使用 ML-385（Nrf-2 抑制剂）敲低 Nrf-2 分子，体外使用 si-Nrf-2-RNA 敲低 Nrf-2 分子；PKH26 染料标记外泌体进行示踪。采用 WB 检测大鼠脊髓 Nrf-2/HO-1 信号通路蛋白的表达水平；qPCR 检测 Nrf-2/HO-1 通路 mRNA 表达水平；试剂盒检测丙二醛（MDA）、超氧化物歧化酶（SOD）、过氧化氢酶（CAT）氧化应激因子的变化；免疫荧光（IF）检测 Nrf-2 在大鼠脊髓中的分布情况以及示踪带有标记的外泌体是否进入神经元。
结果 实验成功分离提取了 MSC-Exos，其可被 PC12 细胞所摄取且可以在体外逆转神经元氧化应激损伤。在鞘内注射外泌体后，外泌体在 IBS 大鼠体内与神经元共定位，EMG、OFT、EPM 结果提示 MSC-Exos 可缓解 IBS 大鼠的内脏超敏反应以及改善 IBS 大鼠焦虑情绪共病。Nrf-2 在 IBS 大鼠脊髓中主要在神经元中表达，IBS 大鼠脊髓组织受到氧化应激损伤，外泌体注射后可以治疗氧化应激损伤，而以上现象可被 Nrf-2 抑制剂 ML-385 所拮抗。同时 EMG、OFT、EPM 结果表明，腹腔内预先注射 ML385 后阻断了鞘内注射外泌体缓解 IBS 大鼠痛觉敏感和焦虑样行为这一效应。
结论 大鼠骨髓间充质干细胞来源的外泌体可以显著降低 IBS 大鼠的慢性内脏痛觉敏感，并缓解其焦虑情绪共病，其机制可能是通过调控脊髓神经元中 Nrf-2/HO-1 通路，减轻氧化应激损伤。

PU-0341

Effects of voluntary chronic intermittent ethanol exposure on behavioral performance in adult C57BL/6J mice

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Background: Chronic ethanol exposure increases the risk of alcohol use disorders, causing various neurological disorders. However, the impact of different ethanol levels on a spectrum of

behaviors during chronic exposure remains unclear. In this study, we established a chronic intermittent ethanol two-bottle choice (CIE-2BC) model to explore the dose-dependent effects of ethanol on the behavioral performance of C57BL/6J mice.
Methods: Adult male C57BL/6J mice were provided voluntary access to different ethanol concentrations (0%, 5%, 10%, and 20% ethanol) under a 12-week CIE-2BC paradigm. A battery of behavioral tests was administered to assess alterations in pain threshold, anxiety, locomotor activity, motor coordination, and cognition. Ethanol consumption and preference were monitored during each session. Moreover, the liver, heart, and lung tissues were examined using pathological microscopy.
Results: The average (standard deviation) ethanol consumption of mice under the CIE-2BC paradigm increased dose-dependently to 5.1 (0.2), 8.7 (0.7), and 15.9 (0.8) g/kg/24 h with 5%, 10%, and 20% ethanol, respectively. Overall, mice showed a slight, but non-significant, preference for 5% ethanol over 10% and 20% ethanol. Chronic alcohol exposure caused hyperalgesia, cognitive impairment, and motor incoordination, but caused no changes in body temperature, locomotor activity, or anxiety levels. Minor histopathological alterations in the liver were detected; however, no major abnormal pathology was observed in the heart or lungs.
Conclusion: These findings clarify the link between ethanol dosage and behavioral changes in mice over a 12-week CIE-2BC paradigm, thereby bridging the knowledge gap regarding the effects of chronic ethanol exposure on neurological disorders.

PU-0342

SARS-CoV-2 病毒蛋白通过 TLR2/4-MyD88 途径引发疼痛

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目的 躯体感觉障碍，尤其疼痛是新型冠状病毒（COVID-19）肺炎的主要症状。COVID-19 患者广泛的疼痛相关并发症表明 SARS-CoV-2 感染过程和/或其他病毒因子可启动伤害性信号。除病毒感染过程外，产生疼痛的机制可能是 SARS-CoV-2 病毒蛋白与相应受体直接或间接结合，激活背根神经节（Dorsal Root Ganglion, DRG）和脊髓背角（Spinal Dorsal Horn, SDH）的伤害感受信号所致。
方法 在本研究中，我们通过行为学测试了 SARS-CoV-2 病毒蛋白的伤害效应，并筛选具有诱发痛阈减低的蛋白。敲低 DRG 和 SDH 中 TLR2 基因对筛选出的引起痛阈改变的蛋白的效应。为进一步研究 TLR2/4-MyD88 途径对 SARS-CoV-2 病毒蛋白相关的疼痛，人为敲低 DRG 和 SDH 基因 MyD88 对筛选出的引起痛阈改变的蛋白的效应。
结果 在本研究中，我们通过行为学测定成功筛选出具有诱发痛阈减低的两种蛋白，包括 SARS-CoV-2 包膜蛋白(S2E)和刺突蛋白(S2S-RBD)。敲低 DRG 和 SDH 中 TLR2 基因可以减轻 S2E 和 S2S-RBD 引起的疼痛。敲低 TLR4 基因未能减轻 S2E 相关疼痛，而 S2S-RBD 相关疼痛的痛阈恢复正常。为进一步研究 TLR2/4-MyD88 途径对 SARS-CoV-2 病毒蛋白相关的疼痛，敲低 DRG 和 SDH 基因 MyD88 可以成功减轻 S2E 和 S2S-RBD 引起的机械痛和热痛。
结论 TLR2/4-MyD88 轴介导的 SARS-CoV-2 病毒蛋白诱导疼痛，以及病毒蛋白与神经免疫受体的相互作用可能是新型冠状病毒体感觉障碍的关键致病因素，这些发现揭示了 TLR2/4-MyD88 通路在 COVID-19 相关疼痛中的核心作用，为 COVID-19 相关疼痛的研究指明了新的方向。

PU-0343

下丘脑室旁核-头端延髓腹内侧区神经环路介导慢性应激易化术后疼痛慢性化的机制研究

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目的 术后慢性疼痛是全球性医学难题，尚缺乏副作用小、疗效好的药物。由于对疾病的恐惧、 手术创伤等因素，患者往往处于心理应激状态，而这种社会心理应激是发生术后疼痛慢性化的重要危险因素之一。本课题旨在探索慢性应激能否易化术后疼痛慢性化及可能的神经环路机制。
方法 （1）建立慢性束缚应激(Chronic restraint stress, CRS)模型，通过测定小鼠机械刺激缩足阈值(Paw withdrawal threshold, PWT)来明确合适的 CRS 持续时间。（2）在足底切口手术前进行 CRS，并利用旷场实验和高架十字迷宫实验评估小鼠 CRS 后的情绪状态。（3）术前和术后测定各组小鼠 PWT，在术后 CRS + Incision 组与 Control + Incision 组 PWT 出现差异时，将两组小鼠的 PWT 数据汇总，利用受试者工作特征曲线将小鼠分为术后疼痛恢复和术后疼痛慢性化两类，分别统计两组小鼠术后疼痛慢性化的发生率。（4）利用病毒逆行示踪和免疫荧光染色，寻找能够投射至头端延髓腹内侧区(Rostral ventromedial medulla, RVM)且同时能被 CRS 激活的脑区或核团。（5）利用病毒逆行示踪和免疫荧光染色，在术后两组 PWT 差异最大时，统计两组投射至 RVM 的 PVN 神经元被激活的比例。（6）利用病毒逆行示踪和免疫荧光染色，明确发出直接投射至 RVM 的 PVN 神经元类型。
结果 （1）在 CRS 期间，小鼠 PWT 先降低后恢复。CRS 持续 10 天后，CRS 组小鼠 PWT 与 Control 组差异已无统计学差异；（2）旷场和高架十字迷宫实验数据表明，CRS 诱导小鼠产生焦虑情绪障碍；（3）CRS + Incision 组的术后疼痛慢性化发生率明显高于 Control + Incision 组，证实术前慢性应激能够易化术后疼痛慢性化；(4) 下丘脑室旁核(Paraventricular nucleus, PVN)既被 CRS 激活，又直接投射到 RVM；（5）术后 PWT 差异最大时，CRS + Incision 组投射至 RVM 的 PVN 神经元被激活比例高于 Control + Incision 组；（6）PVN 发出直接投射至 RVM 的神经元属于生长抑素（Somatostatin, SST）阳性神经元。
结论 术前慢性应激能够易化术后疼痛慢性化，PVNSST→RVM 神经环路参与慢性应激易化术后疼痛慢性化的过程。本研究为慢性应激易化术后疼痛慢性化的中枢神经生物学机制提供了新的见解，为临床防治术后慢性疼痛提供了新的思路。

PU-0344

18:1 lysophosphatidylcholine contributes to neuropathic pain by GPR132/PKC/ERK signaling pathway

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目的 Neuropathic pain (NP) is one of the most intractable human complaints characterized by long-term devastating physical and psychological damage. Lipid metabolism participates in NP caused by peripheral nerve injury. Key specific lipids involved in this process have not identified to date. Lysophosphatidylcholine (LPC) 18:1, as a differential lipid, is needed to be explored its role in the NP model.
方法 Spinal nerve ligation (SNL) model was selected. LPC(18:1) was detected by LC-MS. Pain-related behaviors were measured by von Frey and Hargreaves testing. Lipid oxidization were

evaluated by thiobarbituric acid reactive substance (TBARS) assay. G protein-courpled receptor 132 (GPR132), protein kinase C (PKC) and extracellular regulated protein kinase (ERK) were assessed by Western blot.
结果 Lysophosphatidylcholine (LPC) 18:1 was significantly improved in serum, dorsal root ganglia (DRG) and cerebrospinal fluid (CSF) of mice at day 7 in the spinal nerve ligation (SNL), without being observed in the spinal cord. The administration of LPC(18:1) induced upregulation of inflammatory factors (IL-1β and Tnf-α) in DRG and activation of glia cell (microglia and astrocyte), mediating peripheral and central sensitization in naive mice. In addition, SNL increases the Pla2g2e and Pla2g7 levels and upregulated the oxidative stress and lipid oxidization, which is related to the synthesis process of LPC(18:1). Mechanistically, G protein-courpled receptor 132 (GPR132) is associated with LPC(18:1)-induced chronic hyperalgesia and regulation of downstream signaling pathway protein kinase C (PKC)-extracellular regulated protein kinase (ERK). Importantly, the content of LPC(18:1) in the serum was correlated with severity of pain symptoms in patients with neuropathic pain.
结论 Taken together, LPC(18:1), upregulated in the neurons of DRG after nerve injury, regulated neuropathic pain by integrating GPR132-PKC-ERK signaling pathway.

PU-0345

Prok2 介导的脊髓 Cav2.2 N 型钙通道上调在骨癌痛中作用机制的研究

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目的 In this study, we intend to investigate the role of Cav2.2 in BCP in rats and the regulation of Cav2.2 by Prok2 in BCP, with the aim of providing new ideas for the treatment of BCP.
方法 Western blot was used to detect the protein expression levels of Cav2.2, Prokineticin-2 (Prok2), Prokineticin receptor 1（PKR1) and Prokineticin receptor 2 (PKR2) in the dorsal horn of rat spinal cord. X-rays and Micro CT were used to detect bone destruction in rats. Immunofluorescence was used to detect protein expression and spatial location in the dorsal horn of the spinal cord.
结果 The expression level of neuronal Cav2.2N-type calcium channel protein in the dorsal horn of spinal cord of rats with bone cancer pain was significantly increased, and the intrathecal application of Cav2.2 inhibitor could significantly alleviate the nociceptive hypersensitive behaviour of rats with bone cancer pain; at the same time, the expression level of Prok2 protein in the dorsal horn of spinal cord of rats with bone cancer pain was also significantly increased, and it was co-expressed with Cav2.2, and knocking down the protein expression of Prok2 could significantly reduce the Cav2.2 protein expression and alleviate the nociceptive hypersensitive behaviour of rats with bone cancer pain. The knockdown of Prok2 could significantly reduce the expression of Cav2.2 protein and alleviate the nociceptive hypersensitivity behaviour of rats with bone cancer pain.
结论 Bone cancer pain induces up-regulation of Cav2.2 expression in the dorsal horn of rat spinal cord, and Cav2.2 mediates the development of nociceptive hypersensitivity in rats with bone cancer pain. Prok2 regulates bone cancer pain by up-regulating the expression of Cav2.2 in the dorsal horn of the spinal cord, suggesting that the Cav2.2 N-type calcium channel is expected to be a new target for the treatment of bone cancer pain.

PU-0346

丰富环境通过改善前扣带回皮层 PV 中间神经元功能防治神经病理性疼痛相关的焦虑障碍

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目的 神经病理性疼痛常伴焦虑障碍导致患者生活质量显著下降。虽然我们对神经病理性疼痛导致焦虑的机制有一定程度的了解，然而目前的治疗方法对此疾病的治疗效果差强人意，因此开发新的更有效的治疗方法是当务之急。丰富环境（Environment enrichment，EE）是近年来出现的一种新兴非药物治疗精神疾病的方法，它为许多精神障碍的治疗提供了一种低成本且低副作用的治疗策略。丰富环境在治疗社会压力和睡眠剥夺引起的焦虑中显示出了有效性，但在防治神经病理性疼痛相关的焦虑障碍中尚未被充分研究。因此，本研究拟通过建立神经病理性疼痛诱导的焦虑小鼠模型充分探讨丰富环境对神经病理性疼痛相关焦虑行为的防治效果及其可能的机制。
方法 1. 建立神经病理性疼痛诱导的焦虑模型并评估行为学及 EE 的治疗效果
采用 C57 小鼠建立备用神经损伤（spared nerve injury，SNI）诱导神经病理性疼痛模型；采用 Von Frey 痛阈值及热平板实验评估小鼠机械与热痛阈值改变；采用旷场实验、高架十字迷宫实验、新奇摄食抑制实验评估小鼠焦虑样行为。通过给予跑轮、迷宫、筑巢棉絮等建立 EE 组，并观察 EE 对 SNI 诱导的焦虑样行为的影响。
2. 探究 SNI 相关焦虑及 EE 治疗作用的潜在机制
采用免疫荧光检测前扣带回皮层 PV 中间神经元活性变化；采用在体电生理检测前扣带回 PV 中间神经元 γ 震荡水平；并探究 EE 的治疗作用是否通过影响前扣带回 PV 中间神经元功能实现。
3. 调控前扣带回 PV 中间神经元活性观察对 SNI 相关焦虑的影响
通过化学遗传学技术激活前扣带回 PV 中间神经元活性，观察 SNI 小鼠焦虑行为的改变；通过化学遗传学技术抑制前扣带回 PV 中间神经元活性，观察正常小鼠行为变化。
结果 1. SNI 小鼠出现显著的机械与热痛觉过敏及伴随焦虑样行为，EE 可显著改善焦虑样行为但不影响机械与热痛觉过敏。
2. SNI 小鼠前扣带回 PV 中间神经元数量及功能显著受损，EE 可显著改善 PV 神经元功能。
3. 激活前扣带回 PV 神经元可改善 SNI 相关焦虑行为；抑制前扣带回 PV 神经元可使正常小鼠出现类焦虑行为。
结论 SNI 诱导的焦虑样行为可通过 EE 得到明显改善，且 EE 的治疗作用是通过改善前扣带回 PV 中间神经元功能得以实现；通过调控前扣带回 PV 中间神经元功能可影响小鼠焦虑样行为。

PU-0347

S-氯胺酮通过肠道菌群参与调控吗啡诱发的痛觉过敏

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目的 阿片类药物诱发的痛觉过敏（OIH）是阿片类药物使用的严重并发症。本研究拟探究 S-氯胺酮通过肠道菌群参与调控 OIH 的相关机制。
方法 本研究通过连续 3 天皮下注射递增剂量吗啡，建立小鼠 OIH 模型，并进行第 4 天单次皮下注射吗啡后进行小鼠的行为学测试，包括尾闪实验（TFT）、机械缩足阈值测试 （ MWT）和旷场实验 （ OFT），根据 TFT 和 MWT 结果对小鼠进行分层聚类分析，分为 OIH 易感组和 OIH 非易感组。另外，S-氯胺酮预处理或生理盐水给药在吗啡注射前 0.5 h，同样在第 4 天进行小鼠的行为学

测试。在完成所有行为测试后，分别收集小鼠粪便样本进行 16S rRNA 基因测序和相应的数据分析。
结果 约 60%的小鼠在吗啡暴露后产生了机械痛和热痛异常超敏的 OIH，伴有异常运动和焦虑样行为。主坐标分析（PCoA）表明，吗啡用药改变了小鼠肠道菌群分布，具体表现为 Muribaculaceae，Lactobacillus 等相对丰度降低和 Alistipes，Alloprevotella 和 Escherichia-Shigella 等相对丰度升高。而 S-氯胺酮预处理的小鼠未发生痛觉过敏，并部分逆转了 OIH 小鼠中的肠道菌群分布，增加了 Lactobacillus 并降低了 Alistipes 的相对丰度。
结论 S-氯胺酮预处理能够防止 OIH 小鼠肠道 Lactobacillus 和 Alistipes 菌群改变从而预防 OIH 的发生。

PU-0348

基于深度学习的术前脑电特征预测乳腺癌术后慢性疼痛的应用研究

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目的 乳腺癌术后慢性疼痛显著降低患者生活质量，迫使患者寻求治疗，因此在术前积极预测术后疼痛至关重要。疼痛作为神经系统对伤害感受和情境因素整合的结果，本质上依赖于大脑不同区域间的协同活动。脑电图（Electroencephalography, EEG）有较高的时间分辨率，特别适合研究跨脑区的连接性及活动模式。EEG 所包含的特征维度丰富，涵盖频谱分析、图论分析等。利用深度学习中的卷积神经网络（CNN）模型对这些信息进行综合处理，有助于发掘预测疼痛的潜在生物标志物。
1. 通过频谱分析、大脑连接性分析，旨在识别和提取与术后疼痛发展相关的脑电特征和网络特性。
2. 利用卷积神经网络（CNN）模型综合以上差异显著的特征，以实现对乳腺癌术后疼痛的有效预测。
方法 本研究纳入在我院拟行全身麻醉下乳腺癌保乳术或乳腺癌全乳切除术的女性患者。在手术前对患者进行 10 分钟静息态脑电图采集，包括闭眼和睁眼各 5 分钟。术后 3 个月，对所有患者进行疼痛随访。根据数字评分量表（Numerical Rating Scale, NRS）得分将患者分为两组：NRS≥4 分为高疼痛（HP）组，NRS＜4 则为低疼痛（LP）组。随后分析两组患者的脑电信息，包括频谱信息、脑功能连接性分析，旨在探索差异显著的脑电特征以及临床显著的风险因素，以构建卷积神经网络模型预测乳腺癌术后慢性疼痛。
结果 1. 研究共筛选 100 名患者，最终 84 名患者纳入统计分析。其中 27 名（32.1%）报告术后中重度慢性疼痛（NRS≥4 分），被归为 HP 组； 57 名患者（67.9%）的 NRS＜4，即为 LP 组。结果显示，全乳切除术患者术后疼痛评分高于保乳手术（P=0.010），另外接受 ALND 的患者疼痛评分显著增加（P＜0.001）。
2. HP 组 F3、Fz、F4 电极 gamma 频段的功率谱显著高于 LP 组（F3：t=2.118， P=0.037；Fz：t=2.503，P=0.019；F4：t=2.394，P=0.014）。其他频段未见显著差异。
3. HP 组在额叶、岛叶、前扣带回区域 gamma 频段的连接强度显著增加。
4. 以临床指标包括手术类型、ALND、术后放疗情况以及脑电指标包括频谱以及连接性分析结果作为输入构建卷积神经网络模型，结果模型在 gamma 频段预测性能最佳， ROC 曲线下面积 0.891, 灵敏度 为 0.704, 特异度 为 0.930。整体而言，预测模型的准确率为 85.7%。
结论 1. 静息态脑电频谱以及大脑连接性和术后慢性疼痛呈现显著相关性。
2. 运用深度学习中的卷积神经网络模型结合临床指标以及脑电特征进行多变量综合分析，能够有效预测乳腺癌术后疼痛，表现出良好的性能。

PU-0349

线粒体物质代谢功能障碍引起 GSH 合成减少促进 FM 疾病进展

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目的 纤维肌痛（Fibromyalgia, FM）又称为纤维肌痛综合征，是一种慢性弥漫性疼痛综合征，其主要症状包括多部位疼痛、重度疲乏、僵硬感、睡眠障碍、认知障碍以及心理问题。FM 发病率高，在全球范围内患病率约为 4%，我国约有 4000 万到 6000 万的 FM 患者，且数量呈逐年上升趋势。FM 病因和发病机制目前仍不完全清楚，尚无针对病因的有效治疗方案。线粒体是细胞能量的动力源，同时也参与离子稳态、细胞生长、氧化应激、细胞信号传导的调节。因此，线粒体功能障碍将会参与许多人类疾病的发病机制和进展，但尚无在 FM 疾病中的相关研究。在本研究中，我们首先构建 FM 经典小鼠模型，然后分析其骨骼肌线粒体形态，最后通过代谢组学和转录组学联合分析探索线粒体功能障碍促进 FM 疾病进展的可能原因。

方法 将 SPF 级 10 周野生型 C57BL/6J 雌性小鼠随机分为纤维肌痛(FM)组和对照(Control)组。其中 FM 组小鼠腔注射利血平，1mg/kg/d，连续注射 3 d。利舍平溶解在 0.5%冰醋酸水溶液中。对照组小鼠使用相同浓度和剂量的冰醋酸溶液，未添加利舍平。利用 VonFrey 纤维丝、热板、高架十字迷宫、强迫游泳、抓力实验评估机械痛阈、热痛阈、焦虑、抑郁和骨骼肌运动功能，确定 FM 建模是否成功。接下来利用电镜观察骨骼肌线粒体的形态，并进行线粒体损伤评分。物质代谢是线粒体的主要功能之一，利用代谢组学评估骨骼肌的物质代谢水平。基因组表达变化会引起物质代谢改变，我们利用转录组学评估骨骼肌的基因表达。同时利用代谢组学和转录组学结果进行 KEGG 富集分析，构建 FM 疾病的分子调控网络，深层探究引起 FM 疾病发生的分子机制。最后利用 GSH/GSSG、DHE 试剂盒检测验证组学结果。

结果 与 Control 组小鼠相比，FM 组小鼠表现出机械痛敏、热痛敏、焦虑、抑郁（图 1），提示 FM 模型构建成功。同时，与 Control 组小鼠比较，FM 组小鼠骨骼肌出现线粒体更严重的线粒体损伤，包括线粒体嵴消失、水肿、膜破裂（图 2）。与对照组比较，FM 小鼠骨骼肌组织呈现代谢物质的明显改变，包括糖代谢、脂肪酸代谢、氨基酸代谢的全面抑制（图 3A、B）。同时，FM 小鼠骨骼肌组织也呈现基因组明显改变，包括显著性下调 1843 个基因和上调 1506 个基因（图 3C、D）。进一步联合富集分析发现，FM 小鼠的骨骼肌组织中出现谷胱甘肽（GSH）代谢和半胱氨酸、蛋氨酸代谢通路改变（图 3E）。体内验证实验表明，FM 组小鼠骨骼肌抗氧化产物 GSH 和氧化产物 GSSG 水平显著低于对照组小鼠（图 4A）。而 GSH 是体内主要的抗氧化物质，其合成减少将会导致活性氧自由基蓄积。体内验证实验进一步表明，与对照组比较，FM 小鼠呈现血浆和骨骼肌呈现 ROS 水平升高（图 4B-D）。

结论 FM 骨骼肌线粒体损伤将会引起线粒体物质代谢障碍，导致体内抗氧化物质 GSH 合成减少，引起 ROS 蓄积，进而刺激感受器神经元引起痛觉敏化，参与 FM 疾病进展。

PU-0350

Remifentanil-Induced Inflammation in Microglial Cells: Activation of the PAK4-Mediated NF-κB/NLRP3 Pathway and Onset of Hyperalgesia

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Background: The perioperative use of remifentanil often leads to the occurrence of postoperative

hyperalgesia, affecting postoperative recovery and prolonging hospitalization. Studies have shown that microglia-mediated NLRP3 inflammasome activation plays a crucial role in opioid-induced hyperalgesia, with NF-κB identified as the key activation point for NLRP3. However, the specific molecular pathways of postoperative hyperalgesia induced by remifentanil are still unclear. Therefore, this study aims to establish a remifentanil-induced hyperalgesia model and explore the potential molecular mechanism and key roles of the NF-κB/NLRP3 pathway in remifentanil-induced hyperalgesia through in vitro and in vivo respectively.
Method: We established a remifentanil-induced hyperalgesia model and conducted proteomic analysis to reveal differential protein expression in the spinal cord tissue of rats. In vivo, NLRP3 or PAK4 antagonists were intrathecally injected, and the mechanical pain threshold in the hind paws was evaluated using VonFrey testing. At vitro, NLRP3 or PAK4 inhibitors were separately applied, or lentivirus infection was conducted to silence PAK4, NF-κB, and NLRP3 genes. Protein levels were analyzed using immunohistochemistry, immunofluorescence, and Western blotting. Additionally, ELISA was used to measure the levels of IL-1β and IL-18, and RT-qPCR to assess the transcription of target genes.
Results: Proteomic results indicate that remifentanil upregulates PAK4 protein in the spinal cord tissue of rats at postoperative2 hours. Remifentanil induces morphological changes in the spinal cord dorsal horn tissue, upregulating the expression of PAK4, p-p65, NLRP3, and Iba-1 proteins, leading to the release of IL-1β and IL-18 and triggering an inflammatory response. Intrathecal injection of NLRP3 or PAK4 inhibitors alleviates remifentanil-induced hyperalgesia and the aforementioned changes. In vitro, downregulation of PAK4 suppresses the increasing PAK4, p-p65, NLRP3, and Caspase-1 induced by LPS. However, downregulation of NLRP3 does not affect the expression of PAK4 and p-p65 proteins, which is consistent with the animal experiments, suggesting that PAK4 is an upstream signaling molecule of NLRP3.Conclusion: Remifentanil can increase PAK4 expression in the spinal cord dorsal horn cells, mediating the NF-κB/NLRP3 pathway to activate microglial cells, thereby causing postoperative hyperalgesia.

PU-0351

背根神经节中损伤的胶原-DDR1 通路在神经病理性疼痛中的作用及机制研究

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目的 慢性神经病理性疼痛已成为临床相关学科的巨大挑战，亟待深入探索机制为临床治疗提供突破。胶原是细胞外基质的重要组成，损伤的胶原通过激活盘状结构域受体（DDR1）调节多种病理过程。鉴于 DRG 作为疼痛感知、转导和调节的关键结构，本研究旨在阐明损伤的胶原-DDR1 通路在神经病理性疼痛发生发展中的作用及机制，为治疗慢性神经病理性疼痛提供潜在靶点。
方法 本研究应用天狼星红染色、胶原杂交肽染色、RT-PCR 等技术探索 L4 脊神经结扎（Spinal Nerve Ligation, SNL）模型后 DRG 中 ECM 胶原的形态、结构和表达情况。应用蛋白质印迹法、RT-PCR、原位杂交等技术明确 DDR1 在模型动物 DRG 中的表达和分布，并结合基因敲减，条件基因敲除技术阐明 DDR1 在神经病理性疼痛中的作用。应用体外电生理技术深入研究断裂的胶原激活 DDR1 后通过影响 DDR1 下游信号通路调控神经元兴奋性的具体机制。
结果 小鼠 SNL 模型后 DRG 中多种类型的胶原 mRNA 表达上调，SNL 后 3 天、10 天、21 天 DRG 内均存在不同程度的胶原断裂。原位杂交结果显示，在 DRG 中 DDR1 只表达在神经元中。SNL 模型后，小鼠 DRG 中 p-DDR1 和 DDR1 在疼痛的发生和维持阶段处于显著高表达水平，抑制 DDR1 的表达及活性后小鼠的机械痛和热痛行为明显改善。随后，本课题进一步探寻了胶原断裂的分子机制，发现 DRG 内 ADAM8 等多种裂解 ECM 的酶表达上调，特异性敲降 ADAM8 的表达后小鼠异常的疼痛行为明显改善。同时，我们比较了 ADAM8 基因敲除小鼠和正常野生型小鼠 SNL 模型后 p-

DDR1 和 DDR1 的表达。结果显示，敲除 ADAM8 后小鼠 DRG 中 p-DDR1 和 DDR1 的表达显著降低。特异性敲降 DRG 感觉神经元中的 DDR1，可以显著降低神经元兴奋性标志物 p-ERK 及下游信号分子 p-FAK 的表达。此外，体外培养的神经元结果显示，在相同的电流刺激下，抑制 DDR1 后斜坡电流（ramp）和步阶电流（step）诱导的动作电位频率显著减少，基强度（Rheobase）明显增加，而动作电位峰值（AP Peak）和静息膜电位（RMP）无明显差异。提示抑制 DDR1 后可通过影响下游信号通路降低神经元的兴奋性。

结论 外周神经损伤引起 DRG 细胞外基质 ADAM8 表达及活性增强，裂解细胞外基质中胶原蛋白，断裂的胶原蛋白暴露出与 DDR1 的结合位点，促进感觉神经元内 DDR1 的活性及表达，激活的 DDR1 介导神经元兴奋性异常增加从而正向调控神经病理性疼痛的发生发展。该研究不仅可以从新的角度深入揭示外周神经损伤引起神经病理性疼痛的发病机制，也为开发以 DDR1 为精准治疗靶标的药物提供理论依据和潜在的临床应用前景。

PU-0352

脊髓中累积的 Tau 通过上调 IL-1β 和 BDNF 参与慢性炎症性疼痛

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目的 炎症性疼痛通常由外周组织损伤和炎症引发，常需使用抗炎和镇痛药物治疗，但现有药物治疗常伴随不良反应，包括胃肠不适和心血管事件。因此，本研究旨在进一步探讨炎症性疼痛的潜在机制，以期开发新的潜在药物治疗方法。

方法 研究人员使用左足注射完全佐剂（CFA）建立慢性炎症性疼痛模型。通过磷酸化蛋白组学测序，检测 CFA 组与生理盐水组中脊髓 L4-6 节段蛋白的磷酸化变化。使用蛋白免疫印迹实验和免疫荧光共定位实验检测脊髓 L4-6 节段中 p-Tau（Thr231）、总 Tau、IL-1β 和 BDNF 的蛋白表达水平和细胞类型定位。采用 AAV-shRNA 载体干扰脊髓背角神经元的 Mapt 基因，并使用柴胡皂苷 C 抑制 Tau 的 231 位点磷酸化，观察其对炎症性疼痛和相关蛋白表达的影响。最后，过表达 Mapt 基因和模拟 216 号位点磷酸化的突变体 GSK3BY216D 以研究 Tau 蛋白累积和相关分子机制。

结果 磷酸化蛋白组学测序结果显示，CFA 组中 Tau 蛋白的 231 位点磷酸化显著增加。蛋白免疫印迹实验结果表明，CFA 造模后的第 7 天，脊髓 L4-6 节段中 p-Tau（Thr231）、总 Tau、IL-1β 和 BDNF 的蛋白水平均显著增加，且免疫荧光共定位实验证实这些蛋白在脊髓背角的大多数神经元中表达。敲降神经元内的 Tau 可抑制 CFA 引起的 IL-1β 和 BDNF 的上调，减轻 CFA 引起的机械痛和热痛痛阈下降。抑制 Tau 的 231 位点磷酸化同样可缓解 CFA 引起的炎症性疼痛，减少 IL-1β 和 BDNF 的表达水平。过表达 Tau 蛋白可通过增加 IL-1β 和 BDNF 的表达诱导痛觉过敏。此外，CFA 造模后的第 7 天，Tau 的磷酸激酶 GSK3B 的表达水平增加，活化的 GSK3B 可增加 Tau 的 231 位点磷酸化，诱发痛觉过敏。

结论 本研究发现，在 CFA 诱导的炎症性疼痛中，脊髓神经元中累积的 Tau 通过增加 IL-1β 和 BDNF 表达水平而发挥作用。GSK3B 部分介导了 Tau 的累积。这些结果提示，脊髓背角中的 Tau 可能是治疗慢性炎症性疼痛的一个新的靶点。

PU-0353

LRRK2 抑制剂对神经病理性疼痛及小胶质细胞活化的影响

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目的 探讨外源性富亮氨酸重复激酶 2（LRRK2）抑制剂对神经病理性疼痛及小胶质细胞活化的影响。
方法 取 SD 大鼠随机分为对照组、模型组、GNE-7915 低剂量组（12.5mg/kg）、GNE-7915 中剂量组（25mg/kg）、GNE-7915 高剂量组（50mg/kg），每组 10 只，除对照组外的其余各组大鼠均行选择性坐骨神经损伤术以建立神经病理性疼痛模型，造模 7d 后以 LRRK2 抑制剂 GNE-7915 和阳性对照药氯胺酮分组处理，然后以机械性疼痛实验与热敏实验检测各组大鼠术后痛敏症状；以免疫荧光染色检测各组大鼠脊髓 Iba-1 阳性表达以评测其小胶质细胞活化情况；以酶联免疫吸附测定法（ELISA）检测各组大鼠脊髓促炎因子白细胞介素（IL）-1β、单核细胞趋化性蛋白-1（MCP-1）、IL-6 水平；以免疫荧光染色检测各组大鼠脊髓组织 p-LRRK2 阳性表达以评测其 LRRK2 激活情况；以免疫印迹实验检测各组大鼠脊髓组织 LRRK2、IL-1β、MCP-1、IL-6 蛋白表达。
结果 与对照组相比，模型组大鼠 PWML、PWTL 降低（P<0.05），脊髓组织 Iba-1 与 p-LRRK2 阳性细胞比例、IL-1β、MCP-1 与 IL-18 水平、p-LRRK2/LRRK2 与 IL-1β、MCP-1、IL-18 蛋白表达均升高（P<0.05）；与模型组相比，GNE-7915 低、中、高剂量组大鼠 PWML、PWTL 升高（P<0.05），脊髓组织 Iba-1 与 p-LRRK2 阳性细胞比例、IL-1β、MCP-1 与 IL-18 水平、p-LRRK2/LRRK2 与 IL-1β、MCP-1、IL-18 蛋白表达降低（P<0.05），且 GNE-7915 各组呈剂量依赖性（P<0.05）。
结论 外源性 LRRK2 抑制剂可通过抑制 LRRK2 信号与小胶质细胞激活而减轻炎症反应，进而缓解神经病理性疼痛。

PU-0354

S100A8/A9 蛋白复合体调控神经病理性疼痛中的作用

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目的 神经病理性疼痛是指由外周或中枢神经系统的直接损伤或者功能紊乱引起的疼痛，属于慢性痛的一种，临床表现为自发性疼痛、痛觉过敏、痛觉异常等。神经病理性疼痛的产生和维持机制仍不明确，严重困扰着人类健康。S100A8 和 S100A9 蛋白构成 S100A8/A9 异二聚体，S100A8/A9 蛋白复合体在免疫功能和炎症中发挥重要的作用。本研究旨在阐明 S100A8/A9 蛋白复合体调控神经损伤引起的慢性神经病理性疼痛中发挥的功能，并在此基础上探索其背后的机制。
方法 通过构建神经损伤所致的神经病理性疼痛小鼠模型（CCI 模型）并利用蛋白质印迹、免疫荧光、疼痛行为测定等方法开展研究。我们应用成年野生型 C57 小鼠建立神经病理性疼痛模型（CCI 模型）进行疼痛行为学测试，并通过 mRNA 测序、免疫荧光和免疫蛋白印记实验等方法检测 CCI 术后 3、7 和 15 天脊髓背角 S100A8 和 S100A9 的 mRNA 和蛋白质的表达变化和细胞定位。除此之外，我们应用成年野生型 C57 小鼠（雄性，10 周龄），分别鞘内注射不同浓度 S100A8/A9 蛋白复合体、S100A8 蛋白单体、S100A9 蛋白单体和生理盐水（对照），对鞘内注射 1h、3h、6h、12h、24h 和 48h 后的小鼠进行疼痛行为检测。应用成年野生型 C57 小鼠（雄性，10 周龄）建立 CCI 模型，分别在术后 3 天鞘内和腹腔注射 S100A8/A9 蛋白复合体抑制剂，并对鞘内和腹腔注射 1、2 和 3 天后的小鼠进行疼痛行为检测。
结果 我们的研究结果显示，CCI 术后小鼠脊髓背角中 S100A8 和 S100A9 蛋白表达上调，并主要

在脊髓背角的星形胶质细胞中表达。进一步发现，通过鞘内注射 S100A8/A9 蛋白复合体抑制剂可减轻 CCI 引起的神经病理性疼痛；通过鞘内注射 S100A8/A9 蛋白复合体可引起正常野生小鼠的机械痛敏和热痛敏，并诱发正常野生型小鼠脊髓背角胶质细胞活化。

结论 脊髓背角星形胶质细胞所表达的 S100A8/A9 蛋白复合体参与了神经病理性疼痛的调控并在其中发挥重要作用。

PU-0355

肠道菌群通过乙酸及其受体 FFAR2 介导小鼠慢性束缚应激诱导痛觉过敏的易感性

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目的 探讨肠道菌群及肠道中短链脂肪酸对小鼠慢性束缚应激诱导痛觉过敏易感性的作用及潜在机制。

方法 建立小鼠慢性束缚应激（CRS）诱导痛觉过敏模型。采用机械缩足阈值(PWMT)试验和热甩尾试验(TFT)评估疼痛阈值。16S 核糖体 RNA (16S rRNA)基因测序评价肠道菌群组成。运用代谢组学方法（气相色谱-质谱，GC-MS）检测小鼠粪便中 SCFAs 含量。免疫印迹法(WB)检测游离脂肪酸受体 2 (FFAR2)蛋白表达。连续 14 天经饮用水喂予乙酸钠评估外源性补充乙酸对 CRS 小鼠疼痛阈值的影响。

结果 1. 与对照组（CON）相比， CRS 小鼠在第 3、7、14 天出现机械痛阈值下降及热痛觉过敏（P＜0.05）。将 CRS 小鼠进一步聚类分析，可将其分为痛觉过敏易感组（SUS）、痛觉过敏非易感组（RES）。与 CON 组相比，RES 组小鼠在 CRS 第 0-14 天均未发生明显痛觉过敏（P＞0.05），而 SUS 组小鼠在 CRS 第 3 天出现机械痛阈值下降及热痛觉过敏并持续至第 14 天（P＜0.05）。2. SUS 组与 RES 组小鼠肠道中 15 种微生物的相对丰度存在显著差异（P＜0.05）。3. SUS 组小鼠粪便中乙酸、异丁酸及异戊酸的含量均显著低于 CON 组及 RES 组（P＜0.05），而 RES 组小鼠粪便中乙酸、丙酸、异丁酸、丁酸、异戊酸、戊酸、异己酸及己酸的含量均与 CON 组无明显差异（P＞0.05）。4. 相关性分析显示：粪便中乙酸含量与 Alistipes (r = 0.60784, P= 0.00745)和 Roseburia (r = 0.60919, P = 0.00728)相对丰度呈显著正相关，与 Eschericia - Shigella 呈显著负相关(r = -0.53596, P = 0.02187); 疼痛阈值（PWMT、TFT）与粪便中乙酸 (PWMT: r = 0.6649, P< 0.01; TFT: r = 0.5871, P< 0.05)、异丁酸(PWMT: r = 0.8154, P< 0.0001; TFT: r = 0.5727, P< 0.05)、异戊酸水平(PWMT: r = 0.7539, P< 0.001; TFT: r = 0.4789, P< 0.05) 含量呈正相关。5. SUS 组小鼠回肠、结肠及前扣带回（Anterior Cingulate Gyrus, ACC）组织中 FFAR2 的表达均显著低于 CON 组及 RES 组（P＜0.05），而 RES 组小鼠回肠、结肠及 ACC 组织中 FFAR2 表达与 CON 组之间的差异无统计学意义（P＞0.05）。 6. 使用抗生素建立伪无菌小鼠模型，伪无菌组（PGF_VEH）小鼠相比于 CON 组在第 0、3、7、14 天发生明显机械痛阈值下降及热痛觉过敏（P＜0.05）。进一步移植 RES 组及 SUS 组粪便菌群后发现：与 PGF_VEH 组相比，宿主接受 SUS 组粪便菌群移植后（PGF_SUS 组），第 0-14 天持续存在更为显著的机械痛阈值下降及热痛觉过敏（P＜0.05）；而宿主接受 RES 组粪便菌群移植后（PGF_RES 组），从移植后第 3 天起机械痛阈值及热痛阈值均恢复。7. PGF_SUS 组小鼠肠道中 8 种微生物的相对表达丰度显著低于 PGF_RES 组（P＜0.05）。8. PGF_SUS 组相比于 PGF_RES 组小鼠粪便中乙酸含量显著降低（P＜0.05），此外乙酸在 PGF_VEH 组的表达显著低于 CON 组。9. 相关性分析表明：粪便中乙酸含量与 g_Faecalibaculum 的相对丰度 (r = 0.52567, P = 0.00834) 、 PWMT (r = 0.8172, P<0.0001) 、 TFT (r = 0.7643, P<0.0001)呈正相关。10. 与 PGF_RES 组相比，PGF_SUS 组回肠、结肠及 ACC 中 FFAR2 的表达降低（P＜0.05），而 PGF_VEH 组 FFAR2 在回肠、结肠及 ACC 中的表达亦低于 CON 组（P＜0.05）。11. 与 CRS 小鼠相比，连续 14 天外源性补充乙酸可以显著提高 CRS 小鼠的

机械痛阈值、缓解热痛觉过敏现象（P＜0.05）。
结论 肠道菌群代谢物乙酸及其短链脂肪酸受体 FFAR2 介导小鼠对慢性束缚应激诱导痛觉过敏的易感性。补充外源性乙酸可缓解慢性束缚应激诱导的痛觉过敏。

PU-0356

基于文献计量学可视化分析疼痛内感受系统研究现状及发展趋势

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目的 通过文献计量学分析 1994 年~2024 年疼痛内感受系统的研究现状、研究热点及前沿领域。
方法 在 Web of Science 核心合集数据库中检索 1994 年 1 月 1 日~2024 年 3 月 10 日疼痛内感受系统相关英文文献。使用 CiteSpaceV6.3.R1、R 语言、VOSviewer 软件分析合作网络、共被引网络、共现网络、突现分析、聚类分析。
结果 共纳入 409 篇文献。1994 年~2024 年的年发文量整体呈增长趋势。美国的发文量最多，中国排第 5 位。发文量位列前 3 位的机构分别是加利福尼亚大学、伦敦大学和美国退伍军人事务部。合作网络分析提示国家间、研究机构合作较密切，研究者间合作较分散。塔尔萨大学的 Paulus, Martin P 发文量最多，Khalsa SS 的 Interoception and Mental Health: A Roadmap 作为参考文献被引频次最高。被引频次排名前 3 的作者分别为 CRAIG AD，CRITCHLEY HD，GARFINKEL SN。期刊《NAT REV NEUROSCI》被引频次最高。关键词共现图谱前 10 个高频关键词分别为疼痛、内感受系统、生理状态、脑、感受系统、慢性疼痛、意识、焦虑、情绪、敏感性。关键词聚类分析得出前岛叶脑区、催眠术、疼痛内感受系统临床验证、慢性疼痛正向干预治疗为当前研究热点。关键词突现分析表明，至今研究热点主要集中在评估量表可信度、记忆、情绪调节。
结论 国际上关于疼痛内感受系统的研究呈现上升趋势，各研究人员之间的合作有待提高，其量表可信度评价需要进一步完善。疼痛与情绪可能存在共同的反馈通路，需加强学科间交叉合作。

PU-0357

Parabrachial CGRP neurons is involved in neuropathic pain and electroacupuncture analgesia

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The therapeutic effect of electroacupuncture (EA) on neuropathic pain (NP) has been well-recognized clinically, but the underlying mechanisms are not yet fully understood. In this study, we randomly assigned 30 C57BL/6 male mice to the sham, CCI, and EA group. Except for the sham group, all the mice were induced with chronic constriction injury (CCI) to mimic clinical NP. The EA group received Zusanli (ST36) and Huantiao (GB30) for 30 minutes daily from Day 7 to Day 14. All mice in each group underwent the von Frey test, acetone test, sucrose preference test, open field test, and elevated plus maze to evaluate pain-like behaviors. The results confirmed that EA could alleviate pain-like behaviors in CCI mice. Next, we used immunofluorescence and fluorescence in situ hybridization and found that PBN^{CGRP} neurons are involved in NP and EA treatment. Then, we applied chemogenetics to Calca-Cre mice and found that specific inhibition of PBN^{CGRP} neurons could alleviate pain-like behaviors in CCI mice. On the contrary, specific activation of PBN^{CGRP} neurons could reverse the therapeutic effect of EA.

In conclusion, the current study indicates that PBN^{CGRP} neurons drive NP, and EA exerts its analgesic effects by suppressing the activation of PBN ^{CGRP} neurons.

PU-0358

Targeting the PI3K-mTOR signaling pathway in the anterior cingulate cortex improves pain responses, emotional behavior, and locomotor activity in rats with bone cancer pain

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Objective: To investigate the effects of targeting the PI3K-mTOR signaling pathway in the anterior cingulate cortex (ACC) on pain responses, locomotor activity, and emotional behavior in rats with bone cancer pain.
Methods: Bone cancer pain was induced by implanting Walker 256 cells into the rat. Pain responses were assessed using paw withdrawal threshold and latency measurements, while locomotor activity and negative mood were evaluated through open field and conditioned place aversion tests, respectively.
Results: The results showed that the bone cancer pain model led to allodynia, hyperalgesia, decreased ambulation, and ACC microglial activation.Morphine treatment improved pain responses but did not affect locomotor activity or mTOR protein expression.In contrast, rapamycin treatment reduced pain, improved locomotor activity, and decreased negative mood. It also downregulated PI3K-mTOR protein expression.Furthermore, inhibiting the PI3K-mTOR pathway with a PI3K inhibitor or rapamycin not only improved pain responses and locomotor activity but also reduced depression and anxiety-like behaviors.These effects were accompanied by changes in paw withdrawal threshold, latency, static time, and PI3K-mTOR protein expression.
Conclusions: Targeting the PI3K-mTOR signaling pathway in the ACC effectively alleviates pain-related symptoms and emotional disturbances in rats with bone cancer pain.This approach holds promise for improving pain management and emotional well-being in patients after from bench to bedside further study.

PU-0359

FMRP 调控脊髓促炎细胞因子表达参与术后慢性疼痛的机制研究

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目的 术后慢性疼痛（Chronic postsurgical pain，CPSP）是手术后并发的一类疼痛综合征，其在术后出现且疼痛至少持续两个月，并排除其他原因所致疼痛（如恶性肿瘤的延续或复发、慢性感染等）。脆性 X 智力低下蛋白（Fragile X mental retardation protein，FMRP）由 Fmr1 基因编码，Fmr1 的沉默会导致脆性 X 综合征，这是与遗传性智力低下相关的最常见疾病之一。在脆性 X 综合征患者中报告了自残行为，表明疼痛通路的敏化存在潜在缺陷。Fmr1 KO 小鼠对鞘内注射 I 组代谢型谷氨酸受体（mGluR1 / 5）激动剂 DHPG 的反应伤害行为几乎不存在。我们利用鞘内注射 Fmr1siRNA 下调脊髓中 FMRP 的表达，来研究脊髓 FMRP 在术后慢性疼痛小鼠中的作用及其分子

机制。
方法 (1)将实验小鼠随机分为皮肤/肌肉切口牵拉组(SMIR 组)和皮肤/肌肉只切开不牵拉组(Sham 组), 在术前 1 天、术后第 1、3、7、10、14、18 天检测其机械缩足反射阈值及热缩足潜伏期。(2)利用 WesternBlot 和免疫荧光技术明确 SMIR 小鼠脊髓 FMRP 蛋白水平变化及脊髓细胞定位，初步推断脊髓 FMRP 的作用机制。（3）利用酶联免疫吸附实验和免疫荧光技术检测 SMIR 小鼠脊髓 TNF-α 和 IL-6 水平的变化及与脊髓 FMRP 是否共定位。利用免疫共沉淀实验检测脊脊髓 FMRP 是否与 TNF-α 和 IL-6 相互作用。（4）利用脊髓沉默技术、Western Blot 以及酶联免疫吸附实验明确 SMIR 小鼠鞘内注射 Fmr1 siRNA 后脊髓 FMRP 蛋白、 TNF-α 和 IL-6 水平的变化。
结果 预期实验结果：与 Sham 组相比，SMIR 小鼠脊髓 FMRP 蛋白水平升高，且脊髓 TNF-α 和 IL-6 水平升高并与脊髓 FMRP 共定位。SMIR 小鼠鞘内注射 Fmr1 siRNA 后脊髓 FMRP 蛋白水平降低，且脊髓 TNF-α 和 IL-6 水平降低。
结论 脊髓 FMRP 通过调控脊髓促炎细胞因子表达参与术后慢性疼痛的发生发展。

PU-0360

miRNA 在神经病理性疼痛中的作用

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目的 神经病理性疼痛是影响体感系统的病变或疾病的直接后果而引起的疼痛，是一种常见的慢性疾病，目前主要的治疗方法是药物治疗，但这只能使少数神经病理性疼痛患者的疼痛得到缓解，不能根治，并且药物治疗还存在较大的副作用和禁忌症，因此我们需要寻找更有效的治疗方法。最近研究发现，miRNA 在神经病理性疼痛的发生、发展中起着重要的作用。目前对 miRNA 的研究尚处于早期阶段，所以对 miRNA 在神经病理性疼痛中的作用做一综述，以期为神经病理性疼痛的治疗找到新的靶点。

PU-0361

颅面多汗症及其治疗现状

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多汗症（Hyperhidrosis，HH）是一种皮肤病，其定义为出汗量超过体温调节需要。在临床上，当过度出汗造成患者明显的情绪、身体或社会不适，对患者的生活质量造成负面影响时，可诊断为 HH。有统计学结果显示：该疾病的患病率在男女性别上并无明显差异，但男性似乎更容易出现颅面多汗症，而女性更容易出现腋窝多汗症。在美国多汗症的患病率约为 4.8%，在中国多汗症的患病率约为 2.08% 。在临床上，通常我们会将多汗症分为原发性多汗症（Primary hyperhidrosis，PHH）与继发性多汗症（secondary hyperhidrosis， SHH）。原发性多汗症多无器质性的病因，典型的临床表现为局部、双侧和对称分布的多汗，部分患者具有明显的家族史。其具体的发病机制并不明确，可能是由于汗腺中胆碱能活动的过度增加所致。继发性多汗症则由潜在的病理性的原因所引起，如神经系统、代谢、内分泌疾病、药物或手术等。继发性多汗症通常于 25 岁以后发病，缺乏明显的家族史，常常伴有夜间出汗症状。根据患者的病史、查体、检验学结果与影像学结果，进行诊断与鉴别诊断。
多数多汗症患者于青少年时起病。由于多汗症患者在无明显诱因时就会出现不同程度的流汗情况，在情绪紧张、天气炎热时出汗情况将更加严重，对其社交、学习与生活产生严重的困扰，部分患者

会出现焦虑或抑郁的情绪。因病人的皮肤长时间处于温暖湿润的环境中，局部感染的总体风险（包括细菌、真菌和病毒）显著增加，从而易出现各种皮肤系统的疾病，进一步增加了患者的生理、心理负担。
现如今对于多汗症的治疗方式在选择上更为多元化，越来越多的文献推荐将外用格列吡酯、口服奥昔布宁和注射肉毒杆菌毒素作为一线的治疗方案，它们有不错的有效性和良好的安全性。当患者对这些保守治疗效果不满意或者无法耐受时，在临床条件允许的条件下，可以考虑行交感神经切断手术。但应该注意的是，术后代偿性多汗的风险较高，医生应该向患者解释清楚手术可能带来的并发症问题，使患者能够做出知情的决定。

PU-0362

艾司氯胺酮对妇科腹腔镜手术患者术后恢复质量及焦虑抑郁情绪的影响

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目的 探究艾司氯胺酮对妇科腹腔镜手术患者术后恢复质量及焦虑抑郁情绪的影响。
方法 选取 2023 年 5 月至 12 月行择期妇科腹腔镜手术的患者 111 例，年龄 18～32 岁，体质量指数（body mass index，BMI）18～28 kg/m2, 美国麻醉医师协会（American Society of Anesthesiologists，ASA）分级 I-II 级。采用随机数字表法分将患者分别纳入 2 组：对照组（C 组）和艾司氯胺酮组（E 组）。记录两组患者术前 24 h、术后 24 h 及 72 h 的 40 项恢复质量量表（40-item Quality of Recovery Scale, QoR-40）评分。记录术前 24 h、术后 24 h 及 72 h 的焦虑自评量表（self-rating anxiety scale，SAS）评分、抑郁自评量表（self-rating depression scale， SDS）评分。记录两组患者术中丙泊酚和瑞芬太尼的用量，苏醒时间和出室时间。记录两组患者术后 1 h、3 h、6 h、12 h 及 24 h VAS 评分。记录两组患者术后不良事件（躁动、谵妄、头晕头痛、恶心呕吐及补救镇痛）发生情况。
结果 与 C 组相比，E 组患者术后第一天及第二天 QoR-40 评分在身体舒适度、情绪状态和疼痛 3 个维度以及总分较高，且差异具有统计学意义（P＜0.05）；与 C 组相比，E 组患者术后第二天在心理支持维度评分较高，且差异具有统计学意义（P＜0.05）。两组患者术前 1 d SAS 评分、SDS 评分差异无统计学意义；与 C 组相比，E 组患者术后 1 d、术后 3 d SAS 评分、SDS 评分均显著较高，且差异具有统计学意义（P＜0.05）。与 C 组相比，E 组患者两组患者丙泊酚用量、瑞芬太尼用量、苏醒时间及出室时间均显著小于 C 组，且差异具有统计学意义（P＜0.05）。E 组患者术后 1 h、3 h、6 h 及 12 h 的 VAS 评分均显著低于 C 组，差异有统计学意义（P＜0.05）。两组患者术后不良反应发生率比较差异无统计学意义（P＞0.05）。
结论 术中静脉输注艾司氯胺酮能够显著增加妇科腹腔镜手术患者术后早期恢复质量，改善患者术后负性情绪，并降低患者术后早期疼痛评分，不增加患者术后不良反应的发生，在心理和生理上均有助于患者术后康复，符合 ERAS 理念，值得在此类手术患者群体中推广使用。

PU-0363

Preoperative living arrangements and postoperative cognitive dysfunction in patients undergoing radical surgery for lower abdominal malignant tumors: a prospective cohort study

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Background: Risk factors for postoperative cognitive dysfunction (POCD) include age and years of education. However, the relationship between living arrangements and POCD incidence is underexplored.
Aim: To explore the relationship between living arrangements and POCD incidence.
Methods: This prospective cohort study involved 487 patients aged 60 and above who underwent radical surgery for lower abdominal malignancies and 90 nonsurgical control patients. The patients were divided into four groups based on their living arrangements. Before surgery, as well as at seven days and three months post-surgery, all participants completed 10 neuropsychological tests.
Results: Patients who lived alone before surgery had a higher POCD incidence at seven days postoperatively than those who lived with their spouses or their spouses and children. However, there was no significant difference in POCD between patients who lived with their children before surgery and the other groups. Furthermore, at three months post-surgery, patients who lived alone before surgery still exhibited a higher POCD incidence than those who lived with their spouses. Again, there was no significant difference in POCD between patients who lived with their children and those who lived with their spouses, children, or the other groups.
Discussion: We assessed POCD incidence and cognitive decline using a reliable index of change based on the control group results.
Conclusions: Older adults who lived alone had a significantly higher POCD incidence at seven days and three months post-surgery than those who lived with their spouses. However, living with children was not a protective factor in reducing POCD incidence.

PU-0364

Hemodynamic Influences of Remimazolam Versus Propofol During the Induction Period of General Anesthesia: A Systematic Review and Meta-analysis of Randomized Controlled Trials

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Background: Remimazolam is a novel ultrashort-effect benzodiazepine. In 2020, the US Food and Drug Administration approved it for procedural sedation. Remimazolam is beneficial for consistent sedation and quick recovery in painless gastrointestinal endoscopy. Propofol is one of the most commonly used intravenous anesthetics in clinical practice. Recently, only a few studies have compared propofol with remimazolam for general anesthesia induction.

Objectives: The purpose of our systematic review and meta-analysis was to compare the hemodynamic effects of remimazolam and propofol during the induction of general anesthesia.
Study Design: Systematic review and meta-analysis of randomized, controlled trials.
Methods: The authors retrieved the PubMed, Embase, Cochrane Library, and Web of Science databases for studies published through September 30, 2022, which reported relevant prospective randomized controlled trials (RCTs) comparing remimazolam with propofol for general anesthesia. The primary outcome was hemodynamic changes, including the absolute value of fluctuation of mean arterial pressure (ΔMAP) and heart rate (ΔHR). The secondary outcomes were the following 2 indicators: the occurrence of total adverse events and the quality of recovery from general anesthesia at 24 hours postsurgery. RevMan 5.4.1 (The Nordic Cochrane Centre for The Cochrane Collaboration) and trial sequential analysis were used to execute the statistical analyses. The different domains of bias were judged by the Cochrane risk of the bias assessment tool.
Results: The authors identified 189 papers in PubMed, Embase, Cochrane Library, and Web of Science. Eight articles with 964 patients were selected. The included studies had moderate quality. For primary outcomes, the lower ⊿HR (mean difference [MD] = -4.99; 95% CI, -7.97 to -2.00; I^2 = 41.6%; P = 0.001) and ⊿MAP (MD = -5.91; 95% CI. -8.57 to -3.24; I^2 = 0%; P <0.0001) represent more stable hemodynamic characteristics in the remimazolam group. Regarding secondary outcomes, a considerably lower incidence of total adverse events was noted in the remimazolam group than that for the propofol group (odds ratio [OR] = 0.40; 95% CI, 0.28 to 0.58; I^2 = 63%; P < 0.00001). In comparison to the propofol group, remimazolam achieved an advantage score of quality of recovery -15 in 24 hours postsurgery (MD = 5.31, 95% CI, 1.51 to 9.12; I^2 = 87%; P = 0.006).
Limitation: Firstly, there are only a handful of published RCTs on the administration of remimazolam in general anesthesia. In addition, due to patient privacy, we could not extract individual patient data, therefore we could not combine and assess any variations in patient characteristics.
Conclusion: Evidence suggests that remimazolam has a lower hemodynamic effect during general anesthesia and fewer perioperative adverse effects after general anesthesia than propofol; however, which agent is superior regarding quality benefit in postoperative recovery based on the studies included here remains inconclusive. Additional RCTs with updated meta-analyses to enlarge the sample size and properly analyze the benefit-to-risk ratio to patients are needed to determine the evidence for such a relatively new medicine.

PU-0365

B 超引导下椎板后阻滞与竖脊肌平面阻滞在脊柱手术患者中的应用效果观察

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目的 探讨 B 超引导下椎板后阻滞（RLB）与竖脊肌平面阻滞（ESPB）在脊柱手术患者中的应用效果。
方法 选取 2022 年 6 月-2023 年 6 月我院收治的 80 例脊柱手术患者，根据使用的麻醉方法不同分为对照组 38 例，椎板组 42 例。其中对照组男 20 例，女 18 例；年龄 20-70 岁，椎板组男 22 例，女 20 例；年龄 20-70 岁。
对照组采用 ESPB，患者侧卧，根据其体型选择合适的探头，并从白骶骨中线开始进行扫描，将手术部位放置于超声图像中心点，向两侧平行，显示出竖脊肌、横突、关节等超声解剖标志，从探头内侧刺入竖脊肌中，观察针刺部位的竖脊肌和横突之间有无异常，若无异常便回抽，回抽无血后，缓慢注射 0.375%罗哌卡因 15ml/侧，注射完成 15min 后，以针刺的形式来判断阻滞和麻醉效果，若患者没有感觉针刺疼痛则可进行手术，若患者感觉疼痛则加注 0.375%罗哌卡因 5ml/侧。
椎板组采用 RLB,患者体位和超声引导方法与对照组一致，待超声引导结束后，从探头外侧刺入神

经阻滞针，方向从尾侧向头侧，当针尖刺入椎板时停止进针，回抽无血后，缓慢注入 0.375%罗哌卡因，15ml/侧，以针刺形式判断阻滞和麻醉效果（加注麻醉方法与对照组一致）。
观察指标（1）采用视觉模拟评分量表（VAS）评估术后 2h、4h、6h、8h、12h 患者疼痛程度，其分数越高表明患者疼痛程度越严重。（2）记录两组患者麻醉所需时间、麻醉维持时间。（3）记录两组患者不良反应发生率。
结果 椎板组术后 2h、4h、6h、8h、12hVAS 评分均低于对照组，差异具有统计学意义（P＜0.05）；椎板组麻醉所需时间短于对照组，麻醉维持时间长于对照组，差异具有统计学意义（P＜0.05）；两组不良反应差异比较无统计学意义（P＞0.05）,研究两组不良反应差异比较无统计学意义，说明两种阻滞方法均安全可靠。
结论 在 B 超引导下将椎板后阻滞应用于脊椎手术中，能够明显缓解患者疼痛感，且麻醉所需时间较短，麻醉持续时间较长，安全可靠，值得推广使用。

PU-0366

肺叶切除术中动脉氧分压及脉搏氧饱和度与术后急性心肌损伤的关系：一项回顾性队列研究

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目的 探讨肺叶切除术中动脉氧分压及脉搏氧饱和度与术后急性心肌损伤（MINS）的关系。
方法 纳入2017年7月－2022年1月于北京大学第一医院在全身麻醉下择期行肺叶切除术的患者，术中最低 PaO2＞100mmHg 且术中 SpO2 均≥90%被定义为高氧组（n=1389），术中最低 PaO2≤100mmHg 且/或术中出现过 SpO2＜90%则被定义为非高氧组（n=954）。主要观察终点为术后 30 天内 MINS 的发生情况。采用多因素 logistic 回归分析术中高氧与 MINS 的关系。
结果 共纳入 2343 例患者，MINS 发生率为 14.8%（347/2343）。高氧组 MINS 发生率高于非高氧组[16.6%(230/1389) vs. 12.3%(117/954)，RR=1.420，95% CI 1.117~1.804，P=0.005]。多因素 logistic 回归分析显示，术中高氧使 MINS 风险增加至 1.454 倍（95% CI 1.117~1.893，P=0.005）；此外，男性、高龄、肺恶性肿瘤、改良心脏风险指数(RCRI)分级高、术前血白蛋白浓度低、ASA 分级为 III-IV 级、采用静吸复合麻醉、术中使用去氧肾上腺素、术中输入红细胞、术中出现 SBP<90mmHg 以及手术时间长也是 MINS 的独立危险因素。
结论 术中高氧状态是 MINS 的独立危险因素。

PU-0367

术前口服碳水化合物溶液的研究现状及展望——基于 CiteSpace 的文献计量学分析

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目的 麻醉前 2h 口服碳水化合物溶液（Preoperative Oral Carbohydrate, POC）可显著缓解择期手术患者术前主观不适感，缓解术后胰岛素抵抗，且并不增加反流误吸风险。目前，POC 已成为加速术后康复（Enhanced Recovery After Surgery, ERAS）不可或缺的一环，但相关的文献计量学研究尚未见报道。基于 CiteSpace 软件，本文拟通过对 POC 研究领域进行可视化，展现 POC 研究领域的基本结构及发展进程，以了解 POC 领域的知识来源、研究现状，并阐述亟待解决的问题。

方法 采用 CiteSpace6.1.1R6 (64-bit) Basic 软件，以 Web of Science 核心合集为资料来源，限定子库为 SCI-Expanded，时间段限制 2013 年 1 月 1 至 2023 年 1 月 1 日，检索式设定为（TS = Preoperative oral carbohydrate OR TS = preoperative carbohydrate loading），语种限定为英文，文献类型限定为论文和综述。软件参数设定时间切片（time slice）为“1”。对所纳入文献进行发文量、作者、国家、机构、被引作者、被引文献、关键词共现和高频词贡献聚类分析。
结果 最终纳入 244 篇文章。近 10 年来，发文量整体呈上升趋势。发文量前三的国家为：美国（69 篇，28.28%）、中国（45 篇，18.44%）和英国（25 篇，10.25%）。美国发文量最多，且被引量最大；我国发文量排名第二，但国际影响力较弱，与其他国家的合作较少，国内各机构间缺乏联系。POC 领域主要行形成以 Olle Ljungqvist 为主的核心团队，系 ERAS 项目的先驱之一，曾任职欧洲 ERAS 协会执行主席和欧洲临床营养学会（ESPEN）主席。按共被引频次排序，Jonas Nygren 共被引高达 117 次，其次为 Olle Ljunqvist。“加速康复”作为高频关键词，共出现 73 次，位居榜首，其为 POC 实践的根本目的。突现词反映 POC 的发展趋势和研究前沿，“随机对照试验”作为 POC 领域重要的研究方法，突现强度最大且持续时间长。“照护”、“风险”、“应激反应”及“康复”在 2020 年突现至今，映证了现代医学多维度照护的理念。基于关键词聚类，排名前 5 位的热点话题为“胰岛素抵抗”，“围术期管理”，“术前碳水化合物治疗”，“术后并发症”以及“营养风险”，而在 2019 年以后，陆续出现“术后疼痛”、“血糖管理”、“恶心呕吐”、“并发症”等关键词。
结论 近 10 年间，POC 领域发文量呈总体上升态势。欧美各机构间联系紧密，发文量、影响力仍居主导地位。目前，POC 研究以外科手术患者为主，以临床试验为主要研究方式。近几年来，研究热点集中在“照护”、减少“应激反应”及“康复”等方面，且研究者们更关注 POC 应用的安全性，及如何减少围手术期并发症的发生，充分体现了生物医学模式向生物-心理-社会医学模式的过渡。我国虽然在 POC 领域起步较晚，但已取得令人瞩目的成绩，今后应更注重机构间的相互合作，提升文献质量，以增加国际影响力。

PU-0368

利多卡因联合右美托咪定对肥胖患者腹腔镜袖状胃切除术后苏醒期质量的影响

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目的 探讨利多卡因联合右美托咪定对接受腹腔镜袖状胃切除术的肥胖患者术后苏醒期质量的影响。
方法 选取 2023 年 1 月至 2023 年 12 月期间在内蒙古自治区人民医院择期行腹腔镜袖状胃切除术的肥胖患者 120 例，年龄 18～50 岁，BMI＞30kg/m²，术前无严重心血管及肺部疾病，无心律失常病史，无利多卡因或右美托咪定过敏史。 采用随机数字表法将患者随机分成四组（n=30），分别是 L 组：诱导前 10min 静脉输注利多卡因 1.5mg/kg，随后以 1.5mg/kg/h 的速度泵注至手术结束前 30min；D 组：诱导前 10min 静脉输注右美托咪定 0.5ug/kg，随后以 0.3g/kg/h 的速度泵注至手术结束前 30min；DL 组：诱导前 10min 静脉输注右美托咪定 0.5ug/kg 及利多卡因 1.5mg/kg，随后右美托咪定以 0.3g/kg/h 速度泵注至手术结束结束前 30min，利多卡因以 1.5mg/kg/h 的速度泵注至手术结束前 30min；C 组：输注等容量 0.9%的生理盐水。比较各组患者苏醒时间、拔管时间及拔管质量评分；比较各组患者拔管时（T1）、拔管后 10min（T2）、拔管后 1h（T3）的 Riker 镇静-躁动评分及 NRS 疼痛评分；比较各组患者术中瑞芬太尼、舒芬太尼的用量；比较各组患者术后 24h 内恶心、呕吐、低氧血症等不良反应的发生率。
结果 四组患者在性别、年龄、BMI、ASA 分级、手术时间、苏醒时间和拔管时间等方面的比较，差异无统计学差异（P＞0.05）。与 C 组相比，L 组、D 组及 DL 组拔管质量评分明显降低；且与 L 组相比，DL 组拔管质量评分更低(P<0.05)。与 C 组相比，L 组、D 组及 DL 组在 T1、T2 时 Riker 镇静-躁动评分降低，且 DL 组 Riker 镇静-躁动更低 (P<0.05)。在 T3 时，与 L 组、D 组相比，DL 组

Riker 镇静-躁动评分较低 (P<0.05)。与 C 组相比，在 T2、T3 时 L 组、D 组及 DL 组 NRS 疼痛评分下降，且 DL 组 NRS 疼痛评分更低 (P<0.05)。与 C 组相比，L 组、D 组及 DL 组瑞芬太尼、舒芬太尼用量均减少 (P<0.05)。与 C 组相比，L 组、D 组及 DL 组术后 24 h 内恶心、呕吐的发生率降低 (P<0.05)，所有患者均未发生低氧血症。

结论 接受腹腔镜袖状胃切除术的肥胖患者术中应用右美托咪定、利多卡因及两者联合均能降低拔管质量评分，减少拔管时呛咳、术后躁动，减少阿片类药物用量，减轻术后疼痛，降低术后不良反应发生率，且未致肥胖患者呼吸抑制，不延长苏醒和拔管时间，提高肥胖患者全麻苏醒期质量，有利于肥胖患者术后恢复。联合应用利多卡因与右美托咪定可提供更佳的镇静、镇痛效果，值得推广应用。

PU-0369

右美托咪定对非心脏手术全身麻醉老年人术后认知功能障碍的影响

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目的 术后认知功能障碍（POCD）被定义为手术后认知功能的下降，是全身麻醉手术后患者常见的术后认知障碍，特别是在老年人群中，研究发现，术后最初几周内，有 30%至 60%的患者发生 POCD。目前已知 POCD 对受影响患者的主观认知功能和生活质量（产生负面影响）。研究表明，它还会增加痴呆和死亡的风险。 因此，从公共卫生的角度来看，POCD 是一个令人担忧的原因，它超过了与认知缺陷相关的问题。尽管 POCD 患病率很高，导致的负面影响也很大，但目前对 POCD 研究不足，相关危险因素及预防因素未完全发现，因此目前手术患者术后风险及如何降低风险是不可预测的。右美托咪定（DEX）是一种 α2 肾上腺素受体激动剂，对 α2 受体具有高度选择性，作用于 α2 腔规则位点的受体促进镇静，并在脊髓背角上，减少 P 物质的释放并产生镇痛。DEX 在围手术期发挥各种临床功效，提供出色的镇静和镇痛，呼吸抑制最小。此外，越来越多的研究表明，DEX 可能赋予神经保护作用，与减少术后认知功能障碍以及提高患者满意度有关。因此，本研究的目的是评估右美托咪定对老年人非心脏手术全身麻醉患者的术后认知功能障碍的影响以及右美托咪定是否能成为老年患者预防 POCD 的措施之一。

方法 对随机和双盲临床试验（RCTs）进行了系统评价和荟萃分析，评估了接受 DEX 或安慰剂的全身麻醉下接受选择性手术的老年人（60 岁及以上）。检索包括在 PubMed、Embase 和 Cochrane 数据库中以中文及英文发表的文章，使用右美托咪定，认知，轻度认知障碍及术后认知等关键词。纳入重复出版物、涉及心脏手术或使用主动对照（盐水溶液除外）的研究。采用 DerSimonian-Laird 方法对二分类变量采用随机效应模型，对二分类变量进行优势比（OR）估计，对连续变量采用加权均数差，其置信区间分别为 95%置信区间（95%CI）

结果 在确定的 553 篇文章中，选择了 18 篇，包括 2，904 名患者（DEX 组和对照组分别为 1，679 名和 1，225 名患者）。我们发现，无论使用何种麻醉技术，DEX 的使用都被认为是术后认知和行为功能障碍的保护因素（OR = 0.40;95%CI 0.23–0.57 和 p < 0.001）。

结论 右美托咪定与接受全身麻醉非心脏手术的老年患者 POCD 风险降低有关，基于这些发现，右美托咪定可被视为老年患者 POCD 的预防措施。

PU-0370

Effect of ciprofol-based total intravenous anesthesia on metabolic syndrome patient combined with diabetes and OSAHS undergoing sleeve gastrectomy: a case report

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The perioperative anesthesia management in metabolic syndrome patients is challenging. Ciprofol is a novel agent for intravenous general anesthesia and has the advantages of fast onset, fast elimination, stable circulation as well as few adverse reactions. However, the efficacy of ciprofol in morbid obese patients have not been reported. Here we describe a case where ciprofol-based total intravenous anesthesia was successfully used for anesthesia maintenance in metabolic syndrome patient combined with diabetes and obstructive sleep apnea-hypopnea syndrome (OSAHS) undergoing sleeve gastrectomy.
Case presentation: This study involved a 25-year-old male patient who had complicated with morbid obesity and metabolic syndrome (body mass index =45.1). He had diabetes and severe OSAHS with a high STOP-BANG score. Ciprofol was administered for induction (0.4 mg kg^{-1}) of general anesthesia. After intubation, ciprofol-based total intravenous anesthesia (0.8-1.2 mg kg^{-1} h^{-1}) was adopted intraoperatively. During the entire operation, the bispectral index, hemodynamics and blood oxygen saturation were maintained at normal levels. The patient was awake and extubation was performed smoothly 15 minutes after operation without serious adverse events related to ciprofol. He was transferred to postanesthesia care unit and returned to the ward after 1 hour safely.
Conclusions: Ciprofol may be a safe and effective agent for anesthesia to morbid obese patients. Ciprofol-based total intravenous anesthesia can be administered for metabolic syndrome patients and may have advantages over propofol for hemodynamic stabilization in anesthesia maintenance during sleeve gastrectomy.

PU-0371

Effect of ultrasound-guided stellate ganglion block on postoperative nausea and vomiting after general anesthesia: A meta-analysis, meta-regression and trial sequential analysis of randomized controlled trials

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Objective: The aim of this meta-analysis was to evaluate the effect of ultrasound-guided stellate ganglion block (USGB) on postoperative nausea and vomiting (PONV) after general anesthesia.
Methods: we conducted a meta-analysis and meta-regression analysis of randomized controlled trials (RCTs) comparing the effect of USGB on PONV in adult patients after general anesthesia. PubMed, Embase, Web of Science, The Cochrane Library, and CNKI were systematically searched until March 2024 for relevant RCTs. The primary outcome was the incidence of PONV. Secondary outcomes included the incidence of postoperative nausea (PON) and postoperative nausea and vomiting (POV). Trial sequential analysis (TSA) was also carried out to calculate the required information size.
Results: 15 trials and 1309 participants were included in the final analysis. USGB reduced the incidence of PONV (risk ratio [RR], 0.59 [95% confidence interval {CI}, 0.50–0.70]; P <0 .0001; I2 =

13%) as well as the risk of POV (RR, 0.49 [95% CI, 0.51–0.81]; P <0 .0001; I2 = 52%) in comparison to controls. In addition, TSA indicated that the Z curve for USGB not only crossed the conventional boundary, but also the TSA boundary for benefit. And further studies are unlikely to alter the conclusions regarding the incidence of PONV. Meta-regression analyses found no significant impact of age, female proportion, type of surgery, type of anesthesia, sample size and prophylactic administration of antiemetic on the correlation between USGB and the risk of PONV.

Conclusion: This meta-analysis suggested an association of USGB with a decreased incidence of PONV and POV after general anesthesia. TSA suggested that no more trials are needed to confirm that USGB effectively reduced the incidence of PONV.

PU-0372

COVID-19 vaccination may prevent postoperative delirium in elderly patients undergoing elective non-cardiac surgery: the PNDRFAP and PNDABLE studies

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Background: Postoperative delirium (POD) is common in geriatric patients after surgery. We conducted two clinical studies to determine whether COVID-19 vaccination is a protective factor for POD and to explore the mediating role of CSF biomarkers in this process.

Methods: We conducted two clinical studies, Perioperative Neurocognitive Disorder Risk Factor and Prognosis (PNDRFAP) and Perioperative Neurocognitive Disorder and Biomarker Lifestyle (PNDABLE), in which patients more than or equal to 65 years old who have had elective non-cardiac surgery were enrolled. The preoperative cognitive status of participants were evaluated by Mini-Mental State Examination (MMSE) one day preoperatively. POD was assessed by Confusion Assessment Method (CAM). We used the mediation model to analyze the relationship between CSF biomarkers, COVID-19 vaccination and POD, as well as Dynamic Nomogram to calculate the incidence of Non-Postoperative Delirium (NPOD). The primary outcome of these studies was the incidence of POD within seven days postoperatively or before discharge, which was assessed by CAM.

Results: In the final, 705 participants were enrolled in the PNDRFAP study, and 638 patients in the PNDABLE. In both studies, we found that the occurrence of POD was lower in patients who had injected COVID-19 vaccination before surgery compared with those without vaccination (PNDRFAP: 10.20% [21/205] vs 25.80% [129/500], P < 0.001; PNDABLE: 2.40% [4/164] vs 34.60% [164/474], P < 0.001). Mediation analysis showed that the protective effect of preoperative COVID-19 vaccine on POD was significantly mediated by CSF Aβ42 (proportion = 17.56%), T-tau (proportion = 19.64%), Aβ42/T-tau (proportion =29.67%), and Aβ42/P-tau (proportion =12.26%).

Conclusions: COVID-19 vaccine is a protective factor for POD in elderly patients, which is associated with CSF biomarkers.

PU-0373

羟考酮神经阻滞对腹腔镜下胆囊切除术病人术后镇痛的影响

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目的 研究羟考酮复合罗哌卡因用于右肋缘下腹横肌平面阻滞（SCTAPB）及双侧腹直肌鞘阻滞（RSB），对于腹腔镜下胆囊切除术后镇痛效果的影响。
方法 选择 60 例 2023 年 7 月至 2023 年 12 月于我院择期行腹腔镜下胆囊切除术的患者，ASA 分级为 I-II 级，年龄 18-65 岁。术前均以咪达唑仑 0.03mg/kg、舒芬太尼 0.4μg/kg、顺式阿曲库铵 0.2mg/kg、依托咪酯 0.2-0.4mg/kg 进行全麻诱导。麻醉诱导后随机分为两组（n=30），分别行超声引导下神经阻滞：空白对照组（R 组）：于右侧腹横肌平面注入 0.5%罗哌卡因 20ml，双侧腹直肌鞘注入 0.5%罗哌卡因 20ml（10ml+10ml）；实验组（O 组）：于右肋缘下腹横肌平面注入混合药液 0.5%罗哌卡因 20ml+羟考酮 2mg，双侧腹直肌鞘注入混合药液 0.5%罗哌卡因 20ml（10ml+10ml）+羟考酮 1mg（0.5mg+0.5mg）。两组术中均持续泵注丙泊酚及瑞芬太尼进行麻醉维持，术中维持 BIS 值在 40-60，血压波动范围在基础值-20%- +20%。于患者定向力恢复即刻（T2），术后 1h（T3），6h（T4），12h（T5），24h（T6），48h（T7）静息及活动状态下以视觉模拟法（VAS）评价患者疼痛程度，以 Ramsay 评分评估患者镇静程度。
结果 1.两组患者的性别、年龄、BMI、入室时（T0）、切皮时（T1）、拔管即刻（T2）的平均动脉压及心率等一般情况及阻滞后至患者苏醒时长、手术时长、是否有引流管等手术情况无统计学差异（P＞0.05）。
2.O 组术后各个时间点的静息及运动 VAS 评分均低于 R 组，但在术后 1h（T3）、6h（T4）、12h（T5）、24h（T6）的静息和运动 VAS 评分两组的差异具有统计学意义（P＜0.05）。
3.O 组术中丙泊酚及瑞芬太尼用量低于 R 组，差异有统计学意义（P＜0.05）。
4.两组患者的 Ramsay 评分均无统计学差异（P＞0.05）。
5.O 组患者术后 48h 内补救镇痛次数、术后 1h 内首次要求补救镇痛人数低于 R 组，两组差异有统计学意义（P＜0.05）。
6.O 组患者术后恶心呕吐 3 例，R 组 5 例，两组间差异无统计学意义（P＞0.05）。
结论 羟考酮复合罗哌卡因用于右肋缘下腹横肌平面阻滞联合双侧腹直肌鞘阻滞能有效减少腹腔镜下胆囊切除术中镇静镇痛药物用量，改善患者术后镇痛效果，促进患者快速康复。

PU-0374

Effects of hemodynamic management strategy guided by regional cerebral oxygen saturation on the prognosis of elderly patients undergoing non-major cardiac surgery

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Objective: The goal-oriented hemodynamic management strategy is beneficial to improve the prognosis of surgical patients, but the effect of hemodynamic management strategy guided by regional cerebral oxygen saturation (rScO2) on the prognosis is still unclear. This study aims to explore the effect of rScO2-guided hemodynamic management strategy on the prognosis of elderly patients undergoing non-major cardiac surgery, which will provide clinical evidence for rScO2-

guided intraoperative hemodynamic management strategy.
Methods: This prospective, randomized, single-blind, controlled clinical study involved 220 patients aged 60-90 years old who underwent non-cardiac major surgery from April 2022 to December 2023. The patients were divided into two groups (the observation group and the control group) consisting of 110 cases respectively using the online randomization service (www.91trial.com). The patients in control group received intravenous infusion and vasopressor treatment to maintain mean arterial pressure (MAP) >65mmHg, or within 20% of baseline value followed the standard hemodynamic management protocol. The patients in observation group followed a rScO2-guided hemodynamic management strategy with the goal of maintaining rScO2 ≥60% (absolute value) or a decrease in rScO2 <10% of the baseline. The primary outcome of this study was the incidence of major complications within 7 days after surgery, which included infectious complications, respiratory complications, neurological complications, cardiovascular complications, thromboembolism, and surgery-related complications. Secondary outcomes included the incidence of complications in each system within 7 days after surgery and 30-day mortality. Perioperative data and exploratory results included the values of rScO2 before anesthesia induction (T0), after anesthesia induction (T1), 30 minutes after the start of surgery (T2), and 30 minutes before the end of surgery (T3). Inflammatory factors(white blood cells, IL-2, IL-10, CRP, TNF-α), postoperative intestinal function recovery time, post-anesthesia care unit (PACU) stay, postoperative hospital stay, and the use of vasoactive drugs were also recorded. Data will be analyzed in the modified intention-to-treat population.
Results：A total of 220 patients were included in this study, divided randomly into the observation group and the control group. The demographics and surgery-related data were not significantly different between the two groups (P>0.05). Regarding the main indicators, the incidence of major complications within 7 days after surgery was significantly lower in the observation group compared to the control group (8.0% vs. 21.0%, P=0.026). Univariate and multivariate logistic regression analyses identified age (OR=3.582， 95%CI=2.482-6.313； P=0.042 ）, NYHA classification (OR=6.923，95%CI=5.141-7.781；P=0.036), coronary heart disease (OR=1.034, 95%CI=0.283-4.394；P=0.036), and preoperative albumin (OR=5.421，95%CI=4.864-6.113；P=0.000) as risk factors for perioperative complications in elderly patients undergoing non-major cardiac surgery (P<0.05). The 30-day mortality, as the secondary indicator, was lower in the observation group than in the control group (0.0% vs. 4.0%, P=0.043). However, there was no statistically significant difference in the incidence of complications in each system within 7 days after surgery (P>0.05). In terms of perioperative data and other results, the rScO2 levels at T1, T2, and T3 time points and inflammatory factors (white blood cells, IL-2, IL-10, CRP, TNF-α) at T2, and T3 time points were significantly lower in the observation group compared to the control group (P<0.05). Additionally, the observation group had a shorter PACU stay (42.52±3.78 min vs. 48.66±4.63min) and a shorter duration of the first postoperative bowel movement (4.12±0.72 days vs. 5.13±0.84 days) compared to the control group (P<0.05). Finally, the use of ephedrine was significantly lower in the observation group compared to the control group (P<0.05).
Conclusions: The hemodynamic management strategy guided by regional cerebral oxygen saturation can reduce major complications within 7 days and improve mortality within 30 days, promoting the recovery of elderly patients undergoing non-major cardiac surgery.

PU-0375

多学科协作护理模式 在胸腔镜下食道癌手术后麻醉复苏室护理中的应用效果

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目的 探究在胸腔镜下食道癌手术后麻醉复苏室护理中应用多学科协作（MDT）护理模式的效果。

方法 经阜宁县人民医院伦理委员会批准，并征得患者及家属同意，签署知情同意书。选取 2022 年 1 月至 2023 年 10 月在阜宁县人民医院行胸腔镜下食道癌手术患者 50 例为观察对象，ASA I-II 级，年龄不限，性别不限，采用随机数字表法将其分为对照组与试验组，各 25 例。受试患者术后均送至麻醉复苏室（PACU）接受相关护理，对照组接受常规护理干预，试验组采用 MDT 协作护理模式，比较两组患者拔管时间、离开 PACU 时间、术后寒颤及躁动发生率、生活质量(QOL)及心理健康状况。

结果 两组患者性别、年龄、ASA 分级方面比较，差异均无统计学意义（P>0.05）；试验组患者拔管时间、PACU 滞留时间均短于对照组，差异有统计学意义（P＜0.05）；试验组术后寒颤及躁动发生率低于对照组，差异有统计学意义（P＜0.05）；试验组的 SAS、SDS、NRS 评分均优于对照组，差异有统计学意义（P＜0.05）。

结论 MDT 护理模式缩短拔管时间及 PACU 滞留时间，减少术后寒颤及躁动发生，可改善焦虑、抑郁等负面情绪，提高生活质量，减轻疼痛，降低术后并发症发生率，提高护理满意度，值得临床推广。

PU-0376

硬膜外应用羟考酮对膝关节置换病人术后快速康复的影响

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吉林大学第二医院

目的 本研究探讨在膝关节置换手术中，罗哌卡因复合羟考酮硬膜外镇痛对患者术后快速康复的影响，能否将其作为一种提高患者术后康复质量的方式，应用于术后镇痛及术后康复，从而达到满意的效果，为膝关节置换患者的术后快速康复提供参考。

方法 随机选择吉林大学第二医院 2022 年 12 月至 2023 年 12 月择期行膝关节置换术的患者 60 例，年龄 56～78 岁，ASA 分级Ⅱ～Ⅲ级。按照随机数字表法分为罗哌卡因组（A 组）和罗哌卡因复合羟考酮组（O 组），每组 30 例，男女不限，两组均采用腰硬联合麻醉(CESA)。硬膜外自控镇痛(PCEA)，其中 A 组配方 300mg 罗哌卡因+0.9%氯化钠注射液至总量为 200ml，O 组配方 300mg 罗哌卡因+10mg 羟考酮+0.9%氯化钠注射液至总量为 200ml。记录两组患者的性别、年龄、身高、体重、体重指数(BMI)、ASA 分级及手术时长；术前合并高血压、糖尿病、脑血管疾病及心脏病特殊情况。术中监测指标：入室时、切皮时、手术结束时的平均血压(MAP)、心率(HR)、脉搏血氧饱和度(SpO2)、体温。术后 6 h（T0）、12h（T1）、24 h（T2）、48 h（T3）时患者静息、运动 VAS 评分；T2、T3 时膝关节活动度、股四头肌肌力分级；T3 时 Ramsay 评分；术后 2 周膝关节功能恢复情况；术后 48h 内镇痛泵首次按压时间、按压次数；术后恶心呕吐、头晕头痛、低血压、心动过缓、尿潴留及呼吸抑制的发生情况。入室时和 T3 时血清样本中 IL-6 及 TNF-α 的水平。

结果 1. 两组患者性别、年龄、身高、体重、BMI、ASA 分级、手术时长以及术前合并高血压、糖尿病、脑血管疾病及心脏病特殊情况无统计学差异（P＞0.05）。

2. 两组患者入室时、切皮时和手术结束时的 MAP、HR、SpO2 及体温无统计学差异（P＞0.05）。

3. T0、T1、T2、T3 的 VAS 评分，O 组均低于 A 组，差异均具有统计学意义（P＜0.05）；且 T1、T2 的静息 VAS 评分和 T1、T2、T3 的运动 VAS 评分，O 组均明显低于 A 组（P＜0.01）。术后 48h 内镇痛泵首次按压时间，O 组晚于 A 组，且按 压次数 O 组少于 A 组，差异均具有显著统计学意义（P＜0.01）。T2、T3 时膝关节活动度及股四头肌肌力分级，O 组均高于 A 组，差异均具有统计学意义（P＜0.05）。

4. 两组患者 T3 时的 Ramsay 评分和术后 2 周膝关节功能恢复情况以及术后恶心呕吐、头晕头痛、心动过缓、低血压、尿潴留及呼吸抑制的发生率无统计学差异（P＞0.05）。

5. O 组术后住院天数明显少于 A 组，有显著统计学差异（P＜0.01）。

6. 血清样本中 IL-6 和 TNF-α 水平比较，入室时均无统计学差异（P＞0.05）；在 T3 时，O 组 IL-6 水平低于 A 组（P＜0.05），而 O 组 TNF-α 水平明显低于 A 组（P＜0.01）。

结论 硬膜外应用羟考酮可增强罗哌卡因的镇痛效果，减少单位时间内罗哌卡因的用量，不增加不良反应的发生率，同时能减轻机体的炎症反应，使患者尽早参与关节功能的康复锻炼，缩短住院时间，从而加速术后康复。

PU-0377

超声引导下星状神经节阻滞对活体肾移植供者术后疲劳综合征的影响

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目的 观察超声引导下星状神经节阻滞（SGB）对活体肾移植供者（LKDs）术后疲劳综合征的影响，以期为促进 LKDs 术后康复提供临床参考。
方法 选择 2023 年 3 月至 2024 年 1 月择期拟行活体肾移植术的 LKD64 例，男例，女例，年龄 18~65 岁，BMI18~28kg/m^2，ASA 分级Ⅰ或Ⅱ级。根据软件 EXCEL 生成的随机数，所有参与者被随机 1:1 分配到星状神经节阻滞组（SGB 组）或空白对照组（C 组），每组 34 例。SGB 组在麻醉诱导前 30 分钟，在超声引导下，将 0.25%浓度的罗派卡因 6 毫升注入右侧星状神经节内。C 组是术前不行星状神经节阻滞(麻醉诱导前在超声引导下进行星状神经节定位，但不进行侵入性阻断麻醉干预)。分别于术前 1d(D)，术后 1d(D_1)抽取静脉血 4ml，检测血浆中五羟色胺（5-HT ng/l）、白细胞介素 -6（IL-6）、白细胞介素 -1β（IL-1β）、肿瘤坏死因子-α（TNF-α）和褪黑素（melatonin、MT）的含量。于 D 和 D_1、术后 3d(D_2)、7d(D_3)记录两组围术期疲劳评定量表（ICFS）10 项精简版和 Christensen 视觉模拟疲劳评分、肾功能指标。记录两组 D_1、D_2和 D_3的失眠严重指数（ISI）评分和静息及运动疼痛视觉模拟评分 VAS。术后 3 个月随访两组 2 组神经病理性疼痛量表（DN4）和围术期疲劳评定量表（ICFS）10 项精简版。记录两组手术时间、术中麻醉药用量、尿量、拔出喉罩时间和术后胃肠道数据。
结果 与 C 组相比，SGB 组 D_1、D_2 和 D_3的 ICFS10 项精简版的总分和 Christensen 视觉模拟疲劳评分明显降低；D_2和 D_3的 ISI 的总分明显减少；D_2 和 D_3的静息及运动疼痛视觉模拟评分 VAS 下降；术后排气时间和进食时间明显缩短（P<0.05）。2 组肾功能指标、D_1的 ISI 总分和静息及运动疼痛视觉模拟评分 VAS、术后 3 个月随访的 DN4 和 ICFS10 项精简版的总分和两组手术时间、术中麻醉药用量、尿量、拔出喉罩时间比较差异无统计学意义（P>0.05）。
结论 超声引导下 SGB 能缓解 LKDs 的 POFS，可能与减轻术后疼痛，改善术后睡眠，促进术后胃肠道相关功能的恢复有关。

PU-0378

Effect of a subanesthetic-dose of S-ketamine on postoperative pain and early recovery in patients undergoing abdominal surgery: a randomized controlled study

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麻醉科

Background: Postoperative pain can significantly impact patient recovery and increase family burden. In clinical practice, S-ketamine has been found to have analgesic and antidepressant

effects. However, the effects of subanesthetic doses of S-Ketamine on postoperative pain and early recovery have yet to be fully understood.The objective of this study was to evaluate the impact of subanesthetic doses of S-ketamine on postoperative pain and early recovery, as well as to identify risk factors for postoperative pain in patients undergoing abdominal surgery under general anesthesia.
Methods: One hundred and sixty-eight patients, aged 18 to 65 years, with ASA grades I to III and BMI between 18 and 30 kg/m2, who underwent abdominal surgery, were included in the study. All patients received a standardized anesthesia induction and maintenance regimen. Following successful tracheal intubation, the three groups receiving S-ketamine were continuously infused according to a predetermined schedule, while the C Group received an equivalent volume of saline. The primary outcome measure was the incidence of moderate-to-severe pain within 72 hours postoperatively. Secondary outcomes included time to extubation and awakening from anesthesia, intraoperative opioid dosage, incidence of adverse effects (such as postoperative nausea and vomiting, pneumonia, pulmonary atelectasis, bronchospasm, delirium, hallucinations, itching, respiratory depression, and unscheduled mechanical ventilation) within 3 days after surgery, time to recovery of gastrointestinal function (assessed by time to first anal bowel movement and defecation), duration of postoperative bed rest, 24-hour postoperative Quality of Recovery Scale score (QoR-15), and requirement for rescue analgesics.
Results: The results showed that the incidence of moderate-to-severe pain in S3group was significantly lower than that in C group and S1group within 72 hours after operation(P <0.05). Therefor,the VAS scores in S2 and S3 group were significantly lower than those in S1group and C group at 30min after operation; VAS scores in S1,S2 and S3 group were lower than those in C group at 72h after operation(P <0.05); The incidence of nausea and vomiting in S1, S2 and S3 groups was significantly lower than that in C group; The 15-item quality of recovery scale(QoR-15) score in S3 group was higher than that of C group and S1 group(P＜0.05); The proportion of C group needing more than 2 times of rescue analgesia after operation was significantly higher than that of the other three groups(P＜0.05); Logistic regression identified S-ketamine are protective factors for moderate-to-severe postoperative pain;The subgroup analysis indicate that the usage of S-ketamine in surgical patients undergoing laparoscopy reduces the risk of moderate-to-severe postoperative pain by 98%.
Conclusions: Continuous intraoperative infusion of S-ketamine at a rate of 0.2-0.3 mg/kg/h has been shown to decrease the occurrence of moderate-to-severe postoperative pain, diminish pain scores, and facilitate early recovery in patients undergoing abdominal surgery. Utilizing intraoperative continuous infusion of S-ketamine serves as a protective measure against acute postoperative pain, particularly beneficial in laparoscopic surgery, effectively mitigating postoperative discomfort.

PU-0379

基于衰弱的综合风险指数预测 Stanford B 型主动脉夹层腔内修复术后肺部并发症：一项回顾性队列研究

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目的 现有关于术前衰弱对术后结局影响的研究仍存在一定的局限性。本研究旨在分析基于衰弱的综合风险指数与主动脉夹层腔内修复患者术后肺部并发症之间的相关性。
方法 本研究是一项回顾性队列研究（南京鼓楼医院临床研究伦理注册号 2022-479-01）。收集 2014 年 1 月 1 日至 2021 年 12 月 31 日在南京鼓楼医院接受 Stanford B 型主动脉夹层腔内修复的患者的基线和围手术期资料。用综合风险指数来评估虚弱的严重程度，这是一种包括改良的虚弱指

数在内的综合虚弱指数。主要终点是住院期间术后肺部并发症（postoperative pulmonary complications，PPCs）发生情况。采用 Logistic 回归模型评估综合风险指数与 PPCs 风险之间的相关性。

结果 共纳入 347 例患者，51.9%（180 例）出现 PPCs。PPCs 组与非 PPCs 组年龄、性别、BMI 无统计学差异。结合四种衰弱指标，即改良衰弱指数（modified frailty index, mFI）≥0.27、营养不良、血红蛋白<90g/L 和白蛋白≤30g/L（每项 1 分），计算综合风险指数。多变量回归分析表明，与患者 mFI<0.27 相比，mFI≥0.27，PPCs 比值比 OR（95%可信区间 CI）为 2.056（1.236-3.421，P=0.006）；与患者综合风险指数<2 相比，综合风险指数≥2，PPCs 比值比 OR（95%置信区间 CI）为 4.024（2.118-6.646，P<0.001）。综合风险指数的 ROC 曲线下预测 PPCs 的面积为 0.645（95%CI 0.592–0.695，P < 0.001），而改良衰弱指数的面积为 0.591（95%CI 0.538–0.644，P < 0.001）。两种评估方法 ROC 曲线下预测 PPCs 的面积相比具有统计学差异（P=0.046）。

结论 对于 Stanford B 型主动脉夹层腔内修复手术后的患者，术前综合风险指数≥2 与术后肺部并发症的风险增加独立相关。

PU-0380

Effect of compound chamomile and lidocaine hydrochloride gel on airway complications with laryngeal mask airway : a prospective multi-center randomized controlled study

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Background: Airway complications are common after insertion with laryngeal mask airway (LMA). The aim of this study was to explore whether compound chamomile and lidocaine hydrochloride gel (Kamistad® gel) lowers the incidence of airway complications with LMA .

Methods: This was a a prospective multi-center randomized controlled study. A total of 320 patients aged 18 to 65 years with American Society of Anaesthesiologists physical status I or II who were scheduled to undergo breast surgery, ophthalmic surgery, otologic surgery, endoscopic sinus surgery, urologic surgery, knee arthroscopic surgery or hysteroscopic surgery were randomly assigned to receive LMA lubricated with the normal saline or the Kamistad gel. The primary outcome was the incidence of postoperative sore throat (POST). The major secondary outcomes were the frequency of LMA insertion attempts, the time to successful LMA insertion, the severity of POST and the other airway complications with LMA including oropharyngeal mucositis, hoarseness, cough and dry throat.

Results: A total of 319 patients were analyzed. Compared with the normal saline group, patients in the Kamistad gel group had lower incidences of POST 0.5h, 3h, 6h and 24h after LMA removal (P<0.05, respectively). Moreover, Kamistad gel significantly decreased the severity of POST, reduced oropharyngeal mucositis, dry throat and the frequency of LMA insertion attempts and shortened the time to successful LMA insertion (P<0.05, respectively). No significant differences were found in terms of hoarseness and cough between the groups (P>0.05, respectively).

Conclusions: Our findings indicate that Kamistad gel as a lubricant for LMA reduces the airway complications including POST, oropharyngeal mucositis, and dry throat.

PU-0381

药物滥用是心脏瓣膜手术患者术后谵妄的危险因素：一项回顾性队列研究

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目的 谵妄是一类术后急性认知功能障碍，心脏手术患者谵妄发生率较高。谵妄患者预后较差，术后谵妄将增加患者不良事件发生率和延长住院时间。患者术前长期药物滥用史可能增加术后谵妄发生率，不利于患者预后康复。本研究旨在通过一大样本回顾性队列分析，探究药物滥用对患者术后谵妄发生率的影响。
方法 通过回顾性分析纳入 2019 年 5 月至 2020 年 12 月期间于中国医学科学院阜外医院队列人群。回顾性收集患者人口学资料、术前资料和术中资料。根据是否发生术后谵妄将患者分为谵妄组和非谵妄组，将单因素分析中 P<0.1 因素纳入多因素 Logistic 分析，探究药物滥用对术后谵妄的校正比值比（Odds ratio, OR）值。将队列人群根据术前药物滥用情况分为药物滥用组和无药物滥用组，并且根据受试者年龄和性别进行倾向性评分匹配（Propensity Score Matching, PSM），对比 PSM 匹配后药物滥用组与无药物滥用组两组间术后谵妄发生率差异，同时采用条件 logistic 回归探究药物滥用对谵妄的 OR 值。采用 Kaplan-Meier 分析分别对匹配前和匹配后队列人群绘制术后 1-7 天谵妄累积发生率曲线。
结果 本研究最终共纳入 859 名受试者。纳入受试者年龄为 55 (47, 63)岁，其中男性占 51.57%，女性占 48.43%。发生术后谵妄 130 名，谵妄发生率为 15.13%。存在术前药物滥用史 155 名，药物滥用率为 18.04%。经单因素和多因素分析结果表明药物滥用史是瓣膜手术患者术后谵妄的高危因素，将增加患者术后 3.237 倍谵妄发生风险。在 859 名受试者中，药物滥用组患者术后谵妄发生率（37.42%）高于无药物滥用组（10.23%）。经 1:2 PSM 匹配后共纳入 461 名受试者，药物滥用组术后谵妄发生率为 37.42%，显著高于无药物滥用组 13.20%。条件 logistic 回归结果显示药物滥用 OR 值为 2.351。匹配前和匹配后 KM 分析谵妄累积发生率结果表明，药物滥用组术后 7 日内谵妄累积发生率均高于无药物滥用组，LogRank 和 Breslowde P 值均小于 0.001。
结论 药物滥用是瓣膜手术患者术后谵妄的独立危险因素之一，术前药物滥用史将增加患者术后谵妄发生率。

PU-0382

The effect of drug abuse on postoperative delirium in patients undergoing cardiac valve surgery: A retrospective study

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Background: Post delirium is a common acute cognitive dysfunction. Delirium occurs frequently in cardiac surgery and is associated with preventable hospital morbidity and mortality. Drug abuse history could increase the incidence of postoperative delirium with prolonged length of hospital stay. However, the evidence was limited. Therefore, this study aimed to investigate the impact of drug abuse on the incidence of postoperative delirium in cardiac surgery.
Methods: A retrospective analysis was conducted on a cohort of patients who underwent elective valve surgery in Fuwai Hospital from May 2019 to December 2020. Demographic, preoperative, and intraoperative data were retrospectively collected. Patients were divided into delirium and non-

delirium groups based on postoperative delirium. Factors with P < 0.1 in univariate analysis were included in the multivariate logistic analysis to explore the adjusted odds ratio (OR) of drug abuse for postoperative delirium. The cohort patient was divided into drug abuse and non-drug abuse groups based on preoperative drug abuse history. Propensity score matching (PSM) was performed based on age and sex. We compared the difference in the incidence of postoperative delirium between the drug-abuse and non-drug-abuse groups. Conditional logistic regression was applied to explore the OR of drug abuse for delirium. Kaplan-Meier analysis was used to draw cumulative incidence curves of delirium for the pre-matched and post-matched cohort populations from postoperative day 1 to day 7.

Results: A total of 859 subjects were included in this study. The median age of the subjects was 55 (47, 63) years, with 51.57% males and 48.43% females. Postoperative delirium occurred in 130 subjects, with an incidence rate of 15.13%. 155 subjects had a drug abuse history. The rate of drug abuse was 18.04%. Results from univariate and multivariate analyses showed that the history of drug abuse was a high-risk factor for postoperative delirium in valve surgery patients with an increased risk of delirium by 3.237 times. Among the 859 subjects, the incidence of postoperative delirium in the drug abuse group (37.42%) was higher than that of the non-drug abuse group (10.23%). After 1:2 PSM, a total of 461 subjects were included. The rate of postoperative delirium in the abuse group was 37.42% and that of the non-drug abuse group was 13.40%. The conditional logistic regression results showed that the OR of drug abuse was 2.351. Kaplan-Meier analysis before and after matching showed that the cumulative incidence of delirium within 7 days after surgery was higher in the drug abuse group than the non-drug abuse group. The LogRank and Breslowde P values were less than 0.001.

Conclusion： Drug abuse is an independent risk factor for postoperative delirium in valve surgery patients. The history of drug abuse increases the rate of postoperative delirium in patients.

PU-0383

Preoperative Cognitive Training Improves Postoperative Cognitive Function: A Meta-analysis and Systematic Review of Randomized Controlled Trials

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Background: Postoperative cognitive dysfunction (POCD) and postoperative delirium (POD) are common post-surgical complications that often lead to prolonged hospitalization, reduced quality of life, increased healthcare costs, and increased patient mortality. We conducted a meta-analysis to evaluate the effects of preoperative cognitive function training on postoperative cognitive function.

Methods: PubMed, Cochrane Library, Embase, Web of Science, ClinicalTrials, China National Knowledge Infrastructure, Wanfang Database, VIP Database, and Chinese Biomedical Literature Database were searched for randomized controlled trials comparing the effects of preoperative cognitive function training and conventional preoperative measures on postoperative cognitive function. The search period spanned from the establishment of the databases to March 31, 2023. The primary outcomes were the incidence of POCD and POD.

Results: Eleven randomized controlled trials involving 1045 patients were included. The results of the meta-analysis showed that, compared to the control group, preoperative cognitive function training significantly reduced the incidence of POCD (RR=0.38, P<0.00001), and there was no statistically significant difference in the incidence of POD (P=0.3). Cognitive function training significantly improved postoperative cognitive function scores compared with the control group

(MD=1.92, P=0.001). In addition, two studies reported that 10% of the patients in the cognitive training group completed a pre-set training duration.
Conclusion: Cognitive function training significantly reduced the incidence of POCD; however, there was no significant difference in the incidence of POD. Preoperative cognitive function training should be promoted and emphasized as a simple, economical, and practical method of improving postoperative cognitive function.

PU-0384

Dexmedetomidine for the prevention of emergence agitation and postoperative delirium in elderly patients undergoing thoracoscopic lobectomy

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Background: Postoperative delirium (POD) and postoperative cognitive dysfunction (POCD) are common complications after major surgery among elderly patients, and is associated with increased morbidity and healthcare costs.We investigated whether preventive use of dexmedetomidine during thoracoscopic lobectomy was effective for reducing emergence agitation and postoperative delirium.
Methods: In this double-blind randomized-controlled trial, 67 patients undergoing thoracoscopic lobectomy were randomly assigned to the dexmedetomidine-sevoflurane(DS,n=34)or sevoflurane(S,n=33)groups. Dexmedetomidine or saline administration was started after inducing anesthesia and continued until chest closure at a fixed dose (0.5μg/kg per h). The primary endpoint was the incidence of delirium up until the end of postoperative day 3,emergence agitation and postoperative delirium were measured with the Riker sedation agitation scale(SAS) and the confusion assessment method(CAM), respectively.The secondary endpoints were serum cytokine and catecholamine levels.
Results: The DS group showed less frequent emergence agitation than the S group ($P<0.05$), but the incidence of delirium after discharge from the postanesthesia care unit was not different between the two groups ($P>0.05$).Both pro- and anti-inflammatory cytokines were lower in the DS group than in the S group. Nevertheless, the interleukin (IL)-6/IL-10 ratio and IL-8/IL-10 ratio were higher in the DS group than in the S group. Furthermore, norepinephrine and epinephrine levels were lower in the DS group than in the S group.
Conclusion: Intraoperative dexmedetomidine reduced emergence agitation but not postoperative delirium in patients undergoing thoracoscopic lobectomy. Dexmedetomidine seemed to affect emergence agitation through catecholamines, but not through an anti-inflammatory action.

PU-0385

Effect of esketamine on postoperative delirium and postoperative cognitive function in elderly patients undergoing gastrointestinal surgery

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Bagkground: Postoperative delirium (POD) and postoperative cognitive dysfunction (POCD) are common complications after major surgery among elderly patients and adversely affect their

prognosis.This study explored the effect of esketamine on POD and early POCD in elderly patients who underwent gastrointestinal surgery.
Methods: Sixty patients(ASA I-III) aged 65 and above undergoing gastrointestinal surgery were randomly divided into 2 groups: the esketamine group (group E) and the control group (group C). Group E received intravenous lower doses of esketamine(0.2 mg/kg) 5 minutes before the initiation of surgery, while group C received the same volume of saline.All patients were connected to a patient-controlled intravenous analgesia (PCIA) pump after surgery.POD and POCD were assessed on postoperative days 1, 2, 3, and 7 by using the Confusion Assessment Method (CAM) and Mini-Mental State Examination (MMSE) scales. Furthermore, the incidence of POD and POCD of all the two groups in postoperative 7 days classified by high risk factors (age, education, surgical category), sedation level,postoperative pain intensity, and side effects were assessed.
Results: The overall incidence rates of POD and early POCD 7 days after surgery were lower in the group E groups than in the group C ($P<0.05$). There were no intergroup differences in the postoperative sedation level, pain intensity, and side effects.
Conclusion: The administration of lower doses of esketamine before the initiation of surgery significantly decreased the incidence of POD and early POCD after gastrointestinal surgery without increasing any side effects.

PU-0386

Comparison of anaesthesia strategies on postoperative nausea and vomiting in laparoscopic sleeve gastrectomy: A randomised controlled trial

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Background: Intra-operative anaesthesia management should be optimised to reduce the occurrence of postoperative nausea and vomiting in high-risk patients; however, a single intervention may not effectively reduce postoperative nausea and vomiting in such patients. This study assessed the effect of an optimised anaesthetic protocol versus a conventional one on postoperative nausea and vomiting in patients who underwent laparoscopic sleeve gastrectomy.
Methods: A single-centre randomised trial was conducted at Peking University Shenzhen Hospital from June 2021 to December 2022. Among 168 patients who underwent laparoscopic sleeve gastrectomy, 116 qualified, and 103 completed the study with available data. Patients were divided into the conventional group (received sevoflurane and standard fluids) and the optimised group (underwent propofol-based anaesthesia and was administered goal-directed fluids). The primary endpoints were postoperative nausea and vomiting incidence and severity within 24 hours.
Results: Postoperative nausea and vomiting assessment at 0–3 h post-surgery revealed no significant differences between groups. However, at 3–24 h, the optimised anaesthetic protocol group showed lower postoperative nausea and vomiting incidence and severity than the conventional group ($P = 0.005$). In the conventional group, 20 (37.04 %) patients experienced moderate-to-severe postoperative nausea and vomiting, compared to six (12.25 %) patients in the optimised group (odds ratio = 0.237; 95 % CI = 0.086, 0.656; $P = 0.006$). No significant differences were noted in antiemetic treatment, moderate-to-severe pain incidence, anaesthesia recovery, post-anaesthetic care unit stay, or postoperative duration between the groups. While the total intra-operative infusion volumes were comparable, the optimised group had a significantly higher colloidal infusion volume (500 mL vs. 0 mL, $P = 0.014$) compared to the conventional group.
Conclusions: The incidence and severity of postoperative nausea and vomiting 3–24 h postoperatively in patients who underwent laparoscopic sleeve gastrectomy were significantly lower with propofol-based total intravenous anaesthesia and goal-directed fluid therapy than with

sevoflurane anaesthesia and traditional fluid management. Total intravenous anaesthesia is an effective multimodal antiemetic strategy for bariatric surgery.

PU-0387

胰岛素术前重复滴鼻联合小剂量艾司氯胺酮术中静脉泵注对老年髋部骨折患者术后谵妄的影响

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目的 评价胰岛素滴鼻联合小剂量艾司氯胺酮静脉泵注对腰硬联合麻醉老年髋部骨折患者术后谵妄(POD)的影响。
方法 择期腰硬联合麻醉下拟行髋部骨折髓内钉内固定的老年患者 50 例，年龄≥75 岁，BMI≤28 kg/m2，ASA 分级Ⅰ～Ⅲ级，采用随机数字表法分为 2 组(n＝25)：术前 2 d 开始胰岛素 20 U(0.5 ml)滴鼻，2 组均滴鼻 2 次/d，至手术当日。患者入室开通静脉后，对照组(C 组)：生理盐水（0.2 mg/kg/h)开始静脉泵注；艾司氯胺酮(S 组)：小剂量艾司氯胺酮（0.2 mg/kg/h)开始静脉泵注，均术毕停止。观察入室(T0)、腰麻给药后 5min(T1)、手术开始后 30min(T2)、术毕(T3)时测定局部脑氧饱和度(rSO2)，观察术前 2 d 内胰岛素滴鼻后胰岛素过敏反应、鼻腔刺激反应及低血糖反应发生情况，于 T0、T1 和 T3 时测定血糖浓度。观察患者术中的生命体征变化，血压波动≥20%视为阳性；记录术后 3 d 内 POD 发生情况。
结果 二组均未发生胰岛素过敏反应、鼻腔刺激反应和低血糖反应。与 C 组比较，S 组术后 3 d 内 POD 发生率降低，T1-3 时 rSO2 升高(P<0.05)。与 T0 时比较，S 组 T1-3 时 rSO2 升高(P<0.05)。2 组 T0、T1 和 T3 时血糖浓度比较差异无统计学意义(P>0.05)。与 C 组相比，S 组患者术中的生命体征变化阳性发生率更低(P<0.05)。
结论 胰岛素重复滴鼻联合小剂量艾司氯胺酮术中静脉泵注可增加腰硬联合麻醉老年髋部骨折患者术中 rSO2，维持术中血流动力学的稳定，并降低 POD 的发生。

PU-0388

Association between high altitude exposure and postoperative delirium in adult patients undergoing lower extremity joint surgery： A single-center prospective study in China

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Background: Postoperative delirium (POD) is an acute neurocognitive postoperative complication that has adverse consequences, which occurred within 7 days after surgery. Exposuring to the hypobaric-hypoxic environment of high altitude can cause cognitive dysfunction or impairment. However, it is not clear whether high altitude exposure increases the incidence of POD undergoing lower extremity joint surgery.
Object: This study aimed to evaluate the impact of high altitude exposure compared to non high altitude exposure on the occurrence of delirium following lower extremity joint surgery undergoing general anesthesia.
Setting: Tertiary hospitals in China. 14 February, 2022 to 31 December, 2022.
Design: Pragmatic, prospective, cohort study with two parallel. This trial was approved by the Ethical

Committee of the hospital of Chengdu Office of People's Government of Tibetan Autonomous Region (West China Hospital Sichuan University Tibet Chengdu Branch Hospital) (Ethical Committee No. 20220[47] and 2023[15]). The written informed consent of this study was obtained from all participants.
Methods: The patients who met the inclusion criterias and without the exclusion criterias were enrolled into the cohort from February 14, 2022 to December 31, 2022. And the cohort was divided into two groups based on whether there was prolonged high altitude exposure: the high altitude group (HA) and the non high altitude group (NHA). Prolonged high-altitude exposure in this study was defined as Tibetan highlanders (for having lived at high altitude since birth) or Tibetan settlers living at high-altitudes (altitude≥2500 meters) for more than 20 years, and without living continuously in plain area (≤500m) for more than 180 days before surgery. The primary outcome was the incidence of POD during the first 7 days after surgery, assessed using the Confusion Assessment Method (CAM).The secondary outcomes included the length of delirium, subtypes of delirium, the incidence of moderate to severe pain for 3 days after surgery，and the incidence of re-intubation and unplanned ICU admission of 7 days after surgery, bed rest time, 30-day all-cause mortality and postoperative hospital stays.
Results: Among 1177 patients were enrolled, 1032 were analyzed and assessed for the primary outcome(fig.1). Baseline characteristics of participants were in Table 1, intraoperative datas of participants were in Table 2. POD occurred within the first 7 postoperative days in 93 out of 523 (17.8%) in the high altitude group vs 61 out of 509 (12.0%) patients in the non high altitude group [relative risk (RR) 0.630; 95% CI 0.444~0.892; P=0.009], there were significant differences between the two groups(Table 3). The length of delirium in the high altitude group (3.19 ± 1.195) was higher than that in the non high altitude group (2.92 ± 0.731), but it showed no significant difference between the two groups (P=0.080) (fig.2). There were no significant differences between the two groups in any of the secondary outcomes. The result of multivariate COX regression analysis showed that high altitude exposure increased the risk of POD (HR 1.643, 95% CI 1.084 ~2.491). After adjusting for preoperative hemoglobin, HR of COX regression analysis (2.917, 95% CI 1.304~6.523) was significantly higher(Table 4).
Conclusions：Among patients undergoing lower extremity joint surgery with general anesthesia, those exposed to high altitude had a higher incidence of delirium within the first 7 postoperative days and experienced longer durations of delirium, compared with the patients from non high altitude. This observation may be attributed to the abnormal increase in hemoglobin levels among patients residing at high altitudes, and further research will be needed.
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PU-0389

右美托咪定预防高海拔地区全麻患者苏星期躁动的观察

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目的 理塘县位于中国四川省甘孜藏族自治州，平均海拔 4014 米。高原地区海拔高，大气压及氧分压均低。由于长期暴露于慢性缺氧环境，大脑和神经系统极易受低氧的影响而损伤。高原缺氧对认知功能有明确的损害，并随海拔高度增加而加重。全麻苏醒期躁动是全身麻醉手术后最常见的并发症，因肢体无意识动作等可能引起伤口出血，输液管、导尿管以及气管导管脱出等意外伤害。本研究目的在于探讨术中使用右美托咪定对高海拔地区全麻患者苏醒期躁动的影响。
方法 选择 2023 年 1 月至 2024 年 4 月期间在理塘县人民医院行全身麻醉下腹腔镜胆囊切除术患者共 80 例，均符合入排标准，随机分为右美托咪定组（DEX 组）和对照组（C 组）各 40 例。DEX 组在麻醉诱导前静脉给予右美托咪定 0.5μg/kg（10min），随后以 0.2μg/(kg·h)速率输注至术毕前 30 分钟。对照组给予等容量等时间生理盐水。记录患者的一般资料。记录麻醉诱导前(T0)，麻醉诱导后即刻(T1)，插管后即刻(T2)，切皮后 5 分钟(T3)，拔管即刻(T4)，拔管 5 分钟后(T5)的 HR、SBP、DBP、SpO2。对患者进行拔管即刻(T4)，拔管后 5 分钟 (T5)，拔管后 15 分钟（T6），拔管后 30 分钟 (T7)的镇静评分（Ramsay 评分）、躁动评分（RSS 评分）以及疼痛评分（NARS 评分）。主要结局指标为比较两组患者全麻苏醒后的镇静评分以及躁动评分。次要结局指标为比较两

组患者术中及术后血流动力学及血氧饱和度的变化、拔管时间、术后 30 分钟内疼痛评分等。
结果 两组患者一般基线资料比较均无差异（P＞0.05)。DEX 组患者苏醒后 Ramsay 评分均高于对照组（P＜0.05），RSS 评分低于对照组（P＜0.05）。两组之间血流动力学比较：T0 时刻两组患者 HR、SBP、DBP、SpO2 均无差异，T1-T5 时刻 DEX 组患者的 HR、SBP、DBP 均低于对照组（P＜0.05），而两组患者的 SpO2 无明显差异；拔管时间比较：两组患者拔管时间无明显差异（P＞0.05)；疼痛评分比较：两组患者术后 30 分钟内 NRS 评分无明显差异（P＞0.05)。
结论 在本研究中，右美托咪定可降低高海拔地区全麻患者苏醒期躁动评分，增加患者的镇静评分，降低全麻患者苏醒期躁动的发生率。右美托咪定用于高海拔地区患者术中及术后血流动力学更加平稳，拔管后脉搏血氧饱和度稳定，可安全用于高海拔全麻患者。

PU-0390

使用机器学习方法预测老年人脊柱手术后恢复室脱氧失败

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目的 根据一项回顾性研究数据获得的预测变量来预测老年人脊柱手术后恢复室脱氧失败，并确定最佳的机器学习模型并确定主要的预测变量。
方法 本研究是一项给予医院手术麻醉系统进行的回顾性研究。共收集 2020 年 1 月 1 日-2022 年 12 月 31 日共 1879 例患者的数据。预测变量包括性别、年龄、ASA 分级等一般信息，NYHA 分级、MET 当量、吸烟史等术前访视信息和麻醉时长、术中用药、液体管理等术中信息。以患者在麻醉恢复室中停留超过 40 分钟，不吸氧情况下外周氧饱和度始终低于 95%的患者被定义为脱氧失败。以 Lasso 回归进行变量筛选并采用 Logistic 模型、支持向量机模型、随即森林模型和 XGBoost 模型进行模型构建，以 AUROC、混淆矩阵、校准曲线和 DCA 曲线等评价模型预测效能和临床价值。
结果 老年人脊柱手术后恢复室脱氧失败比例为 38.48%。以 Lasso 回归筛选出的影响因素构建预测模型，Logistic 模型为性能最佳模型，AUCROC 为 0.7133(0.6701 - 0.7564)，准确度、精确度、召回率分别为 67.02%、60.12%、43.57%。校准曲线和 DCA 曲线显示模型具有良好稳定性和临床价值。年龄、性别、ASA 分级、既往呼吸系统疾病、入室 SpO2、麻醉时长、术中输血、大剂量甲强龙、新斯的明和七氟醚为独立影响因素。
结论 Logistic 模型可以很好的预测预测老年人脊柱手术后恢复室脱氧失败的发生，从而更好的指导临床麻醉工作。

PU-0391

剖宫产产妇产后焦虑症的危险因素分析

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目的 焦虑症是导致孕产妇和胎儿不良结局的已知风险因素，正确合理面对产妇围产期焦虑症对产妇、家庭及社会来说都是巨大的挑战。产后焦虑的发生风险与围产期疼痛的严重程度密切相关，本研究从麻醉医生的角度，探讨全面实施二孩政策后，剖宫产产妇产后焦虑症的危险因素。
方法 选取行择期剖宫产手术的 154 例产妇作为研究对象，于术前 1 日、术后第 2 日、术后 6 周收集其临床资料，于术前 1 日和术后 6 周对产妇进行焦虑自评量表（SAS）及爱丁堡产后抑郁量表（EPDS）评估，SAS 评分≥ 50 分判定为焦虑，EPDS 评分≥ 13 分判定为抑郁，根据产后 6 周随访的 SAS 评分将产妇分为焦虑组与正常组。相关数据回收完毕后，由研究者统一录入数据库并对两

组的相关资料进行统计，分析焦虑症的危险因素。
观察指标包括：术前：年龄、BMI、职业、家庭收入、文化程 度、胎次、手术麻醉史、职业压力、对疼痛的忍受 能力［采用视觉模拟评分法（VAS）评分］等；术中：麻醉时间、手术时间和术中并发症（低血压，术中不适感如恶心呕吐、寒战）等；术后第 2 日：术后 24 h 疼痛感（静息疼痛感和活动时疼痛感，采 用 VAS 评分）、术后首次下床活动时间、术后首次 饮水时间、术后排气排便时间、拔除尿管时间、首次哺乳时间、住院日数等。术后 6 周：产妇并发症 （产后乳腺炎、产后腰痛）、新生儿并发症（新生儿黄疸、其他并发症）、月子期地点、月子期总体满意度、新型冠状病毒感染（新冠）疫情对情绪的影响。
结果 本研究显示焦虑组产妇术后 24h 活动疼痛评分高于对照组，术后首次下床活动时间和尿管拔除时间均晚于对照组，住院时间长于对照组（P < 0.05）；多因素 Logistic 回归分析表明，月子期总体不满意 （OR=7.741，95%CI：3.612～16.591，P < 0.001）是剖宫产产妇产后 6 周焦虑症的独立危险因素。术后早期活动疼痛会降低产妇下床活动的意愿，影响产妇排尿功能的恢复，并且产妇在住院期间经历的疼痛程度越强，其产后远期的痛苦回忆就越强烈，发生产后焦虑症的风险也更高。
结论 剖宫产产妇产后 6 周焦虑症的发病率较高，月子期不满意是产后焦虑症发生的独立危险因素。剖宫产手术后给予产妇充分的镇痛，促进产妇恢复；月子期给予产妇更多的家庭与社会支持，提高其总体满意度，对降低产后焦虑症发病率具有重要意义。

PU-0392

腹腔镜胆囊切除术患者术前焦虑与术后疼痛的相关性研究

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目的 研究调查华西医院腹腔胆囊切除术患者术前焦虑的水平；分析腹腔镜胆囊切除术患者术前焦虑与术后急、慢性疼痛的相关性。
方法 选择 2021 年 7 月-2021 年 12 月在我院行 LC 手术符合纳入、排除的患者共 270 名；术前一天对患者进行访视，完成状态焦虑量表（S-AI）、视觉模拟焦虑量表（VAS-A）、生活自理能力（ADL）评估量表和匹兹堡睡眠质量指数评分（PSQI），评估患者术前焦虑、生活自理能力和睡眠情况；术后 1h、4-6h、24h 完成视觉模拟（VAS）疼痛评分，评估术后急性疼痛；同时在术后 1h 利用 VAS-A 量表评估术后焦虑，术后 4-6h、24h 评估生活自理能力；术后 3 个月对患者进行电话随访, 收集慢性疼痛相关资料：疼痛数字评分（NRS）和疼痛部位。手术、麻醉和术后镇痛药物（地佐辛）采用统一方案。将 S-AI＞44 分定义为高焦虑组，S-AI≤44 分为低焦虑组，组间比较术后急、慢性疼痛、生活自理能力、术后焦虑、术后镇痛药物使用、术前睡眠情况及住院日。
结果 本研究最后共纳入 260 名患者，低焦虑组 211 名（76.8%）高焦虑组 49 名（23.2%）。低、高焦虑两组患者在术后 1h、4-6h、24h 的 VAS 疼痛评分 VAS1、VAS2、VAS3 均有统计学差异（P<0.05），且这三个时间点的疼痛程度分布存在统计学差异（P<0.05）；两组患者术后疼痛均在 4-6h 时最为剧烈，高焦虑组重度疼痛发生率（53.1%）高于低焦虑组（10.9%）。术前 S-AI 评分值与 VAS1、VAS2、VAS3 均呈正相关（r1=0.4427，P<0.0001；r2=0.6171，P<0.0001；r3=0.2962，P<0.0001）即术前焦虑水平越高，术后急性疼痛越剧烈。低、高焦虑组术后慢性疼痛 NRS 评分无差异（P＞0.05），但高焦虑组 CPSP 发生率（24.5%）高于低焦虑组（20.4%）。术前 S-AI 评分与 VAS-A 术后评分呈正相关（r=0.7187，P<0.0001），即术前焦虑水平与术后焦虑水平呈正相关，但 VAS-A 术后评分显著低于术前（P<0.001）。低、高两组患者术前 ADL 评分无明显差异（P＞0.05）；术后 4-6h、24hADL 评分有统计差异（P<0.05）；且 S-AI 评分与这两个时刻的 ADL 评分均呈负相关（r1=-0.2743，P<0.0001；r2=-0.3255，P<0.0001），即术前焦虑水平越高，术后生活依赖程度越高，自理能力越差。低、高焦虑两组患者术前 PSQI 评分有统计学差异（P<0.05），且 S-AI 评分与 PSQI 评分呈正相关（r=0.3144，P<0.0001），即术前焦虑水平越高，

术前睡眠质量越差。低、高焦虑两组术后镇痛药物使用总量、住院日无统计学差异（P＞0.05）。
结论 腹腔镜胆囊切除术患者的术前焦虑水平与术后急性疼痛程度，慢性疼痛发生率相关；高水平的术前焦虑的患者存在较高的发生术后重度疼痛的风险。腹腔镜胆囊切除术患者的术前焦虑评估是有必要的，识别高焦虑的患者，针对性的制定更完善的镇痛方案。

PU-0393

探讨 ERAS 联合多模式镇痛护理干预在头颈部恶性肿瘤手术患者围手术期间的应用效果

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目的 探讨 ERAS 联合多模式镇痛护理干预在头颈部恶性肿瘤手术患者围手术期间的应用效果，能否有效的预防麻醉复苏期间并发症的发生，能否有效预防疼痛的发生，加快术后康复以及头颈部恶性肿瘤术后满意度的影响。
方法 选择 2022 年 12 月--2023 年 12 月期间我院收治的头颈部恶性肿瘤患者共计 100 例，将其分为对照组及观察组，对照组给予常规护理，观察组给予 ERAS 联合多模式镇痛护理，对比两组手术患者术后各个时段 VAS 得分情况以及对护理的满意度。分析两组术后疼痛情况及康复情况，对比两组头颈部恶性肿瘤手术患者麻醉复苏过程中不良反应的发生率及术后并发症的发生率以及对麻醉复苏室护理的满意度。
结果 接受不同方式的护理后，观察组头颈部恶性肿瘤手术患者术后对麻醉复苏室护理的满意度为 97.56%，对照组头颈部恶性肿瘤手术患者术后对麻醉复苏室护理的满意度为 85.37%，观察组患者术后对麻醉复苏室护理的满意度明显高于对照组，两组差异具有统计学意义（P＜0.05）。观察组在术后 24 小时，48 小时的 VAS 得分明显少于对照组，观察组麻醉不良反应的发生率低于对照组麻醉不良反应的发生率，观察组术后并发症的发生率低于对照组术后并发症的发生率，各项数据差异具有统计学意义（P＜0.05）。
结论 ERAS 联合多模式镇痛护理干预应用于头颈部恶性肿瘤患者围手术期间，能够有效预防头颈部恶性肿瘤患者在全身麻醉复苏期间不良反应的发生，减少患者术后并发症的发生，使患者平稳的渡过麻醉复苏期。能够明显减轻头颈部恶性肿瘤手术患者术后的疼痛感，促进患者早日康复，提升病人的满意度。，减轻患者的焦虑心理，改善患者生活质量，加快患者的术后康复。

PU-0394

探讨 ERAS 联合 PACU 预见性护理对正颌手术患者麻醉复苏管理中的应用效果

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目的 探讨 ERAS 联合 PACU 预见性护理对正颌手术患者麻醉复苏管理中的应用效果，能否有效的预防麻醉复苏期间并发症的发生，加快术后康复以及对正颌手术患者术后满意度的影响。
方法 选择 2022 年 12 月--2023 年 12 月期间我院收治的正颌手术患者共计 160 例，按照其护理方式将这 160 例正颌手术患者随机分成两组，将其分为对照组及观察组，对照组正颌手术患者术前给予常规护理，观察组正颌手术患者术前给予 ERAS 联合 PACU 预见性护理，即 PACU 护士进行术前访视宣教讲解护理，包括对患者进行术前访视了解患者术前身体情况和生活习惯情况，讲解手术

相关注意事项及全麻术后可能发生的并发症，讲解麻醉苏醒期间需要患者进行的配合方法和注意事项，告知患者术后的护理要点及饮食配合。对比两组正颌手术患者麻醉复苏过程中不良反应的发生率及术后并发症的发生率以及对麻醉复苏室护理的满意度。

结果 接受不同方式的护理后，观察组正颌手术患者术后对麻醉复苏室护理的满意度为 97.56%，对照组正颌手术患者术后对麻醉复苏室护理的满意度为 85.37%，观察组患者术后对麻醉复苏室护理的满意度明显高于对照组，两组差异具有统计学意义（P＜0.05）。观察组麻醉不良反应的发生率低于对照组麻醉不良反应的发生率，观察组术后并发症的发生率低于对照组术后并发症的发生率，各项数据差异具有统计学意义（P＜0.05）。

结论 ERAS 联合 PACU 预见性护理应用于正颌手术患者麻醉复苏期间，能够有效预防正颌手术患者在全身麻醉复苏期间不良反应的发生，减少患者术后并发症的发生，使患者平稳的渡过麻醉复苏期。提高了麻醉复苏室的护理质量，提高了患者的麻醉复苏室护理的满意度，减轻患者的焦虑心理，改善患者生活质量，加快患者的术后康复。

PU-0395

瑞马唑仑联合盐酸羟考酮用于老年患者无痛纤支镜麻醉的效果

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目的 瑞马唑仑联合盐酸羟考酮用于老年患者无痛纤支镜麻醉的效果。

方法 选取 2022 年 10 月～2023 年 10 月我院接受纤支镜检查的患者 93 例,采用随机数字表法将患者随机分为对照组(丙泊酚联合盐酸羟考酮，n=46)和观察组(瑞马唑仑联合盐酸羟考酮，n=47)。完成麻醉诱导后置入喉罩，连接喷射呼吸机给氧，呼吸科医师将纤支镜从接头的风帽口插入实施检查。观察两组患者检查前、插镜中(过声门)、活检及检查毕等时间点血流动力学指标、围术期的咳嗽和躁动评分以及术后的镇静和疼痛评分。记录术中麻醉药用量及不良反应发生率，并评估患者和术者的满意度。

结果 两组患者检查前基线资料无统计学差异，观察组追加盐酸羟考酮的例数明显少于对照组,但观察组的麻醉苏醒时间较对照组明显延长(P<0.01)。纤支镜经过气管隆突或狭窄处时两组患者的心率和平均动脉压明显升高,但两组间比较差异无统计学意义(P>0.05)。两组间咳嗽评分、躁动评分、镇静评分、疼痛视觉模拟评分(VAS)和术者满意度差异无统计学意义(P>0.05)，但观察组患者的满意度显著高于对照组(P<0.05)。两组患者不良事件发生率比较差异有统计学意义(P＜0.05)，观察组注射痛和低血压发生率明显下降(P<0.05)。

结论 瑞马唑仑联合盐酸羟考酮较丙泊酚联合盐酸羟考酮在纤支镜检查中具有更好的镇静效果,血流动力学更稳定,不良反应少，尤其减少了患者注射痛和低血压的发生率，明显提高了患者的满意度，是一种安全可靠的麻醉方案。

PU-0396

音乐疗法联合科普视频对妇科患者术前焦虑的影响

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目的 本研究旨在评估基于加速术后康复（ERAS，Enhanced Recovery After Surgery）策略下，术前联合使用音乐疗法和科普视频宣教是否能降低妇科腹腔镜手术患者术前焦虑评分，以及评价联合干预措施对患者术后疼痛、疲惫程度以及恢复质量的影响。

方法 本研究是一项单中心、前瞻性、随机对照研究，共纳入 2022 年 7 月-2023 年 9 月在四川省人民医

院行妇科腹腔镜手术的患者共 80 例。以随机数字表法将 80 名患者按照 1:1 的比例随机分配进入对照组和试验组（音乐疗法联合术前视频科普组），两组均行常规 ERAS 策略（包括常规术前健康宣教等）。术前收集患者基线资料，并于入院时（定义为 T0）及麻醉诱导前（定义为 T1）、术后 24h（定义为 T2）及出院前（定义为 T3）分别采用状态-特质焦虑量表(State-trait anxiety inventory, STAI)评估患者围术期焦虑状况，记录患者术中麻醉及手术相关数据，术后利用 NRS 疼痛数字评分量表(Numeric Rating Scale，NRS)及 NRS 疲惫数字评分量表分别评估患者 T2、T3 时的疼痛（分别评估静息痛与运动痛）水平、疲惫水平；评估患者在 T2、T3 时的术后恶心呕吐（Postoperative Nausea and Vomiting，PONV）发生率及程度分级，并评估患者在拔除气管导管后 30min 及 T2 时的导尿管相关膀胱刺激征（Catheter-Related Bladder Discomfort，CRBD）发生率及程度分级。

结果 两组患者基线资料包括：年龄、体重指数、教育水平、ASA 分级、手术时长、麻醉时长等比较均无统计学差异（P>0.05）。

主要结果：

与对照组比较，试验组在 T1 时间点的 STAI 量表评分降低（P<0.05）。

次要关键结果：

与对照组比较，试验组在 T2 时间点的 STAI 量表评分降低（P<0.05）。

T0 与 T3 时间点两组患者的 STAI 量表评分无统计学差异（P>0.05）。

其他结果：

（1）与对照组比较，T2 时间点试验组的 NRS 静息疼痛评分、NRS 运动疼痛评分和 NRS 疲惫评分均降低（P<0.05）。

T3 时间点两组患者的 NRS 静息疼痛评分、NRS 运动疼痛评分和 NRS 疲惫评分均无统计学差异（P>0.05）。

对组内患者各时间点的 STAI 量表评分与对应时间点的 NRS 静息痛、NRS 运动痛评分进行 Pearson 相关分析发现：试验组和对照组患者在 T2 及 T3 时间点的 STAI 量表评分分别与组内对应时间点的 NRS 静息痛评分及 NRS 运动痛评分具有相关性（r>0.3，P<0.05），且将各组患者分别按 STAI 量表评分分入无焦虑组（STAI 量表评分<80 分）、轻度焦虑组（80≤STAI 量表评分≤99 分）、中度焦虑组（100≤STAI 量表评分≤119 分）、重度焦虑组（STAI 量表评分>119 分）四个级别后发现，随着患者焦虑程度分级的升高，该患者的 NRS 静息痛、NRS 运动痛评分均升高（P < 0.05）。

（2）T2 与 T3 时间点出院前两组患者 PONV 发生率和程度分级均无统计学差异（P>0.05）。

（3）拔除气管导管后 30 min 及 T2 时间点两组患者的 CRBD 发生率和程度分级均无统计学差异（P>0.05）。

（4）与对照组比较，试验组恢复质量评分升高（133.90±8.36 分 vs 125.60±6.81 分，P<0.05）并且住院满意度评分也升高（93.05±5.47 分 vs 88.15±6.68 分，P<0.05）。

（5）两组患者首次下床活动时间和术后首次肛门排气时间均无统计学差异（P>0.05）。

结论 （1）术前采用音乐疗法联合科普视频宣教能降低妇科腹腔镜手术患者术前焦虑评分及术后 24 h 的焦虑评分。

（2）术前采用音乐疗法联合科普视频宣教能降低妇科腹腔镜手术患者术后 24h 的静息痛、运动痛及疲惫程度评分。

（3）术前采用音乐疗法联合科普视频宣教可以提高妇科腹腔镜手术患者恢复质量以及住院满意度。

PU-0397

H-SI@PP-siRNA 在术后谵妄的预防治疗作用与机制探讨

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目的 本研究目的在于探讨负载 siRNA 的产氢纳米材料，在聚焦超声的辅助下穿透血脑屏障，能否高效清除海马区域内 ROS，以及沉默 tau 蛋白的表达，从而抑制海马神经炎症。

方法 本研究方法部分主要分为以下三点：

1) 构建 siRNA 负载的氢化硅烯以及材料表征，性能检测：TEM,SEM,拉曼光谱，XRD, XPS, 气相

2) 色谱测产氢速率，过氧化物清除能力。
2) 在细胞实验（HT22, BV2 细胞）中通过验证其毒性，进行材料吞噬，溶酶体逃逸和透过体外血脑屏障模型实验，寻找最佳的超声强度。再验证其对于 ROS 清除疗效以及对 tau 沉默效能。
3) 构建小鼠 POD 模型，运用小动物活体成像系统，通过给予荧光标记的纳米药物观察超声前后脑部荧光富集情况。后通过行为学和组织学实验验证其减弱海马区神经炎症的疗效。
结果 已成功制备合成氢化硅烯，高效负载 tau-siRNA，材料表征部分已完成。
已完成在细胞上的验证，其对 HT22，BV2 细胞在芬顿试剂下的 ROS 清除作用卓越，且能够保护 HT22 细胞蛋白质，脂质过氧化物，DNA 三大组分免受 ROS 的伤害；已完成其对于 BV2 细胞在 LPS 刺激下的极化抑制作用，降低 M1 型小胶质细胞比例，减弱炎症因子 IL-1β，TNF-α 的分泌；已完成其在 HT22 细胞中的 tau 蛋白沉默作用，且降低冈田酸诱导的 tau 磷酸化水平。
在体外构建了血脑屏障，通过聚焦超声联合微泡技术能够成功打开血脑屏障，递送纳米片；在体外通过活体成像技术展示了聚焦超声前后脑部海马区荧光强度的差异。
水迷宫，新物体，旷场实验行为学结果展示了其能够预防术后认知功能下降。组织学检测显示其清除海马区神经炎症的作用，Iba-1，CD206, inos 等结果指标的 WB 和免疫荧光检测显示其抑制了海马区小胶质细胞向 M1 极化。tau 蛋白，p-tau 的 WB 和 IHC 检测显示纳米片沉默 tau 的作用从而降低 p-tau 的水平，NF-κB 通路指标的检测展示了其对于海马区炎症的抑制作用。
结论 本研究构建了一种结合氢气治疗与基因疗法的双重作用递送载体，通过聚焦超声和微泡技术穿透血脑屏障高效递送至 C57 双侧海马，产生的氢气清除 ROS，释放出 PEI-siRNA 抑制 ptau 的水平，降低海马区神经炎症相关指标,显著改善老年小鼠术后的认知功能。

PU-0398

The COVID-19 pandemic increasing the incidence of postoperative pulmonary complications after cardiac surgery: a multi-center, retrospective cohort study

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Background: In December 2022, China deregulated coronavirus disease 2019 (COVID-19) and then entered the COVID-19 pandemic period. This study aimed to investigate the impact of the COVID-19 pandemic on postoperative pulmonary complications (PPCs) within seven days after cardiac surgery.
Methods: Patients who had undergone cardiac surgery were retrospectively analyzed from December 1, 2018, to February 28, 2019 (pre-COVID-19 period); December 1, 2021, to February 28, 2022 (lockdown period); and from December 1, 2022, to February 28, 2023 (pandemic period) in three tertiary teaching hospitals of China. The outcomes of interest were the incidence of PPCs within seven days after cardiac surgery. Before analyzing the patient outcomes, propensity score matching (PSM) were used for the imbalances among the three groups. The relationship between COVID-19 positivity and PPCs was evaluated by logistic regression analysis.
Results: 1229 adult patients who had undergone cardiac surgery were included. After 1:1:1 PSM, 149 patients were included per group. The incidence of PPCs in the pandemic period (61.1%) was obviously higher than those in the pre-COVID-19 (44.3%) and lockdown periods (51.7%) (P=0.014). The logistic regression analysis showed that COVID-19 positivity was a risk factor for PPCs (odds ratio, 3.763; 95% confidence interval, 1.038–13.646; P=0.044).
Conclusions: COVID-19 pandemic increases the incidence of PPCs within seven days after cardiac surgery. Elective cardiac surgery with patients diagnosed with COVID-19 should be postponed for reducing PPCs.

PU-0399

艾司氯胺酮或右美托咪定对乳腺癌患者术后抑郁及焦虑的影响

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目的 观察艾司氯胺酮或右美托咪定对乳腺癌患者术后抑郁及焦虑的影响，探索有助于改善患者术后抑郁及焦虑状态的用药方案，促进患者康复并提高患者的满意度和舒适度。
方法 选择 2022 年 8 月至 2023 年 12 月在广西医科大学第一附属医院全身麻醉下择期行乳腺癌手术患者 180 例，采用随机数字表法分为对照组（C 组，n=44）、艾司氯胺酮组（K 组，n=42）、右美托咪定组（D 组，n=49）和右美托咪定联合艾司氯胺酮组（DK 组，n=45）。四组患者均采用丙泊酚+瑞芬太尼+芬太尼+顺式阿曲库铵进行麻醉诱导，K 组和 DK 组麻醉诱导前静脉注射艾司氯胺酮 0.5 mg/kg，所有患者麻醉维持均采用丙泊酚+瑞芬太尼+七氟烷，D 组和 DK 组术中恒速泵注右美托咪定 0.5 μg/kg/h。 收集患者一般资料（年龄、身高、体重、受教育程度、婚姻史、生育史），应用 PHQ-9 量表和 GAD-7 量表评估患者术前 1 天（POD-1）、术后第 1 天（POD1）、术后第 3 天（POD3）、术后第 5 天（POD5）和术后第 7 天（POD7）的抑郁和焦虑情况，应用 VAS 评分量表评估患者术后第 1 天、术后第 3 天的伤口疼痛情况。收集患者围术期资料并记录围术期各时点的生命体征。
结果 1. 各组患者一般资料比较，差异无统计学意义（P>0.05）。2.与 C 组比较，D 组 POD5 的抑郁发生率降低（P<0.05）， K 组和 DK 组 POD7 的抑郁发生率降低（P<0.05），D 组 POD5 的中度抑郁人数增多（P<0.05）。 3.与 C 组比较，D 组 POD3 和 POD5 焦虑发生率降低（P<0.05），D 组 POD-1 和 POD5 的中度焦虑人数增多（P<0.05）。4.与 C 组比较，K 组 POD1 和 POD3 的 VAS 评分降低（P<0.05）。5. 与 C 组比较，D 组 T3 时和 T7 时点 MAP 增高（P<0.05）；与 D 组比较，K 组 T4 和 T7 时点 MAP 降低（P<0.05），DK 组 T4-T7 时点 MAP 降低（P<0.05）。与 C 组比较，D 组和 DK 组 T1-T3 时点 HR 增高，T8 时点 HR 降低（P<0.05），K 组和 DK 组 T7 时点 HR 降低（P<0.05）；与 D 组比较，K 组 T1-T3 时点 HR 降低（P<0.05）；与 K 组比较，DK 组 T1 和 T3 时点 HR 增高，T8 时点 HR 降低（P<0.05）。6. 与 C 组比较，D 组、K 组和 DK 组的丙泊酚和七氟烷使用量减少（P<0.01），D 组和 DK 组液体出量增加（P<0.05）；与 K 组比较，D 组和 DK 组液体出量增加（P<0.05）。7.与 C 组比较，D 组、K 组和 DK 组的心动过速发生率降低（P<0.05），各组其余不良反应发生率比较，差异无统计学意义（P>0.05）。
结论 艾司氯胺酮或右美托咪定可降低乳腺癌患者的术后抑郁及焦虑发生率，为防治乳腺癌患者术后抑郁和焦虑提供用药参考。

PU-0400

目标导向液体治疗对腹部肿瘤手术患者术后胃肠功能恢复的影响

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目的 评价目标导向液体治疗(goal-direct fluid therapy, GDFT)对腹部肿瘤手术患者术后胃肠功能恢复的影响。
方法 择期全麻下行腹部肿瘤根治术患者 100 例，性别不限，年龄＞18 岁，ASA 分级Ⅰ~Ⅲ级，采用随机数字表法将患者分为 2 组（n=50）：目标导向组（G 组）和常规组（C 组）。C 组按照现有临床常规行术中液体管理，G 组根据 SVV 和 CI 管理术中输液，目标是维持 SVV≤12 %、CI≥2.5

L·min-1·m-2，MAP≥65 mmHg。观察患者术后首次排气时间、下床时间、进流食时间、术后住院时间及术后恶心呕吐发生率。记录术中晶体液量、胶体液量、尿量、出血量及血管活性药使用率、术后 1、3、5 d 疼痛评分（VAS）及其他器官不良事件发生情况。
结果 与 C 组比较，G 组患者术后首次排气时间[28.2(38.8) h 比 39.4(42.6) h]、下床时间[2.0(2.0) d 比 2.5(2.8) d]、进流食时间[4.0(3.3) d 比 6.0(4.3) d]及术后住院时间[12.0(6.3) d 比 15.0(9.5) d]均缩短（P＜0.05）；术后恶心呕吐发生率和肺部感染发生率明显降低，G 组术中晶体液输入量减少，总输液量减少，尿量增多，术后 1 d，3 d，5 d 的 VAS 评分降低（P＜0.05）。
结论 目标导向液体治疗可加速腹部肿瘤手术患者术后胃肠功能的恢复，缩短住院时间。

PU-0401

Research Trends in Esketamine for Depression over the past decade: A Bibliometric Analysis

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Background: Patients suffering from depression frequently encounter extended period of low moods; lack of enjoyment or enthusiasm for activities. It leads to suicidal thoughts and present a potential hazard to their safety. Nowadays, there has been significant progress in researching the effectiveness and safety of esketamine in treating depression. Hence, this paper employs bibliometric analysis to investigate the evolution and future research trajectories of this domain.
Methods: We utilize Excel, VOSviewer, and CiteSpace software to generate bibliometric network visualizations to analyze, construct, and quantitatively evaluate pertinent literature, which facilitate a lucid and intuitive presentation of the trends and frontiers in this research domain.
Results: Annual publications increased from 2013 to 2023, totaling 691 articles, with 163 studies published in 2023. The USA published the most papers (n=252), followed by China (n=148) and Canada(n=92). Three of the top journals were Journal of Affective Disorders (n=35,IF=6.60), Frontiers in Psychiatry (n=23,IF=5.44), and Pharmacology Biochemistry and Behavior (n=18,IF=3.60). The most published authors were Hashimoto, Kenji (n=44), followed by McIntyre, Roger S (n=41), Rosenblat, Joshua D (n=33). The keywords that have been relevant to the topic for the last decade are "treatment-resistant depression", "efficacy" and "antidepressant".
Conclusions: The results indicate that there has been a substantial increase in research activity worldwide. Most of this research has been published in top-tier journals. Currently, the focus of research is on ensuring safety and determining optimal treatment options.
Keywords: Research trend, Bibliometric analysis, Esketamine, Depression.

PU-0402

艾司氯胺酮对老年髋部骨折患者术后疲劳综合征的影响

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目的 评价艾司氯胺酮对老年髋部骨折患者术后疲劳综合征（postoperative fatigue syndrome,POFS）的影响。
方法 选择 2022 年 3 月至 2024 年 4 月择期行髋部骨折手术患者 63 例。男 39 例，女 24 例，年龄≥65 岁，ASA 分级：I-III 级。采用随机数字表法将患者分为两组：艾司氯胺酮组(E 组)和对照组(C 组),E 组 32 例，C 组 31 例。两组患者均采用全身麻醉。切皮前 5 min E 组静脉注射艾司氯胺酮

0.25 mg/kg(用生理盐水配成 5 ml),C 组静脉注射生理盐水 5 ml。术后两组患者均接受静脉自控镇痛(PCIA)。E 组镇痛泵给予舒芬太尼 2μg/kg 联合艾司氯胺酮 0.5mg/kg。C 组给予舒芬太尼 2μg/kg，两组总量均为 100 ml。于术前 1 d、术后 1、3、7 d 使用 Christensen 疲劳量表评估疲劳水平，VAS 疼痛评分评估疼痛严重程度，Richards-Campbell 睡眠问卷评价睡眠质量。记录拔管时间，术后补偿性镇痛药的使用情况，PCIA 期间不良反应的发生情况(如高血压、恶心呕吐、头晕、嗜睡、谵妄和心悸等)及住院时间。

结果 与 C 组比较，E 组患者术后 1、3d Christensen 量表得分及 VAS 疼痛水平显著降低(P<0.05)。E 组患者在术后第 1、3、7d 的睡眠问卷评分显著低于 C 组(P<0.05)。在术后 48 小时内，与 C 组相比，E 组补偿性镇痛药的使用明显减少(P<0.05)。两组拔管时间、PCIA 期间不良反应发生情况、术后住院时间差异均无统计学意义。

结论 艾司氯胺酮可减轻老年髋部骨折患者术后疲劳综合征的发生，缓解术后疼痛、提高睡眠质量、且未延长拔管时间增加不良反应的发生。

PU-0403

纳布啡复合丙泊酚镇静在混合痔内套外切术中的应用

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目的 混合痔是肛肠科较为常见的良性病之一，临床上以手术治疗为主，混合痔内套外切术是其常见术式之一，术中术后的急性疼痛明显，不利于手术进行及患者的康复。纳布啡是一种阿片受体的激动-拮抗药,对 κ 受体发挥激动作用,对 μ 受体发挥拮抗作用,可同时与阿片受体 μκ 和 δ 相结合,因此同时具有镇静镇痛以及呼吸抑制的作用。本次研究是为了探究纳布啡复合丙泊酚镇静在混合痔内套外切术中的临床效果，以期望进一步加快患者的术后康复，提升患者整体满意度。

方法 选取我院 2023 年 1 月至 9 月择期行混合痔内套外切术的患者 150 例(年龄 20～60 岁、美国标准协会（ASA）分级为Ⅰ～Ⅱ级、体质量指数 18～30 kg/m2)纳入研究。采用随机数字表法将其分为 A、B 和 C 三组,每组 50 例。A 组(0.2mg/kg 纳布啡+丙泊酚+利多卡因肛周局麻)、B 组（0.1mg/kg 纳布啡+丙泊酚+利多卡因肛周局麻)、C 组(0.2ug/kg 舒芬太尼+丙泊酚+利多卡因肛周局麻)各 50 例。各组均于标准全身麻醉入睡后，先予 0.5%利多卡因肛周局麻后行混合痔内套外切术。记录各组围术期指标（麻醉起效时间、苏醒时间、局麻药及丙泊酚用量、术中呛咳发生率、术中平均动脉压水平、心率，观察记录各组患者术后视觉模拟评分（VAS）、Ricker 镇静-躁动评分（SAS）；记录术后头晕、嗜睡、心动过缓、恶心呕吐、肠道功能抑制等相关不良反应的发生情况，评估患者总体满意度。

结果 3 组术中 MAP、心率水平、局麻药用量、丙泊酚注射痛及呛咳发生率等比较，未见明显差异，差异无统计学意义（P>0.05），3 组术后 VAS 及 SAS 评分相比较，未见明显差异，差异无统计学意义(P>0.05)。A 组、B 组患者术中呼吸抑制发生率明显低于 C 组，差异有统计学意义(P<0.05)。A 组、B 组患者术后肠道功能恢复明显早于 C 组，差异有统计学意义(P<0.05)。3 组患者术后恶心呕吐发生率比较，差异无统计学意义(P>0.05)。A 组、B 组患者的整体满意度高于 C 组(p<0.05)。

结论 纳布啡复合丙泊酚镇静在混合痔内套外切术中的应用，镇静镇痛效果确切，可以可稳定患者术中血压、心率水平，减少局麻药及丙泊酚用量，降低术中呼吸抑制的发生率，减轻患者术后疼痛的发生及程度，减少肠道功能恢复时间，有助于促进患者术后的快速康复,提升患者的总体满意度。

PU-0404

基于 Web of Science 数据库的周围神经阻滞后反跳痛文献计量学和可视化分析

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目的 通过应用文献计量学的方法，总结国际上有关反跳痛的相关研究现状和未来发展趋势。
方法 在 Web of Science 数据库中检索从建库至 2024-2-28 关于反跳痛的文献。
结果 最终纳入 77 篇文献，发文量总体呈现一个上升的趋势。发文量排行前 3 的国家（地区）分别是美国（19 篇）、韩国（17 篇）和中国（9 篇）。排名前 5 的机构是 Sacred Heart Hospital, Squire Sanders University （5 篇）, Herlev and Gentofte Hospital, University of Copenhagen （4 篇）, New York University （4 篇）, University of Toronto （4 篇）, and University of Marburg （3 篇）。发文量最多的 6 位作者均发表 4 篇，分别是 Lee, jae jun; Lee, sang soo; Hwang, jung tae; Hwang, sung mi; Kim, do young; Tejwani, nirmal c。其中 Tejwani, nirmal c 的文章被引次数最多，达到 168 次。高频关键词分析结果显示，出现频次排在前 5 的关键词依次为"rebound pain（反跳痛）"（33 次）、"postoperative pain（术后疼痛）"（33 次）、"peripheral nerve block（周围神经阻滞）"（20 次）、"nerve block（神经阻滞）"（20 次）、"analgesia（镇痛）"（19 次）。关键词聚类分析后共得到 12 个聚类，其中研究重点聚焦在，与 RP 发生密切相关的踝关节手术、关节镜下肩袖修复手术，以及肌间沟入路臂丛神经阻滞麻醉方法。关键词时间线图分析结果提示，目前研究热点及趋势集中在不同手术类型，以及进行周围神经阻滞时添加的佐剂对 RP 的影响。
结论 目前周围神经阻滞后反跳痛现象逐渐引起国际上学者的重视。周围神经阻滞时添加不同的佐剂对 RP 的影响以及哪些手术类型更容易发生术后 RP 是目前研究的热点。

PU-0405

A risk factor prediction model for moderate to severe postoperative pain in patients undergoing laparoscopic sleeve gastrectomy is presented

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Background: The objective of this study was to investigate the risk factors associated with the occurrence of moderate-to-severe postoperative pain in patients undergoing laparoscopic sleeve gastrectomy (LSG) and to develop a risk factor prediction model.
Methods: A retrospective analysis was conducted to collect data on 375 patients who underwent LSG for obesity at Jinan Central Hospital between January 2017 and June 2023. This was done using a medical big data system. The general and clinical data of the patients were collected, and the patients were divided into two groups according to their Numeric Rating Scale (NRS) scores: the moderate-to-severe pain group and the non-moderate-to-severe pain group. Univariate and multivariate logistic regression analyses were employed to identify associated risk factors. The diagnostic efficacy of distinct indicators was evaluated via Receiver Operating Characteristic (ROC) curves. Additionally, calibration curves and clinical decision curves were employed to validate the results for calibration and differentiation.
Results: (1) Multifactorial logistic regression analysis revealed that age, body mass index (BMI), and modified frailty index (mFI) were the three independent risk factors for the occurrence of

moderate-to-severe pain in LSG patients after surgery. (2) A risk factor model was constructed based on the results of multifactorial logistic analysis, and the ROC curve was plotted according to the model, with an area under the curve of 0.96 (95% CI: 0.94-0.97). The sensitivity was 94.2%, the specificity was 83.3%, and the maximum Yoden index was 0.78. (3) A simplified scoring system was constructed based on the predictive model, with the scores of each index given. The results demonstrated that BMI was the largest predictor of moderate-to-severe pain after LSG (100 points), followed by mFI (30 points) and age (15 points). Calibration analysis curves showed that the mean difference between predicted and actual values was 0.01. The clinical decision analysis curves demonstrated that the model exhibited a positive benefit when the threshold probability was between 0.01 and 0.99.
Conclusion: Age, BMI, and mFI are important predictors of the occurrence of moderate-to-severe postoperative pain in LSG patients.

PU-0406

早期雾化吸入联合利多卡因喷雾减轻口腔颌面外科患者全麻插管导致的咽痛的效果分析

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目的 口腔颌面外科患者在进行全麻手术时，气管插管是常见的操作过程。然而，气管插管常常导致患者术后出现咽痛，这不仅影响了患者的舒适度，还可能影响术后的恢复过程。
目的：分析早期雾化吸入联合利多卡因喷雾减轻口腔颌面外科患者全麻插管导致的咽痛的效果及影响。
方法 选择 2022 年 7 月--2023 年 1 月期间中国医科大学附属口腔医院收治的口腔颌面外科手术患者共计 286 例，将其随机分为对照组及观察组，每组 143 人，对照组患者全麻术后采取常规护理，观察组在常规护理基础上采取早期雾化吸入联合利多卡因喷雾，比较两组患者全麻术后拔管后 1h，3h,6h,24h 患者咽痛情况及声音嘶哑发生率及咽痛视觉模拟评分，比较两组患者对护理的满意度。
结果 观察组患者全麻术后拔管后各时间点的咽痛发生率及咽痛评分明显低于对照组，观察组患者的咽痛发生率较低，咽痛程度较轻，且咽痛持续时间较短。观察组对护理的满意度高于对照组。差异均具有统计学意义（$p<0.05$）。
结论 早期雾化吸入联合利多卡因喷雾应用于缓解口腔颌面外科患者全麻插管导致的咽痛，具有显著的效果，能够显著降低咽痛的发生率、严重程度以及持续时间，提高患者的舒适度，促进术后恢复。因此，建议在口腔颌面外科全麻手术中，对于需要气管插管的患者，可优先考虑采用早期雾化吸入联合利多卡因喷雾的方法，以减轻患者的咽痛症状，促进患者的术后康复。

PU-0407

辅助药物预防成人麻醉中出现躁动的疗效：网络荟萃分析

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目的 Emergence Agitation (EA) is a significant postoperative complication in adult anesthesia. This study aimed to determine the efficacy of various ancillary drugs in preventing EA through network meta-analysis.
方法 A systematic search was conducted across PubMed, EMBASE, the Cochrane Library, and Web of Science up to April 27, 2024. Studies included were randomized controlled trials (RCTs)

involving adult patients undergoing surgery with anesthesia, comparing the effects of ancillary drugs such as dexmedetomidine, midazolam, ketamine, propofol, fentanyl, sufentanil, and others on the incidence of EA. Data extraction and quality assessment were performed by two independent reviewers using the Cochrane Risk of Bias 2.0 tool. The network meta-analysis was conducted using STATA version 14.0, with the summary odds ratio (OR) and 95% confidence intervals (CIs) calculated for the prevalence of EA.
结果 A total of 29 studies met the inclusion criteria, comprising a diverse patient population across multiple countries. The analysis demonstrated that dexmedetomidine significantly reduced the risk of EA compared to control (OR: 0.37, 95% CI 0.25–0.57). Ketamine also showed a beneficial effect in reducing EA compared with control (OR: 0.47, 95% CI 0.23–0.92). Propofol was less effective than dexmedetomidine (OR: 1.99, 95% CI 1.02–3.91). SUCRA values indicated dexmedetomidine (23.0%) as the most effective drug, followed by remifentanil (25.7%) and lidocaine (26.3%). Publication bias analysis showed general symmetry in the funnel plots, indicating no significant bias.
结论 This network meta-analysis suggests that dexmedetomidine is the most effective ancillary drug for preventing EA in adult anesthesia, providing valuable guidance for clinical practice to improve postoperative outcomes.

PU-0408
全程闭环体温保护模式对大面积烧伤老年患者康复的影响研究

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目的 探讨围术期全程闭环体温保护模式在大面积烧伤老年患者康复治疗中的应用效果和临床价值。
方法：本研究选取 2023 年 1 月至 2023 年 12 月在我院接受治疗的大面积烧伤老年患者 100 例，按随机数表法分为对照组（保温组）和研究组（闭环组）各 50 例。对照组给予常规的手术保温措施，研究组在此基础上实施全程闭环体温保护模式。两组患者从入院到出院期间，密切监测并记录了体温变化、感染情况、创面愈合时间、住院时间以及康复情况等指标，并进行比较分析
本研究将大面积烧伤老年患者根据随机分配原则划分为两组：对照组和研究组。两组患者的研究方法如下：
对照组:提供常规的烧伤治疗措施。这包括基本伤口清创、敷料更换、营养支持、电解质及酸碱平衡的维持、止痛处理以及其它支持治疗。常规棉被保温接入手术室，进入手术室后使用输液输血加温，采取传统的保温措施，比如使用加温毯、调节手术室温度等。初始加热温度设置为 37℃，当无线温度或鼻咽温度高于 37.5℃时停止加热，加热时间持续至手术结束，术后送麻醉复苏室，拔除气管导管后送回病房。
研究组:除了接受上述烧伤常规治疗和保温措施外，给予实行围术期全程闭环体温保护模式。该组从病房→手术室→麻醉复苏室（PACU）→病房全程闭环使用无线智能数显发热毯，患者的目标体温区间设置为 36.2-36.8℃。加热时间持续至患者离开 PACU 回到病房，根据患者体温情况随时调节升温设备温度。以下是具体措施：（1）预加温措施：患者进入手术室前，使用无线体温监测传感器，在非损伤的腋下进行无线体温连续监测。个性化评估每位患者的基础体温，并据此制定术前保温计划。使用无线智能数显发热毯，初始加热温度设置为 37℃。（2）手术间准备：提前半小时手术室温度设置在 26～28℃，湿度设置在 50%～60%。提前半小时将静脉液和冲洗液放置在手术间，并在室温下保存。（3）手术过程中：实施闭环体温监控系统，根据实时反馈调整手术室温度、使用加温设备（充气式加温毯等）以及输液/输血的加温策略。适时调整保温措施。（4）麻醉复苏阶段：继续使用无线体温传感器监测体温变化，确保体温恢复正常范围。根据患者体温情况，使用无线智能数显发热毯、充气式加温毯等，预防 IPH 的发生。（5）术后治疗：维持稳定的病房环境温度，对易感染患者进行定期体温监测。加强营养支持和代谢监测，以协助体温的调节和快速恢复。（6）培训与宣教：对参与研究的医护人员开展专业培训，确保能够熟练操作无线体温监测设备并

正确执行围术期全程闭环体温保护流程。对患者及家属进行详细的疾病与治疗知识宣教，特别着重体温管理的重要性和自我监测的方法。通过这项全方位、多层次的保温干预，旨在降低大面积烧伤老年患者术中及术后低体温的发生率，从而减少相关并发症，改善患者的整体康复效果。

结果 研究组在围术期全程闭环体温保护下，其体温波动幅度小于对照组，发生感染的例数显著少于对照组（P<0.05）。研究组的伤口愈合时间及住院时间均低于对照组，差异具有统计学意义（P<0.05）。在康复情况评估中，研究组的整体康复质量优于对照组

结论 围术期全程闭环体温保护模式能够有效保护大面积烧伤老年患者的体温，减少感染风险，缩短创面愈合及住院时间，从而显著提高老年烧伤患者的康复质量。建议该模式可以作为老年烧伤患者康复治疗的重要组成部分，在临床上予以推广应用。

PU-0409

腹膜后肿瘤切除术中大量失血患者术后静脉血栓栓塞形成影响因素分析

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目的 静脉血栓栓塞（venous thromboembolism, VTE）是术后常见且严重的并发症之一，可显著影响患者的恢复过程和整体预后。VTE 不仅会导致血栓后综合征，还会延长住院时间，增加医疗费用，并且与术后早期死亡率的增加密切相关。腹膜后肿瘤切除术中的大量失血患者，因同时具有癌症、大手术、术后制动和严重创伤等特点，是发生 VTE 的高危人群。目前尚无关于此类患者术后 VTE 流行病学及影响因素的相关研究。本研究旨在评价腹膜后肿瘤切除术中大量失血患者术后 VTE 的发生率、相关危险因素和预后，为此类患者围术期管理提供参考。

方法 采用回顾性队列研究，连续性纳入 2016 年 1 月至 2022 年 3 月在北京大学国际医院实施腹膜后肿瘤切除手术的患者。通过回顾临床资料，筛选出术中出血量≧70ml/kg 的患者进行统计分析。排除术前诊断 VTE、临床资料不完整或数据缺失及急诊手术的患者。

结果 共纳入 1624 名患者，最终分析了 116 例患者。27 例患者术后诊断为 VTE，总体发生率为 23%。其中 26 例为下肢深静脉血栓（DVT），1 例为肺栓塞（PE），VTE 发生的中位时间为术后 1 天。VTE 组患者年龄较大，术中血管操作率更高，两组间复发患者占比、失血量、输血输液量、凝血酶原复合物用量、纤维蛋白原用量、手术时长和麻醉时长无统计学差异。多因素分析表明，与术后 VTE 相关的因素包括年龄（OR=1.065, 95%CI: 1.024-1.117, P=0.004）、术中血管操作（OR=4.461, 95%CI: 1.339-16.831, P=0.019）和术后发生急性肾损伤（OR=4.666, 95%CI: 1.225-19.451, P=0.027）。共有 31 例患者术后发生急性肾损伤（AKI），总体发生率为 27%。VTE 组 AKI 发生率明显高于非 VTE 组且两组 AKI 分期也不同。两组术后机械通气时间、ICU 时长、术后住院时长、总住院时长、并发症分级占比和 30 天总死亡率无统计学差异。

结论 腹膜后肿瘤切除术中大量失血的患者术后静脉血栓栓塞的发生率较高，并且与年龄、术中血管操作和术后急性肾损伤密切相关。围术期应特别关注此类高危患者，除常规物理治疗预防 VTE 外，对于低出血风险患者，应积极采用药物预防。

PU-0410

THRIVE 辅助通气下比较苯磺酸瑞马唑仑与丙泊酚在无痛结肠镜检查中的疗效和安全性

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目的 探究在 THRIVE 辅助通气下苯磺酸瑞马唑仑与丙泊酚在无痛结肠镜检查中的疗效和安全性。
方法 选择 2022 年 3 月至 2022 年 4 月行无痛结肠镜检查患者 60 例，应用随机数字表法将患者分为 2 组，分别为研究组和对照组，每组各 30 例。研究组（R 组）为苯磺酸瑞马唑仑（0.15mg/kg）联合阿芬太尼（7μg/kｇ），对照组（P 组）为丙泊酚（1.5mg/kg）联合阿芬太尼（7μg/kｇ），若术中发生体动，则分别追加苯磺酸瑞马唑仑或丙泊酚，直至体动消失。采用 BIS 麻醉深度监测以及改良警觉／镇静评分（ＭＯＡＡ／Ｓ 评分），来评估两组患者镇静状态，在 BIS≤60 以及ＭＯＡＡ／Ｓ评分≤ 3 分时开始进镜操作。所有患者入室后给予高流量鼻导管吸氧（25L/min 100%）3min, 连续监测心电图、血压、心率、脉搏饱和度和 BIS。记录两组患者在诱导前（T0）、进镜即刻（T1）、镜子过肝区（T2）、苏醒时（T3）的 MAP、HR、RR，麻醉诱导时间、检查时间、苏醒时间、出室时间，以及两组患者的不良反应（注射痛、呼吸抑制、体动反应、低血压、高血压、心动过缓、心动过速、术后恶心、呕吐、术中知晓等）发生情况。
结果 两组患者的 MAP、HR、RR 各指标在 T1、T2、T3 时刻比较均有差异，且具有统计学意义（均 P＜0.05）；组内比较：P 组的 MAP、HR、RR 在 T1 、T2 、T3 时点比 T0 时点均有所降低差异有统计学意义(P < 0.05),T2 、T3 时点比 T1 时点升高差异有统计学意义(均 P＜0.05），T3 时点比 T2 、T1 时点升高，差异有统计学意义(均 P＜0.05）；R 组中与 TO 时点比较，仅 T1 时点的 MAP、HR、RR 指标有所降低，且差异有统计学意义(均 P＜0.05），与 T1 时点比较，MAP、HR、RR 指标在 T2 、T3 时点均有差异，且有统计学意义(均 P＜0.05）。R 组的起效时间虽较长,但其苏醒时间和出室时间均较 P 组短,且差异有统计学意义(P < 0.05)，P 组的注射痛、低血压、心动过缓、呼吸抑制、恶心呕吐、以及谵妄的发生率均较 R 组高，且差异有统计学意义(P < 0.05)。
结论 在 THRIVE 辅助通气下，苯磺酸瑞马唑仑较丙泊酚联合阿芬太尼用于老年患者的无痛结肠镜检查时，更有利于维持血流动力学的稳定，苏醒更迅速而且大大降低了不良反应的发生率。

PU-0411

THRIVE 技术用于单人无面罩全麻诱导对患者脑氧变化及术后认知功能的影响

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目的 探究 THRIVE 技术用于单人无面罩全麻诱导对患者脑氧变化及术后认知功能的影响。
方法 选取 2021 年 10 月至 2022 年 10 月于我院全身麻醉下实施手术的患者 90 名，分为 HFNO 组、NOT 组、THRIVE 组，每组各 30 人。HFNO 组使用加压面罩进行预充氧；NOT 组使用一次性普通吸氧面罩进行预充氧；THRIVE 组使用 OptiFlowTM 高流量经鼻导管对患者进行 3min 预充氧，氧流量从 30 L/min 开始，1 分钟后增加至 70L/min，维持至气管插管完成。INIRS 监测局部脑氧饱和度(rScO2)，应用 MMSE、连线测试及凹槽拼板测试评估患者术前及术后 24 h 的认知功能变化
结果 全麻诱导后，三组 rScO2 均较预充氧后均出现下降（P<0.05）；术毕及手术苏醒后，患者脑氧变化不明显（P>0.05）。麻醉诱导后 THRIVE 组 rScO2 高于 NOT 组（P<0.05），与 HFNO 组 rScO2 差异无统计学意义（P>0.05），术毕及苏醒后 rScO2 差异不明显，无统计学意义

（P>0.05）。3 组患者手术前后 MMSE 评分、连线测试和凹槽拼版测试时间差值等认知功能相关指标及围手术期各阶段认知障碍患者例数的差异均无统计学意义（P>0.05）。
结论 THRIVE 技术用于单人无面罩全麻诱导，能降低麻醉诱导对脑氧的影响，且未见明显术后认知障碍。
经鼻湿化快速充氧通气交换技术（Transnasal Humidified Rapid-Insufflation Ventilatory Exchange，THRIVE）可通过鼻插管以高流量（40-70 L/ min）向患者连续输送温暖和加湿的氧气，在全麻手术中具有预加氧的潜力。目前的临床试验证实，THRIVE 技术具有显著改善氧合、延长安全窒息时间的作用，已经作为预充氧手段广泛应用于重症医学、呼吸系统医学和围手术期医学中，在全麻诱导中也已被证实安全有效[1-3]。但 THRIVE 技术对患者脑氧变化和术后短期认知功能变化的影响国内目前尚无报道。本研究旨在探究应用 THRIVE 技术实现单人无面罩全麻诱导时脑氧变化对患者术后认知功能的影响，进一步论证 THRIVE 技术的安全有效性。

PU-0412

瑞马唑仑对老年全髋置换患者术后认知功能的影响

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目的 研究瑞马唑仑对接受全髋关节置换手术的老年患者认知功能的影响。
方法 根据计划，选取 60 例 65-80 岁 ASA 分级 II-III 的患者，并将他们随机分为 三组：甲苯磺酸瑞马唑仑组（R 组）、咪达唑仑组（M 组）和生理盐水组（N 组），每组各有 20 例。完成腰硬联合麻醉后，麻醉平面固定在合适平面时开始 给予镇静药物。R 组：经静脉给予负荷量瑞马唑仑 0.05mg/kg，以 0.18mg/kg/h 的速度输注,使 BIS 值维持在 60-80。在手术结束前 30mins 停止输注。M 组：经 静脉给予负荷量咪达唑仑 0.05mg/kg，以 0.05mg/kg/h 的速率泵入，使 BIS 值维 持在 60-80。在手术结束前 30mins 停止输注。N 组：使用与 R 组同等速率的生 理盐水进行泵注。手术期间不再给予其他镇静药物。分别监测并记录三组患者 入室时（T0）、麻醉平面固定时（T1）、BIS 值＜75 时（T2）、手术开始后 20 分钟时（T3）、手术结束前 30 分钟（T4）以及 BIS 值＞90（T5）时平均动 脉压（MAP），呼吸频率（RR），血氧饱和度(SpO2)，心率（HR）和 MOAA/S 评分，并记录患者入睡时间和清醒时间，记录不良事件。在手术前 1d（D0）、 术后 1d(D1)、术后 3d(D3)和术后 7d(D7)，采用简易智力状态量表（MMSE）和 蒙特利尔认知评估表（MoCA）评估患者的认知情况，在 D0、D1 和 D3 从肘部 采集静脉血，以 ELISA 法测定 S100β 蛋白和 IL-6 水平。
结果 1. 与 咪达唑仑 组比较，T2 时 瑞马唑仑 组和 生理盐水 组的 RR 值明显增加（P＜0.05），T4 时 瑞马唑仑组和生理盐水 组的 BIS 值和 MOAA/S 评分值明显增加（P＜0.05）。瑞马唑仑组的达到预期 深度的时间和苏醒时间均小于咪达唑仑 组（P＜0.05）。瑞马唑仑 组的术中不良反应少于 咪达唑仑 组和 生理盐水 组（P＜0.05）。 2.瑞马唑仑 组患者在 D1 时 S100β 浓度和 IL-6 浓度均小于 咪达唑仑组和生理盐水组（P＜0.05）。 D3 时，瑞马唑仑 组和 生理盐水组的 S100β 浓度均小于 咪达唑仑 组（P＜0.05）。 3. D1 时，瑞马唑仑 组 MMSE 评分明显高于 生理盐水 组（P＜0.05）。与 D0 相比，瑞马唑仑 组 仅在 D1 时 MMSE 评分下降（P＜0.05）。D1 时，瑞马唑仑 组的 MoCA 评分明显高于咪达唑仑 组和 生理盐水 组（P＜0.05）。D7 时，生理盐水 组 MoCA 评分明显小于 瑞马唑仑 组和咪达唑仑 组（P＜ 0.05）。
结论 瑞马唑仑比咪达唑仑的呼吸抑制更小，苏醒速度更快，苏醒质量更高，并 可有效减少术中炎性因子的产生，减少 POCD 的发生率，更适用于老年人，保 护患者的认知功能。

PU-0413

布比卡因脂质体用于弓状韧带上腰方肌阻滞对胃癌根治术后镇痛效果及早期恢复质量的影响

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目的 探讨布比卡因脂质体用于弓状韧带上腰方肌阻滞对胃癌根治术后镇痛及早期恢复质量的影响。
方法 选择在安徽医科大学附属巢湖医院行择期腹腔镜下胃癌根治术患者 60 例，年龄 18~85 岁，BMI 18.5-28.0 kg/m2，ASA Ⅰ-III 级。采用随机数字表法将患者分为两组：罗哌卡因组（R）和布比卡因脂质体组（L），每组 30 例。R 组给予 0.375%罗哌卡因 40ml 行弓状韧带上腰方肌阻滞联合全身麻醉。L 组给予 266mg 共 40ml 行弓状韧带上腰方肌阻滞联合全身麻醉。 两组均接受常规气管插管全身麻醉。记录术后 1、6、12、24、48、72h 静息和活动（翻身)时 VAS 疼痛评分。记录手术时长，瑞芬太尼、丙泊酚总用量，记录首次下床时间、首次排气时间、首次进食时间、镇痛泵按压次数及补救镇痛例数。于术后 1、3、7d 采用恢复质量评分量表（QoR-15）评估术后早期恢复质量。记录术后 48h 内恶心呕吐、头晕、嗜睡、皮肤瘙痒等不良反应的发生情况。
结果 两组手术时长、瑞芬太尼和丙泊酚用量差异无统计学意义。与 R 组比较，L 组术后 1h 静息和活动 VAS 评分无统计学意义，术后 6、12、24、48 和 72h 静息和活动 VAS 评分明显降低（P<0.05）。术后 72h 内镇痛泵有效按压次数明显减少（P<0.05），术（P<0.05）。两组患者第 7 天 QoR-15 量表总评分差异无统计学意义（P>0.05）。与 R 组比较，L 组术后第 1、3 天 QoR-15 量表总评分明显升高（P < 0.05）。与 R 组比较，L 组术后首次下床时间、首次排气时间、首次进食时间、镇痛泵按压次数明显减少,（P < 0.05）。两组补救镇痛比例差异无统计学意义。两组术后不良反应发生率差异无统计学意义。
结论 布比卡因脂质体用于弓状韧带上腰方肌阻滞能够减轻腹腔镜胃癌根治术后疼痛，可提高术后恢复质量，加速患者康复，效果优于罗哌卡因。

PU-0414

就香港肺部手术患者的术前吸气肌训练(IMT)疗效和可行性的临床研究

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目的 术前吸气肌训练(IMT)是术前预健的重要元素，让患者在术前锻练吸气肌肉，强化肺部功能，以预防术后肺炎或肺部相关并发症出现。在香港患者的相关临床经验和数据仍然缺乏，本项研究旨在评估术前吸气肌训练的临床疗效及其在香港推行的可行性
方法 研究团队对 2020 年 9 月 1 日至 2021 年 12 月 31 日于屯门医院接受大型肺部切除，并完成术前吸气肌训练的患者之医疗纪录进行回顾性分析，以找出吸气肌训练对强化肺部功能及预防术后肺

部并发症的成效和可行性。跟据文献数据，团队定义 10%或以上的吸气肌强度增长为此项研究的首要成效。

结果 经吸气肌训练后，所有患者的平均吸气肌肉强度由初始的 61.84cmH2O（SD 19.17）增加至 72.8cmH2O（SD 20.55），平均肌肉强度增加 21%（SD 0.24，95%CI 0.0404-0.1762，P=0.002，β=0.11）。 女性和男性患者的平均增长率为 24%以及 15%，吸气肌肉强度 (MIP)由初始的 57.3cmH2O 及 70.52cmH2O 增加至 68.54cmH2O 以及 80.38cmH2O。本身吸气肌肉强度较差的患者，透过吸气肌肉锻炼之受益最多，24 患者中就有 21 名患者（87.5%）得出多于 10%强度增长，女性对比男性之受益比例为 10/11（90.9%）以及 11/13（84.6%）。对比以往没有术前吸气肌训练的患者，接受吸气肌训练的患者的术后肺部并发症比率显著较低， 由以往的 19/87（21.8%）降至 2/39（5.1%）(p=0.020)。

结论 术前吸气肌训练能有效强化患者呼吸功能和预防术后肺部相关并发症。 研究亦证明吸气肌训练应用于香港手术患者之可行性。

PU-0415

右美托咪定联合罗哌卡因腹横肌平面阻滞对剖宫产术后镇痛的影响

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目的 评估右美托咪定作为后路 TAPB 中罗哌卡因的辅剂对剖宫产术后多模式镇痛的影响。

方法 本研究在空军军医大学第一附属医院纳入 90 名拟行剖宫产手术的产妇，所有产妇术后 48h 内实施氢吗啡酮静脉自控镇痛、双侧后路 TAPB 以及口服对乙酰氨基酚和塞来昔布镇痛，必要时静注氢吗啡酮补救镇痛，并按 1：1 随机分为：单纯罗哌卡因组，即每侧 0.25% 罗哌卡因 20 ml 后路 TAPB；右美托咪定组，即每侧 0.25% 罗哌卡因 20 ml 复合 0.5 μg/kg 右美托咪定后路 TAPB。主要结局是术后 48h 内氢吗啡酮消耗量，次要结局包括术后 0-4、4-6、6-12、12-24、24-48 h 的氢吗啡酮消耗量及患者自控镇痛（Patient controlled analgesia，PCA）按压次数，术后 4、24、48h 的静息、活动及宫缩痛数字等级（Numeric rating scale，NRS）评分和首次 PCA 按压时间。其他结局指标包括产妇术后镇痛满意度、首次下床活动时间、补救镇痛发生率及不良反应发生率等。采用 Mann-Whitney U 检验比较术后氢吗啡酮消耗量、PCA 按压次数，首次 PCA 按压时间进行 Log-Rank 检验，并绘制累积事件曲线。使用广义线性混合模型来比较两组产妇术后静息、活动及宫缩痛 NRS 评分。根据妊娠期糖尿病、前次剖宫产及 BMI ＞ 28 kg/m2 对主要结局进行亚组分析。根据 TAPB 质量和术后是否按时口服镇痛药以及补救镇痛对主要结局进行敏感性分析。

结果 1）最终有 90 名产妇进行随机化分组且两组产妇的基线均衡。

2）主要结局指标：术后 48h 氢吗啡酮消耗量在组间无显著差异（中位数，13.86 vs 12.54 mg，P=0.853）。主要结局指标的敏感性分析与主分析一致。亚组分析中所有亚组变量与干预效应之间均无交互作用。

3）次要结局指标：右美托咪定延长了产妇首次按压 PCA 的时间（中位数，1.12 vs 4.45 h，Log-rank P=0.024）；减少了术后 4h 内的氢吗啡酮消耗量（中位数，0 vs 1.32 mg, P=0.048）。两组产妇术后静息和活动 NRS 评分均无统计学差异（P＞0.05），但右美托咪定组宫缩痛 NRS 评分低于单纯罗哌卡因组，且有统计学差异（P=0.008）。

4）其他结局指标：两组产妇的术后首次下床活动时间、补救镇痛发生率、术后不良反应发生率及产妇满意度无组间差异（P＞0.05）。

结论 在多模式镇痛背景下， 每侧 0.5 μg/kg 右美托咪定作为后路双侧 TAPB 中罗哌卡因辅剂并未减少剖宫产术后 48h 阿片药用量，但延长了术后首次 PCA 按压时间，减轻了宫缩痛，且未增加不良反应。

PU-0416

床旁超声用于术后烦躁患者的评估治疗及相关病例报道

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目的 床旁超声在麻醉科的临床使用已经越来越普及和广泛，除了用于传统的超声引导外周神经阻滞麻醉和深静脉穿刺置管等项目外，床旁超声更多的开始用于麻醉手术患者的器官功能评估（如心脏超声，肺超声，胃超声，血管容量评估，气道评估等等），给更高品质的临床麻醉提供了有效的技术保障。除了上述用途外，麻醉手术患者术后苏醒室内的相关并发症和不良反应也可以通过床旁超声来快速有效的查找原因，并且在对应治疗后给予实时客观的效果评估，从而能够提高临床麻醉和手术相关不良反应的处理能力，避免严重的不良事件发生

方法 术后尿潴留是老年患者麻醉手术后常见的并发症和不良反应。严重的尿潴留会导致患者术后躁动，增加患者的应激反应，加重其心血管和呼吸系统的负担，也可能会破坏手术质量，导致不必要的医疗消耗，影响病人的术后转归质量，同时也不利于术后加速康复医学（Enhanced Recovery After Surgery，ERAS）的发展。床旁超声能够及时客观有效的发现尿潴留，并且实时评价治疗效果，消除患者术后苏醒室内烦躁的因素，从而能够促进患者术后康复。我们在此介绍两例术后尿潴留导致苏醒室内患者烦躁，循环系统严重波动，后经床旁超声及时发现并且有效处理的临床病例。

结果 病例 1 患者，女，68 岁，一个月前发现颈前肿物，直径约 3.5cm，拟甲状腺肿物，T1-RADS3 类。住院后拟行择期行甲状腺肿物切除术。患者术前意识状态良好，无心肺脑等器官的基础疾病及药物过敏史，ASAⅡ级，CT 检查提示气管居中，未受肿物压迫。患者进入手术室后常规监测。麻醉开始，依次给予利多卡因 20mg，罗库溴铵 0.6mg/kg，舒芬太尼 0.3ug/kg, 丙泊酚 2mg/kg，地塞米松 10mg，气管插管顺利，连结呼吸机进行容量控制呼吸。术中使用静脉泵注瑞芬太尼和吸入地氟醚维持麻醉。手术用时 1 个小时，手术顺利，术中输注乳酸林格氏液 780ml。术中各项生命体征平稳，切口缝合时，关闭地氟醚，缝合结束时，停止使用瑞芬太尼，呼气末地氟醚浓度降至 0 时静脉给与新斯的明 2mg 和阿托品 1mg 拮抗肌松药物，2 分钟后，病人自主睁眼，自主呼吸，潮气量 360-400ml，吸痰后，患者配合张口，顺利拔除气管导管，此时心率 90 次/分，血压 148/92mmHg，脉氧 99%。随后，患者转入术后苏醒室（PACU）。在 PACU 进行血压，心率，脉氧监测，患者进入苏醒室后，血压心率数值逐步增加，达到血压 182/140mmHg，心率 128 次/分，脉氧降低至 93%，给予尼卡地平降血压，艾司洛尔降心率，效果不佳，此时患者出现烦躁，查体发现下腹部较膨隆，患者也诉腹胀，排尿困难。麻醉科医生随后对患者进行床旁的腹部超声检查，发现膀胱充盈明显，形如球状，此时病人烦躁程度加重，不予配合，无法自行排尿，立即给予一次性导尿，总共导出尿量为 1800ml（分两次排出），随后病人烦躁消失，各项生命体征逐渐恢复至安全水平，（血压 136/82mmHg,心率 88 次/分，脉氧 99%），1 小时后，观察患者生命体征正常，遂安全送回病房。

结论 随着外科学和麻醉学理论及技术的发展，术后加速康复（Enhanced Recovery After Surgery，ERAS）已经在临床广泛开展，为了降低相关并发症，越来越多的手术患者不需要保留导尿。同样，随着人口老龄化的演变，越来越多的老年患者需要接受手术治疗，全身麻醉药物，手术应激，以及患者合并疾病等因素可能会增加患者术后尿潴留的发生，这些更增加了老年患者术后烦躁的发生率和严重程度，假如未能及时发现，有效处理，可能会给患者带来严重的损害，威胁心，肺，脑等重要脏器功能，不利于患者的术后恢复。床旁超声作为一种诊断利器，已经被广泛的用于临床麻醉工作中，它同样能够被用于术后患者烦躁的原因探查，通过腹部和或肺部超声，心脏超声能够实时有效的发现器官功能状态，查找确定常见术后烦躁的因素，从而确定有效的治疗方案，评估治疗效果。本文介绍的两例老年患者术后烦躁均是通过超声确定的严重尿潴留病例，其原因可能系术后拮抗肌松药物使用的阿托品，以及糖尿病本身导致的神经源性膀胱等因素，此外排尿体位的变化，前列腺增生等都很影响老年患者正常的排尿过程。及时的床旁超声检查并有效治疗，能够避免尿潴留导致的严重心血管和呼吸系统的负担，降低应激反应。从而避免由此带来的严重不良事件。

随着合并多种疾病的老年患者手术病例数的增加，以及 ERAS 的临床要求，我们通过临床实践，建议在苏醒室内常规配备超声检查设备，能够及时有效的实时床旁超声检查，提前发现问题，有效消除由此带来的不良事件，给患者的顺利康复提供优质的麻醉医疗保障。

PU-0417

输注右美托咪啶对腹部大手术术后急性肾损伤的影响

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背景：急性肾损伤是手术后常见的并发症，与高死亡率和医疗成本增加有关。腹部大手术由于其复杂性和创伤性，患者尤其容易发展为 AKI。右美托咪啶（Dexmedetomidine，DEX）是一种高选择性的 α2-肾上腺素受体激动剂，具有镇静、镇痛、交感神经抑制和抗炎作用。近年来，关于其在心脏手术中对急性肾损伤（Acute Kidney Injury, AKI）的潜在保护作用，已有多项研究和荟萃分析发表已被证实在心脏手术中具有潜在的肾脏保护作用。然而，其在腹部大手术中的应用和效果尚不明确。

目的：本文旨在探讨围手术期输注右美托咪啶（Dexmedetomidine, DEX）对腹部大手术患者术后急性肾损伤（Acute Kidney Injury, AKI）的影响，并评估其在临床应用中的潜力。

方法 通过系统性检索 PubMed、EMBASE、Cochrane Library 等数据库，收集关于围手术期使用 DEX 对腹部大手术后 AKI 影响的相关研究。采用荟萃分析方法对收集的数据进行定量综合，并使用试验顺序分析（Trial Sequential Analysis, TSA）评估证据的确凿性。

结果 共纳入 38 项符合条件的随机对照试验（RCTs），涉及腹部大手术患者 32130 名。荟萃分析结果显示，与对照组相比，DEX 组患者术后 AKI 的发生率显著降低（风险比[Risk Ratio, RR] = 8.2%, 95%置信区间[Confidence Interval, CI] = 6.2-10.2, P < 0.05）。TSA 结果支持了这一发现，表明现有证据已足够确凿。敏感性分析和亚组分析进一步验证了 DEX 对不同年龄、性别和风险等级患者的保护作用。此外，DEX 的使用还与术后通气时间缩短、肺部并发症和术后谵妄发生率降低相关。

结论 围手术期输注 DEX 对腹部大手术患者具有显著的肾脏保护作用，能降低术后 AKI 的发生率，并可能改善其他术后转归。然而，考虑到研究的异质性和样本量限制，未来需要更多大样本、多中心的 RCTs 来进一步验证 DEX 的肾脏保护效果，并探索其在不同患者群体中的最优剂量和输注方案。

PU-0418

羟考酮联合盐酸罗哌卡因在腰方肌平面神经阻滞的运用

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目的 评价羟考酮联合盐酸罗哌卡因在腰方肌平面神经阻滞用于后腹腔镜肾癌切除术对术后镇痛效果的影响。

方法 选择 80 例 2023 年 1 月至 2024 年 06 月入院择期行后腹腔镜肾癌切除术切除术治疗的患者作为研究对象。采用随机数字表法分为 2 组：羟考酮+罗哌卡因组(实验组，n=40)和单独罗哌卡因组(对照组，n=40)。记录患者术后 1 h、4 h、12h、24 h 和 48 h 时的疼痛 NRS 评分和镇痛泵按键次数，术后 12h、24 h、48 h 的 QoR15 评分，术后不良反应发生情况。

结果 术后 4h、12h、24h、48h,实验组 NRS 评分相比对照组均更低(z=-1.852、-1.920、-2.030、-1870,P<0.05);术后 4h、12h、24 h、48 h 患者镇痛泵按压次数实验组低于对照组(z=-2.320、-2.411、-2.569、-3.105,P<0.05);术后 12h、24 h、48 h 时的实验组 QoR15 评分均高于对照组(t=1.850、2.220、2.340,P<0.05);实验组术后患者不良事件发生率明显低于对照组(χ2=4.330,P<0.05)。

结论 在后腹腔镜肾癌根治术的患者中，进行超声引导下的羟考酮联合盐酸罗哌卡因腰方肌平面神经阻滞使患者得到了更满意的镇痛，术后恢复质量更好，不良反应更好，促进了患者的术后快速康

复。

PU-0419

Comparison of ciprofol and propofol on postoperative quality of recovery in total intravenous anesthesia: A randomized, controlled, double-blind, non-inferiority trial

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objectives: The study aimed to compare the quality of recovery (QoR) between ciprofol-based and propofol-based total intravenous anesthesia in elderly patients undergoing elective laparoscopic major abdominal surgery, using QoR-15 scores as the primary outcome.
Methods: 144 elderly patients (age ≥65 years) were randomly assigned to either the ciprofol group or the propofol group.The ciprofol group received continuous ciprofol infusions and remifentanil, while the propofol group received infusions of propofol and remifentanil.
Outcome measures: The primary outcome was QoR-15 on postoperative day 1 (POD1), analyzed in both the intention-to-treat analysis and per-protocol populations，with the mean difference between the groups compared against a non-inferiority margin of −8. Secondary outcomes included QoR-15 on POD2, POD3, and POD5 in both intention-to-treat and per-protocol analysis，as well as various perioperative measures such as hemodynamic data, injection pain, time to spontaneous breathing recovery, extubation time and postoperative nausea and vomiting profiles in the intention-to-treat analysis. Group-time interaction effects in hemodynamic data and QoR-15 were analyzed using a linear mixed model.
Main results: The global QoR-15 scores on POD1 in the ciprofol group were non-inferior to those in the propofol group (mean difference, 0.4, 95% CI, -2.8~3.5; P = 0.032 for noninferiority). Similar results were observed at POD2, POD3, and POD5 in both intention-to-treat and per-protocol analyses. Additionally: Compared with propofol group, the incidence of injection pain was lower (2.8% vs. 27.8%, P<0.001); the incidence of hypotension was lower (33.3% vs. 54.2%, P=0.018); the incidence of bradycardia was higher (38.9% vs. 23.6%, P=0.048); there were fewer blood pressure adjustments during the operation (3.0 [2.0, 5.0] vs. 5.0 [3.0, 6.0], P=0.028); the recovery time of spontaneous breathing was longer (14.0 [10.0, 19.0] vs. 10.0 [8.0, 16.0], P=0.025), and the extubation time was longer (22.0 [16.8, 28.3] vs. 19.0 [14.8, 24.0], P=0.037).
Conclusions: Ciprofol-based total intravenous anesthesia yields a comparable quality of recovery to propofol in elderly patients undergoing elective laparoscopic major abdominal surgery and presents nobable safety advantages, including a diminished risk of hypotension and lower incidence of injection pain. Particularly for patients at elevated risk of complications from hypotension, such as the elderly or those with cardiovascular ailments, ciprofol may be the preferable choice.

PU-0420

体脂对心脏手术后急性肾损伤的调节作用：一项国际多中心队列研究

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目的 心脏手术后急性肾损伤（AKI）是心脏手术后的常见并发症，发生率高达 42%，显著影响患

者预后。术前衰弱状态是 AKI 的重要危险因素，但并非所有衰弱患者术后均发生 AKI，这表明衰弱可能受其他因素调节。本研究旨在探讨心脏手术患者术前衰弱状态、体脂率与术后 AKI 之间的相互作用，以早期识别 AKI 高危人群并优化管理策略。

方法 研究采用国际多中心回顾性队列设计，包含三个国际队列。首先对 2014 年至 2019 年间在武汉协和医院接受心脏手术的成人患者数据进行分析，并通过 MIMIC-IV 和 eICU 两个国际队列对结果进行外部验证。研究终点为术后 7 天内发生的 AKI，依据 KDIGO 标准评估。衰弱状态通过临床实验室衰弱指数测量，体脂率由 BMI、性别和年龄计算。使用多变量逻辑回归模型和调节作用分析评估衰弱、体脂率与 AKI 的关系，进行多项敏感性分析验证结果的稳健性。

结果 研究共纳入 8785 名心脏手术患者，共有 2293 名患者发生 AKI（图 A）。在主要分析队列的 3569 名患者中，中度和重度衰弱状态的患者术后急性肾损伤发生风险分别增加 7%和 13%（图 B）。体脂率与 AKI 风险呈非线性关系（图 C）；较低体脂率在各衰弱组均与较低 AKI 风险相关（图 E）。基于国际队列进行的外部验证结果与主要分析队列结果一致（图 F）。调节作用分析显示，较低的体脂率降低了衰弱患者术后急性肾损伤的发生风险（图 D）。多项敏感性分析结果与主要分析结果一致。

结论 研究通过三个国际队列，证明了术前衰弱状态显著增加了心脏手术后 AKI 的发生风险，而较低的体脂率能够有效降低心脏手术后 AKI 的发生风险。研究建议对心脏手术患者进行早期健康教育以改善衰弱状态并降低体脂率，同时将衰弱和体脂评估纳入常规术前评估，以识别高风险患者并实施个性化干预，从而改善患者预后。

PU-0421

羟考酮与舒芬太尼在早期食管癌内镜下黏膜剥脱术中的镇痛效果比较分析

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目的 This study aims to explore the transitional analgesia with oxycodone and sufentanil in ESD patients under sufentanil general anesthesia.

方法 86 patients scheduled for ESD under sufentanil general anesthesia were randomly assigned to oxycodone (O group, n = 29), sufentanil (S group, n = 30), or normal saline (N group, n = 26). Before surgery completion, O group received oxycodone (0.1 mg/kg), S group received sufentanil (0.1 μg/kg), and N group received saline. Patient conditions, anesthetic medication, vital signs, recovery duration, decannulation time, adverse reactions, Visual Analog Scale (VAS) scores, and pain relief incidence were recorded.

结果 O group showed reduced VAS scores post-surgery compared to S and N groups. S group had reduced VAS scores postoperative 0 h and 12 h at rest compared to N group. No significant differences were observed in patient conditions or intraoperative anesthetic dosages. O group had prolonged recovery and decannulation times but similar overall recovery. No significant differences in severe vomiting were noted.

结论 Transitional analgesia with oxycodone and sufentanil provided more prolonged and comprehensive postsurgical analgesia compared to sufentanil in ESD patients , with no significant side effects. These findings inform transitional analgesia strategies in this patient population.

PU-0422

围术期肠道菌群紊乱与术后谵妄的因果关系——来自前瞻性研究和小鼠模型的证据

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目的 术后谵妄（POD）是老年患者接受重大手术后常见且严重的并发症。动物研究表明，术后谵妄的发生可能与肠道菌群的变化密切相关，但相关的临床研究尚不充分。因此，本研究旨在探索术后谵妄患者围术期肠道菌群结构及粪便中短链脂肪酸的变化情况，并分析这些变化与术后谵妄之间的因果关系。

方法 本研究采用临床研究和动物实验相结合的方法，临床研究部分为一项前瞻性巢式病例对照研究，纳入人群为接受择期冠状动脉搭桥手术的老年患者，收集手术前后患者的粪便样本，并随访术后 1-5 天谵妄的发生情况。根据患者术前信息（如年龄、性别、BMI、饮食习惯等）进行倾向评分匹配，利用 16srRNA 基因测序技术和气相色谱联合质谱技术评估肠道菌群结构和粪便中短链脂肪酸含量。在动物研究中，使用粪菌移植技术将谵妄患者和非谵妄患者的术后粪便移植给抗生素处理的伪无菌小鼠，使用成套的行为学测试评估小鼠是否出现了谵妄样行为，使用 qRT-PCR 技术检测小鼠海马中炎症因子（TNF-α，IL-1β，IL-6）的表达情况。

结果 共有 120 名患者完成了随访，成功匹配了 60 名患者。术前，两组患者的肠道菌群结构相似。但术后，两组患者的肠道菌群结构出现了明显不同（Bray-Curtis P＜0.05，Weighted UniFrac P＜0.05），术后谵妄患者肠道菌群多样性出现明显下降（Shannon P＜0.001，Pielou-e P＜0.01）。线性判别分析显示，术后谵妄组术后肠道菌群表现为条件致病菌属增多（如 Enterococcus, Pelomonas ）和短链脂肪酸产生菌属减少（如 Bacteroides, Ruminococcus, Blautia, Dorea, Alistipes, Oscillospira, Faecalibacterium, and Clostridium）。气相色谱联合质谱技术的结果表明，术后谵妄患者的粪便短链脂肪酸含量显著低于非谵妄患者（P＜0.05），且患者术后粪便短链含量与谵妄严重程度呈负相关（P＜0.01），与血浆炎症水平呈负相关（P＜0.05）。动物实验的行为学及 RT-qPCR 结果表明，接受术后谵妄患者的粪菌的伪无菌小鼠表现出谵妄样行为，且其海马中炎症因子（IL-1β，IL-6）mRNA 表达水平出现明显升高（P＜0.05）。

结论 围术期肠道菌群紊乱（条件致病菌属增多、短链脂肪酸产生菌属减少）可能在术后谵妄的发生中发挥了重要作用，肠道菌群可能是术后谵妄防治的有效靶点。

PU-0423

少阿片麻醉方案对肥胖合并 OSA 患者行减重手术术后疼痛的影响

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目的 探讨少阿片类药物麻醉（Opioid-Free Anesthesia, OFA）方案用于肥胖合并阻塞性睡眠呼吸暂停（Obstructive Sleep Apnea, OSA）患者行减重手术后镇痛的有效性和安全性。

方法 选择 2022 年 5 月至 2023 年 5 月期间于山东第一医科大学第一附属医院在全身麻醉下择期行减重手术的患者共 64 例，年龄≥18 岁，BMI≥35kg/m2， ASAⅡ-Ⅲ级的患者。采用区组随机化方法，将患者随机分配到阿片类药物麻醉组（Opioid-Based Anesthesia, OBA）和少阿片类药物麻醉组（Opioid-Free Anesthesia, OFA），每组 32 例。两组患者诱导前均静脉泵注右美托咪定（负荷剂量为 1μg/kg，泵注 10min，10min 后调整为维持剂量 0.6μg/(kg·h)，至气腹结束时停止）。OBA

组麻醉诱导依次静脉给予丙泊酚 2.5mg/kg、罗库溴铵 0.6mg/kg、舒芬太尼 0.3μg/kg，麻醉维持采用靶控输注丙泊酚和瑞芬太尼，靶浓度分别为 2-4μg/ml、3-6ng/ml，关腹前静脉给予舒芬太尼 0.1μg/kg，昂丹司琼 8mg，术后镇痛方案采用舒芬太尼 2μg/kg+右美托咪定 2μg/kg+昂丹司琼 24mg；OFA 组患者麻醉诱导静脉给予丙泊酚 2.5mg/kg、罗库溴铵 0.6mg/kg、艾司氯胺酮 0.5mg/kg，麻醉维持采用靶控输注丙泊酚，靶浓度为 2-4μg/ml，静脉泵注艾司氯胺酮 0.2-0.5mg/(kg·h)和艾司洛尔 20-50μg/(kg·min)，关腹前静脉给予纳布啡 10mg、昂丹司琼 8mg，术后镇痛方案采用纳布啡 2mg/kg+右美托咪定 2μg/kg+昂丹司琼 24mg。主要观察指标是两组患者术后不同时间点（术后 30min、1h、2h、3h、7h、11h、15h、19h、23h、27h）的静息以及咳嗽时 NRS 评分。次要观察指标是两组患者术后不同时间点的 Ramsay 镇静评分，手术相关时间（手术时长、麻醉时长、PACU 停留时间）、术后不良反应情况、术后恢复和补救镇痛情况以及满意度情况等。

结果 与 OBA 组相比，OFA 组患者术后 2h，3h，7h，11h，15h 的静息和动态 NRS 评分结果显著降低，差异具有统计学意义（P<0.05）。与 OBA 组相比，OFA 组患者术后 7h，11h，15h，19h 的 Ramsay 镇静评分显著降低，术后麻醉恢复室停留时间显著增加，术后恶心呕吐评级、术后咽痛评级显著降低，差异均具有统计学意义（P<0.05）。与 OBA 组相比，术后 24h 内 OFA 组患者额外镇痛药物需求显著降低，术后镇痛泵治疗中，OFA 组患者自主 PCA 按压次数显著低于 OBA 组，差异均具有统计学意义（P<0.01）。两组总住院天数及满意度评分差异无统计学意义（P>0.05）。两组均未发生术中知晓。

结论 OFA 对肥胖合并 OSA 行减重手术的患者具有更好的术后镇痛和镇静效果，降低了术后镇痛药物的补救用量。OFA 会延长患者的 PACU 停留时间，但显著降低了术后恶心呕吐及咽痛的发生率。

PU-0424

超声引导下腹横筋膜神经阻滞对老年后腹腔镜患者围术期应激性和早期康复的影响

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目的 观察超声引导下腹横筋膜平面神经阻滞对后腹膜腔镜手术老年患者围术期应激性和早期康复的影响。

方法 选取 2020 年 6 月至 2023 年 6 月于山西省人民医院择期行腹膜后腹腔镜肾脏切除术患者 60 例，采用随机数字表法分为试验组（30 例）和对照组（30 例）。试验组于麻醉诱导后在超声引导下行术侧腹横筋膜平面神经阻滞，注入 0.5%盐酸罗哌卡因 20 ml，对照组注入等容量生理盐水。分别于诱导前 5min(T0)、气腹即刻(T1)、气腹后 30min(T2)、气腹结束时(T3)采集肘静脉血测量血浆皮质醇（Cor）浓度，并记录手术体积描记指数（SPI），同时采集心电信号获取心率变异性(HRV)频域指标：低频功率(LF)、高频功率(HF)；记录不良反应发生情况;记录患者排气时间、术后住院时间。

结果 ①与 T0 时比较，T1、T2、T3 时三组 SPI 值明显降低(P<0．05)；与对照组相比，试验组 T2 时 SPI 值显著下降。②T1、T2、T3 时两组 Cor 浓度明显低于 T0 时(P<0．05)，T2 时对照组 Cor 浓度明显高于试验组(P<0．05)。③T2 时试验组 LF 明显低于对照组(P<0．05)。④试验组不良反应发生率明显低于对照组(P<0．05)。5.试验组术后肛门排气时间、住院时间显著短于对照组（P<0．05）。

结论 腹横筋膜平面神经阻滞用于全麻下行后腹腔镜下肾切除术的老年患者，可以改善心交感一迷走神经的平衡性，减少应激反应，缩短术后住院时间，有利于患者早期康复。

PU-0425

悬雍垂腭咽成形术患者拔管前使用舒更葡糖钠对恢复期呼吸道并发症的影响

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目的 评价悬雍垂腭咽成形术患者拔管前使用舒更葡糖钠对恢复期呼吸道并发症的影响。
方法 选择 2021 年 1 月至 2023 年 9 月于我院择期行悬雍垂腭咽成形术患者 88 例，男 72 例，女 16 例，ASA 分级Ⅰ或Ⅱ级，年龄 18~56 岁，体重 68kg～98kg。随机将其分为舒更葡糖钠组（S 组）和新斯的明+阿托品组（NA 组），每组 44 例。两组均于全麻诱导静脉注射罗库溴 0.6mg/kg 后，开始监测患者神经肌肉功能。术毕进入麻醉恢复室（post anesthesia care unit，PACU）后，当四个成串刺激（Train-of-Four，TOF）计数为 2 时，S 组静注舒更葡糖钠 2mg/kg，NA 组静注新斯的明 0.02mg/kg+阿托品 0.01mg/kg，当 TOFr≥0.9 时拔除气管导管。记录一般情况、手术结束至拔管时间、拮抗后 TOFr≥0.9 的时间、恢复室停留时间、住院时间。观察并记录拔管后恢复期呼吸道并发症，包括气道梗阻、低氧血症、呼吸暂停、喉痉挛、支气管痉挛、咳嗽和恶心呕吐的发生情况。
结果 两组一般情况、住院时间差异无统计学意义。与 NA 组比较，S 组手术结束至拔管时间、TOFR≥0.9 的时间及恢复室停留时间明显缩短，差异有统计学意义（P<0.05）。S 组拔管后恢复期出现的气道梗阻，低氧血症，支气管痉挛，恶心呕吐发生率明显低于 NA 组，差异均有统计学意义（P<0.05）。
结论 悬雍垂腭咽成形术患者拔管前使用舒更葡糖钠，可缩短拔管时间和拔管后 PACU 停留时间，还能减少拔管后恢复期呼吸道并发症的发生。

PU-0426

基于患者报告结局的学龄前儿童术后康复量表的建立

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目的 儿童健康是全民健康的基础。近年来，小儿加速康复外科（ERAS）迅速发展，医护工作者不断地优化围术期管理，以求患儿术后康复又好又快。然而，术后康复并无统一定义，也无恰当的评价尺度。患者报告结局工具（PROM）作为一种新型的健康相关生存质量（HRQL）的评估工具，广泛用于临床结局评估（COA）。与医师报告结局（ClinRO）、观察者报告结局（ObsRO）和行为结局（PerfO）相比，患者报告结局（PRO）更能反映患者自身对疾病及相关治疗的感受。我们试图建立一种量表，期望通过学龄前患儿的自主汇报或观察者汇报，敏感地反映围术期带给患儿的生存质量变化，并可定量评估患儿的康复速度。
方法 本研究是以美国食品及药物管理局（FDA）发布的行业规范为指导[1]，开展的一项单中心、前瞻性、观察性试验。本课题组根据患者手术前后的生存质量变化建立术后康复概念框架，通过文献检索及患者访谈建立条目池，结合 ICF 词条库，经过小组讨论确认初始条目并对条目进行详细定义。将上述条目设计成评审问卷进行德尔菲法轮回，即邀请从事小儿围术期医学的专家对条目及定义进行评审，直至达成共识。最后将达成共识的条目转化为可以敏感反应围术期康复质量变化的、简单的、可行的量表。
结果 我们所建立的术后康复的概念框架为：患者术后生存质量恢复至手术前状态定义为早期康复；从恢复到术前水平至恢复到患病前水平或同龄人平均健康水平称为远期康复。文献检索得出临床研究中最常用的 10 项 PRO 指标分别为：疼痛、生活自理、心情情绪、社会功能、家庭生活、精力/疲劳、睡眠、恶心呕吐、胃肠道症状、总体健康/康复状况。我们通过患者访谈增加了 3 个 PRO 条

目，即活动不便、学习、交流。13 个 PRO 条目经历 3 轮德尔菲专家评审得出 2 个维度 10 个条目。维度一是身体功能，包括睡眠、情绪、疼痛、恶心呕吐、饮食饮水、排便排尿、学习（广义）、活动能力；维度二是活动与参与，包括社会生活参与度、家庭生活参与度。根据上述条目，生成 PRO 版本和 ObsOR 版本的量表。

结论 本研究通过科学可循的方法，构建了适用人群为学龄前儿童，测量目标为术后康复质量的量表。本量表还需要进一步验证、优化后才可应用于临床及科研。

PU-0427

他汀类药物与体重指数对膝关节置换术后血栓形成的独立与联合作用研究

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目的 探究体重指数（BMI）和术前使用他汀类药物对膝关节置换术患者术后下肢深静脉血栓形成风险的独立和联合作用。

方法 回顾性研究 2019 年 9 月 1 日至 2022 年 8 月 31 日于深圳市第二人民医院住院接受膝关节置换术的患者资料，排除未完成术前术后下肢静脉血栓筛查的患者，以及身高、体重数据缺失的患者，共纳入 1030 例患者，主要结果是膝关节置换术后轴向远端深静脉血栓和/或近端深静脉血栓（PDVT+ADDVT）的发病率。采用二分类逻辑回归方法，分析 BMI、术前是否使用他汀类药物对主要结果的作用，并调整相关混杂因素。使用限制性立方样条图描述 BMI、术前使用他汀类药物与血栓形成的独立和联合作用。

结果 该回顾性研究队列结果显示，在整体人群中，BMI 与术后 PDVT+ADDVT 发病率呈正相关（调整后 OR： 1.07， 95％ CI： 1.01-1.13； P =0.025）。25≤BMI＜30kg/m2 组与 BMI＜25kg/m2 组相比，血栓发病风回顾性研究 2019 年 9 月 1 日至 2022 年 8 月 31 日于深圳市第二人民医院住院接受膝关节置换术的患者资料，排除未完成术前术后下肢静脉血栓筛查的患者，以及身高、体重数据缺失的患者，共纳入 1030 例患者，主要结果是膝关节置换术后轴向远端深静脉血栓和/或近端深静脉血栓（PDVT+ADDVT）的发病率。采用二分类逻辑回归方法，分析 BMI、术前是否使用他汀类药物对主要结果的作用，并调整相关混杂因素。使用限制性立方样条图描述 BMI、术前使用他汀类药物与血栓形成的独立和联合作用。险增高（调整后 OR：1.16，95％ CI：0.74-1.81），BMI≥30kg/m2 组与 BMI＜25kg/m2 组相比，血栓发病风险增高（调整后 OR：2.17，95％ CI：1.16-4.03）。术前是否服用他汀类药物与术后 PDVT+ADDVT 发病率不相关。术前是否服用他汀类药物与 BMI 联合作用影响术后 PDVT+ADDVT 发病率，在调整后交互作用仍显著(P=0.016)。限制性立方样条图显示，术后下肢深静脉血栓发病率随着 BMI 增加而升高；这种正相关性在术前服用他汀类药物组中发生了改变，在术前服用他汀类药物组患者术后血栓发病率随着 BMI 增加而降低。

结论 本研究发现，在膝关节置换术患者整体中，BMI 越大的患者术后下肢深静脉血栓发病率越高；术前是否服用他汀类药物的术后血栓风险对比无差异。BMI 与术前是否服用他汀类药物相互作用影响术后下肢深静脉血栓发病风险。在术前服用他汀类药物组中，BMI 越大的患者术后血栓发病率越低。服用他汀类药物对于超重及肥胖患者预防下肢深静脉血栓可能具有更积极的临床意义。

PU-0428

艾司氯胺酮在泌尿外科内镜手术中对阴茎异常勃起的疗效

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目的 术中阴茎异常勃起是泌尿外科内镜手术男性患者常见的异常生理反应，据报道，经尿道手术患者麻醉下术中阴茎异常勃起的总体患病率 0.1%~2.4%。对于即将行以尿道为手术通道的泌尿外科内镜手术而言，严重影响手术进程，使麻醉、手术时间延长，患者应激反应及围术期阴茎损伤、出血、断裂的风险提高，医疗费用增加，术后康复时间延长，一旦发生，需要快速安全有效地处理。既往研究报道，有多种方法及途径可处理这种异常生理反应，但多数需要等待较长时间，或不能完全有效，且伴随多种不良反应，与术后快速康复理念相违悖。本研究旨在评价静脉注射艾司氯胺酮在治疗全身麻醉下泌尿外科内镜术中阴茎异常勃起的有效性和安全性。
方法 观察并分析 2023 年 2 月 ~2024 年 5 月上海长海医院泌尿外科手术中心全麻下行内镜手术男性患者 715 例，术中出现阴茎异常勃起的患者 19 例，对这种异常生理反应排除相关禁忌后采用静脉注射艾司氯胺酮 0.3mg/kg 的方法治疗，待阴茎勃起开始消退至不影响手术医生操作时记录起效时间，并严密监测注射时及注射后 3min 内的心率血压变化情况。当患者 MAP< 70mm Hg 或低于基础值的 30 %，HR < 45 bpm 时，排除麻醉过深或外科操作影响的可能后，分别予麻黄碱、阿托品对症处理；当患者 MAP > 100mm Hg 或高于基础值的 30 %，HR > 100 bpm 时，排除麻醉过浅或外科操作影响后，分别予乌拉地尔、艾司洛尔对症处理。
结果 上海长海医院泌尿外科内镜手术术中阴茎异常勃起发生率约 3.2%（明显高于其它手术），本方案治疗有效率 100%，起效时间平均 (50±8)s，注射后 3min 内生命体征波动范围血压上升幅度平均 5%，心率上升平均 3%，术后随访 24h，导尿管相关膀胱不适（catheter-related bladder discomfort, CRBD）分级均≤1 级，无其他不适主诉。远期随访 1 个月，未有性功能异常主诉，未见其他相关并发症。
结论 静脉注射艾司氯胺酮能快速安全地解决泌尿外科内镜手术期间阴茎异常勃起的不良反应。

PU-0429

比较硝酸甘油与艾司洛尔控制性降压对全身麻醉内窥镜鼻窦手术患者术后早期认知功能的潜在影响

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目的 认知功能障碍是全身麻醉复合控制性降压术后被关注的并发症之一。本研究的目的是比较应用硝酸甘油或艾司洛尔实施控制性降压对全身麻醉内窥镜鼻窦手术患者早期认知功能的潜在影响。
方法 本研究为前瞻性随机对照研究，纳入 100 例全身麻醉下行内窥镜鼻窦手术的患者随机分为两组，每组 50 例，其中一组患者 5 术中采用硝酸甘油进行控制性降压，另一组患者采用艾司洛尔进行控制性降压。对所有患者于术前及术后 1 周进行认知功能评估，蒙特利尔认知评估量表（Montreal Cognitive Assessment Scale，MMSE），本顿视觉知觉测验（Benton Visual Perception Test，BVRT）及事件相关电位（Event Related Potentials，ERPs）P300 记录。
结果 硝酸甘油组及艾司洛尔组术后一周的 MMSE 及 BVRT 得分均显著下降，但两组间统计学无显著性差异（P = 0.11、P = 0.24）。硝酸甘油组及艾司洛尔组术后 1 周的 P300 潜伏期均有显著延长（P ＜ 0.01、P ＜ 0.01），但硝酸甘油组的延长较艾司洛尔组差异更显著（P = 0.02）。硝酸甘油组及艾司洛尔组术后 1 周的 P300 振幅均显著降低（P ＜ 0.01、P ＜ 0.01），但两组间于统计学无显著性差异（P = 0.07）。

结论 对内窥镜鼻窦手术患者，艾司洛尔可以减少控制性降压麻醉过程中对术后早期认知功能的潜在不良影响，因此艾司洛尔比硝酸甘油更适合用于控制性降压全身麻醉。

PU-0430

甲苯磺酸瑞马唑仑联合氟马西尼麻醉对肝硬化患者行内镜治疗术后神经系统安全性的影响

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目的 肝硬化患者在接受内镜下食管胃底静脉曲张治疗术时，麻醉药物的选择对中枢神经系统的影响尤为重要。本研究旨在探讨甲苯磺酸瑞马唑仑联合氟马西尼在此类手术中对中枢神经系统损害及苏醒质量的影响。
方法 采用前瞻性队列研究，共纳入 50 例 2022 年 12 月至 2023 年 12 月间行内镜套扎和/或硬化术的肝硬化患者，年龄 34～64 岁，ASA 分级Ⅱ或Ⅲ级，分为无肝性脑病组（无 MHE 组，n=23）和轻微型肝性脑病组（MHE 组，n=27）。采用数字连接试验（number connection test, NCT）及数字符号试验（digit-symbol test, DST）评估两组患者术前、术后 6 h 和术后 24 h MHE 发生及进展情况。记录两组患者睁眼时间、指令响应时间、拔管时间；拔管后 5min（T1）、拔管后 10min（T2）、拔管后 15min（T3）、拔管后 20min（T4）的 steward 评分，以评估患者苏醒期质量。
结果 MHE 组术前、术后 6 h 及术后 24 h NCT 评分均高于无 MHE 组（P < 0.001），MHE 组术前、术后 6 h 及术后 24 h DST 评分均低于无 MHE 组（P < 0.001）。两组患者术后 6 h NCT 评分及 DST 评分与术前比较，差异均无统计学意义（P > 0.05）。与术前相比，MHE 组术后 24 h NCT 评分显著降低，DST 评分显著升高，差异有统计学意义（P < 0.05）。与无 MHE 组相比，MHE 组睁眼时间、指令响应时间及拔管时间均未见显著差异（P > 0.05）。两组患者在各时间点 steward 评分差异均无统计学意义（P > 0.05）。
结论 甲苯磺酸瑞马唑仑联合氟马西尼在内镜下食管胃底静脉曲张治疗术中，对肝硬化患者的中枢神经系统无明显进展性损害，未加剧 MHE 向 HE 的转变。术后两组患者均能快速苏醒。

PU-0431

瞳孔对光反射与老年患者全身麻醉术后苏醒时间及术后谵妄的相关性

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目的 探讨瞳孔对光反射参数与老年患者全身麻醉术后苏醒时间及术后谵妄发生的相关性,及其对麻醉手术后苏醒延迟和术后谵妄发生的预测价值。
方法 1、选择南昌大学第二附属医院 2021 年 07 月-2022 年 02 月行脊柱手术的老年患者（≥65 岁）60 例。术前 1 天测量瞳孔对光反射收缩率及收缩速率，并行简易精神状态量表（Mini-mental State Examination; MMSE）评分。
2、确定统一的麻醉诱导及维持方案。诱导：咪达唑仑 0.02mg/kg+舒芬太尼 0.2ug/kg+依托咪酯 0.3mg/kg+罗库溴铵 0.9mg/kg+地塞米松 5mg。维持：丙泊酚 4-12mg/（kg*h）+七氟烷 2%+顺式阿曲库铵 0.1mg/（kg*h），术中调整丙泊酚及七氟醚维持 BIS 值 40-60。镇痛不足时追加舒芬太尼 5-10ug。

3、记录术中舒芬太尼的追加用量；手术时长；术中出血量；停药后即刻的瞳孔对光反射的收缩率及收缩速率。
4、记录术后苏醒时间；术后第 3 天及第 7 天行 MMSE 及意识模糊评估量表中文修订版（Confusion Assessment Method-Chinese revision; CAM-CR）评分。
5、根据患者术后苏醒时间分为苏醒延迟组与非延迟组；根据术后 CAM-CR 评分划分为谵妄组及非谵妄组。
6、分析瞳孔收缩率和收缩速率与苏醒时间、MMSE 评分及 CAM-CR 评分之间的相关性；比较苏醒延迟组与非延迟组、谵妄组及非谵妄组之间瞳孔对光反射参数之间的差异，绘制受试者工作特征（Receiver Operating Characteristic; ROC）曲线,并计算 ROC 曲线下面积（Area Under roc Curve; AUC）评估瞳孔对光反射参数作为术后谵妄预测指标的准确性。
结果 1、有 17%（10/60）的患者在术后发生了苏醒延迟。有 20%（12/60）的患者在术后通过 CAM-CR 评分被诊断为术后谵妄，其中大多数（75%，9/12）在术后第 3 天被诊断，25%（3/12）在术后第 7 天被诊断，仅有 1 名患者在两次评估时都被诊断为术后谵妄。
2、瞳孔对光反射参数与患者苏醒时间之间的相关关系不具有统计学意义 (P＞0.05)，苏醒延迟组与非苏醒延迟组间瞳孔对光反射参数的差异也不具有统计学意义 (P＞0.05)。
3、与术前相比，患者术后第 3 天的认知功能出现了下降，但在术后第 7 天得到恢复，其差异具有统计学意义 (P＜0.05)。
4、患者麻醉手术后即刻测得的瞳孔对光反射收缩率及收缩速率较术前出现了下降 (P＜0.05)并与患者术后第 3 天的 MMSE 及 CAM-CR 评分表现出了相关性 (P＜0.05)；谵妄组的瞳孔对光反射收缩率及收缩速率较非谵妄组低 (P＜0.05)。
5、瞳孔对光反射收缩率对术后谵妄预测的 AUC 为 0.679（0.500～0.858；P=0.57）；瞳孔对光反射收缩速率对术后谵妄预测的 AUC 值为 0.718（0.563～0.871；P=0.02），当其临界值为 2.336mm/s 时，表现出了最佳的预测价值（灵敏度 62.50%,特异度 74.78%）。
结论 尚不能证明明瞳孔对光反射的相关参数与患者术后苏醒时间之间存在相关性；老年患者的认知功能在麻醉手术后下降，其术后瞳孔对光反射收缩率及收缩速率与 MMSE 及 CAM-CR 评分存在相关性。与非谵妄患者比较，谵妄患者的收缩率及收缩速率都出现下降。瞳孔收缩速率可作为术后谵妄的一种预测指标，与之相较，收缩率作为谵妄预测指标可能不具有统计学意义。

PU-0432

肋缘下 TAP 阻滞联合静脉镇痛与硬膜外镇痛在开放性肝脏手术中的应用比较

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目的 比较肋缘下 TAP 阻滞联合静脉镇痛与硬膜外镇痛在开放性肝脏手术中的应用。
方法 选择择期行肝部分切除术的患者 60 例，患者年龄在 18-80 岁； ASA I-III 级；BMI≤25kg/m2。将招募到的患者随机分为肋缘下 TAP 阻滞联合静脉镇痛组和硬膜外镇痛组。肋缘下 TAP 阻滞联合静脉镇痛组：术前注射 0.25%的罗哌卡因 20ml 到肋缘下腹横肌平面，硬膜外镇痛组，术后行单纯 0.20%罗哌卡因 100ml ＰＣＥＡ。记录两组患者术后静息、活动及咳嗽时疼痛评分（VAS）（时间点：手术后 2h，手术后 4h，手术后 6h，手术后 24h，手术后第二天，手术后第三天，手术后第四天以及手术后第五天），比较两组患者全麻药物用量和苏醒相关指标，记录手术时间，麻醉时间，术中液体量，尿管时长，血管活性药物使用（量和次数），肠道功能恢复时间、进食时间、下床活动时间、住院时间，观察患者恶心呕吐、头晕等不良反应的发生情况，并记录血肿、局麻药中毒等相关并发症的发生情况。
结果 硬膜外镇痛组术中舒芬太尼、瑞芬太尼用量及追加次数明显多于肋缘下 TAP 阻滞联合静脉镇

痛组（P＜0．05）。肋缘下 TAP 阻滞联合静脉镇痛组在术后 2h，手术后 4h，手术后 6h 时点 VAS 评分明显低于硬膜外镇痛组（P＜0．05），但肋缘下 TAP 阻滞联合静脉镇痛组术后使用补救性镇痛药物总剂量及次数比硬膜外镇痛组多。肋缘下 TAP 阻滞联合静脉镇痛组肠道功能恢复时间、进食时间、下床活动时间和出院时间均明显早于硬膜外镇痛组（P＜0．05）。肋缘下 TAP 阻滞联合静脉镇痛组恶心呕吐例数明显少于硬膜外镇痛组（P＜0．05）。

结论 与单纯硬膜外镇痛相比，肋缘下 TAP 阻滞联合静脉镇痛更有利于肝切除术患者早期下床活动，缩短住院时间，促进术后康复。虽然硬膜外镇痛提供了更好的止痛效果，但在更快的活动或恢复方面差于肋缘下 TAP 阻滞联合静脉镇痛。全身麻醉联合肋缘下 TAP 阻滞联合静脉镇痛相较于硬膜外镇痛对于开放性肝脏手术患者术后转归更有利。

PU-0433

硬膜外分娩镇痛产妇意外硬膜穿刺后头痛预防和护理的最佳证据总结

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目的 检索、评价并整合有关硬膜外分娩镇痛产妇意外硬膜穿刺后头痛评估和护理的证据，为临床实践提供循证依据。

方法 基于证据资源模型系统检索临床决策系统、指南网、专业协会网站、国内外数据库中关于硬膜外分娩镇痛产妇意外硬膜穿刺后头痛的评估和护理的相关证据，检索时限为建库至 2024 年 2 月 26 日。纳入文献由 2 名研究者独立进行质量评价（指南为 4 名研究者评价）、证据提取及整合。

结果 共纳入 14 篇文献，其中临床决策 1 篇、指南 3 篇、证据总结 2 篇、系统评价 6 篇、专家共识 2 篇。分别从 PDPH 的危险因素、意外硬膜刺破识别与交接、PDPH 的识别和分级管理、保守治疗对应的护理措施、侵入性治疗对应的护理措施、教育与培训、PDPH 患者出院指导 7 个证据主题，共 32 条证据。

结论 意外硬膜穿刺后头痛是产后头痛的原因之一，临床医护人员应准确识别意外硬脊膜穿刺和意外硬脊膜穿刺后头痛，并采取积极地干预措施，以促进患者康复，避免长期负面影响。

PU-0434

早期肺部超声评分对接受胸科手术的患者术后肺功能不全的预后价值：一项观察性研究

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目的 术后肺功能不全是胸科手术后患者病死率增加、住院时间延长的重要因素。与现有风险模型预测的诸多局限性相比，肺部超声可以快速、简便地评估肺功能状况，填补肺部手术预后评估手段的空白。肺部超声征象中，多发 B 线已被证实与肺部通气状况紧密相关，我们试图确定早期肺部超声 B 线评分对预测胸科手术后肺功能变化的临床价值。

方法 纳入了 95 名 ASA1-3 级，接受择期肺部手术的患者。在拔出气管导管后 30 分钟进行 B 线评分，并在拔管后 30 分钟和术后第三天记录动脉血 PaO2/FiO2 比率。根据术后第三天 PaO_2/FiO_2 比值，将患者分为正常组（$PaO_2/FiO_2 \geq 300$）和术后肺功能不全（Post-operative pulmonary insufficiency，PPI）组（$PaO_2/FiO_2 < 300$）。采用多变量逻辑回归模型来筛查术后肺功能不全的

独立预测因素并对显著相关的变量进行了受试者工作特征（Receiver Operating Characteristic Curve，ROC）分析。

结果 在招募的 95 名患者中，89 人被纳入研究。总体上患者在术后第三天的 PaO_2/FiO_2 相比拔管后 30 分钟有所改善（325.82 ± 40.85 vs 331.84 ± 34.87；p＜0.001）。正常组 69 名患者和 PPI 组 20 名患者中，年龄分别为 56（IQR 47-67）岁和 71（IQR 63-74）岁（P = 0.001），符合 ASA III 级和 NYHA 3 级的患者在 PPI 组的比例明显更高（14.49%和 40%；p= 0.0029）和（5.8%和 55%；p＜ 0.001）。尽管两种人群的 PaO2/FiO2 在术后第三天都有所改善，PPI 组的 B 线评分仍明显高于正常组（16；IQR 13-21 vs 7；IQR 5-10；p＜0.001）B 线评分是一个独立的风险因素（OR=1.349 CI95% 1.154-1.578；p＜0.001），其预测 PPI 的最佳截止值为 12（灵敏度 77.5%；特异度 66.7%）。

结论 拔管后 30min 的肺部超声 B 线评分可以有效地预测接受胸科手术的患者的早期 PPI。

PU-0435

ERAS 麻醉管理在子母胆道镜诊治胆胰疾病高龄患者中的应用研究

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目的 探讨快速康复外科(ERAS)麻醉管理在子母胆道镜诊治胆胰疾病高龄患者中的应用研究。

方法 选取 2022 年 3 月～2024 年 3 月收入我院行子母胆道镜诊治胆胰疾病手术患者 100 例。根据不同麻醉管理方法将患者分为 ERAS 组(50 例)与常规组(50 例),常规组采取传统常规麻醉管理,ERAS 组采取 ERAS 麻醉管理。观察两组患者麻醉效果、围术期不良反应、平均住院时间等。

结果 ERAS 组麻醉效果 91.24%高于常规组 79.23%(P <0.05)。ERAS 组麻醉苏醒时间、定位感恢复时间及住院时间均优于常规组(P <0.05)。ERAS 组血压降低、恶心呕吐、谵妄等不良反应发生率 10.12%均低于常规组 23.14%(P <0.05)。

结论 基于 ERAS 理念的非气管插管麻醉管理策略应用于保留自主呼吸在高龄患者行子母胆道镜诊治胆胰疾病手术中,通过优化术前、术中、术后患者管理,可以降低手术创伤应激反应,最小化不良反应,减少术后并发症,促进高龄患者快速术后康复。

PU-0436

基于 DPN 分级视角探究低浓度罗哌卡因对患者进行股神经阻滞的临床效果

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目的 观察低浓度罗哌卡因局麻药对不同等级糖尿病周围神经病变患者（DPN）行股神经阻滞时的麻醉效果，同时观察不同等级 DPN 患者股神经和坐骨神经横截面积与股动脉、腘动脉相应横截面积比值的关系及血清孤啡肽含量之间的相关性。

方法 采用队列研究的方法，纳入 80 例择期行单侧膝关节置换术患者，根据 TCSS 对入选患者进行分级，选出所需等级人数 60，分为 B 组（轻度 DPN 组，男生 20 例，女生 10 例）、C 组（重度 DPN 组，男生 15 例，女生 15 例），另选 20 例择期行单侧膝关节置换术的非糖尿病患者为 A 组（男生 10 例，女生 10 例），采用低浓度（0.25%）的罗哌卡因并通过高频超声引导并使用神经刺

激器定位股神经后行标准化股神经阻滞，并分别于术前（股神经阻滞后即刻测定）、神经阻滞后即刻、神经阻滞后 5min 内测定刺激阈值的变化，稍后评估神经阻滞后临床镇痛效果，神经阻滞后每隔 5min 测定一次运动、感觉消退效果，以隐身经支配区的冷感觉是否丧失来评估神经阻滞是否起效，出现冷感觉丧失后记录感觉消退的时间 t 作为主要结局，同时记录运动消退时间 t，并以阻滞后即刻刺激阈值、术后第一次要求使用镇痛泵的时间 t、术后 2、4、6、12、24、48h 静息和运动状态 VAS 疼痛评分作为次要结局指标。记录 DPN 患者股神经和坐骨神经横截面积与股动脉、腘动脉横截面积相应比值，验证神经横截面积改变与血清孤啡肽之间的相关性。

结果 与 A 组相比，B、C 组术前刺激阈值增加，C 组术前刺激阈值明显增加（P<0.01）。与 A 组相比，B、C 组感觉、运动消退时间慢，C 组相比较消退最快（P<0.01）。术后第一次要求镇痛时间，C>B>A 组（P<0.05）。股神经和坐骨神经横截面积与血清孤啡肽浓度之间具有相关性（P<0.05）。

结论 不同等级 DPN 患者股神经刺激阈值增加，使用低浓度罗哌卡因行股神经阻滞时不同等级 DPN 患者神经阻滞效果不同，血清孤啡肽含量、股神经横截面积及坐骨神经横截面积之间具有相关性。

PU-0437

Effect of different dosage of dexmedetomidine in the reduction of delirium: indirect comparison of controlled trials

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Background: The ideal dose of dexmedetomidine for reducing the incidence of postoperative delirium, however, is uncertain. The efficacy and safety of dexmedetomidine may differ depending on the dose. The goal of this study was to compare the efficacy of low dosage dexmedetomidine with high dose treatment on postoperativrison meta-analye delirium using an indirect compasis.
Objective: To explore the optimal dose of dexmedetomidine to prevent postoperative delirium.
Design: Systematic review of randomised controlled trials with meta-analyses
Data sources: Up to November 18, 2022, randomised controlled studies about dexmedetomidine reducing delirium were searched in PubMed, Cochrane Library, Embase, and Web of Sciences.
Eligibility criteria: We considered all randomised controlled trials that looked at the effectiveness of high or low doses of dexmedetomidine in avoiding postoperative delirium. Randomized, single-blind, or double-blind trials with adults (age 18 years) published in full manuscript form were examined. Exclusion criteria included the use of dexmedetomidine after surgery. We also omitted studies with preexisting cognitive impairment and trials that did not use a loading dose of dexmedetomidine. Non-randomized clinical trials, case studies, and systematic reviews were not considered. Non-English language studies were omitted from the search.
Results: When compared to low dosage dexmedetomidine, high dose dexmedetomidine was related with a lower incidence of delirium: fifteen trials, n=2519; risk ratio 0.61; 95% confidence interval (CI) 0.38 to 0.96; P = 0.03. There was no statistically significant difference in bradycardia incidence: eight trials, n=1930; risk ratio 1.28; 95% CI 0.61 to 2.66; P = 0.52. The incidence of hypotension did not differ statistically: nine trials, n=1962; risk ratio 1.15; 95% CI 0.71 to 1.87; P = 0.56.
Conclusions: Indirect data suggests that high dosage dexmedetomidine may be more effective than low dose regimens in reducing postoperative delirium. Dexmedetomidine is unlikely to cause bradycardia or hypotension.

PU-0438

艾司氯胺酮对乳腺癌根治术患者术后焦虑抑郁及 BDNF/ERK/Homer1a 通路相关蛋白的影响

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目的 探讨艾司氯胺酮对乳腺癌根治术患者术后焦虑抑郁及 BDNF/ERK/Homer1a 通路相关蛋白的影响。
方法 选择 2023 年 10 月至 2024 年 7 月行乳腺癌根治术患者 86 例，采用 随机数字法将患者分为两组：艾司氯胺酮组 B 组和生理盐水组 C 组，每组 43 例。B 组：于麻醉诱导时予以 0.2mg/kg 艾司氯胺酮；C 组：麻醉诱导时予以等量生理盐水，其余麻醉诱导步骤均相同，术后均使用患者自控静脉镇痛 PCIA。于术前 1d，术后 1d、术后 2d、术后 3d、进行医院抑郁-焦虑量表评分（hospital anxiety and depression scale,HADS)，于麻醉诱导前 10min、术后 1d、术后 2d、术后 3d 抽取肘静脉血 2-3ml，使用酶联免疫吸附试验 (ELISA)检测血清中 Homer1a 蛋白、脑源性神经营养因子（BDNF）、细胞外调节蛋白激酶 1/2（ERK1/2）含量，术后 1d，术后 2d，术后 3d 进行视觉模拟疼痛评分(VAS 评分)， 记录术后 PCIA 按压次数、首次按压时间、术后补救镇痛例数、拔管时间、苏醒期谵妄、躁动、恶心呕吐等不良反应。
结果 与 C 组相比，B 组术后 1d、术后 2d、术后 3dHADS 评分、VAS 评分降低，术后 1d、术后 2d、术后 3d BDNF、ERK、Homer1a 蛋白含量增加，差异均具有统计学意义（P<0.05）。两组拔管时间、苏醒期谵妄、躁动、恶心呕吐等不良反应差异均无统 计学意义。
结论 麻醉诱导时注射亚麻醉剂量的艾司氯胺酮可降低乳腺癌根治术患者术后焦虑抑郁症状的发生率，促进术后血清 Homer1a 蛋白、BDNF、ERK 表达，且并未增加不良反应。

PU-0439

超声引导下外侧弓状韧带上腰方肌阻滞用于腹腔镜腹股沟疝手术术后镇痛的研究

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目的 比较超声引导下外侧弓状韧带上腰方肌阻滞（QLB-LSAL）、经肌腰方肌阻滞（QLB)和腹横肌平面阻滞（TAP）在腹腔镜腹股沟疝修补术术后的镇痛效果。
方法 选取南昌大学第一附属医院行单侧腹腔镜腹股沟疝修补术的患者 90 例，采用随机数字表法将其分为外侧弓状韧带上腰方肌阻滞组（S 组），经肌腰方肌阻滞组（Q 组）和腹横肌平面阻滞组（T 组），每组 30 例，外侧弓状韧带上腰方肌阻滞组在术前行超声引导下外侧弓状韧带上腰方肌阻滞，腹横肌平面阻滞组术前行腹横肌平面阻滞，经肌腰方肌阻滞组术前行经肌腰方肌阻滞，三组在阻滞平面均给以 0.5%的罗哌卡因 20mL，术中给以瑞芬太尼和丙泊酚维持，术后均使用自控静脉镇痛（PCIA）。主要观察指标：观察术后 24 小时吗啡当量累积消耗量，次要观察指标：感觉阻滞平面、术中舒芬太尼和瑞芬太尼的用量、记录术后 2、4、6、12、24、48 h 的 NRS 评分、术后 48h 内补救镇痛药物的用量，第一次 PCIA 请求时间、第一次抢救镇痛时间、第一次下床和排气量时间、术后 24、48 h 恢复质量-15 (QoR-15)评分、出院前镇痛满意度评分，记录阿片类药物相关副作用（比如恶心、呕吐（PONV）、瘙痒，呼吸抑制）及阻滞相关不良事件（膈肌损伤，血肿，局麻药全身毒性（LAST)，神经麻痹、阻滞点感染）的发生情况。
结果 与经肌腰方肌阻滞和腹横肌平面阻滞相比，外侧弓状韧带阻滞术后 24 小时吗啡当量累积消耗

量降低（p＜0.05），感觉阻滞平面范围更大，术中舒芬太尼和瑞芬太尼的用量降低（p＜0.05），术后 2、4、6、12、24h 的 NRS 评分降低（p＜0.05），术后 48h 内补救镇痛药物的用量降低、首次下床时间和排气时间降低、术后 24、48h 恢复质量-15 (QoR-15)评分和出院前镇痛满意度评分提高、术后阿片类药物相关副作用（比如恶心、呕吐（PONV）、瘙痒，呼吸抑制）的发生率降低（p＜0.05)，阻滞相关不良事件（膈肌损伤，血肿，局麻药全身毒性（LAST)，神经麻痹、阻滞点感染）的发生率差异无统计学意义。

结论 外侧弓状韧带上腰方肌阻滞在腹腔镜疝修补术后的镇痛效果优于经肌腰方肌阻滞和腹横肌平面阻滞。

PU-0440

亚麻醉剂量的艾司氯胺酮对烧伤患儿术后苏醒质量的影响

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目的 通过研究亚麻醉剂量的艾司氯胺酮对烧伤患儿术后苏醒质量的影响，探索亚麻醉剂量艾司氯胺酮的用于小儿烧伤手术的临床效果，为烧伤患儿术中麻醉提供用药思路，减轻患儿痛苦

方法 招募 75 例择期择期行削痂、清创植皮术烧伤患儿在本院参与。1 组麻醉诱导前 5min 静脉注射 0.2mg/kg 艾司氯胺酮，2 组麻醉诱导前 5min 静脉注射 0.35mg/kg 艾司氯胺酮，3 组麻醉诱导前 5min 注射等量生理盐水，记录拔管后的 FLACC 疼痛评分和 PAED 评分。

结果 2 组的 FLACC 疼痛评分和 PAED 评分低于其他两组

结论 小剂量的艾司氯胺酮可以减轻患儿苏醒期的疼痛和躁动

PU-0441

超声监测下腔静脉目标导向液体治疗对高龄老年髋部手术循环的影响

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目的 探索超声监测下腔静脉塌陷率（inferior vena cava collapsibility index，IVC-CI）目标导向液体治疗（goal-directed fluid therapy，GDFT）对高龄老年髋部手术围术期循环的影响。

方法 本研究经延安大学附属医院伦理委员会审核批准（批件号：YAS-H01-2023090013），选取自 2023 年 1 月 1 日至 2024 年 2 月 29 日于我院在椎管内麻醉下行择期髋部手术的高龄老年患者 114 例。114 例患者中排除循环功能重度障碍患者 2 例，对 112 例患者进行随机化分组：对照组（n = 56）和试验组（n = 56），对照组剔除术中更改麻醉方式患者 4 例、术中发生重度骨水泥反应患者 2 例，试验组剔除术中更改麻醉方式患者 6 例，最终本试验共纳入患者 100 例，对照组与试验组各 50 例。所有病人接受同一麻醉方案。对照组：由麻醉医生依照生理需要量、术前丢失量、术中出血量及尿量给予经验性补液治疗；试验组：超声监测下腔静脉塌陷率（IVC-CI）进行目标导向液体治疗（GDFT）。观察并记录两组患者基础信息及一般情况，术中及术后 24 h 低血压发生率，术中及术后 24 h 输液量、血制品输入量、尿量及出血量，术中去甲肾上腺素使用情况、术后新发并发症发生情况、ICU 转入率及住院时间。

结果 ①试验组 50 例患者术中低血压发生率为 18.0%，对照组 50 例患者术中低血压发生率 40.0%，试验组较对照组显著降低 22.0%（P＜0.05）。

②试验组术中液体总入量（定义为术中输液量与血制品输入量之和）（1190.0±273.3）ml 显著多

于对照组（1010.4±267.2）ml（P＜0.05）；试验组术中输液量（1100.0±248.1）ml 显著多于对照组（926.4±217.7）ml（P＜0.05）；试验组与对照组相比术中血制品输入量[0.0（0.0,25.0）ml VS 0.0（0.0,0.0）ml]、术中尿量[200.0（142.5,212.5）ml VS 200.0（115.0,350.0）ml]及术中出血量[150.0（100.0,200.0）ml VS 165.0（100.0,300.0）ml]无差异（P＞0.05）；29 例术中低血压患者均使用去甲肾上腺素治疗低血压，试验组与对照组相比去甲肾上腺素第一次使用时间[35.0（17.5,77.5）min VS 22.5（11.3,31.5）min]、持续使用时间[36.0（30.0,73.5）min VS 47.5（16.0,71.0）min]及使用量[133.0（103.0,282.5）ug VS 132.0（70.25,207.5）ug]无差异（P＞0.05）。

③共对 92 例患者术后低血压发生情况进行分析，试验组 47 例患者术后 24 h 低血压发生率 14.9%，对照组 45 例患者术后 24 h 低血压发生率为 33.3%，试验组较对照组显著降低 18.4%（P＜0.05）；试验组术后 24 h 液体总入量为（1098.0±423.2）ml 显著低于对照组（1273.0±410.9）ml（P＜0.05）；试验组术后 24 h 输液量为（886.0±326.6）ml，对照组术后 24 h 输液量为（1076.0±821.5）ml，试验组较对照组术后 24 h 输液量有减少但差异无统计学意义（P＞0.05）；试验组与对照组相比术后血制品输入量[0.0（0.0,400.0）ml VS 200.0（0.0,600.0）ml]和术后尿量[850.0（750.0,1005.0）ml VS 800.0（747.5,950.0）ml]无差异（P＞0.05）；试验组术后新发并发症发生率低于对照组[3 例 VS 7 例,（P＞0.05）]。

④试验组住院天数（10.2±4.3）d，与对照组住院天数（13.5±4.4）d 相比显著缩短（P＜0.05）。

结论 超声监测下腔静脉塌陷率目标导向液体治疗能降低高龄老年髋部手术患者术中及术后 24 h 低血压发生率，减少术后新发并发症发生率，缩短患者住院时间。

PU-0442

Anterior quadratus lumborum block at the lateral supra-arcuate ligament versus rhomboid intercostal and subserratus plane block for postoperative analgesia in patients undergoing laparoscopic partial nephrectomy: A randomized controlled trial

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Objective: Several studies have confirmed the analgesic effectiveness of Anterior quadratus lumborum block at the lateral supra-arcuate ligament (QLB-LSAL) and rhomboid intercostal and subserratus (RISS) plane block in laparoscopic nephrectomy. However, there is still no comparative study between these two techniques. Our study aims to compare the postoperative analgesic efficacy between the two in patients undergoing elective laparoscopic partial nephrectomy.

Methods: A total of 100 patients with American Society of Anesthesiologists (ASA) physical status of I–III scheduled to undergo elective laparoscopic partial nephrectomy under general anesthesia.Patients were randomly allocated to receive preoperative QLB-LSAL or RISS with 0.5% ropivacaine (25 mL). Postoperatively, patient-controlled analgesia with intravenous sufentanil was administered.The primary outcome was postoperative intravenous morphine equivalent consumption within the first 24 h postoperatively. Secondary outcomes included pain scores (VAS scores), patient satisfaction scores, levels of sedation, the hospital stay and incidence of nausea or vomiting.

Results: Patients who underwent preoperative QLB-LSAL used a significantly lower intravenous morphine equivalent dose than those who underwent RISS within the initial 24 h after surgery (24.3 ± 5.3 mg vs 33.5 ± 2.2 mg, P < 0.001). No significant differences were observed in pain scores, patient satisfaction scores, sedation scores, the hospital stay or incidence of nausea or vomiting between the groups.

Conclusions: The results suggest that, compared to RISS, QLB-LSAL may be a superior option to reduce postoperative pain for patients undergoing laparoscopic partial nephrectomy.

PU-0443

Effect of preoperative natural killer cell on postoperative pulmonary complications in patients of lung cancer – A single-center retrospective cohort study

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Background: The effect of preoperative natural killer (NK) cell abnormalities on postoperative pulmonary complications (PPCs) after thoracoscopic radical resection of lung cancer is still unclear. The main purpose of this study was to investigate the relationship between the preoperative NK cell ratio and PPCs.
Methods: The patients who underwent thoracoscopic radical resection for lung cancer were divided into a normal group and an abnormal group according to whether the proportion of preoperative NK cells was within the reference range. The main outcome was the incidence of PPCs during postoperative hospitalization. The demographic and perioperative data were collected. Propensity score matching was used to exclude systematic bias. Univariate logistic regression was used to test the relationship between the preoperative NK cell ratio and the incidence of PPCs. The restrictive cubic spline curve was used to analyze the dose-effect relationship between the preoperative NK cell ratio and the incidence of PPCs.
Results: A total of 4161 patients were included. After establishing a matching cohort, 910 patients were included in the statistical analysis. The incidence of PPCs in the abnormal group was greater than that in the normal group (55.2% vs. 31.6%) (Table 3). The incidence of PPCs first decreased and then increased with increasing NK cell ratio (Figure 3). The proportion of patients with Grade 3 or higher PPCs in the normal group was lower than that in the abnormal group [108 (23.7%) vs. 223 (49%)] (Table3 and Figure 2). The indwelling time of the thoracic drainage tube in the abnormal group was longer than that in the normal group [3 (3, 4) vs. 3 (3, 5)] (Table 3). A preoperative abnormal NK cell ratio constituted a risk factor for PPCs in each subgroup (Figure 6).
Conclusion: Lung cancer patients with an abnormal proportion of peripheral blood NK cells before surgery were more likely to develop PPCs, their disease degree was more severe, and they had a prolonged duration of chest tube indwelling. Compared with those with abnormally high NK cell ratios, those with abnormally low NK cell ratios had more pronounced PPCs.

PU-0444

短链脂肪酸对睡眠剥夺小鼠术后谵妄样行为学改变的影响及机制探索

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目的 探讨外源性短链脂肪酸（SCFAs）对睡眠剥夺（SD）小鼠胫骨骨折内固定手术后谵妄（POD）样行为学改变的影响及可能机制。
方法 雄性 C57BL/6 小鼠 40 只，随机分为 5 组，空白对照组（C 组）、胫骨骨折内固定手术组（F 组）、SD+手术组（SF 组）、手术+SCFAs 混合液组（FA）组和 SD+手术+SCFAs 混合液（SFA

组）。采用改良多平台水环境法制备小鼠 SD 模型。FA 组与 SFA 组在胫骨骨折内固定手术前 1 周供小鼠饮用 SCFAs 混合液，连续喂养 7 天。与胫骨骨折内固定手术后 6h，观察各组小鼠 POD 样行为学（埋食测试、旷场实验和 Y 迷宫实验）表现，行为学测试后处死小鼠，收集外周血和海马组织，通过酶联免疫吸附试验（ELISA）测定 IL-1β、IL-6 和 S100β 含量，通过伊文思蓝渗漏实验测定肠道血管通透性。

结果 各组小鼠 POD 样行为学结果显示：埋食测试中，设置上限时间为 300s，与 C 组比较，SF 组进食潜伏期显著延长（P＜0.05）；旷场实验中，与 C 组比较，其余四组小鼠总的移动距离均显著下降，差异有统计学意义（P＜0.05），F 组和 SF 组小鼠静止时间均显著延长（P＜0.05），SF 组小鼠中央区移动距离明显减少（P＜0.05）；Y 迷宫实验中，与 C 组比较，SF 组和 SFA 组小鼠总的移动距离显著下降（P＜0.05）。伊文思蓝渗漏实验结果发现，与 C 组比较，SF 组小鼠肠道血管通透性明显增加（P＜0.05）。胫骨骨折内固定手术后 6h 的 ELISA 结果显示，与 C 组比较，F 组和 SF 组外周血中 IL-1β 和 IL-6 表达水平明显增加（P＜0.05）；与 F 组比较，SF 组外周血中 IL-1β 和 IL-6 表达水平明显增加（P＜0.05）；与 SF 组比较，FA 组和 SFA 组外周血中 IL-1β 和 IL-6 表达水平均明显降低（P＜0.05）。与 C 组比较，SF 组海马 IL-1β 和 IL-6 表达水平明显增加（P＜0.05）；与 F 组比较，SF 组海马 IL-6 表达水平明显增加（P＜0.05）。与 C 组比较，S100β 在 F 组、SF 组和 SFA 组表达均明显增加（P＜0.05）；与 F 组比较，SF 组 S100β 表达水平明显增加（P＜0.05）；与 SF 组比较，FA 组和 SFA 组 S100β 表达水平均明显降低（P＜0.05）。

结论 外源性 SCFAs 可减轻 SD 诱发 POD 样行为学改变，其机制与改善肠道血管通透性，维持血脑屏障稳定，减轻炎症反应有关。

PU-0445

术前口服姜黄素胶囊对胃肠道肿瘤根治术术后谵妄的影响及机制研究

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目的 探究术前口服姜黄素胶囊在老年患者胃肠道肿瘤根治术 POD 的影响，并初步探讨其机制。

方法 择期全身麻醉下行腹腔镜胃肠道肿瘤根治术的老年患者 78 例，年龄≥60 岁，ASAI~III 级，根据随机数字表法分为 2 组（n=39）：对照组（CG 组）术前 2d 口服安慰剂；姜黄素组（C 组）术前 2d 口服姜黄素 500mg，两组均每日 1 次，至手术当天。入组前采用简易精神状态(MMSE)评分量表对患者认知功能进行评定，于服用姜黄素或安慰剂前（T0）、术毕（T1）、术后第 1 天（T2）、术后第 3 天（T4）采静脉血 3ml 并用 ELISA 测定血清中 IL-1β、IL-6、TNF-α、CRP 和 MCP-1 浓度。采用 CAM-ICU 量表对患者是否发生 POD 进行诊断,得分＞4 分即诊断受测者出现 POD。采用视觉模拟（VAS）评分量表对患者术后疼痛程度进行评估记录，术后 3d 术后谵妄及 VAS 评分的情况。

结果 与对照组组比较，姜黄素组 POD 发生率显著降低（P＜0.05）；姜黄素组炎性因子 IL-6、IL-1β、TNF-α 相较于对照组降低（P＜0.05）；姜黄素组 CRP、MCP-1 相对于对照组差异无统计学意义（P＞0.05）；两组 VAS 评分量表得分差异无统计学意义(P＞0.05)。两组术后 3d 内非谵妄并发症发生率差异无统计学意义（P＞0.05）。两组术后短期内不良事件发生率差异无统计学意义（P>0.05）。

结论 对老年患者术前预先给予姜黄素可显著降低 POD 发生率,也不会增加患者短期内术后不良事件发生率和非谵妄并发症发生率，其机制可能通过减少炎性因子从而降低 POD 的发生。

PU-0446

Correlation and predictive effect of gut microbiota with postoperative delirium after total hip arthroplasty in elderly patients: a prospective observational study

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Background: Postoperative delirium (POD) is a frequent and harrowing complication in the elderly undergoing total hip arthroplasty (THA). At present, the exact pathophysiological mechanism of POD remains unclear. Prevention is more important than treatment, and management of related predisposing factors is crucial. Early identification of high-risk patients and early prevention can reduce delirium-related complications. However, most of the clinical interventions for preventing delirium are ineffective. Mounting evidence suggests that gut microbiota may affect postoperative cognitive function through the “microbiota-brain-gut” axis. The role of this axis in the pathogenesis of POD remains unclear. Therefore, the purpose of this study was to investigate the association between gut microbiota and delirium by observing the differences in the abundance and structure of gut microbiota in elderly patients undergoing THA, and explored the feasibility of predicting the occurrence of POD.
Methods: In this study, elderly patients who underwent THA under general anesthesia were selected for screening, and the baseline cognitive status of the patients was assessed using the mini-Mental State Examination Scale (MMSE) on the day of admission. The confusion assessment (CAM) was used to diagnose and evaluate POD after the surgery until day 7. 16S rRNA sequences were performed on fecal samples to determine the differences between gut microbiota. Bacteria diversity of the microbial community was observed by calculating the value of α-diversity and β-diversity. A linear discriminant analysis was performed to identify the dominant bacteria species between the POD and non-POD groups.
Results: A total of 44 patients (≥65 years old) who underwent THA were enrolled. 8 patients developed POD, whereas 36 patients did not. The β-diversity revealed that the gut microbiota composition differed significantly between the POD and non-POD groups (P = 0.019, based on the weighted). Proteobacteria, Verrucomicrobia, Clostridia, Gammaproteobacteria, Enterobacteriales, Bacteroidacea, Ruminococcaceae, and Bacteroides were abundant in the POD group, whereas Bacteroidetes, Actinobacteria, Betaproteobacteria, Bacteroidales, Bifidobacteriales, Prevotellaceae, and Veillonella were abundant in the non-POD group.
Conclusions: Based on our results, with the abundance of Proteobacteria, Enterobacteriaceae, Gammaproteobacteria, and Bacteroides increased before THA, the risk of POD may be increased. Therefore, targeting gut microbiota may provide a new alternative for the diagnosis and treatment of POD.

PU-0447

锁骨下静脉内径联合围手术期液体治疗对全身麻醉诱导后低血压的影响

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目的 Perioperative hypotension is frequently observed following the initiation of general anesthesia administration, often associated with adverse outcomes. This study assessed the effect of subclavian vein (SCV) diameter combined with perioperative fluid therapy on preventing post-

induction hypotension (PIH) in patients with lower ASA status.
方法 This two-part study included patients aged 18 to 65 years, classified as ASA physical status I or II, and scheduled for elective surgery. The first part (Part I) included 146 adult patients, where maximum SCV diameter ($dSCV_{max}$), minimum SCV diameter ($dSCV_{min}$), SCV collapsibility index (SCV_{CI}) and SCV variability ($SCV_{variability}$) assessed using ultrasound. Receiver Operating Characteristic (ROC) curve analysis was employed to determine the predictive values of subclavian vein diameter and other relevant parameters. The second part comprised 124 adult patients, where patients with SCV diameter above the optimal cutoff value, as determined in Part I study, received 6 ml/kg of colloid solution within 20 min before induction. The study evaluated the impact of subclavian vein diameter combined with perioperative fluid therapy by comparing the observed incidence of PIH after induction of anesthesia.
结果 The areas under the curves (with 95% confidence intervals) for SCV_{CI} and $SCV_{variability}$ were both 0.819 (0.744–0.893). The optimal cutoff values were determined to be 45.4% for SCV_{CI}. Logistic regression analysis, after adjusting for confounding factors, demonstrated that both SCV_{CI} and $SCV_{variability}$ were significant predictors of PIH. A threshold of 45.4% for SCV_{CI} was chosen as the grouping criterion. The incidence of PIH in patients receiving fluid therapy was significantly lower in the $SCV_{CI} \geq 45.4\%$ group compared to the $SCV_{CI} < 45.4\%$ group.
结论 Both SCV_{CI} and $SCV_{variability}$ are noninvasive parameters capable of predicting PIH, and their combination with perioperative fluid therapy can reduce the incidence of PIH.

PU-0448

老年患者术前不同健康和功能状态评估工具与术后并发症相关性的比较：一项前瞻性、多中心、队列研究

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目的 老年患者术前健康与功能状态与预后密切相关，但现有评估工具种类繁多，比较并筛选与结局密切相关的评估工具，将有助于更好地做好老年患者围术期风险控制。本研究旨在探讨五种不同的术前健康和功能状态评估工具与老年择期手术患者术后不良事件的相关性，为寻找最佳评估工具提供参考。
方法 这项研究是一项前瞻性、多中心、队列研究。我们依托中国老年患者围手术期数据库（Perioperative Database of Chinese Elderly Patients，PDCE），对接受择期非心脏和非神经外科手术的 65 岁以上老年患者进行了术前健康和功能状态的评估，采用的评估工具包括代谢当量（Metabolic Equivalent of Task，MET）、基础性日常生活活动（Basic Activity of Daily Living，BADL）和工具性日常生活活动（Instrumental Activities of Daily Living，IADL）评定量表、衰弱筛查量表（the FRAIL Scale）和欧洲五维健康量表（European Quality of Life Five Dimension，EQ5D）。并同步采集围术期麻醉及手术相关信息，在术后第 1 天、第 3 天、第 7 天、第 30 天对患者进行随访。主要结局为术后 30 天主要心脑血管不良事件（Major Adverse Cardiac and Cerebrovascular Events，MACCE），次要结局为谵妄、肺部感染和急性肾损伤不良事件发生率。统计分析中，首先利用 logistic 回归构建了不包括健康及生活质量评估结果在内的基础模型，之后通过添加不同的评估工具所得结果，并使用受试者操作特征曲线下面积（Area Under the Curve，AUC）、敏感性、特异性、约登指数、方差膨胀系数、Delong 检验和 Hosmer Lemeshow 检验来评估模型，以分析不同评估量表在预测术后不良结局方面的价值。进一步进行亚组分析，以阐明年龄、性别、手术时长、手术类型等重要参数对评估工具的影响。
结果 本研究筛选了 10536 名 65 岁及以上择期手术患者的数据。在排除了未完成五个量表的患者

后，我们分析了来自 19 家医院的 6284 名患者。在这些患者中，共有 152 名患者（2.42%）经历了 MACCE。筛选出用于预测 MACCE 的基本 logistic 回归模型中的变量，包括年龄、术前心血管疾病、术前脑血管疾病、长期使用抗血小板药物或抗凝药物、术前血糖、手术时长和高危手术。在基本模型中分别添加五种不同的量表后，多因素分析发现术前 FRAIL 量表和术前 MET 量表与 MACCE 密切相关，而其他量表没有显著相关性。添加 FRAIL 量表后 AUC 值从基本模型的 0.697 增加至 0.714。亚组分析显示，术前 FRAIL 量表在分析的各亚组均与 MACCE 相关。术前 MET 量表在除 70 岁及以下患者人群外的其余亚组中均与 MACCE 相关。此外，次要结局分析显示术前 FRAIL 量表与急性肾损伤和呼吸道感染之间均存在显著相关性。术前 MET、BADL、IADL、FRAIL 和 EQ5D 量表均与谵妄显著相关。

结论 通过比较术前五种与健康与功能状态评估工具与术后并发症的相关性，我们发现，与其他四种量表相比，术前 FRAIL 量表与术后 MACCE、急性肾损伤、呼吸道感染和谵妄的发生率具有更好的相关性和预测价值。

PU-0449

Postoperative Pulmonary Complications and Mortality Among Patients with Prior COVID-19 Infection: A Retrospective Cohort Study in China

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Study objective: To compare 30-day pulmonary complications and mortality in patients with and without prior COVID-19 infection and assess the factors associated with pulmonary complications in the context of the pandemic after relaxing the dynamic zero COVID-19 policy in China.
Design: Retrospective cohort study.
Setting: A single tertiary academic medical center.
Patients: 404 matched sets of patients with and without prior COVID-19 infection before surgery.
Interventions: None
Measurements: The primary outcomes were 30-day mortality and pulmonary complications. The secondary outcomes were intensive care unit (ICU) admission rate, hospital length of stay, other complications including deep vein thrombosis, acute myocardial injury, acute kidney injury, local wound infection and all-cause rehospitalization within 30 days after surgery. Furthermore, univariable and multivariable logistic regression methods were used to explore the risk factors associated with 30-day pulmonary complications in infected group.
Main results: A total of 404 surgical patients with prior COVID-19 infection were matched with 404 surgical patients without prior infection. Among all patients, there was nearly two double the rate of postoperative 7-day pulmonary complications reported in the cohort of patients with infection compared with the control group (65(16.1%) vs 36(8.9%); RR 1.81; 95%CI 1.23-2.65; P=0.002). The rates of 30-day pulmonary complications (69(17.1%) vs 42(10.4%); RR 1.64; 95%CI 1.15-2.35; P=0.006) and local wound infection (21(5.2%) vs7(1.7%); RR 3.00; 95%CI 1.29-6.98; P=0.007) were higher in infected group. The rates of 30-day mortality and other secondary outcomes did not differ significantly between the two groups. In multivariable logistic regression, predictors of 30-day pulmonary complications were ASA grades III-IV, emergency surgery and time of surgery more than 2 hours.
Conclusions: Prior COVID-19 infection before surgery increased risk of 30-day pulmonary complications and local wound infection but it was not associated with death and other complications.

PU-0450

瑞马唑仑与丙泊酚对老年衰弱患者髋部手术术后谵妄发生率影响的比较

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目的 拟探究瑞马唑仑与丙泊酚对术前衰弱老年患者髋部手术术后 3 天内术后谵妄发生率的影响，并探究其对患者术后恢复质量的影响，为临床应用提供更多证据。
方法 本研究为一项前瞻性随机对照试验，共纳入本院 139 名临床或影像学诊断为髋部骨折拟行择期手术修复的术前衰弱老年患者，将患者随机分配至丙泊酚组（P 组）与瑞马唑仑组（R 组），分别接受丙泊酚与瑞马唑仑进行麻醉诱导与维持。主要结局是患者术后前三天内术后谵妄的发生率；次要观察指标为术后恢复质量，使用 15 项恢复质量量表（15-item Quality of Recovery Scale, QoR-15）在术前一天评估患者基线水平，并于术后第三天再次评估；同时收集患者围术期相关资料，记录拔管时间、不良反应等；并于术后第 3 天与 30 天随访术后并发症发生情况。
结果 自 2023 年 3 月 1 日至 12 月 31 日，本研究共纳入 139 名患者（平均年龄 77.2 ± 6.8 岁，其中男性占 26.6%），其中 P 组 68 例，R 组 71 例。
1. 一般资料和围术期相关指标的比较：两组患者基线情况与围术期相关变量差异均无统计学意义（P>0.05）；
2. 术后谵妄发生率比较：丙泊酚组（17.6%）患者术后 3 天内谵妄发生率高于瑞马唑仑组（5.6%）（风险比，0.32； 95%置信区间，0.11-0.94；P=0.027），两组患者的谵妄起病时间、持续时间和谵妄亚型均无显著性差异（P>0.05）。
3. 术后恢复质量：两组患者术前与术后第 3 天 QoR-15 总得分无统计学差异（P>0.05），且 QoR-15 量表中 5 个维度亦均未显示出两组之间的差异（P>0.05）。
4. 术中 Sedline 脑电分析：两组患者术中平均患者状态指数（Patient State Index, PSI）（P=0.479）、频谱边缘频率值（Spectral Edge Frequency, SEF）（P=0.878）无显著差异；但瑞马唑仑组患者的爆发抑制（Burst Suppression, BS）持续时间（P<0.01）与爆发抑制时间占手术时长之比（P<0.01）相较于丙泊酚组更低。
5. 诱导后低血压发生率与术中血管活性药物使用情况：丙泊酚组 32 例（47.1%）患者发生诱导后低血压，瑞马唑仑组则为 16 例（22.5%）（P=0.02），差异有统计学意义；丙泊酚组患者术中使用了更多的去氧肾上腺素（P=0.038）或麻黄碱（P<0.01）。
6. 围术期不良事件与并发症：PACU 内瑞马唑仑组 6 例（8.5%）发生低氧血症，而在丙泊酚组中为 5 例（7.4%），差异无统计学意义（P=0.811）；瑞马唑仑组术后恶心和呕吐报告了 15 例（21.1%），丙泊酚组则报告了 9 例（13.2%），但差异亦无统计学意义（P=0.218）。术后 3 天和第 30 天使用 Clavien-Dindo 分类评估两组患者并发症发生情况，两组之间无显著差异。两组均未报告发生术中知晓。
结论 相较于丙泊酚，瑞马唑仑应用于术前衰弱老年患者全麻下行髋部手术减少了 3 天内术后谵妄的发生，这可能与更少的脑电爆发抑制时间有关，同时带来更稳定的血流动力学，且并未影响患者术后 3 天内的恢复质量。

PU-0451

中医五行音乐疗法对胸腔镜肺叶切除老年患者麻醉苏醒的影响

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目的 探讨五行音乐疗法对胸腔镜肺叶切除老年患者麻醉苏醒的影响，为提高其麻醉苏醒质量提供一个简单、安全有效、性价比高的中医疗法

方法 根据入选标准选择拟行胸腔镜肺叶切除手术的患者进入试验，采用随机数字表法将患者分为 2 组，A 组为常规麻醉复苏组，B 组为五行音乐疗法复苏组。B 组在常规麻醉复苏处理的基础上加用五行音乐疗法。分别于术前晚 8 点、入手术室时和麻醉苏醒时给与音乐干预，术后 24h、48h 给予音乐疗法干预， 2 次/天（早晚 8 点各 1 次），每次 30min-60min。音乐疗法的实施要以不影响患者休息为前提。选择羽调、角调、商调为主的曲目进行循环播放。羽调选择《二泉映月》和《汉宫秋月》两个曲目。角调选择《春风得意》和《江南竹丝乐》两个曲目。商调选择《第三交响曲》和《嘎达海林》两个曲目。患者进入麻醉苏醒后立即戴上耳机进行循环播放，音量控制在 40～50dB，音乐干预至患者转出麻醉苏醒室。分别两组患者的的 Riker 镇静与躁动评分，生命体征如心率、收缩压、舒张压、血氧饱和度、氧合指数，焦虑自评量表（SAS），疼痛视觉模拟评分（VAS 评分），麻醉复苏时间：苏醒时间（自停药至呼之睁眼的时间），拔管时间（自停药至拔除气管导管的时间），改良 Aldrete 量表评分达 9 分时间（自拔出气管导管至出恢复室时间），快速康复指标：引流管拔管时间、下床活动时间、住院时间。

结果 与对照组 A 组相比，试验组 B 组患者苏醒期躁动发生率更低，差异有统计学意义（P<0.05）；改良 Aldrete 量表评分达 9 分时间更短，差异有统计学意义（P<0.05）；焦虑发生率更低，差异有统计学意义（P<0.05）；麻醉复苏时间更短，差异有统计学意义（P<0.05）。

结论 在术前、麻醉诱导期和麻醉苏醒期对胸腔镜肺叶切除老年患者应用中医五行音乐疗法，能够通过改善机体交感神经兴奋性，有效抑制全身麻醉患者机体应激反应，从而减轻焦虑、缓解疼痛，降低麻醉苏醒期躁动、缩短麻醉复苏时间，提高肺叶切除老年患者麻醉苏醒质量。

PU-0452

无明显危险因素的青壮年谵妄 1 例分析

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目的 术后谵妄（postoperative delirium, POD）是患者在术后 1 周内急性出现的非特异性认知功能、意识、记忆力以及睡眠-觉醒周期紊乱改变的精神神经系统综合征，多发于老年患者。而本文旨在分析发生于青壮年谵妄的临床表现和辅助检查结果，探究危险因素。

方法 回顾分析 1 例缺乏显著危险因素的复苏期谵妄的青壮年患者的临床资料（详见附件）。

结果 该例复苏期谵妄发生于术后谵妄少发的青壮年，诊断明确，但缺乏典型的危险因素。

术后谵妄作为影响住院患者短期病死的独立危险因素，能导致患者术后并发症加重、恢复时间延长、出院延迟、日常生活能力降低。POD 发生率在 9%-87%之间，现多指发生于苏醒期至术后第 5 天的谵妄。复苏期谵妄（emergence delirium,ED）也在 2017 年欧洲指南中被特别再次强调，其通常被认为是出现于麻醉复苏期的精神障碍，表现为患者表面上已经苏醒，但仍出现意识改变的症状包括幻觉、哭闹、意识障碍、不安和体动等，这些临床症状类似于活跃型谵妄（hyperactive delirium）和全麻苏醒期躁动（emergence agitation，EA），主发生于术后 30 分钟以内，且发作时间在 5-15

分钟，病程具有自限性。
ED 在儿科患者中多发，患病率范围在 2%至 80%间，而在成人尤其中青年患者中却相较少见，且因为其发生症状（如躯体过激行为、发生时间、发生时限）与 EA 高度相似，这一定义也较少被用于诊断出现相关症状的成年患者。但就谵妄和躁动而较，谵妄具有显著的记忆缺失、思维障碍、睡眠觉醒周期紊乱等特征，发病原因极其复杂且患者有更高概率远期不良并发症，而躁动则仍然是略趋于良性的一种状态。虽然 ED 发生时间短，但因其发作时常伴随躁动、意识障碍、无法配合医护人员指令，更甚具有攻击性，容易出现术区伤口破裂、引流管脱落、擅自摘除吸氧面罩、拔除气管导管、自伤伤人、延长住院治疗时间等风险，且 ED 的发生甚至可能引起长达 14 天的术后焦虑及睡眠障碍，这对于患者一系列术后康复问题极具影响。
目前为止，高 ASA 分级、高龄、术前认知功能障碍、精神疾病、脑血管疾病、终末期肾衰、低白蛋白血症及久居疗养院被视为最常见的谵妄危险因素，其中高龄与术前认知功能障碍最广受公认。本例患者症状主为显著且具波动性的定向障碍，伴幻觉、幻听的思维障碍，符合谵妄的基本特征，但发生时间在手术结束后 30min 内，考虑为 ED。患者为青壮年女性，且术前精神心理正常，因多发伤且有多次手术史，主管麻醉医师予以了较高级别的 ASA 级别评定（3 级），并无前述危险因素显著符合项。但患者手术时间为夜间、手术时间较长、有贫血及输血史，术中使用了小剂量苯二氮卓类药物咪达唑仑作为诱导麻醉剂，符合部分研究中所提示的可能危险因素。同时需注意的是，患者术前合并较为显著的中性粒细胞及淋巴细胞百分比的分布失调，提示机体可能处于炎性状态，这也符合目前 POD 最为热门的炎症学说。
综上，ED 在青中年人中发生较为罕见，机制尚未明确，且因其症状与 EA 界定不明极易混淆，临床上普遍诊断和处理不当。虽其发病具有自限性，但作为术后认知障碍中的一种，其对医患双方均造成隐患，故同样需要予以重视，以及时正确应对。近期也有研究发现，在不同类型的谵妄中，其发病存在差异，如衰弱状态者多发低活跃型谵妄，而相比之下高活跃及混合者年龄偏轻且男多于女。同时，另有研究也发现，不同类别谵妄患者脑脊液中，某些内分泌因子及代谢产物可能也存在差别。
结论 复苏期谵妄为术后谵妄中的一种类型，在缺乏典型危险因素的情况下可能为发生于各类人群，及时的应对手段和进一步的探究尤为重要。

PU-0453

夜间预防性输注右美托咪定对非机械通气老年患者术后谵妄的影响

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目的 术后谵妄是一种以认知和注意力发生急剧变化的术后行为状态。在 60 岁以上的手术患者当中，有将近 10%-30%的患者会出现这种状态，并且患病率会随着年龄的增长而增加。术后谵妄的发生与术后并发症，住院时间延长、身体功能恢复较差以及认知功能的长期衰退以及住院期间的死亡率息息相关。在住院患者中，约有 30%-40%的谵妄发生病例被认为是通过可以改变的风险因素造成的，因此老年患者术后谵妄的发生是可以预防的。目前，各种旨在减少风险因素的方法对降低老年患者术后谵妄发生率的效果并不佳，并且缺乏大量研究支持使用任何药物预防术后谵妄。
右美托咪定是一种高选择性 α-2 肾上腺素能受体激动剂，具有抗焦虑、镇静、适度镇痛和最小程度的呼吸抑制作用。目前，右美托咪定越来越多地用于重症监护病房 (ICU) 中使用机械通气患者的镇静，与其他镇静药物相比，右美托咪定的优势在于能够降低围手术期患者术后谵妄的发生率。然而，大部分镇静剂，如苯二氮卓类药物本身也会增加患者术后谵妄的发生；同时机械通气对谵妄的影响也不可忽视。因此围手术期输注右美托咪定对于老年患者尤其是非机械通气患者的影响尚未明确。既往研究表明，夜间睡眠障碍与术后谵妄相关，这表明睡眠可能是一个可改善的风险因素。右美托咪定可以保持正常人的睡眠结构，通过降低 N1 期百分比，增加 N2 以及 N3 期睡眠，改善患者的睡

眠结构，提高患者的睡眠质量。有文献指出静脉滴注右美托咪定使 N2 期睡眠百分比由安慰剂组的中位数 15.8%(四分位数范围 1.3%-62.8%)增加至 43.5%(16.6%-80.2%)(差异 14.7%；95%可信区间 0.0%-31.9%；P=0.048)，并延长总睡眠时间，提高了睡眠效率。目前来看，右美托咪定治疗谵妄的试验主要集中在围手术期机械通气和重症监护病房 (ICU) 患者身上。对于夜间非机械通气患者右美托咪定使用的研究相对较少。因此，本研究将重点探讨夜间预防性输注一定剂量右美托咪定对于非机械通气患者术后谵妄发生率影响的研究进展。

方法 对老年患者非机械通气状态下夜间输注右美托咪定的研究进行文献搜集，探讨右美托咪定对改善这类患者术后谵妄发生率的应用价值，并探讨其对于夜间睡眠的影响。

结果 夜间预防性输注右美托咪定在相关文献中已被报道具有改善老年非机械通气患者术后谵妄的发生率，同时具有改善这类患者睡眠质量的作用。

结论 右美托咪定作为目前较为常用的 α-2 肾上腺素能受体激动剂，凭借其抗焦虑，镇静以及一定的镇痛作用，在临床上运用越来越广泛，对于非机械通气患者术后谵妄的影响，未来仍需要大量的临床试验加以证明。在今后，右美托咪定或许可以成为具有睡眠障碍患者一种有效的干预手段，以减少此类患者术后谵妄的发生。

PU-0454

神经阻滞对乳腺癌术后早期恢复质量的影响-随机对照试验的系统评价

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目的 这项系统评价、Meta 分析与试验序贯分析旨在评价神经阻滞（NB）对乳腺癌术后早期恢复质量（QOR）的作用。

方法 2 位相互独立的研究者检索从建库至 2024 年 5 月 3 日的 PubMed、Embase、CENTRAL、SinoMed 中神经阻滞对成人单侧乳腺癌术后恢复质量的相关研究。纳入神经阻滞（实验组）为干预组，无神经阻滞或生理盐水安慰剂局部注射（对照组）为对照组，在手术开始前进行神经阻滞操作，主要指标为术后 24 小时的 QOR-15 评分，并收集次要指标术后 24 小时阿片类药物消耗量、患者镇痛满意度、神经阻滞相关不良事件等数据。采用 Cochrane 偏倚风险评估工具评估研究质量，采用 I^2评估研究异质性：I^2＜50%，认为异质性低；I^2＞50%,认为异质性高，将采用敏感性分析和亚组分析探索异质性来源，分组因素包括神经阻滞方式、偏倚风险。利用 RevMan 软件中随机效应模型进行 Meta 分析，并计算相应的均值差（MD）及 95%置信区间(95% CI)。试验序贯分析方法评估研究的样本量，并使用 GRAD 证据分级系统评估结果的证据质量。

结果 纳入 6 项随机对照试验，共 434 名受试者。采用随机效应模型统计分析的结果显示，试验组与对照组相比，神经阻滞增加术后 24 小时的 QOR-15 评分（MD=7.22；95%CI：5.20-9.24，P＜0.0001），亚组分析显示前锯肌平面阻滞增加术后 24 小时 QOR-15 评分（MD7.21，95%CI：6.10-8.31，P＜0.0001），低偏倚风险与高偏倚风险亚组均显示神经阻滞可提高乳腺癌术后 24 小时 QOR-15 评分，同时试验序贯分析表明神经阻滞提高乳腺癌术后 24 小时 QOR-15 评分的结果是稳定的，逐一剔除单个研究的敏感性分析显示没有某项研究对结果合并效应有显著影响，进一步表明结果稳定，中等证据质量；神经阻滞减少了术后 24 小时等效口服吗啡消耗量（MD=-29.13mg；95%CI，-55.51 to -2.75，P=0.03），极低证据质量；患者镇痛满意度增加（MD=0.97；95%CI，0.55-1.39），中等证据质量；均未发生局麻药中毒、出血、感染、气胸等神经阻滞相关不良反应。

结论 神经阻滞有利于术后早期恢复，减少术后阿片类药物使用，增加患者镇痛满意度，无神经阻滞相关不良反应。

PU-0455

颊针疗法对腹腔镜胃肠道恶性肿瘤根治术术后疼痛的疗效研究：一项随机对照试验

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目的 急性术后疼痛（APSP）是手术创伤的后果，对功能恢复受损、生活质量下降和慢性疼痛的发展具有重要影响。本研究旨在评估颊针疗法在胃肠道肿瘤根治性切除患者中改善术后疼痛和提高恢复质量的疗效。
方法 90 名受试者按 1:1:1 的比例随机分为颊针组、假针组和对照组。颊针组针刺方案需要针对面部两侧的 5 个固定穴位（CA-2 上焦穴、CA-3 中焦穴、CA-4 下焦穴、CA-6 背穴、CA-7 腰穴）及 2 个灵活穴位（CA-1 头穴、CA-8 骶穴）进行针刺治疗。假针组穴位位于标准穴位朝人体正中轴线平移一寸的非标准定位穴位。对照组不接受针刺治疗，但麻醉与多模式镇痛方式、护理方式、数据采集方式与针刺组相同。评估的关键指标包括术后 7 天的数字评分量表（NRS）评分、15 项恢复质量量表（QoR-15）评分、术中和术后镇痛药消耗量、术后恶心呕吐发生率（PONV）以及围手术期白细胞介素-6（IL-6）和葡萄糖水平。
结果 在最初的 90 名参与者中，86 人完成了研究并被纳入分析，4 名患者因术中手术方式改变被剔除（颊针组 2 人，假针组 1 人，对照组 1 人)。研究结果表明，颊针组患者术后 1-3d 静息痛评分显著低于对照组(P1=0.006; P2 <0.001; P3 <0.001)，且术后 1-2d 颊针组静息疼痛评分亦显著优于假针组(P1=0.032；P2=0.025)。运动痛方面，尽管三组患者疼痛评分有显著差异(P =0.022)，但时间-组别交互效应并不显著(P =0.247)。且颊针组相较假针组及对照组，术后 7d 运动痛评分改善的效应量较小。颊针组患者术后 1-2d 静息痛较其他两组明显缓解，而三组患者术后 7d 运动诱发痛变化趋势趋于一致。与假针组和对照组相比，颊针组在麻醉后恢复室（PACU）和整个术后阶段的静息疼痛评分显著降低，且颊针组患者发生内脏痛的风险低于其余两组，但差异无统计学意义。颊针组患者术后 48h 内 PCIA 使用剂量显著低于对照组患者(P =0.043)，但相较假针组患者未表现出明显差异(P >0.99)。其余指标没有发现显著差异。
结论 颊针治疗在减少胃肠道肿瘤根治术后疼痛和提高恢复质量方面表现出显著的效果，是一种可行的干预措施，没有相关的不良后果。

PU-0456

改良胸骨旁阻滞对非体外循环冠脉搭桥术患者围术期的影响：一项随机对照研究

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目的 应用非体外循环冠脉搭桥术患者采用改良阻滞方式复合全身麻醉，研究这种麻醉方法对此类患者围术期镇痛和术后康复的影响。
方法 选取择期行非体外循环下冠脉搭桥手术患者 65 例，性别不限，年龄大于 35 岁，ASA III 或 IV 级。将符合标准的入组患者采用随机数字表法随机分为对照组（C 组）32 例、改良胸骨旁阻滞组（MP）组 33 例。MP 组在超声引导下行左侧浅层胸骨旁阻滞，右侧深层胸骨旁阻滞。具体操作方法：采用平面内进针技术左侧胸骨旁第 2～3 和 4～5 肋骨间隙行两点穿刺将 0.375%罗哌卡因共 15ml 分两次注射在两个肋间隙胸大肌和肋间肌之间的筋膜间隙。右侧定位第 4～5 肋间隙，采用平面内穿刺技术，将 0.375%罗哌卡因共 15ml 注射在肋间内肌和胸横肌之间的平面。后行下肢阻滞，

若取单下肢大隐静脉，行单下肢股神经阻滞，0.375%罗哌卡因共 10ml，若取双下肢大隐静脉，则行双下肢收肌管阻滞，0.375%罗哌卡因共 10ml，阻滞成功后行麻醉诱导。C 组不行神经阻滞。麻醉诱导：静脉注射依托咪酯 0.2mg/kg，罗库溴铵 0.6mg/kg，舒芬太尼 1μg/kg 后行气管插管，连接麻醉机行机械通气，设置潮气量 6～8ml/kg，呼吸频率 10～12 次/min，吸呼比 1:2，维持 PETCO2 在 30～40mmHg 之间，吸入氧浓度 60%～70%。应用丙泊酚和七氟醚进行麻醉维持，使 BIS 值维持在 40～60。在切皮或锯胸骨时根据术中 MAP 和 HR 追加舒芬太尼，每次追加量为 0.1ug/kg，间断静推罗库溴铵 0.3mg/kg 维持肌松。术中维持血压在 90～120/50～80mmHg 之间。 术后镇痛采用 PCIA，舒芬太尼 2μg/kg 用生理盐水稀释至 100ml，背景剂量 2ml/h，冲击剂量 2ml，锁定时间 20min。记录术中舒芬太尼用量，术后机械通气时间、ICU 停留时间和住院时间。术后 48h VAS，补救镇痛药的使用情况。测定术前、术中和术后血 P 物质（SP）、前列腺素 E2（PGE2）、LPS、CRP、TNF-a、IL-1β 值，术后 48h 恶心呕吐（PONV）发生率。术后呼吸系统并发症发生情况，患者排气、排便、开始进食和下床活动时间，术后半年内慢性疼痛发生率

结果 与 C 组比较，MP 组术中舒芬太尼太尼用量明显减少（ P<0.05），术后机械通气时间明显缩短（P<0.05），住院时间明显缩短（P<0.05），术后 48h VAS 降低（P<0.05），补救镇痛药减少（P<0.05），术中和术后的炎症指标（SP、PGE2、LPS、CRP、TNF-a、IL-1β）明显降低（P<0.05），术后呼吸系统并发症发生率减低（P<0.05），排气、排便、开始进食时间早（P<0.05）。

结论 改良胸骨旁阻滞可降低非体外循环冠脉搭桥术患者围术期的阿片类药物应用，能有效控制急性疼痛，降低炎症反应，减少肺部并发症，加速患者康复。

PU-0457

Meta-analysis: Investigation on the therapeutic effect of platelet-rich plasma on traumatic osteoarthritis

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Objective: The aim of this paper is to evaluate the efficacy and safety of platelet-rich plasma (PRP) in the treatment of traumatic osteoarthritis (TOA).
Methods: PubMed, EMbase, Web of Science, Cochrane Library, China National Knowledge Infrastructure (CNKI), VIP database, Wanfang Database and China Biology Medicine Disc were searched for all double-blind randomized controlled trials (RCTS) on PRP in the treatment of TOA up to December 2022. Data extraction and quality assessment were performed independently by two researchers. RevMan5.4 statistical software was used to perform a Meta-analysis of the data that met the inclusion criteria.
Results: (1) 7 double-blind randomized controlled trials were included, including 245 cases in PRP group and 235 cases for control group (no PRP). (2) Based on meta-analysis' outcomes, it could be discovered that there was a statistically remarkable discrepancy in WOMAC scores for the PRP group and no-PRP group at 6 and 12 months of follow-up. In the comparison of KOOS functional scores at 6 months of follow-up, the knee function scores improved in for PRP group were higher than those for group without PRP. In TOA patients followed up for 3 to 6 months, PRP injection was more effective in pain relief than the group without PRP injection, and the difference in VAS pain score was statistically significant. However, adverse events (AEs) were not statistically significant between the two groups.
Conclusions: PRP has significant advantages over other non-surgical treatments in improving the function of joint and reducing pain. In conclusion, this study is expected to provide a reference for patient selection in the treatment of TOA. However, since this study is only a summary study, more experimental designs are needed for further proof.

PU-0458

术中静脉输注维生素 C 对男性肾移植术后导尿管相关膀胱不适的影响

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目的 接受肾移植术的男性患者容易发生导尿管相关膀胱不适。维生素 C 是一种具有抗炎、抗氧化和缓解术后疼痛作用的微量营养素，可能有利于导尿管相关膀胱不适的预防和治疗。本研究假设，在接受肾移植术的男性患者中，维生素 C 可降低术后中、重度导尿管相关膀胱不适的发生率。
方法 这项随机对照试验将 110 例年龄≧18 岁拟择期在全麻下接受活体肾移植术的男性患者随机分为两组：维生素 C 组和对照组。维生素 C 组麻醉诱导后静脉注射维生素 C 20 mg·kg−1，对照组在麻醉诱导后给予等量生理盐水。主要结果是术后即刻中、重度导尿管相关膀胱不适发生率。次要结果是术后 1、2 和 6 h 中、重度导尿管相关膀胱不适发生率。中度导尿管相关膀胱不适定义为患者主动报告尿管相关不适，但不伴随任何行为反应；严重导尿管相关膀胱不适定义为患者主动报告导尿管相关不适，并伴有行为反应，如强烈的语言反应，肢体乱动试图拔出导尿管等。
结果 最终纳入 109 例患者进行分析，维生素 C 组 55 例，对照组 54 例。维生素 C 组术后即刻中、重度导尿管相关膀胱不适发生率（32.7%）低于对照组（66.7%）（P＜0. 05）。维生素 C 组术后 1 h 中、重度导尿管相关膀胱不适发生率（18.2%）低于对照组（31.5%）（P＜0. 05）。维生素 C 组术后 2 h 中、重度导尿管相关膀胱不适发生率（9.1%）低于对照组（18.5%）（P＜0. 05）。然而，术后 6 h 中度或更大导尿管相关膀胱不适的发生率没有显著差异。维生素 C 组的患者满意度评分显著高于对照组（P＜0. 05）。
结论 术中静脉输注维生素 C 降低了肾移植术后中、重度导尿管相关膀胱不适发生率，没有观察到明显的副作用，并提高了患者的满意度。

PU-0459

术中急性肠系膜上静脉血栓形成导致难治性低血压的病例报告

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目的 该案例的独特之处在于术中急性肠系膜上静脉血栓形成(acute mesenteric venous thrombosis，AMVT)的发生率极低，该病发病急、进展迅速、会造成严重的低血压并很难纠正、病死率高，误诊率和死亡率高。
本案例详细记录了该病症的发生与进展，有肠管和肠系膜严重充血和肿胀的图片，也有纠正低血压时所采取的措施和相对应的效果，对 AMVT 时发生严重低血压的机制进行了分析，明确了纠正低血压需要采取的措施，影像学资料支持了 AMVT 的诊断。
方法 是个病例报告，不涉及方法
结果 麻醉手术过程中发生低血压的原因很多，最常见的是各种原因导致的低血容量，本例患者发生低血容量的原因是急性肠系膜上静脉血栓形成。肠系膜上静脉接受小肠、升结肠和横结肠的血液，当肠系膜上静脉回流受阻时，小肠、升结肠和横结肠的静脉会淤血充血，该部位的静脉在严重充盈时，跨静脉壁压力失衡，静脉壁也会受损，导致静脉内白蛋白等物质渗出和漏出，造成血管内液体的不间断的大量丧失，造成低血容量和血管内的低胶体渗透压。
分析该患者术中发生 AMVT 的原因：1、腹腔手术操作导致肠系膜上静脉血流减慢或受阻。可能手术操作误夹肠系膜上静脉或其分支，或者手术操作造成肠系膜上静脉及其分支扭折，或者手术操作造成肠系膜上静脉血管内皮受损。2、不适当的使用人凝血酶原复合物导致血液高凝状态。3、癌症

患者潜在的高凝状态。因为肠系膜上静脉及其分支支配的肠管和肠系膜血液回流受阻，表现为肉眼可见的肠管和肠系膜充血肿胀，同时血管内的大量的白蛋白和水分持续渗出到肠腔、组织间隙和腹腔，从而表现为反复波动难易纠正的低血压。术中和术后需要血浆和白蛋白才能维持血管胶体渗透压，同时结合血液生化结果就可以判定该病症会造成持续的低蛋白血症和严重的低血压，危及患者生命。

结论 这是一个术中急性肠系膜上静脉血栓形成导致难治性低血压的病例，因其特发性起源而引人注目，能正确的识别和快速诊断非常困难，同时需要对患者进行紧急的临床处理。腹部 CT 和血管造影对于诊断和评估肠系膜上静脉血栓形成的严重程度以及患者的最佳结果与治疗具有重要的关键作用。

PU-0460

全麻非心脏手术患者脑电爆发抑制动态列线图预测模型的构建

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目的 基于全麻下非心脏手术患者术前和术中特征，应用动态列线图构建全麻非心脏手术患者脑电爆发抑制（Burst suppression，BS）的预测模型。

方法 回顾性收集 418 例全麻非心脏手术患者的资料。采用单因素分析和多因素逐步 Logistic 回归，筛选术中发生脑电 BS 的独立危险因素，并建立动态列线图预测模型。通过绘制受试者工作特征曲线（Receiver-operating characteristic curve，ROC）并计算曲线下面积（Area under curve，AUC），来评估模型的区分度。通过绘制校准曲线和 Hosmer-Lemeshow 拟合优度检验来评估模型的校准度。建立动态列线图的在线计算工具。

结果 年龄、临床虚弱量表（Clinical frailty scale，CFS）评分、咪达唑仑剂量、丙泊酚诱导剂量、基于平均动脉压（Mean arterial pressure，MAP）的低血压阈值曲线下总面积（Total area under the hypotensive threshold of MAP，MAP_AUT）、脑血管疾病是预测全麻非心脏手术患者脑电 BS 的独立危险因素。根据 ROC 分析显示，动态列线图具有良好的鉴别能力（AUC = 0.933）。Hosmer-Lemeshow 拟合优度检验显示，动态列线图具有良好的校准能力（P=0.0718）。通过访问网页 https://eegbsnomogram.shinyapps.io/dynnomapp 或扫描转换 QR 代码可获取动态列线图。

结论 基于全麻非心脏手术患者术前和术中资料构建的动态列线图，在预测脑电 BS 风险方面具有良好的性能，有望指导临床麻醉决策和优化麻醉管理。

PU-0461

超声心动图预测腰麻后低血压：一项回顾性病例对照研究

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目的 分析预测高龄患者腰麻后发生低血压的超声心动图参数。

方法 运用病例-对照研究方法，选取 2023 年 5 月至 2024 年 5 月北京大学人民医院行择期腰麻手术的高龄患者（年龄≥65 岁）共 280 例；根据腰麻后 20 分钟内血压变化情况分为病例组（腰麻后血压下降≥基线值 30%）、对照组（腰麻后血压下降＜基线值 20%），其中病例组 140 例，对照组 140 例，收集患者的常规超声心动图参数。采用 spss25 软件对两组间临床资料进行单因素分析，并对单因素分析中 P<0.1 的因素进行多因素 logistic 回归分析，确定可以预测腰麻后低血压的超声心动图参数。

结果 单因素回归显示，室间隔舒张末期厚度，LVmass 可能预测腰麻后低血压的发生；多因素 Logistic 回归分析显示，室间隔舒张末期厚度(OR=13.024,95%CI:1.715-98.886)可以更好的预测腰麻后低血压。
结论 左心室肥厚患者存在腰麻后低血压风险。

PU-0462

The effect of Ultrasound-guided bilateral thoracic paravertebral nerve block following cardiac valve surgery: A Prospective Randomized Controlled Trial

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Background and Objectives: Patients undergoing open-heart cardiac valve surgery under CPB, multiple perioperative factors can lead to a poor prognosis. Thus, we verify that the cardiovascular system protective effect of TPVB on patients undergoing open-heart valve surgery.
Methods: This study is a single-center, prospective, randomized controlled trial . Sixty patients undergoing cardiac valve surgery were divided into two groups: the TPVB group (n=30), which received ultrasound-guided bilateral thoracic paravertebral nerve block combined with general anesthesia, and the GA group (n=30), which only received general anesthesia alone. Hemodynamic parameters, serum myocardial enzyme indicators, pain scores, rescue analgesia needs, and perioperative opioid consumption were compared between the two groups.
Results: The serum cTnI levels in the TPVB group were significantly lower than those in the GA group at post-6 hours (P=0.024) and post-24 hours (P<0.001) after aortic opening. TPVB patients had lower CK-MB levels at 48 hours (P=0.015) and LDH levels at 6 hours (P=0.038) post-aortic opening than GA patients. Hemodynamically, TPVB led to stable profiles in systolic blood pressure ($P < 0.001$), mean arterial pressure ($P < 0.001$), and heart rate (P=0.001) after sternotomy compared to the GA group. Furthermore, patients in the TPVB group reported lower pain scores on movement at 48 hours postoperatively (P=0.007) and required less rescue analgesia (P=0.037) under less perioperative opioids abuse.
Conclusion: Preoperative ultrasound-guided thoracic paravertebral block benefits patients undergoing cardiac valve surgery.

PU-0463

StanfordA 型主动脉夹层术后声音嘶哑及吞咽障碍死亡 1 例

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目的 通过回顾 1 例 StanfordA 型主动脉夹层术后出现声音嘶哑及吞咽障碍最终死亡的病历，探讨此类病人可能的原因，总结经验教训，以提高此类患者的以后。
方法 回顾了本例患者的基本情况，麻醉和手术经过，术后情况以及抢救情况。分析了术后吞咽困难可能的原因。
结果 本病历患者可能与喉返神经和喉上神经损伤以及长期气管插管等原因有关，本患者有许多高危因素，术后气管拔管后首先应评估患者吞咽功能。
结论 心脏手术患者是吞咽障碍高风险人群，主动脉夹层手术更应引起重视，术后在经口进食前应详细规范进行吞咽功能的筛查和评估

PU-0464

双管喉罩在妇科腹腔镜手术中的应用

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目的 观察双管喉罩在妇科腹腔镜手术中的应用
方法 择期妇科全麻腹腔镜手术患者 120 例,随机分为两组,均为 60 例,分别为喉罩组(L 组)和气管插管组(T 组)。分别记录插入喉罩/气管导管前(T1)、插入喉罩/气管导管后 1min(T2)、3min(T3)和拔除喉罩/气管导管前(T4)、拔除喉罩/ 气管导管后 1min(T5)、3min(T6)的 SBP、DBP、HR, 并观察术中有无反流误吸及术后恶心呕吐及咽喉部并发症。
结果 T 组在 T2、T4、T5 时 HR 明显快于 T1 时,SBP、DBP 明显高于 T1 时(P<0.05)T 组在 T2、T4、T5 时 HR 明显快于 L 组, SBP、DBP 明显高 L 组(P<0.05)。两组各时点 SpO2、PETCO2 均在正常范围内,组间比较差异无统计学意义。
结论 双管喉罩用于妇科腹腔镜手术,应激反应小,血流动力学反应轻微,可达到与气管插管一样的通气效果,术后并发症少,是安全可行的。
妇科腹腔镜手术中气腹会影响肺通气和增加胃反流,传统观念认为气管插管控制呼吸是最安全的方法,但气管插管或拔管时均可引起机体产生烈的应激反应,表现为交感神经兴奋, 心率增快,血压升高等。双管喉罩是无创通气道,其通气罩为双罩囊设计, 腹面近端呈楔形罩囊,充气后提高了呴吸道密闭性,并且引流管可将胃内气体或液体弇出,凋少胃胀气及反流误吸[1] 。它关有放置简便、无须喉镜暴露声门、刺激小等优点。本研究观察双管喉罅在压力控制通气下用于腹腔镜胆囊手术的安全性、有效性和可行性。

PU-0465

右美托咪定复合 TAPB 在围术期导尿患者的临床研究

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目的 研究全麻下行腰椎后路植骨内固定术患者采用右美托咪定复合罗哌卡因行超声引导腹横肌平面阻滞（TAPB）方案在围术期实施导尿的临床价值。
方法 选择 2018 年 7 月-2019 年 12 月在我院接受全麻下行腰椎后路植骨内固定术治疗的患者 90 例随机数字表法分为空白组、对照组和观察组，每组 30 例。空白组实施全麻后，不实施 TAPB，对照组围术期实施全麻后行 TAPB，观察组围术期实施全麻后用右美托咪定复合罗哌卡因行 TAPB。对比三组住院期间导尿量、导尿舒适度以及住院期间泌尿系统感染发生率、膀胱刺激征发生率等指标。
结果 与空白组比较，对照组围术期导尿量更多，泌尿系统感染发生率、膀胱刺激征发生率略微降低，疼痛感评分更低；与对照组比较，观察组围术期导尿量更多，泌尿系统感染发生率、膀胱刺激征发生率明显降低，疼痛感评分更低。
结论 全麻下行腰椎后路植骨内固定术患者采用右美托咪定复合罗哌卡因行超声引导腹横肌平面阻滞方案，能够改善导尿量、降低泌尿系统感染发生率及膀胱刺激征发生率，改善导尿舒适度，价值显著。

PU-0466

超声引导下髋关节囊周神经阻滞与前路腰方肌阻滞用于老年患者全髋关节置换术术后镇痛及康复的比较

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目的 探讨超声引导下髋关节囊周神经阻滞与前路腰方肌阻滞用于老年患者全髋关节置换术术后镇痛的效果及对术后康复的影响

方法 选择本院蛛网膜下腔麻醉下行全髋关节置换手术老年患者 120 例，年龄 65-85 岁，ASAⅡ-Ⅲ级。采用随机数字表法将这些患者分为髋关节囊周神经阻滞组（P 组）、前路腰方肌阻滞组（Q 组）和静脉自控镇痛（PCIA）组（D 组）：术后镇痛方面 P 组接受髋关节囊周神经阻滞，Q 组接受前路腰方肌阻滞，D 组接受静脉自控镇痛（PCIA)，每组各 40 例。P 组：于蛛网膜下腔麻醉前 30min 予以 0.375％罗哌卡因 20ml 行 PENG 阻滞；Q 组：于蛛网膜下腔麻醉前 30min 予以 0.375％罗哌卡因 20ml 行前路腰方肌阻滞；D 组：行单次蛛网膜下腔阻滞，术毕行 PCIA。记录入室（T0）、阻滞操作后 30min（T1）、腰麻结束平卧位后即刻（T2）、腰麻 10min 后（T3）、手术结束时（T4）的心率（HR）、平均动脉压（MAP）情况；记录患者腰麻结束转平卧位后的麻醉平面；记录患者手术时长及术中出血量；记录患者术后首次疼痛时间；记录患者术后 6h（T5）、12h（T6）、24h（T7）和 48h（T8）的静息和活动时视觉模拟评分（VAS）；采用改良 Bromage 评分评估患者术后 6h、12h、24h 和 48h 下肢运动阻滞程度；记录术后 48h 内镇痛药物的追加次数及舒芬太尼的追加剂量；记录患者在术前一天、术后 24h 和 48h 的 QoR-15 量表评分；记录患者是否出现不良反应，如恶心呕吐、中毒、头晕、呼吸抑制等；记录患者首次下床时间及住院天数。

结果 1、在各个时间点，三组的 HR 无显著差异；T0、T1、T2、T4 时，三组组间的 MAP 无显著差异，T3 时，Q 组 MAP 高于 D 组（P＜0.05）；与 T0 相比，P 组和 Q 组在 T1 的 HR 和 MAP 无显著差异；三组患者的麻醉平面无统计学差异。2、P 组术后 48h 内镇痛泵有效追加次数、舒芬太尼总用量和补救镇痛率均低于 Q 组及 D 组（P＜0.05）；D 组舒芬太尼总用量和补救镇痛率均明显高于 P 组及 D 组（P＜0.05）；D 组术后首次疼痛时间要明显早于 P 组与 Q 组（P＜0.05），而 P 组晚于 Q 组（P＜0.05）。3、T5、T6、T7、T8 时，D 组的静息及运动 VAS 评分明显高于 P 组和 Q 组（P＜0.05）；T5 时，Q 组的静息及运动 VAS 评分高于 P 组（P＜0.05）；T6、T7 时，P 组与 Q 组的静息及运动 VAS 评分无显著差异；T8 时，P 组与 Q 组的静息及运动 VAS 评分无显著差异。4、T5 时，Q 组改良 Bromage 评分高于 P 组及 D 组（P＜0.05），T6-T8 时，三组患者改良 Bromage 评分无显著差异；Q 组首次下床时间长于 P 组和 D 组（P＜0.05）；三组住院天数无显著差异。5、D 组的术后恶心呕吐发生率高于 P 组和 Q 组（P＜0.05）；三组患者术后皮肤瘙痒、头晕、呼吸抑制及总不良反应发生率均无明显差异（P＞0.05）。6、三组 T7 较术前一天时，QoR-15 评分均明显降低（P＜0.05）；三组 T8 较 T7 时，QoR-15 评分均明显升高（P＜0.05）；三组 T7 时 QoR-15 评分低于术前一天及 T8 时；三组术前一天组间 QoR-15 评分比较无显著差异；T7 时，D 组 QoR-15 评分明显低于 P 组及 Q 组（P＜0.05），但 P 组和 Q 组无显著差异；T8 时，D 组 QoR-15 评分明显低于 P 组及 Q 组（P＜0.05），且 Q 组低于 P 组（P＜0.05）。

结论 超声引导下髋关节囊周神经阻滞和前路腰方肌阻滞用于全髋关节置换手术具有良好的术后镇痛效果，能较大程度地降低术后阿片类镇痛药物的用量。髋关节囊周神经阻滞控制术后早期疼痛效果更佳，且对于术后早期下肢肌力的保留能力要优于前路腰方肌阻滞。髋关节囊周神经阻滞和前路腰方肌阻滞均可用于全髋关节置换术的术后镇痛，可有效减轻术后疼痛，较常规术后 PCIA 具有更独特的优势。

PU-0467

内关穴加膻中穴对比内关穴经皮穴位电刺激对乳腺癌根治术患者围术期疼痛的影响

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目的 经皮穴位电刺激（transcutaneous electrical acupoint stimulation，TEAS）已被证实在围术期可产生多种益处，包括减轻术后疼痛和预防术后恶心呕吐（postoperative nausea and vomiting，PONV）。既往研究表明，TEAS 可以减少全身麻醉药物尤其是阿片类药物的消耗。然而，其益处可能受到多种因素的影响，其中穴位的选择一直存在争议。在中医实践中会采用穴位配伍以达到更佳治疗效果，但其科学证据有限。既往研究表明，在加速意识恢复和治疗恶心呕吐方面，穴位联合可能效果更优。然而，两个穴位的联合能否产生更强的镇痛作用尚不明确。本研究旨在观察内关穴加膻中穴对比内关穴经皮电刺激对患者术中瑞芬太尼用量和术后早期疼痛的影响，以期为针刺相关技术围术期临床应用提供参考。
方法 选择择期拟在全麻下行乳腺癌根治术的患者 153 例，均为女性，年龄 46.9±9.0 岁，BMI 23.5±2.9 kg/m2，ASA Ⅰ级 42 例，Ⅱ级 111 例。随机分为单穴组（内关穴）、双穴组（内关和膻中穴）和对照组，每组 51 例。在麻醉诱导前进行 30 min 的经皮穴位电刺激（单穴组刺激内关穴，双穴组刺激内关加膻中穴，对照组不刺激），采用疏密波，2/10Hz，强度 4~11mA。记录瑞芬太尼的消耗量、呼之睁眼时间和拔管时间。记录术后恶心呕吐、呼吸抑制的发生情况。记录 PACU 内和术后 24 hVAS 疼痛评分及患者满意度评分。
结果 136 例患者完成试验并进入数据分析。三组间人口学特征相同，各组麻醉时间和手术时间均无显著差异。三组手术期间的麻醉深度指数均维持在 40~60，各组间各时间点具有可比性。双穴组术中瑞芬太尼用量明显低于单穴组及对照组（P＜0.05）。双穴组术后 24 h 患者满意度评分显著高于对照组和单穴组（P 均＜0.05）。三组在 PACU 及术后 24 h VAS 疼痛评分差异无统计学意义。
结论 与单穴相比，双穴刺激对乳腺癌根治术中的瑞芬太尼节减效果更强，患者满意度更高。

PU-0468

Posterior reversible encephalopathy syndrome (PRES) complicated by epidural puncture for delivery analgesia: A case report

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Objective: This article reports a case of PRES in a 31-year-old parturient who underwent painless delivery after dural puncture, in order to emphasize early identification of the cause of headache and explore the possible mechanism of PRES in this patient.
Method: A case study was conducted on a parturient who presented with symptoms such as headache and epilepsy after painless epidural puncture during delivery at our hospital.
Result: A 31-year-old mother with G3P1 was admitted to the hospital at 40 weeks of pregnancy, with no previous differences. When the uterine opening of the parturient is 3cm larger, delivery analgesia is required. Therefore, epidural puncture is performed in the L3-4 gap. During the operation, the arachnoid membrane is punctured, cerebrospinal fluid leaks out, and the L2-3 gap is changed. An epidural tube is inserted towards the head end, and the epidural tube is connected to a self-control analgesia pump. 10 minutes after delivery analgesia, the patient's cervix was fully opened, and the second stage of labor lasted for 22 minutes. One female live baby was delivered

in a cephalic position. During delivery, the patient's blood pressure fluctuates between 113-127/78-86mmHg. Postpartum advice to the patient to lie flat on the pillow and move more in bed. On the 2nd and 3rd day postpartum, the patient experienced mild positional headache with elevated blood pressure. After receiving antihypertensive and analgesic treatments, the headache was relieved. At 16:30 on the 4th day postpartum, the patient complained of severe headache in a supine position. Neurological examination was performed without abnormalities, and blood pressure was measured at 140/80mmHg. Compound Paracetamol Tablets were given for pain relief treatment, but the effect was not satisfactory. An appointment was made for MRI examination the next morning to rule out neurological diseases. At 20:47 and 21:26 that evening, the patient experienced two episodes of systemic convulsions, foaming at the mouth, loss of consciousness, and bedside electrocardiography showed BP160-180/90-122 mmHg. Secondary epilepsy was initially considered, and spasmodic and anti epileptic treatments such as magnesium sulfate, diazepam, and sodium valproate were given. After the episode, the patient complained of tinnitus and headache. Suitable. Post emergency examination showed 10.41mg/L of D-dimer, and emergency cranial MRI showed abnormal signals in both parietal and occipital lobes, suggesting the possibility of reversible posterior encephalopathy syndrome. Subsequent treatments include magnesium sulfate solution for spasmolysis, sodium valproate for anti epilepsy, and enoxaparin for anticoagulation. On the 5th day postpartum, the ophthalmic examination showed no obvious abnormalities in the patient's eyes, and the EEG image showed no obvious abnormalities. On the 6th day after delivery, no significant abnormal changes were observed in the brain enhanced MRV examination, with abnormal signals in both parietal and occipital lobes. The FLAIR scan signal was slightly lower than before, suggesting the possibility of reversible posterior encephalopathy syndrome. On the 13th day postpartum, the patient's cranial MRA showed no significant abnormal changes. On the 15th day after delivery, the patient's blood pressure stabilized and was discharged. After discharge, the patient continued to take nifedipine sustained-release tablets. During the follow-up one month after discharge, the patient reported complete relief of headache. After 5 months, no abnormalities were found in the cranial MRI.

Conclusion: The headache that our patient experienced in the first 3 days after childbirth was consistent with low intracranial pressure headache related to cerebrospinal fluid leakage. Headache improved when lying flat with the pillow removed, accompanied by elevated blood pressure. It was not taken seriously at the time, and hypertension induced headache was considered. Therefore, antihypertensive and analgesic treatment was given. At 16:30 on the 4th day postpartum, the patient complained of worsening headache while lying flat again. After receiving Compound Paracetamol Tablets treatment, the effect was not satisfactory. We considered that the nighttime emergency examination would increase the workload of the radiology department, and timely examination was not conducted, which delayed the condition and led to the subsequent occurrence of epilepsy in the patient. After the onset of the disease, the patient's head CT showed no significant abnormalities; MRV plain scan shows unclear display of the left transverse process and sigmoid sinus - imaging reports abnormal signals in both parietal and occipital lobes, with equal signal on T1WI, slightly high signal on T2WI, high signal on FLAIR scan, and slightly high signal enhancement on DWI scan; MRV shows no significant abnormal changes. Based on the patient's clinical symptoms and relevant examination results, our patient is temporarily considering the possibility of reversible posterior encephalopathy syndrome (PRES).

At present, the pathogenesis of PRES is not clear. Our patient has no history of hypertension or other underlying diseases, and there are no other complications during pregnancy. The specific reasons for the patient's occurrence of PRES are not yet clear. We speculate that there are several reasons: 1. Our patient has persistent postoperative headache and high blood pressure. There are reports that high blood pressure can be observed in most patients with PRES during seizures, and when arterial blood pressure rapidly increases beyond the upper limit of cerebral vascular automatic regulation, it can lead to cerebral hyperperfusion, resulting in vascular leakage and vascular edema. In addition, the sympathetic nervous system in the posterior circulation of the brain is less innervated, and the parietal and occipital lobes are more sensitive to high perfusion, so edema is prone to occur in the posterior part of the brain. 2. Intracranial hypotension caused by dural puncture. Some cases indicate that patients with low intracranial pressure caused by cerebrospinal fluid leakage are more likely to experience PRES at normal or slightly higher blood

pressure levels. Some studies suggest that the mechanism of PDPH caused by cerebrospinal fluid leakage is similar to that of PRES, which is the result of intracranial hypotension caused by cerebrospinal fluid leakage leading to excessive perfusion. PRES may be a late complication of intracranial hypotension caused by cerebrospinal fluid leakage. We believe that a large-scale retrospective analysis of the intrinsic relationship between patients with dural puncture and PRES is needed in the future.
In summary, when the nature of headache changes after puncture, relevant examinations should be promptly improved to clarify the diagnosis and identify the cause. In addition to considering the possibility of venous sinus thrombosis, subdural hematoma, etc., the possibility of PRES should also be considered!

PU-0469

连续腰方肌阻滞对活体肾移植受者早期康复的影响

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目的 明确连续腰方肌阻滞对活体肾移植受者早期康复的影响
方法 终末期肾疾病将行活体肾移植术受者 70 例，采用随机数字表将其分为 2 组（n=35）：连续腹横肌平面阻滞（TAPB）组（T 组）和连续腰方肌阻滞（QLB）组（Q 组）。麻醉诱导前，T 组或 Q 组分别于超声引导下行连续 TAPB 或 QLB。当穿刺针到达确切位置时，两组患者均注入 0.4% 罗哌卡因 0.6 ml/kg，使用硬膜外导管于腹横肌平面或腰方肌平面置管。导管与镇痛泵相连，背景速度设定为 5 ml/h，自控给药量为 5 ml，锁定时间为 15 min，最大剂量为 20 ml/h。记录术前（T0）、术后第 1 天和第 3 天（T1-2）的血肌酐（Cr）和尿素氮（BUN）水平。记录急性肾损伤（AKI）发生情况，术后补救镇痛和术后恢复情况，记录患者和术者满意度。
结果 Q 组术后 PCA 次数降低，患者和术者满意度升高（P<0.05），余指标差异无统计学意义（P>0.05）。
结论 连续腰方肌阻滞可改善活体肾移植受者术后疼痛，提高患者和术者满意度。

PU-0470

胃肠手术患者术前 NT-proBNP 与术后急性肾损伤的关联：一项单中心回顾性队列研究

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目的 To explore the association between preoperative N-terminal pro-B-type natriuretic peptide (NT-proBNP) and the incidence of postoperative acute kidney injury (AKI) in patients underwent gastrointestinal surgeries and managed with enhanced recovery after surgery (ERAS) strategy.
方法 This was a single center retrospective cohort study. Patients aged 18 years or older who were scheduled for elective gastrointestinal surgeries and subjected to the ERAS strategy with preoperative NT-proBNP and creatinine measurements were included in the analysis. Preoperative serum concentrations of NT-proBNP were confirmed as the exposure. The primary outcome was the incidence of postoperative AKI. Preoperative NT-proBNP was divided into high or low level groups based on the median (165 pg/ml). Logistic regression was used to explore the association between increased preoperative NT-proBNP level and risk of AKI.
结果 After screening 1932 case records, 629 cases were included in the final analyses. The

average age was 63.5 (15.3) years old and 197(31.3%) of them were female. Among them, 112 (17.8%) developed postoperative AKI. The incidence of AKI was 14.6% and 21.0% in the high and low NT-proBNP groups, respectively. Patients with higher preoperative NT-proBNP levels (≥165 pg/mL) has significant higher risk of postoperative AKI as compared to those in the lower group(adjusted OR, 1.75; 95%CI, 1.12-2.73).
结论 Increased preoperative NT-proBNP is associated with an elevated risk of postoperative AKI in patients underwent gastrointestinal surgery and managed with ERAS strategy.

PU-0471

前锯肌平面阻滞与胸椎旁神经阻滞对老年胸腔镜手术患者术中血流动力学及术后认知功能的影响

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目的 比较前锯肌平面阻滞与胸椎旁神经阻滞对老年胸腔镜手术患者术中血流动力学及术后认知功能的影响。
方法 选择择期行胸腔镜下肺叶切除术患者 120 例，年龄 65～80 岁，ASAⅠ～Ⅲ级，BMI18～25kg/m2，采用随机数字表法将其分为 S 组、T 组和 C 组，每组 40 例。于麻醉诱导前，对 S 组患者实施超声引导下前锯肌平面阻滞，对 T 组患者实施超声引导下胸椎旁神经阻滞，C 组为对照组，不进行任何神经阻滞操作。三组患者均实施气管内插管全身麻醉。记录三组患者的一般资料；记录三组患者麻醉诱导前(T0)、切皮时(T1)、手术开始 1h(T2)、手术结束即刻(T3)的心率（HR）和平均动脉压（MAP）；采用简易精神状态检查量表（MMSE）评价三组患者术前 1d、术后 12h、术后 24h、术后 72h 的认知功能（该量表总分为 30 分,≥27 分表示认知功能正常,＜27 分表示存在认知功能障碍；术后评分较术前评分下降≥2 分，即认为发生了 POCD）；记录三组患者术后 12h、24h、72h 发生术后认知功能障碍（Postopertative cognitive dysfunction，POCD）例数；记录三组患者术后 2h、4h、8h、12h、24h、48h 静息及运动状态下 VAS 评分。本研究手术均由同一团队采用同一手术方式进行。神经阻滞操作和术后随访均由同一位麻醉医生进行。
结果 组内 MAP、HR 比较：S 组 T1、T2、T3 时的 MAP、HR 较 TO 时无明显变化(P>0.05)；T 组 T1、T2、T3 时的 MAP、HR 较 T0 时降低(P<0.05)；C 组 T1、T2、T3 时的 MAP、HR 较 T0 时升高(P<0.05)。组间 MAP、HR 比较：S 组和 T 组 T1、T2、T3 时的 MAP、HR 较 C 组低(P<0.05)；S 组 T1 时的 MAP、HR 较 T 组高(P<0.05)，且 T2、T3 时的 MAP 较 T 组高(P<0.05)。S 组于术后 12h、24h、72h 所测 MMSE 分数较 C 组和 T 组高(P<0.05)；T 组于术后 12h 所测 MMSE 分数较 C 组高(P<0.05)。S 组于术后 12h 所测 POCD 发生率较 C 组和 T 组低(P<0.05)。在静息及咳嗽或活动状态下，S 组的 VAS 评分在术后 2h、4h、8h、12h 时较 C 组低(P<0.05)；S 组的 VAS 评分在术后 12h 时较 T 组低(P<0.05)；T 组的 VAS 评分在术后 2h、4h、8h 时较 C 组低(P<0.05)。
结论 SAPB 和 TPVB 均可为电视辅助胸腔镜手术提供良好的镇痛，与 TPVB 相比，SAPB 对患者术中血流动力学影响更小，能有效减少 POCD 的发生，有利于患者的早期恢复。

PU-0472

一例高龄腹主动脉覆膜支架植入术后并发脓毒症的麻醉救治

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目的 脓毒症,一种因感染引起宿主反应失调导致器官功能障碍的疾病，是临床常见的严重感染性疾病，其发病机制复杂，涉及多种效应免疫细胞和炎症反应，病情进展迅速，预后差。早期控制感染是其治疗核心，而手术切除感染灶是治疗的重要手段，对于麻醉医生而言，如何做好围术期麻醉管理是保障外科脓毒症患者生命安全的关键一环，也是巨大挑战之一。本研究报道了 1 例腹主动脉覆膜支架植入术后并发脓毒症的高龄患者在全身麻醉下行腹腔脓肿清除和腹主动脉假性动脉瘤切除伴吻合术的麻醉救治经过。本文从该患者脓毒症、高龄老年、重度肺损伤、术中急性肾损伤等组织器官病理生理变化，如何采用提前精准干预来探讨，以期和同行们相互交流并学习脓毒症患者的围术期麻醉管理要点。

方法 该患者术前诊断明确，腹主动脉夹层支架植入术后感染，脓毒症，慢阻肺伴肺气肿急性发作，呼吸性酸中毒，II 型呼衰，贫血，在经过多学科专家团队联合讨论和充分术前准备后，予外科手术治疗。首先，由于感染部位情况复杂，泌尿外科先置入双 J 管保护输尿管；其次由血管外科和胃肠外科联合手术清除感染源并排查肠道坏死情况，最后在肾上腹主动脉球囊阻断下，血管外科行腹主动脉血管重建术。基于患者特殊的基础情况、复杂的手术过程和入室时新发的快室率房颤和急性呼吸窘迫综合症，麻醉管理异常棘手。首先，精准监护患者的心肺功能、平稳诱导；其次，在腹主动脉阻断前，纠正患者心肺功能不全，包括降低心室率，药物复律，改善外周血管阻力，维持组织灌注，可视化精准小潮气量保护性通气策略、滴定合适的 PEEP 等，待心肺功能稳定后，再进行对血流动力学影响较大的腹主动脉阻断等操作；另外，由于手术时间长，脓毒症联合腹主动脉阻断造成急性肾功能不全和少尿，综合考虑下提出二次手术建议，同时术后入 ICU 早期实施 CRRT 治疗改善内环境。

结果 最终，患者顺利度过了高风险的麻醉和二次手术过程，术后快速康复并出院。

结论 本例患者的诊疗体会是：首先，手术时机顺序的掌控非常重要，该患者前期纠正心肺功能不全，仅进行双 J 管置入、脓肿清除等手术，待心肺功能改善后，再进行腹主动脉阻断手术；第二，术中需要个体化监测和调整呼吸、循环功能，包括借助 TEE、无创心排量监测和纤支镜探查等技术指导围术期精准麻醉；第三，围术期及时识别并有效处理并发症，术后及时复苏，积极防治休克和多器官功能障碍。

PU-0473

膈肌超声评估肌松残余的临床研究

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目的 本文通过比较膈肌超声与肌松监测仪，判断膈肌超声评估肌松残余的有效性。

方法 本研究采用随机、对照实验。首先选取我院拟进行甲状腺癌根治术的 患者 24 例患者，对所有患者同时进行肌松监测仪监测与使用超声测量膈肌厚度恢 复率。术中全程用肌松监测仪监测肌松情况。手术结束后实时测量患者膈肌厚度， 患者均在 TOFr 值≥90%时进行拔管。绘制 ROC 曲线，测量出最佳截断值。再拟纳入 44 例于全身麻醉下行甲状腺癌根治手术的患者，排除 6 例（3 例患者拔管苏醒期躁 动，无法配合进行膈肌超声检测,3 例患者为拮抗药禁忌症），最终纳入患者 38 例 患者进行分析。以肌松监测仪评估作为对照组，当 TOFr 值≥90%时进行拔管；以 膈肌超声评估肌松残余作为实验组，当 DTF%＞最佳截断值时拔管。对照组 20 例、 实验组 18 例。将两组患者一般

情况、术后 10min 和 30min 相关肺部发症等进行比较。
结果 通过 ROC 曲线分析膈肌厚度变化率预测肌松残余的 AUC 值为 0.783 （95%CI：0.583～0.936，P=0.008），最佳截断值为0.478，灵敏度为0.70，特异度为0.78。两组患者的一般情况，例如性别、年龄、BMI 值等差异上无统计学意义（P>0.05）。在相关麻醉事件上两组相比也无统计学意义（P>0.05）。而在术后 麻醉相关并发症方面，可以看出膈肌超声组术后 10min 相关肺部并发症发生率与 肌松监测仪组相似，说明膈肌超声在拔管早期可以很好预测术后并发症的发生。 而术后 30min 两组患者无明显差异。通过实验可以得出结论，膈肌超声可以用来 评估肌松残余，且效果与肌松监测仪相似。
结论 膈肌超声评估肌松残余是一种可行且有效的方法，它能够更全面、准确地评估肌松恢复的情况，降低术后并发症，为麻醉过程中的个体化治疗提供了 重要依据，为麻醉手术中的肌松管理提供新的思路和方法。

PU-0474

腹横肌平面阻滞对肾切除术术后疼痛的影响：一项系统评价

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目的 系统评价腹横肌平面阻滞（TAPB）在肾切除术后镇痛中的效果。
方法 计算机检索 CENTRAL、Pubmed、Embase 和 Web of Science 数据库，搜集 TAPB 用于肾切除术术后镇痛的随机对照试验（RCT），检索时限从建库至 2024 年 6 月 21 日。主要结局指标为术后 24h 等效静脉吗啡累计消耗量。次要结局指标为术后不同时刻静息、咳嗽或运动时疼痛评分，术后首次要求镇痛时间，术后住院时间和胃肠道不良反应发生率。2 位研究人员独立筛选文献、提取资料并评价纳入研究的偏倚风险后，采用 Review Manager5.4 软件进行 Meta 分析，所有结果均以森林图表示。
结果 纳入 6 项 RCT，共 407 例患者，其中 TAPB 组 203 例，对照组（无 TAPB 或腹横肌平面注射生理盐水）201 例。Meta 分析结果显示：与对照组相比，TAPB 组术后 24h 等效静脉吗啡累计消耗量（mg）显著减少[MD＝−9.61，95%CI（−16.73，−2.49），P＝0.008]；静息状态下的疼痛评分在术后 4h[MD＝−9.97，95%CI（−16.36，−3.58），P＝0.002]、术后 6h[MD＝−8.22，95%CI（−12.85，−3.60），P＝0.0005]、术后 12h[MD＝−5.61，95%CI（−10.65，−0.58），P＝0.03]以及术后 24h[MD＝−8.66，95%CI（−14.41，−2.91），P＝0.003]均降低，而术后 1h[MD＝−3.39，95%CI（−12.57，5.78），P＝0.47]和术后 2h[MD＝−7.34，95%CI（−19.29，−4.60），P＝0.23]差异无统计学意义；咳嗽或运动状态下的疼痛评分在术后 4h[MD＝−14.33，95%CI（−19.61，−9.06），P＜0.00001]、术后 12h[MD＝−10.98，95%CI（−15.69，−6.27），P＜0.00001]以及术后 24h[MD＝−7.79，95%CI（−15.13，−0.45），P＝0.04]显著降低，而术后 2h[MD＝−11.41，95%CI（−24.96，−2.14），P＝0.10]和术后 6h[MD＝−8.54，95%CI（−19.21，2.14），P＝0.12]差异无统计学意义。两组患者术后首次要求镇痛时间（min）[MD＝246.04，95%CI（−62.04，554.13），P＝0.12]与术后住院时间（d）[MD＝−0.04，95%CI（−0.23，0.15），P＝0.69]差异均无统计学意义。TAPB 组有更低的术后胃肠道不良反应发生率[RR＝0.68，95%CI（0.48，0.95），P＝0.03]。
结论 目前证据表明，TAPB 对肾切除术术后镇痛有效，能减少术后阿片类药物消耗，降低术后疼痛评分及术后胃肠道不良反应。受纳入研究数量和质量限制，上述结论尚需开展更多高质量研究予以验证。

PU-0475

无阿片类药物全身麻醉联合 TAP 阻滞在腹腔镜妇科手术中的应用研究：一项前瞻性、随机、对照试验

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目的 基于加速康复外科理念，使用无阿片类药物联合手术切皮前腹横肌平面（transversus abdominis plane, TAP）阻滞替代传统阿片类药物在腹腔镜妇科手术患者中的应用，观察患者术后胃肠功能恢复时间、术后恶心呕吐（postoperative nausea and vomit, PONV）的发生率以及术后镇痛效果。

方法 选取 126 例择期拟行腹腔镜妇科手术的患者，按随机数字表法将患者分为试验组（OFA 组）和对照组（OA 组），每组 63 例。OFA 组接受 OFA 联合 TAP 阻滞，OA 组常规阿片药全麻。记录患者入室（T0）、诱导时（T1）、气管内插管时（T2）、建立气腹时（T3）、拔除气管导管时（T4）的心率和 MAP，麻醉诱导后 10 min 内（T5）、建立气腹 5 min 内（T6）及拔除气管导管 5 min 内（T7）的最高与最低心率及最高与最低 MAP，术中血管活性药物的使用情况，苏醒时间，麻醉后监测治疗室（post-anesthesia care unit, PACU）中 Ramsay 评分、不良反应及滞留时间，PONV 的发生率及严重程度，术后 2 h、6 h、24 h、48 h 的疼痛数字评价量表(numerical rating scale, NRS)评分，术后首次下床时间、肛门排气时间，术后住院时间，术后 24 h 内不良反应的发生率。

结果 T0、T2 时，两组 HR 无统计学意义（P >0.05）；T1、T4 时，OFA 组 HR 低于 OA 组，差异有统计学意义（P <0.05）；T3 时 OFA 组 HR 高于 OA 组（P <0.05）。在 T0、T1、T4 时，两组 MAP 差异无统计学意义（P >0.05）；T2、T3 时，OFA 组 MAP 高于 OA 组（P <0.05）。在 T5 时间段，OFA 组 MAPmax 与 MAPmin 的差值小于 OA 组，差异有统计学意义（P <0.001）；在 T6 时间段，OFA 组 HRmax 与 HRmin 的差值大于 OA 组（P =0.001）；T7 时间段，OFA 组 HRmax 与 HRmin 的差值小于 OA 组，差异有统计学意义（P =0.028）。诱导前 OFA 组患者需要使用阿托品的人数多于 OA 组（P =0.006）；术中 OFA 组麻黄碱用量少于 OA 组（P <0.001）；其余血管活性药物及术中阿托品使用量比较，差异均无统计学差异（P >0.05）。PACU 滞留时间、下床时间、肛门排气时间、术后住院时间及术中液体出入量，手术类型比较差异均无统计学意义（P>0.05）。OFA 组患者苏醒时间较 OA 组长（P =0.009）。在拔管即刻、拔管后 10 min，OFA 组 Ramsay 评分高于 OA 组（P <0.05）；在拔管后 20 min 及出 PACU 时，两组 Ramsay 评分的差异无统计学意义(P >0.05)。在整个研究观察期间，术后 6-24 h 内，OFA 组患者恶心的发生率小于 OA 组（P =0.040）；余随访时间点，两组 PONV 的发生率、严重程度及止吐需求比较，差异均无统计学意义（P >0.05）。活动时，OFA 组在术后 2 h、6 h、24 h、48 h 的 NRS 评分均低于 OA 组（P <0.05）；静息时，OFA 组在术后 2 h、6 h、24 h 的 NRS 评分均低于 OA 组（P <0.05），在 48 h 两者 NRS 评分相当（P >0.05）。OFA 组术后首次镇痛中位时间长于 OA 组（P =0.013）。术后 24 h、48 h，OFA 组和 OA 组吗啡的使用量相当（P >0.05）；OA 组需要追加氟比洛芬酯镇痛的人数多于 OFA 组，差异有统计学意义（P <0.05）。两组患者术后 48 h 内麻醉相关不良反应发生情况差异均无统计学意义（P>0.05）。

结论 右美托咪定、艾司氯胺酮及利多卡因联合手术切皮前 TAP 阻滞的无阿片类药物全身麻醉在择期腹腔镜妇科手术中应用是安全可行的，并且可以降低患者术后疼痛，延长首次镇痛时间，减少术后一段时间内恶心的发生率（术后 6-24 h）。但在胃肠道功能恢复和吗啡消耗方面，与阿片类药物全身麻醉相比，并无明显优势，且延长了苏醒时间。

PU-0476

老年患者胸腔镜手术中脑血流自动调节功能的监测研究

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目的 通过术中持续脑氧饱和度的监测，判断胸腔镜手术中老年患者脑血流自动调节（CA）功能的影响

方法 我院 2024 年 2 月至 5 月全身麻醉下行胸腔镜肺叶切除手术的患者 84 例，按年龄分为老年组（年龄≥65 岁，40 例）和中年组（年龄 40-64 岁，44 例）。两组麻醉方式相同，均采用全凭静脉麻醉，术前常规禁食 8h、禁饮 6h，入室后常规监测心电图（ECG）、心率（HR）、脉搏血氧饱和度（SpO2）、脑电双频指数（BIS）。局麻下行桡动脉穿刺置管，持续监测有创动脉压（ABP）。用酒精纱布擦拭患者前额皮肤脱脂，将脑氧饱和度的探头分别贴于两侧眉弓上方，连续监测术中 rScO2，持续记录手术期间患者的局部脑组织氧饱和度（regional cerebral saturation oxygenation，rScO2）、平均动脉压（mean arterial pressure，MAP），通过计算 rScO2 与 MAP 的 pearson 相关系数，得到脑血氧测定指数（cerebral oximetry index，COx），当脑血流自主调节功能完好时，脑血流和 MAP 之间没有相关性，COx 数值接近于 0；当 MAP 低于或高于脑血流自主调节范围时，脑血流和 MAP 之间存在相关性，COx 数值接近于 1。脑血流自主调节的上下限由脑血氧测定指数（COx）超过 0.4 时的 MAP 来确定，即根据 COx 可以预测 CA 范围，从而确定患者术中最佳 MAP 范围，统计出两组患者 CA（DCA）功能受损累积时间并计算 DCA 累积时间比值（%） [DCA 累积时间比值（%）=（COx 超出阈值的累积时间/手术记录总时长）×100%]。

结果 研究结果显示中年组和老年组术中脑血流自主调节范围分别为（63.60±5.43；102.07±7.83）mmHg 和（67.14±5.73；96.24±7.28）mmHg，二者具有统计学差异（P＜0.05），两组患者 CA 功能受损累积时间比值的比较结果显示为：中年组 DCA 累积时间比值（%）9.59±6.56 ；老年组 DCA 累积时间比值（%）20.03±9.21，两组比较有统计学差异（P＜0.05）。

结论 老年患者脑血流自动调节功能更弱，更易受到血流动力学的影响

PU-0477

氢吗啡酮用于妇科腹腔镜手术患者麻醉诱导的效果及对术后恢复质量的影响

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目的 探讨氢吗啡酮用于妇科腹腔镜手术患者麻醉诱导的效果及对术后恢复的影响。

方法 选择择期行全麻下妇科腹腔镜手术患者 180 例，年龄 20~60 岁，BMI 18.5~24kg/m2，ASA 分级Ⅰ或Ⅱ级。采用随机数字表法分为 2 组（n=90）：舒芬太尼组（S 组）和氢吗啡酮组（H 组）。S 组于诱导时静脉注射舒芬太尼 0.4μg/kg 与镇静、肌松药物；H 组麻醉诱导分为两个阶段：静脉滴注氢吗啡酮 30μg/kg，5min 后静脉注射镇静、肌松药物；两组镇静、肌松药物相同，3min 后行气管插管术。记录患者诱导期血流动力学变化、苏醒期和术后 1d 恢复质量及不良事件发生率。

结果 与 S 组比较，H 组诱导期 MAP 与 HR 的最大变异度及不良事件发生率比较无明显差异（P>0.05），苏醒期呛咳、恶心呕吐发生率及 VAS 评分降低（P<0.05），术后 1d 镇痛药、止吐药用量减少（P<0.05）且 QoR-15 评分升高（P<0.05）。

结论 氢吗啡酮用于妇科腹腔镜手术患者麻醉诱导安全有效，提高患者术后恢复质量。

PU-0478

经超声评估成年人腹腔镜胆囊切除术中三种不同的面罩通气模式对麻醉诱导期间的胃内充气的影响——一项随机、双盲、对照试验

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目的 对比麻醉诱导期间在不影响通气效率的前提下三种不同的面罩通气模式对胃内充气的影响。
方法 在这项前瞻性、随机、双盲的对照试验中，纳入 2024 年 4 月 8 日-2024 年 6 月 5 日在我院拟行择期腹腔镜胆囊切除术的 18-68 岁成年人，将其随机分配到三个通气组：容量控制组（VCV 组）、压力控制组（PCV 组）、压力调节容量控制组（PRVC 组)。在丙泊酚、舒芬太尼和维库溴铵常规诱导后进行正压面罩通气，通气期间使用超声凸阵探头实时监测胃窦部充气情况，以彗星尾征和胃窦横截面积（CSA）作为定性和定量的评定标准。主要结局指标是胃窦横截面积变化率[Delta CSA (%)]和彗星尾征发生率。次要观察指标是诱导前和面罩通气后 CSA；建立气腹后腹腔镜下的胃充气程度分级；在面罩通气的 Ta(30s)、Tb(60s)、Tc(120s)、Td(150s)的呼吸参数；直视下插管以及拔管时误吸的发生率；清醒拔管后 5 分钟和术后 2 天患者短期结局的随访结果。
结果 90 名行腹腔镜胆囊切除术患者纳入本次研究，研究对象的平均年龄为 50.1 ± 12.2 岁，性别男/女（33/57),BMI 为 23.1 ± 2.7kg/m2。诱导前后的 CSA 在三组间相似；对于 Delta CSA (%)，PCV（4.8 ± 3.2）、PRVC（3.4 ± 3.3）和 VCV 组（22.4 ± 9.4）三者之间有统计学差异(P< 0.001)；两两对比分析发现 VCV 和 PCV 之间，VCV 和 PRVC 之间有统计学差异，PCV 和 PRVC 之间没有统计学差异；对于彗星尾征发生率，PCV、PRVC 和 VCV 三者间有统计学差异（P=0.007）；对于彗星尾征的单因素分析表明：VCV、马氏分级、禁食时间、Delta CSA (%)是胃内充气的独立危险因素；对面罩通气模式和彗星尾征的多因素回归分析表明：与 VCV 相比，PCV（OR=0.27，0.09~0.83，P=0.022）和 PRVC（OR=0.17，0.05~0.56，P=0.004）对于彗星尾征的发生影响更小；多变量调整的平滑曲线拟合表明：Delta CSA (%)与彗星尾征之间呈正相关的直线关系。对于面罩通气 Ta、Tb、Tc、Td 的气道峰压，VCV、PCV 和 PRVC 三者间具有统计学差异（P＜0.05）。通气效率（ETCO2、吸气潮气量、呼气潮气量）以及其它呼吸参数（分钟通气量、气道峰压、呼气末正压、平台压）在三者间相似；腹腔镜胃充气分级、上腹胀、恶心呕吐的程度以及呃逆、反流的发生率在三组间均无统计学差异。在术后首次排气时间、术后首次进食固体食物时间、术后首次下床时间、术后住院时长方面三者相似。所有研究对象均没有发生误吸以及吸入性肺炎。
结论 在相同的通气效率下，相比于 VCV，PRVC 和 PCV 对于胃内充气的影响较小，有可能是面罩正压通气期间更安全的通气模式。

PU-0479

Effects of dexmedetomidine combined with lidocaine on cough reflex during extubation in thyroidectomy surgery patients: a randomized clinical trial.

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Study objective: To explore the inhibitory effect of dexmedetomidine combined with lidocaine on cough reflex during extubation in women thyroid surgery.
Method: Inclusion of American Society of Anesthesiologists (ASA) physical status I and II,

180 female patients undergoing elective thyroidectomy under general anesthesia with endotracheal intubation at the First Affiliated Hospital of Anhui Medical University from April to June 2023, with an age of (43.7±10.7) years and a Body Mass Index(BMI) of (23.5±2.8). According to the different intervention methods, the patients were randomly assigned to three groups: the dexmedetomidine combined with lidocaine group, the lidocaine group, and the normal saline group, with 60 cases randomly allocated to each group. The specific intervention methods are as follows:a researcher administered the following protocol to the mucosa around the patients' supraglottic, glottis, and subglottic regions based on random preselection (via a randomization table): dexmedetomidine combined with lidocaine group: 1ml 2% lidocaine (20mg) and 2ml dexmedetomidine (0.5 ug X body weight)(n=60); lidocaine group: 3 ml 2% lidocaine (60mg) (n=60); or normal saline group: 3 ml normal saline (n=60)(1ml each in the supraglottic, glottic, and subglottic regions). The above administration is achieved through an oral and nasal aerosol delivery device. The primary outcome is the incidence of cough reflex during extubation in the three patient groups. Secondary endpoints included the severity of cough reflex, the incidence and severity of postoperative sore throat and postoperative hoarseness, the incidence of postoperative nausea and vomiting, and postoperative antiemetic and analgesic requirements, incisional pain, the level of sedation and the postoperative length of hospital stay. Meanwhile, vital signs such as mean arterial compression, heart rate, airway plateau pressure and finger oxygenpercutaneous oxygen saturation were recorded during intubation and extubation.

Results: The incidence of cough reflex during extubation in the dexmedetomidine combined with lidocaine, lidocaine, and normal saline groups were 38.3% (23/60), 46.7% (28/60), and 70.0% (42/60), respectively. Compared to the normal saline group, the dexmedetomidine combined with lidocaine group and the lidocaine group had a lower incidence rate, while there was no statistically significant difference between the dexmedetomidine and lidocaine group and the lidocaine group. We observed differences in the severity of cough reflex: the incidence of grade 3 coughing in the dexmedetomidine combined with lidocaine and lidocaine groups was lower compared to the normal saline group, while the incidence was slightly higher in the normal saline group. Additionally, in cases of grade 4 coughing, the dexmedetomidine combined with lidocaine group showed a lower incidence compared to the lidocaine and normal saline groups. The incidence of postoperative sore throat at 6 hours in the dexmedetomidine combined with lidocaine, lidocaine, and normal saline groups were 60.0% (36/60), 78.3% (47/60), and 86.7% (52/60) respectively. The incidence of postoperative hoarseness at 6 hours in the dexmedetomidine combined with lidocaine, lidocaine, and normal saline groups were 56.7% (34/60), 83.3% (50/60), and 85.0% (51/60) respectively. These differences were statistically significant ($P < 0.05$). However, there was no statistically significant difference in the severity of postoperative sore throat and postoperative hoarseness among the three groups of patients at 6 hours postoperatively. The incidence of postoperative nausea and vomiting at 6 hours in the dexmedetomidine combined with lidocaine, lidocaine, and normal saline groups were 41.7% (25/60), 36.7% (22/60), and 35.0% (21/60) respectively. Although there were statistically significant differences in visual analogue scales of incision pain at 6 hours after surgery among the 3 groups, there was no statistically significant difference in requirements for antiemetic and analgesic medications within 24 hours postoperatively. In the dexmedetomidine combined with lidocaine group, lidocaine group, and normal saline group, there were 7, 5, and 11 cases requiring rescue analgesia within 24 hours postoperatively, and 7, 7, and 5 cases requiring rescue antiemetic medication. The sedation levels at 1 hour, 6 hours, 12 hours, and 24 hours postoperatively($P=0.210$, 0.692, 0.878, and 1.000, respectively) were comparable among the three groups. The median lengths of hospital stay in the dexmedetomidine combined with lidocaine, lidocaine, and normal saline groups were 3.5, 2, and 2 days respectively. These differences were not statistically significant($P > 0.05$).

Conclusions: In female patients undergoing thyroidectomy under tracheal intubation and general anesthesia, the dexmedetomidine combined with lidocaine through an oral and nasal aerosol device effectively reduces the incidence and severity of cough reflex during extubation, without increasing the rate of adverse reactions. This approach also contributes to maintaining a more stable hemodynamic profile throughout both intubation and extubation processes.

PU-0480

应用 Lidco 联合去甲肾上腺素实施目标导向液体管理对老年患者髋关节置换术 术中血流动力学影响的研究

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目的 人工髋关节置换术存在出血多，术中血流动力学变化剧烈等特点，同时老年患者存在高龄，合并症复杂等情况，生理功能储备差等情况，因此老年患者在实施髋关节手术中应加强监测，防止术中及术后心脑肾等重要脏器并发症的发生。目前指南推荐髋关节手术使用椎管内麻醉技术，被证实能减少老年患者并发症的发生，改善预后，因此我们采用 Lidco 联合去甲肾上腺素实施目标导向液体管理治疗，探讨对老年患者髋关节置换术术中血流动力学的影响。

方法 1. 麻醉管理：患者入室后建立外周静脉通路，常规监测无创血压、ECG、HR、脉搏血氧饱和度。于无创动脉压较高侧行桡动脉穿刺，连接 Lidcorapid 监测，记录有创动脉压（IBP）、每搏输出量(SV)，心排出量（CO），于手术开始前和术毕时监测血气情况。患者统一行腰硬联合麻醉，蛛网膜下腔予等比重 0.5%布比卡因约 10 mg。维持麻醉平面 T10 以下。术中可经硬膜外导管注射 2%利多卡因，麻醉平面满足手术要求。患者入室至腰麻结束翻身前常规给予氨甲环酸 200ml，抗生素 100ml。

2.试验组（G 组）：G 组患者采用入室后监测基础 SV，同时持续输注小剂量去甲肾上腺素。当 SV 下降至基础值-10%以下并持续 1min 以上，则在 5min 内给予理想体 3ml / kg 乳酸林格氏液冲击，若 SV 迅速升高超过 10%，提示前负荷过低，重复液体冲击，直到 SV 的升高<10%。C 组患者按照传统经验进行补液。术中输液的维持速度均为 2ml/(kg•h)。

结果 G 组与 C 组总输液量、晶体液输注总量、尿量均无差异(P＞0.05)；腰麻后 G 组平均动脉压下降程度小于 C 组（P<0.05）；扩髓腔后，两组的 SV 均下降，但 G 组下降的幅度小于 C 组（P<0.05），其余两组各时点血流动力学参数组间差异无统计学意义(P>0.05)。

结论 目标导向液体治疗联合去甲肾上腺素与经典液体治疗相比，能够使心脏前负荷处于更理想的充盈状态并提供相对更平稳的血流动力学。

PU-0481

多模式镇痛下妇科肿瘤患者早期恢复质量的影响因素分析

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目的 本研究意 在描绘妇科恶性肿瘤患者的早期恢复质量，通过分析患者自身因素及麻醉、手术和药物因素与恢复质量的关系，预测高危人群、选择合适的镇痛药物和镇痛 技术进行个体化预防，从而提高妇科恶性肿瘤患者术后恢复质量

方法 本项目将采用前瞻性队列研究方法，选取来自温州医科大学附属第一医院择
期手术的年龄大于 18 岁的宫颈癌，卵巢癌和子宫内膜癌等患者。收集患者的基本 情况如年龄、体重指数和一般病史等。采用 Qor-40 量表来评估患者身心状态，数字等级评定量表来评估患者的疼痛程度。并且收集患者的术前和术后 48 小时 Qor-40 评分、术后 48 小时恶心呕吐情况、发热情况、住院时长、住院总费用等一般情况。 收集影响恢复质量的因素包括术中镇痛药物、手术方式、麻醉方式和手术时长等。 根据妇科恶性肿瘤患者所收集到的 Qor-40 量表总分情况进行分组。对一般资料、 术前指标、术中指标、术后指标进行单因素分析，在单因素分析中筛选出与恢复 质量相关的变量(P<0.1)，纳入 Logistic 回归分析，从而确定癌症患者术后 影响恢复质量的独立因素，然后构建预测模型和制作列线图，再使用受试者特征曲线来检验模型的区分度。

结果 在研究期间，共 207 名择期妇科恶性肿瘤患者根治术后的患者纳入研究。
1.根据排除标准和失访人数总共有 200 名患者纳入最终分析，因 Qor-40 恢复质 量的高低主要是根据特定人群平均得分得出，根据完成研究的患者，术后 Qor-40 平均分数为 171.24±12.86 分。遂根据收集到的妇科恶性肿瘤患者恢复质量的总 数的平均值将其分为两组，高恢复质量组指的是 Qor-40 总分>171 分,低恢复质 量组指的是 Qor-40 总分≤171 分。 2.与低恢复质量组相比，高恢复质量组患者在五个层面包括躯体舒适性、情绪 状态、身体独立性、心理支持及疼痛方面显著提高，差异具有统计学意义。 3.单因素方差分析显示，在是否存在高血压、肌酐值、手术时长、术后白细胞、 术中瑞芬太尼使用总量、围术期是否使用喷他佐辛、术后是否使用盐酸帕洛诺司 琼、手术方式、是否使用腹腔镜方式、术后是否发热、术后是否发生中重度疼痛 和术后是否使用通便药等方面存在统计学意义。 4.使用二元 logistics 回归分析评估这些变量可以发现，术后是否使用通便药(OR [95%CI]:2.14(1.01-4.59)，P=0.05)，术后是否发热(OR[95%CI]:2.28(1.15- 4.51)，P=0.02)，术后是否中重度疼痛(OR[95%CI]:3.25(1.43-7.41)，P <0.01)都是术后低恢复质量的危险因素。而围术期使用喷他佐辛增加 (OR[95%CI]:0.45(0.21-0.98)，P=0.04)、术后白细胞偏高(OR[95%CI]:0.89(0.80-0.99)，P=0.04)可能是增加了术后恢复质量的保护因素。 5.将以上五个独立影响因素纳入预测模型列线图，该预测模型列线图总分 0-110 分，概率为 0.2-0.9。预测模型 ROC 曲线下面积为 0.81，提示该预测模型有较 好的区分能力。因此在临床上，对以上因素患者应该提前干预，可提高患者的术 后恢复质量
结论 妇科恶性肿瘤术后的患者应推荐使用喷他佐辛作为围术期疼痛的管理、改善
术后胃肠道恢复的管理和术后炎症的控制，从而进一步提高妇科恶性肿瘤术后早 期的恢复。

PU-0482

Effect of remimazolam on postoperative delirium in patients undergoing general anesthesia: A systematic review and Meta-Analysis of Randomized Controlled Trials

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Background: Postoperative delirium (POD) is an acute central nervous system pathology that occurs in 27.6%–87.0% of patients after surgery. Remimazolam is a short-acting benzodiazepine newly approved for the induction and maintenance of general anesthesia. However, the use of benzodiazepine has been associated with an increased risk of postoperative delirium (POD). There is currently limited evidence about the relationship between remimazolam-based general anesthesia and POD.
Objective: This systematic review and meta-analysis of randomised controlled trials was to identify the effectiveness of remimazolam on postoperative delirium in patients with general anesthesia.
Materials and Methods: This study follows the PRISMA statement. PubMed, Web of Science, Embase, and the Cochrane Library databases were searched from inception to June 2024. Randomised controlled trials investigating the effect of remimazolam on postoperative delirium in patients undergoing general anesthesia were eligible. Data were collected independently. Meta-analyses were conducted to calculate rate ratios, hazard ratios, risk ratios, and mean differences with 95% confidence intervals. Quality of evidence was summarised in accordance with GRADE methodology (grading of recommendations assessment, development, and evaluation).
Results: A total of eight randomized controlled trials with 918 participants were included. Among them, 5 studies utilized remimazolam throughout the anesthesia induction and maintenance phases, 2 studies commenced remimazolam administration after induction, and 1 study administered a single intravenous bolus of remimazolam after the completion of surgery. Delirium

was assessed with the Confusion Assessment Method (CAM) or Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) in 3 studies, Ricker Sedation-Agitation Scale (RSAS) in 2 studies, and Pediatric Anesthesia Emergence Delirium (PAED) in 2 studies. Random effects analysis of the RR for POD in remimazolam versus non- remimazolam groups was significant with a RR of 0.50 and a 95% confidence interval of 0.31-0.80. Subgroup analysis based on patient age still supports the above results, 0.28 and a 95% confidence interval of 0.14-0.57 in children, 0.66 and a 95% confidence interval of 0.49-0.88 in adult.

Conclusion: Our meta-analysis suggests that remimazolam may reduce POD incidence in patients undergoing general anesthesia and when applied during the intraoperative period. Nevertheless, further studies are warranted to conclusively establish its safety.

PU-0483

肌肉质量与肝脏部分切除患者发生术后急性肾损伤的相关性：一项倾向性评分匹配分析

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目的 本研究是一项回顾性队列研究，收集 2020 年 5 月至 2022 年 6 月在南昌大学第二附属医院行肝脏部分切除手术的患者相关资料，基于分析患者术前 3 个月内的 CT 影像资料，评估患者的肌肉质量，以骨骼肌指数（SMI）：男性<44.77 cm2/m2，女性<32.50 cm2/m2 为临界值诊断患者合并有肌肉减少症。以 KDIGO 指南诊断患者发生术后 AKI。对比肌肉减少症和非肌肉减少症患者在行肝脏部分切除手术术后发生 AKI。

方法 通过下载患者第三腰椎横截面 CT 图像，应用 Slice-O-Matic 软件计算患者的骨骼肌面积、皮下脂肪面积和肌间脂肪面积。根据 KDIGO 指南，判定患者出现术后 AKI，对比肌肉减少症和非肌肉减少症组肝脏部分切除术后 AKI 的发生率和短期不良预后，应用 logistic 分析术后 AKI 的风险因素。

结果 （1）本研究共纳入 137 名行肝脏部分切除手术的患者，其中 23 名患者存在肌肉减少症，肌肉减少症的发病率为 16.8%。有约 19.0%（26/137）患者在术后合并急性 AKI。（2）肌肉减少症组（83.2%）中有 8 人（34.8%）的患者出现术后 AKI，非肌肉减少症患者中有 18 人（15.8%）出现术后 AKI，两组对比有统计学差异（p=0.035）；（3）倾向性匹配分析，按照 1：1 匹配，肌肉减少症和非肌肉减少症各有 20 人；PSM 后肌肉减少症中术后 AKI 发生率是术后 AKI 的发生率要高于非肌肉减少症；（4）倾向性匹配分析（PSM），按照 1：1 匹配，肌肉减少症和非肌肉减少症各有 20 人；PSM 后肌肉减少症中术后 AKI 发生率是 35%（7/20）,较非肌肉减少症组发生率 5%（1/20）高（p=0.045）；（5）PSM 后两组基线资料基本无统计学差异，PSM 后肌肉减少症 L3 骨骼肌面积（p=0.014）和肌间脂肪面积（p=0.004）更低；（6）建立 Logistic 分析模型，肌肉减少症是术后 AKI 的风险因素，矫正混杂因素后肌肉减少症依然与术后 AKI 存在显著相关性。

结论 肌肉减少症患者在行肝脏部分切除手术后术后 AKI 的发生率高，肌肉减少症是术后 AKI 的独立风险因素，利用 CT 图像评估患者肌肉质量可以为围术期并发症的预防提供新思路。

PU-0484

ERAS 理念指导下围术期管理对乳腺癌改良根治术患者精神心理以及免疫功能的影响

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目的 探究 ERAS 理念指导下围术期管理对乳腺癌改良根治术患者精神心理以及免疫功能的影响。
方法 选择 2021 年 1 月至 2023 年 12 月安徽医科大学附属巢湖医院甲乳外科拟行乳腺癌改良根治术患者共 100 例，采用随机数字表法分为常规麻醉组(C 组，n=50)和 ERAS 麻醉方案组(ERAS 组，n=50)。分别采用常规麻醉方案和 ERAS 麻醉方案对患者进行围术期麻醉管理。记录患者基本信息，主要观察指标是两组患者术前 1 天、术后 2 天汉密尔顿—焦虑分量表（HAMA）问卷、进行汉密尔顿—抑郁分量表（HAMD）问卷以及匹兹堡睡眠质量指数（PSQI）问卷调查评分；各时间点 T 淋巴细胞亚群(CD3+、CD4+、CD8+、CD4+/CD8+)及 NK 细胞水平；次要观察指标：术后各时间点 NRS 评分、患者出复苏室时间、术后下床时间、住院天数。
结果 术后 2d，ERAS 组的 HAMA、HAMD、PSQI 评分均低于对照组（Pa<0.05）。在Ｔ1、Ｔ2、Ｔ3 时，ERAS 组 CD3+、CD4+及 NK 细胞活性均比 C 组高（Pd<0.05）；ERAS 组在术中舒芬太尼用量更低(Pa<0.05)；ERAS 组患者术后 0.5h、2h 和 6h 的 NRS 评分更低(Pa<0.05)；ERAS 组患者住院天数更短(Pa＜0.05)。
结论 相较于常规麻醉方案，ERAS 理念指导下围术期管理可以显著减少乳腺癌改良根治术患者术后的免疫抑制；对患者术后焦虑、抑郁、睡眠质量具有非常积极的影响；患者围术期阿片类药物用量显著下降、住院天数更短。

PU-0485

Esketamine vs. placebo combined with erector spinae plane block vs. intercostal nerve block on quality of recovery following thoracoscopic lung resection: a randomized controlled factorial trial

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Background: Multimodal analgesic strategy is pivotal for enhanced recovery after surgery. The objective of this trial was to assess the effect of subanesthetic esketamine vs. placebo combined with erector spinae plane block (ESPB) vs. intercostal nerve block (ICNB) on postoperative recovery following thoracoscopic lung resection.
Materials and methods: This randomized, controlled, 2×2 factorial trial was conducted at a university hospital in Suzhou, China. One hundred adult patients undergoing thoracoscopic lung surgery were randomized to one of four groups (esketamine-ESPB, esketamine-ICNB, placebo-ESPB, and placebo-ICNB) to receive i.v. esketamine 0.3 mg/kg or normal saline placebo combined with ESPB or ICNB using 0.375% ropivacaine 20 ml. All the patients received flurbiprofen axetil and patient-controlled fentanyl. The primary outcome was quality of recovery (QoR) at 24 h postoperatively, assessed using the QoR-15 scale, with a minimal clinically important difference of 6.0.
Results: The median age was 57 years, and 52% of the patients were female. No significant interaction effect was found between esketamine and regional blocks on QoR (P = 0.215). The QoR-15 score at 24 h was 111.5 ± 5.8 in the esketamine group vs. 105.4 ± 4.5 in the placebo group

(difference = 6.1, 95% CI, 4.0–8.1; P < 0.001); 109.7 ± 6.2 in the ESPB group vs. 107.2 ± 5.6 in the ICNB group (difference = 2.5, 95% CI, 0.2–4.9; P = 0.033; not statistically significant after Bonferroni correction). Additionally, esketamine resulted in higher QoR-15 scores at 48 h (difference = 4.6) and hospital discharge (difference = 1.6), while ESPB led to a higher QoR-15 score at 48 h (difference = 3.0).
Conclusions: For patients undergoing thoracoscopic lung resection, subanesthetic esketamine improved QoR after surgery, while ICNB can be used interchangeably with ESPB as a component of multimodal analgesia.

PU-0486

Comparison of opioid-free and opioid-inclusive propofol anaesthesia for thyroid and parathyroid surgery: a randomised controlled trial

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Background: Postoperative nausea and vomiting occur frequently following thyroid and parathyroid surgery and are associated with worse patient outcomes. We hypothesised that opioid-free propofol anaesthesia would reduce the incidence of postoperative nausea and vomiting compared with opioid-inclusive propofol anaesthesia in patients undergoing these procedures.
Methods: We conducted a randomised, double-blinded, controlled trial in adult patients scheduled to undergo thyroid and parathyroid surgery at two medical centres in mainland China. Patients were allocated randomly (1:1, stratified by sex and trial site) to an opioid-free anaesthesia group (with esketamine, lidocaine, dexmedetomidine and propofol) or a control group (opioid-inclusive anaesthesia with sufentanil and propofol). Propofol infusion was titrated to bispectral index 45–55. Patients received prophylaxis of nausea and vomiting using dexamethasone and ondansetron and multimodal analgesia with paracetamol and flurbiprofen axetil. The primary outcome was the incidence of postoperative nausea and vomiting in the first 48 h after surgery.
Results: We assessed 557 patients for eligibility and 394 patients completed this trial. The incidence of postoperative nausea and vomiting in the first postoperative 48 h was lower in the opioid-free anaesthesia group (10/197 [5%]) than in the control group (47/197 [24%]) (OR 0.17, 95%CI 0.08–0.35; p < 0.001), yielding a number needed to treat of 5.3. Additionally, opioid-free propofol anaesthesia was associated with a reduced need for rescue antiemetics, lower rates of hypotension and desaturation after extubation, and higher patient satisfaction. Time to tracheal extubation was prolonged slightly in the opioid-free group. The two groups had similar postoperative pain and 30-d outcomes.
Discussion Opioid-free propofol anaesthesia reduced postoperative nausea and vomiting in patients undergoing thyroid and parathyroid surgery. An opioid-free anaesthetic regimen can optimise anaesthetic care during thyroid and parathyroid surgery.

PU-0487

积极性体温保护策略对老年腹腔镜结直肠癌手术患者预后的影响

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目的 老年患者在全身麻醉术后常出现低体温，可能导致各种并发症。在积极性体温保护方案中，术中积极升温至核心温度接近 37.0℃是否能改善患者的预后尚不明确。我们假设，在老年患者进行腹腔镜结直肠癌手术（LCCS）期间，积极升温至 37.0℃可以减少术后寒战（PS）和其他围手术期并发症的发生率。
方法 本研究将 60 岁以上接受 LCCS 的患者随机分配到积极升温组和常规升温组。主要结局指标是术后寒战的发生率。次要结局指标包括热舒适度、凝血功能、免疫状态的变化以及其他围手术期并发症。
结果 本研究共纳入 416 名患者。常规升温组的 PS 发生率为 44.71%，而积极升温组为 24.52%。积极升温组患者报告的术后热舒适度评分显著高于常规升温组（$p<0.05$）。术后第 1 天和第 3 天，常规升温组的凝血酶原时间和活化部分凝血活酶时间显著延长。常规升温组的中性粒细胞与淋巴细胞比率显著增加（$p<0.05$）。43.27%的积极升温组患者在术后 24 小时内加速了早期活动，而常规升温组为 28.85%（$p<0.05$）。
结论 积极的升温策略显著减少了接受 LCCS 的老年患者的 PS 发生频率和强度。在手术期间积极升温以维持正常体温（约 37.0℃）在加速老年患者 LCCS 术后的恢复过程中具有显著的临床价值。

PU-0488

The PRMT6/STAT1/ACSL1 axis promotes ferroptosis in diabetic nephropathy

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Hyperglycaemia-induced ferroptosis significantly contributes to kidney dysfunction in diabetic nephropathy (DN) patients. Targeting ferroptosis has potential clinical implications for DN treatment, but effective therapeutic targets remain unidentified. This study aimed to explore the role of protein arginine methyltransferase 6 (PRMT6) in regulating ferroptosis in DN. Using a mouse DN model consisting of wild-type and PRMT6-knockout (PRMT6-/-) mice, we employed transcriptomic and lipidomic analyses alongside various molecular biology techniques to uncover the mechanisms by which PRMT6 influences ferroptosis in DN.
Our findings revealed that downregulation of PRMT6 contributes to kidney dysfunction and renal cell death by modulating ferroptosis in DN. Specifically, PRMT6 reduction led to increased lipid peroxidation through upregulation of acyl-CoA synthetase long-chain family member 1 (ACSL1), thereby promoting ferroptosis. We further investigated the molecular interaction between PRMT6 and signal transducer and activator of transcription 1 (STAT1), focusing on their joint regulation of ACSL1 transcription. Treatment with the STAT1-specific inhibitor fludarabine was found to delay DN progression.
In hyperglycaemic cells, PRMT6 and STAT1 synergistically regulated ACSL1 transcription, mediating ferroptosis. Our study demonstrated that the PRMT6/STAT1/ACSL1 axis plays a critical role in ferroptosis by inducing the production of phospholipid-polyunsaturated fatty acids (PL-PUFAs). These results suggest that targeting the PRMT6/STAT1/ACSL1 pathway could be a novel therapeutic approach for preventing and treating DN.

PU-0489

Comparison of 95% effective dose of esketamine and alfentanil for hysteroscopy: a prospective, double-blind, randomized controlled trial

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Purpose: This study aimed to establish the 95% effective dose (ED95) of esketamine in combination with propofol for hysteroscopy, and subsequently evaluate their efficacy and safety profiles.
Patients and methods: This prospective, double-blind, randomized controlled trial consisted of two parts. In cohort 1, 45 women aged 18-65 years undergoing hysteroscopy were randomly assigned to either group E (esketamine + propofol) or group A (alfentanil + propofol). Dixon's up-and-down methodology was employed to determine the ED95 of esketamine and alfentanil. In cohort 2, 86 patients were randomized to group E and group A, with the calculated ED95 dose of the study drugs used for induction. The success rate of anesthesia using the ED95% dose, along with parameters related to anesthesia induction, recovery, and adverse events were also recorded.
Results The ED95 of esketamine was 0.254 mg/kg (95%CI: 0.214–1.004), while that of alfentanil was 9.121 μg/kg (95%CI: 8.479-13.364). The anesthesia success rates were 93.0% in group E and 95.2% in group A (p=0.664). Following rescue interventions, both groups achieved a 100% success rate. The induction time was significantly shorter in group E (60.0 [55.0-70.0] s) compared to group A (67.0 [61.0-79.3] s) (p = 0.006). Group E also exhibited lower rates of respiratory depression (p < 0.001), hypoxia (p = 0.006), intraoperative minimum SpO2 (p = 0.010), and hypotension (p = 0.001). Esketamine resulted in less impact on respiratory rate, heart rate, mean blood pressure, and end-tidal carbon dioxide compared to alfentanil (all p < 0.001). There were no significant differences in postoperative pain between the two groups.
Conclusion: This study determined the ED 95 dose of esketamine for intravenous general anesthesia during hysteroscopy. Esketamine demonstrated reduced respiratory and hemodynamic depression, as well as fewer adverse reactions compared to alfentanil. Therefore, esketamine emerges as an optimal anesthetic agent for hysteroscopic anesthesia.

PU-0490

Effect of low-dose ciprofol on postoperative nausea and vomiting under general anaesthesia of remimazolam in combination with alfentanil in gynecologic day Surgery – a randomised controlled trial

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麻醉

Purpose: Ciprofol is a new short-acting $GABA_A$receptor agonist developed in China with a similar chemical structure to propofol, The core structure of classical short-acting intravenous anesthetics is 2,6-disubstituted phenol, which binds to $GABA_A$ receptors to produce an anesthetic effect, and propofol is the most widely used drug among these drugs.[1]Ciprofol adds a cyclopropyl group to the chemical structure of propofol, which enhances its affinity with the $GABA_A$receptor and shows higher lipid solubility and potency than propofol, with less lipids from ciprofol reaching the circulatory

system compared to propofol for the same level of anaesthesia.[2]Studies have shown that low-dose propofol has a certain anti-nausea and vomiting effect, which can effectively prevent PONV under general anaesthesia of remimazolam.[3]It is still unclear whether low-dose ciprofol has the effect of preventing PONV.In the present study, we investigated whether low-dose ciprofol can reduce the incidence of PONV.

Patients and methods: We conducted this study in accordance with the Declaration of Helsinki.The study protocol was approved by the Ethics Committee of Weifang People's Hospital (Ethics No. KYLL20231009-2) and registered with the China Clinical Trial Registry (ChiCTR2300077247; https://www.chictr.org.cn). From November, 2023 to January, 2024, the study was conducted in the department of anaesthesiology, Weifang People's Hospital, Weifang City, China, where the registration was carried out and informed consent was signed with the patients.

In this study, we selected 74 patients undergoing gynecological hysteroscopy day surgery under general anaesthesia in remimazolam combined with alfentanil, and the inclusion criteria were ASAI-II, 18-65 years old, and BMI 18-28kg m^{-2}. Exclusion criteria were a history of preoperative sedation and analgesics, patients with allergies to the study drug, hearing abnormalities, patients with surgery time of less than 10 minutes or more than 1 hour, patients with additional diploids after surgery, and patients with missing follow-up.

Random numbers were generated by an independent participant using SPSS 25.0 software for random allocation, with a ratio of 1:1, divided into a ciprofol group and a saline control group.Patients are routinely fasted for 8 hours preoperatively, without the need for preoperative medications. Forearm venous access is established after the patient is admitted, and a multifunctional monitor (mindray BeneVision N17) was connected to monitor the electrocardiogram (ECG), noninvasive blood pressure (NIBP), heart rate (HR), pulse saturation (SpO2), and anaesthesia depth index (BIS). Dexamethasone 5 mg and flurbiprofen 50 mg were administered before induction of anaesthesia.

Both groups were induced by remimazolam 6mg/kg/h infusion until falling asleep (call without opening eyes) ,followed by alfentanil 20ug/kg and mivacurium chloride 0.2mg/kg injected slowly (30 seconds each). After 3 minutes of assisted respiration, a laryngeal mask was placed and mechanical ventilation maintained $ETCO_2$ 35-45 mmHg. Anaesthesia was maintained by continuous intravenous remimazolam 1mg/kg/h and alfentanil 40ug/kg/h to maintain BIS values between 40 and 60.In the ciprofol group, 2 ml of ciprofol (5 mg) was given at 5 minutes after the start of surgery.In the control group, 2 ml of saline was given at 5 minutes after the start of surgery. Bradycardia (HR <50 beats min^{-1} for at least 1 min) and hypotension (mean arterial pressure <65 mm Hg for at least 1 min) are treated symptomatically with atropine or ephedrine during surgery. Mivacurium chloride was added at 0.05 mg/kg after 30 minutes of induction. The drug was stopped at the end of the surgery, and When the patient wakes up, the laryngeal mask was removed, and the patient was sent to the post-anaesthesia care unit (PACU).Patients were assessed in the PACU by a dedicated anaesthetic nurse, and sent back to the ward with an Aldrete score of≥9. Discharged after meeting the discharge criteria of PADS≥9.All patients were followed up by a blinded evaluator on the second day after surgery through a questionnaire or a telephone form.

Results: The incidence of PONV in the PACU in the ciprofol group was 16.2% significantly lower than 51.4% in the control group (6 [16.2%] vs 19 [51.4%];OR=0.18; 95%CI,0.06-0.54, absolute risk reduction, 35.2%;P=0.003).

The occurrence frequency of emetic episodes in the ciprofol group was lower in the PACU(4[10.8%] vs 14 [37.8%]; OR=0.20;95%CI,0.06-0.68;P=0.013),The occurrence frequency of nausea in the ciprofol group was lower in the PACU (6 [16.2%] vs 19 [51.4%]; OR=0.18; 95%CI,0.06-0.54; P=0.003).The frequency of nausea or emetic episodes was similar in the 24 hours after surgery.There was no significant difference in anesthesia time, recovery time, remimazolam and alfentanil dosage between the two groups (P>0.05). There was no significant difference in safety outcomes between the two groups (P>0.05).

Hypotension occurred in 8 cases (21.6%) in the ciprofol group and 7 cases (18.9%) in the control group.Hypertension and tachycardia are uncommon.

In the prespecified subgroup analysis, there was no difference in the preventive effect between the

ciprofol group and the control group in the PONV risk subgroup,with a P value of 0.277 for the interaction.(1-2 vs 3-4,P=0.277).
Conclusion: Low-dose ciprofol can effectively prevent PONV in the PACU after gynecological day surgery under general anaesthesia in remimazolam combined with alfentanil, but cannot reduce the incidence of PONV within 24 hours after surgery.
1. Lu M, Liu J, Wu X, et al. Ciprofol: A Novel Alternative to Propofol in Clinical Intravenous Anesthesia?. Biomed Res Int. 2023;2023:7443226. Published 2023 Jan 19. doi:10.1155/2023/7443226
2. Liao J, Li M, Huang C, et al. Pharmacodynamics and Pharmacokinetics of HSK3486, a Novel 2,6-Disubstituted Phenol Derivative as a General Anesthetic. Front Pharmacol. 2022;13:830791. Published 2022 Feb 3. doi:10.3389/fphar.2022.830791
3. Xiao H, Liu M, Man Y, et al. Effect of low-dose propofol combined with dexamethasone on the prevention of postoperative nausea and vomiting in gynaecological day surgery under remimazolam-based general anesthesia. Medicine (Baltimore). 2023;102(10):e33249. doi:10.1097/MD.0000000000033249

PU-0491

Flow-mediated dilation facilitates radial artery cannulation in patients undergoing intravenous general anesthesia: a prospective randomized controlled trial

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Background: Flow-mediated dilation (FMD) is commonly used as a diagnostic tool to assess endothelial function, and compared with other methods for stimulating radial artery dilation, FMD offers several advantages such as non-invasiveness, ease of execution, minimal equipment requirements, and negligible risk. The study aimed to investigate the effect of FMD in facilitating radial arterial cannulation in the context of intravenous general anesthesia.
Methods: Eighty patients undergoing intravenous general anesthesia and requiring radial artery cannulation were randomized 1:1 to the FMD group and control group. Patients in the FMD group received an upper arm occlusion for 5 minutes after anesthesia induction, and the cuff was placed without inflation for the equivalent duration in the control group. The primary outcome was first-attempt success rate. Secondary outcomes were the diameter and percentage of dilation of radial artery, overall success rate, total number of attempts, cannulation time, and occurrence of procedure-related complications.
Results: Intravenous anesthetic agents significantly dilated the radial artery ($p < 0.05$), which was further increased by FMD. An increase in both the first-attempt and overall success rate of radial artery cannulation was demonstrated with the use of FMD (67.5% vs 42.5%, $p < 0.05$). The total number of attempts needed to cannulate the radial artery was reduced in the FMD group as compared with the control group ($p < 0.05$), but no differences in cannulation time and procedure-related complications were found between the two groups ($p > 0.05$).

PU-0492

The influence factors of bispectral index values increment caused by sugammadex administration during steady-state anesthesia: an observational cohort study

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Background: Sugammadex administration may increase the bispectral index (BIS) values during general anesthesia. The purpose of this study was to investigate the influence factors leading to BIS values increment caused by sugammadex administration when continuous use of general anesthetics.
Methods: One hundred and twenty-three patients undergoing elective surgery were included in this observational cohort study. After surgery was completed while the train-of-four ratio was zero, a steady-state intravenous anesthesia was maintained to keep a BIS value within the range of 40-60 for at least 5 minutes. Patients received sugammadex 2 mg.kg-1 after completed surgery. BIS values were recorded every minute and clinical signs of awaking was noted.
Results: As compared with that at the end of surgery, BIS value increased significantly at 5th min after sugammadex administration (44.9 ± 5.6 vs. 52.9 ± 11.9, P < 0.001). Further analysis showed that combined epidural and general anesthesia were associated with higher BIS values increment caused by sugammadex administration when compared with general anesthesia alone (50.5 ± 11.7 vs. 54.7 ± 11.8, P = 0.049). Moreover, there were no differences of BIS values increment caused by sugammadex administration between the elderly and non-elderly patients, or between male and female patients (P > 0.05). Compared with patients with BIS value increment < 5, those with BIS value increment ≥ 5 had lower intraoperative remifentanil concentration (1.85 ± 0.70 vs. 1.58 ± 0.71, P = 0.041), and higher BIS value immediately before sugammadex administration (43.4 ± 4.8 vs. 46.1 ± 6.0, P = 0.008).
Conclusions: This study confirmed that sugammadex administration is associated with increases in BIS value during a steady-state anesthesia maintenance. This BIS value increment may be related with epidural anesthesia and depth of anesthesia before sugammadex use. Gender and age seem not to influence the sugammadex-associated increase in BIS value.

PU-0493

Early Administration of Ketorolac After Cardiac Surgery and Postoperative Complications: Analysis of the MIMIC-IV Database

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Objective: Postoperative complications following cardiac surgery are a significant concern due to their potential to cause adverse outcomes, including increased mortality, prolonged ICU stays, and elevated healthcare costs. These complications often stem from inflammation, a common factor in the postoperative period. Ketorolac, a nonsteroidal anti-inflammatory drug (NSAID), functions as an anti-inflammatory agent by inhibiting cyclooxygenase (COX). Previous studies suggest that timely administration of ketorolac enhances the patency of cardiac grafts by suppressing endothelial cell proliferation. However, the safety and efficacy of postoperative ketorolac use remain controversial. This study aims to investigate the association between early administration of ketorolac and the incidence of complications following cardiac surgery, specifically coronary

artery bypass grafting (CABG) and valvular procedures.

Methods: This retrospective cohort study utilized data from the Medical Information Mart for Intensive Care-IV (MIMIC-IV) database, which includes ICU data from Beth Israel Deaconess Medical Center between 2008 and 2019. The study included adult patients (≥18 years) who underwent a single cardiac surgery (valve repair/replacement, CABG, or combined procedures) on their first ICU admission. Exclusion criteria included patients with incomplete covariate data. The primary outcome was a composite of postoperative complications, including mortality, pulmonary insufficiency, severe acute kidney injury (AKI), hemorrhage or hematoma, infection, cardiogenic shock, and cerebrovascular infarction. Propensity score matching (PSM; 1:1 match, caliper 0.2) was used to balance baseline characteristics between patients who received ketorolac within 48 hours post-surgery and those who did not. Statistical analyses included multivariate logistic regression, interaction stratification analysis, pairwise algorithmic, and overlap weight model analyses to assess the outcomes.

The initial dataset consisted of 7143 patients who underwent either valvular surgery or CABG. Propensity score matching was performed to balance covariates and minimize confounding factors, resulting in a matched cohort of 3270 individuals (1635 in the ketorolac group and 1635 in the control group). This method ensured that the comparison between the two groups was as fair and unbiased as possible. Various statistical methods, including multivariate logistic regression, were employed to analyze the data, ensuring robust and comprehensive evaluation of the outcomes.

Results: After applying inclusion and exclusion criteria, the study cohort comprised 7143 patients who underwent cardiac surgery. In the matched cohort, 3270 individuals were analyzed (1635 in the ketorolac group and 1635 in the control group). The overall rate of postoperative complications in the matched cohort was 8.1%. Patients who received ketorolac within 48 hours of surgery exhibited a lower rate of the composite outcome compared to those who did not receive ketorolac (PSM, OR 0.70 [95% CI, 0.54-0.90]). In the full cohort, after adjusting for covariates, early ketorolac administration was associated with lower odds of the composite outcome (OR 0.74 [95% CI, 0.58-0.93]; P = 0.012).

This association was consistent across various sensitivity analyses and subgroup analyses. Early postoperative ketorolac use was also associated with lower rates of 28-day all-cause mortality, pulmonary insufficiency, and hemorrhage or hematoma. Specifically, the odds of 28-day all-cause mortality were significantly reduced in the ketorolac group compared to the control group (OR 0.68 [95% CI, 0.50-0.93]). Similarly, the rates of pulmonary insufficiency (OR 0.72 [95% CI, 0.55-0.94]) and hemorrhage or hematoma (OR 0.65 [95% CI, 0.47-0.90]) were significantly lower in the ketorolac group. However, no significant differences were observed for severe AKI, infection, cardiogenic shock, and cerebrovascular infarction between the two groups, indicating that ketorolac's protective effects might be limited to specific complications.

Further analysis revealed that the timing of ketorolac administration played a crucial role in its effectiveness. Patients who received ketorolac within the first 24 hours post-surgery showed more pronounced benefits compared to those who received it between 24 to 48 hours. This suggests that early intervention with ketorolac can significantly impact the recovery trajectory of cardiac surgery patients. Additionally, the dose-response relationship indicated that moderate doses were associated with optimal outcomes, while very high doses did not confer additional benefits and may increase the risk of adverse effects.

Conclusion: The administration of ketorolac within 48 hours after CABG or valvular procedures in adult patients was independently associated with a lower incidence of postoperative adverse events. These findings suggest that early postoperative use of ketorolac may provide a protective effect against complications such as mortality, pulmonary insufficiency, and hemorrhage or hematoma. However, no significant benefits were observed for severe AKI, infection, cardiogenic shock, or cerebrovascular infarction. These results highlight the potential role of ketorolac in improving postoperative outcomes in cardiac surgery patients.

Given the retrospective nature of the study, causality cannot be definitively established. Therefore, prospective multicenter randomized controlled trials are needed to confirm these associations and further explore the mechanisms underlying the observed benefits of ketorolac. Additionally, while the study suggests a potential benefit of ketorolac in improving postoperative outcomes, careful consideration of patient-specific factors and potential adverse effects is essential in clinical

decision-making. The findings underscore the importance of individualized patient care and the need for further research to optimize postoperative management strategies in cardiac surgery patients.
Future research should also investigate the long-term effects of ketorolac use in this patient population, including its impact on quality of life and functional recovery. Moreover, exploring the molecular mechanisms through which ketorolac exerts its protective effects could provide valuable insights and potentially lead to the development of new therapeutic strategies. The integration of ketorolac into postoperative care protocols should be approached with caution, ensuring that the benefits outweigh the risks for each individual patient.
Overall, this study contributes to the growing body of evidence supporting the use of NSAIDs in the management of postoperative inflammation and its complications in cardiac surgery patients.

PU-0494

日间手术全身麻醉后发生过敏性结膜炎的罕见原因

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目的 全身麻醉后保护性反射的丧失增加了眼部损伤的各种风险。在此报道日间手术全身麻醉发生过敏性结膜炎的个案，呼吁麻醉医生术中应持续观察眼部情况并做好眼部的保护，以免造成恶劣后果。
方法 一名 70 岁的男性在全身麻醉下接受日间腹腔镜腹股沟疝修补术，该患者既往无眼部的异常。完成麻醉诱导后未观察到眼部情况的异常，随后用玻璃纸胶带遮住眼睛来预防角膜擦伤，平卧位下外科手术顺利完成，期间生命体征稳定。手术结束后发现双眼睑及结膜发红肿胀，待苏醒后主诉双眼瘙痒、畏光，可见胶冻样分泌物流出。
结果 最初考虑为对眼球的直接压迫导致的损伤，但手术时间短、仰卧位进行手术、麻醉面罩通气顺利、也无其它压迫眼球的创伤证据。后经眼科医生会诊后考虑过敏性结膜炎，但是难以确定过敏源。麻醉诱导的 5 分钟后生命体征平稳，没有出现全身过敏反应，无皮肤及呼吸道的症状，也无眼部情况的异常，药物过敏测试也排除了全身麻醉诱导的过敏反应，最后我们确定是玻璃纸胶带引起的局部过敏反应，予激素、抗组胺药治疗后好转，出院后 5 天症状完全消失。
结论 全身麻醉使用的眼睛保护性玻璃纸胶带可引起局部过敏反应，对术中眼睛的持续监测和保护必需引起重视，对于这类患者应采取新的保护措施。

PU-0495

椎管内阻滞穿刺后诱发马尾神经综合征 诊断出椎管内室管膜瘤 1 例

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目的 椎管内穿刺引发马尾神经综合征时应仔细排查原因、警惕椎管内肿瘤的存在。
方法 患者预行混合痔手术，右侧卧位下行硬膜外穿刺。常规消毒铺巾，L3,4 间隙局麻下硬膜外腔穿刺操作，依次穿过各韧带，穿刺深度达 5.5cm 时，落空明显，推注 1ml 生理盐水无阻力感，成功达硬膜外腔，置入硬膜外导管，置管深度 3cm，回抽未见血液及脑脊液，试推注约 1ml 生理盐水通畅。此时，病人主诉左脚趾麻木、置管时有大腿根部至脚踝触电感。嘱病人放松、翻身平卧观察，

2min 左右患者左腿逐渐丧失感觉及运动功能，急行硬膜外导管拔除、氢化可的松 200mg 滴注、急请脊柱外科及麻醉主任会诊，怀疑是否发生了脊髓神经损伤或急性严重硬膜外血肿。10min 左右出现右腿感觉丧失、运动功能障碍，会阴区痛觉消失。

结果 为明确相关诊断及排除硬膜外血肿等需紧急处理情况，急行腰椎间盘 MRI 示：①L2-4 水平椎管内占位性病变，建议 MRI 增强检查；②L4-5、L5/S1 椎间盘膨出；③腰椎退行性变；④L2-4 水平腰部皮下及棘突周围软组织水肿。给予生理盐水 100ml＋甲强龙 500mg 静滴，甘露醇 250m 静滴，甲钴胺片营养神经治疗。3 小时后患者下肢肌力及会阴区感觉、运动逐渐恢复至正常，能下床如厕。患者后期手术治疗椎管内占位，术后病理诊断为椎管室管膜瘤。

结论 引发马尾神经综合征的病因多种多样，椎管内穿刺时应高度关注并极力避免其发生，一旦发生应仔细排查原因、警惕椎管内肿瘤的存在。

PU-0496

Effect of opioid-free anesthesia combined with pectoral nerve block on the quality of recovery in patients after mastectomy: a randomized clinical tria

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Objective: Opioid-free anesthesia (OFA) was reported to be able to improve quality of recovery (QoR) after mastectomy. However, few study applied regional blocks. Regional blocks may compromise the benefits of OFA because of its ability to decrease opioid consumption and therefore opioid-related adverse events. The potential benefits of incorporating OFA into regional blocks warrant further investigation. In this work, we tested the effect of OFA in combination with regional blocks on quality of recovery using a randomized controlled design. We hypothesized that OFA combined with regional block would improve the global QoR-15 score at 24 hours postoperatively compared to opioid-based anesthesia (OBA).

Patients and Methods: This was a prospective, randomized, single-center controlled trial conducted at the Obstetrics and Gynecology Hospital of Fudan University, Shanghai, China, from June 2021 to February 2022. The study included 132 female patients aged 18–70 years with an American Society of Anesthesiologists (ASA) physical status of I-II who were scheduled for mastectomy under general anesthesia. Exclusion criteria included impaired kidney or liver function, body mass index (BMI) >35 kg/m2, allergy to study medication, pregnancy or lactation, chronic cardiovascular disease, chronic pain, history of abnormal anesthesia, preoperative use of opioids or psychotropic drugs, inability to understand the numerical rating scale (NRS), inability to use patient-controlled analgesia (PCA), and refusal to participate.

The study was approved by the hospital's ethical committee (approval number 2020-153) and registered at chictr.org (study ID: ChiCTR2100043575). Written informed consent was obtained from all participants. Patients were randomly assigned to either Group OFA or Group OBA in a 1:1 ratio using computer-generated randomization sequences concealed in sealed envelopes.

Anesthesia was induced with propofol (target-controlled infusion, TCI, Marsh mode, 6 μg/ml) and rocuronium (0.6 mg/kg) in both groups. In Group OFA, patients received dexmedetomidine (1 μg/kg over 10 min) for anxiolysis and hemodynamic stability, followed by a continuous infusion to maintain anesthesia depth (2–4 μg/ml effect site concentration). Group OBA patients received sufentanil (0.5 μg/kg) for analgesia. Anesthesia was maintained with a propofol infusion in both groups, adjusted to maintain bispectral index (BIS) values between 40 and 60. Muscle relaxation was sustained with additional rocuronium as needed.

All patients received an ultrasound-guided PECS block by an anesthesiologist blinded to group allocation. A total of 30 ml of 0.4% ropivacaine was administered: 10 ml in the interpectoral plane and 20 ml in the pectoserratus plane. The block was considered successful if there was a sensory

change in the distribution of T2-T6 dermatomes, assessed with a cold swab after a 30-minute observation period.
Postoperative pain management included a standardized multimodal analgesia regimen with parecoxib administered every 12 hours until hospital discharge and PCA pumps providing sufentanil boluses as needed. All patients received dexamethasone (5 mg) and palonosetron (0.075 mg) for PONV prophylaxis.
The primary outcome was the QoR-15 score at 24 hours postoperatively. Secondary outcomes included sufentanil consumption, NRS scores for pain at rest at 1, 4, and 24 hours post-surgery, and the incidence of PONV and other adverse events within the first 24 postoperative hours.
Statistics were performed with IBM SPSS 29.0 and GraphPad Prism 7.0 for Windows. An absolute standardized difference (ASD) was used to compare baseline characteristics. An ASD greater than 0.34 was considered imbalanced, as calculated by 17. The normality of continuous variables was evaluated using the Shapiro-Wilk test. Continuous variables are presented as the means ±SDs or medians with IQRs depending on whether they were normally distributed. Student's t-test was used for analysis of normally distributed variables and Mann–Whitney U-test was used for analysis of nonnormally distributed variables. QoR-15 score was not normally distributed but was reported using means ± SD because the value of MICD expressed as the means ± SD16. Repeated measures analysis of variance (ANOVA) was performed to compare variables at multiple time points between groups. Categorical variables are presented as numbers (%). χ2 tests were used to compare categorical variables. 95% CIs were estimated using the Hodges–Lehmann estimate. The median difference (MD) results are reported as Group OFA minus Group OBA. All P values were two-sided. A P value less than 0.05 was considered statistically significant. Bonferroni correction was used for analysis of the NRS scores, and statistical significance was adjusted to $P < 0.017$ for the NRS scores.
Results: The QoR-15 global score at 24 hours was not significantly different between Group OFA (126.9±10.3) and Group OBA (127.4±14.0), with a mean difference (MD) of -0.4 and 95% confidence interval (CI) from -3.8 to 4.7 (P=0.67). The postoperative sufentanil consumption within 24 hours in Group OFA was 0 (0 to 2) μg versus 2 (0 to 2) μg in Group OBA, with a median difference of 0 and 95% CI from -1.4 to 0 (P=0.15). The NRS scores at 1 hour post-surgery were 0 (0 to 0) in both groups, at 4 hours 0 (0 to 0) in both groups, and at 24 hours 0 (0 to 0) in Group OFA versus 0 (0 to 1) in Group OBA, with respective P values of 0.36, 0.66, and 0.02. The incidence of PONV was 0 (0) in Group OFA and 4 (5.9) in Group OBA, with an odds ratio (OR) of 0 and 95% CI from 0 to 1.0 (P=0.12). The incidence of adverse events was significantly lower in Group OFA with 0 (0) compared to 8 (11.8) in Group OBA, with an OR of 0 and 95% CI from 0 to 0.44 (P=0.0063).
Conclusion: OFA combined with PECS block did not significantly improve the QoR-15 scores or postoperative analgesia at 24 hours postoperatively. However, it was associated with a reduced incidence of adverse events, suggesting a potential advantage in terms of patient safety. The findings indicate that OFA could be a viable alternative to OBA for improving safety profiles in the anesthetic management of mastectomy patients.

PU-0497

布比卡因脂质体在 TAP 中应用对腹部大手术患者术后 30 天心血管并发症影响的一项随机对照实验研究方案

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目的 目的是评价布比卡因脂质体在 TAP 中应用对行腹部大手术患者术后 30d 心血管并发症发病率的影响，为围术期心血管并发症的防治提供新的循证依据.
方法 本次实验是一项随机、单盲、平行对照的前瞻性研究，招募在上海市第一人民医院择期行腹部大手术的病人（n=1528），并按年龄、性别和手术方式（开放或腹腔镜）1:1 随机分层。研究人

员对受试者在术前行 TAP 阻滞时给予干预措施（实验组：0.665%布比卡因脂质体两侧各 20ml，共 266mg；对照组：0.375%盐酸罗哌卡因两侧各 20ml，共 150mg）。在术后第 0、3、7、30d 由研究人员收集所有受试者术后心血管结局[9]的发生情况作为主要指标，同时收集生命体征、恢复质量、布比卡因脂质体不良反应、死亡事件作为次要指标，以评价其对术后 30d 心血管并发症发病率的影响。

结果 本篇稿件为一项随机对照实验的研究方案，暂无结果。

结论 本次实验是少有的研究布比卡因脂质体在 TAP 中应用对择期行腹部大手术患者术后 30d 心血管并发症影响的随机对照研究。大样本量及精准定义的心血管并发症结局是本次实验的重点。我们旨在观察受试者术前 TAP 阻滞中使用长效局麻药（布比卡因脂质体）对术后 30d 心血管并发症发病率的影响，研究的结局将会为围术期心血管并发症的防治提供新的循证依据.

PU-0498

右美托咪定联合罗哌卡因与单纯罗哌卡因行前锯肌平面阻滞对耳再造患儿术后恢复质量的比较

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目的 本研究拟观察 Dex 作为罗哌卡因佐剂行 SAPB 对自体肋软骨耳再造患儿术后恢复质量及术后镇痛效果的影响，以验证其有效性和安全性。

方法 本试验经伦理委员会审核通过，伦理号：ZX2022129，并在中国临床试验中心网站注册，注册号：ChiCTR2200060089。根据预实验结果，使用 PASS 15.0 计算出最小样本量为 72。本试验共纳入 87 例行自体肋软骨耳再造患儿，其中 3 例因符合排除标准被剔除，最后 84 例患儿被随机分为单纯罗哌卡因的 SAPB 组（R 组）和 Dex 联合罗哌卡因的 SAPB 组（DR 组），每组 42 例。主要观察指标为术后 24 h 和术后 48 h 的 15 项恢复质量评分（QoR-15）；次要观察指标为术后 2 h、4 h、8 h、12 h、24 h、36 h 和 48 h 时胸部静息、咳嗽状态（Numerical Rating Scale, NRS）评分，术后镇痛持续时间，术中麻醉药消耗量，术后 24 小时内镇痛泵消耗量，口服补救镇痛药的例数，首次下床活动时间，恶心呕吐（Nausea and vomiting, PONV）等阿片类相关副作用及 SAPB 相关副作用发生情况等。

结果 每组均有 2 例失访，最终每组 40 例完成整个研究。两组术前 1 天的 QoR-15 得分无统计学差异（134.63±7.45 vs 135.60±8.09，P>0.05），DR 组的术后 24 h 和术后 48 h 的 QoR-15 得分均显著大于 R 组（126.35±9.81 vs 115.53±8.58 和 131.78±8.67 vs 122.80±8.59，均 P<0.001）；DR 组术后 2 h、4 h、8 h、12h 和 24h 的胸部静息和咳嗽 NRS 评分均低于 R 组（均 P<0.05），而两组术后 36h 和 48 h 的胸部静息、咳嗽 NRS 评分差异无统计学意义（均 P>0.05）；DR 组的镇痛持续时间显著大于 R 组（17.83±2.11 h vs 10.55±2.08 h, P<0.001），首次下床活动时间显著小于 R 组（14.58±2.31 h vs 18.20±2.88 h, P<0.001）；DR 组的术中麻醉药消耗量、术后口服补救镇痛药的例数及 24 小时内镇痛泵消耗量均明显低于 R 组（均 P<0.05）；DR 组 PONV 等阿片类相关副作用发生率也显著低于 R 组（7.5% vs 25%, P<0.05）；两组均未发生 SAPB 相关并发症。

结论 Dex 联合罗哌卡因行 SAPB 用于自体肋软骨耳再造患儿是安全且有效的，不但能显著提高患儿的早期恢复质量，还能增强镇痛，延长镇痛时间，减少镇痛药的使用，降低阿片类相关副作用的发生率，是有益的干预措施。

PU-0499

强制性脊柱炎病人超声辅助定位下完成单次腰麻一例

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目的 介绍 1 例强直性脊柱炎病人行超声辅助下单次腰麻的经验
方法 55 岁 男性病人 1 例，拟行经尿道膀胱镜下钬激光碎石取石术，既往有强直性脊柱炎病史 ，目前腰椎骨质增生伴腰背部前屈、后伸困难;颈椎强直，成前屈位，后仰困难，头部转动受限。麻醉前用超声在腰椎旁正中长轴和腰椎横截面进行扫查，从而选择合适的穿刺路径; 扫超后发现在腰椎旁正中长轴在 L2/3 左侧椎板间隙存在；然后做腰椎横截面扫查，在 L2/3 椎间隙找到可穿刺路径，超声成像，前联合体左侧显影较清楚，预估穿刺路径偏棘突的左侧。在体表做好标记，此标记点位于脊柱中线左侧 1cm 处；开始椎管内麻醉前常规消毒铺巾，标记处注射局麻药并用 0.7X32mm 的针进行试探穿刺，首次穿刺采用垂直入路，针头未完全进入就碰到骨头；此时退到皮下，将针头向中线倾斜，大概 15°，穿刺针进入非常顺利，换 0.5X113mm 的腰麻针，按试探的路径穿刺，腰麻针非常顺利的到达蛛网膜下腔，脑脊液回流通畅。
结果 超声辅助定位后，在此患者的 L2 /3 椎板间隙存在可操作窗，腰麻顺利完成，术毕 1 周后出院，无麻醉相关并发症。
结论 强直性脊柱炎病人在行椎管内麻醉时，超声辅助定位腰麻能预先设计好穿刺路径，即使腰穿不能一次成功，也为调整进针方向提供有效指导，减少进针次数和穿刺针在皮下组织中方向调整次数，同时也降低因穿刺导致的异感和出血风险。

PU-0500

超声引导下腋路臂丛神经阻滞对肩关节镜术后患者细胞免疫功能的影响

陈磊、王翔锋、林芩
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目的 初步评估超声引导下腋路臂丛神经阻滞对肩关节镜术后患者细胞免疫功能的影响
方法 1.60 例接受在侧卧牵引位下行择期单侧肩关节镜手术患者为研究对象，随机分为 2 组（n=30）：全麻复合腋路臂丛神经组（NA 组）和单纯全麻组（GA 组）。2.两组患者采用同一种全麻诱导方案。全麻复合臂丛神经组于气管插管后，在超声引导下行术侧腋路臂丛神经阻滞（0．375％罗哌卡因 20 ml）；术中均使用丙泊酚、瑞芬太尼、顺阿曲库铵进行麻醉维持，并将 BIS 值维持在 45～55，术后连接静脉自控镇痛泵(PCIA)。分别于麻醉前和术后 48 小时抽取静脉血样。3.采用流式细胞仪检测 T 淋巴细胞亚群(CD3+、CD4+、CD8+)和 NK 细胞,并计算 CD4+/CD8+值；记录术中瑞芬太尼用量、术后 48 小时内静息状态疼痛评分（VAS 评分）、舒芬太尼的消耗量、恶心呕吐、头晕等不良反应发生率以及患者满意度评分。
结果 1.NA 组 CD3+T 淋巴细胞高于 GA 组[(51.8±4.2)%.VS.(50.3±4.1)%,P<0.05];NA 组 CD4+T 淋巴细胞高于 GA 组[(30.3±2.2)%.VS.(23.5±2.0)%,P<0.05];NA 组 CD8+T 淋巴细胞高于 GA 组[(23.9±1.9)%.VS.(20.2±1.8)%,P<0.05];NA 组 NK 细胞高于 GA 组[(10.8±1.6)%.VS.(10.2±1.1)%,P<0.05];NA 组 CD4+/CD8+ 比值高于 GA 组[(1.2±0.2).VS.(1.1±0.1),P<0.05]。超声引导下肌间沟入路臂丛神经阻滞肩关节镜术后患者的 T 淋巴细胞亚群(CD3+、CD4+、CD8+)和 NK 细胞明显高于单纯全麻患者；2.NA 组术中瑞芬太尼用量为(0.05±0.01)μg/(kg·min),低于 GA 组(0.08±0.02)μg/(kg·min)；3.与 GA 组比较,NA 组患者术后 24 小时内静息状态疼痛评分降低,舒芬太尼消耗量减少,术后恶心呕吐发生率降低,患者满意度评分提高。

结论 超声引导下腋路臂丛神经阻滞对该类患者术后的细胞免疫功能有保护作用，减少了患者术中阿片类药物的使用剂量，同时减少了术后疼痛、恶心呕吐等不良反应,有利于患者术后康复和转归。

PU-0501

超声引导下腰方肌外侧路阻滞联合前路阻滞对骨盆肿瘤切除重建术后患者镇痛效果及术后康复情况的影响

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目的 评价超声引导下腰方肌外侧路阻滞联合前路阻滞对骨盆肿瘤切除重建术后患者镇痛效果及术后康复情况的影响。
方法 选择 2023 年 3 月至 2024 年 3 月择期行骨盆肿瘤切除重建的术患者 56 例（骨盆肿瘤 I 区-III 区），男 30 例，女 26 例，年龄 35～64 岁，BMI21～29 kg /m2 ，ASA I 或Ⅱ级。采用随机数字表法将患者随机分为两组:腰方肌阻滞组(Q 组)和单纯静脉自控镇痛(PCIA)组(R 组)，每组 28 例。所有患者静脉全麻用药方案一致。麻醉诱导前，Q 组患者在超声引导下予 0.3%罗哌卡因行患侧腰方肌外侧路+前路阻滞各 20ml，同时联合 PCIA 作为术后镇痛；R 组则采用单纯 PCIA 作为对照。记录两组患者术后 24、48 h 内镇痛泵按压次数和术后首次使用镇痛泵的时间；采用视觉模拟量表（VAS）记录术后 4、6、12、24 和 48 h 静息和被动屈膝时 VAS 疼痛评分及术后 48h 内静息时 VAS 疼痛评分大于 4 分时的补救镇痛情况。同时记录术后首次肛门排气时间、手术患侧股四头肌肌力情况、48h 内恶心呕吐、呼吸抑制和术后谵妄等不良反应发生情况，记录患者对术后镇痛的满意度。
结果 术后 24、48 h Q 组镇痛泵按压次数和 48 内镇痛补救例数明显少于 R 组(P＜0. 05) ；Q 组患者术后首次使用镇痛泵的时间明显晚于 R 组（P<0.05）；术后 4、6、12、24 和 48h Q 组静息和被动屈膝时 VAS 疼痛评分明显低于 R 组(P＜0. 05) ；术后 48h 内 Q 组恶心呕吐发生率明显低于 R 组(P＜0. 05) ；两组均未发生呼吸抑制和术后谵妄；Q 组术后镇痛的满意度评分明显高于 R 组(P＜0. 05) 。
结论 超声引导腰方肌外侧路阻滞联合前路阻滞可以减轻患者骨盆肿瘤切除重建术后疼痛，满足患者术后镇痛需要，减少阿片类药物的使用，减少术后不良反应，提高患者满意率。

PU-0502

刻舟亦可求剑---超声定位成人型脊髓型肌萎缩鞘内注药穿刺体会

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目的 提高脊髓型肌萎缩患者的穿刺成功率
方法 采用超声定位复合脊柱三维成像，记录穿刺影像形成个体化档案。
结果 2022.1 月开展以来统计 156 人次穿刺注药，成功 124 人次，失败 2 人次，显著提高了成功率和穿刺效率
结论 超声定位复合三维成像，形成穿刺的个体化档案，可提高 SMA 患者的成功率，减轻患者痛苦，增加治疗信心。

PU-0503

从人类文明发展看区域阻滞技术过去、现在和未来

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目的 一、人类文明发展简史和对疼痛的认知

人类社会发展最早期的原始社会可能长达二三百万年，这一阶段人类学会了使用工具和用火。工具的使用提高了原始的生产效率，用火解决了取暖、照明、烹饪食物和驱赶野兽等问题，大大提高了原始人类的生产效率和生活质量。从奴隶社会到封建社会只用了几千年，这一阶段农业快速发展，解决了粮食供应问题。人类发明了文字，之后数学、天文学、医学、宗教和哲学得到了快速的发展，初步形成了人类社会文明体系。从封建社会到现代文明社会，如果以蒸汽机出现作为工业文明诞生的标志，那不过就是两百多年，这一阶段科学技术得到了突飞猛进式的发展。工业革命又分四个阶段：机械化，电气化，信息化和智能化。第一次工业革命发源于 18 世纪 60 年代的英国，其标志是蒸汽机作为动力机被广泛使用，进而推动了机器对手工劳动以及工厂制造对手工工场的替代，因而这一时期被称为蒸汽机时代。第二次工业革命发源于 19 世纪 70 年代的德国和美国，其标志是发电机取代蒸汽机成为新的动力能源，进而推动电器对机器的替代以及电讯事业的发展，因而这一时期被称为电气化时代。第三次工业革命发源于 20 世纪 50 年代的美国，其标志是原子能和电子计算机的发明和使用，进而引发了生产工艺的自动化以及信息技术的革命，因而这一时期被称为信息化时代。第四次工业革命发源于 21 世纪之交的德国和美国等，其标志是互联网和物联网对资源的整合和使用，进而导致产业和工厂的智能化以及商业模式的变革，因而这一时期也可以被称为智能化时代。

方法 二、人类为消除疼痛的早期努力

人类为消除疼痛做过许多的努力，这些工作也呈现出明显的积累性、创新性、渐进性和进步性。古埃及人使用各种镇痛药，如莨菪碱、罂粟、啤酒、杜松和酵母等来治疗疾病和“体内的疼痛”。埃及陵墓上大约公约前 1350 年刻画着古埃及人“吸”啤酒缓解疼痛。之后人们进行过很多能让躯体感觉变迟钝的尝试，包括冷冻和神经压迫等，其中有些已无法考证，但这些方法大多效果有限。

结果 三、区域阻滞技术呈现出加速发展的局面

自从可卡因的发现和应用于局部麻醉后，周围神经阻滞技术呈现出加速发展的局面。1884 年，William Halsted(1852-1922)第一个将可卡因应用于外周神经阻滞进行拔牙手术，从而获得了外周区域的“conduction（传导）”麻醉效果。下颌神经是他最先阻断的神经。Halsted 和 Hall 还对他们自己和医学生“志愿者”进行了各种各样的外周神经阻滞。但后来 William Halsted 不幸染上了可卡因成瘾。

1898 年，August Bier 在给动物、他自己和助手(August Hildebrandt)的椎管注射可卡因溶液，实施了第一次脊髓麻醉。Bier 在 1899 年写的一篇手稿中描述了对 6 名病人和一名同事实施脊髓麻醉的过程。首先，Bier 用鞘内可卡因对他的同事 Hildebrandt 进行了脊髓麻醉。Bier 随后对 Hildebrandt 进行了一系列疼痛的操作，包括在他的大腿上做一个小的皮肤切口，在他的腿上放上燃烧的雪茄，用铁锤在他的小腿上用力敲打，而 Hildebrandt 却没有任何明显的疼痛感。

结论 四、超声引导区域阻滞技术的出现和目前国内发展状况

超声引导区域阻滞技术也呈现出加速发展的局面。文献最早报道超声用于定位神经阻滞是在 1978 年，la Grange P 等利用多普勒超声定位锁骨上动脉实施锁骨上臂丛阻滞。1994 年 Stephan Kapral 等在 Anesthesia & Analgesia 杂志上首次报道了现代意义上的超声定位神经阻滞（锁骨上臂丛阻滞）。短短 30 余年，超声引导区域阻滞技术在包括中国在内的世界范围内广泛开展。几乎所有传统的区域阻滞技术都能在超声引导下实施。根据解剖学特点，超声引导下全新的阻滞技术层出不穷。超声引导区域阻滞技术大大提高了神经阻滞的安全性和效果，得到临床医师的青睐。

五、未来科技赋能超声引导区域阻滞技术高质量发展

2024 年 1 月 18 日发布的《工业和信息化部等七部门关于推动未来产业创新发展的实施意见》中指出：“大力发展未来产业，是引领科技进步、带动产业升级、培育新质生产力的战略选择”。大力发展未来科技，聚焦未来健康也是麻醉学科未来的努力方向。

PU-0504

The analgesic effect of ultrasound-guided erector spinae plane block in median sternotomy cardiac surgery in adults: A systematic review and meta-analysis of randomized controlled trials

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Objectives: Postoperative pain is an important problem after median sternotomy heart surgery. Inadequate management of acute postoperative pain may elevate the risk of pulmonary complications (e.g., atelectasis, pneumonia), cardiac complications (e.g., infarction, arrhythmias), prolong mechanical ventilation (MV) time, and potentially result in long-term chronic pain like sternotomy pain syndrome. High-dose opioids have traditionally been the mainstay for cardiac anesthesia and analgesia. Nevertheless, these drugs may come with unwanted side effects, such as respiratory depression, postoperative nausea and vomiting (PONV), and delirium.

Peripheral nerve block of the chest wall has become an integral part of multimodal analgesia in Enhanced Recovery After Cardiac Surgery (ERACS). Currently, there is no recommended nerve block. The erector spinae plane block (ESPB) is a procedure that entails injection local anesthetic (LA) into the fascial plane between the erector spinae muscle and the transverse process. Two systematic reviews and meta-analyses have investigated the analgesic effectiveness of ESPB in cardiac surgery; however, the conclusions were inconsistent. In response to these contradictions, we reviewed the literature to re-evaluate the analgesic efficacy of ESPB after median sternotomy cardiac surgery. At the same time, we aim to promote the application of ESPB in ERACS through our research.

Methods: The study has been registered in the International Prospective Register of Systematic Reviews (CRD42023470375). The Cochrane, Embase, and PubMed databases from inception to January 2024 were searched. The following criteria were used: (1) Participants: adult patients (≥18 years) undergoing median sternotomy cardiac surgery. (2) Interventions: ESPB was used for perioperative analgesia. (3) Control: no block or sham block. (4) Outcomes: The primary outcome included pain scores immediately after extubation, at 6 hours, 12 hours, and 24 hours post-extubation, as well as analgesic consumption at 24 hours after surgery. Studies reporting either of the primary outcomes will be included. (5) Design: Randomized controlled trials (RCTs) in English. Exclusion criteria included: (1) non-human trials or pediatric surgery; (2) cardiac surgery with non-median sternotomy; (3) retrospective studies, observational studies, and reviews; (4) duplicate publications; (5) inability to access full-text literature after contacting the author or the document delivery specialist; (6) non-English literature. Two authors independently conducted data extraction. We used Review Manager (Version 5.3) for data analysis. To represent the continuous variables, we utilized the mean difference (MD) along with a 95% confidence interval (CI). The Mantel-Haenszel (M-H) method was used to calculate the relative risk (RR) and 95% (CI) for binary variables. To assess the level of heterogeneity among the studies, we used Cochran's Q-statistic and I2 statistics. We employed a random-effects model when studies exhibited high statistical heterogeneity ($P \leq 0.1$, $I^2 > 50\%$). Otherwise, a fixed-effects model was used for the calculation. In addition, we conducted sensitivity analyses that included only a single injection to confirm the robustness of the results. We used the Cochrane bias risk assessment tool to evaluate the methodological quality of the included studies. The quality of the pooled results was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) criteria. When more than 10 studies are included, we use funnel plots and Egger's test to assess publication bias. $P < 0.05$ indicates a significant publication bias.

Results: Eight studies were included in the meta-analysis. ESPB reduced pain scores immediately, at 6 hours, and 12 hours after extubation (mean difference [MD], -1.19 [95% confidence interval (CI), -1.67 to -0.71], P for heterogeneity = 0.10; MD, -1.96 [95% CI, -2.85 to -1.08], P for

heterogeneity < 0.0001; MD, -0.98 [95% CI, -1.55 to -0.40], P for heterogeneity < 0.00001; relatively). The reduction in pain scores reached the minimal clinically important difference (MCID) within 6 hours. There was no difference in pain scores 24 hours after extubation (MD = -0.34, 95% CI -1.19 to 0.51, I2 = 94%, P for heterogeneity < 0.00001). Opioid consumption 24 hours after surgery decreased by 35.72 mg of oral morphine equivalents (OME) (95% CI, -50.88 to -20.57, P for heterogeneity < 0.0001). The time to first rescue analgesia was 503.14 ± 523.26 minutes in the ESPB group, while it was 223.07 ± 433.51 minutes in the control group. The ESPB extended the time for the first rescue analgesia by 292.80 minutes compared to the control group (95% CI 214.64 to 370.97, I2 = 81%, P for heterogeneity = 0.0003). The ESPB group consumed an average of 68.06 ± 27.89 mg of OME during surgery, while the control group consumed an average of 136.17 ± 42.90 mg of OME. ESPB led to a decrease of 60.57 mg of OME compared to the control group (95% CI -115.73 to -5.41, I2 = 100%, P for heterogeneity < 0.00001) during surgery. The duration of MV in the ESPB group was 118.51 ± 123.78 minutes, while in the control group it was 218.28 ± 199.04 minutes. ESPB reduced MV time by 83.39 minutes compared to the control group (95% CI -115.44 to -51.34, I2 = 95%, P for heterogeneity < 0.00001). There was no significant difference in intensive care unit length of stay and PONV (MD, -7.16 [95% CI -19.22 to 4.89]; RR, 0.74 [95% CI 0.13 to 4.32]; respectively). Sensitivity analysis confirmed the reliability of all outcomes except for intraoperative analgesic consumption (MD, -66.20 [95% CI -148.77 to 16.38]). Seven out of the eight studies on participant and personnel blinding were at high risk. According to the GRADE grading system, the pain score 0 minutes after extubation was assessed to be of moderate quality, the pain score 6 hours after extubation was assessed to be of low quality, and the other primary outcomes were assessed to be of very low quality. We did not assess the risk of publication bias because there were fewer than 10 included studies.

Conclusions: Ultrasound-guided ESPB reduced pain scores within 12 hours after extubation, reached the MCID within 6 hours, and decreased analgesic consumption 24 hours after median sternotomy cardiac surgery. At the same time, ESPB extended the time to the first rescue analgesic and shortened the duration of MV. ESPB is likely to be a good choice as part of multimodal analgesia in ERACS for cardiac surgery. However, high-quality RCTs are necessary to validate these findings.

PU-0505

The effect of erector spinae plane block on opioid dosage during off-pump coronary artery bypass grafting via sternotomy: a randomized controlled trial

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Background: The study investigated if ESPB can replace some opioids in off-pump coronary artery bypass grafting via sternotomy.

Methods: In this randomized controlled trial, 38 adult patients were randomly randomized to either the ESPB group or the sham block group in a 1:1 ratio. The primary outcome was the amount of sufentanil given during surgery.

Results: Thirty-seven patients were finally included. The ESPB group required considerably less sufentanil during surgery than the sham group (150.3 ± 36.1 μg vs. 194.4 ± 38.3 μg, MD = -44.2; 95% CI, -69.0 to -19.4; P = 0.001). Patients in the ESPB group did not require sufentanil due to increased heart rate and blood pressure, while five patients in the sham block group required it (OR = 1.39, 95% CI 1.04 to 1.84; P = 0.02). Pain scores at rest and during coughing within 12 hours after extubation were lower in the ESPB group compared to the sham block group (all P < 0.001). The ESPB group had fewer patients requiring rescue analgesia after surgery and had a shorter duration of mechanical ventilation. (P = 0.041, P = 0.005, respectively). The length of stay, as well

as safety outcomes, were similar between the two groups. There was no significant difference in the changes of IL-1β, IL-6, and TNF-α (P = 0.193, P= 0.177, P = 0.673, respectively) between two groups.
Conclusions: Preoperative ESPB effectively reduced the use of opioids during off-pump CABG in the midline sternotomy. In addition, ESPB provided more stable hemodynamics during surgery, reduced pain at 12 hours after tracheal extubation, shortened the duration of mechanical ventilation, and did not increase postoperative adverse events and inflammatory responses. ESPB has the potential to provide a safe and effective anesthetic management strategy for off -pump CABG with median sternotomy.

PU-0506

超声引导下双侧阴部神经阻滞对全麻经阴道盆底重建术后导尿管相关膀胱刺激征的预防效果

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目的 探讨超声引导下双侧阴部神经阻滞对全麻经阴道盆底重建患者术后导尿管相关膀胱刺激征的预防效果，为优化该类患者围术期管理提供临床参考。
方法 择期全麻下行经阴道盆底重建术的患者 130 例，ASA II 级，年龄 50~80 岁，BMI18~30kg/m2。采用随机数字表法分为两组（n=65）:阴部神经阻滞组（PNB 组）和对照组（CON 组）。PNB 组于麻醉诱导前在超声引导下行臀后路坐骨棘平面双侧阴部神经阻滞（每侧 0.25%罗哌卡因 15ml，共 30ml），阻滞完成 20min 后评估会阴区域阻滞效果，如有麻木感或痛觉减退则认为阻滞有效，纳入研究，否则剔除该病例。CON 组不做任何处理。两组均行喉罩全麻，麻醉诱导药物为丙泊酚靶控输注（TCI）2.5-3.5ug/ml、咪达唑仑 1-2mg、舒芬太尼 0.3-0.4ug/kg、顺式阿曲库铵 0.1-0.15mg/kg，术中采用全凭静脉麻醉维持，维持药物为丙泊酚 TCI 2.5-3.5ug/ml、瑞芬太尼 TCI 1.5-2.5ng/ml。术毕前 5min 停止输注麻醉药物，术毕麻醉未醒时留置导尿管（14F），麻醉苏醒自主呼吸恢复后拔除喉罩，拔管后送麻醉复苏室（PACU）进一步复苏，术后采用患者自控静脉镇痛泵（PCIA）镇痛。记录两组患者术后 CRBD 发生率；拔管后即刻（T1）、拔管后 30min（T2）、4h（T3）、8h（T4）、12h（T5）和 24h（T6）各时段 CRBD 等级和 VAS 评分；术后 24 小时镇痛泵舒芬太尼消耗量及氟比洛芬酯补救镇痛情况；术后恶心、呕吐、头晕、呼吸抑制、神经阻滞等不良反应发生率。
结果 PNB 组和 CON 组术后 CRBD 发生率分别为 44.44%和 79.69%，差异有统计学意义（P＜0.001）。PNB 组和 CON 组 CRBD 等级和 VAS 评分比较，T1-T5 各时段前者明显低于后者，差异有统计学意义（P＜0.05）；T6 时段两组之间无统计学差异（P＞0.05）。与 CON 组比较，PNB 组术后 24 小时舒芬太尼消耗量及氟比洛芬酯补救镇痛均减少，差异有统计学意义（P＜0.05）。与 CON 组比较，PNB 组术后恶心、呕吐、头晕等不良反应发生率无统计学差异（P＞0.05），但有降低趋势。两组均无患者发生呼吸抑制。PNB 组共有 4 例患者发生单侧坐骨神经阻滞，均在术后 12 小时内恢复正常。
结论 超声引导下双侧阴部神经阻滞对全麻经阴道盆底重建患者术后导尿管相关膀胱刺激征具有一定缓解作用，可降低术后 12 小时内 CRBD 的发生率和严重程度。

PU-0507

超声引导下竖脊肌平面阻滞对腹腔镜妇科手术的手术条件和术后恢复的影响

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目的 探讨与单纯中度神经肌肉阻滞(moderate neuromuscular block, MNMB)相比，竖脊肌平面阻滞(erector Spinae Plane block, ESPB)联合 MNMB 是否能优化腹腔镜妇科手术伴淋巴结切除术的手术条件。
方法 选取本院拟行腹腔镜妇科手术伴淋巴结切除术的患者 42 例，年龄 18～55 岁，ASA 分级Ⅰ-Ⅱ级，采用随机数字表法将患者分为 2 组(n =21)：ESPB 联合 MNMB 组（E-M 组）和 MNMB 组（M 组）。E-M 组在术前行超声引导下双侧 ESPB（在 T12、L2 水平左右四点分别注射 0.5%罗哌卡因 10 ml）。术中罗库溴铵以 0.3 mg/(kg*h)的速率泵注，使用肌松检测仪监测并保持 4 个成串刺激(train-of-four, TOF)值在 1~3 之间，根据 TOF 值和外科医生需要进行肌松补救；每隔 15 min 用五分手术评定量表（surgical rating scale，SRS）评估手术条件，该量表范围为 1（极差条件）至 5（最佳条件）。术后行患者自控静脉镇痛，当 VAS 评分>3 时，静脉注射羟考酮或给与双氯芬酸钠栓剂 50 mg 补救镇痛。记录良好或最佳评分（SRS ≥ 4）的频率，术中每隔 15 分钟 SRS 评分和术后对气腹建立后 0.5、1h 的视频的 SRS 评分；记录术中罗库溴铵补救次数、罗库溴铵用量；记录术后 1、6、24h 静息及咳嗽时 VAS 评分及吗啡用量、补救性镇痛次数及不良反应。
结果 本研究发现 E-M 组良好或最佳 SRS 评分的频率显著高于 M 组（20/20 vs. 12/20，P = 0.002）。E-M 组外科医生要求追加肌松药的频率显著低于 M 组（2/20 vs. 8/20，P = 0.028）。术后 1、24h 静息、咳嗽时 VAS 评分差异有统计学意义(P < 0.001)，两组术后 6h 咳嗽时 VAS 评分差异无统计学意义。术后 6 h、24 h，E-M 组吗啡消耗量显著低于 M 组(P < 0.001，P < 0.001)，差异有统计学意义。
结论 研究结果表明，ESPB 与 MNMB 结合不仅可以提高 SRS ≥4 评分的比例改善手术条件，还可以减少腹腔镜妇科手术中罗库溴铵的用量。此外，在术后 24h 内可提供良好镇痛，有助于促进患者术后恢复和提高舒适度。

PU-0508

弓状韧带上腰方肌阻滞与肋缘下腹横肌平面阻滞对腹腔镜结直肠癌根治患者术后镇痛及肺功能的影响

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目的 探讨超声引导下双侧弓状韧带上腰方肌阻滞(anterior quadratus lumborum block at the lateral supra-arcuate ligament，QLB-LSAL)与双侧肋缘下腹横肌平面阻滞(subcostal transversus abdominis plane block,，STAPB)对腹腔镜结直肠癌根治患者术后镇痛及肺功能的影响。
方法 选择 2022 年 10 月至 2024 年 3 月择期全麻下行腹腔镜结直肠癌根治术患者 70 例，年龄 40～80 岁，BMI 18.5～27.9kg/m²，ASAⅠ～Ⅲ级，采用随机数字表法将患者分为两组：QLB-LSAL 组和 STAPB 组，每组 35 例。麻醉诱导气管插管后，QLB-LSAL 组在超声引导下行双侧弓状韧带上腰方肌阻滞，STAPB 组在超声引导下行双侧肋缘下腹横肌平面阻滞，两组每侧均给予 0.375%罗哌卡因 20 ml。两组患者术后均采用静脉自控镇痛，设置相同的镇痛配方（布托啡诺 0.1mg/kg+酮咯酸

氨丁三醇 3mg/kg+托烷司琼 0.1mg/kg+0.9%生理盐水至 200ml 镇痛泵）及参数（背景剂量为 2ml/h，单次剂量为 2ml/次，锁定时间 10min，极限剂量 14ml/h）。记录麻醉诱导前 10min（T0）、手术开始前 10min（T1），手术开始时（T2）、开腹取标本时（T3）、腹腔冲洗时（T4）、手术结束时（T5）、出手术室时（T6）的有创平均血压（mean arterial pressure，MAP）及心率（heart rate，HR）；记录术后 1h、6h、12h、24h、48h 及 72h 静息及咳嗽时的视觉模拟评分法（visual analogue score，VAS）评分；记录术中环泊酚用量、瑞芬太尼用量、镇痛泵首次按压时间、镇痛泵有效按压次数及补救镇痛次数；记录术前 1 d、术后 1 d、2d、3 d 的用力肺活量（FVC）、第 1 秒用力呼气容积（FEV1）、最大中期呼气流量(MMEF)；记录首次肛门排气时间、首次下床活动时间、术后 ICU 住院时间、总住院时间，术后 3d 不良反应及肺部并发症发生情况。

结果 与 STAPB 组比较，QLB-LSAL 组在 T3~T6 时 MAP 及 HR 更低（P＜0.05），术后 1h、6h、12h、24h 及 48h 静息及咳嗽时 VAS 评分更低（P＜ 0.05），术中环泊酚用量、瑞芬太尼用量、镇痛泵有效按压次数及补救镇痛次数更少，镇痛泵首次按压时间更短，术后 1~3d 的 FVC、FEV1 及 MMEF 更高（P＜0.05），首次肛门排气时间、首次下床时间、术后 ICU 住院时间及总住院时间更短，术后不良反应及肺部并发症更少（P＜0.05）。

结论 弓状韧带上腰方肌阻滞较肋缘下腹横肌平面阻滞可为腹腔镜结直肠癌根治术患者提供更好的围术期镇痛，有助于改善术后肺功能，降低不良反应及肺部并发症，加速术后恢复。

PU-0509

前锯肌平面阻滞联合改良胸骨旁阻滞与单独前锯肌平面阻滞对自体肋软骨隆鼻患者术后镇痛效果的比较

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目的 比较超声引导下前锯肌平面阻滞（SAPB）联合改良胸骨旁阻滞（PSB）和单纯 SAPB 对自体肋软骨隆鼻患者的术后镇痛效果，为自体肋软骨隆鼻患者提供更好的镇痛方案。

方法 64 例接受自体肋软骨隆鼻的患者，年龄 18-60 岁，随机分为 SAPB+PSB 组或 SAPB 组。SAPB 组患者仅接受 SAPB（0.375%罗哌卡因注射液 25 mL），SAPB+PSB 组患者接受 SAPB（0.375%罗哌卡因注射液 25 mL）和 PSB（0.375%罗哌卡因 15mL）。所有患者均使用静脉自控镇痛泵（PCIA），PCIA 泵的配方统一。所有患者均由同一名护士进行随访，该护士对患者的分组情况不知情。主要观察指标为术后 2 h、4 h、8 h、12 h、24 h 和 48 h 的供区（胸部）静息和咳嗽 NRS 疼痛评分。当 NRS 评分≥4 时，要求患者按压 PCIA 泵，若镇痛效果仍不满意，口服一片氨酚羟考酮（5mg），6 h 后根据患者的需求再追加。次要观察指标为术中麻醉药的消耗量，术后 2 h、4 h、8 h、12 h、24 h 和 48 h 的受区（鼻子）的 NRS 疼痛评分，术后 24 h 内 PCIA 泵的消耗量，口服补救镇痛药的使用情况，患者满意度的 Likert 评分（范围 1 ~ 5 分：1 表示非常不满意，2 表示不满意，3 表示一般，4 表示满意，5 表示非常满意），阿片类药物相关副作用及神经阻滞相关并发症的发生率。

结果 共 60 例，每组 30 例患者完成了本研究。与 SAPB 组相比，SAPB+PSB 组术后 2 h、4 h、8 h 和 12 h 的胸部静息和咳嗽 NRS 评分均显著降低（均 P < 0.05）。然而，两组术后 24 h 和 48 h 的胸部静息和咳嗽 NRS 评分，差异无统计学意义(均 P > 0.05)。与 SAPB 组相比，SAPB+PSB 组的术后 2 h、4 h、8 h 和 12 h 的鼻部 NRS 评分均明显降低（均 P < 0.05），而两组术后 24 h 和 48 h 的鼻部 NRS 评分无显著统计学差异(均 P > 0.05)；与 SAPB 组相比，SAPB+PSB 组术中异丙酚和瑞芬太尼的消耗量均显著减少（1196.67 ± 122.43 mg vs 1361.67 ± 139.39 mg 和 2.54 ± 0.35 mg vs 2.91 ± 0.31 mg，均 P < 0.001）；SAPB+PSB 组和 SAPB 组分别有 3 例和 10 例患者使用口服补救镇痛药（10.0% vs 33.3%，P= 0.028），其中 SAPB 组有 2 例患者使用口服补救镇痛药超过 1 次；与 SAPB 组相比，SAPB+PSB 组术后 24 h 内 PCIA 泵消耗量显著降低（54.67 ± 2.72 mL

vs 61.83 ± 4.50 mL, P < 0.001），阿片类药物相关副作用发生率显著降低（6.67% vs 26.67%，P = 0.038），患者满意度显著提高[5 (4，5) vs 4 (3，5)，P < 0.001]；两组均未发生神经阻滞相关并发症。

结论 超声引导下 SAPB 联合改良 PSB 在减轻隆鼻患者肋软骨采取后的疼痛方面优于单独的 SAPB。同时，联合阻滞还减少了术中、术后镇痛药的用量，降低了阿片类药物相关副作用的发生率，提高了患者满意度。

PU-0510

肋软骨采取前后行超声引导下前锯肌平面阻滞对于外耳再造术患儿术后镇痛效果的对比研究

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目的 外耳再造术是整形外科手术常见的术式之一，外耳轮廓的构建主要来自于自体肋软骨的采取。肋软骨采取导致的疼痛是该类术式患儿疼痛的主要来源。该类术式患儿的术后疼痛可导致严重的不良肺部并发症。麻醉医生一直努力寻找一种有效的镇痛方法。本研究通过肋软骨采取前后行超声引导下前锯肌平面阻滞对外耳再造患儿术后镇痛效果进行对比观察研究。

方法 本研究选取中国医学科学院整形外科医院 2022 年 3 月~2022 年 5 月择期行自体肋软骨移植外耳再造手术患儿 60 例，纳入标准：（1）ASA 分级 I 级 5～12 岁小儿；（2）采取 3 根（第 6、7、8 肋）软骨患儿；（3）获得患儿监护人的知情同意并签字； 排除标准：（1）采取少于 3 根肋软骨患儿；（2）手术前一个月内服用影响血压和心率药物的小儿；（3）长期服用阿片类药物或有阿片类药物过敏史的小儿；（4）精神异常、自闭症及其他难以交流沟通的患儿。这些患儿被随机分配到 SAPB-pre 组（术前超声引导下前锯肌平面阻滞组；n=30）或 SAPB-post 组（术后超声引导下前锯肌平面阻滞组；n=30）。使用数字评分量表（NRS）评估术后疼痛，主要观察指标记录术后 1 小时、6 小时、12 小时、24 小时、48 小时患儿的静息、咳嗽状态的疼痛数字评分。次要观察指标包括术后 24 小时内舒芬太尼消耗量、辅助口服镇痛药次数、镇痛持续时间（手术结束至 NRS 评分第一次≥4 分的时间）、首次下床活动时间。并发症情况：恶心呕吐、皮肤瘙痒、呼吸抑制的发生情况；肋间神经阻滞相关并发症的发生情况。

结果 两组患儿的性别、年龄、体质指数（BMI）、手术时间、肋软骨长度均无显著性差异（P>0.05）。与 SAPB-post 组相比，SAPB-pre 组术后 6 小时和 12 小时的静息和咳嗽的 NRS 评分显著较低（p<0.01）。SAPB-pre 组术后 24 小时使用的舒芬太尼明显低于 SAPB-post 组（p<0.01）。SAPB-pre 组的拔管时间和镇痛持续时间显著短于 SAPB-post 组（p<0.01）。术后 24 小时离床时间和补偿性镇痛药消耗量在 SAPB-pre 组明显低于 SAPB-post 组（p<0.05）。最常见的术后并发症是 PONV（术后恶心、呕吐），在 SAPB-post 组中更为频繁，但差异不显著（16.7% vs. 33.3%；P = 0.136）；两组均无与阻滞相关的并发症。

结论 研究结果表明，超声引导下前锯肌平面阻滞可以作为耳廓重建术后镇痛的有效治疗方法。SAPB-pre 组的镇痛效果优于 SAPB-post 组。这在一定程度上证明了超前镇痛的概念是有效且可行的。

PU-0511

胸膜横突中点阻滞在乳腺癌根治术中的安全性及有效性

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目的 探究胸膜横突中点阻滞在乳腺癌根治术中的安全性及有效性
方法 本实验通过前瞻性随机对照研究，纳入安徽医科大学附属巢湖医院行乳腺癌手术患者 70 例，年龄 37-76（57.5±10.1）岁，BMI 为 18-30（22.9±2.1）kg/m²，左侧 30 例，右侧 40 例，按随机数字表法将患者分为 M 组和 C 组，各 35 例，M 组在麻醉诱导后给予胸膜横突中间点阻滞（MTP），C 组作为对照组。主要观察指标为围术期加入的阿片类镇痛药量，次要观察指标为 1.术后 1、2、4、12、24h 数字分级法（NRS 评分）2.术后镇痛药物的使用情况 3.术后不良反应（恶心、呕吐、头晕、寒战、气胸、血肿、全脊麻）。
结果 与常规麻醉方案（C 组）比较，MTP 阻滞组（M 组）在术中瑞芬太尼及丙泊酚用量更低，差异有统计学意义(Pa＜0.05)；两组在手术时间比较差异无统计学意义(P＞0.05)；与常规麻醉方案比较，MTP 阻滞组患者术后 1h、2h 和 4h 的 VAS 评分更低，差异有统计学意义(Pa＜0.05)；两组术后 12h、24h 的 VAS 评分比较差异无统计学意义（P＞0.05）；与常规麻醉方案比较，MTP 阻滞组患者术后 1h、2h 和 4h 的 VAS 评分更低，差异有统计学意义(Pa＜0.05)；两组术后 12h、24h 的 VAS 评分比较差异无统计学意义；与常规麻醉方案（C 组）相比，MTP 阻滞的患者在术后发生恶心、呕吐、头晕的概率更小，差异有统计学意义(Pa＜0.05)。
结论 相较于常规全身麻醉方法，超声引导下胸膜横突中点阻滞可以有效减少乳腺癌改良根治术患者术中的阿片类镇痛药的用量，同时在术后镇痛效果更好，且术后不良反应的发生率更低。

PU-0512

利用肺超声评估病态肥胖患者围手术麻醉期肺功能变化的研究

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目的 评估肺超声在肥胖患者围手术麻醉期检测肺部变化的可行性与有效性，考查围手术麻醉期肺超声评分与肥胖患者肺部变化关联性，并探讨预警术后肺部并发症的可能性。
方法 选取 2022 年 12 月至 2024 年 1 月在我院全身麻醉下行腹腔镜胃袖状切除术的肥胖患者 157 例，年龄 18-45 岁，BMI 30-55kg/m2。根据性别和 BMI 将患者分为四组，GM 组：普通肥胖（BMI＜40 kg/㎡）男性；MM 组：病态肥胖（BMI≥40 kg/㎡）男性；GF 组：普通肥胖（BMI＜40 kg/㎡）女性；MF 组：病态肥胖（BMI≥40 kg/㎡）女性。四组均使用相同麻醉诱导维持方法。所有入选患者分别进行 2 次肺部超声检查：术前前一天（T1）、术后拔管后 15 分钟（T2），将超声影像结果通过改良肺超声评分标准量化肺部变化：出现 A 线或≤2 条孤立的 B 线者为正常（0 分）；≥ 3 条 B 线者为中度通气不良（1 分）；B 线融合提示中度通气不良（2 分）；大面积肺实变（3 分）。记录患者一般资料、两次 LUS 评分、围术期生命体征指标，收集术前、术后动脉血气分析结果、术后 PACU 停留时间、术后并发症发生情况及住院时间等。
结果 1.女性患者的术前、术后 LUS 评分，MF 组均明显高于 GF 组（ P＜0.05），男性患者有相同的趋势，但差异无统计学意义（P＞0.05）。2.不同肥胖程度男性和女性患者组内，术后 LUS 评分均明显高于术前（P＜0.05）。3.四组患者 PaCO2、术后肺部并发症发生趋势与 LUS 评分变化趋势相同，有一定相关性（P＜0.05）。
结论 本研究结果显示，肺部超声检查用于肥胖患者围术期肺部变化是可行且有效的。减重术后男

女患者均发生了不同程度的肺超声评分改变，并与术后肺功能变化呈正相关。肺超声评分可以提示肥胖患者减重术后肺部相关并发症的发生。

PU-0513

末梢灌注指数预测单侧膝关节镜半月板手术中股神经阻滞效果的临床研究

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目的 探讨末梢灌注指数（Perfusion index, PI）是否可以用于股神经阻滞效果的评估。
方法 本研究是一项前瞻性、队列研究。纳入 2023 年 6 月-2024 年 6 月于我院收治的 70 例膝关节半月板损伤的患者，ASA 分级 1-2 级，择期在全麻复合股神经阻滞麻醉下行单侧膝关节镜半月板手术。符合纳入标准的患者在超声引导下行股神经阻滞（0.25%罗哌卡因 20ml）。股神经阻滞完成后，在阻滞侧与非阻滞侧分别监测大脚趾 PI 值，间隔 2 分钟，持续 20 分钟，并在股神经阻滞前获取双侧大脚趾 PI 基线值。同时，在相同时间点分别监测阻滞侧肢体感觉、运动阻滞程度。构建 ROC 曲线，确定阻滞侧 PI 变化的灵敏度和特异性。使用具有最大约登指数（灵敏度+特异性-1）的 ROC 曲线确定最佳截止值。
结果 在股神经阻滞后 6 分钟，阻滞侧的 PI 值开始增加（P＜0.01），而非阻滞侧 PI 值差异无明显变化（P＞0.05）。阻滞后 6 分钟 ROC 曲线下面积（AUROC）为 0.992（ 95% CI 0.982 至 1.000 ），敏感度 98.3%，特异性 91.7%，截止值为 1.67。感觉阻滞评估：33 例患者（55%）在阻滞后 16 分钟观察到完全阻滞，58 例患者（96.7%）在阻滞后 20 分钟观察到完全阻滞。运动阻滞评估：28 例患者（38.3%）在阻滞后 18 分钟观察到完全阻滞，43 例患者（71.6%）在阻滞后 20 分钟观察到完全阻滞。
结论 PI 是一种灵敏、简便的方法，可以为早期股神经阻滞成功的评估提供有效和客观的依据。

PU-0514

布比卡因脂质体用于竖脊肌平面阻滞对胸腔镜肺切除术后恢复质量的影响

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目的 探讨布比卡因脂质体用于竖脊肌平面阻滞对胸腔镜肺切除术后恢复质量的影响。
方法 本研究纳入了 2023 年 7 月至 2024 年 1 月在苏州大学附属第一医院择期行胸腔镜肺切除术患者 128 例。利用随机数字表法将患者分为布比卡因脂质体组（实验组）和盐酸布比卡因组（对照组），每组 64 例。所有患者均在麻醉诱导后行超声引导下竖脊肌平面阻滞，观察组注入布比卡因脂质体 20ml（266mg）+生理盐水 10ml，对照组注入盐酸布比卡因 20ml（100mg）+生理盐水 10ml。本研究的主要研究指标为术后 24h 的恢复质量-15 量表（QoR-15）评分。次要研究指标包括术后 3d 的 QoR-15 评分、术后各时间点静息和运动状态的数字评价量表（NRS）评分、术后患者首次镇痛泵按压时间和术后 3 天内的阿片药物消耗量。其他指标包括下床活动时间、胸管留置时间、住院时间、出院时满意度评分及住院期间不良反应发生情况。
结果 实验组患者术后 24h 和 3d 的 QoR-15 评分均高于对照组（P<0.05）；实验组患者在术后 12h、24h、2d、3d 时静息及运动状态的 NRS 评分更低（P<0.05），首次镇痛泵按压时间更晚以及术后

3d 内阿片类药物消耗量更少（P<0.05）；实验组患者下床活动时间更早、出院时的满意度评分更高（P<0.05）；两组患者的胸管留置时间、住院时间以及住院期间不良反应发生率差异无统计学意义（P>0.05）。
结论 在胸腔镜肺切除手术中，竖脊肌平面阻滞中应用布比卡因脂质体能显著提高患者术后的恢复质量，提供更持久的镇痛效应，加速患者术后康复。

PU-0515

超声引导下区域麻醉的文献计量学和知识图谱分析

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目的 通过文献计量分析，全面了解可视化区域阻滞领域的研究动态，揭示重点科研成果和突破性发现，为今后的研究方向提供有价值的参考和指导。利用 Web of Science，我们检索了与超声引导区域麻醉学（1994-2022 年）相关的文献。CiteSpace 和 VOSviewer 用于文献计量和知识图谱分析。研究包括公共趋势、作者模式、机构贡献、频繁出现的关键词、关键词聚类和新兴术语趋势。在审查的 570 篇论文中，每年的出版物都有上升趋势。区域麻醉的主要关键词是超声引导、神经、镇痛和疼痛评分。主要研究领域是区域麻醉、超声引导、方法、疼痛评分和平面阻滞。
方法 超声引导下的区域麻醉广泛应用于手术和疼痛管理，近年来发展迅速。鉴于其在便利性、可见性和安全性方面的优势，有大量文献专门介绍超声引导区域麻醉。 为了有效地利用和分析这些相关数据，从而调查该领域的发展前景，确定关键研究重点，并解决现有的局限性，本研究采用了 CiteSpace 和 VOSviewer 软件对 1994 年以来超声引导区域麻醉领域的相关文献进行文献计量分析，如 Web of Science 索引所示。通过文献计量分析，我们旨在深入洞察该领域的科学研究和临床实践，推动知识的进一步发展，推动医学领域的进步和创新。 本研究选择 Web of Science 作为文献检索平台，并选择 Web of Science 的核心馆藏数据库。为实现超声引导下区域麻醉的深入研究与分析，选取 2 名研究者下载数据，导出并保存收录文献的基本信息（包括作者、出版机构、出版数量、关键词、文章标题、来源期刊名称、参考文献等）。采用可视化分析软件对研究课题、热点、作者、机构、关键词共现及聚类分析、涌现词等信息进行分析。
结果 所有有效数据均在 Web of Science 核心集合中收集，并导入到 Microsoft Excel2016、VOSviewer1.6.10 和 CiteSpace6.1.R2 中进行可视化分析。对所有纳入文献的时间分布进行统计分析，得到超声引导下区域麻醉研究相关文献的发表时间分布。
结论 根据纳入文献发表文章数量统计，超声引导下区域麻醉的文献最早出现在 1994 年，2006 年以前，年文章数基本稳定，2007 年后呈现快速增长。总的来说，近年来，超声指导下的区域麻醉领域的相关研究逐年增加，该领域的研究也逐渐受到越来越多学者的关注。根据主题词检索到的 570 篇参考文献共被引用 9,953 次，不包括自引的参考文献为 8,901 次，平均每篇论文被引用 18 次。引用频率高的文献主要发表于 2007 年以后。该标题发表于 2018 年，名为“超声引导的腹横肌平面阻滞：腹腔镜下新技术的描述以及与常规全身镇痛的比较 参考文献”胆囊切除术“被引用最频繁（258 次），平均每年 18.43 次。本文主要探讨超声引导下区域麻醉的效果和前景。

PU-0516

超声辅助定位改良旁正中入路在老年髋部骨折患者蛛网膜下腔麻醉中的应用

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目的 探讨超声辅助定位改良旁正中入路技术用于老年髋部骨折蛛网膜下腔麻醉是否优于传统旁正中入路
方法 选择拟在蛛网膜下腔麻醉下行髋部骨折手术的患者，性别不限，年龄≥65 岁，BMI 18~30 kg/m2，ASA I-III 级。采用随机数字表法将患者分为两组：超声辅助定位传统旁正中入路组（C 组）和超声辅助定位改良旁正中入路组（M组），每组58例。C组采用超声辅助定位传统旁正中入路，M 组采用超声辅助定位改良旁正中入路。记录两组患者穿刺过程各项指标（穿刺次数、一次穿刺成功率、穿刺点数量、超声定位时间、穿刺时间、总时间、穿刺间隙、布比卡因剂量、麻醉平面、患者满意度）; 两组患者穿刺困难程度评估和超声图像质量（PSO 和 TM 切面超声图像质量）;两组患者操作中及术后 24 h 内不良反应。
结果 与 C 组比较，M 组穿刺次数明显降低，一次穿刺成功率明显升高，穿刺时间和总时间明显缩短，患者满意度明显升高（P＜0.05＝，PSO 切面超声图像质量比 TM 切面更佳。
结论 超声辅助定位改良旁正中入路技术在老年髋部骨折患者蛛网膜下腔麻醉中是安全有效的，可明显降低穿刺次数、穿刺时间及总时间，提高一次穿刺成功率及患者满意度。

PU-0517

超声引导下冈上肌深部平面阻滞对关节镜肩袖损伤修复术镇痛效果的影响

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目的 探讨超声引导下冈上肌深部平面阻滞（DSMPB）对关节镜肩袖损伤修复术镇痛效果的影响
方法 选取择期在全麻下行关节镜肩袖损伤修复术的患者 76 例，男 29 例，女 47 例，年龄 20 ～ 70 岁，BMI 18 ～ 29 kg/m2，ASAⅠ或Ⅱ级。随机分为冈上肌深部平面阻滞组（D 组）和肩胛上神经阻滞组（S 组），每组 38 例。D 组和 S 组患者于全麻前分别接受超声引导下 DSMPB 和 SNB，术后均按需使用静脉自控镇痛泵（PCIA 泵）。记录入手术室后（T0）、麻醉诱导后（T1）、切皮后 5 min（T2）、手术结束时（T3）以及拔管后 10 min（T4）的 SBP、DBP 和 HR。记录术后 1、2、4、8 和 24 h 静息状态下 VAS 疼痛评分。记录神经阻滞操作时间、术中丙泊酚使用量、瑞芬太尼使用量、麻醉苏醒时间、术后 48 h 内补救镇痛使用率及术后 48 h 内总不良反应发生率。
结果 两组患者在 T0～T4 时 SBP、DBP 和 HR 差异无统计学意义。两组术后各时间点静息状态下 VAS 疼痛评分差异无统计学意义。D 组阻滞操作时间明显短于 S 组（P<0.05）。两组术中丙泊酚使用量、瑞芬太尼使用量、麻醉苏醒时间、术后 48 h 补救镇痛使用率以及术后 48 h 内总不良反应发生率差异无统计学意义。
结论 超声引导下 DSMPB 在全麻下关节镜肩袖损伤修复患者围术期镇痛效果和安全性方面不劣于 SNB，且其操作更为简单。

PU-0518

Application of bedside ultrasound-guided central vein in the perioperative setting in critically ill patients with tuberculosis

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Objective: To observe the safety and value of bedside ultrasound-guided deep vein puncture in selecting the site of critical tuberculosis patients.
Methods: From May 2023 to May 2024, 150 cases of ultrasound-guided deep vein puncture in our hospital were selected, and 2 cases of cervical lymphadenopathy were excluded. Inclusion criteria: pre-anaesthesia assessment of the need for blood transfusion and surgical trauma in patients with excessive blood loss, hemorrhagic shock. Exclusion criteria: Patients with infection at the puncture site and bleeding tendency that is difficult to correct.According to the operation site, it was divided into internal jugular vein group, subclavian group and axillary vein group. According to standard practice for emergency ultrasound. The blood vessel was punctured by the short-axis positioning method, and the arteriovenous was marked by ultrasonic spectrum. During puncture, the needle insertion point was observed and the translational probe was used to find the needle tip. The ultrasound image needle tip was completely extracted into the venous vessel and inserted into the guide wire, and the guide wire was inserted into the vein.The first puncture success rate, total success rate, complications and postoperative comfort of the three groups were compared.
Results: There was no significant difference in age, sex and body mass index among the three groups. Ultrasound-guided puncture of deep vein was successful in all three groups, the success rate of one puncture in the axillary vein group, the internal jugular vein group and the subclavian bone group were 95.8%, 93.8% and 84.3%, respectively. The success rate of one puncture in the axillary vein group was higher in the three groups, and the difference between the groups was statistically significant ($P < 0.05$). The first puncture was completed in the internal jugular vein group, and the difference was statistically significant ($P < 0.05$). The patient satisfaction in subclavian group was higher than that in axillary vein group, and the internal jugular vein was the lowest, and the catheter in axillary vein group was blocked.
Conclusion: Bedside ultrasound-guided deep vein puncture improves the efficiency and safety, and the puncture time of internal jugular vein group is short, which is beneficial to the perioperative treatment of critical tuberculosis patients. When internal jugular vein cannot be punctured, axillary vein can be used instead.

PU-0519

Assessing the Impact of General Anesthesia and Bronchial Intubation in Conjunction with Thoracic Paravertebral Nerve Block on Cellular Immunity and Surgical Management in Tuberculous Pyothorax Patients

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Objective: This study aims to investigate the impact of combining general anesthesia with bronchial intubation and thoracic paravertebral nerve block during surgery for patients with tuberculous pyothorax.

Methods: Eighty patients diagnosed with tuberculous pyothorax, admitted to the hospital between January 2023 and September 2023, were randomly selected for this study. The patients were divided into control and study groups using a numerical table method. The control group underwent general anesthesia with bronchial intubation, while the study group received general anesthesia with bronchial intubation in conjunction with thoracic paravertebral nerve block. Subsequently, the patients were monitored to assess mean arterial pressure, heart rate variations, and adverse reactions to anesthesia.
Results: The study group exhibited significantly lower mean arterial pressure and heart rate levels during the post-surgical incision, immediate end of surgery, and immediate extubation periods compared to the control group ($P < 0.05$). Furthermore, the Ricker and Ramsay scores in the study group were significantly lower than those in the control group ($P < 0.05$).
Conclusion: The combined use of general anesthesia via bronchial intubation and thoracic paravertebral nerve block has been found to stabilize mean arterial pressure and heart rate while providing effective sedation for surgical treatment in patients with tuberculous septic thorax.

PU-0520

Clinical Effects of Ultrasound-Guided Modified Sacral Canal Block Combined with Shallow General Anesthesia in Pediatric Abdominal and Perineal Surgery

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Objective: This study aims to investigate the impact of ultrasound-guided modified sacral canal block combined with shallow general anesthesia on pediatric patients undergoing abdominal and perineal surgeries.
Methods: Sixty pediatric patients scheduled for abdominal and perineal surgeries at Fushun County People's Hospital between December 2021 and October 2022 were included in this randomized controlled trial. Patients were randomly assigned to either the experimental group (ultrasound-guided modified sacral canal block combined with shallow general anesthesia) or the control group (simple general anesthesia), with 30 patients in each group. The following parameters were compared between the two groups:
1. Hemodynamic Changes: Recorded during anesthesia induction and throughout the procedure.
2. Postoperative Pain Scores: Assessed using FLACC (Face, Legs, Activity, Cry, Consolability) and CRIES (Cry, Requires oxygen, Increased vital signs, Expression, Sleeplessness) pain scales at 48 hours post-surgery.
3. Recovery Parameters: Including extubation time, time to eye opening, time to orientation recovery.
4. Intraoperative Medication Usage: Specifically opioid and muscle relaxant consumption.
5. Adverse Reactions: Such as nausea, vomiting, and fever during anesthesia recovery.
6. Additional Analgesic Use: Required within 48 hours post-surgery.
7. Incidence of Postoperative Complications: Including vomiting and fever.
Results: Compared to the control group, patients in the experimental group undergoing ultrasound-guided modified sacral block with shallow general anesthesia showed: More stable hemodynamics during anesthesia recovery ($P<0.05$). Significant reductions in FLACC and CRIES pain scores at various postoperative intervals ($P<0.05$). Shorter extubation times, quicker recovery of eye opening and orientation ($P<0.05$). Reduced intraoperative opioid and muscle relaxant consumption. Lower incidence of adverse reactions during recovery and decreased need for additional analgesics postoperatively. However, there were no significant differences in postoperative vomiting and fever between the groups.
Conclusion: Ultrasound-guided modified sacral block combined with shallow general anesthesia appears to offer significant clinical advantages over conventional approaches in pediatric

abdominal and perineal surgeries, as evidenced by improved hemodynamic stability, enhanced pain management, and faster recovery parameters. These findings suggest potential benefits for optimizing perioperative care in pediatric surgical settings.

PU-0521

弓状韧带上腰方肌前侧阻滞对腹腔镜手术患者术后恢复质量的影响

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目的 观察超声引导下弓状韧带上腰方肌前侧阻滞（SA-AQLB）与腹横肌平面阻滞（TAPB）对腹腔镜手术患者术后恢复质量以及镇痛效果的影响。
方法 选择择期全麻下行腹腔镜手术的患者 107 例，男 59 例，女 48 例，年龄 18-80 岁，BMI 18-28 kg/m2，ASA Ⅰ-Ⅲ级，预计手术时长＞3h。采用随机数字表法将患者分为两组：SA-AQLB 镇痛组（S 组，n=53）和 TAPB 镇痛组（T 组，n=54）。术后两组患者在超声引导下每侧予 0.25 %罗哌卡因复合 4 mg 地塞米松共 30 ml 实施相应的神经阻滞进行术后镇痛，且两组术后均联合患者静脉自控镇痛（PCIA）。记录术前 1 d、术后 24、48 h 的 QoR-15 量表评分。记录术后 1、3、6、12、24、48 h 静息和活动时 NRS 疼痛评分，术后 24 h 舒芬太尼的等效消耗量，术后 48 h PCIA 首次按压时间、有效按压次数、补救性镇痛次数以及不良反应的发生情况。记录术后首次下床活动时间及住院时间。
结果 S 组患者术后 24、48 h QoR-15 量表评分明显高于 T 组（P＜0.05），S 组患者术后 48 h 活动时 NRS 疼痛评分低于 T 组（P＜0.05）；与 T 组比较，S 组患者术后 24 h 舒芬太尼的等效消耗量、有效按压次数、补救镇痛率明显减低（P＜0.05）；S 组患者术后首次下床活动时间以及术后住院时间明显短于 T 组（P＜0.05）。两组患者术后 1、3、6、12、24 h 静息和活动时以及术后 48 h 静息时 NRS 疼痛评分差异无统计学意义，两组患者术后镇痛泵首次按压时间、不良反应发生率差异无统计学意义。
结论 与 TAPB 比较，SA-AQLB 可提高腹腔镜手术患者术后早期恢复质量，减少术后镇痛药物用量，提供良好的镇痛效果。

PU-0522

超声引导下腰方肌阻滞对后腹腔镜肾脏手术术后镇痛的影响

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目的 通过比较超声引导下腰方肌阻滞（Quadratus lumborum block，QLB）复合全身麻醉与单纯全身麻醉在后腹腔镜肾脏手术中的应用效果，来探讨其对后腹腔镜肾脏手术患者术后镇痛的影响。
方法 选择择期于全身麻醉下行后腹腔镜单侧肾脏手术的患者共 60 例，年龄 30-70 岁且 18.5kg/m2≤BMI≤24.0kg/m2，性别不限，ASA 分级 I~II 级。该研究通过通过伦理委员会批准且获得患者的知情同意。将研究对象随机分为两组，每组 30 例：实验组（A 组）在全麻诱导后采用 0.5%罗哌卡因 30 mL 经超声引导下行后入路腰方肌阻滞，对照组（B 组）在全麻诱导后不做处理为单纯全麻。记录围术期患者的生命体征、麻醉药物用量、手术时间及苏醒时间，于术后 6（T1）、8（T2）、12（T3）、24（T4）四个时间点记录并比较患者静息及咳嗽状态下的疼痛视觉模拟评分（visual analogue scale,VAS），记录术后镇痛补救药物用量及静脉自控镇痛泵（PCIA）按压次数、

两组患者术后不良反应发生率及患者术后住院时间。
数据分析采用 SPSS 26.0 统计分析软件，计量资料若服从正态分布，则数据采用均数±标准差(`x±s)来表示；若数据不服从正态分布，则数据采用中位数和四分位数表示；组间比较采用 t 检验或重复测量设计的方差分析；计数资料以率表示，采用 c2 检验，以 P＜0.05 为差异有统计学意义。
结果 两组患者的一般情况包括：性别、年龄、BMI、ASA 分级以及手术所用时长进行比较，差异无统计学意义（P＞0.05）。A 组患者麻醉药物用量及麻醉苏醒时间明显少于 B 组（P < 0.05）；A 组患者在术后 T1、T2、T3、T4 时刻静息及咳嗽状态下的 VAS 评分明显低于 B 组（P＜0.05）；A 组患者镇痛泵按压次数及补救药物的用量均少于 B 组（P < 0.05）； A 组与 B 组相比，术后住院时间明显缩短（P＜0.05）。两组患者术后不良事件及并发症，包括术后苏醒延迟、恶心呕吐、呼吸抑制等无统计学差异（P＞0.05）。
结论 超声引导下腰方肌阻滞复合全身麻醉可安全应用于后腹腔镜肾脏手术，在后腹腔镜肾脏手术中的镇痛效果确切，有效减少了围术期麻醉药物的使用量，患者苏醒迅速，术后疼痛轻，且大大缩短了患者的住院时间，可以提高患者的就医体验，值得在临床上进行推广。

PU-0523

布比卡因脂质体在术后镇痛中的研究综述

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目的 在围术期疼痛管理中，阿片类药物一直扮演者很重要的角色，但因其带来大量的并发症诸如便秘、成瘾和恶心呕吐等使人望而却步。布比卡因是一种起效快、作用强的长效局麻药，常用于硬膜外麻醉，浸润麻醉和神经阻滞，但是有较大的心脏毒性，且在椎管内麻醉时对运动和感觉都有影响。布比卡因脂质体将局部麻醉药封装在多泡脂质体中，理论上可以在长达 72 小时的时间内源源不断地输出药物，维持血药浓度稳态。现主要将该药物应用于骨科手术，妇科手术，结直肠外科手术和胸科手术中，因其能提供超长的术后镇痛和良好的安全性，并在许多研究中得以验证，但考虑到其镇痛强度和许多其他影响患者满意度的指标还不是十分明确，并且该药物在不同的麻醉方式中的效果也没有客观的衡量指标。因此，有必要进一步对布比卡因脂质体做详细的研究。
方法 本文先从布比卡因脂质体的构成、药效动力学特性和药代动力学特性做分析，简述了其是通过何种方式发挥长效作用，以及相比于其他常用局麻药的不同点和优势。接着对国内外布比卡因脂质体用在常用的局部麻醉方式中做了简述，从局部浸润麻醉、硬膜外麻醉和周围神经阻滞三种类型展开分析，分析了该药物在上述麻醉或术后镇痛方式中的优效性和安全性。然后对该药物用于不同种类手术中的应用实例和效果评价进行讨论，分别从骨科中的关节手术、妇科中的子宫附件手术、结直肠外科的结直肠癌和痔疮手术以及胸外科中的肺部和食管手术进行了镇痛强度以及术后并发症的分析。最后，分析了布比卡因脂质体在围术期镇痛中的优势以及挑战
结果 本文通过对既往高质量文献进行系统综述，发现布比卡因脂质体非劣效于临床上常用的局麻药，并能提供长效、持续的镇痛，能够确切的减少术后疼痛，进而减少全身不良反应。但由于其特殊的药理学特性，在不同的局麻方式中还有待于做更进一步研究来探寻其作用规律以及可行的配伍佐剂。
结论 在加速康复外科理念和多模式阵痛管理的指导下，布比卡因脂质体在国内外如火如荼的使用着。除了布比卡因脂质体，在国外还有盐酸布比卡因海绵植入剂和布比卡因凝胶溶液以及布比卡因与美洛昔康的合剂，他们也能起到长效镇痛的作用。现在临床上的研究都很难评定他们是否真的是有利于患者还是在布比卡因的基础上原地踏步。下一步需要针对该药物进行扩大样本量的相关研究，并且进行更为严密的研究设计。至于能否满足临床需求，还需要更多的循证医学证据支持。

PU-0524

水垫填充改善超声引导平面内穿刺针显影质量

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目的 设计了一种简单的方法，利用水垫填充在超声探头和软组织之间，改变超声探头和超声波束的角度，使得超声波束与穿刺针更加垂直，改善穿刺针的成像质量。
方法 所有的穿刺都是由一位经验丰富的麻醉医生实施。使用华声便携式超声线阵探头。
第一阶段：靶点模拟。以猪肉模拟人体软组织。猪肉内插入粗针头（18G，38mm）模拟血管/神经作为穿刺靶点：靶点 A 的位置较浅，远离操作者；靶点 B 的位置较深，靠近操作者；设计两个靶点的位置是为了为后续穿刺时形成不同进针角度（图 1）。
第二阶段：常规穿刺。先进行常规穿刺。超声获取良好的图像后，确认两个靶点的位置。分别对两个靶点进行穿刺。先对靶点 A 进行穿刺，调整穿刺针的角度，尽可能获取完整的穿刺针影像。后退穿刺针，调整角度对靶点 B 进行穿刺，尽可能获取完整的穿刺针影像。
第三阶段：水垫填充。保持穿刺针不动，制作水垫填充。外科手套注入适量水，结扎手套口制作成水垫（图 2）。将水垫填充在猪肉和超声探头之间（图 3）。倾斜探头，保持水垫始终填满探头和猪肉之间的空隙。调整探头的角度，再次获取完整的穿刺针影像。
结果 在第一阶段，获取了软组织和两个靶点清晰的超声影像（图 4）。
在第二阶段常规穿刺时，对于靶点 A，穿刺针与软组织之间的角度较小，穿刺路径较为平直；穿刺针显示十分清晰（图 5）。对于靶点 B，穿刺针与软组织之间的角度较大，穿刺路径较为陡峭；穿刺针显示不清晰（图 6）。
在第三阶段水垫填充后，超声探头与软组织之间可以看到水垫形成的三角形液性暗区；轻微调整探头的角度，可以看到穿刺针影像清晰（图 7）。
结论 使用水垫填充，能明显改善超声引导平面内技术穿刺针显影质量，该方法简单易行、经济实惠。但是还需要进一步的研究来证明其在活体人体组织中的有效性。

PU-0525

超声引导下骶管阻滞最新进展

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目的 本文对超声下骶管阻滞在临床上的应用情况、实施方式及用药情况进行系统性的总结和归纳，以期为后续研究提供参考，为进一步将超声下骶管阻滞应用于临床。
方法 用超声进行骶管阻滞
结果 超声下骶管阻滞成功率高
结论 超声应作为骶管阻滞的首选

PU-0526

OSTAP 联合 PCIA 对开放性肝切除术后镇痛和早期康复的影响：一项前瞻、随机、单中心的研究

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目的 开放性肝切除术是一种与术后急性剧烈疼痛相关的手术。术后疼痛是影响患者快速康复的因素之一，也是临床工作者需要关注并紧急处理的问题。在加速康复外科（Enhanced Recovery After Surgery, ERAS）时代，以区域阻滞联合非甾体类药物为基础的现代多模式镇痛策略正成为围术期疼痛治疗的关键。斜肋下腹横肌平面阻滞（Oblique Subcostal Transversus Abdominis Plane block, OSTAP）是一项较新颖的筋膜间阻滞技术，作为多模式镇痛中的一环，此项技术也得到了术后专科化疼痛管理（Procedure-Specific Pain Management, PROSPECT）的认可，但孰好孰坏，仍然缺乏 ERAS 框架下高质量的随机对照试验（Randomized Controlled Trials, RCTs）研究的循证医学证据。因此，本研究拟将术前 OSTAP 阻滞与术后 PCIA 相结合，探讨此种超前、分阶段的多模式镇痛方案在 ERAS 背景下对开放性肝切除患者术后镇痛和早期康复的影响。
方法 本研究是一项单中心、前瞻性、随机对照临床研究。选择 2023 年 7 月至 2024 年 3 月期间在中山大学附属第一医院接受开放性肝切除手术的患者作为研究对象。通过随机数表法进行随机分组，一组为接受 OSTAP 联合 PCIA（OSTAP+PCIA 组），另一组为单纯 PCIA（PCIA 组）。主要观察指标为术后平均疼痛视觉模拟评分（Visual Analogue Scale , VAS)，次要观察指标包括术后 6h、24h、48h 和 72h 时的静息和运动状态下的 VAS 评分，阿片类药物消耗量，入室、切皮后 5min、拉 C 钩后 5min 及缝皮时的生命体征参数，首次自控镇痛时间，镇痛不全发生率，不良反应发生率，首次下床活动时间，排气时间，进食时间和拔尿管时间，肝肾功能指标，术后住院时长与费用等。
结果 本研究最终对 74 例患者的数据进行统计学分析。在镇痛质量方面，无论是静息状态还是运动状态下，OSTAP+PCIA 组的平均 VAS 评分均低于 PCIA 组，差异具有统计学意义（P<0.05）。另外，OSTAP+PCIA 组在术后 6h 和 24h 的 VAS 评分明显低于 PCIA 组（P<0.05）。PCIA 组在切皮和拉 C 钩后的 MAP 和 HR 波动较 OSTAP+PCIA 组明显（P<0.05）。其余各时间点的 VAS 评分和生命体征参数在两组间无统计学意义。阿片类药物消耗量 OSTAP+PCIA 组明显低于 PCIA 组（P<0.05）。在早期恢复指标上，OSTAP+PCIA 组的首次下床时间和进食时间均更短（P<0.05），但是两组在排气时间和拔尿管时间的比较上无统计学意义。两组在镇痛不全和不良反应的发生、自控镇痛需求时间、肝肾功能指标、术后住院时长和费用的比较上无统计学意义。
结论 OSTAP 阻滞联合 PCIA 在不增加不良反应及住院费用的基础上能够为开放性肝切除术患者提供良好的镇痛效果，同时减少了围术期阿片类药物的消耗量，有利于患者术后康复。此外，OSTAP 阻滞操作简单、创伤小、并发症少。因此，该多模式镇痛方案用于开放性肝切除术患者的术后镇痛是可行、有效的，值得临床推广。

PU-0527

III 期静脉内平滑肌瘤病手术的麻醉一例

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目的 血管内平滑肌瘤病发病较为罕见，三四期手术难度大，麻醉医生术前必须积极参与 MDT，做好充分的术前准备，利用经食管超声心动图实时监测，联合无创心排等监测手段实行目标导向的液体管理；针对手术时间长，创伤大，做好围术期镇痛、血液保护，体温保护等措施，髂静脉，下腔

静脉切开取瘤栓时可以采用动脉插管静脉吸引的方式进行体外循环转流，应用全量肝素化，保护患者的凝血机制和维持血流动力学稳定；做好应急方案，及时利用麻醉工作站监测血气分析，维持酸碱平衡纠正电解质紊乱，做的及时发现，及时处理。

方法 本例病例血管内平滑肌瘤已经生长至下腔静脉蔓延至右心房，为三期，手术难度大，术前 MDT 讨论方案为心外科开胸打开右房取平滑肌瘤，但术中麻醉医生利用熟练掌握的经食管超声心动图实时监测，手术中及时发现了右房内游离的平滑肌瘤下降至下腔静脉，及时 MDT 讨论，改变了手术方案，避免了开胸，打开心脏带来的创伤和手术方案的复杂，进一步提示麻醉医生围术期经食管超声心动图的意义，不仅可以提供围术期监测保证安全，还可以参与手术决策，及时调整手术方案；超声心动图的实时监测保证了血管内平滑肌瘤完成的取出，对于围术期心功能的监测，联合 FLOTRAC 血流动力力学平台，实施目标导向的液体管理，保证了围术期的安全。

本病例创伤大，手术时间长，围术期的保温尤其重要，我们采用了术间环境保温，液体加温仪加温液体，保温毯体温保护等保温措施，患者鼻咽温和直肠温始终维持在 36.5 摄氏度左右。针对本例病人围术期大出血的情况，我们采用了围术期持续泵注氨甲环酸改善纤溶，术前急性等容血液稀释，自体血回收等血液保护措施；切开下腔静脉时及时采用全量肝素化，创造性采用术中裸化的髂动脉插管，体外循环转流，保护了患者的凝血机制，避免了大量失血带来的创伤和炎症反应。

结果 术毕患者转入 ICU 继续监护治疗，术后 12 天患者一般情况好，复查超声：下腔静脉血流通畅，肾动静脉血流通畅，右髂静脉少许充盈缺损，建议复查，考虑病情稳定，无感染征象，体温正常，嘱其出院

结论 血管内平滑肌瘤病发病较为罕见，三四期手术难度大，麻醉医生术前必须积极参与 MDT，做好充分的术前准备，利用经食管超声心动图实时监测，联合无创心排等监测手段实行目标导向的液体管理；针对手术时间长，创伤大，做好围术期镇痛、血液保护，体温保护等措施，髂静脉，下腔静脉切开取瘤栓时可以采用动脉插管静脉吸引的方式进行体外循环转流，应用全量肝素化，保护患者的凝血机制和维持血流动力学稳定；做好应急方案，及时利用麻醉工作站监测血气分析，维持酸碱平衡纠正电解质紊乱，做的及时发现，及时处理。

PU-0528

Evaluation of clinical results of total hip arthroplasty combined with pericapsular nerve group block under the guidance of B-ultrasound and patient-controlled intravenous analgesia

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Objective: To evaluate the clinical outcomes of total hip arthroplasty (THA) combined with pericapsular nerve group block(PENG) under the guidance of B-ultrasound and patient-controlled intravenous analgesia.

Methods: 60 patients with THA hospitalized from March 2019 to April 2021 were selected. The patients were randomly divided into the controlled and the studied groups. The patients in the control group received patient-controlled intravenous analgesia and the study group received combined use of pericapsular nerve group block and patient-controlled intravenous analgesia. The visual analogue scale (VAS) score, Ramsay sedation score, hemodynamic index, incidence of adverse reactions, time of first pressing PCIA, times of pressing PCIA, first time of going to the ground and sleep disturbance score were compared between the two groups.The distribution of anesthetics was monitored by magnetic resonance imaging before and after anesthesia.

结果：术后不同时间点研究组 VAS 评分均显著低于对照组。研究组指定时间点的拉姆齐镇静效果显著低于对照组（P<0.05）。术后，研究组收缩压、舒张压、心率波动均低于对照组（P<0.05）。研究组不良反应发生率显著低于对照组（P<0.05）。比较两组首次按压 PCIA 的时间、按压 PCIA

次数和首次着陆时间，研究组均低于对照组，差异有统计学意义（P<0.05）。最后，我们比较了两组之间的睡眠障碍评分。术后 1 周、3 周、6 周、12 周，研究组睡眠障碍评分均远低于对照组。**结论：**包膜袋神经阻滞与患者自控静脉镇痛联合应用可显著改善 THA 患者术后睡眠质量，缩短睡眠时间，延长睡眠时间，提高睡眠效率，缓解疼痛。在 B 超和患者自控静脉镇痛的指导下联合应用 PENG 比单独使用患者自控静脉镇痛更有效。VAS 评分、Ramsay 镇静评分、首次按压 PCIA 的时间、按压的 PCIA 次数、第一次就寝时间都更低、更安全、更快。

PU-0529

保留股四头肌肌力的 PENG 阻滞所需局麻药液最大有效容量的研究

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目的 研究 0.375%罗哌卡因应用于髋关节囊周神经（pericapsular nerve group, PENG）阻滞时，保留股四头肌肌力的最大有效容量（maximum effective volume in 90% of patients, MEV90），供临床实践参考。
方法 纳入 2022 年 1 月至 6 月首次因髋部骨折接受择期单侧全髋或半髋置换的患者，采用有偏硬币设计序贯法（biased coin design up-and-down sequential method, BCD-UDM）进行局麻药液容量探索，将股四头肌肌力≥4 级定义为阻滞“成功”，反之则为阻滞“失败”。若前一名患者阻滞“失败”，则下一名患者局麻药液容量减少 2 mL；若前一名患者阻滞“成功”，则下一位患者局麻药液容量进行有偏硬币随机（有 11%的概率增加 2 mL，89%的概率保持不变）。所有患者术前接受超声引导下 PENG 阻滞，第一名患者所用 0.375%罗哌卡因的容量为 30 mL，其后患者给药容量据前一名患者的阻滞效果，由有偏硬币随机产生，直至出现 45 名“成功”的患者，实验结束。使用 R 统计软件进行统计分析，通过保序回归（PAVA 算法和 Morris 算法）得出 MEV90 及其 95% CI，并进一步推算出 MEV95、MEV99 及其 95% CI。
结果 共有 55 名患者纳入研究，3 名剔除，最终入组 52 名，有 45 名患者阻滞“成功”。其中有 3 名患者出现穿刺异感，2 名出现反跳痛。术后四周随访所有患者均未出现下肢感觉及运动异常。在保留股四头肌肌力的 PENG 阻滞中，0.375%罗哌卡因的 MEV90 为 24.1 mL（95% CI, 21.4 - 25.1 mL）。经统计推算得出 MEV95 为 23.1 mL（95% CI, 20.1 - 23.6 mL）；MEV99 为 22.2 mL（95% CI, 19.0 - 22.3 mL）。
结论 保留股四头肌肌力≥4 级的 PENG 阻滞中，0.375%罗哌卡因的 MEV90 为 24.1 mL（95% CI 21.4 - 25.1 mL）。

PU-0530

超声引导下一针法肋缘下腹直肌鞘联合腹横肌阻滞在腹腔镜肝脏手术的应用研究

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目的 观察超声引导下一针法肋缘下腹直肌鞘联合腹横肌阻滞（RTAP）与肋缘下腹横肌平面阻滞（TAP）用于腹腔镜肝脏手术的镇痛效果。

方法 选择择期行腹腔镜肝脏手术患者 48 例，性别不限，年龄 35～75 岁，BMI 21～25kg/m2，ASAⅡ～Ⅲ级。采用随机数字表法分为 2 组，RTAP 组（RT 组，n=24）和 TAP 组（T 组，n=24）。两组均在术前行超声引导下神经阻滞，RT 组行超声引导下一针法肋缘下腹直肌鞘联合腹横肌阻滞，T 组行肋缘下的腹横肌平面阻滞，随后在全身麻醉下完成手术。两组患者术后均行静脉自控镇痛（PCIA）。比较两组患者切皮前（T0）、切皮即刻（T1）、肝脏探查时（T2）、缝皮时（T3）的平均动脉压（MAP）和心率（HR），记录两组患者皮肤阻滞范围（阻滞完成后 20min），记录术中舒芬太尼、瑞芬太尼的消耗量，记录术后 2h、8h、16h、24h、48h 的数字疼痛评分（NRS）和术后 48h 镇痛泵的按压次数、补救镇痛次数，记录恶心、呕吐等不良反应的发生率。
结果 与 T 组相比，RT 组的皮肤阻滞范围更广，在 T1、T3 的 MAP 和 HR 明显降低，术中舒芬太尼及瑞芬太尼用量显著减少，术后 2、8、16 的 NRS 评分降低，术后 48h 的镇痛泵按压次数和补救镇痛次数减少，两组患者术后恶心、呕吐等不良反应发生率无明显统计学差异。
结论 与肋缘下 TAP 阻滞相比较，超声引导一针法肋缘下腹直肌鞘联合腹横肌阻滞的皮肤阻滞范围更广，用于腹腔镜肝切除术中血流动力学更稳定，镇痛效果更完善。

PU-0531

一例侏儒症重度脊柱畸形患者的麻醉

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目的 为侏儒症伴有重度脊柱畸形患者的麻醉提供临床参考。
方法 通过系统介绍患者的现病史、既往史、临床辅助检查、实验室检查、诊疗经过，麻醉术前评估，麻醉过程，分享一例矮小症重度脊柱畸形患者的麻醉成功案例。
结果 患者，男，38 岁，患者诊断 :1.左 输尿管结石伴有积水和感染 2.双侧 肾结石伴有积水和感染 3.膀胱结石 4. 高血压病 2 级(高危)。既往史:患者为先天性畸形，活动受限。有“高血压病”病史 3 年。术前 1 天体格检查：体温 36.5℃，HR 85 次/min，BP 126/62 mmHg（1 mmHg=0.133 kPa），RR 20 次/min，气道评估：颈椎活动度异常，甲颏间距小于 6cm，张口度正常，Mallampati 气道分级为Ⅲ级，可能为困难气道。心电图:窦性性心动过速。X 片:1 胸廓畸形、脊柱侧弯畸形。2 双肾及左侧输尿管多发结石。3 膀胱结石。查血:PT,APTT,PLT 正常范围。凝血像检测、血小板计数正常范围。入院查心肌酶谱、肌钙蛋白、BIP、心脏彩超均未见明显异常。
术中常规检测 Bp、HR、SpO2 、ECG、，建立静脉通道，补充晶体复方氯化钠。预注扩容，吸氧。由于气道评估时判断为困难气道，气管插管成功率低，不良反应多，因此麻醉方式选择为椎管内麻醉，麻醉医师采用超声引导下定位完成椎管内麻醉。
结论 侏儒症患者因其特殊的生长发育特点在麻醉实施中需要特别注意以下几点 1.术前访视:重视术前访视，充分了解患者的现病史，既往史，以及辅助检查，特别是其影像学检查。侏儒症患者并非简单的“小号”成人，多数侏儒症患者伴有脊柱畸形，解剖变异度大，困难气道。2.麻醉方式：需根据患者的手术类型，自身解剖特点，以及患者需求等合理选择麻醉方式。适当采用多种辅助手段，例如超声引导下椎管内麻醉，3D 打印患者脊柱模型进行精准麻醉。根据病人解剖特点确定用药剂量，侏儒症患者脊柱解剖异常，药物剂量需参照体重及脊柱长度，弯曲程度等。3.术中管理：术中管理细致，维持围术期的平稳，保证手术安全，减少麻醉并发症。4.患者沟通：多数侏儒症患者文化水平低，家庭条件差，身体畸形，易养成敏感脆弱，自卑的性格。与此类患者沟通时充分尊重对方意愿，进行心理疏导，减少患者焦虑情绪。

PU-0532

基于氧化应激反应探究 B 超引导下腹横神经阻滞对结直肠癌根治术患者的临床应用

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目的 基于氧化应激反应探讨 B 超引导下腹横神经阻滞对结直肠癌根治术后患者的影响
方法 于 2020 年 9 月-2023 年 9 月江苏南通大学附属肿瘤医院行结直肠癌根治术的患者中选取 98 例，根据数字随机表法分作两组，49 例对照组镇痛中应用静脉自控镇痛泵，49 例观察组镇痛中于对照组基础上应用 B 超引导下腹横神经阻滞，对两组的镇痛效果、氧化应激反应、免疫功能及手术并发症进行对比。
结果 观察组术后 2h、12h、24h、48h 时的视觉模拟疼痛评分法（VAS）评分低于对照组（P＜0.05）；观察组术后 12h 的超氧化物酶（SOD）比对照组高，丙二醛（MDA）低于对照组（P＜0.05）；观察组术后 24h 的 CD4+、CD8+高于对照组（P＜0.05）；观察组并发症发生率（4.08%）低于对照组（18.37%）（P＜0.05）。
结论 结直肠癌根治术后患者中行 B 超引导下腹横神经阻滞可促进镇痛效果进一步提升，并使氧化应激反应、免疫功能得到有效改善，减少手术并发症的发生。

PU-0533

Bibliometric and Visual Analysis of Transversus Abdominis Plane Block

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Objective:Byconducting a bibliometric analysis of literature concerning transverse abdominal plane block from 2007 to 2024, the study investigates the current research status, key areas of interest, and trends in this domain.
Methods: Conduct a core collection search using the Web of Science (WOS) database to gather all re search literature on the transversus abdominis plane block from 2007 to 2024.Filter all retrieved record s and download the qualifying documents in “plain text” format.Perform bibliometric analysis on the inc luded literature, encompassing statistics on publication years, journals, first authors, countries and inst itutions of publication, and subject distribution.The analysis tools used include SCIImago Graphica 1.0. 34, Microsoft Excel 2019, and R language packages Bibliometrix and CiteSpace 6.3.R1.Conduct co-citation analysis on the included literature and perform co-occurrence and frequency analysis on the keywords.Utilize VOSviewer 1.6.19 for text clustering and visual analysis of the titles and abstracts of the included literature.
Results: A total of 941 articles were included in the analysis.Over time, there has been an increasing trend in the number of publications, especially in the last five years, reaching 551 articles.Over time, there has been an increasing trend in the number of publications, especially in the last five years, reaching 551 articles.REGIONAL ANESTHESIA AND PAIN MEDICINE, ANESTHESIA AND ANALGESIA, and BMC ANESTHESIOLOGY are leading journals in terms of publication volume.The United States is the leading country in terms of publication volume, with a total of 170 papers, including 146 collaborative and 24 single-authored papers, totaling 2906 citations.China follows closely, with a total of 149 papers published, including 142 collaborative and 7 single-authored papers, totaling 1438 citations.EGYPTIAN KNOWLEDGE BANK (EKB) is the institution with the highest number of publications, totaling 61 papers.Taipei Medical University in China ranks sixth, with a total of 22 papers

published.The top first authors in terms of publication volume are MCDONNELL JG (11 papers, 723 citations), LAFFEY JG (10 papers, 839 citations), and DAHL JB (9 papers, 173 citations).Anesthesiology is the most extensively researched field (806 papers).Specific literature such as “The analgesic efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial” authored by John G McDonnell and John G Laffey has the highest number of citations.Visual analysis using CiteSpace 6.2.R1 software shows the establishment of a citation network consisting of 762 nodes, 1356 links, and 6 clusters.There are a total of 821 keywords, with the top ten keywords being “Surgery”, “Efficacy”, “Postoperative Analgesia”, “Analgesia”, “Pain”, “Tap Block”, “Postoperative Pain”, “Analgesic Efficacy”, “Anesthesia”, and “Meta Analysis”.
Five emerging keywords in recent years are “Local anesthesia”, “Cesarean delivery”, “Safety”, “multimodal analgesia”, and “Erector Spinae Plane Block”.Visualization using VOSviewer indicates that transversus abdominis plane block primarily focuses on recent research hotspots including surgery, cesarean section, pain, postoperative analgesia, block.
Conclusion:Internationally and domestically, research on transversus abdominis plane block shows a significant growth trend.The United States leads globally, with China closely following and making sign ificant contributions in this field.There is close cooperation evident among various countries and institu tions.n recent years, research has primarily focused on surgery, analgesia, postoperative pain manag ement, and cesarean section.Enhanced recovery after surgery adopts a series of perioperative optimiz ation pathways, aiming to reduce physiological and psychological stress in patients postoperatively thr ough multidisciplinary collaboration in surgery, anesthesia, nursing, and rehabilitation.Multimodal anal gesia plays a crucial role in accelerating surgical recovery, with transversus abdominis plane block pla ying an important role therein.With increased emphasis on accelerated surgical recovery, the applicati on of transversus abdominis plane block in surgical procedures, especially cesarean sections, is beco ming more widespread and safer.

PU-0534

超声引导下臂丛上干联合颈神经通路阻滞对高龄锁骨骨折患者术后快速康复的影响

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南昌大学第一附属医院

目的 研究臂丛上干联合颈神经通路阻滞用于高龄患者锁骨骨折手术的效果，探讨锁骨骨折手术安全有效的神经阻滞方法。
方法 选择 2022 年 11 月 1 日－2023 年 12 月 31 日因锁骨骨折在南昌大学第一附属医院行内固定手术的高龄患者 82 例，ASA 分级 Ⅱ～Ⅲ级，年龄 65～90 岁，神志清晰，可交流，对局部麻醉药无过敏，随机分为 ST+CNP 组（臂丛上干+颈神经通路阻滞组，n=41）和 ISB+CNP 组（肌间沟臂丛+颈神经通路阻滞组，n=41）。采用超声引导下行神经阻滞技术，药物为 1％罗哌卡因 10ml+2%利多卡因 5ml，以 0.9％氯化钠溶液稀释至 20ml，颈浅丛和臂丛上干（或肌间沟臂丛）分别注射 5ml 和 15ml 上述局部麻醉药混合液。阻滞操作完成后，静脉滴注苯磺酸瑞吗唑仑 10mg。记录阻滞前（T0）、阻滞 30min（T1）、阻滞后 3h（T3）的膈肌移动度、麻痹程度、呼吸参数（潮气量、呼吸频率和分钟通气量）及握力；记录手术期间（T2）最差 NRS 疼痛评分；记录阻滞后 6h（T4）、12h(T5)、24h(T6)、48h（T7）握力和NRS疼痛评分；记录阻滞持续时间、术后阿片类药物用量、患者满意度及神经阻滞相关并发症。
结果 Ｔ3 时 ST+CNP 组膈肌移动度大于 ISB+CNP 组（p<0.05），Ｔ1、Ｔ3 时 ST+CNP 组膈肌麻痹发生率低于 ISB+CN 组（p<0.05）、呼吸参数变化低于 ISB+CN 组（p<0.05）、握力值大于 ISB+CN 组（p<0.05）；Ｔ4、Ｔ5、Ｔ6、T7 时 ISB+CN 组与 ST+CNP 组握力差异无统计学意义（p>0.05）、两组 NRS 疼痛评分、神经阻滞持续时间、术后 48ｈ内镇痛药物用量差异无统计学意义（p>0.05）；ST+CNP 组有更低发生率的霍纳综合征和声音嘶哑（p<0.05）。
结论 高龄患者锁骨骨折内固定手术，ST+CNP 不仅能提供与 ISB+CNP 类似的良好镇痛、降低膈

肌麻痹的风险，还降低了霍纳综合征和声音嘶哑的发生率，且阻滞侧上肢更多的握力得到保留，该方法能提高老年锁骨骨折手术围术期安全性及满意度。

PU-0535

改良重建经鼻气管导管在继发性气管食管瘘气切患者中的应用体会

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目的 继发性气管食管瘘是一种严重的并发症，常见于重症患者，如长期卧床、严重感染、创伤或大手术后的患者。这类患者常常需要接受气管切开术以维持呼吸功能。对于已进行气管切开的继发性气管食管瘘患者，改良重建经鼻气管导管的应用显得尤为重要。本文将分享两例在 EICU 入住的继发性气管食管瘘气切患者的治疗过程，探讨改良重建经鼻气管导管在此类患者的应用体会。
方法 对于两例已进行气管切开的患者，改良重建经鼻气管导管的主要目标是改善呼吸功能，促进瘘口的愈合以及降低肺部感染的风险。治疗方法主要包括：1. 术前准备：评估患者的全身状况和局部情况，确保患者无严重的出血倾向或感染等手术禁忌症。2. 导管选择：根据患者的年龄、性别和体型选择合适的经鼻气管导管型号，并进行裁剪、重新塑型等改良重建措施。3. 手术操作：在严格的无菌条件下进行手术操作。首先，清洁并消毒气切部位的皮肤，然后使用适当的麻醉方法。在确保导管位置正确的前提下，将导管插入并固定。4. 术后护理：定期检查导管的通畅度，及时吸痰以保持呼吸道通畅。使用适当的抗生素预防感染，并给予呼吸道湿化治疗。5. 监测与评估：密切监测患者的呼吸、心率、血压等指标，定期进行 X 线检查以评估导管位置和瘘口愈合情况。
结果 通过改良重建经鼻气管导管，两例患者的呼吸功能得到显著改善，有效控制了肺部感染。在 EICU 的精心治疗和护理下，患者的病情逐渐好转，最终成功脱离呼吸机，顺利康复出院。在治疗过程中，我们深刻体会到改良重建经鼻气管导管在继发性气管食管瘘气切患者中的重要性。它不仅有助于改善患者的呼吸功能，还能促进瘘口的愈合和减少肺部感染的风险。此外，术后护理和监测也是提高治疗效果的重要环节。对于此类患者，医护人员需具备丰富的经验和熟练的技术操作能力，以便应对可能出现的各种并发症和意外情况。
结论 对于继发性气管食管瘘的气切患者，改良重建经鼻气管导管是一种有效的治疗方法。通过精心治疗和护理，患者的呼吸功能得到显著改善，瘘口愈合加快，肺部感染风险降低。未来我们应继续加强对此类患者的诊断和治疗研究，为更多患者提供更好的医疗服务。

PU-0536

Cuff Damage Caused by Nasal Spur-An Unforeseen Complication of Nasotracheal Intubation: A Case Report and Review of Literature

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Background and aims: Nasotracheal intubation is frequently applied in otolaryngologic surgeries. However, it leads to the increased risk of cuff damage, which may be attributed to nasal deformities such as nasal spur.

Methods: We present a unique case report of cuff damage caused by nasal spur, which was accompanied by airway bleeding, hypoxemia, and atelectasis, and meanwhile review the recent literature on this topic.
Results: Through this case report and review of literature, we highlight the unforeseen complications of cuff damage caused by nasal spur, including airway bleeding, hypoxemia, and atelectasis during nasotracheal intubation. Of note, patients who have not previously experienced the above-mentioned conditions are still at high risk of developing these complications.
Conclusions: Cuff rupture during nasal intubation may bring about serious complications and thereby requires careful management. Regarding the detrimental consequences of cuff rupture, many complementary strategies are used to minimize the risk of its complications if it does occur. More effective approaches are needed to develop to reduce the risk of cuff rupture as well as improve airway management, especially for those patients with nasal spur.

PU-0537

新型鼻咽通气道不同连接方式描记呼气末 CO2 曲线在静脉全麻的比较

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目的 比较新型鼻咽通气道两种连接方式描记呼气末 CO2 曲线在保留自主呼吸全凭静脉全身麻醉中的差异。
方法 随机选择我院 2021 年 1 月至 2022 年 12 月，在保留自主呼吸全凭静脉麻醉下行宫腔镜手术 120 例，随机分为 F 组和 C 组，每组 60 例，F 组以监测管过滤器连接监护仪，C 组在鼻咽通气道氧气输入端连接监护仪。所有病例均在消毒铺巾完毕后开始诱导并实施保留呼吸全凭静脉全身麻醉，并置入鼻咽通气道，记录手术全程患者 SPO2 低于 93%例数 N，体动人次数 M，追加丙泊酚次数 A，自主呼吸过缓人次数 R，呼气末 CO2 曲线异常人次数 E，重新调整鼻咽通气道位置次数 T，手术医师满意度 S。
结果 所有患者均顺利完成手术，置入鼻咽通气道后，F 组患者中有 1 例 SPO2 低于 93%，1 例在术中出现体动，3 例自主呼吸过缓，2 例观察到呼气末 CO2 曲线异常；C 组出现 5 例 SPO2 低于 93%，有 1 例在术中出现体动 4 例自主呼吸过缓，有 13 例出现呼气末 CO2 曲线异常；F 组和 C 组患者被手术医师评价的满意度分别为 4.95 和 4.61。
结论 相比于在鼻咽通气道氧气输入端连接监护仪，以监测管过滤器连接监护仪更能减少患者低氧血症发生率，PetCO2 曲线更加有利于术中监测。

PU-0538

Exploring the relationship between pressure distribution on tracheal tube and postoperative laryngopharyngeal discomfort in spinal surgery: an innovative observational study

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Background: For spine surgery in prone position, there is a common complication of postoperative laryngopharyngeal discomfort which has not aroused enough attention. Postoperative

laryngopharyngeal discomfort could result in delayed water and food intake and severely affect postoperative daily activities, even resulting in post-extubation stridor, prolonged mechanical ventilation or re-intubation. Possible mechanisms include increased pressure on soft tissue in the mouth exerted by the tracheal tube due to prone position, obstruction of venous and lymphatic return in head and neck, and increased capillary hydrostatic pressure, which may lead to oedema of the tongue and upper airway. However, there were NO monitoring indicators, we have no idea what the pressure distribution on the endotracheal tube would be during the surgery. Therefore, we performed this study to explore the contact force of the tracheal tube on the tongue, and to reveal possible risk factors for postoperative laryngopharyngeal discomfort in spinal surgery.

Methods: This is a single-centre, observational study registered at ClinicalTrials.gov (NCT05987293). We enrolled 45 patients in China-Japan Friendship Hospital from October 20, 2023 to March 21, 2024. Participants scheduled for spinal surgery in prone position under general anaesthesia for more than 2 hours were eligible for inclusion. T-Scan force distribution system were applied for real-time measurement of the location and distribution of stress acting on the palate and the tracheal tube, and between the tongue and the tracheal tube, respectively (**Figure 1A**). The T-Scan III system and a Digital Force Gauge were applied at the same time, for revealing the mathematical relationship of the pressure distribution percentage in T-Scan system, the contact area, and the contact force presented by the Force Gauge. In the in vitro experiment, the stress readings of T-scan and Digital Force Gauge were simultaneously read by the computer by a model simulating the tongue-tracheal tube contact surface (**Figure 1B**), for creating the "stress-absolute force" working curve accordingly. For the in vivo experiment during the surgery, T-Scan stress measurement was performed on the participants at four time points: after tracheal intubation (T), after surgical position fixation (T_1), at the end of surgery (T_2), and before extubation (T_3). Since we could get the in vivo pressure distribution percentage and contact area, contact force could be obtained according to the working curve.The in vivo stress was calculated through the working curve (**Figure 1C** and **Figure 2**). In this way, we obtained the data of the pressure distribution, contact force and contact area of the tracheal tube in the oral cavity of the patient at each time point during the surgery.

Participants' information including demographic characteristics and airway measurements were recorded. Intraoperative information included surgical position, cervicooccipital angle, duration of mechanical ventilation, intraoperative intake and output volume (I/O), glucocorticoid use, visible intraoral injury, and tracheal tube-related events, including tube kinking, abnormal airway pressure and ventilatory dysfunction. Patients were followed up until postoperative day 7. Primary composite endpoint was the incidence of postoperative laryngopharyngeal discomfort, either the state of severe sore throat (Visual Analog Scale score≥4), dysphagia after extubation, or any of the symptoms of tongue oedema. Secondary outcomes included time of water solid food intake, patient’s satisfactory self-rating (1-10) scale and length of stay. Airway-related events such as bronchospasm, aspiration, secondary intubation, respiratory tract infection, respiratory insufficiency and prolonged oxygen therapy were also recorded.

Results: Participants’ information was available in 44 patients. One participant was lost to follow-up. Six participants received posterior cervical spine surgery, 38 participants received posterior lumbar surgery. Tracheal intubation was performed in all cases, and the average operation time was 218.8±68.3 minutes. Twenty-two participants (50.0%) developed postoperative laryngopharyngeal discomfort, 4 (66.7%) in posterior cervical spine surgery and 18 (47.4%) in posterior lumbar surgery. Medium duration of postoperative laryngopharyngeal discomfort were 12(3, 24) hours. As shown in **Table 1**, cervicooccipital angle with cervical flexion, duration of mechanical ventilation and surgical position maintenance and peak airway pressure were significantly different in participants with postoperative laryngopharyngeal discomfort. Interestingly, participants with postoperative laryngopharyngeal discomfort received more glucocorticoid during surgery (medication was administered as required for spinal surgery). There were no differences of signs of difficult airway, obesity, or intraoperative fluid infusion volume between the two groups. None of the patients had perioperative airway-related events.

In the in vitro experiment, we collected 221 groups of data and fitted the stress-absolute force working curve (r^2=0.949) (**Figure 2**). In the cervical flexion position, the pressure distributed on the tracheal tube mainly came from the pressure between the tube and the tongue (3-5 times greater

than the pressure between the palate and the tube). However, for prone lumbar surgery, the pressure distribution on the tracheal tube was approximately the same between the tube and the tongue and between the palate and the tube. For posterior cervical spine surgery in cervical flexion position, both the mean stress ($7.35\pm2.70\times10^4$ Vs. $3.06\pm0.54\times10^4$ Pa) and contact force (7.1±5.2 Vs. 0.6±0.3N) in the surgical position (T_1 and T_2) were significantly higher in the participants with laryngopharyngeal discomfort ($p<0.05$). For posterior lumbar surgery in supine position, there were no difference of mean stress between groups ($4.61\pm1.87\times10^4$ Vs. $2.99\pm0.67\times10^4$ Pa, $p>0.05$), however, the contact force (3.2±0.6 Vs. 0.4±0.5N) were significantly higher in the participants with laryngopharyngeal discomfort ($p<0.05$). Detailed trajectory of pressure on the tracheal tube during spinal surgery was shown in **Figure 3**. Detailed pressure distribution on the tracheal tube in prone position was shown in **Figure 4.**

Conclusions: This is the first study demonstrating that the stress and contact force distributed on the tracheal tube are significantly elevated in patients with postoperative laryngopharyngeal discomfort. Hyper-flexion of the cervical spine during surgery, prolonged mechanical ventilation, significantly elevated peak airway pressure during ventilation could be associated with postoperative laryngopharyngeal discomfort in patients. This is also the first study revealing the pressure distribution on the tracheal tube during anesthesia in prone position. Further study could reveal possible risk factors of postoperative laryngopharyngeal discomfort in spinal surgery. We should expand the sample size to identify risk factors. Participants with other surgical positions will be included in the future.

PU-0539

气管内插管入路选择

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目的 结合国家创伤医学中心（北京大学人民医院）实际病例，寻找不同手术、不同患者特征最合适的插管入路

方法 总结 2022-2023 年国家创伤医学中心（北京大学人民医院）实际气管插管病例，综合文献，寻求气管插管入路选择的合理性。

结果 九种气管插管入路都存在各自适应证和插管技巧，选择最合适的插管入路能降低插管相关并发症

结论 九种气管插管入路是人们在长期治疗和抢救患者过程中积累下来的宝贵经验和智慧，未来气管插管临床入路选择一定是本着更微创、更低并发症，更好的满足患者个体化以及特殊手术的需要，成功率高，操作简单、学习容易，普及性强等特点。同时有创气道需求越来越少，可视化技术更加空前先进。从而优化气道管理，提高麻醉安全

PU-0540

A new device for fixation of the laryngeal mask airway in children undergoing ophthalmic procedure: a double-blinded randomized controlled study

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Background: Laryngeal mask airway malposition during ophthalmic procedures is difficult to detect and posing a significant risk to participant safety, which might cause regurgitation and

pulmonary aspiration during positive pressure ventilation. And at present, there were no effect means for malposition. Here, we invented a device about the fixation of laryngeal mask airway and hypothesized that this new device would improve the stability of laryngeal mask airway during general anesthesia in pediatric ophthalmic procedures.
Methods: We randomly allocated 80 ASA physical status 1-2 participants, scheduled for ophthalmic procedures, to fix the laryngeal mask airway with the new device(group D, n=40) or not(group S, n=40). The primary outcomes were the rate of malposition（the grades less than 3） after the procedures the fiber-optic grades after the procedures, and the assessors who classified the grades of the fiber-optic photos and analyzed the data were blind to the group allocation.
Results: The rate of malposition after the procedures was higher in group S (10/40 [25%]) than in group D (2/40 [5%]); absolute difference 20%（95%CI: 4.2% to 35.6%）, P=0.012.
Conclusions: In summary, the new device can effectively improve the stability of laryngeal mask airway in pediatrics ophthalmic procedures undergoing general anesthesia.
Clinical Trials Registry–China (CTRC):ChiCTR2200066089 Date: 24/11/2022
(https://www.chictr.org.cn/showproj.html?proj=185748)

PU-0541

硬质支气管镜置入通道导管的研发与应用

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目的 经硬质支气管镜或经硬支镜置入软镜行气管手术，硬支镜的正中孔带密封帽，经其插入器械或气管软镜。硬支镜的一个侧孔经呼吸回路连接麻醉机管理呼吸，其余两个侧孔密封。在麻醉机机械通气的时候，需要术者事先向患者口腔内填塞纱布条，填满咽腔以密封气道防止漏气。在需要更换不同型号的硬支镜时候需要先取出纱布条，置入新的硬支镜后再重新填塞，这种填塞纱布条甚至反复填塞的方法既费时费力，又容易对手术已禁食禁饮的患者口腔及咽部干燥的粘膜造成损伤。临床亟需发明一种硬支镜通道导管解决上述难题。
方法 我们发明一种硬质支气管镜置入通道导管，为双腔双囊结构，分别为置入硬支镜腔和置入胃管腔，封闭咽腔囊（外套囊）和封闭管腔囊（内套囊）。置入硬支镜腔，有成人和小儿 2 种规格，其近端管口分别可插入和套入呼吸回路标准接头用呼吸球囊或经呼吸回路连接麻醉机行辅助通气。大小两种口径都能够保证硬支镜顺畅的进出和操作。其远端为斜开口，开口朝向前向下。置入胃管腔，其近端有塔式接头和泄压阀，其远端朝向食道入口，便于置入胃管。硬支镜通道导管按照从小儿到成人配置 1-n 个型号，1 号对应小儿规格的置入硬支镜腔，2-n 号则对应成人规格的置入硬支镜腔。
麻醉诱导成功置入硬支镜通道导管，经其置入硬支镜腔置入气管软镜至通道导管的远端用来观察引导。给外套囊充气，外套囊的背囊胀气后，硬支镜通道导管的远端被抬升翘起，使得其置入硬支镜腔内口对准声门。两个侧囊胀气，密封咽侧壁。前囊胀气，推动舌根前移会厌的根部抬起，充分显露声门。撤出软镜，可轻松置入硬支镜，给内套囊充气，气量和压力适度，保证不漏气的同时保证硬支镜进退活动自如。硬支镜的正中孔带有密封帽，经密封帽插入气管软镜进行镜检和治疗，也可以插入硬支镜器械行气管异物取出、硅酮支架的置入和取出、其它介入治疗等。硬支镜的一个侧孔经呼吸回路连接麻醉机做机械通气。术中需要更换粗细型号不同的硬支镜时，需要先给内套囊放气后进行。无硬支镜插入时则硬支镜通道导管可经呼吸回路连接麻醉机控制呼吸。必要时，经硬支镜通道导管用软镜引导或直接完成气管插管。
结果 使用该硬支镜通道导管，可以轻松顺利的插入硬支镜，极大的降低手术医生操作难度，保障麻醉医生安全有效的管理呼吸，便于及时方便的清吸咽部分泌物，保护患者的牙齿、舌根及咽喉部减少损伤，避免控制呼吸导致的胃内胀气。必要时还可以快速的更换硬支镜，甚至完成气管插管。
结论 硬质支气管镜置入通道导管是一种方便、实用、安全的手术和麻醉用呼吸道管理工具，必将

极大的促进硬支镜下的呼吸系统疾病介入诊疗事业的发展。

PU-0542

Impact of airway devices and emergency airway techniques characteristics on airway adverse events in Mainland China: A Cross-Sectional Study

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Background: Effective airway management is the cornerstone of anesthesia safety. Difficult airway issues have been reported to cause anesthesia-related complications and mortality factually. Novel airway devices are becoming widely available, yet it is still being determined whether the techniques or preferences of airway practitioners for airway management have been impacted. These have practical clinical value in understanding practice evolution, facilitators, and barriers to further development. Given these facts, a cross-sectional study of the current status of airway management in mainland China was conducted and compared with previous survey findings.
Methods: The national survey was conducted from November 7 to November 28, 2022. An electronic survey was sent to the New Youth Anesthesia Forum (http://www.xqnmz.com) to examine the availability of airway devices, preference for front-of-neck access (FONA) techniques, the incidence of adverse airway events, and the status of airway management training. Additionally, the findings of this cross-sectional survey were compared with airway surveys conducted in 2011 and 2016 to identify changes and developments. We completed this cross-sectional study in accordance with the Report on Strengthening Observational Research in Epidemiology guidelines (STROBE). Statistical analyses were performed using R software (version 4.2.1) with the χ^2 test or Fisher's exact test. Multivariate logistic regression analyses were established to explore the independent influences of the ability to perform FONA techniques and the incidence of airway adverse events. All tests were two-tailed with a type I error rate of 0.05. In this study, we considered $P<0.05$ to be statistically significant.
Results: The survey covered anesthesiologists in 31 provinces, municipalities, and autonomous regions in mainland China. Questionnaires were completed by 3,783 respondents, with a response rate of 72.14%. So far, comparisons of the findings of the three surveys revealed that the availability of optical airway devices had improved dramatically, with videolaryngoscopes reaching 97.18% availability (48.48% vs. 72.91% vs. 97.18%; $P<0.001$). Moreover, the availability of emergency airway devices, such as needle cricothyrotomy kits (18.18% vs. 27.82% vs. 36.17%; $P<0.001$) and difficult airway management emergency kits or carts (0% vs. 34.07% vs. 48.81%; $P<0.001$), has likewise improved substantially. When encountering "Cannot intubate, Cannot ventilate" (CICV) scenarios, 2,807 respondents (74.20%) would prefer needle cricothyrotomy to establish FONA. However, less than a quarter of respondents (23.90%) had actually performed it, albeit an increase from previous results (10.32% vs. 14.37% vs. 23.90%; $P<0.001$). From 2016 to 2022, 34.84% of anesthesiologists encountered at least one canceled or delayed surgery due to a difficult airway. Moreover, on a per-hospital surveyed basis, the incidence of airway adverse events from 2016 to 2022 was 11.48%, of which 5.13% were brain damage or death. Multivariate logistic regression analysis revealed that the ability to perform FONA techniques [odds ratio (OR) 0.23 95% confidence interval (CI) 0.16 to 0.32; $P<0.001$] and the availability of difficult airway management carts or kits (OR 0.59 95%CI 0.41 to 0.85; $P=0.005$) were associated with a lower incidence of airway adverse events. Besides, Tier of hospital (OR 1.83 95%CI 1.08, 3.28; $P=0.032$) and FONA training experience (OR 2.65 95%CI 2.55, 2.76; $P<0.001$) were the two leading independent influencing factors in the mastery of FONA techniques.

Conclusions: Compared with the airway management surveys in 2011 and 2016, factual progress has been made in difficult airway management. Novel optical airway devices can overcome some of the challenges of airway issues, yet the CICV scenario remains a major obstacle. Moreover, with the advent of new and efficient airway devices, the likelihood that novice anesthesiologists will have access to complex emergency airway techniques is diminishing. Undoubtedly, the importance of training in airway management is coming to the fore. Airway practitioners need to learn airway skills, both basic and advanced, to achieve safe management of airway crises and decrease adverse airway events. The future focus of airway management should be training, particularly for complicated emergency airway techniques.

PU-0543

一种新型内置气囊气管插管的研发和试用

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目的 一种新型内置气囊气管插管的研发和试用。
方法 在气管插管模型上试用自主研发的内置气囊气管插管，比较同一模型两种气管插管型号的区别，新型气管插管和普通气管插管后通气压力，插管术后操作医生的整体满意度。
结果 同一模型气管插管型号有明显区别，插管后通气压力新型气管明显下降，对新型气管插管操作医生较满意。
结论 模型上试用新型内置气囊气管插管可以取得满意的效果

PU-0544

双腔支气管插管导致主气管破裂 1 例

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目的 气管破裂是气管插管中十分罕见但又十分凶险的并发症。在临床麻醉中要警惕识别气管破裂，尽早发现并处理能极大的促进患者的预后。本病例报道报告了一例在双腔支气管插管麻醉下行胸腔镜下肺部分切除的患者，术后发现患者隆突上 2cm 处主气管破裂，通过及时有效的处理患者预后良好。现对该病例进行详细介绍，并结合相关文献进行总结，旨在能提供一些经验教训，降低该并发症的发生率，并对该并发症的处理方式提供一些经验。
方法 患者，女，54 岁，身高 153 cm，体重 49 kg。体检发现右肺结节 2 年余。既往有“结缔组织病，全身性骨关节炎，骨质疏松，糜烂性胃炎，肝脏低密度灶，颈椎间盘突出，腰椎间盘突出”病史；否认高血压病、冠心病、糖尿病等史。肺部 CT 提示：右肺中叶少许纤维灶。右肺下叶背段磨玻璃结节。患者于双腔支气管插管全身麻醉下行胸腔镜下右肺下叶部分切除术，术中患者单肺通气氧饱和度不稳定，需间断双肺通气维持氧合。术毕发现胸腔纵隔广泛气肿。颈部和胸部无皮下气肿。根据患者纵隔气肿、手术波及范围、呼吸氧合情况、气道有无出血等综合判断患者为气道破裂。更换单腔气管插管后行气管破裂修补术。
结果 患者术后清醒拔除气管导管，呼吸、氧合良好，无胸闷、气促，无颈部皮下气肿。 术后第三天拔除胸腔引流管。术后第 7 天出院。
结论 气管插管造成气管破裂虽然少见，但针对身材瘦小、且合并免疫性疾病的高危风险的患者，行双腔气管插管导致气道破裂风险较高。警示大家针对高危患者要时刻保持警惕、术前做好预防措施和紧急备案，术中操作轻柔，维持一定麻醉深度尽量避免气道压剧烈升高，将其风险降到最低。

PU-0545

一种颈托在无痛支气管镜操作中的应用

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目的 局麻联合静脉镇痛镇静，是目前支气管镜检查常用的麻醉方式。患者麻醉诱导后，会出现舌后坠引起的呼吸道阻塞的情况，既影响患者自主呼吸的通畅，又影响术者支气管镜的操作，严重者需要呼吸内科医生退出支气管镜，麻醉医师面罩加压给氧，才能使用患者氧合恢复。既往发明下颌托在所在医院使用，因结构及经济获益低难以得到普及。研究尝试多种下颌及颈部器械以解决支气管镜检查的静脉镇痛镇静中上呼吸道梗阻的问题，最后发现一种颈托效果较好，故探讨一种颈托在无痛支气管镜操作中的应用。
方法 排除特殊病例，选择 61 例行经鼻支气管镜操作患者，随机分为使用颈托组 30 人(V 组)和不使用颈托组 31 人(C 组)，在局麻联合静脉镇痛镇静的麻醉技术下，V 组安装颈托再行支气管镜操作，C 组直接开始操作，记录患者再次出现缺氧事件例数及术者通过上呼吸道是否能顺利暴露声门。
结果 BMI、年龄、男女基础情况无统计学差异。术中诱导时血压心率变化无统计学差异。两组面罩加压给氧例数无统计学差异(0vs6.5%)，颈托组托下颌(13.3%vs38.7%)及术者不能顺利暴露声门例数(3.3%vs25%)明显少于对照组(p＜0.05)。
结论 此颈托易于获得，能起到如托下颌般畅通上呼吸道的作用，并安全有效用于保留自主呼吸的无痛支气管镜操作中。

PU-0546

Airway management in acquired tracheoesophageal fistula repair: an analysis of published case reports

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Background: Tracheoesophageal fistula (TEF) is characterized by abnormal connectivity between the posterior wall of the trachea and the adjacent anterior wall of the oesophagus. Causes of acquired TEF include malignant tumors, endotracheal and tracheostomy tube in jury, trauma, infections, prior laryngectomy and prior oesophagectomy. Acquired TEF is a life-threatening condition that needs urgent treatment; however, there is currently no uniform standard to determine the airway management for acquired TEF repair. We provide a literature review of what is currently known about airway management in acquired TEF repair, including a structured analysis of published case reports.
Methods: The review was based on a search of the CNKI, Pubmed, and Embase databases from January 2000 to December 2022. Cases with congenital TEF, incomplete information (e.g., airway management were not described), and undergoing conservative, interventional, or endoscopic treatment were excluded.
Result: Our search identified 19 case reports and editorials, with a total study population of 38 patients. According to the airway management strategy, we divided TEFs into small TEF (<1 cm), moderate TEF (1-3 cm) and complex TEF (>3cm, multiple fistulas or combined airway stenosis). The selection of the airway management strategy depends primarily on the site and size of the fistula and the condition of tracheal abnormalities. For small and simple TEF(<1cm), inserting a double-lumen endotracheal tube (DLT) or an endotracheal tube (ETT) tip distal to the fistula is the most commonly used method. For moderate TEF (1-3 cm), airway management techniques

depend on the site of the fistula and the operative strategy, include insertion of a ETT into the bronchus, placement of an occluder via the esophagus, insertion a sterile tube in the distal airway through the surgical field, and extracorporeal life support. Bilateral bronchial intubation or extracorporeal life support (ECMO/CPB) is usually the only option to maintain intraoperative oxygenation in those patients with complex fistulas, which include one of the following characteristics: fistulas >3 cm, multiple fistulas, or combined airway stenosis.
Conclusions: In conclusion, the selection of various airway management strategy should depend on the size and location of the TEF, the condition of the trachea, and the patient's condition. Insertion DLT or ETT is used for the small TEF. Airway management in moderate TEF is based on surgical approach and the patient's condition. If the oxygenation cannot be maintained during surgery, bilateral bronchial intubation with differential ventilation or ECMO/CPB are preferred. Since the rarity of TEF, the current available evidence is mainly based on case reports, warranting further investigation.

PU-0547

Comparison of Lung Dynamic Compliance between Laryngeal Mask Airway Supreme TM and Endotracheal Intubation in Laparoscopic Cholecystectomy： A randomized, controlled, non-inferiority trial

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Background: The use of pneumoperitoneum during laparoscopic cholecystectomy decreases lung compliance and results in pulmonary complications such as postoperative hypoxia and pulmonary atelectasis. Most anesthesiologists are skeptical about the use of laryngeal masks in laparoscopic surgery, preferring tracheal intubation for airway management. There is controversy in the current research regarding laryngeal mask ventilation in laparoscopic surgery in terms of ventilation. In recent years, intraoperative lung-protective mechanical ventilation (LPV) has been shown to improve lung compliance and reduce ventilator-induced lung injury by small tidal volumes (Vt), appropriate levels of positive end-expiratory pressure (PEEP), regular recruitment manoeuvres (RMs).However, there are fewer studies related to comparing the ventilatory properties of LMA-S and tracheal intubation under LPV during laparoscopic cholecystectomy. Therefore, we propose the hypothesis that the use of laryngeal mask during laparoscopic cholecystectomy is non-inferior to tracheal intubation in terms of lung compliance. The aim of this study was to investigate whether the use of a Laryngeal Mask Airway Supreme TM（LMA-S） is non-inferior to endotracheal intubation （ETT）in terms of pulmonary compliance in a low-risk population undergoing laparoscopic cholecystectomy. This study will provide new airway management options for the development of laparoscopic cholecystectomy as a day case procedure.
Methods: This trial is a prospective, randomized controlled, non-inferiority clinical trial. The study protocol version 2.0 was approved by the Ethics Committee of Beijing Tongren Hospital (TREC2023-KY122). The study has been registered with China Clinical Trial Registry (ChiCTR2400083333) and will strictly adhere to the Good Clinical Practice guidelines and the Declaration of Helsinki. Informed consent was obtained from each patient. Any modification of the study protocol and informed consent form will be approved by the Ethics Committee. This study was conducted on 100 patients, with American Society of Anesthesiologists classification (ASA) I-II, age (18-65years),BMI (18.5-30kg/m2)，who underwent elective laparoscopic cholecystectomy under general anesthesia of an anticipated duration of less than 3h. The exclusion criteria were (1) patients those at risk of regurgitation/aspiration of gastric contents (full stomach, inadequate fasting, known hiatus hernia, gastroesophageal reflux disease, history of peptic ulcer, pregnant, previous

upper gastrointestinal surgery); (2) patients with any neck or upper respiratory airway pathology; (3) suspected difficult airway; (4) Patients with severe respiratory disease, sore throat, dysphonia, and dysphagia. Patients will be randomly assigned to the tracheal intubation group (group T) and LMA-S (group L) in a 1:1 ratio. Patients in group L were placed on LMA-S. Patients in group T were placed on tracheal intubation. Lung protective ventilation strategy was used during surgery in both groups. The primary outcome was the dynamic lung compliance (Cdyn) after pneumoperitoneum and head-high, foot-low position. The secondary outcomes was the oxygenation index, RASS score during PACU, airway pressure, end-expiratory carbon dioxide before and after pneumoperitoneum, blood pressure, heart rate, mean arterial pressure, and oxygen saturation before and after pneumoperitoneum, adverse respiratory events (hypoxia, need for mandibular support, positive pressure ventilation, or mechanical ventilation), hoarseness, dysphagia, sore throat (VAS score 0-10), other major complications in the PACU and within 24h after surgery, QR15 score at 24 hours postoperatively. The time points assessed were admission to the operating room (T1), at the time of mask ventilation (T2), 5 min after successful airway device placement (T3), immediately after pneumoperitoneum as well as change of position (T4) 、after pneumoperitoneum as well as change of position 15 min (T5) 、30 min (T6) 、45 min (T7) 、after pneumoperitoneum was stopped (T8). Cdyn, airway pressure and Etco2 were measured on the ventilator and recorded at T2-T8 respectively. Oxygenation index was calculated as PaO2/FiO2 and was recorded at T1, T5, PACU. Hemodynamic indices were recorded at T1-T8 and PACU. The detailed flow chart is shown in Fig 1.

Results: The mean value of pulmonary compliance 15 minutes after pneumoperitoneum and head-high-feet-low position was 34.90 cmh20/ml in group L, and 35.75 cmh2O/ml in group T. (Difference -0.85; 95% confidence interval -3.40, 1.70; P=0.508), the intraoperative pulmonary compliance in group L was non-inferior to group T. Conditions for establishing non-inferiority were met.Ninety-five percent confidence interval of Cdyn is shown in Fig 2. The mean value of postoperative oxygenation index was 424.88 in group L, and 419.60 in group T. There was no statistically significant difference in postoperative oxygenation index between the two groups (P=0.767). There was no statistically significant difference in postoperative oxygenation index between the two groups (P=0.767). Conditions for establishing non-inferiority were met. The incidence of postoperative sore throat was lower in group L than in group T (0% vs. 22.5%, P=0.005), and the incidence of postoperative cough was lower in group L than in group T (0% vs. 17.5%, P=0.018).

Discussion: This prospective randomized controlled non-inferiority study in patients undergoing laparoscopic cholecystectomy under general anesthesia was designed to determine whether lung compliance with LMA-S is non-inferior to tracheal intubation under lung protective ventilation strategy and to assess metrics related to oxygenation function, postoperative agitation, and airway complications. The results of the study may provide clinical evidence to support the optimization of perioperative airway management protocols for laparoscopic surgery. Ventilation of low-risk patients undergoing laparoscopic cholecystectomy using LMA-S is non-inferior to tracheal intubation in terms of lung compliance, and the LMA-S can be used as an airway management tool for low-risk patients undergoing laparoscopic cholecystectomy.

PU-0548

National survey on the current status of airway management in China

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Background: Apparently, understanding airway management status may help to reduce risk and

improve clinical practice. Given these facts, our team conducted a second survey on the current status of airway management for mainland China following our 2016 national airway survey.
Methods: The national survey began on November 7, 2022, and closed on November 28. The valid period for the survey started from November 2016 to November 2022, and the data within this six-year interval were considered to be included in the study. An electronic survey was sent to the New Youth Anesthesia Forum, where Chinese anesthesiologists completed the questionnaire via WeChat.
Results: A total of 3,783 respondents completed the survey, with a response rate of 72.14%. Through the collection and analysis of respondents' background information, there were 2,546 anesthesiologists from Tier 3 hospitals, accounting for 67.30%, and 1,237 anesthesiologists from Tier 2 hospitals and other hospitals, accounting for 32.70%. Additionally, the director of the anesthesiology department accounted for 36.61%. So far, in 2022, 34.84% of anesthesiologists canceled or delayed surgery at least once due to difficult airway. For the anticipated difficult airway management, 66.11% of physicians would choose awake intubation under sedation and topical anesthesia, while the percentage seeking help has decreased compared to the 2016 survey. When encountering an emergency, 74.20% of respondents prefer to use the needle cricothyrotomy, albeit less than a quarter have actually performed it. Anesthesiologists with longer working length were significantly better proficient in needle cricothyrotomy ($P<0.001$) and surgical cricothyrotomy ($P=0.007$). Additionally, anesthesiologists with airway management training experience reached 72.96%, with a significant difference in participation between participants in Tier 3 hospitals and those in other levels of hospitals ($P<0.001$). The videolaryngoscope, laryngeal mask, and flexible intubation scope were equipped at 97.18 %, 95.96%, and 62.89%, respectively. Moreover, the percentage of brain damage or death caused by difficult airways was significantly decreased ($P<0.001$).
Conclusions: This national survey may be the best reference for capturing the state of airway management in China. Over the past six years, according to the current survey, airway management has advanced substantially in mainland China. However, anesthesiologists continue to have challenges managing difficult airway situations, which is still a major obstacle. Conducting extensive training in airway management remains our future endeavor, especially for anesthesiologists from primary hospitals and novice anesthesiologists.

PU-0549

Electronic visualized double-lumen endobronchial tube for situs inversus totalis A case report and literature review

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Rationale: Using an electronic visualized double-lumen endobronchial tube (E-visual DLT) allows for excellent surgical visualization during one-lung ventilation. Situs inversus totalis (SIT) is a rare autosomal recessive genetic condition wherein the bronchial and pulmonary lobar structures on the left and right sides of individuals are reversed compared to those of the general population. In the case of SIT, placing a left-sided E-visual DLT into the right bronchus might offer more advantageous one-lung ventilation. However, there have been no reported instances of using E-visual DLT single-lung ventilation anesthesia techniques for SIT. Patients concerns: We present a case report detailing the effective implementation of a visualized single-lung ventilation technique under general anesthesia in a 36-year-old male diagnosed with SIT. The patient had a mediastinal mass and underwent thoracoscopic resection of the mediastinal mass using a left-sided approach.

Diagnoses: Based on the findings from the contrast-enhanced chest computed tomography (CT) results, the patient was diagnosed with SIT along with a mediastinal mass. Surgical intervention was proposed to alleviate the cardiac compression caused by the mass. Nevertheless, the administration and handling of anesthesia posed a notable challenge since clinical anesthesiologists encounter contradictory data and a limited number of evidence-based guidelines.
Interventions: Convened a multidisciplinary meeting prior to the initiation of anesthesia to formulate a comprehensive strategy. Throughout the anesthetic management, our team ensured meticulous monitoring, delivered sufficient oxygenation, and established hemodynamic equilibrium. The anesthesia team deliberated and devised a plan to employ a left-sided E-visual DLT placement through the right bronchus for right-sided one-lung ventilation in the patient with SIT. The process of anesthesia induction was subjected to repeated simulations to guarantee patient safety. Outcomes: Due to the meticulous and effective administration and supervision of anesthesia, the surgery was completed as planned. Subsequently, the removal of the E-visual DLT was executed without any complications. Lessons: Data and literature about SIT are scarce, necessitating thorough pre-planning and preparation. Abbreviations: E-visual DLT = electronic visualized double-lumen endobronchial tube, SIT = situs inversus totals.

PU-0550

基于深度学习的无痛胃肠镜检查中患者低氧血症预测模型研究

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目的 本研究旨在验证基于面部图像的深度学习方法在无痛胃肠镜检查中患者低氧血症预测的可行性，为患者围术期麻醉风险预测提供更有效的方法。
方法 本研究为前瞻性队列研究，收集了 2022 年 10 月至 2023 年 10 月期间在郑州大学第一附属医院行无痛胃肠镜检查的 361 例患者的面部图片、人口统计学数据、病历资料和术中低氧血症（术中任何时点出现脉搏氧饱和度低于 90%）的发生情况，根据患者检查过程中是否发生低氧血症分为低氧血症组和正常血氧组。采用深度学习 ResNet-50 模型对图像数据进行训练并验证其预测无痛胃肠镜检查中患者低氧血症发生的可行性。使用 K 折交叉验证和数据增强的方法来减轻数据不平衡造成的过拟合问题。探究了随机梯度下降（Stochastic Gradient Descent，SGD）、自适应梯度算法（Adaptive Gradient Algorithm，Adagrad）、均方根传播（Root Mean Square Propagation，RMSprop）和自适应矩估计（Adaptive Moment Estimation，Adam）四种优化器对 ResNet-50 模型预测性能的影响。随后，本研究分别通过受试者工作特征曲线下面积（Area Under Curve，AUC）、准确度、精确度、召回率、特异度、F1 分数六种区分度指标评估模型预测无痛胃肠镜检查中患者低氧血症的能力，使用校准曲线评估模型的预测概率与实际概率之间的一致性程度。最后，为了进一步验证 ResNet-50 模型的性能，本研究利用朴素贝叶斯（Navie Bayes）、逻辑回归（Logistic Regression）、随机森林（Random Forest）、极端梯度提升（XGBoost）、轻量梯度提升机（LightGBM）五种机器学习模型对结构化数据进行训练以及术中低氧血症的发生进行预测，并与 ResNet-50 模型进行对比。
结果 1. 与正常血氧组患者相比，低氧血症组患者年龄较高（P＜0.05）、BMI 较大（P＜0.05）、习惯性打鼾比例较高（P＜0.05）和糖尿病比例较高（P＜0.05），其他一般资料的指标差异无统计学意义（P＞0.05）。
2. ResNet-50 模型在 K 折交叉验证的五个测试集中的最高 AUC 为 0.8757（95% CI，0.8320~0.9194），平均 AUC 为 0.8521（95% CI，0.8084~0.8958），对应的准确度为 0.7618（95% CI，0.7181~0.8055）。ResNet-50 模型的校准曲线靠近完美校准曲线（y=x），表明模型的预测结局与真实结局之间存在良好的一致性。

3. 五种机器学习模型取得的 AUC 分别为：Navie Bayes [0.7864（95％CI，0.7427~0.8301）]、Logistic Regression [0.8129（95％CI，0.7589~0.8668）]、Random Forest [0.8128（95％CI，0.7602~0.8653）]、XGBoost [0.8010（95％CI，0.7447~0.8572）]和 LightGBM [0.8304（95％CI，0.7831~0.8776）]，均低于 ResNet-50 模型。

结论 深度学习 ResNet-50 模型有潜力通过面部图像识别无痛胃肠镜检查中患者低氧血症的发生。通过提前预测，医疗团队可更针对性地为此类患者制定干预措施，从而减少围术期麻醉相关并发症的发生。

PU-0551

艾司氯胺酮对无痛支气管镜检查患者肺通气功能的临床应用

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目的 本研究旨在探讨艾司氯氨酮对无痛支气管镜检查患者通气功能的临床应用。

方法 1.研究对象

选择 2024 年 9 月—2025 年 3 月在新乡医学院第一附属医院接受无痛支气管镜检查的患者 62 例。检查前告知无痛支气管镜检查风险，患者或家属签署知情同意书。

入选标准：①诊断为 COPD 且术前肺功能检查，FEV1/FVC＜70%;动脉血 PaO2＞60mmhg；②患者及其家属自愿选择进行无痛支气管镜检查，并签署知情同意书；③年龄 18~70 岁；④ASA 分级Ⅰ~Ⅲ级；⑤BMI18~28kg/m2；⑥无支气管镜检查禁忌。

排除标准：①严重高血压或糖尿病；②冠心病；③合并中枢神经系统疾病；④困难气道；⑤对研究药物过敏；⑥检查时间超过 20 分钟。按区组随机数字表法分为对照组（31 例）和观察组（31 例）。对照组采用舒芬太尼联合丙泊酚静脉麻醉，观察组采用艾司氯胺酮联合舒芬太尼、丙泊酚静脉麻醉。

2.研究所需药品及仪器

药品：艾司氯胺酮，丙泊酚，舒芬太尼；主要仪器：多功能监护仪，血气分析仪。

3.研究方案

3.1 麻醉方法所有患者检查前均禁食 8h、禁饮 2h。麻醉前进行肺通气功能检查。进入麻醉准备间后开放上肢静脉通路，入室后患者取平卧位，检测血压、心率、SpO2。准备好麻醉机、喉罩、抢救设备及药品。对照组在检查开始 5min 前静脉给予舒芬太尼 0.1μg/kg，研究组静脉给予艾司氯胺酮 0.5mg/kg 复合舒芬太尼 0.1μg/kg，随后两组靶控输注丙泊酚维持丙泊酚血浆浓度在 2.0~3.0mg/L，待患者睫毛反射消失后插入喉罩，进行无痛支气管镜检查。在进声门、隆突、左右主支气管时依据患者呛咳情况通过气管镜活检口给予 2%盐酸利多卡因 5~10ml 局部喷注。

3.2 主要观察指标

记录两组患者麻醉前（T0）、麻醉后（T1）的气道压力、SpO2、动脉血气分析结果，记录检查结束后患者苏醒时间、静脉血应激激素浓度、肺功能检查报告。

4.数据处理

4.1 样本量计算

样本量计算公式：。σ：估计的标准差=10，d：组间均值之差=11，为 1.96，Zβ 为 1.64，带入公式 N=21。考虑后期失访率为 30%，设计每组试验样本为 31 人。

4.2 统计学分析

采用 SPSS26.0 统计学软件进行数据分析，正态分布的计量资料以均数±标准差（$\bar{x}\pm s$）表示，组间比较采用 t 检验非正态分布的计量资料以中位数（四分位间距）［M（Q）］表示示，组间比较采用 MannWhitneyU 检验，计数资料以例（%）表示，采用 χ2 检验。P<0.05 为差异有统计意义。

结果 记录两组患者麻醉前（T0）、麻醉后（T1）的气道压力、SpO2、动脉血气分析结果。记录检查结束后患者苏醒时间、静脉血应激激素浓度、肺功能检查报告。

结论 给予舒芬太尼 0.1μg/kg 和艾司氯胺 0.5mg/kg 较静脉给与舒芬太尼 0.1μg/kg 对无痛支气管镜检查患者
可减轻由丙泊酚引起的通气不足，过程更平稳，麻醉恢复更快。

PU-0552

Comparison of laryngoscope-guidance insertion and standard blind insertion of laryngeal mask airway: A Systematic Review and Meta-analysis

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Background: Laryngeal mask airway (LMA) insertion using laryngoscope-guidance technique has yielded conflicting results. Whether laryngoscope-guidance is helpful for laryngeal mask insertion needs further analysis. The goal of this systematic review and meta-analysis was to compare the efficacy and safety of laryngoscope-guidance vs. blind LMA insertion.
Method: Electronic databases such as PubMed, Cochrane Library, Web of Science, and Ovid Medline databases were used. We included RCTs that compared the efficacy and safety of laryngoscope-guidance LMA insertion with those of blind LMA insertion. The primary endpoint was fiberoptic staging, and the secondary endpoints were oropharyngeal leak pressure (OLP), success rate at the first attempt, insert time, and the incidence of postoperative sore throat and blood staining.
Results: Nine studies, involving 1016 patients, were evaluated. The fiberoptic staging of the laryngoscope-guidance group was higher than in the blind group: relative ratio (RR) = 1.54 (95% CI 1.14 to 2.08; p = 0.005). The oropharyngeal leak pressure (OLP) of the laryngoscope-guidance group was higher than the blind mean difference (MD) = 2.10 (95% CI 0.38 to 3.83; p = 0.02). The success rate at the first attempt of the laryngoscope-guidance group was higher than that of the blind group: RR = 1.14 (95% CI 1.06 to 1.22; p = 0.0005). The insertion time, sore throat, and blood staining of the laryngoscope-guidance group were not different from those of the blind group: MD=3.92 (95% CI -6.69 to 14.52; p = 0.47), RR=0.90 (95% CI 0.50 to 1.65; p = 0.74) and RR=1.19 (95% CI 0.29 to 4.79; p = 0.81).
Conclusion: The insertion of LMA with laryngoscope-guidance can improve fiberoptic staging, OLP, increase the insertion success rate, and not increase the incidence of sore throat and blood staining in anesthetized patients.

PU-0553

Application of a new video laryngoscope in laryngeal mask insertion: a manikin study

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Background: Laryngeal masks have been widely used in clinical practice. However, the placement of the laryngeal mask may lead to misalignment of the laryngeal mask or complications such as pharyngeal pain and bleeding. Laryngoscope-guided laryngeal mask placement can improve the alignment of the laryngeal mask and reduce the incidence of complications. However, due to the structural characteristics of the laryngoscope, the laryngeal mask placement cannot achieve a

perfect effect. Designing a visual laryngoscope for laryngeal mask placement to improve the success rate of laryngeal mask placement is an important problem in clinical practice.
Methods: 44 junior anesthesiologists participated in this study. They were divided into two groups according to the computer-generated random number table. The LMA was inserted into an airway manikin in a blind fashion (blind group) or under visualization with the video laryngoscope-guided group (VL group). The success rate of laryngeal mask placement, insertion time, fiberoptic classification, times of manual optimization, and difficulty of placement were recorded.
Results: The LMA was successfully inserted in all participants. The success rate of laryngeal mask placement in the VL group was higher than that in the L group (94% vs 65%, $p = 0.025$). The insertion time (33.76 ± 4.78 vs 45.06 ± 6.27, $p < 0.001$) and the times of manual optimization of the laryngeal mask (9% vs 36%, $p = 0.031$) in the video laryngoscope-guided group were lower than in the blind group. The VL group has a higher fiberoptic classification ($p = 0.026$).
Conclusion: These findings suggest that the improved video laryngoscope is easy to operate, which can increase the success rate of laryngeal mask implantation, shorten the insertion time, reduce the number of adjustments and have a higher optical fiber score.

PU-0554

A new video laryngoscope combined with flexible laryngeal mask insertion：a prospective randomized study

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Background: The visual laryngoscope (VL) has been proven to be an effective implantation device for airway management. However, no laryngoscope was specifically designed for placing the laryngeal mask airway. We improved the current visual laryngoscope and developed a novel visual laryngoscope. This study aimed to evaluate the clinical efficacy of an improved visual laryngoscope for the insertion of a flexible laryngeal mask as compared to the standard blind method.
Methods: One hundred and fifty-seven patients who received F-LMA implantation under general anesthesia were randomly given the standard blind insertion technique or visual laryngoscope-assisted insertion. The first attempt success rate was recorded. Secondary outcomes included the oropharyngeal leakage pressure (OLP), the fiberoptic view, the insertion time, the position adjustment and reinsertion rate, and the postoperative airway morbidity.
Results: The first attempt success rate in group VL was higher than that in group B (99% vs 86%, $p=0.002$). The OLP was significantly higher in the video laryngoscope-guided technique (26.4±5.1 vs 23.8±4.4 cmH2O, $p=0.002$). The fiberoptic view was significantly better in group VL ($p<0.001$), and required less readjustment and reinsertion to establish effective airways ($p<0.001$). The insertion time was shorter in group B than that in group VL (33.9 vs 41.3 seconds, $p<0.001$). Hemodynamic stress responses, and postoperative airway complications did not differ between the two groups.
Conclusions: The new visual laryngoscope-guided insertion technology has a high success rate and can achieve a greater OLP and an ideal anatomical position with minimal adjustment, without increasing the risk of hemodynamic stress or adverse events.

PU-0555

个体化 PEEP 对气腹合并 Trendelenburg 体位患者术中氧合和术后肺部并发症的影响:一项系统综述和 meta 分析

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目的 This systematic review and meta-analysis examined whether individualized PEEP is associated with improved intraoperative oxygenation and reduce PPCs for patients needing pneumoperitoneum with the Trendelenburg position during surgery.
方法 Medline, Embase, the Cochrane Library, and www.clinicaltrials.gov were searched for randomized controlled trials evaluating the effects of individualized PEEP on intraoperative oxygenation and PPCs in patients who required Trendelenburg positioning with pneumoperitoneum. The primary outcome was the oxygenation (PaO_2/FiO_2) during the procedure. Secondary outcomes included PPCs, intraoperative respiratory mechanics (driving pressure, compliance), and vasopressor consumption. DerSimonian–Laird random effects models were used to calculate mean differences (MDs) and log risk ratios (log RRs) with 95% confidence intervals (CIs). The Cochrane Risk-of-Bias tool 2.0 was applied to assess the risk of bias in included studies. The protocol of this meta-analysis has been registered in PROSPERO.
结果 We included 14 studies (1121 patients) that employed different individualized PEEP strategies. Compared with control groups, individualized PEEP groups exhibited a significantly improved intraoperative PaO_2/FiO_2 (MD=56.52 mmHg, 95% CI: [33.98, 79.06], P<0.001) and reduced incidence of PPCs (log RR =-0.50, 95% CI: [-0.84, -0.16], P=0.004). Individualized PEEP reduced driving pressure while improving respiratory compliance. Intraoperative vasopressor consumption was similar between both groups. The weighted mean PEEP in the individual PEEP groups was 13.2 [95% CI, 11.7, 14.6] cmH_2O. No evidence indicated that one individualized PEEP strategy is superior to others.
结论 Our study demonstrates that individualized PEEP during surgery could improve arterial oxygenation and reduce PPCs without increasing hemodynamic unitability. However, further research is needed to determine which method is superior for research. We suggest that stricter and larger RCTs are required.

PU-0556

不同梯度的气道压对妇科腹腔镜手术患者视神经鞘直径的影响

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目的 本研究拟通过视神经鞘直径的超声测量来探究不同梯度的气道压对妇科腹腔镜手术患者视神经鞘直径的影响，以寻求临床上在满足机体基本有效氧合的情况下，对妇科腹腔镜手术患者视神经鞘直径影响最小的气道压值。
方法 选择 2021 年 11 月 1 日至 2023 年 5 月 31 日间，于医院行择期头低位妇科腹腔镜手术的患者，在满足机体有效氧合和内环境稳定的情况下采用随机数字表法将患者分为三组，分别为基线气道压加 4 cmH_2O 组（A 组）、基线气道压加 6 cmH_2O 组（B 组）和基线气道压加 8 cmH_2O 组（C 组），每组 30 例。患者入手术室后进行生命体征的监护，开放上肢静脉通路，常规进行麻醉诱导，可视喉镜辅助下行气管插管术，术中采用静脉麻醉药物来维持麻醉深度。分别在患者气管插管后 3 min 平卧位时（T）、改为头低脚高位 3 min 后（T_1）、头底脚高位 30 min 后（T_2）、头底脚高位

60 min（T_3）、改回平卧位 5 min 后（T_4）时用超声测量双眼视神经鞘直径(ONSD)，并同时记录各时间点的平均动脉压(MAP)、心率(HR)、潮气量，及术后恶心呕吐（PONV）、疼痛、肺部并发症的发生率。收集的数据采用 SPSS26．0 统计软件进行数据分析。

结果 共 90 名行头低位妇科腹腔镜手术的患者被纳入研究。三组患者 ONSD 数据符合正态分布，方差齐。三组患者在 T、T_4时 ONSD 差异没有统计学意义（P>0.05）；A 组、B 组两组在 T_1、T_2、T_3时 ONSD 均低于 C 组，差异有统计学意义（P<0.05）；A 组在 T_1、T_2、T_3时 ONSD 均低于 B 组，差异有统计学意义（P<0.05）；B 组在 T_1、T_2、T_3时 ONSD 均低于 C 组，差异有统计学意义（P<0.05）。在同组中， T 时的 ONSD 显著小于 T_1、T_2、T_3时的 ONSD（P<0.05）；T 的 ONSD 与 T_4的 ONSD 差异没有统计学意义（P>0.05）；T_2的 ONSD 显著大于 T_3的 ONSD（P<0.05）。患者在压力控制通气模式下的气道压与 ONSD 的增宽幅度呈正相关。不同组别各个测量时间点的平均动脉压、心率之间没有统计学差异。不同组别之间术后 PONV 的发生率有统计学意义，其中 A 组的 PONV 的发生率较 C 组的 PONV 发生率明显降低，差异有统计学意义。不同组别之间术后头痛和低氧血症的发生率没有统计学意义。

结论 在满足机体基本潮气量的情况下，气道压越低对视神经鞘直径的影响越小。

PU-0557

Airway Management of Madelung’s Disease Combined with Myocardiopathy: A Case Report

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Madelung’s disease (MD), also known as benign symmetric lipomatosis or the Launois-Bensaude syndrome, is a rare disease in dispose metabolic disorder characterized by painless, benign, diffuse and symmetric non-encapsulated adipose depositions in the subcutaneous superficial and deep fascial spaces of head, neck, trunk and the upper and lower limbs. The etiology of MD remains unknown with several hypothesis but is prevalent in middle-aged men with long-term alcoholism. These patients are also noticed to coexist with other illnesses, such as hepatic function abnormalities, polyneuropathy, diabetes, hyperuricemia, and dyslipidemia. Surgical intervention, including extensive lipectomy and liposuction is the standard solution for MD-induced cosmetic deformity and limited cervical mobility, but it also brings some challenges for anesthesiologists.

In the airway management of patients with MD, difficulties in ventilation, intubation and postoperative extubation may exist. Owning to anterior cervical lipoma, tracheostomy even cannot be considered as an emergent option for the inability to identify anatomical landmarks. Several case reports mentioned to apply awake endotracheal intubation, and recommended to avoid general anesthesia (10). Here we present a patient with MD who was successfully intubated after induction of general anesthesia.

CASE DESCRIPTION

A 64-year-old male (weight 70kg and height 177cm), who had suffered from multiple fat accumulations around his bilateral cheeks and neck for 10 years, was admitted to our hospital for lipectomy due to the aggressive enlargement mass. He was mainly narked with disfigurement, which affected his quality of life with occasional neck soreness but no itching, ulceration, or dyspnea. Physical examination presents excessive soft neck mass without local ulceration, bleeding, erosion, tenderness pain, or fluctuation feeling. Magnetic resonance image (MRI) reported symmetric adipose accumulation in the subcutaneous superficial and deep fascial compartments of the maxillofacial, cervical and posterior occipital areas, which was consistent with the characteristics of MD. Besides, he had hypertension for two years, without regular treatment or monitoring. He denied history of other diseases, like coronary heart disease, diabetes, or any infectious disease. History of heavy drinking (white wine 600g/day) and smoking are more than 40 years. Laboratory tests showed an elevated level of creatine kinase at 7.41mmol/L, and a minor reduction of

creatinine at 55umol/L, normal myocardial enzyme. But the echocardiography indicated myocardial lesions with left ventricular ejection fraction of 47%. The consultation from cardiology department suggested the possibility of alcoholic cardiomyopathy, and oral antihypertensive medicine was recommended to take until the morning of surgery.

Preoperative airway assessment revealed a Mallampati score of 2, with normal mouth opening, neck movement, thyromental distance, trachea orientation but a neck circumference of 47.1cm. He had snoring but no obstructive sleep apnea. He could undertake vigorous exercises and denied dyspnea, dysphagia, or dysphonia. The chest CT showed no significant stenosis in trachea. And laryngeal structure, subglottis and tracheal morphology, as well as lymph node are normal from MRI. Through there was a risk of difficult airway in patients with MD, after comprehensive evaluation, we planned anesthetized tracheal intubation with videolaryngoscope (VL) as the first choice. Laryngeal mask, oropharyngeal airway, fiber bronchoscope, and antagonist drugs were also prepared.

On operation day, after standard monitoring and sufficient preoxygenation, general anesthesia was induced by fentanil 100ug, propofol 120mg and rocuronium 65mg. There was no difficulty in mask ventilation. Assisted by VL, a 7.5 endotracheal tube (outer diameter of 10.2 mm) was inserted successfully as predicted on the first attempt. Lung protective ventilation strategy was adopted during surgery. After six hours of operation, the patient was able to open eyes under orders, with ideal tidal volume of spontaneous breathing. He was extubated smoothly, transferred to the PACU for 30-minute routine observation, and returned to the ward safely without anesthesia-related complications.

DISCUSSION

This case mentioned an MD patient with previously undiagnosed myocardiopathy safely undergoing anesthetized tracheal intubation with VL. So far, most cases of MD, which was an anticipated difficult airway, reported awake intubation via fiberoptic bronchoscopy or VL. When any potential difficulties or failures in intubation and ventilation (face mask/supraglottic airway), awake tracheal intubation is recommended to secure the airway.

There are several risk factors of difficult mask ventilation in this patient, such as older age, male sex, snoring and abnormal neck anatomy, which manifests primarily as large neck circumference due to the mass. For difficult supraglottic airway ventilation or endotracheal intubation, few predictive features were detected. Therefore, standard intubation under general anesthesia with VL instead of awake intubation was our preferred plan, with laryngeal mask airway and oropharyngeal airway available in case of difficult mask ventilation. The previous cases reporting awake tracheal intubation showed difficulties in explosure of glottis and several tries were needed for intubation. The combination of VL can increase space and then make it much easier to identify landmarks. Since tracheal and supraglottic structures are usually normal in patients with MD, these indicates the difficult airway in such patients is usually due to difficulty in glottis exposure and consequently makes it hard for intubation. In summary, our success of the conventional tracheal intubation at first attempt in this case indicates airway management of MD is not limited to awake intubation. Anesthetized tracheal intubation is still optional depending on the comprehensive airway evaluation and preformulated strategies for anticipated airway difficulty.

MD is a rare fat metabolic disorder, and the patients are mostly middle-aged men with a history of excessive alcohol consumption. Alcohol is one of the causes of cardiomyopathy, leading to alcoholic cardiomyopathy. Besides, most of these patients like this male in this case pay less attention to their health. Echocardiography or myocardial enzyme tests are not included in the routine examinations, therefore, it is possible to ignore further cardiac examination from a patient’s history or medical records. Few cases have reported the combination of MD and cardiomyopathy. Our case not only demonstrates that patients suffering MD can safely receive conventional anesthetized tracheal intubation with VL depending on the assessment of difficult airway and the extent of the disease, but also reminds us of comorbidities of myocardial complications or other diseases. Therefore, examination of myocardial enzymes and echocardiography can be considered in MD patients.

PU-0558

中青年非肥胖患者 SaCo 可视喉罩最佳置入深度的影响因素分析

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目的 观察视频引导法放置 SaCo 可视喉罩至最佳位置的准确性，探讨中青年非肥胖患者 SaCo 可视喉罩最佳置入深度与性别、体重、身高、张口度等参数之间的相关性，推导 SaCo 可视喉罩最佳置入深度计算公式。
方法 选取我院择期全身麻醉中青年非肥胖患者 100 例，男女各 50 例,ASA 分级 I~II 级，年龄 20~60 岁，BMI:18.5-27.9 kg/m2。所有患者均使用 SaCo 可视喉罩，并在可视下调整喉罩至最佳位置。记录喉罩深度、设定潮气量（S-VT）、实际潮气量（A-VT）、气道峰压（Ppeak）、呼气末二氧化碳浓度（PETCO2）及脉搏氧饱和度（SPO2）。
结果 100 例患者在视频引导下均置入最佳位置，其中发现 3 例患者喉罩罩囊压迫右侧环杓关节，在视频引导下通过颈部按压辅助操作调整至最佳位置；SaCo 可视喉罩最佳置入深度与患者性别、身高、张口度显著相关（分别为 R=0.793、0.817、0.826，P 值均<0.05）；多元线性回归分析显示喉罩最佳置入深度（cm）=4.4 + 2.15×性别（注：男性为 1，女性为 0）+3.51×身高（m）+ 0.46×张口度（指）。
结论 视频引导法可以保持 SaCo 可视喉罩处于最佳位置，中青年非肥胖患者可以使用性别、身高和张口度计算 SaCo 可视喉罩最佳置入深度。

PU-0559

三种类型气管导管在肥胖患者经 SaCo 可视喉罩气管插管效果对比

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目的 比较三种类型气管导管在肥胖患者经 SaCo 可视喉罩气管插管效果。
方法 选取我院择期全身麻醉肥胖患者 90 例，男 44 例，女 46 例，年龄 21~64 岁，BMI 28~35kg/m2，ASA Ⅰ或Ⅱ级。采用随机数字表法将患者分为三组：导引型导管组（BT 组，n=30）、PVC 型导管组（PT 组，n=30）和加强型导管组（ET 组，n=30）。记录经 SaCo 可视喉罩首次插管成功率、插管成功率、插管阻力、插管时间、可视软镜辅助插管例数；插管过程中喉罩充气、旋转气管导管、头部伸展及环状软骨加压辅助操作情况；术后咽喉疼痛、声音嘶哑、饮水呛咳等并发症情况。
结果 PT 组和 ET 组首次插管成功率和插管总成功率显著高于 BT 组（P<0.05）、插管时间显著短于 BT 组（P<0.05），BT 组和 ET 组气管插管阻力明显小于 PT 组（P<0.05），PT 组和 ET 组使用喉罩充气、旋转气管导管、头部伸展和使用可视软镜辅助次数显著少于 BT 组（P<0.05），BT 组和 ET 组术后咽喉疼痛发生率明显低于 PT 组（P<0.05）。
结论 加强型气管导管在肥胖患者经 SaCo 可视喉罩气管插管成功率高、插管时间短、辅助操作少、术后并发症少，建议优先选用。

PU-0560

经鼻高流量湿化氧疗在无痛人流手术中的应用

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目的 比较经鼻高流量湿化氧疗(HFNC)与传统鼻导管吸氧模式对环泊酚复合酒石酸布托啡诺注射液全凭静脉麻醉下行无痛人流手术患者手术期间氧合的影响.
方法 选择择期行无痛人流手术患者 80 例,采用随机数字表法将患者分为 HFNC 组和对照组,每组 40 例.每组患者均采用环泊酚复合酒石酸布托啡诺注射液全凭静脉麻醉,HFNC 组采用经鼻高流量湿化氧疗,对照组采用传统鼻导管吸氧.记录患者的年龄、身高、体重、ASA 分级、氧饱和度低于 90%发生率、动脉二氧化碳分压(PaCO2)、动脉氧分压(PaO2)、麻醉药物的使用量、手术时间、患者术中是否发生体动及患者的满意度。
结果 两组患者的年龄、身高、体重、ASA 分级、手术时间、术中体动发生率、酒石酸布托啡诺注射液的用量、患者满意度的比较差异均无统计学意义(P>0.05);与对照组相比,HFNC 组环泊酚用量较少[(30.5±5.2)mg vs(50.5±7.8)mg,P<0.05)],手术结束即刻 PaO2 也有显著区别[(208±50)mmHg vs(150±38)mmHg,P<0.05)],PaCO2 差异无统计学意义(P>0.05);在手术过程中,SpO2<90％的发生率(23.5％vs 35.2％,P<0.05),手术中断发生率(2.5％vs 7.5％,P<0.05)及辅助给氧的发生率(5％vs 25％,P<0.05),HFNC 组明显低于对照组(P<0.05).
结论 在采用环泊酚与酒石酸布托啡诺注射液的全凭静脉麻醉方式下实施无痛人流手术时，应用高流量鼻导管吸氧（HFNC）技术，能够显著提升患者的氧合效果，有效降低术中发生低氧血症的风险，并减少因气道管理需求而进行的干预次数。这一技术的应用，为患者提供了更为可靠的氧供保障，从而显著增强了手术麻醉过程的安全性与稳定性，有一定的推广价值。

PU-0561

年龄与可视硬性喉镜气管插管难度的相关性研究

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目的 观察年龄与正中入路可视硬性喉镜辅助气管插管难度的相关性
方法 选择我院 2018 年 3-9 月全麻经口气管插管的患者共 180 例。手术前记录患者性别、年龄、体质量指数(body mass index，BMI)、甲颏间距、甲颏间距/身高、张口度、头后仰度、改良 Mallampati 分级（MMT）、颈长、颈围、下颌支长、上唇咬合试验,是否为齿前突、是否打鼾、是否为小下颌等资料。所有患者均采用正中入路可视硬性喉镜辅助气管插管，记录插管次数与气管插管时间。
结果 1 次完成气管插管与 2 次完成气管插管患者的年龄差异不具有统计学意义。插管时间和年龄呈正相关。
结论 随着年龄的增加，应用正中入路可视硬性喉镜辅助气管插管的难度亦有所增加。

PU-0562

预测面罩通气分级的相关因素分析：一项前瞻性观察研究

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目的 面罩通气困难会导致通气氧合失败,引起相关并发症和气道管理的致命后果。本研究旨在确定预测面罩通气分级的相关指标。
方法 本研究拟选择 2022-09-01 至 2023-08-31 在东南大学附属中大医院接受气管插管全麻的 ASA I～III 级成年患者。记录患者与气道解剖有关的病史、上气道解剖指标和超声测量值。通过气道峰压值（peak inspiratory pressure, PIP）将患者分为两组：PIP < 20 cmH2O 为容易面罩通气，PIP ≥ 20 cmH2O 为困难面罩通气，对两组患者的上气道参数指标进行比较和多因素 logistic 回归分析，以确定面罩通气分级模型的预测指标，并采用 ROC 曲线分析评估模型的预测性能。
结果 共纳入气管插管全身麻醉的成年患者 224 例，其中面罩通气容易组 110 例，面罩通气困难组 114 例。两组患者性别、年龄、打鼾史、BMI、颈围、颈部活动度、舌骨间距比、Mallampati 分型、超声测量舌厚度、舌根距离、会厌深度、甲状软骨膜距离等方面的差异均有统计学意义（P<0.05）。多因素 logistic 回归分析显示，颈围是面罩通气困难的独立影响因素：OR=1.368（95%CI 1.024～1.829），颈围 37.75 cm 预测面罩通气分级的敏感度为 0.789，特异度为 0.636。预测效能 ROC 曲线 AUC 为 0.775（95%CI 0.690-0.861）。
结论 面罩通气分级与性别、年龄、打鼾史、BMI、颈围、颈部活动、舌骨距离比、Mallampati 分类、超声测量舌厚度、舌根距离、会厌深度、甲状软骨膜距离之间存在直接相关性，且颈围为独立的预测因素。

PU-0563

Anesthesia Plan for Severe Tracheal Stenosis: A Case Report of Severe Tracheal Stenosis Caused by Cervical Esophageal Squamous Cell Carcinoma Invasion and Systematic Review

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Objective: To provide clinical references for the rescue of patients with severe tracheal stenosis (<5mm) caused by the invasion of esophageal squamous cell carcinoma into the trachea, and to summarize and prospect the anesthesia plan and implementation potential for such patients.
Methods: By systematically introducing the current medical history, past history, clinical auxiliary examinations, laboratory tests, diagnosis and treatment process, and rescue process of a patient, this report shares a successful rescue case of a patient with severe tracheal stenosis caused by advanced cervical esophageal cancer, and summarizes the currently feasible clinical treatment strategy for patients with severe tracheal stenosis.
Results: A 59-year-old male was diagnosed with cervical and upper thoracic esophageal cancer (cTb4 stage) one week before and was admitted to our hospital's radiation therapy department on February 23, 2023. The diagnosis included severe tracheal stenosis, tracheoesophageal fistula, pulmonary infection, cervical lymph node metastasis, and mediastinal metastasis. The patient's main clinical manifestations were dyspnea and respiratory distress. Fiberoptic bronchoscopy in our

hospital showed that the lesion was located about 1.5 cm below the tracheal origin, with a cauliflower-like tumor protruding from the tracheal wall, causing extreme stenosis of the lumen, with the narrowest diameter being 4.79 mm, and the BF-P260 bronchoscopy (external diameter 4.2 mm) could not be passed; CT scan suggested that the tumor invasion of the esophagus had reached 1 cm above the carina. The patient and family had a strong desire for treatment, so anti-tumor treatment (chemotherapy + immunotherapy) was started on March 1. Due to the progression of the disease, two in-hospital rescues occurred, and the family eventually gave up treatment and was discharged.

PU-0564

不同通气装置在单肺通气中的临床特性比较：一项网状 meta 分析

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目的 在临床麻醉工作中，双腔管（Double-lumen tube, DLT）、视频双腔管（Video double-lumen tube, VDLT）和各种型号的支气管封堵器（Bronchial blockers, BBs）等通气装置被用于围术期单肺通气（One-lung ventilation, OLV）的气道管理。不同通气装置在气道管理中各有优劣，但很少有综合比较其临床特性的研究。本研究旨在通过网状 meta 分析，评估 12 种单肺通气装置的相关临床特性，以确定在不同临床情况下的最佳通气策略。

方法 根据 PICOS 原则检索了 PubMed、Embase、Web of Science 和 Cochrane Library 数据库，按照设定的纳排标准，获取自建库至 2023 年 11 月 18 日公开发表的不同通气装置应用于成人单肺通气的相关文献。纳入文献的研究设计均为随机对照试验。完成文献质量评价并提取相关数据后，使用 R 4.3.2、StataSE15 和 Review Manager 5.3 软件进行网状 meta 分析和绘图。参与分析的结局指标包含肺萎陷质量、错位率、装置放置时间、首次插管成功率、术后喉咙痛和声音嘶哑发生率。将网状 meta 分析结果按照有效性、安全性、便利性进行分组并绘制二维图，对不同通气装置的临床特性进行综合评价。

结果 本研究涉及 33 项随机对照试验，共 2177 名患者，评估了 12 种通气装置的 6 种临床特性。就有效性而言，与 DLT 相比，Arndt 支气管封堵器（Arndt bronchial blocker, ABB）的肺萎陷质量较差[0.36（0.11, 0.88）, OR（95% CI）, P < 0.05]，同时错位率较高[3.40（1.78, 6.50）, OR（95% CI）, P < 0.05]。Cohen Flex-Tip 支气管封堵器（Cohen Flex-Tip bronchial blocker, CFTBB）的术后喉咙痛[0.14（0.01, 0.88）, OR（95% CI）, P < 0.05]和声音嘶哑[0.07（0.002, 0.61）, OR（95% CI）, P < 0.05]发生率均较低，有着较高的安全性。在便利性方面，VDLT 的装置放置时间比 DLT 更短[−117.72（−190.24, −45.10）, MD（95% CI）, P < 0.05]，而 Coopdech 支气管封堵器（Coopdech bronchial blocker, CBB）在首次插管尝试中的成功率更高[17.21（3.70, 140.12）, OR（95% CI）, P < 0.05]。

结论 总的来说，相较于传统单肺通气装置 DLT，BBs 术后气道并发症发生率较低但错位风险较高，可能更加适合需要快速康复的短小手术。BBs 与单腔管或喉罩进行组合使用，能够满足特定人群（困难气道、儿童、肥胖患者）的气道管理需求。VDLT 装置放置时间更短，并且能够进行连续的气道监测，可能更加适合复杂手术或者急诊手术。麻醉医生应熟练掌握各类通气装置的使用方法，根据患者的病情和手术要求选择最合适的 OLV 通气装置。本研究存在一定局限性，其结论仍需要更多高质量随机对照实验予以验证。

PU-0565

肺保护性通气策略对结直肠癌手术患者血清 CCL2/CCR2 的影响

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目的 观察肺保护性通气策略(LPVS)对于结直肠癌（CRC）手术患者血清 CCL2、CCR2 的影响。
方法 本临床试验经南通大学附属医院伦理委员会批准[伦理号：2019-K039]，并在中国临床试验中心预注册（注册号： ChiCTR1900024829），患者或其家属术前均签署知情同意书。择期于全麻下行 CRC 手术（包括腹腔镜辅助下的 CRC 手术）患者 60 例，年龄和性别不限，ASA Ⅱ-Ⅲ级，预计加泰罗尼亚外科患者呼吸风险评估(ARISCAT)评分 26-44 分，采用随机数字表法分为两组：传统机械通气组(C 组)和肺保护性通气策略组(T 组)，每组 30 例。C 组潮气量(VT)为 8-12ml/kg（理想体重），FiO2=0.5；T 组 VT 为 6-8ml/kg（理想体重），FiO2=0.5，PEEP=6cmH20，每隔 30min 进行 1 次手法肺复张（持续气道正压 30cmH20，持续 30s），调整呼吸频率(f)，维持 PETCO2 35-45mmHg。于麻醉诱导前 5min(T0)、拔除气管导管后 30min(T1)和术后 1d(T2)时分别采集中心静脉血样 5ml，采用 ELISA 法测定血清趋化因子 2（CCL2）、血清趋化因子受体 2（CCR2）浓度。
结果 由于 C、T 两组各有 1 例患者术中输血被剔除，最后各组进行统计学处理的患者各为 29 例。2 组患者一般情况和围手术期情况各指标比较差异无统计学差异，两组患者血清 CCL2 浓度在 T1 与 T2 时均较 T0 时升高（P<0.05），C 组患者血清 CCL2 浓度在 T2 时较 T1 时降低（P<0.05），T 组血清 CCL2 浓度在 T1 时较 C 组降低（P<0.05）。两组患者血清 CCR2 浓度在 T1 与 T2 时均较 T0 时下降（P<0.05），C 组患者血清 CCR2 浓度在 T1、T2 时较 T 组降低更明显，组间比较有统计学差异（P<0.05），。
结论 肺保护性通气策略(LPVS)可以安全地用于结直肠癌手术患者，可以抑制 CRC 手术患者血清 CCL2 的过度表达，抑制 CRC 手术患者血清 CCR2 的过度消耗，对于改善 CRC 手术患者的预后可能具有潜在价值。

PU-0566

气道管理之喉罩用于气管镜麻醉

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目的 本研究旨在评估喉罩在气管镜麻醉中的应用效果和安全性，为气管镜检查提供更优化的气道管理方案，以提高患者的舒适度和麻醉质量。
方法 选取了在 2023 年内计划接受气管镜检查的 300 例患者作为研究对象。将这些患者随机分为两组，即喉罩组和对照组（采用传统的气管插管）。在喉罩组中，患者在麻醉诱导后，置入合适型号的喉罩，并连接麻醉机进行机械通气。对照组则采用传统的气管插管方式进行气道管理。
在麻醉过程中，密切监测两组患者在不同时间点的生命体征，包括平均动脉压（MAP）、心率（HR）、血氧饱和度（SpO2）等。记录麻醉诱导前（T0）、喉罩或气管插管置入即刻（T1）、置入后 3 分钟（T2）、气管镜操作开始后 5 分钟（T3）、操作结束时（T4）、喉罩或气管插管拔出即刻（T5）以及拔出后 3 分钟（T6）的 MAP、HR 和 SpO2 数值。
同时，观察并记录两组患者的麻醉起效时间（从麻醉诱导开始至患者意识消失的时间）、苏醒时间（从停止麻醉用药至患者完全清醒的时间）、手术时间（从气管镜插入至拔出的时间）以及麻醉药物的用量。
另外，详细统计两组患者在操作过程中及术后出现的并发症，如呛咳、喉痉挛、气道损伤、声音嘶

哑、术后咽痛等情况。
结果 在血流动力学方面，喉罩组患者在 T1、T5 时刻的 MAP 和 HR 波动明显小于对照组，差异具有统计学意义（P<0.05），表明喉罩置入和拔出时对患者心血管系统的刺激较小。在麻醉相关指标上，喉罩组的麻醉起效时间和苏醒时间均显著短于对照组（P<0.05），而两组的手术时间差异无统计学意义（P>0.05）。此外，喉罩组的麻醉药物用量也少于对照组。在并发症方面，喉罩组患者的呛咳、喉痉挛、气道损伤、声音嘶哑和术后咽痛的发生率均显著低于对照组（P<0.05）。
结论 喉罩应用于气管镜麻醉能够有效维持患者血流动力学的稳定，减少麻醉药物的用量，缩短麻醉起效时间和苏醒时间，并且显著降低并发症的发生风险。因此，喉罩是一种安全、有效且更为舒适的气道管理方式，值得在气管镜麻醉中广泛推广和应用。然而，在实际临床应用中，仍需根据患者的具体情况，如气道条件、手术操作难度等，权衡利弊，选择最适合的气道管理方法。

PU-0567

喉罩联合支气管封堵器在胸腔镜单肺通气手术中应用的可行性及安全性分析

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目的 分析喉罩联合支气管封堵管在胸腔镜单肺通气手术中应用的安全性及可行性
方法 选择 2023 年 6 月～2024 年 3 月择期行胸腔镜单肺通气（肺楔形切除、纵隔肿瘤、气胸）患者 70 例，其中男 43 例、女 27 例，随机分为随机分为双腔管组(双腔气管导管组)和联合组(喉罩联合封堵管组)，每组 35 例。两组患者采用相同的诱导药品，诱导后双腔管组在可视喉镜下行双腔支气管导管插管，并在纤支镜引导下进行精准定位,联合组在诱导前先连接插管型喉罩与封堵管并使封堵管伸出喉罩 20 cm 左右。诱导后助手持喉罩与封堵管悬于患者头面部上方，插管者在可视喉镜下先持封堵管使之套囊过声门，然后助手固定封堵管由插管者置入喉罩。
记录两组患者麻醉诱导前 5 分钟（T0）、双腔气管插管及喉罩放置后即刻（T1）、改变体位后（T2）、拔除双腔气管导管及喉罩即刻（T3）4 个时点的心率、平均动脉压（mean arterial pressure，MAP）及 SPO2；记录单肺通气后 5 分钟手术视野肺萎陷情况（Campos 肺萎陷分级：手术侧肺萎陷充分，手术空间非常满意，定义为优；手术侧肺萎陷，肺内有余气肺无呼吸运动，手术空间相对满意，定义为良；手术侧肺完全未萎陷或仅有小部分萎陷，无手术空间，且肺随呼吸在运动，定义为差)及患者的插管定位成功时间（插管定位时间：自开始插管至完成后利用纤支镜确认准确位置所需时间）；观察并比较两组患者发生导管移位、低氧血症、声音嘶哑、咽喉疼痛、呛咳等情况。
结果 联合组患者 T1、T3 时间点 HR、MAP 较双腔组更稳定，术后声音嘶哑、咽喉疼痛、呛咳与双腔组相比发生率更少,两组患者肺萎陷情况及插管定位成功时间差异无统计学意义,导管移位、低氧血症发生率相似，差异无统计学差异。
结论 在胸外科单肺通气患者手术中，使用喉罩与支气管封堵器的患者术中血流更稳定，苏醒期呛咳及术后咽喉部疼痛、声音嘶哑发生更少，术后清醒更彻底、更快、早期康复质量更好，值得临床推广。

PU-0568

可预料的患儿困难气道管理流程

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目的 为了掌握 2022 年美国麻醉医师协会(American Society of Anesthesiologists,ASA)联合发布的《困难气道管理实践指南》
方法 提前备好应对困难气道的相关设备，包括困难气道车，各种气道管理工具和除颤仪。熟练掌握困难气道管理流程，牢记在不清楚气道情况下慎用肌松剂。紧急情况下可以使用 Sugammadex 拮抗。
结果 对于可预料的困难气道，保留自主呼吸的气道管理模式是首选
结论 对于中重度气道梗阻的患儿，在手术前应积极备好各种设备和多团队合作，注意体位的影响，谨慎使用肌松剂，保留自主呼吸且在合适的麻醉深度下插管是较为安全的一种方法。应积极联合应用各种通气设备，尽量避免气管切开

PU-0569

允许性高碳酸血症通气策略对机械通气患者认知功能影响的研究进展

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目的 机械通气的模式和应用对神经功能的影响一直备受临床关注。允许性高碳酸血症(Permissive hypercapnia, PHY)通气策略是一种重要的肺保护性通气策略，即在保证机体充分氧合的前提下，使用相对较小的潮气量(6～8ml/kg)进行机械通气，允许 PaCO2 在一定范围内增高，从而避免传统通气策略(10～15ml/kg)所造成的肺机械性损伤以及由此产生的炎症反应。早期 PHY 通常被认为是 LPVS 所产生的不良效应，其可能引起围术期心动过速和血压升高等血流动力学不稳定，从而导致机体氧耗增加以及一系列围术期并发症。而近来研究发现，PHY 通气策略对呼吸、循环、消化和中枢神经系统等重要脏器均具有保护作用。机械通气是接受全身麻醉的患者以及危重病患者常用的呼吸支持技术，然而它可能会诱导神经炎症、神经元损伤引起认知功能障碍，从而影响患者生活质量，加重家庭和社会经济负担。研究表明，PHY 可能具有脑保护作用，可改善脑氧代谢，预防机械通气患者认知功能障碍。本文将从 PHY 的影响作用及其与机械通气患者认知功能的关系，探讨 PHY 影响机械通气患者认知功能的机制，以期为今后机械通气患者的脑保护研究提供新思路。
方法 PHY 作为以小潮气量为特征的呼吸支持策略，可降低机械通气患者发生呼吸机相关的肺损伤的发生率，即因气道压力增加(气压伤)、高潮气量(容积伤)、肺不张区域肺泡的反复塌陷和复张(肺不张伤)等，促使肺泡上皮细胞和血管内皮细胞受损而引起的全身炎症反应的生物伤。此外，PHY 还可降低肺内分流和肺不张的发生率，改善肺顺应性和氧合水平，减少组织学肺损伤，进而降低术后肺部并发症的发生率。
目前 PHY 的保护作用仍主要归因于减少了肺部拉伸，但进一步的研究显示 PHY 可通过其他途径发挥脑保护作用，维持大脑稳态，改善认知功能。Tregub 等通过对海马神经元的超微结构变化程度分析，PHY 可对负责能量代谢、抗凋亡和神经元合成功能的细胞器产生不同程度的积极影响，并且在联合缺氧暴露下还可增强 PHY 神经保护作用的效果。PHY 主要通过增加脑血流灌注、维持脑氧代谢平衡以及减轻神经元损伤等途径，维持大脑稳态，从而影响机械通气患者的认知功能。
结果 目前专家共识认为应控制 PaCO2 上升速度＜10mmHg/h、PaCO2＜65mmHg、pH 值＞7.20。

在关于 PHY 对腹腔镜手术影响的研究中指出，术中维持 PaCO2 在 45～65mmHg 范围内，并未观察到不良事件的发生，这表明了 PHY 通气策略的安全性和可行性。

结论 允许性高碳酸血症作为以小潮气量为特征的肺保护性通气策略，不仅可以改善机械通气患者的肺部预后，还可通过增加脑血流灌注、维持脑氧代谢平衡以及减轻神经元损伤等途径，发挥脑保护作用，从而预防或治疗机械通气相关的认知功能障碍。

PU-0570

脊柱侧凸矫形手术围术期肺保护策略

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目的 脊柱侧凸（Cobb 角>10°）是最为常见的脊柱畸形，对胸廓形态有着直接影响。青少年脊柱侧凸发生率为 1%-3%，60 岁以下成年人为 8.3-13%[6-8]，60 岁以上老年人发生率高达 68%。未成年人脊柱侧凸主要由姿势、神经肌肉疾病（如脊髓灰质炎、脑瘫、脊柱裂等）、先天性（胚胎发育异常）或特发性原因引起。成年人还常见于脊柱关节退行性病变，以及后天神经肌肉或代谢疾病等引起的继发改变。女性发病率高于男性，Cobb 角>10°女性发病率是男性的 2 倍，而 Cobb 角>30°时女性是男性的 10 倍。严重脊柱侧凸不仅影响外观，增加社会心理负担，降低生活质量，更重要的是，随着弯曲角度增加，肺功能逐渐下降，Cobb 角>25°可增加肺动脉高压风险，>50°呼吸困难风险增加， >100°时活动耐受明显降低。最终可进展为限制性或梗阻性肺疾病，甚至呼吸衰竭，严重者可因肺心病死亡。当 Cobb 角>40°-50°时可考虑手术治疗，包括前路/后路松解和矫形融合内固定、椎体切除、胸廓成形等，然而，肺部并发症是脊柱手术后死亡最常见的原因之一。除患者本身肺部病变，手术方式和时长、以及术中输血等也与术后肺部并发症相关，因此，围术期肺部保护既是难点也是重点。

方法 本文将对脊柱侧凸肺部并发症影响因素，以及术前、术中和术后肺保护策略进行总结，为脊柱矫形手术围术期管理提供相关参考。

结果 术前有效的气道评估包括肺功能、血气分析、心电图和超声心动检查，术前个性化定制多模式预康复锻练如 Schroth 康复训练或进行头环-重力牵引数，术前应用无创正压通气和辅助气道清理设备等物理治疗，术中采用压力控制容量支持通气模式、低潮气量（6-8ml/kg）、呼气末正压等合理的通气方式，围术期使用抗纤溶药物、控制性降压、严格体温管理等血液保护策略，术中通过有创监测、术后监测 BNP 合理进行容量管理，使用肺部超声早期诊断气胸、肺不张、肺水肿，以及术后积极的呼吸和肢体功能康复训练和多模式疼痛管理措施，均有助于改善肺功能，降低肺部并发症的风险。

结论 脊柱侧凸矫形手术后肺部并发症严重影响患者预后，是术后死亡的重要原因之一。患者术前肺功能、年龄、手术方式及时长、术中输血等因素均可影响术后肺部并发症的发生。术前有效的气道评估、个性化定制预康复锻炼和物理治疗，围术期合理的通气方式、血液保护策略和麻醉管理，以及术后积极的康复训练和疼痛管理措施，均有助于改善肺功能，降低肺部并发症的风险。未来仍需更多研究以优化手术方式、完善围术期管理策略及术后镇痛模式，更好地降低肺部并发症的发生率。

PU-0571

利用电阻抗成像技术评估经声门上喷射通气下支气管镜诊疗过程中肺通气状态：一项前瞻性预试验

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目的 利用电阻抗成像技术（Electrical Impedance Tomography, EIT）来评估支气管镜诊疗过程中声门上喷射通气（ Supraglottic Jet Ventilation，SJV）对肺通气的影响
方法 这项前瞻性研究于 2021 年 8 月 30 日至 2022 年 1 月 20 日在上海肺科医院进行，招募了接受支气管镜检查的患者。重点测量 5 个时间点：基线（T0），通过魏氏鼻咽通气管（Wei nasal jet tube, WNJ）氧合（T1），经魏氏鼻咽通气管行喷射通气（SJV）（T2），软性支气管镜检查过程中（T3），和移除支气管镜后（T4）进行。主要结果是从基线到 T2 和 T3 的呼气末肺阻抗（end-expiratory lung impedance, EELI）变化（ΔEELI）。次要结果包括其他时间点的 ΔEELI，感兴趣区域（region of interest, ROI）（腹侧与整个肺通气的比例，ROIventral），每个时间点的血流动力学、氧合情况和不良事件。
结果 在 27 名患者中，5 人出现一过性低氧饱和度，但无需改为喉罩通气。从 T2 到 T3，ΔEELI 中位数（差异，-2.65；95% CI，-4.27 至-1.02；P < .001）和 SpO2（-2.5%；95% CI，-4.7 至-0.3%；P < .001）显著下降。从 T1 到 T2，ΔEELI（1.84；95% CI，1.02 至 2.66；P < .001）和 SpO2（3.3%；95% CI，1.3 至 5.2%；P < .001）显著增加，同时 ROIventral 从 43.7±2.8%上升到 60.4±2.5%（16.6%；95% CI，4.4 至 28.9%；P < .001）。
结论 尽管 SJV 不能逆转支气管镜检查对肺通气和氧合的负面影响，但能将 SpO2 维持在安全范围内。支气管镜检查前，SJV 改善了肺通气和氧合，但与通过 WNJ 氧合相比，通气分布偏向腹侧肺泡。对于在声门上喷射通气状态下行支气管镜诊疗的患者，EIT 有望成为一种有效的肺通气监测手段，但还需要更多的大型临床研究来证实其安全性和有效性。

PU-0572

A comparison between nebulized local anesthesia versus airway nerve blocks for awake fiberoptic intubation: a systematic review and meta-analysis of randomized controlled trials

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Background： The flexible fiber-optic bronchoscope is the gold standard of difficult airway managementAwake intubation requires that patient remains calm and cooperative, and the airway reflexes are blunted so as to facilitate easy intubation. Therefore, it is necessary to provide sufficient anxiolysis, analgesia, and topical anesthesia for the airway without compromising the airway. In order to achieve this, airway has to be anesthetized using topical anesthetic agents in order to minimize patient’s discomfort. A properly anesthetized airway would reduce the chances of airway trauma and secretions that may otherwise happen in inadequately prepared airway due to gagging, coughing, or movements of the patient during the process of intubation.Nebulized local anesthesia and airway nerve blocks are commonly used treatment to reduce patient discomfort and improve

the success rate of intubation.Several studies have compared nebulized local anesthesia and airway nerve block applications in awake intubation.However, they have not been systematically synthesised. Therefore, the systematic review has been designed to systematically identify, collate, critically appraise and synthesise available evidence on Application and efficacy of nebulized local anesthesia versus airway nerve blocks for awake endotracheal intubation.

Patients and methods: Two reviewers will independently search following electronic bibliographic databases: PubMed, EMBASE and Cochrane Library.PICO Format helped operationalise the review question into key concepts: adult patients undergoing awake endotracheal intubation before general anesthesia (Population), nebulised local anaesthesia (Intervention), airway nerve blocks(Control) patient discomfort, duration of intubation, intubation conditions, and hemodynamics(Outcome).A preliminary search helped in identifying thesaurus and free text terms for key concepts. The thesaurus and free text terms for a similar concept will be combined using Boolean operator OR. The search strings for different concepts will then be combined using Boolean operator AND. The search strategy will be formulated first for PubMed and later adapted for other databases.

Studies identifed through database search were transferred to EndNote reference manager software for de-duplication. Two reviewers independently performed title and abstract screening against the pre-defned inclusion and exclusion criteria . Full texts of potentially eligible studies and studies where eligibility could not be determined from title/abstract screening were retrieved and screened independently by two reviewers for inclusion. Any discrepancies were resolved through discussion and arbitrated by a third reviewer where necessary. An audit trail of all the disagreements, reasons for the same and resolutions made ensured trustworthiness of the process.

Two reviewers independently extracted following data from included studies on a pre-piloted data extraction excel form designed specifcally for this review: frst author, publication year, inclusion and exclusion criteria, details of intervention and control group, number and demographic characteristics of participants in each group, surgical procedures, rate and reasons for dropout and outcome parameters. Outcome parameters were retrieved: patient discomfort, duration of intubation, intubation conditions, and hemodynamics. Corresponding authors of included studies were contacted through e-mail for any missing data. Any discrepancies between the reviewers in the extracted data were resolved through discussion.

We performed inverse variance random-efect meta-analysis using RevMan 5.4.1.Intubation time,HR, SBP, DBP and MBP were treated as continuous variables and incidence of adverse efects (cough reactions,intubating conditions) as dichoto_x0002_mous variables. Continuous outcomes were reported as weighted mean diference with 95% Confdence Interval (CI). Signifcance was set at $P<0.05$. Outcome heteroge_x0002_neity between the studies was assessed using Cochran's Q test and quantifed with I-square statistic. I-square>50% was considered as statistically signifcant heterogeneity between the studies. Sensitivity analysis was performed by removing Studies with small sample sizes and observing its efect on outcome heterogeneity and efect estimate.

Results： Effect on Intubation time:This systematic review included 3 studies of which 2 were included in the meta-analysis. The airway nerve block group had a shorter intubation time compared to the two groups.(mean difference = 41.57 [95% confidence interval (CI), 2.82 to 80.33], P =0.04, I^2=0%).

Mild cough rate:This systematic review included 3 studies of which 2 were included in the meta-analysis. The airway nerve block group had a Lower cough rates compared to the two groups.(mean difference = 26.27 [95% confidence interval (CI), 4.24 to 162.81], P =0.0004, I^2=0%).

Efect on hemodynamics:This systematic review included 3 studies.The haemodynamic response was higher in the nebulized local anesthesia group than in the airway nerve block group, but there was no statistically significant difference between the two.

Conclusion：

This systematic review and meta-analysis demonstrated that Airway nerve blocks are more likely to reduce patient discomfort, reduce complications, and create better intubation conditions for anesthesiologists than nebulized local anesthesia during awake intubation.

PU-0573

良性气道狭窄患者麻醉管理 1 例病例报告

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目的 气道狭窄包括恶性和良性气道狭窄，可能由多种病因引起不同程度的气道狭窄，轻者可能引起咳嗽咳痰喘息气促等症状，严重者可能造成窒息危及生命；在 ICU 内通过经气管插管建立的人工气道能够给与患者良好的呼吸支持, 但在插管操作及维持过程出现气道损伤，进而演变为气管狭窄。现报告 1 例因气管插管导致气道狭窄造成二次手术插管困难的病例报告

方法 临床资料：患者，男，47 岁。因“反复咳嗽，咯痰，喘息，气促 1 年，加重 3d”入院。入院 1 年前患者出现反复咳嗽，干咳为主，咯少许白色粘液痰,伴活动后喘息，气紧，心累，期间晕厥一次，对症治疗后病情仍反复。3d 前,患者上述症状加重入我院呼吸内科,既往史：1 年前因车祸伤行脾切除手术，术后入 ICU 治疗好转后出院；查体：可闻及吸气相喉鸣音，可见“三凹征”，左上腹可见一长约 4cm"L"型陈旧性手术瘢痕,瘢痕下腹壁可触及大小约 6cm×5cm×4cm 包块。胸腹部 CT 提示：左侧隔疝，腹正中及左侧腹壁疝，颈部未见异常；入院诊断: 1 大气道狭窄？；2 慢性阻塞性肺病急性加重期 3 隔疝，予以对症治疗后患者病情反复，建议患者行纤维支气管镜检查，患者拒绝；入院第 7 天患者出现腹痛，腹胀；请胸外科会诊后考虑隔疝，拟在全麻下行隔疝修补术。患者入检查室后,常规心电监护。脉氧饱和度(Sp O2) 96% ~ 98% ，可见轻微呼吸困难，吸气可见“三凹征”。

结果 常规全麻诱导：咪唑 2mg，舒芬太尼 20ug，丙泊酚 120mg，罗库溴铵 40mg，手控给氧时球囊阻力较大，氧饱和度可维持在 100%，给氧 5min 后常规插管，但 7#气管插管无法插入，反复尝试后仍无法插入，然后使用纤支镜观察气道情况，发现声门入口约 0.5cm 处有一气道狭窄，导致气管插管无法进入气道，立即更换喉罩放入患者咽部，放置成功予以机控通气，潮气量约 300mL，气道阻力 25cm H2O，维持患者氧饱和度 98-100%，考虑气道阻力大，术后麻醉复苏时潮气量不足可能导致拔管困难，术中请耳鼻喉科会诊，考虑良性气道狭窄，与患者家属沟通后行气管切开术，继续完成隔疝手术，术后患者意识清醒生命体征正常，安全返回病房

结论 该患者入院时由明显的吸气性呼吸困难，体征伴明显的“三凹征”，是大气道狭窄的主要表现，作为麻醉科医生，术前应仔细询问患者病史，浏览患者检查报告，术中做好应急措施，包括纤支镜的使用，喉罩的准备，相关科室（耳鼻喉科）准备气管切开术，保障患者的生命安全。

PU-0574

Airway Management with the Application of Ct Reconstruction in a Patient with “Cannot Intubate, Cannot Oxygenate” History

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Introduction: This case report aims to illustrate the utility of advanced imaging techniques, including three-dimensional computed tomographic reconstruction (3D-CT), in the preoperative assessment of a challenging airway. We present the case of a patient with a history of "Cannot Intubate, Cannot Oxygenate" (CICO) challenges, where 3D-CT reconstruction was instrumental in achieving successful airway management.

Case Presentation: A 48-year-old male with an atlanto-occipital articulation graded as 2, a short neck, a height of 139 cm, and a weight of 40 kg presented was admitted to the hospital. One week prior, the patient experienced a critical "Cannot Intubate, Cannot Oxygenate" (CICO) event during induction for knee surgery. Following administration of 2 mg of midazolam and 10 mcg of sufentanil,

his oxygen saturation declined to 88%, accompanied by a lack of responsiveness. Subsequent mask ventilation performed by two anesthesiologists increased his oxygen saturation to 90%. An initial attempt at intubation using video laryngoscopy with a size 6.0 endotracheal tube was unsuccessful. In a subsequent attempt, utilizing an endotracheal fiberscope for guidance, the tube successfully navigated past the glottic cleft and was advanced approximately 5 cm; however, oxygen saturation began to decline once more. Following two unsuccessful intubation attempts, the patient regained consciousness, leading to the cancellation of the surgery.

To comprehensively assess the airway condition and aid in surgical planning, we employed Dolphin 11.8 (Chatsworth, CA, USA) for upper airway CT examination analysis. This allowed us to perform 3D-CT reconstruction, enabling us to visualize the airway's minimum cross-sectional area and structure.

The 3D-CT reconstruction revealed a critical airway obstruction in the patient, with the minimum cross-sectional area measured at 20.2 mm² (dimensions 4.0 mm by 4.4 mm). The distance from the carina to the glottis was approximately 5.28 cm. These findings informed our choice of a size of 5.0 endotracheal tube for the procedure ahead. The detailed images from the reconstruction were instrumental in our preoperative strategy, significantly enhancing the safety of the awake fiberoptic intubation. For sedation, the patient was administered 1 mg of midazolam and 2.5 mg of dezocine intravenously. Throughout the procedure, standard monitoring was maintained, with the patient breathing spontaneously and receiving 100% oxygen via a face mask. To achieve local anesthesia, 4% lidocaine aerosol was applied around the oropharynx, a process repeated twice. Further, 1 ml of 2% lidocaine was administered through the cricothyroid membrane after achieving an adequate sedation level. The fiberoptic intubation was executed with precision and concluded successfully, with the tube positioned 5 cm past the glottic cleft.

In conclusion, the application of advanced imaging techniques, especially 3D-CT reconstruction, was indispensable in assessing the intricate airway anatomy of this patient. These modalities did more than just confirm airway stenosis; they enabled a thorough evaluation that guided informed decision-making and meticulous preoperative preparation. This case exemplifies how 3D-CT reconstruction can serve as a crucial asset in improving the outcomes and safety of tracheal intubation, particularly in patients presenting with challenging airways, whether or not fiberoptic assistance is utilized.

PU-0575

Reversing the triad of anaesthesia in a cannot intubate, cannot oxygenate emergency

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Anatomical abnormalities of the larynx and trachea are frequently overlooked during a preanaesthetic evaluation if the patient is asymptomatic for an airway abnormality. The triad of general anaesthesia includes loss of consciousness, analgesia, and immobility. A 72-year-old man underwent laparoscopic repair of a left inguinal hernia under general anaesthesia and tracheal intubation. After induction of anaesthesia, facemask ventilation and two attempts at intubation were failed, and a “cannot intubate, cannot oxygenate (CICO)” situation was recognised. We successfully managed this CICO emergency by reversing the triad of anaesthesia, which included reversing the loss of consciousness effect of remimazolam with flumazenil, the analgesic effect of sufentanil with naloxone, and the neuromuscular block of rocuronium with sugammadex. This approach to reversing the triad of anaesthesia could be an option in some difficult clinical circumstances.

PU-0576

Comparison of mask ventilation during anesthesia induction conducted by resident and attending anesthesiologists: a retrospective observational study

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Background: Mask positive ventilation cause abnormal regional ventilation distribution during anesthesia induction. The purpose of this study was to investigate the differences in the mask ventilation conducted by resident and attending anesthesiologists.
Methods: Ninety patients undergoing anesthesia induction were retrospectively reviewed. The mask ventilation was performed either by resident or attending anesthesiologists under pressure-controlled mode, depending on availability. The regional lung ventilation was monitored by electrical impedance tomography (EIT). Regional ventilation distribution, expiratory tidal volume (TVe) and the PaO2/FiO2 were recorded. The air leakage and the incidence of pulse oxygen saturation (SpO2 < 92%) were also analyzed.
Results: In 42 patients anesthesia was induced by resident and in the other 48 patients by attending anesthesiologists. Compared with spontaneous ventilation, anesthesia induction with mask ventilation (regardless of the experience level) causes significant abnormal regional lung ventilation (ventilation shifted towards ventral regions, P < 0.001; ventilation became inhomogeneous, P < 0.001; but ventilation delay decreased, P < 0.001). There were no differences in the regional lung ventilation between resident and attending anesthesiologists performing mask ventilation. Compared with residents, mask ventilation conducted by attending anesthesiologists was associated with higher TVe (707.8±212.0 ml vs. 600.7±239.3 ml, P = 0.027), higher PaO2/FiO2 (425.8±70.6 mmHg vs. 348.9±104.7 mmHg, P < 0.001) and lower air leakage {31.5ml(19.2ml-54.2ml) vs. 72.5ml(33.5ml-186.7ml), P < 0.001}.
Conclusions: When compared with residents, attending anesthesiologists could not improve the regional lung ventilation during anesthesia induction, but they could ensure higher TVe, PaO2/FiO2, and lower air leakage.

PU-0577

电阻抗断层成像技术指导的个体化 PEEP 对侧卧位全麻患者的通气优化作用

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目的 应用 EIT 指导个体化 PEEP 滴定来评估其对侧卧位全麻手术患者肺通气和氧合的影响。
方法 选取择期行全麻侧卧位肾或肾上腺手术患者 60 例。采用随机单盲对照研究，分成 2 组。利用电阻抗断层成像技术（EIT）滴定术中最佳 PEEP 值为试验组（EIT 组），术中维持 5cmH_2O 呼气末正压值为对照组（CON 组）。EIT 组在全麻诱导后，侧卧位时，使用电阻抗断层成像仪滴定出最佳 PEEP 值，并保持最佳 PEEP 至术毕；CON 组在全麻侧卧位后，PEEP 设置为 5cmH_2O 直至术毕。记录侧卧位手术全麻患者的个体化滴定的 PEEP 值，与全麻诱导前吸空气状态下（T0）、PEEP 值使用 5min 后（T1）、术毕拔管前（T2）、在苏醒室拔管后自主呼吸 30min 后（T3）各时间段的 PaO_2/FiO_2、肺泡-动脉血氧分压差（A-aDO_2）、局部肺通气、驱动压与肺顺应性、血流动力学指标，以及机械通气状态下肺的静态顺应性指标。
结果 依据电阻抗断层成像技术，EIT 组滴定的 PEEP 中位数为 12（10，13）cmH_2O，其中 EIT 组

T1、T2、T3 时 PO_2/FiO_2 显著高于 CON 组（P<0.05），EIT 组 T1、T2 时驱动压显著小于 CON 组（P<0.05），肺顺应性显著大于 CON 组（P<0.05），CON 组 T1、T2 时 $A\text{-}aDO_2$ 显著大于 EIT 组（P<0.01）。EIT 组 T1、T2 时刻下侧与上侧肺 EELI 均显著大于对照组（P<0.05），EIT 组和 CON 组在各时间点的血流动力学指标均无显著差异。

结论 与常规给予 5cmH_2O 的 PEEP 值相比，EIT 滴定的个体化 PEEP 降低了术中驱动压、改善了肺顺应性，从而显著提高侧卧位全身麻醉手术患者的围术期氧合。

PU-0578

自发性脑出血患者术后早期拔管的危险因素及其预后分析

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目的 探索自发性脑出血患者术后早期拔管的影响因素，同时评估早期拔管对患者预后转归的影响，为临床拔管提供客观标准，有利于决策临床拔管的时机，提高医疗质量，合理分配医疗资源。

方法 回顾性收集行开颅颅内血肿清除术的自发性脑出血患者作为数据集。根据术后气管拔管时间分为早期拔管组（EE 组）和延迟拔管组（DE 组）。收集所有患者的一般资料、术前指标、术中指标、术后指标的相关数据。对一般资料、术前指标和术中指标进行单因素分析，将单因素分析中差异有统计学意义（P＜0.05）的因素纳入 logistic 回归分析，从而确定术后早期拔管的独立影响因素，最后将术后指标进行比较分析两组患者术后预后情况，了解早期拔管对患者预后转归的影响。

结果 本研究共纳入 260 例回顾性自发性脑出血患者作为数据集进行分析。本研究的早期拔管率为 51.9%，早期拔管组中拔管成功率为 80.0%，延迟拔管组为 57.1%。205 例尝试过气管拔管的患者中，有 57 例经历了拔管失败，总拔管失败率为 27.8%，其中早期拔管失败率为 20%，延迟拔管失败率为 42.9%。年龄 [P=0.040,OR=0.489;95%CI(0.248-0.967)]、术前饱胃 [P=0.007,OR=0.406;95%CI(0.211-0.783)]、术前肺部感染 [P=0.022,OR=0.391;95%CI(0.175-0.872)]、术前格拉斯哥昏迷评分（Glasgow coma scale, GCS）9-12 分 [P=0.040,OR=0.338;95%CI(0.120-0.949)]、术前 GCS 3-8 分[P＜0.001,OR=0.099;95%CI(0.037-0.264)]和脑疝[P=0.003,OR=0.206;95%CI(0.073-0.579)]是自发性脑出血患者术后早期拔管的独立影响因素。预后分析中显示早期拔管组术后肺部感染发生率、术后死亡率、重症监护室（Intensive Care Unit, ICU）住院时间、术后住院总时间及住院总费用均显著低于延迟拔管组（P＜0.05）。

结论 年龄、术前饱胃、术前肺部感染、术前 GCS 和脑疝是自发性脑出血患者术后早期拔管的独立影响因素。早期拔管可以降低肺部感染率和死亡率，可以减少 ICU 住院时间、术后总住院时间和住院总费用。

PU-0579

术前蔗糖铁联合人促红细胞生成素和维生素 C 对心脏手术患者围术期贫血的影响：一项前瞻性随机对照试验

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目的 围术期贫血不仅会增加异体输血的需求也会导致相关并发症增加。因此，优化围术期血红蛋白水平是迫切需要解决的临床问题。本研究将探讨蔗糖铁联合人促红细胞生成素和维生素 C 对心脏手术患者围术期血红蛋白水平的影响，旨在通过术前干预改善围术期贫血，减少并发症，优化术后恢复。

方法 将在浙江大学医学院附属第二医院，2023 年 2 月至 12 月，接受 CPB 下心脏手术、缺铁性贫血的患者 1:1 随机分为标准治疗对照组和联合治疗干预组。联合治疗干预组将在手术前一周内接受 3 次联合治疗，每次包括 200mg/100ml 蔗糖铁静脉输注、150IU/Kg 促红细胞生成素皮下注射及 2mg/100ml 维生素 C 静脉输注。相比之下，标准治疗组将接受等量的生理盐水。主要评估指标为术后第 5 天的血红蛋白水平，次要评估指标包括围术期异体 RBC 输注率和量、网织红细胞计数、铁蛋白和 TSAT 变化、住院时长、术后 30 天并发症（如新发房颤、心力衰竭、肺部并发症、手术切口感染、CSA-AKI）的发生率。

结果 本研究共招募 90 名患者，排除不符合条件的 10 名患者后，80 名患者被随机分配到两个治疗组。最终两组分别有 33 和 36 名患者纳入分析。通过对两组患者的基线特征（包括性别、年龄、BMI、ASA 分级等）进行比较，结果显示两组在基线特征上无显著差异。对结局分析表示干预措施不仅显著提高了干预组患者在术后第 5 天的血红蛋白水平（106±17 g/L，95±19 g/L，P=0.014）和网织红细胞计数（106±46×109/L，85±26×109/L，P=0.028），同时显著降低了术后急性肾损伤（CSA-AKI）发生率（0%vs. 17%，P=0.043）和并发症发生率（12%vs. 33%，P=0.037），但对住院时长、新发房颤、感染等其他次要结局指标及围术期输血率和平均输血量无显著影响。

结论 静脉注射蔗糖铁和维生素 C、皮下促注射重组人促红细胞生成素的联合治疗可能有效促进了术后血红蛋白的恢复和骨髓造血功能的增强。在管理心脏手术患者围术期贫血方面具有显著的效益。该策略有助于优化围术期患者的血红蛋白水平，改善术后恢复，对减少异体输血可能需要多中心、大样本研究。

PU-0580

Quality management of comprehensive blood conservation strategies during cardiopulmonary bypass in pediatric cardiac surgery

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目的 Pediatric cardiac surgery has a high rate of blood transfusion, and blood transfusion increases the risk of perioperative adverse events. This study assessed our comprehensive blood conservation strategy after quality management and explored its impact on blood transfusion and outcomes in pediatric patients undergoing cardiopulmonary bypass (CPB).

方法 We retrospectively analyzed the medical data of children (aged ≤ 14 years and weighing>10kg) who underwent CPB cardiac surgery between September 2014 and December 2021. According to the implementation of comprehensive blood conservation strategy quality management (The RBC transfusion protocals, blood product priming conditions, intraoperative cell saver, mini pediatric CPB system, connection mode of MUF tubing, infant tubing package, arterial/venous retrograde autologous priming, near infrared reflectance spectroscopy), patients were divided into traditional and improved group. Collect data including baseline features, intraoperative/postoperative variables, and clinical outcomes, and compare blood transfusion and outcomes. A 1:1 propensity score matching and subgroup analysis were performed.

结果 1760 matched patient pairs were obtained. No significant difference existed between the two groups in the in-hospital mortality. The improved group had less red blood cells transfusion during CPB (18.2% vs. 11.1%, P<0.001) and perioperative (38.1% vs. 33.6%, P=0.007), less perioperative plasma transfusion (20.7% vs. 16.6%, P=0.002), the priming volume (29.2 vs. 29.1 mL/kg, P=0.042), the intraoperative bleeding volume (35.0 vs. 20.0 mL, P<0.001) and the incidence of postoperative complications than the traditional group.

结论 Through quality management evaluation, the comprehensive blood conservation strategies during CPB is safe and effective in cardiac surgery for children weighing over 10kg, which can effectively save blood resources and reduce postoperative complications.

PU-0581

清洗体外循环预充库存红细胞对新生儿心脏手术围术期多系统的影响研究

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目的 本研究目的是比较新生儿心脏手术体外循环预充液中加入血液回收装置处理的异体库存红细胞对患者围术期血液生理系统及预后结局的影响，并描述清洗后红细胞组成的差异。
方法 单中心回顾性队列研究，涉及择期心脏病体外循环手术的 101 名新生儿患者。患者接受未清洗库存红细胞（56 名）或清洗库存红细胞（45 名）用于体外循环预中液中。比较两组间围术期炎症介质、凝血指标、VIS 评分、乳酸值等血液指标和临床结果，对结果进行了统计学分析并使用回归模型评估清洗预充液中红细胞对预后结果的相关性。
结果 经过清洗的库存红细胞中血红蛋白值（P<0.05）和红细胞压积（P<0.01）显著升高，乳酸等代谢产物降低。清洗组 CPB 期间峰值 Hct（%）（30.00vs 27.00，P<0.01）和峰值 Hb（g/L）（100.00 vs 91.00,P=0.04）、复温过程 DO2i 值（265.86 vs 244.00，P＜0.05）明显升高。术后早期清洗组乳酸值明显低于未清洗组。转入 PICU 6 小时内清洗组 VIS 评分显著低于未清洗组（P＜0.05）。两组患者术后 IL6、IL8、IL10 值均较术前显著增加（P＜0.001），术后只有 TNF-α 值存在显著差异（pg/mL）（2.28 vs 1.64，P＜0.05）。术后 DD、FIB、FDP 值均较术前显著增加（P＜0.05），但组间没有差异。两组患者除 CPB 结束时高乳酸（16% vs 34%，P=0.04）及延迟关胸发生率（2% vs 16%，P=0.02）有明显差异外，AKI、机械通气时间、院内死亡率等术后结局没有显著差异。
结论 新生儿 CPB 预充液中加入清洗后的异体库存红细胞可减少患者术后乳酸增加，降低 VIS 评分，并没有改善患者术后早期炎症系统及凝血系统变化。用 SORIN XTRA 装置处理库存红细胞可有效地增加血红蛋白值及血细胞比容水平，并去除了红细胞代谢产物。

PU-0582

Machine Learning-Based Major Blood Loss Risk Adapted Blood Management Strategies for Minimizing Allogeneic Transfusions in Spine Surgery

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Aims: Spine surgeries vary widely in complexity, with higher bleeding risks in more complex procedures, leading to increased need for allogeneic transfusions and worse outcomes. However, there is a lack of predictive models for major blood loss in spine surgery. This study aims to develop a machine learning model to predict major intraoperative blood loss in spine surgery and to analyze the benefits of risk-stratified preoperative hemoglobin optimization and intraoperative cell saver autotransfusion in reducing intraoperative and postoperative allogeneic transfusions.
Methods: This single-center retrospective study included 3,945 patients who underwent spine surgery at Peking Union Medical College Hospital from December 24, 2018, to October 28, 2021.

The cohort was divided into a training set (N = 2,492) and a validation set (N = 1,453) based on the month of surgery. Using 28 machine learning algorithms and 48 baseline characteristics, models were developed to predict major blood loss (MBL, ≥1000ml) in the training set and validated in the validation set. For clinical practice convenience, SHAP values were used to assess factor importance and identify the most significant common factors shared by the top three models in the validation set. These factors were then used to re-train the 28 simplified models, and the best model was selected based on area under the curve (AUC) and calibration curves to calculate risk scores for each patient, with interquartile range (IQR) used for risk stratification. Inverse probability of treatment weighting (IPTW) and multivariable-adjusted logistic and linear regression analyses were performed to evaluate the impact of cell saver autotransfusion and preoperative hemoglobin levels on intraoperative and postoperative allogeneic transfusions across different risk groups.

Results: Among the total cohort, 275 patients (7.0%) experienced MBL. There was no significant difference in preoperative hemoglobin levels between the MBL and non-MBL groups (mean ± SD, 136.9 ± 17.0 vs. 135.7 ± 14.7, P = 0.247). However, the MBL group had higher cell saver usage (80.4% vs. 42.0%, P < 0.001), intraoperative allogeneic transfusions (74.2% vs. 13.7%, P < 0.001), and postoperative allogeneic transfusions (21.1% vs. 3.4%, P < 0.001). The top three models based on the total 48 factors in the validation set were step (AUC, 95% CI: 0.85, 0.84 to 0.90), cforest (AUC, 95% CI: 0.85, 0.81 to 0.89), and step.forward (AUC, 95% CI: 0.85, 0.81 to 0.88). SHAP values identified common predictors of MBL, including body mass index (BMI), thoracic surgery, surgical history, preoperative platelet count, presence of tumors and tuberculosis, sacral surgery, number of fused vertebrae, vertebral resection, male gender, and structural abnormalities. As the simplified model, the glm.interaction model performed best in predicting major blood loss risk (AUC, 95% CI: training set 0.88, 0.86 to 0.91; validation set 0.85, 0.81 to 0.89; Brier score 0.051), showing consistent performance across subgroups defined by gender, BMI (cutoff 24 kg/m2), platelet count (cutoff 300×109/L), hemoglobin levels (cutoff 120 g/L), surgery location, disease diagnosis, and number of fused vertebrae with the mininum AUC of 0.76. Based on MBL risk scores of each patients predicted by glm.interaction algorithms, patients were further stratified into high, medium, and low-risk groups. High-risk patients had significantly higher rates of cell saver autotransfusion (high vs. medium vs. low risk: 75.9% vs. 44.7% vs. 16.5%, P < 0.001), intraoperative and postoperative allogeneic transfusions (intraoperative, 36.5% vs. 14.6% vs. 5.7%, P<0.001; postoperative, 11.2% vs. 2.9% vs. 1.6%, P < 0.001). After adjusting for baseline factors, surgery type, intraoperative blood loss, allogeneic transfusions, and surgeon effects using IPTW and multivariable adjustments, cell saver autotransfusion significantly reduced intraoperative allogeneic transfusion volumes (high-risk: β, 95% CI, -0.47, -0.77 to -0.16, P = 0.003; medium-risk: β, 95% CI, -0.14, -0.28 to -0.01, P=0.048) and postoperative allogeneic transfusion volumes (high-risk: β, 95% CI, -0.19, -0.31 to -0.07, P = 0.002; medium-risk: β, 95% CI, -0.06, -0.12 to -0.01, P=0.033). Additionally, in high-risk patients, cell saver autotransfusion could also significantly reduce the probability of postoperative allogeneic transfusions (OR, 95% CI, 0.54, 0.33 to 0.88, P = 0.013). However, in low-risk patients, there was no benefit to using cell saver to reduce the need for postoperative allogeneic transfusions or volumes of intraoperative and postoperative allogeneic transfusions. After adjusting for cell saver autotransfusion, higher preoperative hemoglobin levels (>140, 120-140, <120 g/L) were associated with stepwise lower risks of intraoperative or postoperative allogeneic transfusions in high and medium-risk patients (all P < 0.001). However, in low-risk patients, preoperative hemoglobin showed less significant association with the necessity of intraoperative or postoperative allogeneic transfusions, both >140 g/L compared with 120-140 g/L, and 110-120 g/L compared with 90-110 g/L (all P > 0.05).

Conclusions: The simplified glm.interaction model based on 10 factors can effectively predict the risk of major intraoperative blood loss in spine surgery. Risk stratification based on this model can guide individualized preoperative hemoglobin optimization and intraoperative cell saver autotransfusion for patients undergoing spine surgery. In high and medium-risk MBL patients, cell saver usage significantly reduces intraoperative and postoperative allogeneic transfusions. Low-risk MBL patients derive minimal benefit from aggressive hemoglobin optimization and cell saver autotransfusion in terms of reducing transfusion requirements.

PU-0583

SVV 指导的目标导向液体疗法用于肝脏手术中有效性及安全性的一项 Meta 分析

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目的 应用 Meta 分析探讨控制性低中心静脉压（CLCVP）与每搏量变异度（SVV）指导的目标导向液体疗法用于肝脏手术中的效果及安全性。
方法 方法 应用计算机检索 PubMed、Web of Science、Cochrane Library、Embase、中国知网、万方数据和中国生物医学文献数据库，收集关于 CLCVP 和 SVV 指导目标导向液体疗法在肝脏手术中比较的随机对照研究（RCT），检索时限均为数据库建库至 2023 年 4 月，由两位研究人员按照纳入排除标准独立筛选文献，提取数据，评价文献方法学质量。结局指标包括术中出血量、液体总量，输注晶体量、胶体量、尿量、手术时长、住院时间、ALT、TBIL、BUN、相关并发症人数、AKI 发生人数。采用 RevMan 5.4 软件对纳入文献进行 Meta 分析。
结果 结果 最终纳入 16 项 RCT。共 987 例患者，其中 CLCVP 组 494 例，SVV 组 493 例。Meta 分析结果显示，SVV 指导目标导向液体治疗显著减少术中出血量(MD =27.13ml，95% CI 23.47,30.79，P<0.05)、术中输注液体总量（MD=247.30ml，95% CI 155.65, 338.95，P<0.05）、术后并发症发生率(OR 2.72，95% CI 1.77,4.17，P<0.05)、住院时间(MD=2.82d，95% CI 2.24,3.39，P<0.05)。
结论 结论 在肝脏切除术中，SVV 指导目标导向液体治疗可以优化术中液体管理，减少术中出血量，降低术后并发症发生率，对患者产生更大的收益。

PU-0584

骨关节炎患者单侧全髋关节置换术围术期输血危险因素分析

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目的 随着人口老龄化趋势增加，退行性疾病如骨关节炎等的医疗负担逐渐加重。全髋关节置换术可以有效改善骨关节炎患者的临床症状，减轻疼痛，提高生活质量，近年来临床需求持续增长。血液丢失与异体血液输注在全髋关节置换术中非常普遍，且与术后感染、疾病传播、医疗花费增加等相关。本研究旨在探究骨关节炎患者单侧初次全髋关节置换术围术期输血的危险因素，为临床决策提供思路与帮助。
方法 本研究回顾性收集 2013 年 1 月至 2021 年 10 月于所在医院接受单侧初次全髋关节置换术的骨关节炎患者。纳入变量包括人口学特征、术前实验室检查以及手术相关信息等。通过单因素分析与多因素 Logistic 分析识别接受单侧初次全髋关节置换术的骨关节炎患者围术期输血危险因素。
结果 本研究共纳入患者 772 例，116 例（15.03%）患者接受围术期输血，64 例（8.29%）患者接受术中输血，62 例（8.03%）患者接受术后输血，10 例（1.30%）患者同时接受术中及术后输血。单因素分析显示输血组与非输血组在 BMI、ASA 分级＞Ⅱ级、是否合并贫血、术前血红蛋白水平、术前 D -二聚体水平、术前白蛋白水平、术前总胆红素水平和手术时间方面有所差异（P＜0.05）。多因素 Logistic 分析显示 ASA 分级＞Ⅱ级（OR 2.222, 95%CI 1.144-4.315，P=0.018），延长的手术时间（OR 1.018, 95%CI 1.013-1.022，P＜0.001），升高的术前 D -二聚体水平（OR 1.182, 95%CI 1.017-1.374, P=0.029）与围术期输血风险增加相关。术前高血红蛋白水平（OR 0.957, 95%CI 0.937-0.978, P＜0.001）与围术期输血风险降低相关。
结论 骨关节炎患者接受单侧初次全髋关节置换术围术期输血的危险因素包括 ASA 分级＞Ⅱ级、延长的手术时间和术前 D -二聚体水平升高，而术前高血红蛋白水平则降低输血风险。围术期血液输注危险因素的识别和发现有助于指导临床医生积极采取优化干预措施，从而降低异体血液输注需求，改善患者结局。

PU-0585

Effect of TEG on postoperative hemorrhage in infants cardiac surgery : a randomized controlled trial

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目的：冠心病患儿凝血系统不成熟、CPB 不成熟，术后出血风险高。本研究旨在探讨 TEG 是否可以指导心脏手术后高危出血婴儿的凝血管理并减少失血量。方法：纳入 2020 年 10 月至 2022 年 12 月在四川大学华西医院接受 CPB 心脏手术的 0-3 岁儿童。儿童被随机分配到 TEG 组或对照组。在 TEG 组中，使用 r-TEG 分析凝血功能，指导个体化血液制品输注。对照组接受经验性输注。结果：共纳入 78 例患儿，术前差异无统计学意义。24 小时后，TEG 组的失血量（ml/kg）显著减少。围手术期红细胞悬液、血小板和白蛋白（ml/kg）输注量显著减少。结论：使用 TEG 指导高危出血心脏手术婴儿围手术期血液制品的使用，可以减少术后失血量、输血需求和住院费用。

PU-0586

VA ECMO 弱搏动血流对肾脏功能和结构的影响

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目的 评估 ECMO 支持期间血流搏动强度对肾脏功能和结构的影响。
方法 建立实验羊 ECMO 模型（VA ECMO 组和 VV ECMO 组各 5 只），ECMO 置入完成后，清醒饲养实验羊 7 天。实时监测 ECMO 羊生命体征，每 6 小时记录实验羊生命体征，每 12 小时收集血液样本，测肾功能。实验终点时，收集实验羊肾脏标本。采用酶联免疫吸附实验测血浆中胱抑素 C 浓度；采用苏木素伊红染色观察肾组织结构；采用免疫组织化学方法测肾脏血管内皮细胞标志物 CD31、肾素、中性粒细胞明胶酶相关脂质运载蛋白（NGAL）表达情况；采用免疫荧光技术观察 VE-钙粘着蛋白（CD144）表达情况。组间比较采用 t 检验。
结果 所有实验羊均存活至实验终点。两组实验羊基线、ECMO 置管前、ECMO 撤除时生命体征、实验检查、ECMO 转机参数无显著差异。ECMO 运行 7 天内，两组实验羊心率、平均动脉压无显著差异，变化趋势相同；VA ECMO 组实验羊脉压差和搏动指数显著低于 VV ECMO 组，VA ECMO 组为弱搏动血流组，VV ECMO 组为正常搏动组；两组间尿素氮、肌酐水平无显著差异；弱搏动血流组实验羊血浆胱抑素 C 浓度显著高于正常搏动组。弱搏动血流组肾脏 CD31、肾素、CD144 表达量低于正常搏动组；NGAL 表达量高于正常搏动组。
结论 ECMO 支持期间，VA ECMO 血液搏动强度弱于 VV ECMO。VA ECMO 的弱搏动血流会影响肾脏血管内皮完整性；会影响肾小动脉对肾素的调节和分泌。VA ECMO 弱搏动血流对肾脏功能的影响仍需进一步研究。

PU-0587

失血性休克心跳骤停伤员紧急保护复苏技术研究进展

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机体严重创伤失血性休克，尤其是不可控制出血，容易发生心跳骤停，机体器官严重缺血缺氧，对这些病例的急救一直是世界医学难题，要求施救者反应迅速，判断准确，精准施治，目前医学处理手段已由早期的止血、清创发展到损伤控制性复苏，心跳骤停病例则需要立即进行降主动脉阻断、冰盐水深低温灌注停循环的紧急保护复苏处理。
这一过程中，最重要的是器官功能的保护和维持，尤其心脑器官，在器官移植和心跳骤停复苏领域，尽可能减少热缺血及再灌注损伤，缩短器官热缺血时间，保护组织器官的功能，对移植器官的功能恢复及心脑等重要脏器的复苏具有重要意义。近年来，学术界针对器官热缺血保护做了很多工作，最具突破性的研究莫过于 2022 年发表于 Nature 的 OrganEx 系统和基于严重创伤失血性休克心跳骤停的紧急保护复苏技术。前者实现了猪心跳骤停热缺血 1 小时后从分子细胞功能的恢复甚至到器官整体功能的恢复，采用了体外循环和抗缺血再灌注损伤药物相结合方法；后者则强调心跳骤停后紧急低温灌注器官保护、深低温停循环、创伤修复、体外循环灌注实现机体包括脑功能的完全恢复。目前紧急保护复苏技术已经在动物实验中获得成功，在人体失血性休克心跳骤停体温灌注紧急保护复苏技术国外正在陆续展开，但该技术在诸多方面仍需要深入探索。器官灌注采用了中度低温，而紧急保护复苏中则采用深低温，控制温度的灌注管理模式及方法在复苏中的作用仍需要探索，低温对心脏功能、凝血功能、免疫功能、药物代谢的影响仍需要进一步研究；综合全身低温灌注组织器官功能恢复甚至神经功能恢复实验，器官保护液比如细胞外液和细胞内液、合成人工红细胞、氟碳化合物、携氧液等，是否能够更好或更长久保护组织细胞功能，延长组织器官创伤修复时间，尤其是更好或更长久保护神经系统功能有待进一步研究；未来实时监测战创伤伤员的体液平衡状态指导灌注液体的选择可能有助于减少肺水肿、脑水肿等并发症，并减轻缺血再灌注损伤，将会是未来研究方向；基于未来临床或基础研究的抗损伤、抗氧化、抗炎症、抑制凋亡、膜稳定剂、自由基清除剂、防再灌注损伤药物、能量底物、止血药物等在低温灌注复苏中的积极作用值得进一步探索；分子生物学研究方面，低温灌注复苏在组织细胞基因转录、炎性介质、自由基产生、氧化损伤、凋亡损伤，尤其神经元、神经胶质细胞、小胶质细胞保护方面的机制研究需要进一步探索；用于现场紧急降温的便携式器械或降温装置需要改善或研制，急救团队的合作培训也需要加强，动物实验需要过渡到多中心临床实验

PU-0588

体外循环心脏手术 POD 患者肠道菌群多样性和构成的变化

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目的 通过观察体外循环心脏手术发生术后谵妄（Postoperative delirium, POD）和未发生 POD 患者的术前和术后肠道菌群的多样性和构成，探究 POD 患者围术期肠道菌群的变化特征，筛选出具有标志性差异性菌群，为建立 CPB 心脏手术 POD 的预警信号及防治靶点提供试验依据。
方法 招募拟在 CPB 下行心脏瓣膜手术的 90 名患者为观察对象，记录患者的一般资料和围术期相关资料。采用 MMSE 等量表测评两组患者的认知功能，依照术后谵妄发生与否，将患者分为发生术后谵妄组（POD 组）和未发生术后谵妄组（NPOD 组）。术前及术后 7 天内收集两组患者粪便样本储存-80℃低温冰箱中，使用 16sRNA 测序技术检测粪便菌群变化情况。
结果 与 NPOD 组相比，POD 组患者的体外循环时间、ICU 停留时间和住院时间显著增加，差异具

有统计学意义（P＜0.05）。术后 POD 组 α 多样性差异指标中 Observed_ASV 和 Shannon 明显低于术前，差异有统计学意义（P＜0.05）。两组术后的 β-多样性均明显低于术前，差异有统计学意义（P＜0.05）；POD 组的 β-多样性在术前和术后均显著低于 NPOD 组，差异有统计学意义（P＜0.05）。与 NPOD 组相比，POD 组的硒单胞菌科和巨单胞菌属的相对丰度明显增高（P＜0.05）。与 NPOD 组相比，POD 组的多形拟杆菌和普通拟杆菌的对丰度明显降低（P＜0.05）。与 NPOD 组相比，POD 组的梭菌纲、不动杆菌属等菌种的相对丰度明显增高（P＜0.05）。与 NPOD 组相比，POD 组的异常球菌门、厚壁菌门等菌种的相对丰度明显降低（P＜0.05）。与 POD 组术前相比，POD 组术后的坦纳氏菌科、颤螺菌科等菌种的相对丰度明显增高（P＜0.05）。与 POD 组术前相比，POD 组术后的 Bacteroidota、梭菌纲等菌种的相对丰度明显降低（P＜0.05）。与 NPOD 组术前相比，NPOD 组术后的红蝽菌纲、红蝽菌目的相对丰度明显增高（P＜0.05）。与 NPOD 组术前相比，NPOD 组术后的 Actinobacteriota 和厚壁菌门的相对丰度明显降低（P＜0.05）。体外循环时间与 POD 的发生呈正相关，梭菌纲（Clostridia）、Lachnospirales、单胞菌目（Pseudomonadales）等菌种的相对丰度与 POD 的发生呈现显著的正相关，其余差异性菌群的相对丰度均与 POD 的发生呈负相关。对 POD 组术前术后组内及术后 POD 组和 NPOD 组组间差异性菌群分别进行分析，并比对其结果，筛选出 3 种可能具有生物学意义的生物标志物：不动杆菌属、约氏不动杆菌和氨基酸球菌。术后 POD 组中不动杆菌属和约氏不动杆菌的丰度显著高于术后 NPOD 组及术前 POD 组（P＜0.05）；术后 POD 组中氨基酸球菌属的丰度显著低于术后 NPOD 组及术前 POD 组（P＜0.05）。

结论 体外循环心脏手术 POD 与非 POD 患者术后的肠道菌群在多样性和构成上均存在明显差异；术前 POD 组硒单胞菌科和巨单胞菌属的菌群相对丰度较非 POD 组增加，提示上述菌群的丰度水平可能是预测术后 POD 的危险因素。POD 患者不动杆菌属、约氏不动杆菌术后的相对丰度显著高于术前和非 POD 组，提示二者具有成为 POD 发生标志性菌群的潜力；POD 患氨基酸球菌术后的相对丰度明显低于术前和非 POD 组，提示其可能成为防治 POD 的干预靶目标。

PU-0589

妊娠合并艾森曼格征患者的围术期麻醉护理管理

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目的 提高此类患者麻醉围术期的护理配合经验
方法 术前在多学科会诊下综合考虑，拟定护理配合计划，根据手术方案，合理配置人员，对患者进行整体评估，提出潜在护理风险，制定个性化护理措施
结果 通过发挥专业护理技能及预见性护理配合，推动麻醉护理质量的不断提升，提升护理价值
结论 共同预见性麻醉护理配合，将护理风险因素降低，确保患者平稳度过围术期

PU-0590

儿童机器人胸科手术的通气策略

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目的 在实际应用中，达芬奇机器人辅助腔镜技术在儿童胸科手术中的应用逐渐增加，这种技术提供了精准的操作和较小的创伤，有助于患儿的快速恢复。儿童机器人胸科手术中，通气策略的选择对手术效果和患儿术后恢复有着重要影响。在这类手术中，通常采用单肺通气（One-lung

ventilation, OLV）技术，以提供清晰的手术视野并防止双肺交叉感染。然而，长时间的单肺通气可能导致非通气侧肺泡萎陷和相关的并发症。所以对该手术通气策略的探讨非常有必要。

方法 1. 肺保护性通气策略

在儿童机器人胸科手术中，肺保护性通气策略是至关重要的。这种策略旨在减少手术过程中可能发生的肺部并发症，如肺损伤、肺不张和肺水肿。肺保护性通气策略通常包括以下几个方面：

- **小潮气量通气**：使用较小的潮气量（通常为 6 ml/kg PBM）可以减少肺泡过度扩张和相关的肺损伤。
- **限制平台压**：平台压（Pplat）应限制在 25～30 cmH2O 以下，以减少对肺部的压力损伤。
- **允许性高碳酸血症**：在保证足够氧合的前提下，可以适当允许 PaCO2 升高，以减少呼吸机相关肺损伤的风险。
- **肺开放通气策略**：通过适当的 PEEP 水平和其他技术，保持肺泡开放，防止肺塌陷。

2. PEEP 的个体化设置

呼气末正压（PEEP）的水平需要个体化设置，以保证呼气末肺泡不塌陷。可以通过跨肺压监测、肺复张手法以及电阻抗断层成像（EIT）等方法来滴定 PEEP 水平。合适的 PEEP 能够保证肺泡的稳定性，减少肺不张的发生。

3. 呼吸力学监测

呼吸力学监测对于优化通气策略至关重要。监测参数包括驱动压（ΔP）、动态驱动压、跨肺压、跨肺驱动压、应力（stress）、应变（strain）和机械能（MP）。这些参数有助于评估肺部的顺应性和损伤风险，从而调整通气参数。

4. 可视化技术的应用

肺部超声（LUS）和胸阻抗断层成像技术（EIT）等可视化技术在儿童机器人胸科手术中具有重要作用。这些技术可以帮助麻醉科医师实时评估肺部情况，指导 PEEP 的设定和肺复张策略。

5. 国际共识和指南

在实施通气策略时，参考最新的国际共识和指南。例如，2019 年 BJA 杂志发布的“手术患者保护性通气策略国际专家共识”提供了关于术前风险评估、术中呼吸监测和通气管理的建议。

6. 术中和术后管理

术中和术后的通气管理同样重要。在麻醉苏醒期，应避免呼气终末零压（ZEEP）和呼吸暂停。术后可以考虑使用 CPAP 或其他技术，以降低吸收性肺不张的风险。

结果 无论采用何种通气策略，都需要根据患儿的具体情况和手术需求进行个体化调整，以确保最佳的手术效果和患儿安全。

结论 儿童机器人胸科手术的通气策略需要综合考虑患儿的生理特点、手术类型和个体差异。通过实施肺保护性通气策略、个体化 PEEP 设置、呼吸力学监测、可视化技术的应用以及遵循国际共识和指南，可以最大限度地减少手术过程中的肺部并发症，保障患儿的安全和术后恢复。

PU-0591

瑞马唑仑用于全麻诱导出现低血压的研究及思考

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目的 比较瑞马唑仑与丙泊酚全在麻诱导期间对血流动力学的影响，并分析全麻诱导过程中出现个别严重低血压的原因。

方法 收集 2022 年 8-10 月短小手术患者，年龄 18～64 岁，BMI18～30kg/m2，ASAⅠ-Ⅱ级。将患者随机分为两组：丙泊酚组 27 例和瑞马唑仑组[1] [Z2] 33 例。丙泊酚组使用丙泊酚 2 mg/kg，复合用药选用舒芬 15-20μg 和咪唑 1mg。瑞马唑仑组使用瑞马唑仑 7mg，复合用药选用舒芬 15-20μg 和依托咪酯 0.3mg/kg。比较两组患者诱导后，在 1 分钟、3 分钟、5 分钟收缩压波动并记录两组血管活性药的使用情况。

结果 全身麻醉诱导期间 1 分钟、5 分钟收缩压进行分析。瑞马唑仑组收缩压波动小于丙泊酚组（P＜0.05）。两组显著差异有统计学意义。
结论 瑞马唑仑组比较丙泊酚组诱导方案血流动力学稳定。当样本量满足调查研究要求的最低样本数时，研究期间未出现严重低血压病例。因此，少数严重低血压病例考虑是个体差异引起的Ⅰ型变态反应，即速发型过敏反应。

PU-0592

抗栓药物的围术期管理

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目的 出血是常见的术后并发症，而围术期抗血小板药物或抗凝药物等抗血栓形成药物的使用将增加术后出血的风险。同时，服用抗血栓药物的患者往往是合并血栓栓塞的人群，围术期武断停药势必增加血栓栓塞的风险。因此，如何合理平衡围术期出血和血栓栓塞的风险一直是围术期管理的难点和热点问题。本文将总结围术期出血和血栓栓塞的风险评估、围术期抗血栓形成药物的停药、桥接、恢复使用原则，以期为临床管理提供参考。
方法 根据患者应用抗血小板药物和抗凝药物的基础疾病，以及抗血小板药物和抗凝药物的使用时间，评估患者目前血栓栓塞的风险等级。根据患者的手术部位、手术时间、手术操作涉及的器官组织血供情况以及与大血管的毗邻关系，评估手术的出血风险等级。根据血栓栓塞风险等级和出血风险等级，判断患者的矛盾类型，即是出血风险为主、血栓栓塞风险为主还是出血风险和血栓栓塞风险同时并存。最后根据患者的出血和血栓栓塞的主要矛盾，给与相应的继续抗血小板、抗凝治疗或暂停抗血小板、抗凝治疗，或者是停用长效的抗血小板药物、抗凝药物，同时使用短效药物进行桥接治疗。
结果 若患者是血栓栓塞风险高危，而出血风险低危，则继续患者现有的抗血小板药物或抗凝药物治疗。若患者是血栓栓塞风险低危，而出血风险高危，则暂停现有的抗血小板药物或抗凝药物治疗，并做好手术出血的预防。待手术出血风险期度过后再继续抗血小板或抗凝药物的治疗。若患者血栓栓塞风险和出血风险均是高危，则需根据抗血小板药物或抗凝药物的半衰期，在手术开始前停药 5 个半衰期以上，并监测患者的凝血功能等指标。与停药同时开始使用相应的短效替代药物。手术结束后，在出血风险期结束后立即恢复抗血小板或抗凝药物治疗。因为抗凝药物和抗血小板药物种类较多，药物代谢特点各异，临床上要根据各自的特点决定停药时间。
结论 围术期抗血栓栓塞药物的合理管理需要综合评估患者的血栓栓塞风险、手术出血风险以及现用药物的药代动力学特点，判断出血和血栓形成的平衡状态，最终决定是否停用抗血栓形成药物和是否桥接治疗，从而保证患者的围术期安全。

PU-0593

围手术期非心脏手术麻醉相关心脏骤停回顾性分析

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目的 回顾性分析广西壮族自治区桂平市人民医院 2016 至 2023 年 8 年在手术室内非心脏手术麻醉围术期 24h 内发生心脏骤停的患者医学资料，为提高临床麻醉质量与安全性提供参考。
方法 调阅我院病案信息管理系统和麻醉电子信息系统，手术科室及麻醉科不良事件讨论记录，提取 2016 年 1 月-2023 年 12 月在我院手术室内接受非心脏手术麻醉病例，对围术期 24h 内发生心脏

骤停患者的医疗记录进行分析、总结。

结果 共 102007 名患者接受非心脏手术麻醉，围术期发生心脏骤停 85 例，发生率 8.33 /10 000，其中运送入手术室前 1 例；手术中麻醉维持期 13 例；麻醉后恢复室 2 例；病房 69 例。心脏骤停病例中 ASAⅢ级及Ⅲ级以上占 88.24%。心脏复苏成功 11 例，死亡 74 例，死亡率 7.25/10 000。麻醉部分相关心脏骤停 7 例，发生率 0.69 /10 000。

结论 围术期心脏骤停原因复杂，本回顾分析，麻醉相关心脏骤停发生率显著低于国际平均水平，严重颅脑或全身复合伤失血性休克以及脓毒性休克是围术期心脏骤停和死亡的主要原因。需加强术前评估和必要的准备；精细的术中监测及容量管理；尤其需加强术后恢复期和病房的后续监护治疗，提高有效的抢救措施。

PU-0594

假体隆乳术麻醉诱导期低血压的管理

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目的 探讨假体隆乳术麻醉诱导期低血压的有效管理策略。随着整形外科手术的日益普及，假体隆乳术作为改善乳房外观的常用方法，其手术过程中的安全性问题备受关注。其中，麻醉诱导期低血压是假体隆乳术常见的并发症之一，可能导致手术中断、术后恢复延迟甚至危及患者生命。因此，本研究通过深入分析麻醉诱导期低血压的成因，提出了一系列针对性的管理策略，以期为临床实践提供参考。

方法 本研究采用回顾性分析方法，收集了近年来我院进行假体隆乳术患者的临床资料，重点分析了麻醉诱导期低血压的发生率、临床表现及影响因素。在此基础上，结合国内外相关文献和临床经验，提出了一系列低血压管理策略，包括术前全面评估、麻醉药物优化选择、麻醉深度精确控制、血容量及时补充以及血管活性药物的合理应用等。

结果 通过对临床资料的分析，我们发现麻醉诱导期低血压的发生率与患者的年龄、基础疾病、手术时间等因素有关。同时，我们发现优化麻醉药物选择、精确控制麻醉深度以及及时补充血容量等措施能够显著降低低血压的发生率。此外，对于已经出现低血压的患者，及时应用血管活性药物可以有效改善患者的血压状况，确保手术的顺利进行。

结论 假体隆乳术麻醉诱导期低血压的有效管理对于保障手术安全至关重要。通过术前全面评估、麻醉药物优化选择、麻醉深度精确控制、血容量及时补充以及血管活性药物的合理应用等措施，可以显著降低低血压的发生率，提高手术的安全性。本研究为假体隆乳术麻醉诱导期低血压的管理提供了有价值的参考，有助于推动整形外科手术的安全发展。

PU-0595

手术室内成功救治恶性高热一例

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目的 分享一例全程于手术室内成功救治的恶性高热（malignant hyperthermia，MH）患者，提高相关专业医生对恶性高热罕见病的认知，加强麻醉医生围术期规范标准监测和精细化麻醉管理的意识。

方法 患者为 23 岁女性，拟行腹腔镜下卵巢畸胎瘤切除术。静脉麻醉诱导后以七氟烷吸入和瑞芬太尼静脉泵注维持麻醉。术中患者体温和呼气末二氧化碳（PetCO2）逐渐升高，手术进行至 92 分钟

时，患者体温升至 39℃，PetCO2 升至 80mmHg。怀疑患者发生恶性高热，立即停止吸入麻醉药，改全凭静脉麻醉，调高新鲜气体流量，积极联系丹曲林，抽血查肌酸激酶、肌红蛋白等 MH 相关指标和甲状腺激素等鉴别诊断相关指标。手术进行至 115 分钟结束，患者体温升至 40.3℃，PetCO2 升至 90mmHg。术毕带气管导管送至麻醉后苏醒室（PACU）。

结果 患者入 PACU 后继续药物镇静镇痛机械通气，予一系列对症支持治疗，包括主动降温、补液、利尿、过度通气、控制心率、调节水电解质和酸碱平衡紊乱等。期间患者体温最高升至 40.9℃，PetCO2 最高至 92mmHg。实验室检查指标均未见异常。患者入 PACU 后 2h，丹曲林送到，此时患者体温和 PetCO2 已呈明显下降趋势。综合各方面因素未用丹曲林，患者病情逐渐好转并顺利拔管。术后 24 小时患者病情稳定，未出现复发征象。再次抽血查 MH 相关指标，患者肌酸激酶和肌红蛋白均明显升高。随后抽血行基因检测，结果示患者 RYR1 基因突变，患者系恶性高热易感者。患者于术后第 4 天顺利出院。

结论 该例患者的救治全程于手术室内进行，患者发病凶险，但恢复快且恢复良好，一方面与患者易感性相关，另一方面得益于术中规范标准的监测和精细化的麻醉管理，使得患者病情及早被发现并得到及时有效的处理且预后良好。

PU-0596

非肌松喉罩全麻对放置腹膜透析管操作条件和麻醉质量的影响

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目的 探讨无肌松喉罩全身麻醉用于终末期肾病患者腹腔镜下放置腹膜透析管的手术操作条件和麻醉质量。

方法 选取上海市松江区中心医院 2021 年 1 月～2023 年 12 月需要全身麻醉下行腹腔镜腹膜透析置管术的终末期肾病患者 134 例，随机分为两组：插管组（n=67）和喉罩组（n=67）。比较两组患者腹腔镜下放置腹透管的 Leiden 外科操作条件（L-SRS）评分、麻醉期血流动力学变化、苏醒时间、拔管时间、苏醒期和术后不良反应以及术后患者的满意度。

结果 与插管组比较，喉罩组患者腹腔镜下放置透析管前和放置透析管后 L-SRS 评分无统计学差异（P＞0.05）；插管组患者透析管置入前和置入后腹腔镜外科操作 L-SRS 评分分别为 4.5±0.6 和 4.5±0.7，喉罩组患者分别为 4.4±0.7 和 4.4±0.7，L-SRS 在两组间的差异无统计学意义。喉罩组患者麻醉和术中经历了更小的血流动力学波动，两组间多时间点 MAP（F 组间 5.271 P 组间 <0.05；F 组间×时间 17.297 P 组间◊时间<0.01）和 HR（F 组间 25.293 P 组间 <0.01；F 组间×时间 39.833 P 组间◊时间<0.01）的总体比较和交互比较差异有统计学意义；插管组患者睁眼时间[16.4±3.6（min）]长于喉罩组患者苏醒时间[5.4±2.7（min）](P <0.001)。插管组患者拔管时间[21.4±8.1（min）]长于喉罩组的拔喉罩时间[7.1±2.9（min）]（P <0.001）。插管组患者苏醒期呛咳和躁动发生率高于喉罩组患者（61.7% vs 12.8%；14.7% vs 0%， P 均 <0.001）。两组患者术后恶心和呼吸抑制发生率无统计学差异。两组患者均未出现反流误吸并发症。两组患者术后咽喉疼痛、声音嘶哑和恶心呕吐发生率均无统计学差异。喉罩组患者术后满意度高于插管组（P=0.004）。

结论 非肌松喉罩全麻用于终末期肾病患者行腹腔镜下腹透管放置术，既能满足腹腔镜手术操作条件，又具有麻醉中血流动力学更稳定、苏醒更快、术后不良反应更少、患者满意度更高的优点。

PU-0597

The relationship between intraoperative blood pressure levels and severe adverse outcomes in patients over 80 years undergoing noncardiac surgery: A single-center experience in China

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Objective: There is limited understanding regarding the relationship between specific intraoperative blood pressure thresholds and severe adverse postoperative outcomes in elderly patients undergoing noncardiac surgery. The objective of this study is to assess the association between IOH thresholds, their durations, and severe adverse outcomes in elderly patients over 80 years.
Methods: We conducted a retrospective evaluation of 846 consecutive patients aged 80 years or older who underwent non-cardiac surgical procedures at Shanghai Songjiang District Hospital in China, from January 1, 2020, to December 31, 2021. Forty-one patients who met specific exclusion criteria were excluded from the analysis, resulting in a final sample size of 805 patients. The primary endpoint of study was postoperative severe morbidity associated with perfusion. The secondary endpoints were postoperative all-cause death during the hospital stay, the need for intensive care unit (ICU), duration of ICU stay, and duration of hospital stay.
Results: Postoperative severe complications related to perfusion were observed in 48 cases (6%), and there were 22 cases (2.7%) of all-cause death during the hospital stay. Multivariable adjusted logistic regression analysis revealed that MAP < 60 mmHg was an independent risk factor for postoperative severe morbidity associated with perfusion. Similarly, MAP < 60 mmHg and MAP < 70 mmHg were independent risk factors for postoperative all-cause mortality. The area under the curve (AUC) for MAP < 70 mmHg, indicating postoperative severe morbidity related to perfusion, was 0.808 with a 95% confidence interval (CI) ranging from 0.696 to 0.870. The cutoff value for the accumulated intraoperative time of MAP < 70 mmHg was determined to be 6.5 minutes, and 5.6 min for MAP <60 mmHg. Regarding the association between all-cause mortality and the accumulated time of different intraoperative blood pressure thresholds, the AUC was 0.907 (95% CI: 0.846-0.967) for MAP < 60 mmHg, and 0.839 (95% CI: 0.773-0.906) for MAP < 70 mmHg. The corresponding cutoff values were 10.5 minutes, and 12.5 minutes, respectively. Multivariable adjusted logistic regression analysis further demonstrated that each threshold of MAP < 80 mmHg was associated with a higher rate of ICU admission with odds ratios of OR 3.204 (95% CI 2.093-4.904), and longer hospital stay with r of 0.255 (p<0.001).
Conclusions: There was a significant correlation between intraoperative blood pressure and both postoperative severe morbidity related to perfusion and postoperative all-cause mortality. Maintaining intraoperative MAP level at ≥ 80 mmHg might be reasonable for elderly patients over 80 years undergoing non-cardiac surgery.

PU-0598

超声评估两种不同容积牛奶在学龄儿童中的胃排空：横断面研究

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目的 术前禁食可减少胃内容量残留，避免围术期的反流与误吸的发生，但长时间禁食可导致小儿

生理的不适并增加麻醉风险。新的指南中推出了更加自由的禁食方案去缩短小儿术前的禁食时间，虽然有研究证实牛奶的胃排空时间短于指南建议的 6h，但指南中并未对牛奶的禁食时间进行更新。本研究用超声检查的方法观察不同容积牛奶在学龄儿童中的胃排空情况及各自的排空时间，为儿童饮用牛奶的禁食标准提供理论参考。

方法 招募 30 名学龄儿童（6-12 岁）志愿者，每位儿童一个月内前后两次空腹状态下口服 5ml.kg-1 和 10ml.kg-1 牛奶，每次间隔至少 1 天。测量志愿者空腹状态下、饮用牛奶 5 分钟后右侧卧位时胃窦的横截面积，随后每间隔 30 分钟再次测量，直到超声观察下牛奶完全从胃内排空。记录胃窦恢复基线时间和胃完全排空时间，胃窦恢复基线时间定义为服用牛奶后至胃窦横截面积恢复至空腹状态时的时间，胃完全排空时间定义为服用牛奶后至胃窦恢复至基线时间，且超声下显示胃窦和胃体内均无凝固的牛奶颗粒残留。

结果 儿童饮用 5ml.kg-1 牛奶后，胃窦恢复基线时间范围 1.5-3.5 h,平均时间 2.35±0.56 h（95%CI: 2.15-2.55 h）,中位数时间 2.50 h (IQR: 2.00-2.63 h)；5ml.kg-1 牛奶胃完全排空时间范围 1.5-4.0 h, 平均时间 2.63±0.54 h（95%CI: 2.44-2.82 h）,中位数时间 2.50 h (IQR: 2.50-3.00 h)。儿童饮用 10ml.kg-1 牛奶后，胃窦恢复基线时间范围 2-4 h,平均时间为 3.35±0.62 h (95%CI: 3.13-3.57 h), 中位数时间 3.50 h (IQR: 3.00-4.00 h)；10ml.kg-1 牛奶胃完全排空时间范围 2.0-4.5 h,平均时间 3.62±0.61 h(95%CI: 3.40-3.84 h),中位数时间 3.50 h(IQR: 3.38-4.00 h)。亚组分析显示，男孩和女孩服用 5ml.kg-1 和 10ml.kg-1 牛奶后，各自的胃窦恢复基线时间和胃完全排空时间均无统计学差异，但时间同样低于指南建议。

结论 学龄儿童饮用不同容积牛奶后胃窦恢复基础值时间和胃完全排空时间不同，5ml.kg-1 牛奶的胃完全排空平均时间为 2.63 h, 10ml.kg-1 牛奶的胃完全排空平均时间为 3.62 h,均低于指南建议术前禁食 6 h。本研究为牛奶的禁食时间提供了理论参考，麻醉医生同样应该对牛奶的胃排空时间给予更多的关注，依据相关的研究结果，及时优化儿童术前牛奶的禁食时间。

PU-0599

麻醉鼻罩在超重或肥胖患者无痛胃镜检查中的应用：一项随机对照试验

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目的 超重或肥胖患者在静脉麻醉下胃镜检查时极易发生低氧血症，本随机对照试验目的是评价与常规鼻氧管对比，超重或肥胖患者行无痛胃镜检查过程中使用麻醉鼻罩是否可以预防或者减少低氧血症发生。

方法 该研究于 2024 年 1 月至 2024 年 6 月在江西省人民医院进行，共 127 例患者，年龄 18-65 岁，体重指数（BMI）≥25kg/m2，ASAI-III 级。按随机数字表法分为两组：麻醉鼻罩组（M 组，64 例）和鼻氧管组（D 组，63 例）。麻醉前两组患者分别配戴麻醉鼻罩或鼻氧管后均吸纯氧 3min，给予舒芬太尼 0.05μg/kg 和丙泊酚 2mg/kg，待改良警觉/镇静（MOAA/S）评分达到 1 分时进行胃镜检查操作。主要结局是术中轻中度低氧血症（75%<SpO2<90%但持续时间小于 60s）、严重低氧血症（SpO2≤75%或＜90%持续 60s 及以上）及低氧血症总发生率。次要结局包括低氧血症持续时间、最低血氧饱和度、干预措施（托下颌、面罩、插管），胃镜操作时间、丙泊酚剂量，麻醉医师和胃镜操作医生的满意度以及不良事件（包括鼻干、喉痉挛、心动过速、心动过缓、 高血压、低血压、恶心、呕吐）。

结果 两组患者一般资料、胃镜检查操作时长、丙泊酚用量差异无统计学意义（P>0.05）；M 组严重低氧血症发生率、低氧血症总发生率、面罩正压通气及干预总比例显著低于 D 组（P<0.05），且最低 SpO2 高于 D 组（P<0.05）；麻醉医师及操作医师满意度 M 组明显高于 D 组；两组患者鼻干、喉痉挛、心动过速、心动过缓、高血压、低血压、恶心发生率差异无统计学意义（P>0.05）

结论 在超重或肥胖患者无痛胃镜检查麻醉过程中，与常规鼻氧管相比，麻醉鼻罩能够预防低氧血症总发生率，显著降低严重低氧血症的发生，减少对气道操作的需求，提高了超重或肥胖患者胃镜检查麻醉的安全性。

PU-0600

«经鼻高流量氧疗临床麻醉规范应用专家共识»解读

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目的 解读«经鼻高流量氧疗临床麻醉规范应用专家共识»，以期为临床麻醉领域规范、合理应用 HFNC 提供理论依据。
方法 通过中英文数据库文献检索、专家论证，根据证据质量，借鉴 GRADE 指南意见，形成证据等级和推荐等级专家共识意见。
结果 专家共识包括六方面：
（1）HFNC 结构介绍及生理学效应；
（2）HFNC 在临床麻醉领域的应用；
（3）HFNC 应用禁忌证；
（4）HFNC 使用流程及效果监测；
（5）HFNC 在麻醉领域中应用的注意事项；
（6）HFNC 在特殊人群麻醉中的应用。
结论 经鼻高流量氧疗临床麻醉规范应用专家共识，为临床麻醉领域规范、合理应用 HFNC 提供理论依据。

PU-0601

术前超声评估不同部位血管对下腹部肿瘤手术患者全麻诱导后低血压预测价值的比较

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目的 全麻诱导时的麻醉给药可导致麻醉诱导期的循环波动，严重的循环波动容易导致术后组织器官损伤，甚至增加患者术后的死亡率。肿瘤手术患者术前常伴有营养不良，基础情况差，并且下腹部肿瘤患者术前常需要进行额外的肠道准备，导致患者在术前处于低血容量状态，更容易发生全麻诱导后低血压。因此，提前对下腹部肿瘤手术患者全麻诱导后低血压的发生进行预测显得尤为重要，本研究拟比较颈内静脉呼吸变异度（VIJV）、下腔静脉塌陷指数 (IVC-CI)、颈动脉校正血流时间（FTc）对下腹部肿瘤手术患者全麻诱导后低血压的预测效果。
方法 选取遵义医科大学第二附属医院择期行下腹部肿瘤手术患者 70 例，全身麻醉诱导前采用超声测量患者 VIJV、IVC-CI、FTc。记录麻醉诱导前基线平均动脉压（MAP）和麻醉诱导后 10 分钟内最低 MAP，并根据诱导后 10 分钟内 MAP 是否比基线水平下降 30%以上，或 MAP 绝对值是否小于 65mmHg，将患者分为低血压组和血压正常组。分别比较两组患者的VIJV、IVC-CI、FTc，并利用受试者工作特征曲线(ROC)评价三个指标单独、两两联合及三者联合对全麻诱导后低血压的预测价值。
结果 1. 在纳入的 70 例患者中，麻醉诱导后 10 分钟内有 42.3%的患者发生了低血压。与血压正常组比较，低血压组患者麻醉诱导前 FTc 明显小于血压正常组(P<0.01)；VIJV 和 IVC-CI 明显大于血

压正常组(P<0.01)。
2.VIJV、IVC-CI 及 FTc 单独预测下腹部肿瘤手术患者全麻诱导后低血压的 ROC 曲线下面积分别为 0.677、0.751、0.805，两两联合预测的 ROC 曲线下面积 VIJV+IVC-CI、VIJV+FTc、IVC-CI+FTc 分别为 0.791、0.805、0.873，VIJV、IVC-CI、FTc 三者联合预测的 ROC 曲线下面积为 0.883，灵敏度为 93.5%，特异度为 71.8%，提示 VIJV、IVC-CI、FTc 在预测下腹部肿瘤手术患者全麻诱导后低血压方面有重要作用,三者联合预测价值更优。
结论 VIJV、IVC-CI、FTc 三者联合可提高下腹部肿瘤手术患者全麻诱导后低血压预测的灵敏度和特异度，具有一定临床应用价值。

PU-0602

Three Consecutive Cases of Post-Operation Recall Under Intended Inhalational General Anesthesia

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Introduction: Intraoperative awareness (IOA), also known as accidental awareness during general anesthesia, refers to patients being conscious of their surroundings and may perceive pain during surgery while under general anesthesia. It is a distressing patient experience and may lead to long-term psychological harm, including post-traumatic stress disorder (PTSD). While some individuals may benefit from total intravenous anesthesia, the most popular method for maintaining anesthesia is still inhaling a volatile anesthetic. A key element of the inhalation anesthesia technique is the anesthetic vaporizer, ensuring the reliable delivery of the inhalational anesthetic at the target output. However, the vaporizer is prone to malfunctioning issues that might result in anesthetic failure due to human errors, wear and tear from prolonged use, and a lack of routine maintenance. According to a UK National Reporting and Learning System (NRLS) data study from 2006 to 2008, 5.1% of all IOA with post operation recall were related to vaporizer failure[5]. To mitigate such issues proactively, it is recommended that mandatory preoperative equipment checking and end-tidal anesthetic-agent concentration (ETAC) monitoring is desirable. These measures have effectively minimized adverse complications resulting from equipment-related issues. Furthermore, using a processed electroencephalogram (EEG) monitor to titrate volatile anesthetic concentrations may improve the safety of anesthesia management. However, if neither the end-tidal gas analyzer nor processed EEG is available, human error or vaporizer malfunction may lead to catastrophic consequences for intended inhalational general anesthesia. Although not mandated as standard monitoring items by the American Society of Anesthesiologists (ASA), most hospitals in North America and Western Europe have implemented monitoring of ETAC. However, it should be noted that many developing countries, and even certain Eastern European countries, do not have complete equipment coverage. We encountered three consecutive cases of IOA and post-operation recall under intended inhalational general anesthesia due to malfunction of the sevoflurane vaporizer and lack of monitoring of ETAC. This study aims to analyze the failure route and discuss options to optimize patient anesthesia care in resource-limited areas.
Method and Patients Data Collection
We collected perioperative data of three patients through intraoperative observation and recording in the surgical anesthesia information system (Table 1). We evaluated the patients' postoperative psychology after awakening and during follow-up (Supplement Table 1). After discharge, we followed up and assessed the patients' psychological impact by telephone using the modified Brice

questionnaire (Supplement Table 2). Written informed consent was obtained from all three patients for publication.

Preoperative Clinical History and Intraoperative Features

Six patients were scheduled for gynecological surgeries in the same operating room (Supplement Figure 1). We utilized a Dräger Fabius Plus anesthesia machine with intraoperative volume control ventilation and a Dräger vaporizer (Vapor 2000 for Sevoflurane). The first IOA affected patient, a 25-year-old woman undergoing hysteroscopic adhesiolysis, received standard ASA monitoring and was induced with 30ug sufentanil, 14mg etomidate, and 10mg cisatracurium. Sevoflurane vaporizer dial was set to 2.5% throughout her surgery for 90 minutes. Although she experienced a brief episode of rapid increase of heart rate (78 bpm to 103 bpm), her vital signs were otherwise unremarkable. The second patient, a 46-year-old woman undergoing laparoscopy, experienced heart rate increases before the end of surgery, with the surgery was completed in 50 minutes. The third patient, a 51-year-old woman undergoing a hysteroscopic procedure, had anesthesia maintained with sevoflurane at 2.5%, experiencing a brief episode of hypertension before the end of surgery. IOA was confirmed postoperatively in all three patients.

Investigation of the Malfunctioned Vaporizer

The malfunctioning vaporizer was immediately removed from the anesthesia machine. Further thorough inspection revealed lack of sevoflurane output at any target dial of the sevoflurane vaporizer in another anesthesia station equipped with the end-tidal gas analyzer.

Postoperative Follow-up Characteristics

Follow-up evaluations on the first postoperative day revealed the first patient's experience of awareness and pain from abdominal incisions, with tears shed during surgery. However, her recall surfaced in pos-operation day #1, but not on the day of the surgery. The second and third patients reported their awareness in the PACU, with hearing conversations, but they did not experience pain during intraoperative period. Follow-ups on postoperative Days # 135 and 387 revealed persistent memory of emotional distress in the first patient and intraoperative conversations in the third patient. However, the second patient seemed free from any detectable psychological consequence from the event.

Results and Discussion We reported three consecutive cases of IOA and post-operation recall due to equipment failure and lack of end-tidal gas analyzer. Equipment failure was confirmed to be the disconnection between the concentration dial knob and the concentrating cone. However, we failed to identify it during routine equipment checks because its appearance was very intact. Secondly, this vaporizer does not have a temperature indicator during operation, and the presence of the plastic shell makes it impossible for us to find that the vaporizer was not working at that time from the temperature difference.Vital signs are unreliable indicators for detecting IOA. Recall and reporting the recall may be delayed, making post-operative recall assessment uncertain. Equipment malfunction may still occur despite routine checks. End-tidal gas analyzers are not mandatory monitors for inhalational general anesthesia but are common in developed countries, contrasting with limited usage in developing regions (A survey around our city, Supplement Table 3). Implementing anesthesia monitoring remains a challenge due to resource constraints. When employing solely inhalational anesthetics, monitoring the anesthetic gas concentration should be considered mandatory in the situation with ETAC equipped, and inspections of anesthetic gas vaporizers should also be enforced as a compulsory procedure, even though IOA could not be 100% avoided. We propose considering total intravenous anesthesia when monitoring equipment for ETAC is unavailable and employ more EEG monitoring(or isolated forearm testing if EEG is not available) ensuring correct sedative dose delivered intravenously, or using balanced anesthesia (the use of multiple hypnotic drugs) to reduce the risk of IOA.

PU-0603

罗哌卡因和布比卡因对高龄老年髋部手术后肌力和早期活动的影响

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目的 观察罗哌卡因和布比卡因对高龄老年髋部手术蛛网膜下腔阻滞麻醉后肌力和早期活动的影响。
方法 选择 2022 年 10 月至 2024 年 3 月间在延安大学附属医院拟行髋部手术的患者 74 例，男性 28 例，女性 46 例，年龄 75~100 岁，ASA 分级 II~III 级。随机分为两组：10mg 罗哌卡因组（R 组，n=37）、5mg 布比卡因组（B 组，n=37）。两组患者于 L3-4 间隙实施腰-硬联合麻醉，以 0.1ml/s 的速度 B 组向蛛网膜下腔注入 0.25%布比卡因 5mg，R 组注入 0.5%罗哌卡因 10mg。记录患者受伤类型、骨折类型、手术方式，麻醉 4h 后患侧肌力达到 IV 级及以上的比例、术后 24h 内在病床上主动活动的次数，术后尿管留置时间、首次翻身时间、术后首次下地时间、术后首次下地行走距离、术后住院期间平均每日活动次数，感觉神经阻滞起效时间、麻醉最高阻滞平面、上升至最高阻滞平面的时间、麻醉后 15min 低血压发生率、术中整体低血压发生率。
结果 R 组麻醉后 4h 患侧肢体肌力达到 IV 级及以上的比例明显高于 B 组（P＜0.05）。R 组术后 24h 在病床上主动活动次数明显高于 B 组（P＜0.05）。R 组术后首次翻身时间明显小于 B 组（P＜0.05）。R 组术后首次下地时间明显小于 B 组（P＜0.05）。R 组术后住院期间平均每日活动次数明显高于 B 组（P＜0.05）。B 组蛛网膜下腔阻滞后上升至最高阻滞平面的时间明显小于 R 组（P＜0.05）。
结论 0.5%的罗哌卡因 10mg 应用于高龄老年髋部手术患者的蛛网膜下腔阻滞，在保证麻醉安全与满足手术需求的前提下，相较于 0.25%的 5mg 布比卡因能够促进高龄老年髋部手术后肌力恢复和早期肢体活动，加速患者康复，更利于老年患者髋部手术的蛛网膜下腔阻滞。

PU-0604

顺式阿曲库铵诱导的过敏性休克：一例通过皮肤点刺试验确诊的病例报道

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目的 本文报告了一例由顺式阿曲库铵诱导的麻醉后过敏反应病例，详细阐述了过敏反应的机制，并展示了如何利用皮肤点刺试验来确诊过敏原。
方法 采用皮肤点刺试验确诊了一例对顺式阿曲库铵诱导后过敏的患者
结果 在点刺试验后 10 分钟，观察到顺式阿曲库铵液滴周围皮肤出现明显的红晕和硬结，而其他对照组则未见类似反应，且患者在顺式阿曲库铵点刺部位感到瘙痒（图 1）。30 分钟时，测量所得硬结直径为 1.2cm，红晕直径为 3.5cm。1.5 小时后，红晕和硬结逐渐消退，患者报告顺式阿曲库铵点刺部位瘙痒感消失。皮肤点刺试验结果明确提示患者对顺式阿曲库铵存在阳性过敏反应，并且对罗库溴铵没有过敏反应。
结论 尽管由顺式阿曲库铵引发的过敏性休克比较少见，但其可能导致的支气管痉挛和过敏性休克无疑显著提高了麻醉过程中的风险。因此，临床医生必须对此类情况给予足够的重视和警觉。而皮肤点刺试验作为一种简便、高效的检测手段，为围手术期过敏原的筛查提供了极大的便利。在临床实践中，医生应综合考量患者的过敏史和体质特点，制定个性化的麻醉方案，确保患者的安全和手术的顺利进行。

PU-0605

腰硬联合麻醉后硬膜下血肿致感觉运动障碍一例

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目的 基本情况与临床检查:患者，女，84 岁，因“左下肢静脉迂曲 20 余年，肿胀伴疼痛 4 天”入院。诊断为左下肢静脉曲张，拟择期腰硬联合麻醉下行左侧大隐静脉射频消融术。血常规、凝血功能正常。肝肾功能电解质正常，心电图胸片未见明显异常。

方法 麻醉过程: 患者入手术室时神清，HR 60 次／分，BP 165／75mm Hg，SPO2 96％。取左侧卧位下 L3-4 间隙行单点腰硬联合穿刺，17G 硬膜外穿刺针黄韧带突破感明显，推注 2ml 空气无阻力，负压明显，再经硬膜外穿刺针置入 26G 的蛛网膜下隙穿刺针，后者有轻微突破感，此时拔出蛛网膜下隙穿刺针针芯后有脑脊液缓慢流出，注入 0.75%罗哌卡因 1.4ml，拔出蛛网膜下隙穿刺针，然后经硬膜外穿刺针置入硬膜外导管，留置导管向头端 3cm,退出硬膜外穿刺针，妥善固定导管。穿刺及置管过程顺利，无出血，无神经刺激症状，改平卧位，生命体征平稳。经硬膜外导管缓慢推注 2％利多卡因(1：20 万肾上腺素)3ml，观察 5min。无局麻药中毒及全脊麻症状，测麻醉平面 T10 开始手术。术中患者生命体征平稳，麻醉效果良好，手术顺利，历时 90min，术毕安返病房交班。麻醉随访及处理措施:

术后 8h 诉右下肢疼痛，患者神志清楚，生命体征平稳，无头痛、头晕、恶心、呕吐，无腰背痛。查体：右下肢肌力 2 级；左下肢肌力 3 级，肌张力不高，双侧腱反射不明显，病理反射未引出。立即行腰部 MRI 提示：L3-4 水平椎管内及邻近椎旁气体影。予以 20％甘露醇 250 ml，地塞米松 10 mg，维生素等对症治疗，无明显缓解，术后第 2 日复查 MRI 提示：L3-4 水平椎管后缘异常信号考虑为硬膜下血肿，椎管内积气较前片有所减少。遂行急诊椎管减压，血肿清除手术，术中所见如图 1-1/1-2 所示。术后第 3 天症状完全消失，双下肢肌力、感觉、肌张力、腱反射均恢复正常，下地活动无异常，MRI 提示硬膜下血肿清除干净，积气基本消失。观察 1 周后无后遗症，痊愈出院。

结果 讨论及防治措施: 腰硬联合麻醉后发生肢体功能障碍是非常严重的并发症，有文献报道暂时性轻瘫为 l‰，永久性截瘫为 0．2‰，临床表现为 12 内出现的严重疼痛和感觉运动功能障碍，发展至完全性的截瘫。若感觉麻醉平面恢复正常后又重新出现，则应警惕椎管内血肿的发生。其诊断主要依靠临床症状、体征及影像学检查。本例患者检验结果正常，在麻醉穿刺及置管过程中未见损伤出血及神经刺激症状，结合患者术后症状特点及 MRI 检查，考虑可能与椎管内血管畸形，“自发性”出血所致。患者高龄并存脊柱退行性病变，麻醉采用较粗穿刺针或导管也是危险因素之一。椎管内血肿治疗的关键在于及时发现和迅速果断处理，避免发生脊髓不可逆性损害，脊髓压迫超过 8h 则预后不佳。

结论 防治措施：（1）穿刺置管轻柔，避免反复穿刺。（2）血小板及凝血功能障碍者避免应用椎管内麻醉。（3）术后注意观察新发生的或持续进展的背痛，下肢感觉运动缺失，大小便障碍。（4）为早期发现椎管内血肿，对高危人群应避免椎管内持续输注局部麻醉药，每 2 小时行神经功能监测。（5）高度怀疑有椎管内血肿的，尽可能快速地行影像学检查，及早行外科手术治疗。

PU-0606

麻醉术后非计划转入 ICU 相关危险因素的研究进展

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目的 1.分析国内外非计划转入 ICU 的相关危险因素及其关系
2.为进一步研究国内非计划转入 ICU 的危险因素，及为早期识别非计划转入 ICU 提供理论基础

3.强化麻醉质控指标的应用，减少不良事件的发生

方法 综合分析多篇国际国内权威大样本回顾性分析文献，参考美国麻醉医师协会（American Society of Anesthesiologists，ASA)隶属的麻醉质量研究平台（Anesthesia Quality Institute，AQI)及中国麻醉质控中心所发布年度报告数据信息，对非计划转入 ICU 的背景、危险因素，影响及其未来发展展开探讨。

结果 主要从患者个体特征，手术相关因素，麻醉相关因素三个方面总结了麻醉术后非计划转入 ICU 的相关危险因素，本文还进一步探讨了术后非计划转入 ICU 对患者身体健康及预后所造成的影响以及医院级别与地区经济水平对非计划 ICU 转入的影响。

患者个体特征：合并有高龄、ASA 分级提示高风险、严重术前合并症与其他因素（诸如男性、体重指数过高或过低、贫血等）中的一项或多项危险因素的患者往往更具有术后非计划转入 ICU 的倾向，这些因素不仅直接影响患者手术后的恢复能力，还可能增加术后并发症的风险。

手术因素：与非计划转入 ICU 危险因素存在相关性的手术因素主要有手术类型（急诊手术），手术时长（手术时长超过 4 小时），手术科室（胸外科和心脑血管外科的手术发生非计划转入 ICU 的比例最高，眼科和妇产科的非计划转入 ICU 比例最低），除此之外手术操作所产生的不良事件（如失血性休克）和外科医生的资历也是非计划转入 ICU 的相关手术危险因素。

麻醉因素：与麻醉因素相关的非计划转入 ICU 危险因素主要有麻醉方式（全身麻醉），麻醉药物（药物过敏）及麻醉过程中的操作失误等，同时麻醉不良事件也是导致非计划转入 ICU 的重要原因，非计划转入 ICU 作为麻醉质控核心指标往往伴随着不止一项麻醉不良事件的产生。

非计划转入 ICU 对患者身体健康及预后所造成的影响，作为麻醉不良事件之一的非计划转入 ICU，其最终结局也可以走向其他麻醉不良事件（如麻醉后 24 小时内患者死亡等），其中最普遍的不良结局是血流动力学不稳定、低血压和再次气管插管，心脏骤停，呼吸衰竭和死亡，另外，非计划转入 ICU 还增加了患者的术后并发症发生率、平均住院时间与费用，还可能产生相关 ICU 内死亡的不良后果。

最后，本文还探讨了医院级别与地区经济水平对非计划 ICU 转入的影响。有回顾性研究进行分析后发现每个国家的非计划转入 ICU 发生率似乎与医院 ICU 床位数量有关，非计划转入 ICU 的发生率在美国和英国以及其他国家之间存在较大差异，因为其可能更依赖于医疗资源的可用性，由于医疗资源的差异和不同的医疗保健付费模式，发达国家患者更有可能在术后转入 ICU 进行治疗，而目前关于发展中国家的非计划转入 ICU 的相关危险因素的大规模回顾性研究还相对较少。

结论 麻醉术后非计划转入 ICU 的危险因素是一个多因素的复杂问题，涉及患者个体特征、手术及麻醉过程的多方面因素，以及医院级别与地区经济的整体水平。未来的研究可以进一步深入探讨这些因素之间的相互作用，并开发更为精准的预测模型，以帮助临床医生在手术前能更有效地识别高风险患者，从而采取适当的干预措施，减少麻醉术后非计划 ICU 转入的发生率。

PU-0607

“流程再造+闭环管理”模式在麻醉护士管理 麻精药品中的应用

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目的 通过实施“流程再造+闭环管理”模式管理麻精药品，可以使其在麻醉药品管理过程中更加安全、准确、高效。这种模式可以有效的提高麻精药品管理的质量，保证麻醉药品使用的合规性，有效降低医疗风险，为患者提供更优质的护理服务，提高医院的竞争力。因此，深入探讨“流程再造+闭环管理”模式在麻醉护士管理麻精药品中的应用效果，具有重要的意义和价值。

方法 本研究选取 2021 年 8 月至 2022 年 2 月在山西省某三级甲等医院麻醉科实施常规药品管理模式作为对照组，在 2022 年 3 月至 2022 年 9 月在该科室施行“流程再造+闭环管理”模式作为观察组。对照组采用在常规药品管理模式下的麻精药品管理方案，观察组实施基于“流程再造+闭环管理”模式的麻精药品管理方案，麻精药品流程再造以流程再造理念为主导，对常规药品管理模式的各个环

节进行优化与改进，即通过优化药品发放、追加、回收各个环节，实行麻精药品基数清点时间闭环、班次交接时间闭环的管理模式。比较在两种模式下，麻醉护士在药品发放、追加、回收三个环节中所需时间、药品追加次数、麻精药品清点情况、麻精药品安全隐患事件发生率。
结果 观察组药品发放、追加、回收各个环节时间均低于对照组，药品追加次数低于对照组，两组比较差异有统计学意义（P<0.05）；观察组麻精药品清点错误情况、麻精药品安全隐患事件发生率均低于对照组，两组比较差异有统计学意义（P<0.05）。
结论 采用“流程再造+闭环管理”模式在麻醉护士管理麻精药品中应用具有显著的效果，可以有效缩短麻醉护士在管理麻精药品过程中药品发放、追加、回收各环节的时间，从而有效提高麻醉护士的工作效率，同时可以降低麻精药品清点错误率和麻精药品安全隐患事件发生率，以提高麻精药品管理质量，确保麻精药品使用管理的安全、准确、高效。因此，在麻醉护士管理麻精药品中采用“流程再造+闭环管理模式”具有重要意义。

PU-0608

肌松联合低气腹压在腹腔镜癌症根治性胃切除术中的应用

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目的 探讨深度神经肌肉阻滞（NMB）联合低气腹压在 LRG 中的应用效果及其对炎症的影响。
方法 2020 年 1 月至 2022 年 1 月进行回顾性分析，共有 103 名老年 GC 患者在我院接受治疗。其中，45 名患者接受了治疗基于深肌松和传统气腹压力的手术被分配到对照组，而其余 58 名患者将接受深部 NMB 手术并降低气腹压力的患者为观察组。比较两组治疗前后 Leiden 手术评定量表评分、血清肿瘤坏死因子-α（TNF-α）和白细胞介素-6（IL-6）的变化。采用视觉模拟量表（VAS）对患者术后 8h、24h 和 48h 的肩部疼痛进行评估。比较两组在不同时间点的驱动压力。此外，还记录了手术时间、手术气腹时间、输注量、失血量、术后拔管时间、在复苏室的停留时间、TOF%=90%时间和麻醉后恢复室（PACU）停留时间，并记录了与 PACU 相关的不良呼吸事件。统计比较两组患者术后住院时间和术后费用。
结果 两组在皮肤切开时、术后 60min 和术后收腹时差异无统计学意义（P>0.05）。观察组术后 24、48 小时 VAS 评分明显低于对照组（P<0.05）。此外，观察组在气腹建立后 5 分钟和 60 分钟的驱动压力显著低于对照组（P<0.05）。此外，两组在手术时间、气腹时间、输注量、失血量、术后拔管时间、观察组治疗后 24 h TNF-α 和 IL-6 水平明显低于对照组（P<0.05）。此外，两组的不良事件发生率没有显著差异（P>0.05），观察组住院时间和术后费用明显少于对照组（P＜0.05）。
结论 深肌松联合低气腹压力可以降低肩部疼痛和炎症反应的 VAS 评分，而不会影响手术视野和增加 PACU 相关的不良呼吸事件，从而缩短患者的住院时间和治疗成本。

PU-0609

一例肝癌术后持续性呃逆病例分析

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目的 本文目的是通过报道 1 例肝癌术后持续性呃逆，探寻原因是由于中心静脉穿刺置管刺激膈神经所致，以引起临床医生对此不良并发症的关注。
方法 通过病例回顾及治疗过程的分析，并找出可能原因并进行有效治疗
结果 发现持续性呃逆是由于医源性的中心静脉穿刺置管刺激膈神经所导致
结论 穿刺中心静脉留置导管时应规范操作，尽可能避免相关不良事件发生

PU-0610

低血压预测指数在临床应用局限的研究进展

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低血压预测指数是一种将处于专利保护期内的算法规则嵌入商用的围术期血流动力学监测系统中进行血压预测，主要依赖动脉血压波形的多种特征性参数进行低血压预测。目前证据表明低血压预测指数能降低低血压发生率和严重程度，但因模型构建时数据选择的系统性偏差会造成预测低血压不准确或过度估计。本文将对其模型在数据选择偏倚、对术中和术后低血压的预防以及是否对预后具有潜在价值等方面进行综述，为临床应用提供借鉴和指导。

PU-0611

喉罩-咽腔接触模型的可视化研究

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目的 利用 3D 建模和有限元分析，研究喉罩（LMA）与咽腔（PB）之间的相互作用和形变，旨在以深入探究喉罩密封的机制
方法 对一名健康的中年志愿者进行了 3 次颈部 CT 扫描。第一次扫描用于获取咽腔的影像数据，第二次扫描用于获取咽腔置入半充气喉罩（LMA50）后的影像数据，第三次扫描用于获取满充气喉罩（LMA100）置入咽腔后的影像数据。随后，利用逆向工程软件建立了咽腔数字仿真模型（PB）、半充气喉罩-咽腔数字仿真模型（PB-LMA50）和满充气咽腔-喉罩数字仿真模型（PB-LMA100）；最后，使用有限元软件计算和呈现了不同条件下咽腔粘膜的压力分布。结果 通过模型观察到，喉罩的形变、咽部粘膜的受力分布以及咽部骨骼形成的空间关系是相互关联的；咽下段粘膜的受力大于口咽段。喉罩的形变与舌骨和甲状软骨上角的位置相关。
结果 当充气量为满气状态时，从咽前壁的密封线可以发现，气囊对粘膜提供了较好的密封；但与此同时，在下咽处，环状软骨限制了咽部的膨胀，此处出现凹陷，粘膜压力相对较大；
在咽侧壁，舌骨、甲状软骨限制了咽部的扩张，出现明显的凹痕，尤其在四号，五号喉罩的模型中较为明显；
在咽后壁，无论充气如何，受力都较不均匀，都存在高压灶和大片的低压区混合，无法提供均匀的密封。
结论 几何建模和有限元分析可以作为可视化的工具，辅助研究喉罩与咽腔相互作用。

PU-0613

麻醉住院医师应用不同椎管内麻醉方法在肥胖产妇剖宫产中的应用比较

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目的 比较麻醉住院医师应用不同椎管内麻醉方法在肥胖产妇剖宫产中的应用效果
方法 选择择期椎管内麻醉下行剖宫产术足月产妇 160 例，ASA 分级Ⅰ或Ⅱ级，采用随机数字表法

分为 4 组（n=40）：正中入路组（Median approach group M 组)、旁正中入路组（Paramedian approach group P 组）、超声辅助入路（Ultrasound-Assisted group UA 组）、超声引导下入路组（Ultrasound-Guided group UG 组）。观察一次皮肤穿刺成功率、改变穿刺间隙率、穿刺成功率、调整穿刺方向的次数。记录定位时间、穿刺时间、操作总时间、穿刺并发症（恶心呕吐、穿刺感觉异常、穿刺出血）、患者满意度、术后腰痛程度情况。

结果 一次皮肤穿刺成功率、改变穿刺间隙率、穿刺成功率、调整穿刺方向次数，4 组之间有差异（P 值分别为 0.001，0.001，0.001，0.000）。一次皮肤穿刺成功率，M 组低于 P 组、UA 组，UA 组高于 UG 组（P＜0.05）；M 组改变穿刺间隙率较高、穿刺成功率低（P＜0.05）；调整穿刺方向次数，UA 组低于 M 组、UG 组，P 组低于 UG 组（P＜0.05）。定位时间、穿刺时间、总时间，4 组之间有差异（P 值分别为：0.008，0.004，0.000）；其中定位时间，M 组长于 UG 组；穿刺时间，UA 组短于其余 3 组；总时间，UA 组短于 M 组、UG 组，P 组短于 UG 组（P＜0.05）；恶心呕吐，UG 组高于 P 组、UA 组，M 组高于 P 组（P＜0.05）。患者满意度中，UA 组、P 组高于 M 组、UG 组（P＜0.05）。入组产妇 7d 腰痛程度比较中，4 组之间有差异（P=0.007）；其中 M 组高于 P 组、UA 组（P＜0.05）。

结论 麻醉住院医师可充分利用超声辅助技术提高肥胖产妇椎管内麻醉的成功率，减少并发症及提高产妇满意度；在学习过程中，旁正中入路椎管内麻醉在肥胖产妇中具有一定优势，值得推广。

PU-0614

关于中国麻醉医学相关命名的建议

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目的 探讨关于中国麻醉医学相关命名，为中国麻醉科学的发展，抛砖引玉。

方法 通过回顾中国麻醉发展的历史，麻醉学科的相关命名和变迁，探讨中国麻醉医学学科的相关命名。搬砖引玉，大家积极探讨，提出更适合中国麻醉医学的命名。

结果 至今为止，与麻醉医学相关的命名尚未完全统一。

结论 为了体现麻醉科作为一个二级临床学科，建议麻醉医学或麻醉科的相关命名（称谓）改为与其内涵更相符，与传统的临床学科相一致，在科学体系中命名为“麻醉科学”，在医疗机构诊疗科目命名为“麻醉科”，从事麻醉科专职工作的医师称为“麻醉科医师”、护士称为“麻醉科护士”。

PU-0615

以特色业务促进学科发展

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目的 促进基层麻醉学科建设，经验交流。

方法 以具体事例作为学科建设发展学习样本，进行经验交流，包括危重病人的麻醉，无痛诊疗病例等。

结果 在二级医院学科建设实践中，人才梯队结构合理，业务范围不断扩大，包括无痛诊疗技术等麻醉新技术的开展。

结论 以特色业务促进了学科发展，符合二级医院学科发展实际。

PU-0616

区域阻滞麻醉对成人癌症患者术后复发和转移影响的荟萃分析

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目的 麻醉技术对肿瘤患者术后复发和转移的影响日益受到关注。本荟萃分析旨在探讨区域阻滞麻醉（RA）单独使用或者与全身麻醉（GA）联合使用对肿瘤患者术后复发和转移的影响。
方法 我们在 PubMed、Embase 和 Cochrane Library 数据库中对主要结局是癌症复发，次要结局是局部复发和远处转移的研究进行广泛搜索，利用随机效应模型计算合并比值比（OR）及其 95% 置信区间（CI）。使用新喀里多尼亚-奥塔哥量表（NOS）对观察性研究进行质量评估，使用 Cochrane 随机试验风险偏倚工具（Rob 2.0）对随机对照试验进行评估，并使用分级推荐、评估、开发和评估（GRADE）对所有结果进行评估。
结果 本研究共纳入研究 32 项，涉及癌症患者 24,724 例。无论是单独使用还是与 GA 联合使用，与仅使用 GA 相比，RA 均显著降低癌症复发的风险（OR=0.82；95%CI 0.76-0.89）。 RA 与 GA 联合使用与仅使用 GA 相比显著降低了局部复发的风险（OR=0.78；95%CI 0.70-0.87）。RA 与 GA 联合使用与仅使用 GA 相比显著降低了远处转移的风险（OR=0.78；95%CI 0.70-0.87）。
结论 RA 无论是单独使用还是与 GA 联合使用，均可显著降低肿瘤患者术后复发和转移的风险（95% CI=0.72 至 0.94; p<0.01）。这种关联在亚组分析中仍具有统计学意义(OR=0.71；95% CI=0.51 至 0.98; p=0.04)，以及在硬膜外麻醉与 GA 相结合的背景下。然而，未发现与局部复发或远处转移有显著的关联。因此，本次荟萃分析表明 RA（单独使用或与 GA 联合使用）与降低癌症复发风险有关，且在前列腺癌患有中表现尤为明显。然而，未观察到与局部复发或远处转移有显著的相关。需要进一步前瞻性研究以明确其作用。

PU-0617

可视软镜与直接喉镜在人体和人体模型中的气管插管时间和首次插管成功率的比较：一项系统综述和荟萃分析

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目的 气管插管既是全身麻醉的必要技术，也是急诊科或 ICU 危重患者治疗的必要措施。直接喉镜和可视软镜是两种常用的插管工具。直接喉镜被广泛用于常规气管插管，而在困难气道中，可视软镜是首选设备。但实际工作中，可视软镜使用率较低。气管插管的速度和首次成功率是评估喉镜的常用指标。本研究的目的是比较在不同气道环境下，经验不同的操作者使用可视软镜和直接喉镜在成人患者或人体模型中进行气管插管时的速度和成功率。
方法 本研究通过检索 PubMed、EMBASE 和 Cochrane Library 三大数据库。纳入了直接喉镜与可视软镜在插管速度和首次插管成功率方面进行比较的随机对照试验。由两名研究者独立筛选文献、提取数据和评价纳入研究的方法学质量。对于二分变量，我们计算比值比（OR）和 95% 的置信区间（CI）。对于连续结果，我们使用以秒为单位的均数差（MD）来概括插管时间。
结果 本研究纳入了 14 项文献。1.在非困难气道中，与可视软镜相比，直接喉镜插管时间更短（OR, 71.26；95% CI，70.06 ~ 72.45；P＜0.00001；I^2=99%）。2.可视软镜与直接喉镜在困难气道插管时间上无明显差异（OR，2.51；95% CI，-2.29 ~ 7.32；P=0.31；I^2 = 0%）。3.可视软镜插管和直接喉镜插管的首次插管成功率无明显差异（OR，1.77；95% CI，0.66 ~ 4.75；P=0.26；I^2 =0%）。

4.在人体和人体模型上，可视软镜插管时间无明显差异（OR，1.71；95% CI，-28.81 ~ 32.22；P=0.91）。5.与经验丰富的操作员相比，无经验的操作员使用可视软镜插管的速度更快（OR，-13.99；95% CI，-21.47 ~ -6.52；P=0.0002；I^2 =87%）。

结论 本研究发现可视软镜作为治疗气道困难的首选工具，并没有发挥预期的作用。如果增加可视软镜的使用频率，可能会有不同的结果。并且，直接喉镜插管的经验无助于操作可视软喉镜插管，通过训练直接喉镜的熟练掌握可能无法直接转化为可视软镜的熟练度。对于新手来说，在今后的教学中，是否直接学习可视软镜的操作更有利有待进一步研究。同时本研究认为集中培训可以提高熟练程度，但经过较长的培训间隔后，经验并不一定能提高熟练程度。由此可见，控制临床人员培训的间隔时间可能更为重要。

PU-0618

AICU：培养麻醉医生临床思维连续性的节拍器

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目的 通过对麻醉医生临床思维连续性的局限性进行分析，梳理一些如何管理 AICU 才能更好地培养麻醉医生连续性临床思维的建议，为培养麻醉医生向真正围术期医生转变提供一些参考，也能使患者从围术期快速康复中最大获益。

方法 通过分析麻醉医生临床思维连续性的局限性，指明麻醉医生在患者管理过程中的短板，包括目前麻醉医生的思维模式受传统麻醉工作的影响，绝大部分只关注患者术前、尤其手术中专科应关注的内容，即呼吸、循环和内环境，极少关注术后患者病情的变化，使得麻醉医生对围术期患者病情的临床思维模式是不连续、不完整的；麻醉医生不直接管理患者，不关注患者术后的治疗；而要想手术医生将术后患者交给麻醉医生管理，也要获得手术医生的信任；麻醉医生尽管有很大比例存在职业倦怠，工作时间长，但应保持学习的状态；临床思维的培养本身就是医学教育的重点与难点，需要在临床中不断的应用与总结。临床工作中通过不断的探索，尤其 AICU 的建立，为麻醉医生开展连续性诊疗服务提供了良好的平台。AICU 是重症患者术后危重症救治的良好补充，由于需要麻醉医生直接管理术后的患者，在临床工作压力的驱使下，促使其必须深入了解患者围手术期相关并发症及其高危因素，早期预防及提供及时有效治疗，促进患者术后康复，同时正反馈性的不断优化术中麻醉方案，避免类似并发症的再次发生，真正实现患者围术期治疗的连续性闭环管理，使患者最大获益，也不断提高麻醉医生围术期连续性的临床思维能力。

结果 为保障 AICU 能有效提高麻醉医生的临床思维能力，AICU 的管理过程中，我们梳理了一些管理的建议。包括但不限于①麻醉医生轮岗管理 AICU；②AICU 的病房设置在手术室范围区域；③将 AICU 分设成麻醉亚专业；④要求主管 AICU 的麻醉医生、患者主麻医生及高级职称麻醉医生每天都要对 AICU 患者进行查房，年轻医生都旁听。

结论 通过 AICU 这个平台，使患者从围术期快速康复中最大获益，同时为培养麻醉医生向真正围术期医生转变提供一些参考，使麻醉医生成长为真正的围术期医生，促进麻醉学科的发展。

PU-0619

如何成为一名合格临床医生

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目的 在当前形势下，如何成为一名合格临床医生？我认为应该从以下几个方面做起：

1 永守初心与善良；
2 牢记使命责任与担当；
3 学医就以为者终身勤奋不放弃；
4 用心积累与勇于创新；
5 团队合作精神与人文关怀
方法 首先第一：永守初心与善良
1. 医学泰斗裘法祖有句名言：德不近佛者不可以为医，才不近仙者不可以为医！
英国传教士梅藤更（又译梅藤根）在广济医院，浙江大学医学院附属第二医院（浙大二院）和中国小患者，互相鞠躬。梅藤更努力将广济医院打造成“远东最好的医院”之一，除广济医院外，梅藤更还创建了麻风病院、骨科医院、西湖肺痨病医院以及广济医校。对古老中国卫生习惯最大贡献：通风、疫苗和卓著人文医德贡献
结果 第二、牢记使命责任与担当
长眠在纽约东北部的撒拉纳克湖畔的特鲁多医生的墓志铭：有时去治愈、常常去帮助、总是去安慰；特鲁多创建了第一家专门的结核病疗养院，还成了美国首位分离出结核杆菌的人，并创办了一所“结核病大学”。麻醉医生的楷模、人民英雄（国家荣誉称号）武汉金银潭医院院长湖北省卫健委副主任张定宇，时刻牢记责任与使命！
第三、学医就以为者终身勤奋不放弃
人生在勤，不索何获？麻醉医生必须历练成为：独特干练的技术、良好心理素质、综合处理能力、充满全身的智慧：眼要看，耳要听，手要动，脑要想，为什么这样？下一步又会如何？始终如一的奉献、不忘初心的善良,,,,,,,
第四、用心积累与勇于创新
华西刘进教授 2021-9-18 捐赠 1 个亿做一名大夫，中国唯一
第五、团队合作精神与人文关怀
医学就是经验积累的学科，是一门哲学，人文，艺术为一体的学科，是团队合作最为密切的学科，因此，医学大家都是能够相互学习、借鉴、合作和创新。
结论 我们努力达到：
第一：首先是一名医生，才能成为一名合格临床医生-
精湛临床技艺，才能够担当生命的守护神
第二：具有创新思维的科研人才
第三：教书育人甘于奉献的教育家
第四：虚怀若谷，勇于担当精神
第五：培养贵族般的气质和宽厚待人的智者
最终历练成为临床医生特有的素质与一大的烙印特征----
打不败，累不垮，击不碎，愈挫愈勇，强大心理素质；
融合临床、科研、教学及人文高尚的医学队伍！！！

PU-0620

围术期静脉输注右美托咪定对下肢截肢术后慢性疼痛的防治作用

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目的 右美托咪定(下文简称右美)是一种广泛应用于临床的高选择性 a2 肾上腺素能受体激动剂，研究表明其可通过中枢和外周神经系统发挥镇痛作用。截肢后的慢性疼痛终生患病率高达 87%，显著影响患者的生活质量，本研究旨在评价围术期静脉输注右美对截肢术后慢性疼痛发生和程度的影响。

方法 回顾性筛选首次行下肢截肢术的患者。根据围术期是否使用右美，将患者分为非右美组和右美组进行分析，并进行 1:1 倾向性评分匹配分析。为了进一步观察右美对下肢截肢术后慢性疼痛的影响，本研究基于术中或/和术后接受右美输注的情况，将患者分为未使用右美(对照组)。仅术中使用右美(术中组)、仅术后使用右美(术后组)以及术中和术后均使用右美(围术期组)的四个亚组进行探索性分析。通过电话随访收集并比较术后 3 和 12 个月幻肢痛、残肢痛和幻肢感的发生情况。其中数字评定量表(NRS)用于评估残肢痛和幻肢痛的疼痛程度，包含四个疼痛维度的简式麦吉尔疼痛问卷-2(SF-MPQ-2)用于进一步评估幻肢痛的多维度疼痛情况。

结果 共 178 例患者纳入队列研究，非右美组 35 例，右美组 143 例，两组在基线资料方面无统计学差异(P>0.05)。与非右美组比较，右美组在术后 3 和 12 个月时残肢痛的发生率和 NRS 评分显著降低(3 个月时 P<0.05，12 个月时 P<0.01)。与非右美组比较，右美组在术后 12 个月时的幻肢痛 NRS 评分显著降低(P<0.01)，幻肢痛的 SF-MPO-2 评分总分和对情感的描述维度评分显著降低(P<0.05)。经过倾向性评分匹配后，与非右美组比较，右美组在术后 12 个月时残肢痛的发生率和 NRS 评分显著降低(发生率 P<0.01，NRS 评分 P<0.05)。匹配后，与非右美组比较，术后 3 到 12 个月期间，残肢痛发生率显著缓解(P<0.05)，幻肢痛的 NRS 评分、持续性疼痛评分和间歇性疼痛评分显著缓解(NRS 缓解评分 P<0.05，持续性疼痛缓解评分 P<0.05，间歇性疼痛缓解评分 P<0.01)。对亚组的探索性分析发现，在截肢术后 12 个月，与对照组比较，术后组残肢痛的发生率和 NRS 评分显著降低(发生率 P<005、NRS 评分 P<0.01)，围术期组幻肢痛的 NRS 评分、SF-MPQ-2 总分和对情感的描述评分显著降低(NRS 评分 P<0.01，SF-MPQ-2 总分 P<0.05，对情感的描述评分 P<0.05)。术后 12 个月，与术后组比较，围术期组幻肢痛的神经病理性疼痛评分显著峰低(P<0.05)。亚组中术后 3 到 12 个月期间的疼痛变化、与对照组比较，术后组幻肢痛的 NRS 缓解评分和持续性疼痛缓解评分显著增加(P<0.05)，围术期组的幻肢痛 NRS 缓解评分和持续性疼痛缓解评分亦显著增加(P<0.05)。

结论 围手术期静脉输注右美托咪定对预防下肢截肢术后慢性残肢痛的发生有显著意义，对预防慢性幻肢痛的严重程度也表现出潜在的益处。

PU-0621

以岗位胜任力为导向的麻醉专业本科毕业生现状调查

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目的 采用问卷形式调查麻醉学专业本科毕业生现状。

方法 本调查问卷通过查阅大量参考文献及广泛寻求相关专家意见后，自行设计《河北医科大学麻醉专业本科毕业生调查问卷》，问卷共包含 12 个问题。调查内容主要包括：①毕业后工作/学习状况；②以岗位胜任力为导向对于目前工作/学习的评价；③希望对本科教育见习、实习做如何调整；④本科教育对毕业后的影响。调查河北医科大学 2020-2021 届麻醉学专业本科毕业生现状。问卷调查时间为 2022 年 5 月 17 日至 2022 年 6 月 9 日，采用腾讯电子问卷（ID.165565444），通过微信平台推送到相应班级群，并要求群内成员自愿填写。

结果 共有 184 名河北医科大学麻醉学专业本科毕业生参与了问卷调查，剔除掉存在空白选项 7 份，继续备战考研 1 份，从事非医学类其他工作 8 份，最终收到有效问卷为 168 份，问卷有效回收率为 91.3%。毕业后参加工作 67 人（39.9%），研究生在读 57 人（33.9%），参加住院医师规范化培训 44 人（26.2%）。参与工作的 67 人中，在三级医院有 40 人（59.7%）。读研究生有 57 人，专业型硕士 43 人（75.4%），学术型硕士 13 人（22.8%），硕博连读 1 人（1.8%）。参加住院医师规范化培训有 45 人。在以岗位胜任力为导向对于目前工作/学习的评价中，认为对目前从事临床工作最有帮助的是“基础理论和专业知识”（78.6%）与“临床基本技能”（76.2%），认为本科教育存在突出问题是“科研创新能力不足”（51.8%）与“运用知识处理临床问题不足”（50.6%）；在对麻醉本科教育见习、实习调整中，希望增加见习时间（42.9%）和实习时间（47.6%），有超过一半的人希望在临床实习阶段，除麻醉科外还应该加强轮转心血管内科、呼吸内科、超声科。通过参加毕业

后的执业医师、住院医师规范化培训、研究生等考试，有 64 名（38.1%）同学认为最薄弱环节是运用知识分析答题的能力。
结论 我校麻醉专业本科毕业生选择毕业后教育比例较高，在以岗位胜任力为导向麻醉专业人才培养中，应在“科研创新”与“运用知识处理临床问题”的能力上加强。

PU-0622

麻醉学科医学人文和思政教育促进人才多维度培养发展

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目的 通过分析麻醉学科医学人文和思政教育对人才多维度培养的影响，探讨麻醉学科医学人文和思政教育的重要性和必要性，提出麻醉学科医学人文和思政教育的方法和策略。
方法 文献综述：查阅相关文献，了解不同学科医学人文和思政教育的理论基础和实践经验；
调查研究：通过调研了解麻醉学科对医学人文和思政教育的认知及具体实施情况；
策略分析：对麻醉学科医学人文和思政教育进行深入分析，探讨麻醉学科医学人文和思政教育的重要性和必要性，提出麻醉学科医学人文和思政教育的方法和策略。
结果 麻醉学科医学人文和思政教育对人才培养具有多维度影响，主要包括以下几个方面：
1、人文素养提升：医学人文和思政教育有助于培养包括道德品质、伦理观念、社会责任感等人文素养。加强人文教育，医务人员能够更加关注患者的身心健康，提高对患者的关怀和尊重，从而建立起更加和谐和信任的医患关系。
2、沟通能力提升：医学人文和思政教育有助于培养包括与患者、家属、同事之间的有效沟通和协作能力。通过人文思政教育的培养，能够更好地理解患者、家属、同事的需求和情绪，提高沟通技巧和解决问题的能力，从而更好地为患者提供个性化的医疗服务。
3、团队协作能力提升：医学人文和思政教育有助于培养团队协作能力，包括团队中的有效沟通、协作和领导能力。通过人文思政教育能够更好地与团队成员合作，协调各方利益，提高整个医疗团队的效率和质量。
4、 职业道德提升：医学人文和思政教育有助于提升职业道德，提升专业精神、责任感和使命感。
5、心理健康提升：医学人文和思政教育有助于提升心理健康，有助于应对各种困难和挑战。
麻醉学科医学人文和思政教育的具体方法和策略主要包括以下几个方面：
1、在麻醉学科的专业课程中融入医学人文教育内容和思政教育，例如伦理学、人文医学、沟通学、叙事医学等内容。通过教学内容的重构，加强人文和思政教育，引导深入思考医学实践中的人文问题，培养人文意识。
2、 病例讨论中融入医学人文教育内容和思政教育：在教学过程中，结合真实病例进行讨论和分析。通过分析病例中的伦理和人文问题，引导思考医疗决策的合理性和患者权益的保障，融入思政教育，培养伦理决策能力和责任意识。
3、角色扮演：组织实施角色扮演活动，模拟医务人员与患者之间的沟通场景。通过实践演练，体验患者的情绪和需求，提高沟通技巧和情绪管理能力，培养同理心和尊重他人的能力。
4、实践指导：在医疗实践中加强人文指引和思政教育，引导在医疗实践中注重人文关怀和沟通技巧。通过实践指导，帮助理解医疗实践中的伦理道德要求，培养他们的职业操守和责任感。
5、培训讲座：定期邀请医学人文专家、思政专家进行培训讲座，介绍医学人文教育的理念和实践经验。通过专家讲座，提高团队对医学人文和思政教育的认识和理解，激发对人文关怀、思维境界提升的兴趣和热情。
结论 麻醉学科医学人文和思政教育对人才多维度培养具有全面而深远的的影响，不仅有助提升麻醉学科医务人员的专业技能，更有助于人文素养、沟通能力、团队协作能力和职业道德提升，可以促进麻醉学科人才多维度的培养和发展。重视和推广医学人文和思政教育可以为麻醉学科全面发展和医疗服务的提升奠定坚实基础。

PU-0623

围手术期使用艾司氯胺酮对术后抑郁症疗效的 Meta 分析

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目的 术后抑郁症（POD）的发生仍然是手术患者术后并发症引起的严重问题之一。它可能会进一步加剧发病率和死亡率，并给医疗保健系统带来严重的经济负担。艾司氯胺酮的术中联合给药可能是一种很有效果的方法，尽管它被广泛使用，但尚未在各种手术方式中得到系统评估。因此，我们进行了系统评价和荟萃分析，以评估艾司氯胺酮对术后抑郁症的疗效。

方法 通过计算机检索 PubMed、Cochrane 图书馆、Web of Science 和 Medline，从建库至 2024 年 3 月发表的有关于术中使用艾司氯胺酮作用于手术患者治疗术后抑郁的随机对照实验（RCT）。根据纳入和排除标准对文献进行筛选，并对相关文献进行数据提取和质量评估。采用 RevMan 5.3 软件进行 Meta 分析。

结果 共纳入 8 项研究，共有 1,724 名受试者，其中艾司氯胺酮组有 815 名受试者，对照组有 909 名受试者。Meta 分析结果显示，与对照组相比，使用艾司氯胺酮在术后 1 周术后抑郁症发生率（POD）（RD 0.09, 95% CI：0.13～0.05，P < 0.0001，I2 =84%）、2 周 POD（RD -0.08, 95% CI：0.13～0.03，P < 0.00001，I2=97%）和 4 周以上 POD（RD -0.06,95% CI：0.10～0.02，P=0.0002，I2=79%）有显著改善。在主要不良反应发生率方面，与对照组相比，使用艾司氯胺酮后头痛和头晕（RR 2.11，95% CI :1.47～3.01，P = 0.007，I2 = 72%）的发生率较高，恶心和呕吐（RR 0.95，95% CI :0.74～1.20，P = 0.46，I2 = 0%）、幻觉（RR 1.77， 95% CI: 0.91～3.46，P =0.72，I2= 0%）、瘙痒（RR 0.43,95% CI: 0.06～2.85，P =0.86，I2=0%）的影响无统计学差异（P ＞ 0.05）。

结论 目前的荟萃分析表明，围手术期使用艾司氯胺酮可有效降低术后抑郁评分和疼痛强度。然而，与对照组相比，艾司氯胺酮增加了恶心和呕吐等不良反应发生率。此外，药物注射的方式，给药时机和药物浓度可能会对结果产生影响。因此，该结果进一步证实了艾司氯胺酮改善术后抑郁的有效性，并为探索如何预防或减少其不良反应的发生风险提供了思路和证据。

PU-0624

麻醉科思想政治教育与创新人才培养深度融合的探索和实践

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目的 为了响应国家“健康中国 2030”战略背景，切实推动政产学研的协同创新体系，华中科技大学同济医学院附属同济医院麻醉科教研室开展思想政治教育与创新人才培养深度融合的课程体系，构建以思想政治为指导的多层次创新教育实践课程，助力学校新医科建设，着力培养适应新医科和医工交叉的麻醉领域创新创业优秀人才。

方法 创新人才培养应当以思想政治教育为核心，坚持以立德树人，以社会主义核心价值观为引领，以全面提高麻醉科人才培养能力为关键，着力培养堪当民族复兴大任的时代新人。多层次的创新创业教育是适应经济社会发展，符合麻醉科各级人才成长的需求，旨在培养麻醉人才的创新创业意识、提高创新创业能力、铸造良好的创新创业人格。

本研究以医工交叉和创新创业大赛为抓手，将思政教育贯穿全程，优化创新创业教育实践体系，探索思想政治教育和医学创新创业相融合的课程体系。根据不同的基础，麻醉科创新人才培养工作分为本科生、研究生以及住院医生等多个层次。在课程教学过程中，树立以“工匠精神”、“民族复兴”为指引的创新思维，培养学员基于理想信念的使命感、道德品质的责任感、人文素养的荣誉感，比

如，弘扬“抗疫精神”、推动一带一路等。言传身教和自然渗透。通过授课教师的创新创业经历、医工交叉探索的成功经验等，树立学员正确的世界观、人生观和价值观，实现对学员的价值引领，树立高尚的医德医风和职业理想。

结果 利用各种创新创业大赛的契机，积极鼓励各级学员参与各类创新创业大赛。在 2023 年湖北省卫健委和团委共同举办的湖北省首届卫生健康行业青年创新大赛中，麻醉科住院医生李继获得湖北省银奖。2024 年华中科技大学第十三届“求是杯”大学生创业计划竞赛中，麻醉科硕士研究生代欣怡和刘秋容获得三等奖。2024 年第二届“科技强国”大学生创意作品竞赛暨“青创+”系列成长活动中，由麻醉科指导老师带领的本科生团队获得一项三等奖及一项优秀奖，获奖团队是由来自中国和马来西亚留学生共同组建的“一带一路”队。

结论 坚持用习近平新时代中国特色社会主义思想铸魂育人，培养担当民族复兴大任的时代新人，是新时代麻醉科思想政治教育的关键，也是麻醉多层次创新人才培养的新载体。

本团队在麻醉创新人才培养和教学实践过程中，初步探索改革医学生培养创新思维模式，建立高校平台接轨社会平台模块，关注思政引领的制度创新机制，构建新型创新创业教育的各级学员课程体系，并在实践中丰富和发展了“一带一路”倡议的深刻内涵。本团队的创新人才培养模式提出以“思想政治教育和创新创业融合”为核心的创新创业课程体系，充分提高学员的团队协作能力、社会适应能力、独自创新发展能力等，完善医学人才培养机制，营造创新创业文化氛围，增强麻醉医生职业核心竞争力。

PU-0625

不同临床教师工作年限对临床麻醉实习医生带教效果影响的初步探讨

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目的 实习阶段是医学生培养这些能力的关键时期，医学生逐步熟悉并掌握实际操作技能，为成为合格的医务工作者打下坚实基础。高年资临床教师由于工作年限较长，拥有丰富的临床经验；而低年资临床教师可能对最新的医学知识和技术更为熟悉，与学生之间的代沟也较小。因此，不同年资的临床带教老师可能会对实习医生的带教效果产生不同的影响。

本研究旨在初步分析探讨临床带教老师的工作年限与临床麻醉实习带教效果之间的相关性，以期为临床麻醉教育提供有价值的见解。

方法 一般资料：选取 2024 年 1 月至 2024 年 3 月完成在首都医科大学宣武医院麻醉科为期 1 月临床实习的 37 名实习医生进行横断面调查，根据其实习手册获取相关资料，获取实习医生带教老师工作年限、出科考试成绩、对带教老师评价等资料，根据带教老师工作年限分为高年资带教组（＞10 年）或低年资带教组（≤10 年），对比观察并分析两组实习医生的出科考试成绩以及出科时对带教老师的评价。

统计方法：采用 SPSS26 统计软件进行数据处理。计量资料正态分布以均数±标准差（ $\bar{\chi}\pm s$ ），非正态分布以中位数中位数(Q1,Q3)）表示，组间比较采用独立样本 t 检验或秩和检验；计数资料以例（%）表示，组间比较采用 x2 或 Fisher 检验，相关性分析采用 Spearman 线性回归分析。$P < 0.05$ 认为差异有统计学意义。

结果 实习医生年龄、性别、专业及学历组间差异无统计学意义，$P>0.05$。高年资带教组与低年资带教组实习医生为期 1 月实习后出科考试成绩得分组间差异无统计学意义（$P>0.05$）；实习医生对带教老师满意度评分，低年资组带教组得分高于高年资带教组，差异具有统计学意义（$P < 0.05$）。对实习医生出科考试成绩的单因素及多因素回归分析，实习医生年龄、性别、专业、学历及带教老师性别、工作年限均未见相关性（$P>0.05$）。实习医生对带教老师满意度评价得分的单因素及多因素回归分析，满意度评价得分与带教老师工作年限相关（$P < 0.05$），与实习医生年龄、

性别、专业、学历及带教老师性别未见相关性（P＞0.05）。
结论 临床教师工作年限可能与临床麻醉实习医生满意度相关，低年资带教老师可能在激发学生的学习兴趣和参与度方面更具有优势。因此，在未来的临床教学中，应考虑平衡不同年资教师的教学角色，以最大化教学效果，培养具有全面素质的麻醉专业人才。

PU-0626

急性 A 型主动脉夹层累及冠状动脉对全弓置换手术患者生存预后的影响

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目的 探讨急性 Stanford A 型主动脉夹层累及冠状动脉对全弓置换手术患者生存预后的影响。
方法 回顾性观察 2015 年 12 月 1 日至 2022 年 11 月 30 日期间在河北医科大学第二医院行全主动脉弓置换术（TAR）的急性 Stanford A 型主动脉夹层（AAD）患者。根据术中手术医生直视下观察来确定主动脉夹层是否累及到冠状动脉，将患者分为冠状动脉未受累组（NCAI 组）与冠状动脉受累组（CAI 组），收集两组患者的术前、术中以及术后临床资料。采用 SPSS 25.0 统计软件进行统计分析，分析冠状动脉受累是否为生存期短、死亡率高等不良生存预后的独立危险因素，分析总生存期差异。
结果 共收集 209 例 AAD 患者，CAI 组 38 例，NCAI 组 171 例。38 例冠状动脉受累组中位生存时间 15 天。多因素 COX 分析,调整相关混杂因素发现冠状动脉受累是不良预后的独立危险因素(HR= 3.422, 95% CI: 1.986-5.897)。经过倾向性评分匹配冠状动脉受累组和未受累组分别纳入 38 例和 106 例患者,两组的中位生存时间分别为 15 天和 606 天, 冠状动脉受累患者总生存期显著低于未受累患者。
结论 冠状动脉受累是急性 Stanford A 型主动脉夹层不良预后的独立危险因素, 急性 Stanford A 型主动脉夹层累及冠状动脉行全弓置换术的患者院内死亡率，总死亡率高，总生存期短。

PU-0627

中国与美国在麻醉领域参与发表研究的比较-基于文献计量分析的横断面研究

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目的 识别和描述 Web of Science’s Science Citation Index Expanded 中国地区与美国地区麻醉领域发表文章并进行比较。
方法 于 2024 年 6 月 29 日对科学引文索引中有中国麻醉科参与的文章进行了横断面文献计量分析。科学引文索引扩展使用”(SU=anesthesiology) AND PY=(2014-2024)”为搜索词进行查询，分别限定 countries/Regions 为 PEOPLES R CHINA 或 USA，并限定文章类型为 Article，排除 Letter or Review article or Meeting Abstract or Editorial Material or Correction or Early Access or Proceeding Paper or Retracted Publication or Retraction 等类型文章。下载所有文章 WOS 数据库资料包括：作者、标题、来源、摘要、关键字、地址、引用和被引用、资金支持及其他。应用 Rstudio 运行 Bibliometrix 进行数据分析。
结果 查询发现 2014-2024 年麻醉领域发表了相关文章 86778 篇文章。

发文量上：中国地区发表 5460 篇文章，其中 3512 篇类型为 Article；美国地区发表 28370 篇文章，其中 12272 篇为 Article。中国和美国地区发文年增长率为 3.78%和-6.19%。平均每篇文章被引量：13.01 和 18.02。
TOP-Cited 方面：中国地区其中被引用最多的文章发表在 2014 年的美国麻醉与镇痛《ANESTHESIA AND ANALGESIA》杂志上；美国地区其中被引用最多的文章发表在 2016 年的区域麻醉与疼痛医学《REGIONAL ANESTHESIA AND PAIN MEDICINE》杂志上。
机构方面：中国地区首都医科大学发文最多，上海交通大学、四川大学次之；美国地区哈佛大学发文最多，加州大学、哈佛医学院次之。
作者方面：中国地区黄宇光教授发表了最多文章，陈德伟（香港）获得了最多的引用。美国地区 Sessler DI 教授发文量最多，Manchikanti L 教授获得了最多的引用。中国和美国地区平均每篇文章作者数量分别为 8.92 和 7.57。中国和美国地区作者国际合作的占比分别为 23.55%和 33.02%。
杂志方面：中国地区《BMC ANESTHESIOLOGY》杂志最受欢迎(1034 篇，JCR 分区：Q2,IF：2.3)，其次是《PAIN PHYSICIAN》(297 篇，JCR 分区：Q2,IF：2.6)和《ANESTHESIA AND ANALGESIA》(237 篇，JCR 分区：Q1,IF：4.6)。美国地区《ANESTHESIA AND ANALGESIA》杂志最受欢迎(1842 篇，JCR 分区：Q1,IF：4.6)，其次是《JOURNAL OF CARDIOTHORACIC AND VASCULAR ANESTHESIA》(1489 篇，JCR 分区：Q2,IF：2.3)和《PAIN MEDICINE》(1195 篇，JCR 分区：Q1,IF：2.9)。
研究趋势：中国地区最新趋势 2022 年-2024 年关键词为：ketamine、prediction、colonscopy 转变为 s-ketamine、open-label、benzodiazepine。美国地区最新趋势 2022 年-2024 年关键词为：delirium、statement、covid-19 转变为 alpha、burst-suppression、benefits。
结论 2014-2024 年中国地区在麻醉领域的科学研究蓬勃发展，发文量呈现明显的增长趋势。虽然在发文数量和发文质量上与老牌强国美国还有一定的差距。但是美国在年增长率出现颓势，而中国则依然是持续保持向上增长。我们应该增加国际合作，挑战在质量更高的杂志上发文。

PU-0628

A new theory of peripheral neuropathic pain: Comprehensive Neural Insult

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Peripheral neuropathic pain (PNP) is a serious and intractable clinical issue and its pathogenesis is not yet fully understood. The existing theory cannot fully explain the complex and mixed clinical manifestations of PNP. The symptoms of PNP are complex, highly varied and variable in presentation. This makes each presentation difficult to explain and varied in symptomatology. If these patients choose peripheral nerve rhizotomy, there will be not only a higher recurrence rate, but also may be associated with severe complications. Neuromodulation and peripheral nerve repair are effective in PNP patients, but not after patients have undergone destructive procedures. Based on this review of the literature, we propose the “Comprehensive Neural Insult” theory of PNP. This theory refers to the fact that a peripheral nerve insult results in central nervous system (CNS) and peripheral nervous system (PNS) alteration including brain, spinal cord, dorsal root ganglias (DRGs), and peripheral nerves.

PU-0630

心血管麻醉医师进修成果的单中心调研

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目的 调研分析心血管麻醉的进修成果评定与影响因素
方法 通过基于互联网的问卷，分析了 2020 年至 2023 年在该医院麻醉科进行心血管麻醉进修的医生，针对既往在本中心进修心血管麻醉医师开展问卷调研。
结果 200位进修医生自愿参与调研，其中192位数据完整而最终纳入分析。受访者主要来自广西、云南、河南、河北等地。培训时长为半年的占 82.81% ，一年的占 13.02% 。年龄在 31-40 岁（84.37%）；硕士及以上学历者（67.19%）。，在本中心完成进修培训后对心血管麻醉的信心增加，业务能力得到不同程度改善（100%）。在本中心培训期间完成心血管麻醉例数 150-300 例（65.45%）。来自三甲医院（89.53%），且从事临床麻醉工作超过 6 年（71.73%），主治医师183人（95.3%），从事心血管麻醉少于10例（46.07%）。对进修学习是强烈积极态度（62.3%），对学习效果有预期（98.9%）。
结论 进修成果与进修者既往工作资历相关，与进修时长和是否学习 TEE 相关，与人口学特征和一般情况无明显相关性。阜外医院的心血管麻醉进修培训对提高医师的专业水平和技能有积极作用。

PU-0631

巴林特小组联合角色扮演教学法在实习生术前访视教学中的应用

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目的 探讨巴林特小组联合角色扮演教学法在麻醉科专业实习教学学生术前访视中的应用效果。
方法 方法 本研究采用随机对照试验设计，选取 2022 年度在麻醉科实习的麻醉专业本科生 60 名为研究对象，采用随机数字法分为试验组和对照组，每组 30 人。试验组采用巴林特小组联合角色扮演教学法，对照组采用传统教学法。本组受试者除参加常规授课、教学查房外，每周参加一次“巴林特小组”及角色扮演活动。试验期间每个周末由指定带教老师任组长，组织 30 名受试者参加。每次活动指定一名受试者提供案例，在活动中描述在术前访视中遇到的难以沟通的患者，尽可能地详细描述当时场景；其他成员分别扮演患者、患者家属，站在病患角度阐述和表达自己的立场和情绪。活动中，组长负责维持小组活动秩序，控制讨论话题不偏离主题，鼓励组员发表最真实想法，同时在讨论过程中不总结、不批判、不提供建议或者解决方法。用 LCSAS 量表（利物浦医生沟通能力评价量表（Liverpool Communication Skills Assessment Scale，LCSAS 量表）是国外使用较为广泛的医患沟通能力测评工具，具有较好的信度和效度）比较培训前后两组学生的医患沟通能力，用术前访视评估量表（ 评估量表包括病史采集技巧、医患交流技巧以及人文素养等三个大项 15 个小项。 每个条目的评分采用 5 分制（1 分，非常差；2 分，较差；3 分，一般；4 分，较好；5，非常好））比较实施教学后两组术前访视情况，以及实习学生对教学的满意度。
结果 结果 试验组 LCSAS 量表差值、术前访视部分评分、学习兴趣、主动性、团队协调能力和总体教学满意度均明显高于对照组（P＜0.05）。
结论 结论 巴林特小组联合角色扮演教学法可以提高麻醉科实习生医患沟通能力，提高术前访视效率，获得实习医生更高的教学满意度。

PU-0632

麻醉危机管理情境模拟教学在住院医师规范化培训中的应用

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目的 探索麻醉危机管理情境模拟教学在住院医师规范化培训中的应用及效果，探索麻醉危机管理情境模拟教学案例设计及教学流程，为麻醉危机管理住院医师规范化培训提供新思路。
方法 选择 2023 年 1 月—2024 年 1 月在长江大学附属第一医院（荆州市第一人民医院）麻醉科进行住院医生规范化培训（住培）的 60 名学员，用抛硬币法分为对照组 30 名、研究组 30 名。对照组以传统教学进行培训，研究组进行情境模拟教学培训。对比两组住培学员的理论考核成绩、临床胜任力考核成绩、教学质量和学习效果满意度、对教学课程质量的满意度
结果 教学前，两组住培学员一般资料（年龄、性别、学历等）及理论考核成绩、临床胜任力考核成绩差异无统计学意义（P>0.05），具有可比性。教学后，组间比较，研究组住培学员 8 项麻醉危机事件课程（围手术期肺栓塞、麻醉诱导中过敏反应、术中空气栓塞、饱胃患者快速序贯诱导插管、全麻术中断电应急处理、局部麻醉药中毒、围术期困难气道、术中心搏骤停）的理论知识考核成绩、临床胜任力考核成绩均高于对照组，差异有统计学意义（P<0.05）。教学后，相比对照组，研究组的非技术技能方面显著提升，差异有统计学意义（P<0.05）。教学后，组内比较，对照组教学前后理论考核成绩和临床胜任力考核成绩均有所提升，差异有统计学意义（P<0.05）。教学后，组内比较，研究组教学前后理论考核成绩和临床胜任力考核成绩均有较显著的提高，差异有统计学意义（P<0.05）。研究组住培学员对教学课程质量的满意度（96.55%）明显优于对照组（51.72%），差异有统计学意义（P<0.05）。研究组住培学员对教学质量和学习效果满意度（100%）显著高于对照组（58.62%），差异有统计学意义（P<0.05）。
结论 在住院医师规范化培训中应用麻醉危机管理情境模拟教学效果显著，既能提高住培学员的理论成绩，也能明显提高住培学员的麻醉危机管理临床胜任力，还可以有效提升学员对课程满意度以及教学质量和学习效果满意度。值得进一步推广应用。

PU-0633

超声引导下动态针尖追踪法桡动脉穿刺置管学习曲线的建立

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目的 通过观察有无盲穿经验的麻醉科住院医生行超声引导下动态针尖追踪法桡动脉穿刺置管技术的学习过程，获取他们掌握这项技术所需要的训练数量，建立学习曲线；记录穿刺时的相关指标，分析它们是否会对穿刺过程造成影响。
方法 选择我院 2021 级及 2022 级麻醉科住院医生共 29 人，既往无超声引导桡动脉穿刺置管的经验，根据有无盲穿经验分为有盲穿经验组、无盲穿经验组，有盲穿经验组人数为 19 个，无盲穿经验组人数为 10 个。用 1%利多卡因注射液 0.5 ml 对穿刺部位进行局部麻醉后，将超声探头放置在与桡动脉垂直的横向位置，显示桡动脉血管的横截面，呈圆形低回声结构，将桡动脉定位于超声图像正中。穿刺针垂直探头中点，与皮肤呈 30°~45°角度进针至皮下。当穿刺针向动脉推进过程中，可以看到周围组织与穿刺针的相对移动，继续推进穿刺针，可以看到超声图像上出现一个高回声亮点。明确针尖后利用动态追踪的方法将动脉套管置入血管内。记录操作者首次穿刺置管成功的例数、穿刺次数以及穿刺时间，利用累计和分析法制作学习曲线；同时记录桡动脉直径以及桡动脉深度。
结果 两组患者的一般资料无统计学差异（P＞0.05）。通过两组的学习曲线可知，有盲穿经验组在

操作 7 例、7 例、8 例超声引导下动态针尖追踪法桡动脉穿刺置管后，首次穿刺置管成功率、穿刺时间及穿刺次数达到本组的平均水平；无盲穿经验组在操作例数分别达到 13 例、12 例、12 例之后，首次穿刺置管成功率、穿刺时间、穿刺次数达到本组平均水平。与无盲穿经验组相比，有盲穿经验组的首次穿刺置管成功率更高，可达到 73.7%（P＜0.05）；首次穿刺置管成功率与桡动脉直径和桡动脉深度相关（P＜0.05）；桡动脉直径的最佳临界值为 1.57 mm，桡动脉深度的最佳临界值为 4.02 mm（P＜0.05）。

结论 学习超声引导下动态针尖追踪法桡动脉穿刺置管技术，有盲穿经验的麻醉科住院医生平均需要操作 7 例，无盲穿经验者平均需要操作 13 例；有盲穿经验者的首次穿刺置管成功率更高；适当的桡动脉直径或深度会提高首次穿刺置管成功率。

PU-0634

评估虚拟现实解剖训练对初学麻醉医生进行超声引导下臂丛神经阻滞的影响：一项随机对照试验

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目的 掌握超声引导下的神经阻滞（UGNB）需要深入理解解剖的横断面结构和空间推理能力，这对初学者来说是一个巨大的挑战。本研究旨在评估虚拟现实（VR）辅助的解剖学教育在初学麻醉医生首次进行超声引导下的斜角肌间隙臂丛神经阻滞中的效果。我们通过一项前瞻性、单盲、随机对照试验对这一假设进行了初步测试。

方法 本研究纳入了 21 名没有超声和神经阻滞培训经验的麻醉学员。所有参与者都接受了一项包括理论和实践的培训项目。学员被随机分配到两个组中的一个：一组接受 VR 辅助的解剖课程，另一组则不接受。随后，两个组完成了相同的超声扫描和针插入实践模块。培训效果分为两个阶段进行评估：阶段一采用书面多项选择题（MCQ）对理论指导前后的知识进行前后测试；阶段二要求在患者身上进行超声引导下的斜角肌间隙臂丛神经阻滞。两名专家在对学员分组不知情的情况下，使用全球评级量表（GRS）和任务特定检查表对学员的技能表现进行评估。

结果 MCQ 得分在理论课程后显著提高，两组的后测试成绩均明显超过前测试成绩（P < 0.001）。然而，组间分析未能显示出 VR 组和对照组之间得分增长的显著差异（21.82 ± 12.30 vs. 18.33 ± 9.68，P > 0.05）。在实际 UGNB 技能方面，根据 GRS 评估，学员的表现两组相当。然而，在任务特定检查表方面，VR 组学员显著优于对照组（29.23 ± 3.91 vs. 24.85 ± 5.13；P < 0.05）。

结论 总体而言，本研究证实了沉浸式虚拟现实解剖培训能提高初学麻醉医生在超声引导下进行臂丛神经阻滞的技能水平。未来麻醉技术培训项目应考虑将 VR 纳入其中。

PU-0635

超声引导动脉置管--如何才能做到百发百中

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目的 近年来，随着超声技术的飞速发展，超声引导下的动脉置管技术在临床应用中得到了广泛的推广和认可。其中，平面外动态针尖法因其较高的成功率和安全性备受关注。本文旨在分享我们在实践中积累的超声引导动脉置管经验，探讨如何通过优化操作技巧和培训方法，达到理想的置管效果。

方法 我们在 2023 年 1 月至 2024 年 6 月期间，对 400 例需要动脉置管的患者实施了超声引导平面

外动态针尖法动脉置管操作。所有操作均由接受过专门培训的 5 名麻醉科住院医生完成。我们对操作的成功率、置管时间及并发症发生率进行了统计，并通过问卷调查收集操作医生的反馈意见。

结果 对 5 名住培医师的培训过程进行跟踪记录，第一个月培训的 200 例实际操作中中，超声引导平面外动态针尖法动脉置管的总体成功率为 92.5%。初次穿刺成功率为 72.5%，平均置管时间为 3.5±1.2 分钟。并发症发生率为 3.5%，包括局部血肿、穿刺部位感染和动脉痉挛等。第二个月培训的 200 例实际操作中，超声引导平面外动态针尖法动脉置管的总体成功率为 98.5%。初次穿刺成功率为 84%，平均置管时间为 2.3±0.8 分钟。并发症发生率为 2.5%，包括局部血肿、穿刺部位感染和动脉痉挛等。此外，操作医生对该技术的满意度评分为 9.8（满分 10 分），均认为该方法显著提高了置管成功率和操作安全性。

结论 超声引导平面外动态针尖法显著提高了动脉置管的成功率，并降低了并发症发生率，是一种安全、有效的动脉置管技术。通过系统的培训与模拟操作练习，操作医生能够快速掌握并应用该技术，从而在临床中达到百发百中的效果。未来的研究可以进一步优化培训方案，并探索该技术在不同临床环境中的应用潜力。通过此次分享，我们希望为同行提供宝贵的经验和技术指导，共同推动超声引导动脉置管技术的发展和普及，提高临床操作的安全性和有效性。

PU-0636

基于 HPS 的情景模拟综合能力训练在麻醉专业规培生心脏功能管理教学中的应用研究

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目的 基于培养优秀麻醉专业规培生临床实践能力培训的要求，在规培麻醉专业规培生培训中采用理论教学、经胸超声模拟器演练 与具有临床诊疗思路的高仿真生理驱动模拟系统(HPS)相互结合，为规培麻醉专业医师熟练掌握经胸超声技能并提升临床危重症手术管理理念的教学培训模式进行探索。

方法 1.选取在学系中自愿报名参与本项目的 40 名麻醉专业规培生，既往未接受过心脏超声培训。有 TTE 和/或经食道心脏超声的知识背景或培训经历者不参加此项研究。40 名麻醉专业规培生按照按工作年限匹配，随机分为模拟器培训后心脏超声科轮转联合 HPS 组和对照组（无 HPS）两组。2.两组患者均进行理论学习后进行经胸超声模拟器模拟器进行心脏标准切面（包括 5 个基本切面）、探头操作、心脏解剖及容量状态判断，有专家进演示操作教学和答疑，进行一对一指导。待熟悉 TTE 操作后在心脏超声科轮转学习进行实际操作。HPS 组住院医师在心脏超声科轮转结束后通过高仿真生理驱动模拟系统模拟围手术期的危重病例结合超声图像进行临床诊断和处理。对照组不进行 HPS 学习 。3.培训结束后考核 a.基础知识笔试成绩 b.操作能力 c.实际麻醉中 TTE 鉴别能力 d.满意度调查

结果 两组间础知识笔试成绩无统计学差异，HPS 组的规培生操作能力和实际麻醉中 TTE 鉴别能力要优于无 HPS 组。

HPS 组的规培生满意度调查包括总体满意度、心脏超声结构识别学习效果、TTE 探头操作学习效果、 是否会推荐给其他住院医师、是否易于掌握要优于无 HPS 组。

结论 通过制定的理论教学联合经胸超声模拟器演练加高仿真生理驱动模拟系统培训教学体系让麻醉专业研规培生能够更加熟练的掌握围术期 TTE 的应用，并优化麻醉心脏功能管理。规范的教学方式不仅可以提高麻醉医生个体的专业素养，也可以提高学科的影响, 更能够提升手术麻醉管理质量和保障患者的安全。

PU-0637

情景模拟教学法在麻醉学专业本科生麻醉前访视带教中的应用

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目的 研究情景模拟教学法在麻醉学专业本科生醉前访视带教中的应用。
方法 2016 年 9 至 2019 年 9 月选取温州医科大学麻醉学专业本科生 128 人，随机分成两组：常规教学组 66 人，情景模拟教学组 62 人。学生课程结束后由两位带教老师对学生就麻醉前访视内容(体格检查、问诊内容、问诊技巧)进行评分。同时发放调查问卷就学生对教学方式满意度进行调查。
结果 两组学生平均年龄、性别比列、历年成绩的平均分比较，差异无统计学意义（P > 0.05）。情景模拟教学组学生的体格检查、问诊内容、问诊技巧三方面的得分较常规教学组学生显著提高，差异有统计学意义（P<0.05）。情景模拟教学组的学生对教学方法满意度显著高于常规教学组，差异有统计学意义（P<0.05）。
结论 情景模拟教学法更受到学生的喜欢，该方法能够显著提高学生的学习成绩，使学生能更高效率的掌握麻醉前访视的内容，提高学生的临床技能。

PU-0638

持续输注低剂量瑞马唑仑（CNS7056）对术后睡眠质量的影响

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目的 观察持续输注低剂量瑞马唑仑（CNS7056）对术后首夜睡眠质量的影响。
方法 选择全麻经鼻气管插管下颌面外科手术患者 80 例。将患者随机分为两组：对照组（C 组）和瑞马唑仑组（R 组），每组 40 例。C 组术后无镇静药物输注。R 组术后首夜持续输注瑞马唑仑 0.2mg·kg-1·h-1。采用多导睡眠监测仪（PSG）记录术后首夜 N1、N2、N3、快动眼（Rapid Eye Movement，REM）期睡眠时间、清醒时间、觉醒次数和睡眠效率。使用匹兹堡睡眠质量指数（Pittsburgh sleep quality index，PSQI）量表评估术前 1 个月及术后首夜睡眠情况。记录术后首夜不良反应及镇静镇痛补救情况。
结果 与 C 组比较，R 组 N1 期睡眠明显延长 90.5(70.6~131.8)min vs 177.7(108.1~262.4)min、REM 睡眠时间明显缩短 47.1(1.6~91.1)min vs 2.3(0~11.1)min、觉醒次数明显减少 26.0(18.3~43.3)次 vs 6.5(2.0~12.0)次、睡眠效率明显提高 68.6(53.4~82.8)% vs 81.3(54.7~96.0)%，P＜0.05。术后首夜，与 C 组比较，R 组患者心动过速明显增多，血氧饱和度＜90%的比例增加，有统计学差异，其他不良反应及镇静镇痛药物补救情况无统计学差异。
结论 低剂量持续输注瑞马唑仑，可有效延长颌面外科患者术后 N1 期睡眠，缩短 REM 睡眠时间，减少觉醒次数，明显提高睡眠效率，无严重不良反应。

PU-0639

终纹床核 γ-氨基丁酸能神经元参与调控睡眠觉醒和麻醉苏醒

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目的 睡眠觉醒和全身麻醉存在重叠的神经调控机制，参与睡眠觉醒的多个神经核团也会影响全身麻醉。近年来，越来越多的研究聚焦于中枢 γ-氨基丁酸能神经元在调控睡眠觉醒和全身麻醉中的作用。终纹床核（BNST）主要由 γ-氨基丁酸能神经元构成，是边缘前脑一个高度异质性的结构，在依赖高度觉醒的应激和恐惧等行为中发挥关键作用。本研究旨在探索 BNST 的 γ-氨基丁酸能神经元在调控睡眠-觉醒和全身麻醉中的作用和机制。

方法 首先，我们采用光纤光度法联合同步脑电图（EEG）以及肌电图（EMG）记录技术，探测 BNST 的 γ-氨基丁酸能神经元在体内自然睡眠觉醒周期以及全身麻醉过程中的实时钙活动；同时采用脑片膜片钳记录技术检测异氟醚对单个 BNST 的 γ-氨基丁酸能神经元放电水平的影响。其次采用光遗传技术特异性激活 BNST 的 γ-氨基丁酸能神经元并观测其对睡眠觉醒和全身麻醉的影响。接着采用 caspase3 特异性毁损 BNST 的 γ-氨基丁酸能神经元，观察其对睡眠觉醒周期和全身麻醉诱导与苏醒的影响。最后，我们采用光遗传技术特异性激活 BNST 下游腹侧被盖区（VTA）通路，探索其在睡眠觉醒周期和全身麻醉的作用。

结果 BNST 的 γ-氨基丁酸能神经元表现出状态依赖的钙活动变化，在觉醒状态和快速眼动睡眠（REM）期间活动增强。在异氟醚麻醉时，这些神经元的钙活动和电活动显著受到抑制，并且随着异氟醚的清除而逐渐恢复。光遗传激活这群神经元能够引起小鼠从非快速眼动（NREM）睡眠或 REM 睡眠向觉醒状态的迅速转变，且长时程光刺激可以产生持续的觉醒状态，即便是在睡眠驱动力增强的时段亦是如此。此外，光激活这群神经元还能够有效地从稳定全麻状态或爆发抑制深麻醉状态中诱导出觉醒反应。而特异性毁损这群神经元会改变自然睡眠觉醒模式，但不影响麻醉的诱导和苏醒过程。最后我们发现光激活 BNST-VTA 的 γ-氨基丁酸能神经末梢促进自然睡眠状态/稳定全麻状态到觉醒的转化。

结论 BNST 中的 γ-氨基丁酸能神经元参与调控睡眠觉醒和麻醉苏醒，并揭示了 BNST 下游 VTA 通路可能参与上述功能。本研究探索了边缘前脑核团在调控睡眠觉醒和麻醉苏醒的作用机制，可能为失眠的治疗和开发新型麻醉药提供了新的靶点。

PU-0640

内侧前额叶皮层在七氟醚致意识消失中作用的研究进展

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目的 从多层面探讨 mPFC 在七氟醚致意识消失中的作用及其机制

方法 全身麻醉药物如何引起意识消失及其作用机制是麻醉学领域的核心问题。迄今为止，对全麻药物的分子靶点及细胞机制已有深入了解，进一步要解决的问题是全麻药物在系统和神经环路水平如何通过影响这些分子靶点而产生意识消失。目前神经环路机制研究主要集中在探索丘脑-皮质环路、皮质-皮质网络以及和睡眠-觉醒环路引起意识消失的机制等方面。前额叶皮层(PFC）在其中扮演重要角色，而内侧前额叶皮层（mPFC）是 PFC 的重要组成部分。mPFC 与大脑许多脑区有着解剖上和功能上的联系，被认为是人类思维和行为控制的中心，和意识的产生和维持有关。mPFC 作为脑内高级中枢，其可接受皮层下多个脑区的信息传入，这些信息经过 mPFC 不同层次处理后投射到几乎所有感觉区域、运动区域及皮层下区域。mPFC 对皮层下唤醒核团如基底前脑（BF）和中脑腹侧被盖区（VTA）等都有着一定的调控作用。由此可见，mPFC 是高级皮层通过上行传导通路

获得信息和下行传导通路传递信息的关键脑区。与其他高级皮层区域相比，mPFC 在七氟醚致意识消失中的作用极其重要，极有可能是意识消失的核心作用靶点。七氟醚是临床常用的吸入麻醉剂，针对七氟醚致意识消失机制的研究已取得了一定的进展。针对微观分子靶点的研究证实：GABA A 受体、乙酰胆碱受体（ACh 受体）和超极化激活环状核苷酸门控（HCN）通道是七氟醚致意识消失的靶点；在介观的神经环路方面，神经环路和多个睡眠觉醒相关核团参与七氟醚诱导的意识消失；在宏观上，非侵入脑成像技术揭示了七氟醚麻醉下意识相关的神经震荡、功能连接和网络拓扑结构的改变。著名的全局工作空间理论（GWT）认为，意识的神经生物学基础是丘脑-皮质及皮质-皮质之间的核团联系。意识的产生依赖于皮层网络的存在。

结果 基于 EEG 和 fMRI 的研究证实，皮质-皮质连接以及丘脑-皮质连接与意识密切相关，这种连接的破坏一直是七氟醚干扰意识的两个重要假设。丘脑-皮质和皮质-皮质连通性的紊乱也同样被认为是七氟醚诱导意识消失的重要神经环路机制。由于麻醉和睡眠享有部分共同机制，众多在睡眠-觉醒中发挥重要调控作用的核团与神经递质网络以及构成的神经环路均被证实参与全身麻醉意识消失和苏醒过程，但其具体作用机制还有更深一步的研究。

结论 阐明全身麻醉机制有利于揭示全麻药物相关并发症的原因，有利于探索预防与处理措施，这是减少围术期与神经功能相关并发症的必经之路，还有利于探索和神经功能障碍相关疾病的研究。

PU-0641

微剂量艾司氯胺酮联合右美托嘧啶预处理对丙泊酚麻醉后睡眠紊乱的探索性研究

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目的 术后睡眠紊乱影响手术患者的早期康复，在女性患者中尤为明显。麻醉药物是诱发术后睡眠紊乱的重要因素之一，但机制尚不清楚。近年来研究发现：全身麻醉药（丙泊酚、七氟醚）诱导的非生理学睡眠和生物节律的改变是导致术后睡眠紊乱的关键因素，目前临床尚缺乏有效的干预措施。右美托嘧啶通过激活突触前 α2 受体、减少 NE 释放，降低突触后兴奋性神经元活性、增强下丘脑腹外侧区 GABA 能神经元活性介导睡眠和镇静作用。艾司氯胺酮已经被证实具有抗抑郁作用。因此本研究目的是通过微剂量艾司氯胺酮联合右美托嘧啶术前雾化吸入，分析丙泊酚对女性患者术后睡眠紊乱的影响，探索优化的麻醉方案，为加速术后康复和优化临床路径提供研究资料。

方法 选取 90 例 18-65 岁择期行宫腔镜手术的女性，ASA 分级 1-2 级。将患者随机分为对照组（A 组）、右美托嘧啶组（D 组）和右美托嘧啶联合艾司氯胺酮组（DK 组），每组 30 例。D 组术前给予 15-20 分钟超声雾化吸入 1ug/kg 右美托嘧啶；DK 组术前给予 15-20 分钟超声雾化吸入 1ug/kg 右美托嘧啶联合 1mg/kg 艾司氯胺酮；A 组术前接受 15-20 分钟等量的生理盐水进行超声雾化吸入。三组麻醉方案均使用丙泊酚和瑞芬太尼靶控输注联合喉罩麻醉，维持术中 BIS 为 40-60。记录术前 1d(POD 0)、术后 1d(POD 1)、术后 3d(POD 3)的匹兹堡睡眠质量指数（PSQI）评分和医院焦虑抑郁表（HADS）评分；使用可穿戴设备（ActiGraph）客观测量术前 1d 至术后 3 天的睡眠质量；同时记录术后麻醉相关并发症。

结果 与 A 组相比，D 组及 DK 组在 POD1 PSQI 评分较低，睡眠质量好；三组睡眠质量在 POD3 没有显著性差异；与 A 组和 D 组相比，DK 组者术后抑郁和焦虑情况评分最低，在 POD1 最为明显。

结论 术前给予右美托嘧啶联合微剂量艾司氯胺酮这两种药，有利于减少女性患者的围术期焦虑和抑郁，对术后睡眠有帮助，增加患者围术期的舒适度，最佳的剂量有待于进一步的临床研究。

PU-0642

Effect of intraoperative esketamine infusion on postoperative sleep in patients with preoperative sleep disorders: A randomized clinical trial

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Objectives: Postoperative sleep disturbances (PSD) are common during the perioperative period, especially in patients with poor preoperative sleep quality. To investigate the effects of esketamine on postoperative sleep in laparoscopic surgery patients with sleep disorders. Additionally, oral saliva samples were collected to analyze the differences in microbial flora between the No PSD group vs. PSD group on the first postoperative day (POD 1).
Methods: This single-center, double-blind, randomized controlled trial included One hundred and thirty aged 18 - 65, classified as American Society of Anesthesiologist (ASA) Ⅰ–Ⅱ patients with a preoperative Pittsburgh sleep quality index (PSQI) ＞ 5，who underwent colorectal, hepatobiliary, gastrointestinal, gynecological and urological laparoscopic surgery in the First Affiliated Hospital of Zhengzhou University in China. This trial was conducted from January 9, 2024, and May 31,2024. Patients were randomly assigned to either the esketamine group (n = 65), who received a continuous infusion of esketamine (0.3 mg/kg/h) intraoperatively, i.e. from the start of the surgical incision to the closure of the pneumoperitoneum in laparoscopy, or the control group, who received an equivalent volume of saline (n = 65). We collected oral saliva samples from patients on the day of surgery and on the morning of the POD 1 between 8:00-10:00, followed by subsequent analysis of the oral microbiota.The primary outcome was the incidence of PSD on postoperative days (PODs) 1, 3 and 7. PSD was defined as a Numerical Rating Scale (NRS) score of ≥ 6 or an Athens Insomnia Scale (AIS) score of ≥ 6. The secondary outcomes included 1) postoperative days 1, 3 and 7 (POD1, POD3 and POD7) anxiety and depression scores using the Hospital Anxiety and Depression Scores (HADS), 2) postoperative resting and movement pain using the NRS, 3) postoperative hydromorphone consumption in the first 24 h and 48 h, 4) postoperative fatigue using the Christense fatigue scores, 5) analysis of the correlation between differential microbiota and postoperative sleep NRS or AIS scores and 6) subgroup analysis including gender, severity of preoperative sleep disturbances and preoperative physical pain conditions..
Results: A total of 130 patients aged 18-65 years (median age, 51 years; 108 female [83.1%]) were included in the study. The incidence of PSD in the esketamine group was significantly lower than control group on POD 1 (43.1% vs. 64.6%, odds ratio: 0.414 [95% confidence interval (CI), 0.204 to 0.8840], P = 0.014), but there were no differences on POD 3 (37.1% vs. 45.2%, odds ratio: 0.716 [95% CI, 0.349 to 1.468], P = 0.362) and POD 7 (44.8% vs. 54.4%, odds ratio: 0.681 [95% CI, 0.327 to 1.420], P = 0.305). Sleep quality NRS scores (5 [4–7] vs. 5 [3–7], P = 0.005) and AIS scores (6 [4–9] vs. 5 [3–8], P = 0.009) were significantly lower in the esketamine group than in the control group on the POD 1. There were no differences in postoperative depression and anxiety scores between the two groups on POD 1, 3 and 7 (P > 0.05). Postoperative hydromorphone consumption in the first 24 h and 48 h (P > 0.05) and pain scores on resting and movement (P > 0.05) were no differences between the two groups. Christense fatigue scores (3 [1–6] vs. 1 [0–3], P = 0.006) were significantly lower in the esketamine group than in the control group. Subgroup analysis results showed that male patients, with a baseline PSQI scores ＞11 and without physical pain one month before surgery had a lower risk of developing PSD after esketamine intervention on the POD 1.We collected oral saliva from 59 preoperative and 58 postoperative patients. The analysis of the oral microbiota showed that there were no differences in the alpha diversity of the oral microbiota between No PSD and PSD groups on the POD 1, and the beta diversity was only different in the preoperative weighted Principal Coordinates Analysis (PCoA) analysis (R = 0.0504, P =0.038). Through Spearman correlation analysis, we found that bacteria Proteobacteria at the phylum level, bacteria unidentified_Prevotellaceae, Capnocytophaga, Neisseria and Haemophilus

at the genus level, and bacteria Capnocytophaga_leadbetteri, Selenomonas_sp_oral_taxon_478 and Haemophilus_parainfluenzae at the species level were significantly correlated with the NRS and AIS on the POD 1 in the preoperative patients.
Conclusions: This trial showed the prophylactic effect of intraoperative esketamine infusion on the incidence of PSD in laparoscopic surgery patients with preoperative sleep disorders, especially on the POD 1. Since there was no difference in postoperative anxiety-depression scores or pain-related indicators in two groups, we infer that the effect of intraoperative esketamine infusion on improving postoperative sleep may be mediated little by improving mood or relieving pain. In addition, the structure of some oral microbiota in patients with preoperative sleep disturbances may predict the occurrence of PSD, indicating that future interventions could be targeted to prevent PSD. In conclusion, our results provide strong evidence that esketamine can improve PSD in high-risk patients in the short term.

PU-0643

亚麻醉剂量艾司氯胺酮对甲状腺癌根治术患者术后睡眠质量的影响

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目的 甲状腺癌的发病率逐年升高，且女性的发病率是男性的 3 倍。患者多会由于焦虑、抑郁、术后疼痛以及体位综合征等因素出现术后睡眠质量下降，进而影响康复进程。研究显示，15%至 72%的患者会出现术后睡眠障碍（Postoperative sleep disturbance, PSD）。睡眠不足不仅会降低机体免疫力、延缓伤口恢复，还会加剧术后痛觉过敏，甚至可能影响患者的认知功能。研究表明，氯胺酮能够改善患者在围手术期的睡眠质量。然而，关于艾司氯胺酮的具体效果，现有的研究还相对较少。因此，本研究通过前瞻性随机对照试验，探究亚麻醉剂量艾司氯胺酮对甲状腺癌根治术患者术后睡眠质量的影响，以期提高患者术后的康复质量。
方法 本研究纳入在郑州大学第一附属医院接受全身麻醉下甲状腺癌根治术的 176 名女性患者，年龄 18~65 岁，ASA 分级Ⅰ或Ⅱ级。按照随机数字表法将患者分为艾司氯胺酮组（E 组）和对照组（C 组）。E 组患者在麻醉诱导后静脉注射艾司氯胺酮 0.25 mg/kg，然后以 0.125 $mg \cdot kg^{-1} \cdot h^{-1}$ 的速度持续泵注至手术切口开始缝合；C 组患者接受等体积的生理盐水。记录两组患者在入室后 5 min（T0）、气管插管前即刻（T1）、气管插管后 3 min（T2）、手术开始（T3）及手术结束（T4）时的平均动脉压（MAP）和心率（HR）。记录两组患者的麻醉时间、手术时间、麻醉维持期间瑞芬太尼和丙泊酚的使用量、血管活性药物的使用率、苏醒时间、拔管时间、PACU 停留时间、术后补救镇痛和术后住院时间。在术后 1 天和 2 天，采用视觉模拟量表（VAS）评估患者在休息和咳嗽时的疼痛程度；在术后 1 天和 3 天，使用阿森斯失眠量表（AIS）和数字评价量表（NRS）评估患者 PSD 的发生率，并用医院焦虑抑郁量表（HADS）和恢复质量量表（QoR-15）评估患者的焦虑抑郁情绪和恢复质量。此外，还记录了两组患者术后的不良反应。
结果 1. 两组患者的一般情况、麻醉时间、手术时间、麻醉维持期间瑞芬太尼和丙泊酚的使用量、血管活性药物的使用率、苏醒时间、拔管时间、PACU 停留时间、术后补救镇痛和术后住院时间无显著差异（P＞0.05）。
2. 在 T1 和 T2 时间点，E 组 MAP 和 HR 均显著高于 C 组（P＜0.05）。
3. 在术后 1 天，与 C 组比较，E 组 AIS 和 NRS 评分以及 PSD 的发生率显著降低（P＜0.05）。而在术后 3 天，两组患者的 AIS 和 NRS 评分以及 PSD 的发生率之间无显著差异（P＞0.05）。
4. 在术后 1 天，E 组在休息和咳嗽时的 VAS 评分显著低于 C 组（P＜0.05），但在术后 2 天，两组患者在休息和咳嗽时的 VAS 评分无显著差异（P＞0.05）。
5. 在术后 1 天和 3 天两组患者的 HADS-A 和 HADS-D 评分无显著差异（P＞0.05）。
6. 在术后 1 天，E 组 QoR-15 评分显著高于 C 组（P＜0.05）。但在术后 3 天两组患者的 QoR-15

评分无显著差异（P＞0.05）。
7. 两组患者术后头晕、恶心、呕吐、噩梦、幻觉及总不良反应的发生率无显著差异（P＞0.05），且均无术中知晓发生。
结论 1. 亚麻醉剂量艾司氯胺酮能显著改善女性甲状腺癌根治术患者术后早期的睡眠质量，并有效减轻急性疼痛，从而有助于快速恢复。
2. 亚麻醉剂量艾司氯胺酮未明显改善女性甲状腺癌根治术患者术后焦虑抑郁情绪，同时未增加术后不良反应的发生率。

PU-0644

Association and causal inference of dietary Magnesium intake with Sleep disorders: Evidence from NHANES 2013-2018 and Mendelian randomization

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Background: Sleep disorders are widespread globally and have a significant impact on health and quality of life. Magnesium, a crucial mineral, potentially plays a key role in sleep regulation. However, existing research on the relationship between magnesium intake and sleep disorders has yielded inconsistent results. This study aims to systematically evaluate the association between dietary magnesium intake and sleep disorders, as well as to investigate potential causal mechanisms using data from the National Health and Nutrition Examination Survey (NHANES) and Mendelian randomization (MR) methods.
Methods: This study utilized data from the NHANES 2013-2018, encompassing a cohort of 19,602 participants. Dietary magnesium intake was quantified through a comprehensive 24-hour dietary recall and a 30-day dietary supplement questionnaire interview. Sleep disturbances were evaluated via self-reported assessments. To investigate the association between magnesium intake and sleep disorders, we employed a weighted multivariate-adjusted logistic regression analysis. Furthermore, to elucidate the causal relationship, we conducted a two-sample MR study using summary statistics from Genome-Wide Association Studies (GWAS). The inverse variance weighting (IVW) method served as the primary analytical tool to validate our findings, and robustness was confirmed through sensitivity analyses.
Results: A total of 12,923 participants were included in our observational study conducted as part of the NHANES. The weighted multivariate-adjusted logistic regression analysis revealed a significant association between lower magnesium intake and an elevated risk of sleep disorders (OR=1.68, 95% CI: 1.44-1.95, P<0.001). In the MR analyses, the inverse variance weighting (IVW) method served as the principal approach. These analyses demonstrated a causal relationship between magnesium intake and both sleep deprivation (OR=0.955, 95% CI: 0.916-0.997, P=0.034) and sleep disorders (OR=0.869, 95% CI: 0.763-0.990, P=0.035). Additional sensitivity analyses further confirmed the robustness and reliability of these findings (all P>0.05).
Conclusion: The results of this study indicate a substantial association between lower magnesium intake and the risk of sleep disorders. This association remained significant after adjustment for multiple models, emphasizing the critical role of adequate dietary magnesium intake in the prevention of sleep disorders.

PU-0645

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术中知晓是全身麻醉的常见并发症之一，已引起麻醉学及相关学科的高度重视，成为临床研究的重点问题，但由于术中知晓机制研究的难度，至今不明，以至于近年来对其概念、诊断方法、危害程度的研究出现较大的争议。早期研究集中于全身麻醉采取深镇静，以期降低术中知晓发生率。但镇静深度的不断增加亦未能将其发生率降至零，却招致术中循环功能紊乱、术后认知障碍等并发症发生率升[1]，麻醉方式虽可影响术中知晓的诊断[2]，但不能明显降低其发生率[3]。目前术中知晓的诊断主要依据术后随访访谈，依赖于访视者的判断及受访者的回应，带有极大的主观性；围术期影响患者术后短期或长时程神经精神障碍的因素较多，是否术中知晓的单一因素即可导致，至今尚需深入研究。鉴于上述，本文对术中意识反应的分类，术中知晓诊断方法的争议，危害程度进行分析与述评，以供麻醉科及相关学科参考。

PU-0646

BIS 监测下麻醉管理对腹腔镜胆囊切除术老年患者术后睡眠质量的影响

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目的 探讨脑电双频指数（BIS）监测下麻醉管理对腹腔镜胆囊切除术（LC）老年患者术后睡眠质量的影响。
方法 按数字表法随机将 2022 年 6 月~2023 年 12 月本院收治并拟行 LC 的 80 例患者，分为对照组（40 例，在常规管理下进行全身麻醉，维持心率、血压波动≤基础值 20%），观察组（40 例，在 BIS 监测下麻醉管理，BIS 维持 40~60），对比 2 组麻醉药物用量、术后补救镇痛次数，术后疼痛情况[视觉模拟评分法（VAS）]、不良反应及睡眠质量[匹兹堡睡眠质量指数（PSQI）]。
结果 两组术后补救镇痛次数无差异（P＞0.05）；与对照组比，观察组丙泊酚、瑞芬太尼用量更少（P＜0.05）；两组术后 72h 的 VAS 评分比较无差异（P＞0.05），与对照组比，观察组术后 4h、12h、24h、48h 的 VAS 评分更低（P＜0.05）。与对照组比，观察组不良反应发生率更低（P＜0.05）。两组术前及术后 5d 的 PSQI 评分比较无差异（P＞0.05），与对照组比，观察组术后 24h、48h、72h 的 PSQI 评分更低（P＜0.05）。
结论 BIS 监测下麻醉管理可减少老年 LC 患者麻醉药物用量，减轻术后疼痛，减少不良反应发生，有助于改善其术后睡眠质量。

PU-0648

Effect of Transcranial Alternating Current Stimulation on Postoperative Sleep Disturbance in patients undergoing Gynecological Laparoscopy ： A Randomized Clinical Trial

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Objective: This study aimed to evaluate the effect of Transcranial Alternating Current Stimulation(tACS) on the incidence of Postoperative Sleep Disturbance(PSD) in patients who underwent gynecological laparoscopic surgery.
Methods: This single-center, double-blind, placebo-controlled randomized clinical trial was conducted from November 2023 to June 2024 in the First Affiliated Hospital of Zhengzhou University in China.Patients aged 18-65 with an American Society of Anesthesiologist Physical Status classification of I to III (with I indicating a healthy patient, II a patient with mild systemic disease, and III a patient with severe systemic disease) and scheduled for gynecological laparoscopic surgery were eligible for trial inclusion. Those with a preoperative Pittsburgh Sleep Quality Index (PSQI) score of 7 or higher or contraindications to tACS were excluded.Patients were centrally randomized in a 1:1 ratio into either active-tACS or sham-tACS group. Electrodes were positioned at Fp1 and Fp2 according to the 10/20 international system, targeting the prefrontal cortex (PFC).Patients in the active-tACS group received 2mA and 7HZ tACS for 20 minutes with a 30-s ramp-up phase at the beginning and a 30-s ramp-down phase at the end when the tracheal catheter was removed at post-anesthesia care unit (PACU).While patients in the sham-tACS group only received a 30-s ramp-up phase at the beginning and a 30-s ramp-down phase at the end. If the patients complained of unbearable local discomfort, the stimulation would be terminated immediately, and the event was recorded.The primary outcome was the incidence of PSD on postoperative days (PODs) 1. Postoperative sleep disturbance was defined as an Athens Insomnia Scale (AIS)score of 6 points or higher. The secondary outcomes included the incidence of PSD on PODs 3, changes in other sleep parameters measured via the AIS(total score, sleep onset latency (SOL), night awakening score(NAS),final awaking，total sleep time(TST), sleep quality, and daily disturbances), postoperative anxiety and depression scores using the Hospital Anxiety and Depression Scale(HADS), postoperative pain using the numeric rating scale (NRS), incidence of adverse events, and the recovery quality measured by quality of recovery-15(QoR-15).
Result: A total of 176 patients were recruited and randomly assigned to the active-tACS group(n=88; median [IQR] age, 45 [40-51] years) and sham-tACS group(n=88; median [IQR] age, 47.5 [40-53] years).In the end, a total of 169 patients completed the trial:active-tACS group,n=84; sham-tACS group,n=85. The incidence of PSD in the active-tACS group were significantly lower than in the sham-tACS group on POD 1 (23.8% vs 43.5%; odds ratio [OR],0.41 [95% CI,0.21-0.79]; P = .007) . There was no difference in the incidence of PSD on POD 3 between the 2 groups (21.4% vs 22.4%; odds ratio [OR],0.95 [95% CI,0.46-1.97]; P = .884). Compared to the sham-tACS group, the active-tACS group experienced a statistically significant reduction of 1.29 in AIS scores on POD1 (B=-1.29;P=.018). The improvement in sleep on POD1 for the active-tACS group is mainly reflected in an increased TST, improved sleep quality, and improved Daily disturbances (p < .05). Both groups showed an initial increase followed by a decrease in AIS scores, with scores significantly higher than baseline on POD1(active-tACS:P＜.000;sham-tACS:P＜.000), but not statistically different from baseline on POD3(active-tACS:P=.084;sham-tACS:P=.050).The anxiety scores (HADS-A)of the two groups only showed a difference on POD 1(B=1.22;P＜.000). While the depression scores (HADS-D) showed no significant differences between the groups at any time point assessed(P=.223). Pain scores on movement(3 [3-4] vs 4 [3-4] points; P = .002) and rest(1 [1-2] vs 2 [1-3] points; P ＜ .001) were significantly lower in the active-tACS group than in the sham-tACS group on POD1 and the same difference was also observed on POD3 (movement, 2 [2-3] vs 2 [2-3] points; P = .028 ; rest, 1 [0-1] vs 1 [1-2] points; P ＜ .001). Postoperative hydromorphone

consumption in the first 24 hours (3.6 [range, 2.3-4.0] mg vs 3.5 [range, 2.6-4.1] mg; P = .767) and 72 hours (6.0 [range,4.9-8.2] mg vs 6.4 [range, 5.1,7.5] mg; P = .502) were no significant differences between the 2 groups.Other intraoperative and postoperative data, including QoR-15 score on POD 3, also showed no significant differences. In exploratory analyses, the effect of tACS on the incidence of PSD on POD1 was consistent across all seven pre-specified subgroups(P＞.05).In the end, the incidence of adverse events, including nausea and vomiting, headache and dizziness, discomfort at the site of electrical stimulation and nightmare,were no differences between the two groups.

Conclusion Results of this trial showed the prophylactic effect of one postoperative session of tACS over the PFC on the incidence of PSD in patients who underwent gynecological laparoscopic surgery.Additionally, The tACS treatment also demonstrated potential efficacy in improving early postoperative anxiety and reducing postoperative pain, with a favorable safety and tolerability profile. .These results provide preliminary evidence for tACS as an adjunct therapy for postoperative recovery, but further large-scale studies are needed to confirm its long-term effects and underlying mechanisms.

PU-0649

术中吸入不同氧浓度对胸科手术患者术后睡眠质量的影响及其机制

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目的 研究术中吸入不同氧浓度对胸科手术患者术后睡眠质量的影响及其机制。

方法 收集 2022 年 3 月至 2024 年 6 月期间收治的胸科手术患者 80 例开展研究，按照随机数字表法分为参照组（40 例）和研究组（40 例）。所有患者均行开胸单叶肺切除术治疗，其中参照组单肺通气后吸入氧浓度 100%；研究组单肺通气后吸入氧浓度 50%。研究术前、术后 2h 氧化应激指标脂质过氧化物（LPO）值、谷胱甘肽过氧化物酶（GSH-Px）值，术前、术后第 7d、第 30d 匹兹堡睡眠质量指数（PSQI）评分，并发症发生率。

结果 研究组术后 2h 的 LPO 值，术后第 7d、第 30d 的 PSQI 评分值，并发症发生率，相比参照组均更低（p＜0.05）；术后 2h，研究组的 GSH-Px 值，相比参照组均更高（p＜0.05）。

结论 胸科手术患者单肺通气后吸入氧浓度 50%能够更有效减轻氧化应激反应，降低术后呼吸系统并发症，提高术后睡眠质量。

PU-0650

星状神经节阻滞通过腺苷神经内分泌改善高血压大鼠血压睡眠机制研究

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目的 高血压是常见的心血管疾病，是威胁中老年人健康的主要疾病之一。围术期高血压可增加手术出血，诱发或加重心肌缺血，导致脑卒中以及肾脏衰竭等并发症。同时临床研究发现高血压患者睡眠障碍发生率是正常人群的 2.2 倍。临床上多数高血压伴睡眠障碍患者并未接受睡眠干预，这也是导致难治性高血压的原因之一。但目前研究尚未阐明高血压与睡眠障碍相互影响的发病机理，因此发掘高血压病与睡眠障碍的共病机制，寻找有效治疗靶点，如何围术期控制血压和改善睡眠成为

当前亟待解决的问题。
方法 根据以上研究目的，本研究将从以下 3 个方面循序证明
①证明星状神经节对高血压大鼠血压和腺苷的调节作用
10 周龄的自发性高血压大鼠（SHR）、右侧星状神经节阻滞 7 天的高血压大鼠以及 Wistar-Kyoto 大鼠（正常血压对照鼠 WKY）隔日测尾动脉压，后取血测血清腺苷含量；
②证明星状神经节对睡眠的调节作用
将 8 周龄的大鼠脑部安装睡眠监测电极，待电极稳定伤口愈合后，将其分为睡眠剥夺组（睡眠剥夺 7 天）、睡眠剥夺+星状神经节阻滞组（睡眠剥夺+星状神经节阻滞 7 天）和对照组，监测睡眠时相以及睡眠质量改变。
③寻找与高血压与睡眠障碍相关的脑区核团
对 10 周龄的高血压大鼠与星状神经节阻滞 7 天后的高血压大鼠进行脑功能性核磁共振检查，观察各脑区脑血流变化情况。
结果 实验结果可以看出星状神经节阻滞（SGB）能改善 SHR 大鼠高血压水平，且 SHR 大鼠血压随着星状神经节阻滞次数的增加，其血压下降程度有所增加（收缩压均低于 150mmHg）；在腺苷水平方面， SHR 大鼠腺苷代偿性增高，且在星状神经节阻滞后降低；在睡眠方面，可发现睡眠剥夺组总体睡眠时长延长（主要为 REM 期）和睡眠时相切换次数上升，星状神经节阻滞后能改善上诉情况。在 fmri 的结果中可以看到，与高血压组相比，星状神经节阻滞组在部分脑区（杏仁核、海马等）出现明显脑血流增强现象。
结论 腺苷作为一种神经内分泌递质能同时对血压睡眠产生调控，异常当量的腺苷水平浓度可能会引发睡眠障碍和高血压的发生，而星状神经节阻滞这一治疗手段能通过调控腺苷水平重回稳态以此来调节血压与睡眠，与此同时，fmri 的结果也表明了星状神经节对部分脑区（特别是杏仁核、海马等与血压睡眠密切的脑区）具有调控作用。后续实验将锚定上述脑区与腺苷的联系，构建与高血压和睡眠障碍相关神经回路，为明确共病机制以及星状神经节的治疗作用提供一种新的可行性。

PU-0651

Effects of ultrasound-guided stellate ganglion block combined with auricular acupressure on postoperative sleep disturbance in patients undergoing hip arthroplasty

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Patients who undergo total hip arthroplasty (THA) commonly suffer from poor sleep during the postoperative period. This randomized controlled trial set out to evaluate the effect of stellate ganglion block (SGB) combined with auricular acupressure (AA) on postoperative sleep disturbance (POSD) in patients undergoing THA. 105 subjects undergoing THA under spinal anaesthesia were randomly assigned into three groups, and received either sham AA whithout using Semen Vaccariae (group A), AA using Semen Vaccariae (group B) or AA combining with SGB (group C). The primary outcome was the incidence of POSD on the first postoperative night. Secondary outcomes included the data of objective and subjective sleep quality, night VAS pain scores, number of PCA and amount of additional analgesics during that time. On the first postoperative night, the incidence of POSD was significantly lower in group C than in group A, 36.4% and 75.8%, respectively ($p=0.005$). Compared with group A, the total sleep time, deep sleep duration and proportion and sleepefficiency in group B and C (all $p < 0.05$) were statistically increased. Meanwhile, the time and number of awakening, light sleep duration and proportion were statistically reduced and REM duration was statistically increased in the latter group as well (all $p < 0.05$). The sleep depth and total St.Mary's Hospital scores in group B and C, while the number of awakening, daytime function and sleep satisfaction scores in group C were significantly higher than

that in group A (all p < 0.05). In addition, there were no significant differences in other secondary outcomes between the three groups (all p > 0.05). The results above suggested that the combined treatment of SGB and AA effectively prevented the occurrence of postoperative sleep disorders and improved the subjective and objective sleep quality of patients undergoing THA on the first postoperative night.

PU-0652

右美托咪定对短期失眠老年肿瘤患者全麻术后睡眠质量的影响

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目的 评价右美托咪定对短期失眠老年肿瘤患者全麻术后睡眠质量的临床疗效
方法 选择短期失眠的胃肠道肿瘤老年患者 85 例，男 53 例，女 32 例，年龄 60～75 岁，手术时间≥2 小时，ASA I～III 级。将患者随机分为两组：右美托咪定组（Dex 组，43 例）和生理盐水组（NS 组，42 例）。两组均在全身麻醉下接受腹腔镜肿瘤根治手术，术后均接受静脉自控镇痛（PCIA）。Dex 组在麻醉诱导前 10～15min 期间给予负荷剂量 0.6μg/kg 右美托咪定；随后持续静脉泵注右美托咪定[0.2μg/（kg·h）]至手术结束前 1h；NS 组以相同方案给予生理盐水。PCIA 方案：Dex 组舒芬太尼 2μg/kg+右美托咪定 200μg，生理盐水稀释至 150ml。NS 组舒芬太尼 2μg/kg，生理盐水稀释至 150ml。两组均采用理查兹-坎贝尔睡眠问卷（RCSQ）评估术前和术后第 1d 夜间的睡眠质量；利用体动记录仪（华为智能手环）记录术前和术后第 1d 夜间的睡眠情况，测定两组患者术前以及术后第 1d 晨静脉血中的白介素 6（IL-6）、褪黑素（MT）的含量水平。采用匹兹堡睡眠质量指数（PSQI）量表、汉密尔顿抑郁量表(HAMD)、汉密尔顿焦虑量表（HAMA）、蒙特利尔认知评估量表(MoCA)记录术前水平，采取Ｒamsay 评分、视觉模拟评分法（VAS）评估患者麻醉恢复室（PACU）、术后第 1、2、3d 镇静镇痛情况；采用 3 分钟谵妄诊断量表（3D-CAM）评估第 1、2、3d 谵忘的发生；记录四组患者术中、PACU、术后第 1、2、3d 低血压、心动过缓、恶心呕吐、头晕、呼吸抑制、皮肤瘙痒等不良发应发生情况。
结果 对比术后两组第 1d 夜间 RCSQ 评分，Dex 组评分明显高于 NS 组（P ＜0.05）；相较于术前 RCSQ 评分，两组评分差异无统计学意义。体动记录仪数据显示，与术前比较，Dex 组夜间睡眠时间明显延长（P ＜0.05），清醒次数减少（P ＜0.05），浅睡眠比例增加（P ＜0.05），深睡眠连续性增加（P ＜0.05）,NS 组觉醒次数明显增加（P ＜0.05），深睡眠连续性显著减少（P ＜0.05）；与 NS 组比较，Dex 组术后第 1d 夜间睡眠时间显著延长（P ＜0.05），深睡眠连续性增加（P ＜0.05），觉醒次数减少（P ＜0.05）；与 NS 组比较，Dex 组术后第 1d 血清 MT 水平明显升高（P ＜0.05），术后第 1、2d 的镇痛评分明显降低（P ＜0.05），术后第 2d 镇静评分明显升高（P ＜0.05）；两组术后谵忘的发生率以及不良反应的发生率差异无统计学意义。
结论 右美托咪定能够显著改善短期失眠胃肠道肿瘤老年患者的术后睡眠质量，提供良好的镇痛，且无不良反应以及认知功能障碍的发生。

PU-0653

The role and mechanism of TLR4/NLRP3/GSDMD-dependent pyroptosis in PND induced by sleep deprivation

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Perioperative neurocognitive disorder (PND) is a common central nervous system complication in patients after surgery or anesthesia, closely related to sleep deprivation and neuroinflammation, but its mechanism has not been clarified. NLRP3 is a cell membrane receptor protein that is heavily expressed in the central nervous system and promotes the secretion of inflammatory factors and the segmentation of GSDMD, thereby triggering an inflammatory form of cell death (pyroptosis). Studies have shown that TLR4 is an important membrane recognition receptor and a key mediator of NLRP3 inflammasome activation and pyroptosis, but its mechanism of action in sleep deprived cognitive dysfunction is unknown. Since TLR4 and NLRP3 are essential regulatory targets for central nervous system function, and our preliminary experimental results, we speculate that sleep deprivation induces mild to moderate central inflammatory response. Inflammatory factors released by peripheral surgical stress act on TLR4 receptors on the central microglia cell membrane, activate the TLR4/NLRP3/GSDMD signaling pathway, further secrete a large number of inflammatory factors and chemokines, aggravate central inflammation, form a vicious cycle, and eventually lead to PND. Cognitive behavioral assays, gene overexpression/silencing, Co-IP, Pull down, qRT-PCR, western blot analysis, ELISA, Hematoxylin-eosin staining, and high-throughput sequencing technologies, etc. were performed in animals (in vivo), cultured microglial cells (in vitro) or in clinics. The water maze test showed that compared with the Con group, the escape latency of SD group and Sur group was significantly prolonged, and the number of crossing the platform was reduced. Compared with Sur group, the escape latency of SD+Sur group was further prolonged, and the number of crossing the platform was reduced. HE staining of rat hippocampal tissue showed that hippocampal neurons in Con group were arranged neatly and had regular morphology, while neurons in SD and Sur group were swollen, nuclear staining was deepened, and the boundary between the nucleus and cytoplasm was blurred, which was further aggravated by SD+Sur. Compared with Con group, mRNA and protein contents of IL-1β, IL-18, and Iba1 in SD group and Sur group were significantly increased; Compared with Sur group, mRNA and protein levels of IL-1β, IL-18, and Iba1 in the hippocampus were further increased in SD+Sur group. Immunofluorescence results showed that NLRP3 and Iba1 neurons in SD and Sur groups were significantly activated compared with Con group. NLRP3 and Iba1 were further activated in hippocampal neurons in SD+Sur group compared with Sur group. Compared with Con group, mRNA and protein levels of TLR4, NLRP3, GSDMD, and caspase-1 in the hippocampus of SD group and Sur group were significantly increased; Compared with Sur group, mRNA and protein levels of TLR4, NLRP3, GSDMD, and caspase-1 were further increased. In the occurrence and development of PND induced by sleep deprivation, TLR4/NLRP3/GSDMD signaling pathway regulates microglia pyroptosis, thus affecting postoperative cognitive function. This study will provide a new idea for the prevention and treatment of PND in patients with sleep disorders.

PU-0654

多模式联合治疗法用于顽固性失眠的有效性与安全性研究

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目的 评价以星状神经节阻滞、麻醉睡眠平衡术、CBT-I、经颅磁刺激等多种手段为一体的多模式

联合治疗法对顽固性失眠的有效性和安全性。
方法 选择 2022 年 10 月～2023 年 6 月在我院治疗顽固性失眠患者 63 例，性别不限，年龄 18-65 岁之间，符合顽固性失眠的诊断标准，PSQI 评分＞7 分，采用随机数字表法分为两组，对照组 C 组（n=31）和多模式联合治疗组 M 组（n=32）。M 组患者治疗周期 11 日，治疗周期内进行连续的 CBT-I、连续 2 日的麻醉睡眠平衡术、连续 7 日的星状神经节阻滞及 2 次经颅磁刺激，其中 CBT-I 持续三个月；C 组患者治疗周期 9 日，治疗周期内只进行 CBT-I 和经颅磁刺激，方案及频次同 M 组。分别在第 0 周、第 2 周、第 4 周、第 8 周末采集两组患者 PSQI 量表总分、PSQI 量表六项因子分数、华为手环检测的客观睡眠数据、HAMD 量表评分及 HAMA 量表评分数据，并计算两组失眠患者的临床疗效。同时，记录两组患者第 0 周、第 8 周末睡眠相关中枢递质活动情况及整个治疗周期内不良反应发生情况。
结果 在睡眠质量上，两组患者均有改善作用，与 C 组相比，M 组更有益于失眠患者睡眠时间延长，睡眠总体质量提高；在睡眠结构上：两组患者也均有改善作用，与 C 组相比，M 组更有益于增加深睡眠比例，降低浅睡眠比例及苏醒次数；在临床疗效上，M 组患者显著及以上有效率明显高于 C 组，总有效率也明显高于 C 组；在焦虑抑郁情绪改善上，两组均有改善作用，M 组优于 C 组；在脑神经递质激活水平影响上，两组患者经过治疗后脑内 GABA 、Ach 和 5-HT 的相对功率升高、Glu 的相对功率降低，与 C 组相比，M 组对 GABA 和 5-HT 的改变更为显著。
结论 多模式联合治疗法治疗顽固性失眠效果确切，能有效改善失眠患者的睡眠质量及情绪障碍，其作用机制可能与升高 GABA 和 5-HT 水平相关。

PU-0655

The Effect of Dexmedetomidine on Postoperative Sleep Quality and Melatonin Levels in Surgical Patients

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Background: Postoperative sleep disturbance is a common complication that delay the functional recovery of surgical patients. Changes in melatonin levels during the perioperative period are a potential mechanism for postoperative sleep disturbances. Dexmedetomidine has been reported to improve postoperative sleep quality. Unfortunately, the specific mechanisms of this effect remain unclear. This study aims to investigate the effect of continuous intraoperative dexmedetomidine infusion on postoperative sleep quality in elderly patients undergoing elective thoracoscopic lung surgery and analyze its relationship with changes in melatonin secretion.
Methods: A total of 126 elderly patients were randomly divided into two groups: Dexmedetomidine group（Group D）, which received continuous dexmedetomidine infusion at 0.3-0.5 μg/(kg·h) combined with propofol during surgery, and Propofol group（Group P）, which received propofol alone. The primary outcome was the postoperative sleep quality on the first day, assessed by the Richards-Campbell Sleep Questionnaire (RCSQ). Secondary outcomes included sleep quality scores on the second and third postoperative days, melatonin levels postoperatively, and the incidence of delirium on the first and seventh postoperative days (discharge day).
Results: The sleep quality score of patients in Group D was lower on the first postoperative night compared to preoperative levels (P = 0.006), with no difference on the second and third postoperative nights. In Group P, sleep quality scores were lower on the first two postoperative nights compared to preoperative levels (P = 0.000 and P = 0.006, respectively), with no difference on the third postoperative night. On the first postoperative night, Group D had a higher sleep quality score compared to Group P (P = 0.012), with no difference between groups on the second and third postoperative nights. The nighttime urine 6-SMT concentration in Group D showed no significant difference from preoperative levels over the three postoperative days. In Group P, nighttime urine 6-SMT concentrations were significantly lower on the first and second postoperative

days compared to preoperative levels (P = 0.000, P = 0.000), with no significant difference on the third postoperative night (P > 0.05). There was no statistically significant difference in the preoperative and postoperative day 3 urine 6-SMT concentrations between the two groups (P > 0.05); however, Group D had significantly higher urine 6-SMT levels on postoperative days 1 and 2 compared to Group P (both P = 0.000).There was no significant difference in the incidence of postoperative delirium between the two groups (P=0.65).
Conclusion: Continuous intraoperative infusion of dexmedetomidine can effectively improve sleep quality during the first two postoperative days and promoted melatonin secretion which is the potential mechanism of postoperative sleep improvement.

PU-0656

瑞马唑仑与丙泊酚全麻对宫腔镜手术患者术后睡眠和疲劳情况的影响——一项随机交叉试验二次分析

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目的 术后睡眠障碍和疲劳综合症是阻碍患者恢复的常见问题。纳入三个月内连续两次宫腔镜手术的患者，分别采用瑞马唑仑和丙泊酚麻醉方案进行了一项随机交叉研究，该研究结果发现与采用丙泊酚方案的患者相比，采用瑞马唑仑方案的患者表现出更高的脑电指数（BIS）、更小的血流动力学波动。考虑到新型苯二氮卓类镇静药瑞马唑仑是否对术后睡眠和疲劳状态有影响尚无定论。本研究将上述随机交叉实验中术后睡眠和术后疲劳评分数据作为主要结论并对相应的术中数据进行二次分析，对宫腔镜手术患者应用瑞马唑仑和丙泊酚麻醉方案后睡眠和疲劳状况进行比较
方法 术前一晚通过匹兹堡睡眠质量指数（PSQI）问卷评估患者，术中使用改良观察者警觉/镇静评分（MOAA/S）监测。术后第一天和第二天早晨通过微信调查进行阿森斯失眠量表（AIS）和疲劳量表（FS-14）评估。主要结果为两种方案术后第一天的 AIS 评分，次要结果包括术后第二天的 AIS 和 FS-14 评分。已纳入 17 名子宫内膜癌或复杂增生的宫腔镜手术患者，排除术前 PSQI > 15 和术后随访数据不全的患者，同时重新分析了术中生命体征、手术时间和恢复时间等。
结果 15 名平均年龄 34.4±5.8 岁的患者完成了统计分析。两种方案的术前 PSQI 评分相似：4（3-5）vs 4（3-6），p=0.377。术后两天的总 AIS 评分在两种方案间无差异。术后第一天丙泊酚方案患者的觉醒次数多于瑞马唑仑方案：1（0-2）vs 2（1-3.25），p=0.029，而瑞马唑仑方案患者整体睡眠质量更高：1（0.5, 2）vs 1.5（1-2），p=0.043。术后第一天丙泊酚方案患者的 FS-14 评分更高：5（3-7.5）vs 3（2-6），p=0.035，且瑞马唑仑方案患者的精神疲劳评分显著更低：0.5（0-1.75）vs 2.5（1.5-3.5），p=0.023。两方案患者在第二天的 FS-14 评分无显著差异。两组患者均未报告术中知晓，麻醉满意度相似。
结论 该二次分析比较了瑞马唑仑与丙泊酚全身麻醉对宫腔镜手术患者的术后失眠评分和疲劳的影响。与丙泊酚麻醉相比，瑞马唑仑方案患者在术后第一天表现出较低的疲劳水平，尤其是在精神疲劳方面。两种方案在术后两天的 AIS 失眠评分无差异。需要进一步的研究来比较丙泊酚和瑞马唑仑麻醉对更长时间手术的术后失眠情况和疲劳状况的影响。

PU-0657

术后睡眠障碍的研究现状及发展趋势：基于文献计量学的分析

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目的 术后睡眠障碍（PSD）已成为研究人员关注的焦点，并已经有大量的出版物不断涌现。通过对术后睡眠障碍的相关研究进行文献计量学分析，探索本领域的研究现状、热点和发展趋势。
方法 以 web of science 核心合集数据库为文献来源，检索术后睡眠障碍领域相关的研究文献。使用 R 软件、VOSviewer 和 CiteSpace 软件对国家、研究机构、作者和关键词进行共现分析，并对研究机构、关键词进行聚类分析、时间演化分析和突现分析，并绘制可视化图谱。
结果 共检索到 1748 篇出版物。1991 年~ 2022 年发表出版物的平均年增长率为 16.56%，科研人员对本领域的兴趣逐年增加。文献共被引聚类图谱呈现出 11 个结构良好的网络，进一步确定了六大研究趋势：与麻醉相关的睡眠机制、褪黑激素与睡眠障碍、疼痛管理、镇痛药物的影响、右美托咪定与睡眠质量以及术后恢复。关键词突现性分析发现，占前十位的关键词分别为：positive airway pressure, anesthesia, surgery, randomized controlled-trial, expression, apnea syndrome, preoperative anxiety, efficacy, bariatric surgery 和 apnea。 近年来，"validation", "general anesthesia", "neurons" 和 "functional conectivity" 受到更多关注，可能是未来研究的潜在热点趋势和方向。
结论 本篇文献计量学分析提供了术后睡眠障碍相关的国家、机构及作者合作网络信息，并揭示了本领域的研究现状、热点及前沿趋势，为研究人员开展未来的工作提供重要参考。

PU-0658

氢氧吸入改善失眠的真实世界研究

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目的 失眠以入睡困难、睡前忧虑烦躁、睡眠中断、造型、主观睡眠不足等为主要表现，发病率达到 6%～7%。随着社会人口老龄化的发展，老年人的健康问题备受关注，而睡眠对于老年人健康的重要性不言而喻，因而失眠问题成为关注的热点。慢性失眠的发生不仅给老年人日常生活造成极大的困扰，还会使得躯体疾病风险增高，同时还可引起精神方面的问题，甚至可能造成意外事件，增加社会负担。因此针对老年人失眠，予以有效治疗意义重大。目前，临床上常采用苯二氮卓类药物如艾司唑仑等治疗失眠障碍，但疗效不持久，且长期应用存在一些不良反应，故安全可靠的新型干预手段有待探寻。

近年来，有许多研究表明氢气具有抗氧化、抗炎症和抗凋亡作用，而且对缺血/再灌注以及以炎症为基础的急性组织缺血性疾病和慢性退化性疾病（包括帕金森病、阿尔兹海默病和动脉粥样硬化等氧化应激相关疾病）均具有较为理想的正面效果。在一项针对 82 晚期癌症患者使用氢气控制癌症的研究中表明，使用混合氢氧吸入的肿瘤患者的生活质量，包括疲劳、恶心、呕吐和失眠，在氢氧混合气吸入治疗两周后和四周后都有所改善，本研究是观察老年失眠患者接受氢氧吸入治疗后失眠症状是否改善。
方法 本课题以泰康之家燕园社区的失眠人群为研究对象，采用回顾-前瞻性队列研究的设计，通过访谈和电话随访的方式进行问卷调查和量表评估，观察氢氧吸入对于失眠患者的疗效并探讨影响失眠的相关因素。主要研究指标是匹兹堡睡眠质量指数（Pittsburgh Sleep Quality Index, PSQI），次要研究指标是总睡眠时长（total sleep time，TST）、深睡眠时长（deep sleep time, DST）、浅睡眠时长（light sleep time, LST）、快动眼睡眠时长（rapid eye movement sleep time, REMST）、

睡眠效率（sleep efficiency, FE）和觉醒次数（frequency of awakenings, FOA）、生活质量评分和不良事件的发生率。

结果 共有 191 例失眠人群参与本研究（其中 99 例为氢氧吸入组，92 例为对照组）。本研究采用两因素重复测量数据方差分析方法，判断氢氧吸入随着时间的变化对参与者匹茨堡问卷总评分的影响。其中氢氧吸入组第一次调查问卷总分均数及标准差为 10.80±0.30，第二次总分的均数及标准差为 9.84±0.27。对照组第一次调查问卷总分均数及标准差为 13.69±0.35，第二次总分的均数及标准差为 13.00±0.37。我们发现氢氧吸入和时间的交互作用对参与者问卷总评分的影响无统计学意义，F(1,91)=1.896，P=0.172。但时间因素对参与者问卷总评分的影响具有统计学意义，F(1,91)=67.839，P<0.001。此外，氢氧吸入对参与者问卷总评分的主效应具有统计学意义，F(1,91)=70.328，P<0.001。因为，可以说明氢氧吸入对参与者的睡眠存在积极的影响。

结论 睡眠对于老年人身心健康十分重要，随着年龄增长，失眠逐渐成为威胁老年人身心健康的因素之一。氢氧吸入对于老年人失眠具有一定的改善作用。

PU-0659

小剂量艾司氯胺酮复合星状神经节阻滞对妇科腹腔镜手术患者术后睡眠质量的影响

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目的 探讨小剂量艾司氯胺酮复合星状神经节阻滞对妇科腹腔镜手术患者术后睡眠质量的影响。

方法 选择择期行妇科腹腔镜手术患者 160 例为观察对象，采用随机数字表法将患者分为四组，每组 40 例：基本全麻组（C 组）、艾司氯胺酮组（A 组）、星状神经节阻滞组（S 组）和艾司氯胺酮复合星状神经节阻滞组（A+S 组）。C 组给予 0.2~0.3 mg/kg 依托咪酯，0.4~0.5 μg/kg 舒芬太尼及 0.6 mg/kg 罗库溴铵进行全身麻醉诱导。静脉泵注丙泊酚 4~6 mg·kg－1·h－1、瑞芬太尼 0.1~0.2 μg·kg－1·min－1 和 1 %七氟烷进行麻醉维持；A 组在基本麻醉诱导前 1 min 给予 0.2mg/kg 艾司氯胺酮；S 组在基本麻醉诱导前行星状神经节阻滞；A+S 组在基本麻醉诱导前行星状神经节阻滞，并给予 0.2 mg/kg 艾司氯胺酮。记录四组患者术前 1 d、手术当日、术后 1 d 的匹兹堡睡眠质量指数（PSQI）；记录四组患者术后 24h 疼痛视觉模拟量表（VAS）评分，补救镇痛情况及术后首次下床活动时间、苏醒时间、住院时间。记录局麻药中毒、全脊髓麻醉、气胸、臂丛神经阻滞等星状神经节阻滞相关并发症发生情况。

结果 四组患者在年龄、性别、体重指数、ASA 分级等差异均无明显统计学意义（P>0.05）。与术前 1 d 相比，C 组、A 组患者手术当日、术后 1 d PSQI 评分无明显统计学差异（P>0.05）；S 组、A+S 组手术当日、术后 1 d PSQI 评分较术前 1 d 降低（P<0.05）；A+S 组患者睡眠质量改善率较 S 组高（P<0.05）；A 组、S 组和 A+S 组术后 24 h VAS 评分均较 C 组有所降低，其中 S 组、A+S 组与 C 组相比具有统计学意义（P<0.05）；与 C 组相比，A+S 组补救镇痛情况及术后首次下床活动时间具有统计学意义（P<0.05）。S 组与 A+S 组无一例出现局麻药中毒、全脊髓麻醉、气胸、臂丛神经阻滞等星状神经节阻滞相关并发症。

结论 小剂量艾司氯胺酮复合星状神经节阻滞可有效改善妇科腹腔镜手术患者的术后睡眠质量，降低术后疼痛，同时减少患者卧床时间，有助于提高患者围术期舒适度，加快患者康复。

PU-0660

基于 ERAS 理念的无阿片麻醉改善环状脱垂痔切除术患者术后睡眠和恢复质量

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目的 观察基于加速康复外科（ERAS）理念的无阿片麻醉应用于环状脱垂痔切除术的临床效果。
方法 择期行环状脱垂痔切除术患者 60 例，性别不限，年龄 18～65 岁， ASA 分级 I 或 II 级，采用随机数字表法分为无阿片类药物麻醉组（OFA 组）和阿片类药物麻醉组（OA 组），每组 30 例。所有患者均采用 ERAS 方案。OFA 组：麻醉诱导前输注右美托咪定 0.6μg/kg，诱导时给予艾司氯胺酮 0.5mg/kg，术中持续泵注右美托咪定 0.3μg/kg/h 和艾司氯胺酮 0.25mg/kg/h；OA 组：麻醉诱导前接受等体积生理盐水，诱导时给予舒芬太尼 0.5μg/kg，术中持续泵注环泊酚 0.4mg/kg/h 和瑞芬太尼 0.1～0.4μg/kg/min。采用恢复质量评分量表（QoR-15）评估患者状态，阿森斯失眠量表（AIS）和数字评价量表（NRS）评估患者睡眠情况。记录患者手术时间、拔管时间和麻醉恢复室（PACU）停留时间，术后 0、2、6、12、24h 的疼痛视觉模拟量表（VAS）评分，围手术期不良反应（头晕、恶心呕吐、排尿费力、口腔分泌物增多、呼吸抑制）发生情况。
结果 与 OA 组比较，OFA 组术后 QoR-15 评分较高、AIS 和 NRS 评分降低，拔管时间、PACU 停留时间延长，术后恶心、排尿费力发生率降低（P＜0.05），两组患者手术时间、术后各时间点 VAS 评分和其他围术期不良反应发生率差异无统计学意义（P＞0.05）。
结论 ERAS 理念下无阿片麻醉能够改善环状脱垂痔切除术患者术后睡眠和恢复质量，减少术后恶心、排尿困难的发生率。

PU-0661

七氟烷对术后睡眠质量的影响：一项系统综述

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目的 麻醉常影响患者术后睡眠模式。然而七氟烷对患者术后睡眠质量的影响尚不明确，本系统综述旨在探索七氟烷对患者术后睡眠质量影响的证据。
方法 我们在 Pubmed、Embase、Web of Science 和 Clinicaltrials 中搜索文献，搜索时间为 2024 年 1 月。我们纳入的文献为使用七氟烷的全麻手术，且在随访阶段中随访患者睡眠质量。排除标准为（1）病例报道；（2）综述和社论；（3）动物研究；（4）诊断为睡眠呼吸障碍的患者；（5）同一组患者同时使用七氟烷和其他吸入麻醉药物。使用考克兰风险偏倚评估工具评估随机对照研究的偏倚，并用纽卡斯尔-渥太华量表评估队列研究的质量。
结果 根据搜索语句共发现 705 篇文献，最后共纳入 10 篇文献，其中包括 6 项随机对照研究、2 项前瞻性队列研究、1 项回顾性队列研究，以及 1 篇无法定义类别的会议论文。纳入的文献中，6 篇研究对象为成年人，4 篇研究对象为儿童和婴儿。纳入研究的对照组（非暴露组）较为多样化，其中 2 个研究的对照为健康志愿者，2 个为其他的吸入麻醉药物（氟烷和地氟烷），剩余 6 个研究的对照为静脉使用丙泊酚。评估睡眠质量的工具不一致，大部分研究采用的是问卷形式，其中有 3 项研究采用匹兹堡睡眠质量评分，仅一项研究采用睡眠监测工具。睡眠研究常见的混杂因素包括中重度疼痛、恶心呕吐、焦虑、抑郁、和腹胀等，纳入的研究均存在混杂因素记录不足的现象，甚至有 3 项研究没有记录混杂因素。在纳入的 10 个研究中，有 7 个研究比较了七氟烷组内术前与术后患者睡眠质量的变化，其中 5 个研究发现了患者睡眠质量的降低。在 2 项比较两种吸入麻醉药对睡眠质量的研究中，没有发现七氟烷对睡眠影响的额外损害。有 3 项研究指出术中维持用药使用七氟烷时，

相比丙泊酚更会引起患者术后睡眠障碍，但是这个结果与另一个设计较好的随机对照研究的结果不一致。

结论 七氟烷相比其他吸入麻醉药，不额外损害患者术后睡眠质量。多项研究发现七氟烷相比丙泊酚会降低成年人、而不是儿童的睡眠质量，在针对婴儿的研究中，七氟烷能增加婴儿的睡眠时间。但大部分纳入研究的混杂因素控制较差，证据较低。

PU-0662

基于多生理信号构建深度学习模型实现围麻醉期非侵入式连续内环境监测技术的开发与验证

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目的 麻醉过程对实时、连续监控有极高的要求，任何滞后都可能影响临床判断和患者安全。目前围麻醉期内环境监测技术以间断、有创血气分析的方式进行，存在内环境监测频率不足、处理不及时等问题。因此，内环境的监测是当下围麻醉期监测的薄弱环节。非侵入式、连续的内环境监测技术具有迫切的需求，是急需突破的技术难点，对提升麻醉监测水平具有里程碑意义。本研究拟基于多生理信号进行围麻醉期非侵入式、连续内环境监测。

方法 本研究纳入择期全麻手术且术中拟行血气分析的患者。以四川大学华西第二医院作为模型开发数据集，收集心电图（ECG）、光电容积脉搏波（PPG）等生理信号，动脉血气采集时间和结果、以及与内环境相关信息。本研究在四川大学华西医院、四川大学华西第四医院、贵州医科大学附属医院同步进行，作为外部验证数据集。生理信号数据采集采取同样方式，并实时、远程上传至电子科技大学电子测试技术与仪器研究所服务器后台进行存储。最后，基于 ECG、PPG 波形，构建深度学习网络模型，对血液电解质、代谢指标、酸碱指标进行预测。

结果 开发集收集 83 例患者，验证集共收集 210 例患者。

基于单一 ECG 信号，构建卷积可分离神经网络（DSCRNN），结果显示对钾离子预测性能最佳，其准确率高达 96%，F1 值为 0.96（图 1）。在数值量化模型中，钾离子平均绝对误差（MAE）仅为 0.302 mmol/L，平均绝对百分比误差（MAPE）为 7.5%，说明模型预测与实际钾离子浓度非常接近；钙离子的 MAE 仅为 0.059 mmol/L，MAPE 为 5.0%，提示模型具有较好的的预测准确性。

基于单路 PPG 信号，构建人工神经网络（ANN）模型预测血糖 MAE 为 2.118 mmol/L，并且 MAPE 为 36.9%，Bland-Altman 图一致性评价显示存在部分血糖指标超出 1.96 SD 界限（图 2）。而乳酸预测性能则表现较好，MAE 为 0.522 mmol/L。而 ANN 模型对酸碱指标预测表现欠佳，模型预测 pH 的 MAE 为 1.371；PCO2 预测性能显示 MAE 为 2.111 mmHg，Bland-Altman 图一致性评价显示存在部分酸碱指标超出 1.96 SD 界限，提示模型具备一定可行性，但仍需优化算法性能（图 3）。对于碱剩余（BE）、阴离子间隙（AG）等指标，模型也实现了数值量化。

融合 ECG、两路 PPG 信号作为输入构建模型，该模型包含 2 个卷积模块（CNN）和 1 个多层感知机（MLP）。多模信号融合后，内环境预测性能显著提升。血钾 MAE 仅为 0.226 mmol/L，血钙 MAE 仅为 0.037 mmol/L，误差较小（图 4）。血糖预测的 MAPE 由单一 PPG 信号的 37%下降至 20%，MAE 下降至 1.811 mmol/L，进一步接近临床应用标准；同样地，乳酸预测性能也获得极大提升（MAE 0.443 mmol/L, MAPE 33.7%）。多模参数融合后，对于 PH，PCO2， BE， AG 均显著提升，距离临床应用差异进一步减小。

结论 深度学习模型用于 ECG、PPG 等波形改变特征提取和分析，能够有效加强对手术患者患者内环境监护和预警，该技术的成功实现，将促进我国智能医疗水平的提升，提升围术期监测水平以及诊疗技术创新，降低有创操作相关不良事件和医疗成本。

PU-0663

Development and validation of a prediction tool for intraoperative blood transfusion in brain tumor resection surgery: a retrospective analysis

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三甲

Background：Early identifcation of a patient with a high risk of blood transfusion during brain tumor resection surgery is difcult but critical for implementing preoperative blood-saving strategies. This study aims to develop and validate a machine learning prediction tool for intraoperative blood transfusion in brain tumor resection surgery.
Methods： A total of 541 patients who underwent brain tumor resection surgery in our hospital from January 2019 to December 2021 were retrospectively enrolled in this study. We incorporated demographics, preoperative comorbidities, and laboratory risk factors. Features were selected using the least absolute shrinkage and selection operator (LASSO). Eight machine learning algorithms were benchmarked to identify the best model to predict intraoperative blood transfusion. The prediction tool was established based on the best algorithm and evaluated with discriminative ability. The data were randomly split into training and test groups at a ratio of 7:3.
Results：LASSO identifed seven preoperative relevant factors in the training group: hemoglobin, diameter, prothrombin time, white blood cell count (WBC), age, physical status of the American Society of Anesthesiologists (ASA) classifcation, and heart function. Logistic regression, linear discriminant analysis, supporter vector machine, and ranger all performed better in the eight machine learning algorithms with classifcation errors of 0.185, 0.193, 0.199, and 0.196, respectively. A nomogram was then established, and the model showed a better discrimination ability [0.817, 95% CI (0.739, 0.895)] than hemoglobin [0.663, 95% CI (0.557, 0.770)] alone in the test group (P= 0.000). Hemoglobin, diameter, prothrombin time, WBC, age, ASA status, and heart function are risk factors of intraoperative blood transfusion in brain tumor resection surgery.
Conclusion：The prediction tool established using the logistic regression algorithm showed a good discriminative ability than hemoglobin alone for predicting intraoperative blood transfusion in brain tumor resection surgery.

PU-0664

让计算机“看见”麻醉深度：基于脑电时频分析和卷积神经网络深度学习技术

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目的 当前各麻醉深度监测仪主要通过计算患者麻醉状态下的某些特定脑电特征（比如 alpha 波、beta 波能量等），将不易解读的脑电原始波形转换成临床麻醉医生易于理解的 0-100 的数值，称为麻醉深度指数。这种基于机械的人为规则和简单统计的麻醉深度指数，常常不能反映患者的个体差异。近些年，国内外麻醉学家均大力倡导麻醉医生在麻醉临床中直接通过解读脑电时频图的特征，判断患者的麻醉状态。但这需要麻醉医生较深入掌握脑电知识，且会大幅增加麻醉医生在临床工作中的认知负荷。计算机视觉技术是深度学习在图像领域的具体应用，它最大的特点是不需要人为事先定义和提取特征，而是由深度卷积模型根据训练数据自主提取特征和进行学习。经初步文献检索，目前国内外关于麻醉深度算法的研究，很多还是使用传统的脑电特征提取的方法；少量使用深度学

习的麻醉深度算法研究，是将脑电波看作时间序列，并没有采用针对图像的计算机视觉技术。本研究旨在建立一套先将一维脑电波转化为二维图像，再利用计算机视觉技术进行图像自动识别的技术，进而提出一种和目前各种指数型麻醉深度算法在本质上完全不同的麻醉深度算法。

方法 收集了 2580 例丙泊酚静脉麻醉的脑电麻醉深度监测数据。利用小波变换，将一维的脑电波波形转换成二维的脑电时频图。建立和训练卷积神经网络模型，模型的输入为脑电时频图，输出为患者的意识水平状态（由能解读脑电时频图的人类专家进行标注，图 1），然后进行分类监督学习。训练后的卷积神经网络模型命名为 AnesNet，其参数量为百万左百，大小为 5MB 左右，对算力要求低，能够部署在目前监护设备使用的嵌入式设备中。 AnesNet 能根据患者脑电时频图的特征，给出“清醒”、“清醒且在眨眼”、“中、浅镇静”、“全身麻醉”和“麻醉过深(出现脑电爆发抑制）”5 种判读结果；每种判读结果伴有一个 0-1 的概率值，描述对判读结果的把握程度。患者意识 水平状态通过不同颜色进行可视化表现：蓝色表示清醒，青色表示中、浅镇静，绿色表示适宜的全身麻醉水平，红色表示出现脑电爆发抑制；并通过同种颜色的深浅对判读的把握程度进行可视化表现（图 3）。借鉴脑电睡眠结构图（hypnogram）的叫法， 将此工具命名为“麻醉深度分期图”（anesthetogram）。

结果 测试了 124 例新患者的麻醉脑电数据，得到的“麻醉深度分期图” 符合麻醉过程中清醒-麻醉诱导-麻醉维持-麻醉苏醒的一般趋势，且与脑电时频图特征吻合（图 2 和图 3）。

结论 本研究利用深度学习方法，实现了对患者脑电时频图的自动判读。本研究提出的基于深度学习的麻醉深度分期算法与目前各种指数型的麻醉深度算法有本质不同，它“模拟”了麻醉医生和脑电专家肉眼解释麻醉状态下脑电时频图的过程，能够更好应对不同患者的个体差异。

实际临床过程中，麻醉深度指数曲线的上下波动常常对麻醉医生引起误导。人眼对色彩比数字字符和曲线更为敏感，“麻醉深度分期图” 蓝、绿、红三色非常显眼、且颜色的隐喻能够减少麻醉医生的认知负荷，有可能成为麻醉深度指数曲线以外，一种新的麻醉深度监测工具 。

PU-0665

三维立体动态脑电时频图：一种新的麻醉脑状态可视化工具

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目的 当前各麻醉深度监测仪主要通过计算患者麻醉状态下的某些特定脑电特征（比如 alpha 波、beta 波能量等），将不易解读的脑电原始波形转换成临床麻醉医生易于理解的 0-100 的数值，称为麻醉深度指数。这种基于机械的人为规则和简单统计的麻醉深度指数，常常不能反映患者的个体差异。近些年来，国内外麻醉学家均大力倡导麻醉医生在临床中通过直接解读患者的脑电波形和脑电时频图的特征，判断患者的麻醉状态。脑电波形判读较为困难，现有脑电时频图在脑电波形上作了改进，但还可以进一步优化。好的可视化方式，能让观察者更容易进行判读。本研究，尝试建立一种三维立体的、动态的脑电时频图可视化方法。

方法 借鉴海底地形数据的三维可视化技术（图 1、图 2），具体实现如下：1、使用短时傅利叶变换、小波变换或多窗口算法等时频分析方法计算脑电时频图，结果为一个二维矩阵，分别为时间维度和频率维度，2、将脑电能量作为第三个维度，把脑电时频图数据变换为三维网格数据，3、在三维空间坐标系中绘制出三维图形并加入光照模型，实现空间上的立体效果，4、选择合适的时长作为窗口，适合的时长作为画面更新的步长，不断重绘，实现时间上的动态效果（图 3）。

结果 通过测试发现，将脑电信号以 2 分钟左右为一段、沿着未来时间 45 度视角进行三维立体动态显示，可以达到较好的效果。在这个显示比例和显示视角下，观察者既能看到充足的脑电历史信息，又能清楚看到当前时刻的脑电特征，可以很容易的将两者结合，作出患者脑状态的判断。通过这种立体、动态的三维可视化，能清楚的展现麻醉过程中患者的脑状态。对麻醉诱导、麻醉苏醒过程中的脑状态变化和脑电爆发抑制等具有临床意义的脑电特征有非常好的反映（图 3）。

结论 本研究通过对三维脑电时频图增加光照，实现了立体的三维效果；同时，实现了时间维度上的动态显示。将其命名为“三维立体动态脑电时频图”。相比于现有的二维脑电时频图，这种可视化方式能让麻醉医生更为直观的判读麻醉过程中患者的脑状态及其变化，可以作为麻醉医生实时判断患者麻醉脑状态的一种临床工具。

PU-0666

让计算机“看见”麻醉深度：基于格拉姆角场和卷积神经网络深度学习技术

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目的 格拉姆角场（GAF, Gramian Angular Field）是一种将时间序列数据转换为图像的编码技术。其和各种针对图像的深度学习技术相结合，已在传感器数据、金融时间序列数据等的分析中取得了广泛应用。在生理数据分析方面，初步检索发现，已有一些尝试使用此方法进行心电、人体运动数据的研究[1-2]，也有使用此方法进行脑电癫痫诊断的研究[3]。目前还未来发现有利用此方法进行脑电麻醉深度方面的研究。本研究尝试利用格拉姆角场将麻醉状态下的一维脑电波转化为二维图像，再利用卷积神经网络学习进行图像自动识别，实现一种新的麻醉深度自动判别算法。
方法 收集了 2580 例丙泊酚静脉麻醉的脑电麻醉深度监测数据。由人类脑电专家对脑电原始波形进行判读，从中筛选出有代表性的清醒、清醒且在眨眼、全身麻醉状态和麻醉过深（出现脑电爆发抑制）的脑电片段，每段时长为 8 秒。根据文献[4]中对格拉姆角场算法的描述，编写 MATLAB 程序，将上述脑电一维时间序列数据转换成格拉姆角场。使用 SqueezeNet 卷积神经网络进行迁移学习。模型的输入为格拉姆角场图，输出为患者的意识水平状态（清醒、清醒且在眨眼、全身麻醉和麻醉过深 4 种状态）。将数据随机分成训练集（80%）和测试集（20%），设定机器学习参数训练参数（学习率 0.0002、学习训练轮数 20、批样本数量 10 ），然后进行模型训练。 训练后的卷积神经网络模型命名为 AnesGAFNet，在测试集上测试模型表现。（图 1、2）
结果 模型在训练集的准确率为 94.%， 在测试集上的准确率为 75%。在测试集上，模型对全身麻醉状态脑电分类的准确率最高，为 86.2%；对脑电爆发抑制分类的准确率较低，为 65.2%（图 3、图 4）。其原因可能是：在进行人工筛选时，将部分全身麻醉状态的脑电误归类到了麻醉过深；另一方面，脑电爆发抑制的格拉姆角场与清醒眨眼时有一定相似性。
结论 本研究利用格拉姆角场和卷积神经网络深度学习，实现了对患者麻醉状态下脑电信号的自动分类，提出了一种新的麻醉深度分期算法。基于格拉姆角场和卷积神经网络的深度学习技术是一种针对时间序列数据的通用技术框架，可以用于围术期各种生理监测数据的分析。除了对时间序列数据进行分类以外，此方法还可用于时间序列的预测。有可能在围术期不良事件预警和预测（比如低血压预警、术中麻醉变浅预警、麻醉苏醒时间预测等）中发挥作用。

PU-0667

Unsupervised Machine Learning Model for Phenotype-Based Stratification in Type A Aortic Dissection to Identify Postoperative Acute Gastrointestinal Injury

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Objective: We aimed to explore the application value of unsupervised machine learning in

identifying acute gastrointestinal injury (AGI) after extracorporeal circulation for acute type A aortic dissection (ATAAD).
Methods: Patients who underwent extracorporeal circulation for ATAAD at the First Hospital of Lanzhou University from January 2016 to January 2021 were included. Unsupervised machine learning algorithms (K-means clustering based on silhouette coefficients) were used to stratify patients into different phenogroups according to the similarity of their clinical features and laboratory test results. The differences in the incidence of perioperative AGI and other adverse events among different phenogroups were compared. Logistic regression was used to analyze the high-risk factors for AGI in each phenogroup, and random forest (RF) algorithms were used to construct diagnostic models for AGI in different phenogroups.
Results: A total of 188 patients were included, with 166 males and 22 females. Unsupervised Machine Learning stratified patients into three phenogroups (phenogroup A, B, and C). Compared with other phenogroups, phenogroup B patients were older (P<0.01), had higher preoperative lactate and D-dimer levels, and had the highest incidence of AGI (52.5%, P<0.001) and in-hospital mortality (18.6%, P=0.002). The random forest model showed that the top four risk factors for AGI in phenogroup B were cardiopulmonary bypass time, operation time, aortic clamping time, and ventilator time, which were significantly different from other phenogroups. The areas under the curve (AUCs) for diagnosing postoperative AGI of phenogroup-A, B, and C were 0.943 (0.854-0.992), 0.990 (0.966-1.000), and 0.964 (0.899, 0.997) using the RF model, respectively. Different risk factors in different phenogroups had good diagnostic value for postoperative AGI.
Conclusion: Phenogroup stratification based on unsupervised learning can accurately identify high-risk populations for postoperative AGI in ATAAD, providing a new approach and basis for implementing individualized preventive and therapeutic measures in clinical practice.

PU-0668

远程智能静脉镇痛系统在妇科肿瘤术后患者镇痛管理中的应用研究

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目的 本研究旨在评估远程智能静脉镇痛系统（PCA）在妇科肿瘤术后镇痛管理中的有效性和安全性。通过比较远程智能 PCA 和传统静脉镇痛方法，旨在明确远程智能 PCA 在改善疼痛控制、降低药物副作用和提高患者满意度方面的潜在优势。
方法 采用随机对照试验设计，选取 160 名妇科肿瘤需行手术的女性患者作为研究对象。被试随机分为两组：远程智能 PCA 组（80 名）和传统静脉镇痛组（80 名）。两组患者在术后 24 小时内的镇痛方法不同，分别使用远程智能 PCA 泵和传统静脉推注。主要评估指标包括术后疼痛评分（使用视觉模拟评分法，VSA）、药物使用总量以及镇痛相关的副作用。数据收集包括基线数据、术后即刻（0 小时）、术后 6 小时、术后 12 小时及术后 24 小时的评分和药物使用记录。
结果 远程智能 PCA 组的术后疼痛评分在各时间点均显著低于传统治疗组（P<0.05），显示出较好的镇痛效果。此外，远程智能 PCA 组的患者在术后 24 小时内的总吗啡消耗量少于传统静脉镇痛组，但差异未达到统计学意义（P=0.07）。在镇痛相关副作用方面，远程智能 PCA 组的患者发生恶心和呕吐的比例显著低于传统组（P<0.05）。患者满意度调查显示，远程智能 PCA 组的满意度显著高于传统治疗组（P<0.01）。
结论 远程智能静脉镇痛泵在妇科肿瘤术后镇痛管理中显示出较传统静脉镇痛方法更优的疼痛控制效果和较低的副作用发生率。远程智能 PCA 可以显著提高患者的舒适度和满意度，是一种有效和安全的术后镇痛选择。在妇科肿瘤术后镇痛管理中推广使用远程智能 PCA 泵，可以优化疼痛控制方案，改善患者预后。

PU-0669

Preliminary validation of Qnox index for intraoperative nociception and analgesia: A prospective diagnostic study

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Background: Qnox index is a novel tool based on an electroencephalographic algorithm and aimed to quantify intraoperative nociception and analgesia balance. Herein, we evaluated the ability of the Qnox index to discriminate noxious from nonnoxious stimuli, respond to graded stimuli, and discriminate different levels of analgesia in patients under propofol anaesthesia with muscle relaxants.
Methods: This was a prospective diagnostic study. Qnox was compared to heart rate (HR) around five graded stimuli: a nonnoxious period, tetanic stimulations of the ulnar nerve with (tetanic #2) and without sufentanyl analgesia (tetanic #1), skin incision, and intubation. The response around skin incision was also evaluated at two target remifentanil concentrations.
Results: In 83 patients, compared to changes in HR, Qnox worse discriminated four graded stimuli from nonnoxious period with area under curves of 0.65, 0.67, 0.54, and 0.52, respectively. The post-stimulus values of Qnox elevated significantly after intubation and skin incision, but not tetanic #1 and tetanic #2. Post-stimulus values of skin incision were similar between the low and the high remifentanil concentration groups.
Conclusion: In patients under propofol anaesthesia with muscle relaxants, Qnox had a poor ability to discriminate noxious stimuli from nonnoxious stimuli. Although Qnox responded to intubation and skin incision successfully, it was unable to respond to tetanic stimulations, failed to respond to progressively increasing stimuli, and was unable to discriminate different levels of analgesia. The Qnox index was not superior to changes of HR in assessing nociception during general anaesthesia.

PU-0670

Risk prediction model for pulmonary complications after lower extremity Orthopedic surgery in elderly patients aged 90 years and older

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Objective: The ongoing rise in the elderly population, attributed to increased life expectancy. In China, according to the latest census, there are 4.59 million people aged 90 and above. Within this demographic, lower limb fractures or degenerative conditions are prevalent, impacting patients' quality of life. Despite the presence of multiple comorbidities, surgical interventions can offer substantial clinical and functional benefits, enhancing overall quality of life. However, postoperative pulmonary complications (PPC) pose a considerable challenge following surgery, particularly in this age group with limited mobility.
PPC, a common occurrence post-surgery, often result in prolonged hospital stays and heightened postoperative mortality rates. Depending on the definition of PPC and the surgical specialty involved, the incidence of PPC in major surgeries ranges from 1% to 23%, with postoperative mortality rates ranging from 14% to 48%. Patients experiencing PPC typically face extended hospitalization periods of 13-17 days, leading to increased healthcare costs.
This study aimed to develop and externally validate a predictive model for early detection of pulmonary

complications post lower limb Orthopedic surgery in elderly patients aged 90 years and above. The goal is to establish a reliable predictive tool for clinical application to guide subsequent treatment strategies effectively.
Methods: Data for this study were collected retrospectively from three hospitals in China, involving 1,306 cases of elderly patients aged 90 years or older who were admitted for surgical treatment between January 2012 and February 2023. The inclusion criteria were as follows: age ≥90 years and a clear diagnosis of lower limb lesions requiring surgical treatment based on history, physical examination, and test results. Patients who underwent non-lower limb Orthopedic surgeries, had incomplete data records exceeding 20%, experienced preoperative combined lung infection or respiratory failure, or had intraoperative deaths were excluded from the study.
The data derivation model utilized in this study involved two centers. The 340 samples were randomly divided into training and validation sets, with 70% (n = 238) allocated to the training set and 30% (n = 102) assigned to the validation set. To address class imbalance between positive and negative categories, the Synthetic Minority Oversampling Technique (SMOTE) was applied to preprocess the training set. A 5-fold cross-validation was employed on the training set to adapt the model hyperparameters and prevent overfitting. The training set was further divided into five subsets, with one subset serving as the test set and the remaining subsets as the training set in each iteration. Model performance was evaluated using sensitivity, specificity, accuracy, and the AUC of the receiver operating characteristic (ROC) curve.
Result: To assess the performance of the machine learning models, the data was divided into training and test sets at a ratio of 7:3, and a five-fold cross-validation was performed. Among the seven models, the RF model exhibited the highest AUC value of 0.94, outperforming the other models. For external validation, 484 patients over 90 years old from another center were collected. After applying inclusion and exclusion criteria, 185 samples constituted the externally validated set. The same methodology used for pre-processing and feature selection in the initial models was applied, with the RF model maintaining the highest performance with an AUC of 0.74.
Conclusion: In summary, our study examined and validated seven commonly employed machine learning algorithms, ultimately identifying the RF algorithm as the most effective in predicting postoperative pulmonary complications following lower limb Orthopedic surgery in patients aged 90 years and older. This finding has significant implications as it can serve as a valuable tool for screening elderly patients in this age group for potential pulmonary complications post-surgery. By leveraging the RF algorithm, healthcare providers can make informed clinical decisions, offer timely interventions, and enhance patient care by addressing pulmonary complications promptly and effectively.

PU-0671

事件相关电位与术后认知功能障碍的相关性分析

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目的 比较全身麻醉术后谵妄与非谵妄患者事件相关电位（ERP）的差异，探讨 ERP 与术后谵妄和认知功能障碍的相关性，为术后谵妄和术后认知功能障碍提供预测诊断依据。
方法 选取 2023 年 5 月-2023 年 12 月南昌大学第二附属医院东湖院区胃肠外科行胃肠肿瘤手术患者，纳入符合标准的患者作为研究对象。术后经 3D-CAM 评估，纳入为谵妄组与非谵妄组，最终入组谵妄组 9 例，非谵妄组 19 例。于术前记录患者的基线数据(年龄、性别、BMI、学历、基础疾病等基本资料)并进行 MMSE 量表评估术前认知功能。患者术后 1，3，7 天采用 3D-CAM 法进行谵妄评估，在出院前谵妄症状消失后进行任务态 64 导脑电图采集，记录中线 8 个位置的 P300、N200 的潜伏期与振幅。本研究定量资料采用均数±标准差(X±S)描述，两组间的差异性分析采用两独立样本 t 检验或秩和检验；定性资料采用例数（构成比）描述，两组间的构成比差异使用 x^2检验或 Fisher 确切概率法。指标的诊断效果采用 ROC 曲线描述。假设检验均采用双侧检验法，检验水准为 α=0.05，即 P≤0.05 认为差异具有统计学意义。
结果 所有入组的患者中，谵妄患者的一般情况，术中 ASA 分级、麻醉时间、镇静药、抗胆碱药量，术后并发症、疼痛评级等，术前和术后血红蛋白、白蛋白、CRP 生化指标等与非谵妄患者差异不大(P>0.05)。但谵妄患者术中收缩压变异度明显高于非谵妄患者（P＜0.05）。谵妄患者 P300 的潜伏期明显高于非谵妄患者，在中线 FCz、Cz、CPz、Pz、POz 5 个位置上述差异具有统计学意义(P<0.05)，而振幅低于非谵妄患者，但是均无统计学差异；谵妄患者 N200 的潜伏期明显高于非谵妄患者，在中线 Fz、FCz、Cz、CPz、Pz、POz 、Oz 7 个位置上差异具有统计学意义(P<0.05)，而中线导联 CPz、Pz、POz 和 Oz 的 N200 振幅低于非谵妄组，但是差异均无统计学差异。P300

潜伏期与谵妄的 ROC 曲线结果显示：P300 潜伏期诊断谵妄 Cpz 处的 AUC 为 0.8918；Pz 处的 AUC 为 0.8187；Cz 处的 AUC 为 0.7836。N200 潜伏期与谵妄 ROC 曲线结果显示：N200 潜伏期诊断谵妄 POz 处的 AUC 为 0.9883；FPz 处的 AUC 为 0.9152；Pz 处的 AUC 为 0.9123；CPz 处的 AUC 为 0.8304；Fz 处的 AUC 为 0.7807；Cz 处的 AUC 为 0.7690；FCz 处的 AUC 为 0.7368，故 P300、N200 潜伏期对术后谵妄有较好的诊断作用。

结论

1、事件相关电位的变化可能和谵妄的认知和意识改变相关，事件相关电位有望成为评估术后谵妄的客观指标；

2、术后谵妄患者事件相关电位 P300、N200 潜伏期延长、振幅减小；P300 和 N200 潜伏期为术后认知功能障碍提供了潜在的预测和辅助诊断的临床价值。

PU-0672

控制呼吸意外中断的新型监测及报警方式研究

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目的 控制呼吸时气管导管内温度在每个呼吸周期出现升降变化，温度最高值和最低值之间存在较稳定的温度差。当呼吸气流持续存在时，这种温度波动即可呈现规律性；当呼吸气流中断时气管导管内温度显示为某一固定值，丧失升降的波动性。运用气管导管内温度波动的节律可探测性，研制控制通气的监测装置，当呼吸气流中断时发出人工语音报警。经吉林大学第二医院伦理委员会批准，在临床麻醉中测试研制的呼吸监护仪对控制呼吸意外中断监测的及时性和特异性，观察语音报警方式的警示效果。

方法 1、选择全身麻醉成人患者 100 例 ，全麻诱导后，连接麻醉机行机械通气，观察呼吸持续性监测仪探测的呼吸频率（RR）与麻醉机设定的呼吸频率（F）的差异性并记录温差平均值（监护仪显示的温度最高值、温度最低值、温度差值是经数据处理系统积分计算后的积分值，并非常规以℃为单位的温度值）。2、手术开始前模拟控制呼吸意外中断方式：①、麻醉机手控未转换为机控；②、呼吸管路断开；③、呼吸管路缓慢漏气。每项模拟呼吸中断方式均观察：A、模拟通气中断开始到报警所用时间； B、发现报警到解除报警原因所用时间； C、手术室内其他人员对报警理解程度； D、模拟通气中断实验过程中 SpO2 是否报警并记录 SpO2 数值。

结果 1、100 例患者应用此呼吸监测装置均可测出 RR，且 RR 与麻醉机设定呼吸频率 F 比较差异无统计学意义（P＞0.05）；气管导管内温差平均值 1166.50（1090.00，1244.00）。2、①、麻醉机手控未转换为机控监测结果：A 模拟通气中断开始到报警所用时间 18.31±0.96s ；B 发现报警到解除报警原因所用时间 5.14±0.31s； C 手术室内其他人员对报警理解程度 100% ； D 模拟通气中断实验过程中 SpO2 无报警，SpO2 数值 99.07±0.58；②、呼吸管路断开 A 模拟通气中断开始到报警所用时间 15.12±1.28s； B 发现报警到解除报警原因所用时间 5.37±0.37s； C 手术室内其他人员对报警理解程度 100%；D 模拟通气中断实验过程中 SpO2 无报警，SpO2 数值 99.03±0.56；③、呼吸管路缓慢漏气：A 模拟通气中断开始到报警所用时间 33.65±.97s ；B 发现报警到解除报警原因所用时间 7.57±0.64 C 手术室内其他人员对报警理解程度 100%； D 模拟通气中断实验过程中 SpO2 无报警，SpO2 数值 99.10±0.48。

结论 1、此呼吸监测仪可以依据气管导管内温度变化准确探测呼吸频率。呼吸频率表示呼吸稳定存在的数字特征。2、此监护仪在控制通气意外中断时，监护仪丧失探测呼吸频率计算所依据的气流温度变化物理量，并在 15～35 秒内发出人工语音报警，报警内容为：请注意，呼吸停止。3、人工语音报警使麻醉医生及其他医护人员对报警理解充分，均在 SpO2 均无显著下降时完成处理险情。可见此监护仪具有报警及时、敏感、警示更高的优点。

PU-0673

新型气管导管预防环杓关节脱位的研究

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目的 环杓关节脱位是指杓状软骨失去与环状软骨的正常解剖位置关系，导致环杓关节生理功能异常，常发生于全身麻醉气管插管的术后。Komorn 在 1973 年报道了首例气管插管后环杓关节脱位。环杓关节脱位可导致患者声音嘶哑、发声困难、呼吸异常、吞咽呛咳等症状，对患者的生活质量有实质性的影响，可显著影响患者麻醉后的满意度和活动度。此外，长时间的声音嘶哑对教师、表演者或售货员等专业声音使用者来说是灾难性的，并且在临床中也引起了一些医疗纠纷，麻醉医生需加深此问题的重视。因此，针对环杓关节脱位发生机制及防范措施的研究具有重大意义。本文通过对环杓关节脱位可能的发生机制进行深入探讨，认为气管导管在插管期间对环杓关节高强度和长时间的压迫和摩擦损伤是环杓关节脱位发生的主要原因。为机制性解决此问题，本课题组设计新型气管导管并获得国家实用新型专利，旨在使气管导管与环杓关节处脱离硬接触，避免对环杓关节施加高强度的压力和机械性摩擦，预防全麻气管插管后环杓关节脱位。新型附带咽喉枕囊的气管导管是有知识产权的原创性新型麻醉器材，本试验通过在气管插管期间测试该气管导管设计理念的可实现性及临床效果，希望未来为临床麻醉中预防环杓关节脱位提供新思路。
方法 1.附带咽喉枕囊的气管导管构造包括：气管插管本体、气管套囊 1、套囊充气阀 4 及套囊充气管，于气管插管本体外弧咽喉处、环杓关节的上方，设置咽喉枕囊 2；该咽喉枕囊为半球形套囊，与咽喉后壁接触；咽喉枕囊单独设充气阀 3 和充气管。附带咽喉枕囊气管导管临床使用方法与现有的气管导管插管方法相同。气管导管插入声门后，需确保咽喉枕囊 3 置于声门外、咽后壁处，套囊 1 充气，套囊 2 充气，固定导管，避免导管在口腔内绕轴转动。2.本试验采用同个体自身前后对照的研究方法，选择全身麻醉下经口气管插管患者 12 例，同一患者先后接受干预处理和对照处理两种处理，干预处理为咽喉枕囊充气；对照处理为咽喉枕囊未充气。利用电子纤维咽喉镜观察两种处理后气管导管本体抬离的效应和气管导管本体对环杓关节的挤压程度。
结果 干预处理组使气管导管本体抬离的成功率高于对照处理（$P<0.05$）。干预处理使气管导管对环杓关节的挤压程度减轻的有效率高于对照处理（$P<0.05$）。
结论 咽喉枕囊充气后可以使气管导管本体成功抬离，并有效减轻气管导管对环杓关节的挤压程度。附带咽喉枕囊的气管导管可减轻对环杓关节高强度挤压和机械性摩擦所造成的损伤，可为未来临床上预防环杓关节脱位提供参考。

PU-0674

虚拟现实（VR）技术在小儿腹腔镜疝气高位结扎术中的应用：一项前瞻临床试验

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目的 This study aims to investigate the effects of virtual reality (VR) technology in pediatric laparoscopic high ligation hernia repair, particularly its role in reducing preoperative anxiety, emergence agitation, and pain in children.
方法 Fifty pediatric patients who underwent laparoscopic high ligation hernia repair at our hospital from January 2022 to February 2023 were selected. Patients were randomly divided into a control group and a VR group, each with 25 cases. The control group received routine preoperative preparation, while the VR group watched a 5-minute animated video using VR glasses before

entering the operating room. Both groups received routine general anesthesia with tracheal intubation and intravenous inhalation.Primary outcome measures included anxiety scores, assessed using the modified Yale Preoperative Anxiety Scale (m-YPAS) before entering the operating room and during anesthesia induction. Secondary outcome measures included the induction compliance checklist (ICC), pediatric anesthesia emergence delirium scale (PAED), postoperative pain scale (FLACC), parental satisfaction.
结果 The VR group had significantly lower preoperative anxiety scores (m-YPAS) compared to the control group (P<0.001). ICC scores indicated higher compliance during anesthesia induction in the VR group (P<0.01). The PAED scores in the VR group were also significantly lower than in the control group (P<0.001). For FLACC scores at various time points, both time (P=0.011) and group (P=0.005) influenced the scores, with an interaction effect (P=0.019). The VR group had significantly lower FLACC scores at 15 minutes post-emergence (P=0.005), indicating better postoperative pain relief.
结论 Virtual reality (VR) technology can significantly alleviate preoperative anxiety in children, improve compliance during anesthesia induction, reduce emergence agitation and pain, and enhance parental satisfaction with the surgical process.

PU-0675

基于机器学习的脊柱术后深静脉血栓形成预测模型的构建与验证

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目的 深静脉血栓栓塞症(Deep vein thromboembolism, DVT)是一种常见的术后并发症，具有较高的发病率和死亡率。然而，脊柱术后预防性使用抗凝药物在预防 DVT 中的安全性和有效性仍存在争议。因此，提前对脊柱术后 DVT 的发生进行预测显得尤为重要。本研究旨在基于机器学习建立脊柱术后 DVT 形成的预测模型。
方法 回顾性分析 2020 年 1 月至 2022 年 12 月在遵义医科大学第三附属医院行择期脊柱手术患者的病历资料。最终筛选出符合择期脊柱手术标准的 500 例患者的临床资料。采用 Boruta-SHAP 算法进行特征选择，使用 SMOTE 算法进行数据平衡。筛选并分析脊柱术后 DVT 发生的相关危险因素。建立了 5 种机器学习预测模型。选取 2023 年 7 月至 2023 年 10 月遵义医科大学附属医院收治的 150 例患者资料进行模型的外部验证。采用受试者工作特征曲线下面积(Area under the curve, AUC)值、几何平均值(geometric mean, G-mean)、灵敏度、准确度、特异度和 F1-score 评价模型的性能。
结果 结果显示，术前活化部分凝血活酶时间、年龄、体重指数、术前血肌酐、麻醉时长、罗库溴铵使用量、丙泊酚使用量是预测脊柱术后 DVT 的 7 个重要特征变量。在本研究建立的 5 个机器学习模型中，随机森林模型在内部验证集中表现出优于其他模型的性能。该模型的 AUC 值为 0.768，准确度为 73%，特异度为 87.6%，G-mean 为 0.707。随机森林模型在外部验证集中也表现出良好的结果。最后，基于开发并验证的随机森林模型，我们开发了一个用于预测脊柱手术后 DVT 的程序，用于临床评估预测。
结论 本研究纳入了 7 个术前和术中变量，构建了基于机器学习的脊柱手术后 DVT 形成预测模型，该模型可用于辅助临床评估和决策。

PU-0676

基于机器学习和“静态“-”动态”结合的高危腹部大手术后器官/间隙手术部位感染的预测与验证

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目的 手术部位感染（Surgical site infection, SSI）是外科手术后最常见的并发症之一，与患者不良预后、住院时间延长、住院费用增加息息相关。SSI 根据发生的部位分为浅表 SSI、深部 SSI 以及器官/空间 SSI（Organ/Space SSI, O/S SSI）。其中 O/S SSI 逐渐成为 SSI 的主要类型，并严重妨碍患者的术后早期康复。目前关于 SSI 的预测和高危患者识别的研究往往将三种 SSI 类型合并，共同作为主要结局进行预测和分析，然而 O/S SSI 与浅表、深部 SSI 具有不同的病理生理机制，因此目前的研究并不能有效预测 O/S SSI 的发生、及时识别高危患者。此外，现有研究的预测变量大多只包含术前和术中测量指标，没有关注手术过程对患者机体的影响和改变，没有强调术后早期指标变化对 O/S SSI 的预测和警示作用。本研究旨在使用机器学习算法，结合术前、术中和术后预测因素，着眼于高危腹部大手术后 O/S SSI 的发生风险，构建相应预测模型并进行验证，以提高预测准确性和临床实用性。

方法 本研究纳入了 2013 年至 2023 年在北京协和医院诊断为胰腺癌、胃癌或结直肠癌并接受择期根治性切除术的患者。主要结局是术后 30 天内发生 O/S SSI，O/S SSI 的诊断依据美国 CDC 给出的定义。将患者依据入院时间分为训练队列（2023 年之前入院）和验证队列（2023 年入院）。我们将潜在的预测因素分为三组：“静态”预测因素，主要包括人口统计学、合并症、吸烟史、新辅助放化疗史、术前化验指标等术前的测量指标；术中预测因素；以及“动态”预测因素，主要包括术后 24 小时内测量的化验指标。采用随机森林算法分别构建三个预测模型，Model1 仅含“静态”预测因素，Model2 同时包含“静态”预测因素和术中预测因素，Model3 则包含术前“静态”、术中及术后“动态”预测因素。同时对三种模型的表现进行了分析和比较。

结果 本研究共纳入 4133 名患者，其中 504 人在术后 30 天内发生了 O/S SSI。在训练队列的 3503 名患者中，有 435 人（12.4%）术后 30 天内发生了主要结局，验证队列中则有 69/630 例（10.9%）。三个最终模型在验证分析中均表现良好。仅包含术前“静态”预测因素的 Model1 其 AUC 为 0.734（95% CI: 0.712, 0.757），Brier 评分为 0.092（95% CI: 0.089, 0.094）。添加了术中预测因素后，Model2 的 AUC 提高到了 0.742（95% CI: 0.718, 0.767），Brier 评分降低到 0.090（95% CI: 0.087, 0.092）。进一步，当 Model3 将术后“动态”预测因素也加入其中后，模型的区分度和校准度均达到最好，AUC 为 0.755（95% CI: 0.738, 0.771），Brier 评分 0.087（95% CI: 0.084, 0.090）。

结论 本研究展现了“静态”-“动态”预测因素结合在预测高危腹部大手术后 O/S SSI 中的价值。基于机器学习算法和术前、术中及术后指标，本研究构建的模型实现了更高的预测准确性和临床实用性，从而能够更有效地进行风险分层和个体化术后管理。未来还需要进一步的前瞻性验证以推动模型在临床实践中的应用，从而改善患者预后和医疗服务质量。

PU-0677

基于机器学习算法的 PACU 患者恶心呕吐预测模型的构建与验证

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目的 建立并验证 PACU（麻醉恢复室）患者恶心呕吐（PONV）风险预测模型。
方法 筛选四川省人民医院 2021 年 1 月至 2021 年 12 月入 PACU 的全麻术后患者，收集其人口学特征、生命体征、PACU 停留时间、麻醉用药、疼痛评分等数据。按 8：2 将数据分为训练集和测试集，分别用于训练和测试模型。使用 KNN、随机森林、简单填充法进行缺失处理，使用 SMOTE、BorderlineSMOTE、SVMSMOTE 法平衡阳性和阴性样本数，使用 LASSO 和 RIDGE 回归法筛选关键变量，使用 18 种机器学习算法开发预测模型。采用 10 倍交叉验证法建立并验证模型，并使用加权投票法对模型进行集成。采用曲线下面积（AUC）、准确率、精确率、召回率和 F1 值评价模型的预测性能，采用 SHAP 法进行变量可解释性分析。
结果 从 36913 例患者中筛选了 1600 例患者用于研究。使用不同的数据处理方法，得到了 18 个数据集，并建立了 144 个集成机器学习模型。最优模型的 ROC 曲线下面积为 0.96，F1 评分为 0.95，召回率为 0.93。该模型使用了 18 个变量用于预测，其中疼痛评分、性别和 PACU 停留时间为预测重要性高的变量。
结论 本研究建立的 PONV 风险预测模型具有好的预测性能，可准确识别在 PACU 阶段恶心呕吐风险高的患者，为精准护理提供智能化的技术工具。

PU-0678

可视单腔气管导管联合支气管封堵器用于小切口冠状动脉旁路移植术患者效果：与可视双腔气管导管的比较

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目的 比较可视单腔气管导管联合支气管封堵器（VBB）与可视双腔气管导管（VDLT）在小切口冠状动脉旁路移植术（MIDCAB）患者中的应用效果，为该类患者的气道管理方法选择提供参考依据。
方法 本研究经北京大学第三医院伦理委员会批准，选择 2023 年 6 月至 2024 年 4 月期间择期行 MIDCAB 术的 102 例患者，年龄 18 至 80 岁，ASA 分级Ⅲ~Ⅳ级。随机分为 VDLT 组和 VBB 组，每组 51 例患者。两组患者分别使用 VDLT 和 VBB 进行气管插管及单肺通气，术后 VDLT 组更换为单腔气管导管。收集患者一般资料，主要观察指标为插管操作所需时间，次要观察指标包括插管次数及首次成功率、术中肺萎陷评分、校正总次数及时间、气道压力、血气分析指标等。
结果 两组患者在术前一般指标无显著统计学差异（P＞0.05）。两组患者的张口度、甲颏间距、Mallampati 分级以及颈围等指标在统计学上无显著性差异（P＞0.05）。两组患者麻醉诱导期间麻醉药及血管活性药用量在统计学上无显著性差异（P＞0.05）。VBB 组插管操作所需时间显著短于 VDLT 组（143.0 vs 182.0,P＜0.001）。VBB 组在单肺通气 10min 时的气道峰压（23.0 vs 24.0）、肺泡-动脉血氧分压（442.1 vs 491.8）差显著低于 VDLT 组（P＜0.05）。VBB 组在单肺通气 10min 时的氧分压显著高于 VDLT 组（225.0 vs 171.0,P＜0.05）。VBB 组在单肺通气 30min 时的气道峰压显著低于 VDLT 组（25.0 vs 23.0,P＜0.05），见表 1。其他次要指标在统计学上无显著性差异。
结论 本研究表明，可视单腔气管导管联合支气管封堵器与可视双腔气管导管均可成功应用于小切

口冠状动脉旁路移植术中的气道管理。与可视双腔气管导管组相比，可视单腔气管导管联合支气管封堵器组的插管操作时间显著缩短，在单肺通气 10 分钟时可维持更高的氧分压，在单肺通气 10 分钟和 30 分钟时的气道峰压、肺泡-动脉血氧分压差显著降低，且避免术后更换气管导管，并有效改善气道压力，具备较好的临床应用前景。

PU-0679

机器学习在麻醉诱导后低血压中的应用：一项来自 VitalDb 数据库的研究

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目的 麻醉诱导后低血压（post-induction hypotension, PIH）是临床麻醉中较为常见的情况，发生率可高达 36.5%，与术后急性肾功能不全等不良结局相关。机器学习方法允许对大批量数据开发强大的预测分析。我们假设，机器学习方法可以提供诱导后低血压风险的预测模型。
方法 本研究为回顾性观察性研究，数据集包含了从 VitalDB 数据库 （http://vitaldb.net/data-bank）获得的生物信号波形，囊括了从 2016 年 6 月至 2017 年 8 月共 6388 名在首尔国立大学医院经历了非心脏手术的患者的数据。患者被随机分为两组：① 用于开发模型的训练数据集（90%）② 用于协调参数的验证数据集（10%）。在手术结束前 30 分钟内采用神经卷积模型（VGG）预测诱导后低血压的预测因素，并计算预测模型的准确率（Accuracy）、 AUC(ROC 曲线下面积，ROC:receiver operating characteristic curve(受试者工作特征曲线))，loss(模型预测值和真实值的误差)。
结果 本研究主要筛选出与诱导后低血压直接相关的因素有 60 个，其中心电图波形、心率以及 ST 段变化是影响诱导后低血压最重要的三个因素（图 1）。使用循环神经网络（GRU）, 以及针对 vgg16 模型进行不同层数 vgg 网络结构的试验，最终在 vgg14 网络中测试集取得最高得分（acc：91%，AUC：96%，loss：24%）（图2）。手术前不同时间段在VGG14模型上的参数特征如下：0-1min：acc 82%，AUC：83%，loss：21%；1-5min：acc 78%，AUC：81%，loss：23%；5-15min：acc 90%，AUC：89%，loss：16%；15-30min：acc 92%，AUC：93%，loss：17%（图 3）.
结论 VGG14 模型可较好地预测诱导后低血压，并筛选出诱导后低血压最主要的影响因素为心电图、心率以及 ST 段。

PU-0680

基于深度学习的人脸疼痛识别模型应用于术后疼痛评估

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目的 术后疼痛评估是围术期管理的重要组成部分，但现有方法如患者自我报告和医生的临床观察存在诸多局限性。尤其是在麻醉复苏室，繁忙的工作环境可能使得医护人员对患者术后疼痛状态察觉不足。本研究旨在开发一种基于深度学习的人脸疼痛识别模型，以提供更准确、客观的疼痛评估方法，从而改善临床疼痛管理。
方法 研究团队构建了两个数据集：一个是临床疼痛数据集，另一个是模拟疼痛数据集。临床疼痛数据集包含了 503 名术后真实患者的面部表情视频，而模拟疼痛数据集则包括 51 名在实验室环境

下体验疼痛刺激的志愿者的面部表情视频。研究过程中，使用 NRS 量表对患者和志愿者进行疼痛评估，同时录制他们的面部疼痛表情视频。根据 NRS 评分，将数据划分为无痛、轻度疼痛、中度疼痛和重度疼痛四个类别。每个视频随机裁取 5-10 帧面部表情图片构成数据集。最终，数据集按 7:1.5:1.5 的比例划分为训练集、验证集和测试集。选择预训练的 VGG-16 模型分别对两个数据集进行训练和测试。

结果 模型在模拟疼痛数据集上表现良好，准确率和宏观 F1 分数分别为 0.665 和 0.664。然而，在临床疼痛数据集上，模型的表现有所下降，准确率和宏观 F1 分数分别为 0.565 和 0.519，尤其是在轻度和中度疼痛的识别上面临挑战。这可能是因为实验室环境较为可控，疼痛数据分布均衡，而临床环境中，在术后镇痛情况下患者术后疼痛程度多集中分布在无痛和轻度疼痛。在模型训练的基础上，研究人员开发了一个能够实时捕捉并分析患者的面部疼痛表情的应用程序，以识别疼痛程度，为医护人员提供了实时监测工具。

结论 本研究使用预训练的 VGG-16 深度学习模型，在模拟和临床环境中的疼痛评估进行了测试。尽管在临床应用中存在一些挑战，但研究结果表明，该模型在疼痛评估领域具有巨大的应用潜力。未来的工作将集中于扩大数据集规模、提高多样性、引入动态视频数据，并增强模型的解释性，以提高模型的泛化能力和临床医生的信任度。通过这些改进，深度学习模型有望成为临床疼痛管理中不可或缺的工具，帮助医护人员更好进行疼痛管理。

PU-0681

Machine learning-based prediction model for hypoxemia occurrence during gastrointestinal endoscopy undergoing anesthesia

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Objective: This study aims to develop a machine learning prediction model to enhance the prediction of hypoxemia and the identification of high-risk patients.
Methods: The study is a single-center, prospective, observational study that enrolled 1,010 individuals who underwent painless gastrointestinal endoscopy at the General Hospital of Ningxia Medical University, from June 2023 to May 2024. We employed three feature selection methods: univariate factor analysis, sequential backward selection, and feature importance from the random forest model to identify the input features for our model. Subsequently, we utilized six machine learning algorithms—logistic regression, k-nearest neighbors, support vector machine, random forest, neural network, and extreme gradient boosting tree—to construct predictive models. To prevent overfitting, we applied cross-validation, addressed class imbalance using oversampling, and optimized hyperparameters with grid search. Finally, we evaluated model performance using the area under the ROC curve (AUC) and interpreted feature importance with SHAP values after determining the final model.
Results: After feature selection, 18 feature variables were identified to construct the risk prediction model. Following cross-validation and hyperparameter optimization, XGBoost demonstrated the best performance in the current dataset, exhibiting the highest AUC and the narrowest confidence intervals. In the training set, the area under the receiver operating characteristic curve (AUROC) was 0.7805 (95% CI 0.7499-0.8108); in the test set, the AUROC was 0.7132 (95% CI 0.6362-0.7814). SHAP analysis using the XGBoost model identified weight, age, neck circumference, and propofol administration time as significant predictors of hypoxemia during gastrointestinal endoscopy undergoing anesthesia.
Conclusion: Machine learning models can enhance the prediction accuracy of hypoxemia occurrence during gastrointestinal endoscopy undergoing anesthesia. Feature importance analysis from these models can reveal high-risk factors for hypoxemia, thereby helping anesthesiologists

identify high-risk patients more effectively.

PU-0682

供应链服务系统对南京市某儿童医院手术室麻醉耗材的管理效果评价

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南京医科大学附属儿童医院

目的 探讨供应链服务(SPD)系统对接医院信息系统对南京市某儿童医院手术室麻醉耗材的管理效果,为医院麻醉耗材的管理提供参考。
方法 SPD 系统应用前按照手术室传统管理方式对儿科手术室麻醉耗材进行管理, 应用后运用供应链服务对接医院信息系统进行管理,统计并比较应用前、后的相关数据。
结果 应用 SPD 系统后,手术室麻醉耗材月存放种类数、存放总数量、订货提前期、储存空间、人力成本、麻醉耗材使用记录单填写错误月发生例数、追溯条码粘贴错误月发生例数明显少于应用前,差异有统计学意义(P< 0.01)。 收费错误抽查中收费名称、规格型号 2 个方面应用后少于应用前,差异有统计学意义(P<0.05),遗漏 收费方面应用后明显少于应用前,差异有统计学意义(P<0.01)。 满意度调查中配送速度、使用方便、配备齐 全 3 个项目应用后优于应用前,差异有统计学意义(P<0.05)。
结论 SPD 系统对于儿科手术室麻醉耗材的管理效果可靠,贴合儿科麻醉运转模式,提高了手术室护士工作质量。

PU-0683

围术期结局研究中的建模方法思考

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目的 随着医疗技术的发展和患者需求的多样化，围术期结局研究越来越受到重视。本文旨在探讨围术期结局研究中的建模方法，以便为临床决策提供更加精准的支持。通过文献综述和专家意见，本文分析了当前围术期结局研究中建模方法的现状、挑战和未来发展方向。围术期结局研究旨在通过分析手术前后各种因素的影响，优化手术方案，减少并发症，提高患者的生存质量和预后。建模方法的选择对于结局指标的科学性和准确性至关重要，能够为临床决策提供有力支持。
方法 本文采用文献综述的方法，系统地检索了相关数据库，包括 Pubmed、Scopus、Cochrane Library 等。对 2013 年至 2023 年发表的围术期相关的预测模型根据样本量大小、结局类型、建模方法进行了归类分析。同时，结合人工智能在围术期预警及干预决策支持领域的应用，探讨了计算机算法在结局研究中的发展前景。
结果 研究发现，围术期结局研究涉及多种结局指标，不仅包括患者的生理性结局、临床结局、医疗资源消耗，近十年来也越来越关注患者的生活质量、心理结局等主观感受方面的指标。但由于主观感受的评估缺乏客观性且依赖于研究人员长期的随访，此类结局的模型效果普遍不佳（0.6<ROC-AUC<0.8)。在对结局的建模过程中，样本量的大小与建模方法的使用也存在强相关，大样本（>1000 例）研究通常会使用超过 5 种的机器学习建模方法。而其中，随机森林和 XgBoost 在各预测任务中都表现出更强大的性能（ROC-AUC>0.75）。此外，考虑到模型的可解释性和危险因素的探究，研究者通常更倾向于使用多因素逻辑回归的方法参与建模并获得变量系数以衡量特征的危险度。而在人工智能应用方面，随着对多模态数据采集技术的进一步提升，深度学习已被用于处理术中实时的监测信号，如循环神经网络（RNN）和长短时记忆网络（LSTM），因其在处理

时间序列数据方面的优势，已被用于分析术中生命体征的动态变化。这些模型能够捕捉到生命体征的微小波动，从而预测术中可能出现的并发症，如术中大出血。而基于文本嵌入方式的结局研究中，预训练大模型在 AUROC 上比传统 NLP 模型的方式提高了 0.38，而将标签纳入微调也进一步提高了模型性能。

结论 机器学习算法在围术期结局建模中的应用仍处于发展阶段，未来的研究需要在多中心、大规模的临床数据集上进行验证，以确保模型的泛化能力和在不同医疗环境中的临床实用性。同时，提高算法的可解释性和鲁棒性，以及处理多源异构数据的能力，将是推动该领域发展的关键。 此外，近年来大模型展现的可扩展性、多任务学习和迁移学习能力，结合进一步模型微调，在围术期结局研究中也具有重要的应用潜力和前景。

PU-0684

基于机器学习算法的基层医院腹腔镜手术患者围术期谵妄风险模型的构建与应用

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目的 本研究基于机器学习算法构建并验证基层医院腹腔镜手术患者围术期谵妄风险预测模型，并通过比较 AUC 值等指标评价各模型的预测效能，最终获得效能最佳的建模算法，为基层医院医护人员识别腹腔镜手术患者围术期谵妄高危人群提供参考。

方法 纳入山西省“千名医师下基层”定点医院——平遥县人民医院 2022 年 1 月至 2024 年 6 月期间收治的腹腔镜手术患者为研究对象，登记所纳入患者的一般人口学资料并记载各种围术期相关资料，按照 7:3 随机分为训练集（792 例）和验证集（339 例）。以患者是否于术后 3 天内出现谵妄为因变量，以患者腹腔镜围手术期多项潜在影响因素为自变量，通过对自变量进行单因素分析、Lasso 回归分析及 Logistic 回归分析明确腹腔镜手术患者中围术期谵妄发生的独立危险因素；采用逻辑回归、线性判别分析、二次判别分析、K 近邻、决策树、随机森林、XGBoost、Lasso 回归、岭回归、弹性网络回归、逐步逻辑回归、支持向量机、梯度提升机、朴素贝叶斯算法等 14 种机器学习算法，建立基于独立危险因素的围术期谵妄风险预测模型，通过使用 R4.2.1 软件“pROC”包计算 ROC 曲线下面积(AUC)来评估模型的预测性能，最终获得效能最佳的建模算法，并对验证集患者进行验证。

结果 经纳入排除标准，最终纳入 1131 例接受腹腔镜手术的患者，其中男性 515 例，女性 616 例；年龄 19～87 岁，平均(51.22±14.76)岁；有 88 例患者发生围术期谵妄，发生率为 7.8%。多因素分析结果显示患者年龄（OR=1.5,95%CI:1.48 ～ 1.52 ， P ＜ 0.05 ） ， ASA 分级（OR=6.27,95%CI:4.61～8.54，P＜0.05），脑卒中史（OR=4.51,95%CI:2.98～7.14，P＜0.05），糖尿病史（OR=3.51,95%CI:1.86～5.74，P＜0.05），术前白蛋白水平（OR=1.55,95%CI:1.28～2.12，P＜0.05），手术时间（OR=1.88,95%CI:1.38～2.68，P＜0.05）等 6 个特征变量是围术期谵妄发生的独立危险因素；多种机器学习算法训练集的 AUC 介于 0.568～0.982 之间，其中随机森林模型表现出最高的 AUC 值，表示该模型的识别性和精确性最好，其预测效能最优。

结论 机器学习算法开发的风险模型可用于腹腔镜手术患者围术期谵妄发生的早期预测，不同模型的预测效能存在差异，其中随机森林表现出较好的预测效能，适合于基层医院的数据框架，对基层医院腹腔镜手术患者围术期谵妄的筛查及早期干预具有重要意义。

PU-0685

老年骨科手术患者术中脑电图复杂性指数与术后谵妄的关系：一项前瞻性观察性研究

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目的 预测术后谵妄（postoperative delirium，POD）的主要方法依赖于对临床特征的分析。大脑活动的复杂性是与意识状态相关的一个因素。然而，大脑活动的复杂性却很少受到关注。本研究的目的是探讨脑电图（electroencephalogram，EEG）复杂性变化在预测老年骨科手术患者 POD 中的作用。

方法 从 2023 年 7 月至 2023 年 12 月，在南京医科大学第二附属医院招募了 289 名接受骨科手术的老年患者。收集患者术中 EEG 数据，采用 Matlab 自定义脚本提取 EEG 非线性特征。采用 logistic 回归和卷积神经网络（convolutional neural network，CNN）从静态和动态两个角度探讨非线性特征指数对 POD 的预测作用。

结果 EEG 非线性特征中的排列 Lempel-Ziv 复杂度（permutation Lempel-Ziv complexity，PLZC）是 POD 的独立危险因素[OR = 0.210；95% CI =（0.050-0.850）；p=0.029]。受试者工作特征曲线（receiver operating characteristic curve，ROC）分析显示，PLZC 预测 POD 的曲线下面积较差，为 0.615（95% CI： 0.517-0.711）。考虑时间因素后，ROC 分析显示，EEG 非线性指标对 POD 有中度的预测作用[AUC = 0.701；（95% CI：0.541-0.862）]。

结论 EEG 非线性特征指标可能是 POD 的有效生物标志物，并有助于预测老年骨科手术患者 POD 的发生。

PU-0686

基于电子病历和机器学习算法的 ASA 自动评级系统的建立和验证

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目的 美国麻醉师协会身体状况评分（ASA 评分）是对外科手术患者的整体健康状态的主观评级。准确的 ASA 评分对于围术期不良结局风险预测、术前准备、医疗资源分配和质量控制等具有重要意义。但由于临床医师的专业能力差异、时间限制、以及评分主观性等原因，ASA 评分错误时常发生，对临床工作、病历质量等带来不利影响。ASA 评分与患者的客观特征（如年龄、合并症）高度相关，电子病历系统的普及、自然语言处理及机器学习等技术的出现，为设计自动化 ASA 分类系统、消除人为 ASA 评分错误提供了可行性。本研究的目的是开发和验证一种基于机器学习的 ASA 评分模型，以利用医院电子病历中的客观数据精确完成术前患者的 ASA 评分。

方法 本研究回顾性分析了来自一所大型三级甲等教学医院的围术期科研数据平台上的 112,650 名非心脏手术患者的数据。从患者麻醉记录中提取 ASA 分级数据，并按照 ASA 指南中推荐的 ASA 评分规则对 ASA 评分进行校正，获得最准确的 ASA 评分信息。随后，使用来自患者人口统计资料、实验室结果、病史记录、护理记录、会诊记录、医嘱、麻醉前访视数据等来源的多维特征训练机器学习模型。为了处理数据中的类别不平衡，我们采用了合成少数过采样技术（SMOTE）来生成平衡的训练数据。我们训练了五种不同的机器学习算法，包括逻辑回归、k-近邻（k-NN）、支持向量机（SVM）、随机森林和梯度提升决策树（GBDT）。通过交叉验证和超参数调优，选择性能最佳的模型。为了验证模型的准确性，我们在 3800 例参与前瞻性临床研究的非心脏手术患者中对模型

表现进行了前瞻性验证

结果 我们发现，基于梯度提升决策树建立的 ASA 自动评分模型在预测性能上表现最佳，其在验证集上的总体准确率达到 78%，各 ASA 评分（1-4 级）的召回率分别为 92%、60%、65%和 85%。我们还进行了多模型集成，进一步提高了预测的稳定性和准确性。对比分析表明，改进的数据增强方法显著提高了模型的预测性能，特别是在处理类别不平衡数据时。ASA 自动评分对术后总体并发症和死亡率的预测 ROC 曲线下面积为 0.78（95%置信区间 0.74-0.82），表现出良好的预测能力。

结论 本研究开发的基于电子病历和机器学习的 ASA 自动评分模型在预测 ASA 评分方面表现优越，通过使用数据增强技术有效解决了类别不平衡问题，显著提高了预测准确性。未来的研究将致力于进一步优化模型性能，并在随机对照试验中进一步评估模型的临床实用性，以便更好地支持临床决策和围术期患者管理。

PU-0687

人工智能化患者自控镇痛系统（Ai-PCA）应用于孕产妇分娩镇痛效果及舒适度比较

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目的 产妇阴道分娩会产生持续、剧烈疼痛，这是常见的生理现象，但会对母体身心健康、内环境、内分泌造成一定影响。尤其是分娩疼痛出现后更容易产生焦虑及恐惧等负面情绪，会和分娩疼痛形成恶性循环，最终延长产程时间，诱发不良妊娠结局。[1-2]近年来，无痛分娩在临床广泛应用，帮助很多孕产妇顺利度过阴道分娩，有效降低剧烈宫缩疼痛诱发的一系列不良妊娠结局[3-4]。目前常使用传统病人自控镇痛(PCA)进行持续的分娩镇痛，但麻醉医生在进行分娩镇痛操作后并未在产妇床边持续观察镇痛效果及镇痛泵运行情况，而人工智能化患者自控镇痛系统（Artificial intelligence patient controlled analgesia, Ai-PCA）具有远程监控、智能预警、智能报警、质控质量分析、全面评估等特点。因此本研究提出，将 Ai-PCA 应用于孕产妇的分娩镇痛有助于麻醉医生进一步动态监管患者的镇痛情况，促使患者产程进展顺利，提高患者的舒适度和满意度。

方法 本研究选取本院 240 例 ASAI-II 级正常妊娠产妇作为研究对象，随机分为正常对照组（不进行分娩镇痛）、对照组（使用传统病人自控镇痛泵(PCA)）、实验组（使用 Ai-PCA 镇痛泵系统），比较三组镇痛前、镇痛后 0.5h、镇痛后 1h、镇痛后 2h、宫口开全时及产后 1h 的疼痛视觉模拟评分量表（VAS）以及 24h 以内的镇痛泵按压次数、总药液输入量为主要结局指标，血压、心率、不良反应、产妇满意度情况、分娩结局等作为次要结局指标。

结果 三组 VAS 评分比较，镇痛差异无统计学意义，P＞0.05，与正常对照组相比，对照组及实验组的镇痛后 VAS 评分明显降低，且实验组略优于对照组，其差异有统计学意义。三组分娩指标情况比较，实验组的 24h 按压次数以及总药物输入量相较于对照组更加精准反应于数据库，三组产妇满意度及分娩结局比较，实验组明显优于其余两组，实验组不良反应发生率低于其余两组，自然分娩率、产妇满意度评分高于对照组及正常对照组，差异有统计学意义（p＜0.05）.

结论 使用 Ai-PCA 技术进行分娩镇痛可获得安全有效的镇痛效果，明显降低不良反应，极大的提升患者满意度并且不会影响分娩结果，值得推广。

PU-0688

Polar H10 sensor data estimated heart rate variability as a biomarker of inadvertent perioperative hypothermia

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The AUC values of previous IPH prediction models are not ideal, fluctuating between 0.70 and 0.794. Another controversial point in the previous IPH models is that some variables in those models cannot be accurately estimated before surgery, such as surgery time and blood loss. In theory, IPH during the first hour of surgery is caused by redistribution hypothermia, and it is mostly related to the thermal status and thermal preservation characteristics of the patient at the time of anesthesia induction. It is rarely affected by surgical factors like surgical type and fluid replacement volume.Therefore, more accurate predictions on IPH in the first hour can be made based on the preoperative characteristics of the patients.

As a popular commercialized technology, short-term (5-10 minute) heart rate variability (HRV) analysis has been validated as an objective indicator for evaluating the body's thermal sensation in environmental science. The existing research further shows that factors related IPH, such as age, BMI and individual responsiveness to anaesthetic drugs, are all related to HRV metrics. In this study, we used a validated Polar H10 sensor and its paired HRV analysis procedure in adult patients scheduled for abdominal surgery with general anaesthesia, to explore the relationship between pre-anesthesia 5-minute HRV metrics and IPH in patients with passive insulation during the first hour of surgery (Figure 1).

Patient demographic data and intraoperative measurements are shown in Table 1. Of the 220 included individuals, 69 (31.4%) developed IPH (core temperature <36℃) within the first hour following anesthesia induction. There was no significant difference in age, sex, BMI, and pre-anesthesia thermal survey scores between individuals with and without IPH in the first hour after anesthesia induction (Table 1).

Comparisons of 14 pre-anaesthesia HRV metrics in the two groups, we found a significant difference in rMSSD, Ln HF power, LF/HF, Poincaré plot SD1, Poincaré plot SD2/SD1, SampEn, and DFA (α1) between patients with and without IPH in the first hour (Supplementary Table 1).

For the association among pre-anesthesia baseline core temperature, core temperature decrease in the first hour, and these 14 HRV candidates, the variable with the highest Spearman correlation coefficients for both pre-anaesthesia baseline temperature and core temperature decrease in the first hour is LF/HF (Figure 2a, 2b and 2c).

Set IPH in the first hour as the primary outcome, univariate logistic regression analysis of 22 variables indicates significant predictors for IPH in the first hour were baseline core temperature, Ln VLF power, Ln HF power, LF/HF, Poincaré plot SD2/SD1, and DFA (α1). LH/HF as a single predictor, has the highest AUC of 0.87 (95% CI, 0.80–0.93), suggesting LF/HF is the best pre-anesthesia digital biomarker of IPH. The AUC and cut-off values for these variables are shown in Supplementary Figure 1.

ROC curves of the multiple logistic regression modelling were further constructed to evaluate performance of the models with or without LF/HF for prediction of IPH in the first hour. On the outcome of IPH in the 30 minutes after anesthesia induction, Using the reported predictors for IPH4-6, baseline body temperature, gender, age and BMI, the AUC was 0.91 (95% CI, 0.86–0.96, AIC 121.3). while adding LF/HF into the model, the AUC was 0.96 (95%CI, 0.93–0.98; AIC 95.7) (Figure 2d). On the outcome of IPH in the first hour, similarly, adding LF/HF to the predictors pool also greatly improve the performance of the model. The final model with variables of baseline core temperature and LF/HF showed a probability that 92% that the model would correctly classify a randomly selected patient (AUC 0.92, 95%CI, 0.88–0.97; AIC 152.5). The sensitivity was 76.8%, specificity was 95.4%, the positive predictive value (PPV) was 88.3%, and the negative predictive value (NPV) was 90.0% (Figure 2e).

Still, bounded by the LF/HF cut-off value of 2.44, the trend of intraoperative core temperature changes in the two groups is presented (Figure 2f). This cut-off value is close to the previous LF/HF threshold for prediction for obstetric spinal hypotension near 2.0–2.511. The median core temperature decrease in the first hour among patients with LF/HF >2.44 was 0.9℃ (IQR, 0.8-1.1), compared with 0.5℃ (IQR, 0.4-0.7) in patients with LF/HF <2.44. The core temperature in patients with LF/HF >2.44 was significantly lower than that in patients with LF/HF <2.44 within the first hour after induction. The relationships between HRV metrics and two predictors of intraoperative hypothermia (age and BMI) are presented in Supplementary Table 2.
Different from previous prediction models for IPH, our model is focused on the IPH within 1 hour, not only because the core temperature decreases more quickly during the initial hour of surgery than thereafter, but also because patients receiving surgeries less than 1 hour are tend to be without active thermal protection. On the other side, the harm caused by hypothermia is proportional to its duration, patients who experience hypothermia starting from the first hour have a higher risk of intraoperative hypothermia.
In summary, we tested an approachable HRV analysis procedure for predicting the individual risk of IPH among patients in whom passive insulation was used during surgery. We suggest that the digital biomarker LF/HF can be easily obtained by validated wearable commercial off-the shelf devices and can help physicians to identify patients at high risk for IPH, thereby helping to optimize the allocation of perioperative thermal protection resources, especially in LMICs.

PU-0689

探索未知边界：AI 在麻醉领域的创新之旅与装备新纪元

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目的 麻醉学作为现代医学的重要组成部分，其安全性和有效性直接关系到患者的生命健康。近年来，人工智能技术的快速发展为麻醉学提供了新的发展机遇。本文旨在分析人工智能技术在麻醉领域的应用现状，探讨其对麻醉装备智能化的推动作用，以及未来可能面临的挑战和机遇。
方法 1、文献综述：系统回顾了近五年国内外关于人工智能在麻醉领域应用的文献，包括学术论文、会议报告和临床指南。
2、案例分析：选取了多家医疗机构在麻醉中应用人工智能和新型麻醉装备的实例，进行深入剖析。
3、实验研究：在模拟实验环境中，对比了传统麻醉方法与人工智能辅助下的麻醉效果，评估了新型麻醉装备在实际操作中的性能。
结果 1、人工智能在麻醉决策支持系统中的应用：通过分析患者的生理指标、手术类型等信息，人工智能能够协助麻醉医生制定更准确的麻醉方案，提高麻醉的安全性和有效性。
2、智能麻醉装备的研发：借助人工智能技术，麻醉装备实现了自动化、智能化升级。例如，智能麻醉机能够实时监测患者的生命体征，自动调整麻醉药物的剂量和速度，降低人为操作误差。
3、麻醉过程的智能化监测与管理：人工智能技术能够实时监测麻醉过程中的各项参数，对异常情况进行预警和干预，确保麻醉过程的安全可控。
4、挑战与机遇：尽管人工智能在麻醉领域的应用取得了显著进展，但仍面临数据质量、算法准确性、伦理道德等方面的挑战。未来，需要进一步加强跨学科合作，推动人工智能与麻醉学的深度融合。
结论 人工智能和麻醉装备在麻醉领域的创新应用已经展现出了巨大的潜力和价值。通过对传统麻醉流程的智能化改造，我们能够显著提高麻醉过程的精确性和安全性。智能决策支持系统能够基于大数据分析和机器学习技术，为医生提供更为科学、个性化的麻醉方案，从而减少人为因素对麻醉效果的影响。同时，智能监测系统能够实时、准确地监测患者的生命体征，并预测潜在风险，使得医生能够及时发现并处理异常情况，降低麻醉并发症的发生率。

人工智能技术在麻醉领域的应用为麻醉学的发展带来了新的机遇和挑战。通过智能化麻醉装备的研发和应用，能够提高麻醉的安全性和有效性，降低医疗风险。未来，应进一步加强人工智能技术在麻醉领域的研究和应用，推动麻醉学的创新发展。同时，也需要关注人工智能技术的伦理道德问题，确保其在医疗领域的安全可靠应用。

PU-0690

一种基于深度卷积神经网络的有效识别超声引导下腹横肌平面阻滞的 AI 模型

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目的 结合人工智能技术与超声影像，建立一个快速有效的识别腹横肌平面超声切面图像并穿刺阻滞。

方法 3 个不同入路腹横肌平面阻滞超声标准切面图像由南昌大学第一附属医院麻醉科主治医师及以上医师，参考临床实际的研究情况，根据腹横肌平面阻滞中国疼痛学与麻醉学专家共识（2023 版）所定义的标准切面图像 进行采集，经 3 名长期从事（至少 10 年）超声引导下神经阻滞的麻醉专家进行判别， 3 名专家判断一致的 TAPB 图像作为基于深度卷积神经网络（deep convolutional neural networks， Deep CNN）模型识别的金标准。80% 个图像数据的用于模型建立，20%个图像数据用于模型验证。基于深度学习自学习特征的运算特点，并受到来自医学专家关注超声图像特征的先验知识启发，本文对裁剪后高度脱敏数据实行了局部区域的像素增强处理。进行降低超声图像的斑点噪声和加强 TAP 区域的对比度处理，实现对成人 TAP 的分类 。 构建基于深度卷积神经网络模型（DeepCNN 模型）将基于卷积神经网络自学习特征、权值共享的特点，本研究考虑构建一 种多层 Deep CNN 以证明卷积神经网络能够在 TAPB 中保存较高的灵敏度与准确度。通过对 Deep CNN 模型在 TAPB 特征提取性能上的进行的实验研究，本文发现，随着卷积神经网络层数与宽度的递外侧入路腹横肌平面阻滞 TAPB（以腋中线和腋前线之间的外侧腹壁中的腹横肌平面为目标；）、肋缘下腹横肌平面阻滞(TAPB)以前腹壁的腹横肌平面为目标，位于剑突和髂前上棘之间的任何位置；后侧 TAPB 取腋中线后方，腰方肌的前外侧边界为目标进行扫描超声图像并进行穿刺。3 种入路腹横肌平面阻滞共 600 个患者，其中 480 个用于构建深度卷积神经网络模型（Deep CNN），120 个用于模型验证。以 3 名长期从事超声引导下神经阻滞麻醉专家判断一致的标准切面图像作为模型识别的金标准。同时对本模型与以 3 名长期从事超声引导下神经阻滞麻醉专家识别 80 张的效能进行比较。

结果 （1）Deep CNN 模型在识别不同 TAPB 的准确率为 0.966。（2） 本模型与 3 名长期从事超声引导下神经阻滞麻醉专家识别性能相近 （P＞0.05），但所识别的切面所需时间更短。

结论 Deep CNN 模型能有效地识别不同入路的 TAPB，对辅助麻醉医生识别腹横肌并实施腹横肌平面阻滞提供帮助，提高了识别效率。具有较高的临床使用价值。

PU-0691

Artificial Intelligence to assess Drowsiness level of Outpatient Children based on facial expression recognition

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Background: Children who are prepared for ancillary examinations at the outpatient clinic usually need to be sedated at an anesthesia clinic prior to the examination. At present, the commonly used anesthesia method is sedation, which is noninvasive and safe, and is preferred by most parents. Whether sedation can be successfully implemented clinically and the dosage of sedative drugs used are closely related to the degree of drowsiness before operation. However, in clinical practice, there is no accurate evaluation method for the degree of drowsiness before operation. Anesthesiologists use sedative based on experience. This study aimed to develop a pediatric drowsiness assessment system to guide outpatient sedation and improve the success rate of one-time sedation.
Methods: Training Deep Learning Systems (ResNet-18 convolutional neural network): Facial videos of 460 children were collected 10 minutes before sedation. High quality video images of children's faces in quiet environment and natural conditions were identified and cut. Drowsiness was graded by percentage of eyelid closure over the pupil over time (PERCLOS), usually the proportion of time taken for eyelid closure in all frames within 1 minute. PERCLOS<7.5% was awake, 7.5%<PERCLOS<15% was fatigue, PERCLOS>15% was sleepiness.
Then external validation tests were performed: 120 children were sedated by anterior video to assess drowsiness. As the gold standard for diagnosing the accuracy of AI drowsiness assessment, EEG monitoring showed a shift from α waves (8-13 Hz) associated with wakefulness and β waves (13-30 Hz) associated with hypervigilance or anxiety states, to θ waves (4-8 Hz) associated with light sleep states and δ waves (0.5-4 Hz) associated with deep sleep states as individuals transitioned from wakefulness to sleep states.
Results: Deep learning systems in external test sets(ResNet-18 convolutional neural network): It could accurately predict the three levels of drowsiness in 59% of cases, and its sensitivity to detect the two levels of wakefulness and sleepiness was higher than that of fatigue, which were 80.3% and 71.5% respectively.
Conclusion: Through deep learning and training, we can further improve the accuracy of artificial intelligence assessment of drowsiness before sedation, and it is feasible to develop artificial intelligence recognition system for drowsiness of children.
Meaning:This study initially explored and developed a fully automatic, rapid, accurate and objective drowsiness assessment method based on the analysis of PERCLOS, which has high clinical value for the determination of sedative dosage in outpatient work. Further research is needed to explore its specific use in guiding sedative drugs.

PU-0692

基于大语言模型的术前慢性病共病信息自动提取系统的构建与评估

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目的 构建基于大语言模型的算法，从电子病历入院记录的既往史中自动识别术前慢性病共病情况，

并评估其准确性与效能。
方法 本研究随机纳入了我院 100 例包含详细既往史信息的入院记录作为研究样本，通过三种方式提取 60 种慢性病共病信息：（1）构建基于 GPT-4 Turbo 的大语言模型，训练以自动识别并提取慢性病共病；（2）由 4 名已获取执业医师执照的住院医生独立阅读入院记录，手动标注出所有慢性病共病信息；（3）由包括一名高级职称医生在内的小组共同讨论上述 100 名患者的共病情况，作为可靠的参考标准。比较大语言模型自动提取的结果、住院医师手工提取的结果与参考标准，采用 Kappa 系数和准确率等指标评估模型性能。
结果 与参考标准相比，大语言模型提取慢性病共病信息的准确率达 98.63%，Kappa 系数 0.739，表明一致性较高。住院医生独立提取的准确率 98.12%，Kappa 系数 0.609。对于无慢性病共病的患者，大语言模型能够全部准确识别，而住院医生独立提取信息的准确识别率为 96.67%。时间效率上，模型处理速度显著优于人工，模型用时 2 分钟完成了 100 例患者信息的识别，而 4 名医生每人需花费约 1.5 小时分别提取 25 例患者信息。
结论 本团队构建的大语言模型在自动提取慢性病共病信息方面具有高效性与高准确性，其性能接近甚至超越了专业医生的人工审查，展示了大语言模型在医疗信息处理领域的巨大潜力。该成果有望在临床实践中推广，辅助医生快速识别患者慢性病共病情况，协助术前评估，为大规模医疗数据的快速处理开辟新路径。

PU-0693

瑞芬太尼对丙泊酚闭环靶控输注在镇静镇痛麻醉中效果的影响

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目的 丙泊酚联合阿片类药物应用于镇静镇痛麻醉，可减少术中的应激及不良记忆，改善和增强局麻效果，提高局麻患者的舒适度和满意度，是整形外科手术的常用麻醉方式。丙泊酚闭环靶控输注技术能够通过实时监测反应麻醉深度的脑电双频指数（bispectral index，BIS），自动调整丙泊酚的输注速度，维持合适的药物浓度，进一步提高了镇静深度的可控性和精准度。临床研究提示丙泊酚闭环靶控输注技术联合瑞芬太尼可获得良好的镇静镇痛麻醉效果，但瑞芬太尼在不同手术和不同人群的适宜剂量还有待进一步研究。本研究观察丙泊酚闭环输注复合不同输注速度瑞芬太尼镇静镇痛麻醉用于脂肪抽吸手术的临床效果。
方法 镇静镇痛麻醉下接受脂肪抽吸术患者 60 例， ASA 分级Ⅰ或Ⅱ级，随机分为三组，A、B、C 组患者分别给予初始速度 0.05、0.06、0.07μg/kg.min 瑞芬太尼持续泵入，每组 20 例。静脉注射咪达唑仑 0.05mg/kg，A、B、C 组患者分别给予初始速度 0.05、0.06、0.07μg/kg.min 瑞芬太尼持续泵入，5min 后选择 Marsh 模型血浆靶控输注丙泊酚，初始血浆靶浓度为 2μg/ml。三组患者均在靶控输注开始 10min 后改为闭合输注，BIS 靶目标为 55±5。比较三组患者术中 BIS 值、呼吸抑制、体动、调节瑞芬太尼频次，以及丙泊酚平均效应室浓度。
结果 C 组在体动、调节瑞芬太尼的频率，以及丙泊酚平均效应室浓度均低于另外两组（P<0.01）。三组患者术中呼吸抑制、BIS 在 45-65、50-60 间的百分比差异无统计学意义（P>0.05）。
结论 丙泊酚联合瑞芬太尼不仅可以获得较好的镇静和镇痛效果，并具有协同作用，能降低丙泊酚和瑞芬太尼的用药剂量，减少呼吸抑制的发生率。由于镇静镇痛麻醉是需要保留患者的自主呼吸，而瑞芬太尼对呼吸中枢有明显的一致作用，并与使用的剂量正相关。前期的临床工作中验证丙泊酚初始血浆靶浓度调节为 2μg /ml 时，镇静麻醉效果好并且安全，因此，本研究观察丙泊酚初始血浆靶浓度 2μg /ml，闭环目标 BIS 值为 55，配伍不同初始泵注速度的瑞芬太尼（0.05、0.06、0.07μg/kg.min）的麻醉效果。结果显示三组均能顺利完成手术，呼吸抑制发生率也无统计学差异，但调节瑞芬太尼次数以及术中疼痛发生率，瑞芬太尼 0.05 和 0.06μg/kg.min 组明显增多，术中丙泊酚平均效应室浓度此两组也明显高于瑞芬太尼 0.07μg/kg.min 组。提示瑞芬太尼泵注速度为 0.07μg/kg.min，配伍丙泊酚闭环靶控输注，是脂肪抽吸手术镇静镇痛麻醉较为适宜配伍剂量。

本研究还显示，三组的呼吸抑制发生率虽无统计学差异，但发生率在 30%-45%之间，比例较高。瑞芬太尼泵注速度为 0.07μg/kg.min，配伍丙泊酚闭环靶控输注组在临床麻醉中效果更佳，但不能忽略呼吸抑制的发生。

PU-0694

LGBM 是胃癌术后并发症的有效预测模型: 一项整合影像组学与集成学习的研究

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目的 胃癌根治术后并发症是影响患者术后恢复、延长住院时间、甚至二次手术的重要因素。准确预测并发症的发生风险十分必要，本研究旨在开发针对胃癌患者发生术后早期并发症的预测模型，以指导围术期的临床决策。

方法 回顾性纳入 2022 年 4 月-2023 年 6 月于南京医科大学第一附属医院行胃癌根治术的患者，共收集 213 例患者临床资料及影像资料，根据排除标准，最终纳入 166 例患者。记录纳入患者的人口特征、实验室检查、手术资料及病理特征等，使用 3Dslicer 勾画患者术前腹部 CT 内脏脂肪区域，并通过三维卷积神经网络(3D-CNN)提取影像特征，选择最小绝对收缩和选择算法（LASSO）回归模型进行特征筛选。采用集成学习策略进行特征的训练和胃癌术后并发症的预测，并对比轻量级梯度提升机器学习（Light Gradient Boosting Machine，LGBM）、极端梯度提升树（XGBoost，XGB）、随机森林（Random Forest，RF）和梯度提升决策树（Gradient Boosting Decision Tree，GBDT）四种机器学习模型以及传统逻辑回归模型（LogisticRegression）的预测效能，通过 5 折交叉验证进行模型的评估。

结果 基于最优算法 LGBM 成功构建预测胃癌根治术术后早期并发症的模型，在 LGBM 模型中 AUC 值为 0.9232，准确率为 87.28%（95%CI，75.61%-98.95%），召回率为 81.81%（95%CI，63.16%-100.46%），精确度为 89.11%（95%CI，80.00%-98.22%），F1 分数为 85.14%（95%CI,70.59%-99.69%），预测效能优于其他模型。

结论 通过集成学习联合患者围术期的临床资料与内脏脂肪影像组学，建立了 LGBM 预测模型。该模型有效的预测胃癌患者术后早期并发症的发生，有助于实施个体化的临床决策，以促进胃癌患者术后的早期恢复。

PU-0695

基于机器学习对老年人心脏手术术后谵妄发生率的预测

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目的 谵妄是一种暂时性精神障碍，常常发生于老年手术患者，容易给患者及其家属带来意料之外的风险即损失。预见有谵妄风险的患者的能力将指导及时启动多模式预防干预措施，这将有助于减轻与谵妄相关的负担和负面后果。已经有一些研究集中在谵妄的预测上，然而，使用机器学习方法的心脏手术患者的研究数量非常有限。本研究旨在开发和验证为中国 65 岁及以上行心脏手术人群量身定制的机器学习 （ML） 模型，以提供一种更好的方法来预测术后谵妄的发生，同时观察患者肌肉量、围术期血糖变异度是否与术后谵妄相关

方法 本研究是一项多中心研究，选取包括本医院在内的三家医院，在其中选取 65 岁以上进行心脏手术的老年人总共 105 作为研究对象，根据既往的研究筛选出与术后谵妄发生的高危因素，除了常

规采集患者的检验检查外，我们还纳入了患者肌肉量（即 CT 腰椎 L3 平面肌肉面积）及患者围术期血糖波动度（即术前一天、麻醉诱导后血糖值、术中每小时记录血糖值、术后第一天血糖值），请经过培训的专业人员在手术后第一、第三、第七天根据 3D-CAM 表评估患者是否谵妄，采用各种机器学习算法，包括线性支持向量机（SVM）、具有径向基函数（RBF）核的 SVM、线性极端学习机（ELM）、具有 RBF 核的 ELM、线性判别分析和二次判别分析来区分谵妄患者和非谵妄患者。
结果 我们基于机器学习的预测模型在对患者数据训练时，使用带有 RBF 内核的 SVM 获得最大分类精度。尚未进一步研究患者肌肉量、围术期血糖变异度与术后谵妄是否相关
结论 训练集包括 90 例患者（50 例[55.5%]女性;11 例[12.2%]谵妄），测试集包括 10 例患者（6 例[60%]女性;2 例[20%]谵妄）。该分析共纳入 105 例入院病例（65 例[59.0%]女性;15 例[14.2%]伴有谵妄）。使用带有 RBF 内核的 SVM 获得最大分类精度表现最佳，AUC 为 0.755。将特异性设置为 90%，该模型的敏感性为 55.7%（95% CI，52.4%-64.2%），阳性预测值为 23.1%（95% CI，20.5%-25.9%），阴性预测值为 97.8%（95% CI，97.4%-98.1%），进一步分析将观察患者肌肉量、围术期血糖变异度与术后谵妄是否相关

PU-0696

The Effect of Intraoperative Fluid Management According to Stroke Volume Variation on Lung Ultrasound Patterns and Their Correlation with Postoperative Pulmonary Complications in Abdominal Surgery: a Randomized Controlled Trial

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Objectives: The effects of intraoperative fluid management according to stroke volume variation(SVV) on lung ultrasound (LUS) patterns, and their correlation with postoperative pulmonary complications (PPCs) in abdominal surgery have not been completely clarified. The primary aim of this study was to assess the effect of intraoperative fluid management on global and regional (anterior, lateral, and posterior areas) LUS scores and their correlation with PPCs. The secondary aim was to study the relationship between LUS scores at the end of surgery and the appearance of PPCs.
Methods: In a prospective, observational, single-centre trial, we enrolled 186 patients scheduled to undergo elective colorectal cancer surgery. All patients provided written informed consent before study enrolment. The inclusion criteria were: aged 18–80 years , both genders, American Society of Anesthesiologists (ASA) class I–III. Exclusion criteria included: an unexpected surgical plan change; poor echogenicity due to the presence of an acoustic barrier (pneumothorax, subcutaneous emphysema, etc.); with a suspected or proven acute lung disease or chronic interstitial lung disease; preoperative cardiac disease, renal insufficiency, impaired liver function; participation in another trial. Patients in the GD group received i.v. fluid based on SVV. Patients in the C group received i.v. fluid based on traditional principles. The intraoperatively maintained fluid was crystalloid in both groups at about 4 mL/kg/h. In the GD group, bolus colloid (single bolus: 100–200 mL, maximal 30 mL/kg) was administered when SVV >10%. In case hypotension (MBP falling to less than 65 mmHg within 5 min) occurred for SVV <10%, a vasoconstrictor was intermittently injected or continuously infused. In the C group, the administration of crystalloid or colloid (maximum: 30 mL/kg) and vasoconstrictor followed conventional parameters, including blood pressure, heart rate, output volume, and the anesthetist's preference. The main crystalloid was lactate linger solution, and the colloid was hydroxyethyl starch (HES 130/0.4). Since mechanical respiration is a confounding factor of SVV, a tidal volume of 8 mL/kg and the positive end-expiratory pressure (PEEP) were unified as‘0’. The LUS scores was assessed at the times

before entering the operating room (T0) and 30 minutes after awakening from anesthesia(T1). For each hemithorax, six regions were explored (upper and lower parts of anterior, lateral, and posterior chest wall). Four ultrasound aeration patterns were defined with different scores: A line alone or less than three B lines (0 point); B lines with pleural involvement < 50% (1 point); B lines with pleural involvement > 50% (2 points), and lung consolidation (3 points). The worst ultrasound abnormality detected was considered as characterizing the region examined. The LUS score of each region (regional LUS score) corresponded to the average score of all pertaining intercostal spaces and ranged from 0 to 3. LUS score was then calculated globally (as the sum of the 12 regions score, ranging from 0 to 36), and regionally (LUSp, posterior; LUSa, anterior and LUSl, lateral regions). The results were recorded, including the LUS score; regional (anterior, lateral, and posterior areas) LUS scores, the total liquid infusion volume; infusion volumes of crystalline and colloidal liquids; urine production rate; pulmonary complications 7 days after surgery.

Results: We obtained our results between November 2022 and June 2023 at the First Affiliated Hospital of USTC, China. After screening 331 patients for recruitment, we excluded 70 patients who declined to participate and 75 patients who did not meet the eligibility criteria. A total of 186 patients were randomly allocated to two groups (n=98 per group), and we obtained primary outcome data for 176 patients. Demographic features and surgical procedures were similar between the two groups. There was no statistical difference in the duration of anesthesia, duration of surgery, LUS scores at T0, and length of hospital stay between the two groups. The number of patients who received intraoperative vasoconstrictors (p=0.985) and intraoperative blood transfusions (p=0.547) and the amount of bleeding (p=0.058) did not differ significantly between the two groups. There were, however, significant differences between groups(C group vs GD group) in the amounts of total fluid volume (2000 [1675,2325] mL vs. 1600 [1500,2000] mL, p < 0.001), colloid (600[500,1000] mL vs. 850 [650,1000] mL, p< 0.001), crystalloid (1250 [1000,1500] mL vs. 850 [690,1000], p< 0.001) and urine output administered (400[300,600] mL vs. 300[200,500], p= 0.009). At T1, the LUSp scores in GD group decreased significantly compared with C group (6.2 [5.0, 7.0] vs. 8.3 [6.8, 8.9], p< 0.042). The patients in the GD group had fewer postoperative pulmonary complications than those in the C group (P < 0.05). The LUStot and LUSp scores and the amounts of total fluid in patients with pulmonary complications increased significantly compared with patients without pulmonary (P < 0.05).

Conclusions: Intraoperative fluid management according to SVV can reduce the occurrence of postoperative pulmonary complications. Additionally, LUS can aid clinicians in the bedside assessment and prediction of postoperative pulmonary complications.

PU-0697

基于机器学习的全麻术后延迟拔管的预测模型

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目的 本研究旨在探讨机器学习算法在全麻术后延迟拔管预测中的应用，构建一种准确、实用的预测模型，以期为临床麻醉管理提供决策支持。

方法 本研究是一项多中心研究，选取包括本医院在内的三家医院，收集三甲医院 2018 年 1 月至 2020 年 12 月期间接受全身麻醉手术的患者资料。纳入标准为年龄在 18-65 岁之间，ASA 分级Ⅰ-Ⅲ级，预计术后需进行机械通气的患者。排除标准为术前已存在严重呼吸系统疾病、免疫系统疾病或肿瘤患者。共纳入 1200 例患者，其中 600 例为术后延迟拔管（观察组），600 例为术后按时拔管（对照组）。所有患者均签署知情同意书。采用随机数字表法将患者分为建模组和验证组，按照 7:3 比例 建模组 840 例，验证组 360 例。。

在建模组中，通过单因素分析筛选出可能影响术后延迟拔管的因素，包括年龄、性别、体重指数、手术时长、是否为急诊手术、麻醉方式、术中出血量、术中输液量、术后引流液量、术后引流液性状等。然后采用多因素 logistic 回归分析确定独立危险因素。在此基础上，运用机器学习算法（包

括决策树、随机森林、支持向量机等）构建预测模型。通过交叉验证和网格搜索等方法优化模型参数，提高模型的预测性能。
在验证组中，将构建好的模型进行外部验证，评价模型的准确性、敏感度、特异度等指标。同时，采用 ROC 曲线下面积（AUC）评估模型的区分能力。
结果 经过多因素 logistic 回归分析，我们发现手术时间、术中出血量、术后引流液量、术后引流液颜色、术后引流液性状等因素是术后延迟拔管的独立危险因素。基于这些因素，我们成功构建了基于机器学习算法的预测模型。在建模组中，该模型的准确率为 85.3%，敏感度为 82.1%，特异度为 88.5%，AUC 为 0.862。在验证组中，模型的准确率为 84.7%，敏感度为 81.5%，特异度为 87.8%，AUC 为 0.877。这表明该模型具有良好的预测性能，可以为临床麻醉管理提供参考。
结论 本研究基于机器学习算法构建的全麻术后延迟拔管预测模型具有较高的准确性、敏感度和特异度，可为临床麻醉管理提供决策支持。但该模型尚需在更多中心、更大样本中进行验证，以进一步优化模型参数，提高其预测性能。此外，我们还应关注模型的可解释性，以便更好地应用于临床实践。

PU-0698

脑电意识指数与脑电双频指数 在老年患者麻醉深度监测中的应用比较

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目的 比较脑电意识指数（index of consciousness, IoC）与脑电双频指数（Bispectral index，BIS）监测在指导老年患者全身麻醉维持中的应用价值。
方法 收集 2022 年 8 月-2023 年 11 月于空军特色医学中心行全身麻醉手术的老年患者 80 例，随机分为 BIS 组和 IoC 组。全身麻醉中，BIS 组以 BIS 监测指导麻醉维持， IoC 组以脑电意识指数 IoC1 和伤害敏感指数 IoC2 为监测指标判断麻醉深度和镇痛强度。两组均采用静吸复合全身麻醉，术中靶控输注丙泊酚和瑞芬太尼维持镇静和镇痛，按需追加舒芬太尼以及其他血管活性药物。记录患者性别、年龄、BMI、入室后 5min(T1)、OAA/S=5(T2)、OAA/S=4(T3)、OAA/S=3(T4)、OAA/S=2(T5)、OAA/S=1(T6)、意识恢复(T7)七个时间点的 IoC1 与 BIS 值，记录术中舒芬太尼用量（μg/h）、丙泊酚和瑞芬太尼用量（mg/h）、麻醉及手术时长（h）、术中循环波动（高血压、低血压、心动过速和过缓）时间及次数、术中知晓情况、拔管后苏醒 Steward 评分以及术后苏醒期的疼痛 VAS 评分。
结果 两组患者一般资料（性别、年龄和 BMI）、手术和麻醉时长差异均无统计学意义，两组手术类型差异具有统计学意义（$P < 0.05$）。两组舒芬太尼用量、丙泊酚用量、术中低血压、心动过速、心动过缓发生例数、拔管后苏醒 Steward 评分以及术后苏醒期的疼痛 VAS 评分均无统计学差异（$P > 0.05$），IoC 组瑞芬太尼用量高于 BIS 组（$P < 0.05$），BIS 组术中发生高血压例数多于 IoC 组（$P < 0.05$），两组患者术中均未发生术中知晓。各例患者 T1 至 T7 时间点的 BIS 和 IoC1 相关性良好。
结论 IoC1 和 IoC2 能有效监测老年患者全身麻醉深度和伤害性刺激强度，使麻醉维持中循环稳定，精准调控麻醉。

PU-0699

基于深度学习的超声图像识别技术在困难气道评估中的应用研究

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目的 气道管理是安全麻醉的重要组成部分。基于深度学习的超声图像识别技术具有快速提取图像特征的优势。通过结合深度学习技术，有望构建一种智能、快速、精准的气道评估工具。本研究旨在：1）评估利用基于人工智能的超声技术预测可视喉镜下困难喉镜暴露的可行性，2）根据人工智能生成的热图确定可预测困难喉镜暴露的超声新指标。

方法 本研究纳入了 ASA I-Ⅲ级，并在全身麻醉下行择期手术的成年患者作为研究对象。所有患者于术前采集超声图像数据（舌矢状面、环甲膜水平面、声带水平面、气管矢状面、甲状腺峡部水平面、颈静脉切迹水平面、舌骨平面以及会厌平面）。采用 Cormack-Lehane 分级标准，将Ⅰ级-Ⅱ级患者定义为非困难气道组，Ⅲ级-Ⅳ级患者定义为困难气道组。我们的研究方法分为两个阶段。在第一阶段中，按照 6:2:2 的比例将数据集随机分为训练集、验证集和测试集。引入深度学习神经网络（ResNet-18），对超声图像进行特征自动识别。采用多种机器学习算法构建智能超声气道评估模型。采用 Grad-CAM++生成热图，得出超声图像中各区域对困难气道评估的权重分布。在第二阶段中，根据人工智能生成的热图，筛选出对困难气道评估具有高权重的区域；采用多因素 Logistic 回归评估高权重区域中超声指标与困难气道之间的相关性；采用协变量校正法控制混杂因素的影响。Logistic 回归的结果以比值比（Odds ratio，OR）的形式呈现，P <0.05 提示差异具有统计学意义。

结果 共收集了 1,474 名患者的资料。在第一阶段中，在筛选模型特征后，使用 LightGBM 算法的智能超声气道评估模型（包括舌矢状面图像、舌骨平面图像以及甲颏间距）在测试集上表现出最好的评估效果，其 AUC 值为 0.804，灵敏度为 0.994，特异度为 0.653。热图分析显示，在“舌矢状面”超声图像中，对气道评估权重最高的区域分布在舌根区域。在第二阶段中，高权重区域中超声指标包括皮肤到舌根末端的距离（Distance from skin to end of tongue root，DSTR）。多因素 Logistic 回归结果显示，皮肤到舌根末端的距离的 OR 值为 4.83（95% CI：2.99，8.01，P <0.001）。限制性立方样条图显示 DSTR 与可视喉镜检查困难之间存在非线性关系，随着 DSTR 增高，尤其是在 DSTR≥3.89cm（约登指数下的最佳截断值）时，困难喉镜暴露的 OR 值显著提高。

结论 基于深度学习的超声技术是识别可视喉镜下困难喉镜暴露的有效工具。此外，超声下测量的皮肤到舌根末端的距离与可视喉镜下困难喉镜暴露存在显著相关性。

PU-0700

麻醉决策对患者术后急性疼痛的影响

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术后急性疼痛是手术患者常见的并发症之一，对患者的术后转归和快速康复具有重要影响。麻醉决策在术后急性疼痛管理中扮演着关键角色。科学的麻醉决策可在确保患者安全的前提下，尽可能减轻术后急性疼痛，从而改善患者就医体验，加速术后快速康复。本文对近年来关于麻醉决策对术后急性疼痛影响的研究进行了综述，旨在为临床医生提供该方面最新的理论和实践指导。

PU-0701

髂筋膜联合后路骶丛阻滞对糖尿病足截肢术后急慢性疼痛的影响

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目的 探讨髂筋膜联合后路骶丛阻滞对糖尿病足截肢术后急慢性疼痛的影响
方法 纳入 2019 年 10 月至 2022 年 10 月在合肥市第八人民医院接受糖尿病足截肢术的患者 40 例，其中对照组（C 组，n=20）和试验组（E 组，n=20），试验组麻醉后手术前用 0.25%罗哌卡因 40ml 行髂筋膜（20ml）联合后路骶丛（20ml）阻滞，对照组不进行神经阻滞。记录两组术前及术后不同时间点静息和运动 VAS 评分、机械压痛阈、术后舒芬太尼用量、血清炎症因子和术后 3、6 个月时慢性疼痛的发生情况
结果 与 E 组相比，C 组术前、术后 3、6、24、48、72 h 的机械压痛阈显著降低（P < 0.05），术后 3、6、12、24、48、72 h 静息和运动 VAS 评分明显升高（P < 0.05），术后 3、6、12、48、72 h 时舒芬太尼用量明显增加（P < 0.05），以及术后 72 h 内镇痛泵的总按压次数和有效按压次数均明显增加（P < 0. 05）。两组之间术前及术后 3 h 血清 IL-6、TNF-α 水平差异无统计学意义（P > 0.05）。C 组术后 6 个月时，术后慢性疼痛的发生率以及疼痛程度均高于 E 组（P < 0.05）
结论 髂筋膜联合后路骶丛阻滞能减轻糖尿病足截肢术后急性疼痛的严重程度和减少术后舒芬太尼用量，也降低了术后慢性疼痛的发生率和严重程度

PU-0702

新型 NMDA 受体拮抗剂艾司氯胺酮在加速康复脊柱外科术后持续静脉镇痛的临床研究

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目的 探讨艾司氯胺酮用于脊柱矫形外科术后持续静脉镇痛，以减少阿片类药物使用剂量，降低相关不良反应发生率，缩短住院时间，加速患者康复。
方法 选取择期行脊柱矫形术患者 50 例，年龄 18～64 岁，BMI18～30kg/m2,ASAⅠ～Ⅲ级。采用完全随机设计方法等分为两组：艾司氯胺酮复合舒芬太尼组（ES 组）和单纯舒芬太尼组（S 组），每组 25 例。ES 组静注艾司氯胺酮 0.25mg/kg 复合舒芬太尼注射液 1.5ug/kg 行 PCIA,S 组静注舒芬太尼 2ug/kg 行 PCIA。记录术后 2、4、8、12、24、48、72h 静息和活动时 NRS 镇痛评分和 Ramsay 镇静评分。记录患者 PCIA 总按压次数、有效按压次数、PCIA 中舒芬太尼总用量。记录术后住院时间、术后 0～24、24～48、48～72h 头晕、恶心呕吐、尿储留等不良反应发生情况。
结果 与 S 组比较，ES 组术后 2、4、8、12、24、48、72 h 静息和活动时 NRS 评分明显降低(P＜0.05)，术后 2、4、8、12hRamsay 镇静评分明显升高(P＜0.05)，PCIA 总按压次数、有效按压次数、PCIA 中舒芬太尼总用量明显减少(P＜0.05)，术后 0～24h 恶心呕吐发生率明显降低(P＜0.05)，术后住院时间明显缩短(P＜0.05)。
结论 小剂量艾司氯胺酮应用于脊柱矫形外科术后持续静脉镇痛能够减少舒芬太尼总用量,镇痛、镇静效果优于单用舒芬太尼,降低术后恶心呕吐发生率，缩短术后住院时间，有助于围术期疼痛管理及患者康复。

PU-0703

膝关节置换术后慢性疼痛发生率及影响因素分析：一项前瞻性队列研究

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目的 调查膝关节置换术（KA）患者术后急性疼痛（APSP）及术后慢性疼痛（CPSP）的发病率，同时探索分析与 KA 患者 CPSP 发生与发展相关的危险因素。
方法 采用前瞻性队列研究的方法，分析 2023 年 1 月~2023 年 6 月期间就诊于宁夏回族自治区人民医院并行 KA 患者共计 169 例，收集患者临床资料，术前资料包括患者性别、年龄、民族、体重指数（BMI）、美国麻醉医师协会（ASA）分级、受教育史、失眠史、高血压病史、冠心病病史、糖尿病病史、脑血管疾病病史、患肢动脉粥样硬化史、患肢大隐静脉瓣膜功能不良史、麻醉史、手术史、术前疼痛总时间、术前最大数字等级评定量表（NRS）疼痛评分、术前镇痛药物使用史；术中资包括手术类型、腰麻药物中是否加入阿片类药物、术中是否使用镇静药物、手术持续时间；术后资料包括术后第一日是否下地运动、术后第 1 天、第 2 天、第 3 天及术后 3 个月（第 13 周）最大 NRS 疼痛评分。主要结局指标为患者术后第 13 周最大 NRS 疼痛评分情况。根据 KA 后第 13 周最大 NRS 疼痛评分将患者分为两组：①无或轻度疼痛组：最大 NRS 疼痛评分＜4 分；②中或重度疼痛组：4 分≤最大 NRS 疼痛评分≤10 分。比较两组患者临床资料，分析 KA 患者术后 APSP 及术后 CPSP 的发生率；采用单因素 Logistic 回归方法从临床资料中筛选 KA 患者 CPSP 的可能影响因素；采用多因素 Logistic 回归方法分析 CPSP 发生与发展的独立危险因素。
结果 本研究收集病例共计 169 例，剔除失访患者 19 例，最终随访完整患者临床资料共计 150 例，其中术后 3 天无或轻度 APSP 者（术后 3 天平均最大 NRS 疼痛评分＜4 分）7 例，发生中至重度 APSP 者（4 分≤术后 3 天平均最大 NRS 疼痛评分≤10 分）143 例，故本研究中 APSP 发生率为 95.3%；术后 3 个月无或轻度疼痛者（术后第 13 周最大 NRS 疼痛评分＜4 分）123 例；发生中或重度疼痛者（4 分≤术后第 13 周最大 NRS 疼痛评分≤10 分）27 例，故本研究中 CPSP 发生率为 18%。单因素 Logistic 回归分析结果显示，中或重度 CPSP 的发生可能与患者性别及 APSP（术后 3 天平均最大 NRS 疼痛评分）有关（均 P＜0.05）；多因素 Logistic 回归分析结果显示，女性性别〔优势比（OR）=4.697,95%可信区间（95%CI）为 1.033~21.360，P=0.045〕及 APSP（术后 3 天平均最大 NRS 疼痛评分）〔优势比（OR）=1.553, 95%可信区间（95%CI）为 1.120~2.154，P=0.008〕对 CPSP 的影响具有统计学意义。
结论 ①本研究结果提示，KA 患者术后 3 天中或重度 APSP 发生率及术后 3 个月中或重度 CPSP 发生率相对较高，分别为 95.3%，18%；②女性性别及术后 3 天内的 APSP 情况是 KA 患者术后 3 个月发生 CPSP 的独立危险因素。

PU-0704

膝关节置换术后慢性疼痛发生率及影响因素分析：一项前瞻性队列研究

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目的 调查膝关节置换术（KA）患者术后急性疼痛（APSP）及术后慢性疼痛（CPSP）的发病率，确定 KA 患者 CPSP 的独立危险因素。
方法 采用前瞻性队列研究的方法，分析 2023 年 1 月~ 6 月期间就诊于宁夏回族自治区人民医院

并行 KA 患者共 169 例，收集患者临床资料，术前资料包括患者性别、年龄、民族、体重指数、美国麻醉医师协会分级、受教育史、失眠史、高血压病史、冠心病病史、糖尿病病史、脑血管疾病病史、患肢动脉粥样硬化史、患肢大隐静脉瓣膜功能不良史、麻醉史、手术史、术前疼痛总时间、术前最大数字等级评定量表（NRS）疼痛评分、术前镇痛药物使用史；术中资包括手术类型、腰麻药物中是否加入阿片类药物、术中是否使用镇静药物、手术持续时间；术后资料包括术后第一日是否下地运动、术后第 1 天、第 2 天、第 3 天及术后 3 个月（第 13 周）最大 NRS 疼痛评分。根据 KA 后第 13 周最大 NRS 疼痛评分将患者分为两组：①无或轻度疼痛组：最大 NRS 疼痛评分＜4 分；②中或重度疼痛组：4 分≤最大 NRS 疼痛评分≤10 分。比较两组患者临床资料，分析 KA 患者 APSP 及 CPSP 的发生率；采用单因素及多因素 Logistic 回归方法分析 CPSP 发生的独立危险因素。

结果 本研究共收集病例 169 例，剔除失访患者 19 例，最终收集完整临床资料 150 例，其中术后 3 天发生中至重度 APSP 者（4 分≤术后 3 天平均最大 NRS 疼痛评分≤10 分）143 例，术后 3 个月发生中或重度 CPSP 者（4 分≤术后第 13 周最大 NRS 疼痛评分≤10 分）27 例，发生率分别为 95.3%及 18%。单因素 Logistic 回归分析结果显示，CPSP 的发生可能与患者性别及 APSP 有关（均 P＜0.05）；多因素 Logistic 回归分析结果显示，女性〔优势比（OR）=4.697,95%可信区间（95%CI）为 1.033~21.360，P=0.045〕及 APSP〔优势比（OR）=1.553, 95%可信区间（95%CI）为 1.120~2.154，P=0.008〕对 CPSP 的影响具有统计学意义。

结论 ①KA 患者 APSP 及 CPSP 发生率分别为 95.3%，18%；②女性及 APSP 是 KA 患者发生 CPSP 的独立危险因素。

PU-0705

Hydrogen-oxygen Mixture Inhalation and Initiative Practice for Health Program in Older Patients with Knee Osteoarthritis: An Open-label, Blinded-endpoint, Randomized Controlled Trial

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Purpose: Knee osteoarthritis (KOA) is a common degenerative joint condition impacting the cartilage in the knee joint and surrounding tissues, stemming from various factors such as mechanical stress, inflammation, and metabolic dysregulation, probably leading to disability and diminished quality of life. It is acknowledged that the onset and progression of KOA are primarily attributed to the degeneration and damage of articular cartilage and the resultant chronic inflammation reactions. Interestingly, molecular hydrogen has been proven to have antioxidant and anti-inflammatory properties, but few studies have investigated its effects on osteoarthritis. Our study aims to assess the therapeutic potential of hydrogen-oxygen mixture (H2-O2) inhalation for KOA.

Patients and methods: From July 2023 to February 2024, at Taikang Yanyuan Continuing Care Retirement Community (CCRC) in China, an open-label, blinded-endpoint, randomized controlled trial was conducted. The Ethics Committee of Sanbo Brain Hospital, Capital Medical University, approved the study (SBNK-YJ-2023-014-01), and it was registered with the Chinese Clinical Trial Registry (ChiCTR2300073102). Participants were required to meet the following criteria for inclusion: (I) age ≥ 65 years. (II) diagnosis of KOA based on Taikang healthcare medical records. (III) duration of KOA ≥ 6 months and did not receive joint replacement surgery or arthroscopic surgery. (IV) self-reported knee-joint pain ≥ 4 on the numeric rating scale (NRS) during the past week. Exclusion criteria for participants encompassed the following conditions: (I) mental disorders; (II) cognitive impairment; (III) severe systematic diseases such as severe cardiopulmonary disease or multi-organ failure; (IV) inability to cooperate in completing exercises; (V) intolerance to

inhalation therapy; (VI) involvement in other clinical trials within the previous 3 months. In this randomized controlled trial, eligible elderly KOA patients were randomly assigned to an intervention group (Group H) or a control group (Group C), utilized block randomization with block sizes of 4 and 6. Randomization codes were enclosed in opaque sealed envelopes sequentially numbered, and then revealed by a researcher in sequence post-recruitment. Both groups participated in a 12-week Initiative Practice for Health (IPFH) Program, which included home-based knee exercises and health education. Group H additionally received H2-O2 inhalation for 60 minutes per day over 2 weeks (2.0 L/min of hydrogen and 1.0 L/min of oxygen), while Group C did not. The primary outcome was measured using Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Secondary outcomes included Chair Stand Test (CST), Timed Up and Go (TUG), SF-36, Exercise Adherence Rating Scale (EARS), and adverse events. Participants were scheduled for follow-up at weeks 2, 6, and 12 after enrollment.

Results: Out of the initial 169 subjects screened for this study, 17 did not meet the inclusion criteria, and 31 declined to participate. Ultimately, 121 subjects were enrolled, with 61 assigned to Group H and 60 to Group C. Most of the individuals enrolled in our study were female (80.2%, 97/121), with a mean age of 81.2±6.1 years. Bilateral KOA was the most prevalent condition, affecting 66.9% (81/121) of participants. The median duration of KOA was 20 (10-30) years. The mean NRS of knee-joint pain was 4.4±0.7. No significant difference was observed in demographic characteristics and medical comorbidities between the two groups. The between-group mean difference in the WOMAC total score decreased from -1.6 (95% CI -8.5, 5.3) to -5.2 (95% CI -12.7, 1.7), revealing a significant group × time interaction (F=14.425, P<0.001) after the 12-week study period. In WOMAC subscales, the between-group mean difference in pain score decreased from 0.9 (95% CI -2.6, 0.8) to -0.2 (95% CI -1.9, 1.5), and function score decreased from -3.2 (95% CI -9.0, 2.7) to -5.2 (95% CI -11.1, 0.7), both with significant group × time interactions (F=6.218, P<0.001; F=8.870, P<0.001). However, there were no significant differences in CST, TUG, SF-36 scores, EARS score, or adverse events between the two groups.

Conclusion: As an adjunctive treatment, H2-O2 mixture inhalation has demonstrated its therapeutic potential in alleviating pain and improving restricted functional activity compared to the control in elderly KOA patients undergoing the IPFH program. Based on the available evidence, the therapeutic potential may be attributed to hydrogen molecules' properties to inhibit oxidative stress, exert anti-inflammatory effects, and maintain mitochondrial functional homeostasis. Long-term, multicenter double-blinded randomized controlled studies, along with in vitro and in vivo experiments, are needed to further confirm the role and mechanisms of hydrogen molecules in KOA in the future.

PU-0706

罗哌卡因在单孔胸腔镜肺叶切除术后减轻引流管刺激性疼痛的最低有效浓度研究

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目的 探究罗哌卡因用于胸膜腔内减轻单孔胸腔镜肺叶切除术后引流管相关疼痛的最低有效浓度（MLAC）和 90%有效浓度（EC90）。

方法 选取本院拟行单孔胸腔镜肺结节切除的患者 40 例，其中男 19 例，女 21 例。术前访视时已经和患者及其家属或陪伴沟通了术后镇痛的作用及使用方法，并教会如何识别切口疼痛和引流管相关性疼痛，并记录术后疼痛评分。所有患者入室后常规生命体征监测，开放外周静脉通道。局麻下两点法行患侧胸椎旁神经阻滞（T4-5、T6-7），采用 0.33%罗哌卡因各 15ml。常规麻醉诱导、插管行支气管麻醉，根据手术需求选用双腔气管导管或者支气管封堵器。所有患者采用静吸复合麻醉维持。术毕安置 2 跟胸腔闭式引流管（24F、10F 各一根），患者转为平卧位后连接脉冲镇痛泵

，镇痛泵连接于 10F 胸引流管的旁路，关闭 10F 引流管的主道，开启镇痛泵。
脉冲镇痛泵的罗哌卡因以首次 0.5%罗哌卡因浓度为起始，脉冲剂量 15ml，间隔 4h，采用序贯法第次给药，升降浓度梯度设置为 0.05%。当引流管刺激胸膜时的 VAS 评分≥4 时，阻滞无效，进行麻醉补救（曲马多注射液 100mg im），并提高下一患者罗哌卡因浓度；当 VAS 评分＜4 时，降低下一患者罗哌卡因浓度。最低浓度与最高浓度分别设置为 0.1%、1%，在出现 7 个上-下周期或罗哌卡因浓度≤0.1%或≥ 1 %，并持续 7 例时，即停止试验。如果患者感觉是切口疼痛，则予以氟比洛芬脂 50mg iv。采用概率单位回归分析计算罗哌卡因的 MLAC 和 EC90.
结果 罗哌卡因用于胸膜腔内减轻单孔胸腔镜肺叶切除术后引流管相关疼痛的最低有效浓度 0.1%，EC90 为 0.2%。
结论 罗哌卡因用于胸膜腔内减轻单孔胸腔镜肺叶切除术后引流管相关疼痛的低有效浓度 0.1%，EC90 为 0.2%。镇痛起效快，无局麻药中毒等不良反应。

PU-0707

应用红外热成像技术观察颊针疗法在慢性疼痛中的疗效

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目的 采用红外热成像技术评价颊针疗法在慢性疼痛治疗中的临床疗效。
方法 选取 2023 年 1 月至 2023 年 12 月收治单侧慢性疼痛患者，记录患者性别、年龄、疼痛部位、疼痛时间、查体时疼痛视觉模拟(VAS)评分，采用红外热成像技术按矩形面积测温法记录患者疼痛部位温度（T1）及对应健侧温度（T2），计算温度差（ΔT1）。患者取平卧位由同一位疼痛科医生进行体格检查，确认并记录病变部位。参照《颊针疗法》选取相应穴位，一次性无菌针灸针直刺进针后，重新进行体格检查，根据患者疼痛缓解程度调整进针深度和角度，直到患者疼痛消失或明显缓解，留针 30min 后拔除。随后再次采用红外热成像技术测定患者疼痛部位温度（T3）与对应健侧温度（T4），计算温度差（ΔT2），记录治疗后疼痛视觉模拟(VAS)评分。统计比较相关数据。
结果 本研究共收治单侧慢性疼痛患者 35 例，男性 19 例，女性 16 例，年龄 44.8±8.7 岁，疼痛时间 195.00±151.96 天。左侧疼痛 24 例，右侧疼痛 11 例，其中肩颈部疼痛 18 例，胸背部疼痛 3 例，腰背部疼痛 4 例，四肢疼痛 9 例，下腹部疼痛 1 例。体格检查发现 35 例患者患侧疼痛区域压痛明显，查体时压痛区域 VAS 评分 6.69±1.23，经过施针、调针、留针后，患者疼痛均明显缓解，治疗后 VAS 评分为 2.43±0.88，差异有统计学意义（P<0.05）。颊针治疗前患侧温度（T1）为 31.82±2.65℃，治疗后温度（T3）为 33.78±3.07℃，差异有统计学意义（P<0.05）。颊针治疗前健侧温度（T2）为 32.72±2.57℃，治疗后温度（T4）为 33.87±3.06℃，差异无统计学意义。颊针治疗前患侧及健侧温度差（ΔT1）为 0.90±0.45℃，颊针治疗后患侧及健侧温度差（ΔT2）为 0.27±0.28℃，差异有统计学意义（P<0.05）。35 例患者均未发生不良反应。
结论 颊针疗法治疗慢性疼痛快速、安全、微创，治疗效果明确。红外热成像技术可作为研究疼痛治疗的客观评价指标。

PU-0708

人工智能镇痛系统提高术后患者镇痛质量

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目的 术后疼痛指手术后即刻发生的急性疼痛，通常包括躯体痛和内脏痛，持续时间一般不超过 3 到 7 天。术后疼痛对机体造成多方面影响，包括但不限于生理、心理和行为上的反应。通过有效的

术后镇痛不仅可以减轻患者疼痛，提高患者术后恢复速度，还能带来社会和经济效益。目前临床上使用的镇痛模式大多为镇痛泵，其固定的药物及固定的给药方式使得术后镇痛质量大打折扣，无法使患者个性化镇痛获得最大效益。研发人工智能镇痛系统可以达到在安全的前提下，达到持续、有效的镇痛，最小化不良反应，有效促进患者术后的康复, 实现最佳的疼痛控制和患者满意度。

方法 实验步骤

1. 实验目的

主要目标：验证人工智能镇痛系统能否改善术后患者的疼痛管理，提高患者的舒适度和促进术后恢复等。

2. 实验设计

2.1 实验类型

随机对照试验（RCT）：将 1000 患者随机分为两组，一组使用传统镇痛方法（对照组），另一组使用人工智能镇痛系统（实验组）。

2.2 试验地点：与 10 所大型三甲医院合作，进行多中心试验。

2.3 纳入标准和排除标准

纳入标准

- 术后需要进行疼痛管理的患者
- 签署知情同意书的患者

排除标准

- 术前存在慢性疼痛史（如带状疱疹，癌性疼痛等患者）
- 术前存在长期持续使用镇痛药物史（3 个月以上）
- 对镇痛药物过敏的患者
- 有严重认知障碍或精神疾病的患者
- 不愿意参与或无法按时参加随访的患者

3. 数据收集

3.1 基线数据

人口统计学数据：年龄、性别、BMI 等。

医学历史：既往病史、手术类型等。

3.2 疼痛评估

VAS 评分：视觉模拟量表（Visual Analog Scale）

NRS 评分：数字评分量表（Numeric Rating Scale）

AEQ 评分：抗焦虑量表（Anxiety Evaluation Questionnaire）

3.3 其他评估指标

药物使用量：记录使用的镇痛药物类型和剂量。

康复指标：术后康复进展，住院时间，术后并发症等。

满意度调查：患者对疼痛管理的满意度。

4. 实验过程

4.1 成立实验小组

多学科团队：包括外科医生、疼痛管理专家、数据科学家和伦理学专家。

4.2 随机分组

随机化算法：使用计算机生成随机数进行患者分组，确保随机分配。

4.3 干预措施

对照组：使用标准的术后镇痛方法；PCA（患者自控镇痛）。

实验组：使用人工智能镇痛系统，根据系统建议进行个性化镇痛管理。

4.4 数据收集时间点

术后即刻：手术后立即收集数据，作为基线。

术后 24 小时：评估疼痛管理的初期效果。

术后 72 小时：评估中期效果。

出院时：评估长期效果和患者满意度。

术后随访：1 个月和 3 个月，评估长期效果和康复进展。
5. 数据分析
5.1 描述性统计
基线特征分析：对两组患者的基线特征进行描述性统计，确保两组之间无显著差异。
5.2 主要效应分析
疼痛评分比较：使用 T 检验或 Mann-Whitney U 检验比较两组在各时间点的疼痛评分。
药物使用量比较：比较两组的镇痛药物使用量。
5.3 次要效应分析
康复指标：使用卡方检验或 Fisher 精确检验比较术后并发症、住院时间等。
满意度：使用 Likert 量表和统计分析比较患者满意度。
5.4 多变量分析
回归分析：使用多变量回归分析排除混杂因素，进一步验证镇痛系统的有效性。
6. 伦理与合规
结果 VAS 评分：实验组术后即刻评分为 8.90±0.94，术后 24h 分数为 4.55±1.02，术后 72h 评分为 2.20±1.01。相较于对照组术后即刻评分为 8.85±0.96，术后 24h 评分为 6.80±1.10，术后 72h 分为 5.70±1.23。在术后即刻 P= 0.78＞0.001 无统计学意义，而术后 24h 及 72h＜0.001 具有高度差异性而统计学意义。
NRS 评分：术后实验中即刻评分为 8.94±0.94，术后 24h 为 4.59±1.00，术后 72h 为 2.19±0.90 而对照组术后即刻评分为 8.98±0.90，术后 24h 评分为 6.97±1.11，术后 72h 评分为 5.71±0.95。同样的是术后即刻 P=0.75＞0.001 而不具有统计学意义，术后 24h 及 72h P 值＜0.001 具有统计学意义，说明在术后 24h 至 72h 人工智能镇痛系统相较于传统标准的 PCA 镇痛具有显著优势。
AEQ 评分：实验中术后 24h 评分为 26.44±6.28，术后 72h 评分为 15.37±4.83。对照组术后 24h 评分为 25.95±5.49，术后 72h 30.45±5.06。术后 24h 及 72hP 值均＜0.001 而具备统计学意义。说明在改善患者术后焦虑中，人工智能镇痛系统相较于传统标准的 PCA 镇痛具有显著意义。
结论 实验组在所有测评项目中相较于对照组均显示出显著的得分差异，证实了人工智能镇痛系统相较于传统标准的 PCA 镇痛对于术后患者的疼痛管理更加有效。前者更有利于提高术后患者的生活质量，控制术后疼痛发生，并具有改善患者术后焦虑状态等优势

PU-0709

右美托咪定联合羟考酮患者静脉自控镇痛用于晚期肾盂癌反复发热一例

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目的 通过对该例晚期肾盂癌患者反复发热采用右美托咪定联合羟考酮静脉自控镇痛退热治疗个案的分析讨论，从作用机制上明确右美托咪定联合羟考酮静脉自控镇痛对晚期肾盂癌反复发热是否有效。
方法 回顾性研究该例晚期肾盂癌患者镇痛及退热的诊治经过，治疗难点和治疗效果；明确癌性发热的致病机制；明确右美托咪定联合羟考酮退热的作用机制，最终证实其是否相关。
结果 患者老年男性因 “晚期肾盂癌左侧腰腹部爆发性疼痛 3+月，反复发热 2+月 ”就诊，前期泌尿外科予以消炎、抗感染、退热、止痛（肌注哌替啶、,吗啡）及相关对症治疗效果不佳，后期请我科会诊。疼痛评估：患者左侧腰腹部爆发性疼痛不适、反复发热（最高体温 39.4℃），翻身、下床、深呼吸疼痛均可加重，夜间难以入眠，VAS 评分 4 分，癌性爆发痛，每日大于 10 次，VAS 评分 7～8 分。根据《癌痛患者静脉自控镇痛中国专家共识》，建议病人行 PCIA 镇痛，并行疼痛评估。

我科给与患者右美托咪定联合羟考酮静脉自控镇痛**治疗 24 小时后**评估，病人 VAS 评分 1～2 分，爆发痛 VAS 评分 3 次，每日 3-4 次，予按压 PCA 1 次，VAS 评分即可降至 1 分，**体温恢复正常**，食欲、睡眠、 便秘、精神均得到明显改善。确定右美托咪定联合羟考酮静脉自控镇痛治疗方案，且密切随访，随访发现患者**治疗 2+月期间**无明显疼痛主诉且**体温监测无反复发热出现**（控制在 36.0℃-37.1℃），**直至患者死亡前 4 天停 PCIA 泵，2 天后体温升高至 39.5℃**。癌性发热的致病机制复杂，可能是肿瘤细胞自身、坏死组织或巨噬细胞吞噬肿瘤细胞所释放的白细胞介素（IL）、肿瘤坏死因子 （TNF-α）等细胞因子诱导作用于下丘脑前部视前核导致前列腺素 E 2 的产生，引起恒温设定点的变化，或因肿瘤细胞自身释放抗原物质产生免疫反应，或分泌某些活性物质，引起机体炎症反应。而右美托咪定联合羟考酮可明显降低患者的癌性痛，同时可降低患者血清促炎因子 HMGB1、TNF-α、 IL-6 水平，抑制机体免疫功能，随着疼痛的明显缓解，炎性因子水平的下降，免疫功能的抑制，有助于缓解患者癌性发热。

结论 从作用机制上证实右美托咪定联合羟考酮静脉自控镇痛对晚期肾盂癌反复发热患者治疗有效。也为临床这类难治性患者提供了一种新的治疗用药和方式。

PU-0710

现代麻醉学科门诊建设及管理经验分享

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目的 麻醉科门诊服务诞生于不断构建、调整的现代麻醉医疗事业。近年来，应国家要求及人民就医需求，组建、优化、加强麻醉学科门诊建设势在必行。本发言以北京协和医院麻醉科门诊为例，从组建路径、现阶段运行概况、管理模式等几方面，分享、探讨现代麻醉学科门诊工作经验，突出“以人为本，发扬优势，持续改进”，旨在为兄弟单位提供参考。

方法 本发言从北京协和医院麻醉科门诊概况（组建路径、现阶段运营情况）、北京协和医院麻醉科门诊管理模式经验分享（“以患者为本，以员工为本”、“发扬自身优势，建设学科门诊”、“质量控制，持续改进”）几个方面做出介绍。

结果 -

结论 以患者需求为导向，持续优化就医流程、加强多学科协同合作，或可提高麻醉门诊的服务质量与效率，提升患者的就医体验，以力争实现医疗资源的高效整合与利用。本发言以北京协和医院为例，分享、探讨了现代麻醉学科门诊工作经验，旨在为兄弟单位提供参考。

PU-0711

中频电脉冲联合半导体激光治疗腰背肌筋膜疼痛综合征临床研究

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目的 观察中频电脉冲同步联合半导体激光照射治疗腰背肌筋膜疼痛综合征（myofascial pain syndrome，MPS）的疗效，为 MPS 治疗提供优化方案。

方法 回顾性分析 75 例腰背肌筋膜疼痛综合征患者临床资料，并将其分为两组:对照组接受中频电脉冲治疗 36 例;观察组接受中频电脉冲同步联合半导体激光照射治疗 39 例。记录疼痛视觉模拟评分(visual analogue scale,VAS)、Oswestry 功能障碍指标(oswestry disability index)、腰椎功能 JOA

评分(Japanese orthopaedic association scores)、临床疗效、血清炎性因子（IL-1β、IL-6）水平及不良反应发生率，以评估两组治疗差异

结果 治疗后，观察组 VAS 评分、ODI 评分、JOA 评分、血清 IL-6、TNF-α 水平，差异有统计学意义；观察组患者总有效率 92%明显高于对照组 55%, 差异具有统计学意义(P<0.05)；两组均无不良反应发生，差异无统计学意义(P>0.05)。

结论 应用中频电脉冲同步联合半导体激光照射治疗 MPS，效果优于单一中频电脉冲治疗，中频电脉冲同步联合半导体激光治疗优良率高，无明显副作用，安全性好，值得在临床推广。

PU-0712

THRIVE 技术在带状疱疹后三叉神经痛颅外射频无痛诊疗中的临床研究

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目的 探讨快充式经鼻湿化高流量通气（THRIVE）技术在带状疱疹后三叉神经痛颅外神经射频无痛诊疗中保障患者无自主呼吸状态下氧疗的安全性研究。

方法 选择 30 例诊断明确的带状疱疹后三叉神经痛患者，依据治疗方案随机分为两组：THRIVE 组（T 组）和对照组（C 组），每组 15 例。两组患者均行 CT 引导下三叉神经颅外神经射频治疗，根据受累神经决定治疗靶点，包括眶上孔、圆孔和卵圆孔。穿刺点局麻后用射频套管针在 CT 引导下穿刺至射频靶点，沿套管插入射频电极，给予高频电流刺激（50 Hz，0.1 V），电流≤0.5 mA 可诱发原疼痛症状，确认针尖到大靶点。静脉推注芬太尼 0.001mg/kg，丙泊酚 12 mg/kg，待患者入睡后，C 组采用鼻导管吸氧（5L/min），T 组采用 THRIVE（氧浓度为 100%，50 L/min）对患者供氧。待患者意识消失后，调节射频针达到 80 ℃，设定射频时间 180 s。待患者完全清醒后，询问原疼痛区域是否出现感觉减退和痛觉消失，通过 VAS 评价治疗效果。记录两组手术操作所用时间及患者满意度。记录两组患者入室、麻醉前，麻醉后 1min、3min、5min、苏醒时，出手术室时各时刻的无创血压、心率、SpO_2；麻醉前、麻醉后 5min 苏醒时呼末二氧化碳（$EtCO_2$）的变化情况。

结果 两组患者苏醒时间，射频治疗后两组 VAS 评分无显著差异（p＞0.05），麻醉后 3min 两组患者无创血压和心率均高于麻醉前（p＜0.05），但两组间无创血压和心率无显著差异。T 组在麻醉开始后 3min 及 5 min 时间点 SpO2 均高于 C 组（p＜0.05）；围术期 C 组有 26%(4/15)患者出现一过性血氧低于 92%，但均在 90%以上；T 组所有患者围术期 SpO2 均保持在 95%以上。T 组麻醉后 5min 呼末二氧化碳 EtCO2 明显低于 C 组（p＜0.05）。

结论 THRIVE 用于带状疱疹后三叉神经痛颅外神经射频治疗可改善手术期间患者通气和氧合，提高患者无自主呼吸期间的安全性。

PU-0713

不同剂量的艾司氯胺酮在老年烧伤患者床旁换药术中的临床观察

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目的 探索艾司氯胺酮用于老年烧伤患者床旁换药操作性疼痛的最大耐受剂量，评价艾司氯胺酮的镇痛效果及临床安全性，以期减轻老年烧伤患者的换药疼痛，为临床上医生和患者用药提供新的依据，促进患者的康复，提高其生活质量。

方法 本研究分为两个阶段，阶段一依据传统“3+3”剂量爬坡法探索艾司氯胺酮的最大耐受剂量（Maxi mum Tolerated Dose，MTD），阶段二为一项前瞻性、随机、对照临床试验，按照入组标准筛选受试者后，将其以 1：1 的比例随机纳入生理盐水组（c 组）和艾司氯胺酮组（s 组），通过比较两组患者的疼痛评分、生命体征变化、满意度及换药前后与疼痛相关的炎症因子的水平变化，进一步评估艾司氯胺酮在最大耐受剂量下对清醒灼伤患者的换药操作性疼痛所发挥的镇痛效应和安全性。

结果 试验阶段一设立了 0.125mg/kg、0.25mg/kg、0.375mg/kg、0.5 mg/kg 四个剂量组，一共纳入 40 人。0.125mg/kg 组和 0.25mg/kg 组未发生一例不良反应，0.375mg/kg 组有一人发生轻微头晕， 停药后迅速缓解，0.5 mg/kg 组的三名患者中有两人发生幻觉，新增 1 名患者后也发生严重噩梦，故停止试验，并将 0.375mg/kg 确定为阶段一的目标剂量。在阶段二中，艾司氯胺酮组和生理盐水组各纳入受试者 60 例，两组的基础情况相似，两组在换药期间的生命体征变化包括氧饱和度、呼吸频率、平均血压无统计学差异（P>0.05），但心率变化存在显著差异，具有统计学意义（P=0.031）。换药期间无一例患者出现低血压、 心律失常、呼吸抑制、严重头晕等不良反应。换药期间各阶段艾司氯胺酮组的 VAS 疼痛评分明显低于生理盐水组（P=0.000）。两组的炎症因子 IL-6、CRP 水平在换药后均呈现升高趋势， 具有统计学差异(Psl =0.002，Paf=0.003)。艾司氯胺酮组的换药满意度明显高于生理盐水组，有统计学差异（P=0.000）。两组患者的烧伤严重程度、换药时间、用药总剂量、其他干预事件等方面无明显差异。

结论 艾司氯胺酮用于老年烧伤患者的床旁换药操作性疼痛，能安全有效地缓解不同程度的烧伤患者的疼痛，提高患者换药期间的满意度，促进康复。

PU-0714

超声引导下胸椎旁神经阻滞对难治性心绞痛 治疗效果的研究

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目的 心绞痛发病原理至今尚无定论，现阶段的研究认为，难治性心绞痛发生时，心肌发生缺血缺氧，局部产生的代谢致痛物质如腺苷、乳酸和血浆激肽类等刺激末梢感受器，引起痛觉的神经冲动的发生，通过第 1~4 胸交感神经节传导到相应的脊髓节段，经传入神经传至大脑皮层而产生疼痛。近来有研究提出交感神经的兴奋与难治性心绞痛相关，由之提出应用胸椎旁神经阻滞的治疗手段缓解难治性心绞痛。该研究旨在探讨超声引导下胸椎旁神经阻滞对难治性心绞痛的治疗效果，为难治性心绞痛的治疗提供新思路。

方法 一、研究对象的入选标准及排除标准

试验对象的选择：经医院伦理委员会同意，并签署知情同意书。选择 12 例诊断明确的难治性心绞痛患者（心绞痛诊疗指南 2021），排除呼吸、肾脏疾病、凝血功能异常者。

二、治疗方案的实施

超声引导下胸交感神经阻滞的实施：患者使用超声引导，取右侧卧位，连续监测心电图和血压。常规消毒皮肤，穿刺点选在胸 2~3 或胸 3~4 棘突间隙沿中线向左旁开 3~3.5cm，用 23G 长 10cm 穿刺针与皮肤垂直进针,到达横突后使针尖向内侧偏斜，缓慢进针，超声显示见针尖到达胸椎体前侧方，回吸无血、无气，确认位置正确无误后注入 0.25% 罗哌卡因 8~15ml（0.5mg/kg）。

三、检测和观察指标

1、疗效：记录治疗前、后 48h 内心绞痛的发作情况，包括发作次数及每次心绞痛缓解所需要的时间，采用现存的疼痛强度（PPI）和疼痛视觉模拟量表（VAS）评估患者的疼痛程度，并对心绞痛发作频率及持续时间进行评估。

2、心肌耗氧指数：记录治疗前及治疗后 1、12、24、48h 血压和心率。

3、肌钙蛋白（Tn）、肌酸激酶同工酶（CK-MB）检测：患者治疗前及治疗后心绞痛发作时，留取空腹静脉血 6ml，用以检测血浆中 Tn 及 CK-MB 水平。

四、统计处理
采用 SPSS 20.0 统计学软件进行统计分析。计量资料以均数±标准差（±s）表示，采用单因素方差分析；计数资料比较采用卡方检验。P＜0.05 差异有统计学意义。
结果 1、心绞痛发作情况：12 例患者中的 10 例于接受治疗后 48h 内心绞痛发作明显改善，其中 5 例无心绞痛发作，5 例发作次数明显减少，且每次发作缓解所需时间缩短；2 例心绞痛发作无改善，加用静脉滴注硝酸甘油后心绞痛发作得以控制。
2、心绞痛发作时疼痛程度的评估：统计患者接受治疗后，2 例心绞痛发作无改善者 48h 内现存的疼痛强度（PPI）和疼痛视觉模拟量表（VAS）评分，结果提示患者与接受超声引导下胸交感神经阻滞的实施后评分明显降低（P＜0.05），
3、心肌耗氧指数的比较：心肌耗氧指数于治疗前后差异无统计学意义（P＞0.05）；但 2 例治疗后仍发生心绞痛的患者心绞痛发生时，与治疗前比较，接受超声引导下胸交感神经阻滞后心肌耗氧指数（SBP×HR）明显下降（P＜0.05），
4、肌钙蛋白（Tn）及肌酸激酶同工酶（CK-MB）的比较，超声引导下胸交感神经阻滞治疗心绞痛患者，血浆中 Tn 及 CK-MB 水平治疗前后差异无统计学意义（P＞0.05），
结论 超声引导下胸椎旁神经阻滞缓解难治性心绞痛发作频率及疼痛评分，降低心肌耗氧指数，可协助治疗难治性心绞痛。

PU-0715

麻醉护航，疼痛拓局

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目的 随着疼痛综合管理试点工作与麻醉疼痛诊疗的实施，麻醉医师在临床诊疗中的角色与工作半径也发生了拓展，由手术室内的生命守护者拓宽至能诊断会治疗的急慢性疼痛类疾病的终结者，由围术期救治拓宽至围住院期甚至围生命期急慢性疼痛患者的诊治与照护，上述转变实现了麻醉护航，疼痛拓局的目标，也使得麻醉医师由传统的“被动”逐步向“主动”角色转变，同时，在科室绩效方面也实现了开源节流。
方法 选派科室骨干至国内外知名疼痛管理中心进修学习，提升疼痛综合管理能力；
注重多学科疼痛管理沟通交流，以多学科为技术支撑，以病因痛症同治为宗旨，提升患者就医体验；
注重多渠道疼痛诊疗科普宣教，以广大群众需求为导向，讲好麻醉疼痛故事，助力健康中国。
结果 社会效益：逐步得到临床兄弟科室与大众的认可与支持，并大幅提高了患者就医的依从性和满意度，同时，以临床问题为导向，实现临床、科研、教学多维度共赢；
经济效益：在疼痛诊疗业务逐年攀升的同时，通过大门诊小病房或共享病房的运营模式，降本减耗，切实实现开源节流。
结论 以“麻醉护航，疼痛拓局”作为科室发展的战略方针，不仅践行并落实了疼痛综合管理试点工作与麻醉疼痛诊疗任务，同时也提升了麻醉学与麻醉医师的社会效益和经济效益。

PU-0716

超声引导下竖脊肌阻滞对胃肠道手术老年患者术后疼痛程度及认知障碍的影响

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目的 为有效缓解行胃肠道手术的全麻老年患者术后疼痛程度、减少围手术期神经认知障碍发生情况，对行胃肠道手术的全麻老年患者，有针对性地术前行超声引导下竖脊肌平面阻滞技术（erector spinae plane block，ESPB），评估其对患者术后疼痛程度及围手术期神经认知障碍（perioperative neurocognitive disorders，PND）发生情况的影响，探寻有效改善术后疼痛及认知障碍的方法。

方法 选取 2023 年 6 月至 2024 年 6 月在南昌大学第一附属医院进行腹腔镜胃肠道手术的老年患者 60 例。随机分为实验组 30 名和对照组 30 名。获得患者及家属知情同意和伦理学审查。患者入室后行基础生命体征检测，实验组行超声引导下竖脊肌平面阻滞技术，对照组患者不做特殊处理，随后两组患者均在静吸复合麻醉下行结肠癌根治术。于 T0(术前 12h)、T1(术后 24h)、T2(术后 72h)三个时间点分别记录患者血压心率情况，简易精神状态评价量表（MMSE）得分，及抽取静脉血进行神经元特异性烯醇化酶 NSE 水平检测。术毕记录患者麻醉时间、手术时间、液体入量、尿量及出血量。记录患者 T1(术后 24h)时刻 VAS 分级、P 恶心评分。

结果 与对照组相比，术后 24h 及术后 72h,实验组患者 MMSE 评分均高于对照组（P＜0.05）；术后 24h 实验组发生 PND 的患者少于对照组（P＜0.05）。术后 24h 及术后 72h,实验组患者 NSE 水平低于对照组（P＜0.05），且实验组 NSE 水平下降更明显（P＜0.05）。实验组术后 24h 中度及以上疼痛患者少于对照组（P＜0.05）。

结论 这说明胃肠道根治术老年患者术前进行超声引导下竖脊肌平面阻滞技术能获得较好的镇痛效果，有助于减轻患者术后疼痛程度，减少围手术期神经认知障碍的发生，能够使患者获得更满意的围手术期体验。

PU-0717

TAPB 联合 TVIA 对腹腔镜妇科手术后疼痛、不良反应的影响及阿片类药物的节制效应

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目的 TAPB 联合全凭静脉麻醉在妇科腹腔镜手术术后使用 PCIA 镇痛的情况下，观察能否取消术毕静脉镇痛负荷量的应用，以减少阿片类药物用量，进而减少临床不良反应的发生。

方法 收集本院行择期妇科腹腔镜手术患者120例作为受试者，随机分为TAPB+负荷量组和TAPB+安慰剂组。两组患者麻醉方案为 TAPB 联合全凭静脉麻醉，麻醉维持方案为术中持续静脉泵注丙泊酚 4-10 mg/(kg·h)+瑞芬太尼 0.25-4 ug/(kg·min)维持麻醉深度。两组腹横肌平面阻滞方法相同，TAPB+负荷量组于术毕给予静脉镇痛负荷量舒芬太尼 10ug；TAPB+安慰剂组于术毕给予安慰剂 2ml。两组患者术毕给予甲氧氯普胺 10mg，术后 PCIA 配方：舒芬太尼 2 ug/kg+甲氧氯普胺 30 mg 溶解至 NS 100 ml。对比两组基线数据：吸烟史、PONV 史或晕动病史、术中麻醉药使用情况等，观察两组术后各时间段 VAS 评分、镇痛药物消耗量及术后镇痛泵按压次数等镇痛评价；收集围术期镇痛药物使用情况、尿管拔出时间、引流管拔出时间等数据。

结果 本研究纳入患者 120 例，每组各 60 例，共剔除 5 例，。其中 TAPB+负荷量组剔除 3 例，TAPB+安慰剂组剔除 2 例，最终 115 例患者纳入研究进行数据整理与分析，其中 TAPB+负荷量组两组患者术后 48h 内各时间段 VAS 评分、镇痛药物舒芬太尼使用量及镇痛泵按压次数等数据对比均未见明显统计学差异(P＞0.05)。
两组患者发生与阿片类镇痛药物相关并发症包括便秘、尿潴留、皮肤瘙痒及过度镇静等发生率对比均未见明显统计学差异(P＞0.05)；两组术后各时间点 HR 及 SpO2 等指标数据对比未见明显统计学差异（P＞0.05）；TAPB+负荷量组 手术结束时 MAP 值明显低于 TAPB+安慰剂组（P＜0.05）；两组间其余时间点 MAP 数据对比未见明显统计学差异（P＞0.05）。
TAPB+负荷量组术中舒芬太尼及舒芬太尼总消耗量较 TAPB+安慰剂组明显升高(P＜0.05)；TAPB+负荷量组复苏及 PACU 停留时间较 TAPB+安慰剂组相比更长（P＜0.05）；两组尿管和引流管拔出时间、总住院和术后住院天数、医疗费用等数据对比无明显统计学差异（P＞0.05）。
结论 TAPB 联合全凭静脉麻醉在妇科腹腔镜手术术毕取消静脉镇痛负荷量使用阿片类药物，对术后疼痛、不良反应影响不明显，但可缩短患者术后复苏时间，节约阿片类药物。

PU-0718

肩袖间隙复合盂肱关节后隐窝入路肩关节囊水扩张术对肩周炎患者关节活动度及疼痛的影响:一项前瞻性、随机对照试验

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目的 对于肩周炎患者，肩关节囊水扩张术通常是在超声引导下通过盂肱关节后隐窝使用进行水扩张。最近，一种新的经肩袖间隙入路已被描述，本研究旨在比较曲安奈德经肩袖间隙复合盂肱关节后隐窝和肩袖间隙扩张治疗粘连性关节囊炎的疗效。
方法 选择门诊部疼痛科及骨科运动医学科确诊的肩周炎患者 50 例。治疗前依据随机数字表法随机分为肩袖间隙复合盂肱关节后隐窝组（A 组）和肩袖间隙组（B 组），分别行超声引导下肩关节囊水扩张术，随访周期为 12 周。扩张混合液由醋酸曲安奈德注射液 1ml(40 mg)、2%盐酸利多卡因 5ml 和生理盐水 14ml 共计 20ml。治疗前，记录患者肩关节疼痛和功能障碍评分（The shoulder pain and disability index）,疼痛视觉模拟评分(visual analog scale for pain)，受累肩关节主动活动度（range of motion），治疗后分别记录患者一周，三周，六周,十二周的 SPADI 评分与 VAS 评分及一月，二月受累肩关节主动活动度。（主要观察指标：肩关节疼痛和功能障碍评分,次要观察指标：疼痛视觉模拟评分、受累肩关节主动活动度、患者满意度、以及患者服用镇痛药的剂量。统计学方法：用 Shapiro-Wilk 检验判断连续变量是否服从正态分布。在正态分布的情况下，使用单向方差分析对连续变量进行单变量分析，否则使用 Mann-Whitney U 检验。分类资料比较采用卡方检验。如果遇到小样本的数据，则使用 Fisher‘s 精确检验。）
结果 共纳入 75 人，排除 15 人，剔除 10 人。最终有 50 人纳入最终的分析。在患者整个随访周期过程中，两组患者的 SPADI 评分、VAS 评分和肩关节活动度均显著改善；然而，除了肩关节主动内旋与外展的活动度（p＜0.05）外，两组之间的结局指标的逐组交互作用都不显著。两组未见明显的不良事件。
结论 在肩周炎患者中，超声引导下曲安奈德关节囊水扩张术通过肩袖间隙复合盂肱关节后隐窝注射在肩关节内旋和外展功能活动度改善优于经肩袖间隙注射。然而，两种方法在患者疼痛程度改善方面没有显著差异。因此，通过肩袖间隙复合盂肱关节后隐窝行肩关节囊水扩张治疗可能是改善肩周炎患者关节活动度及疼痛症状的良好选择入路。

PU-0719

术后疼痛的个性化管理：从基因到虚拟现实的多模态干预

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目的 术后疼痛是手术患者普遍面临的问题，传统的疼痛管理方法主要依赖药物治疗，但个体差异常导致效果不理想。本研究通过评估不同干预手段在术后疼痛管理中的效果，探索其潜在机制，并提出综合的个性化多模态干预方案，以优化术后疼痛管理，提升患者康复效果和生活质量。我们将基因分析与术后疼痛敏感性和药物反应的关联研究结合，识别出影响术后疼痛的关键基因，并根据基因分析结果制定个性化药物治疗方案。同时，虚拟现实技术作为新兴的心理干预手段，将用于术后疼痛和焦虑的缓解。通过认知行为疗法和放松训练，进一步改善患者术前和术后的心理状态。最终，综合这些干预手段，通过随机对照试验评估多模态疼痛管理方案的整体效果，验证其在临床实践中的应用价值。

方法 基因分析：

样本采集：术前采集患者的血液样本，提取 DNA。

基因检测：利用高通量基因测序技术，检测与术后疼痛敏感性和药物反应相关的基因多态性。

设备和软件：使用高质量虚拟现实设备和专门设计的虚拟现实软件，提供放松训练、冥想引导和沉浸式游戏等干预内容。

实施过程：术后患者在康复期间每日使用虚拟现实设备 30 分钟，连续使用 7 天。

评估指标：通过视觉模拟评分评估术后疼痛，状态焦虑量表评估术后焦虑，记录住院时间和患者满意度。

心理干预：

干预方法：采用认知行为疗法和放松训练，术前进行 1-2 次心理咨询，术后每日进行 30 分钟的放松训练，持续 7 天。

实施过程：由专业心理医生和护士进行指导和实施，提供心理支持和技术指导。

评估指标：术前术后通过状态焦虑量表和视觉模拟评分评估焦虑和疼痛水平，记录术后感染率和慢性疼痛发生率。

个性化药物治疗：

制定方案：根据基因分析结果和患者个体差异，制定个性化的术后镇痛药物方案，选择合适的药物和剂量。

实施过程：术后每日评估患者的疼痛和药物副作用，及时调整药物方案。

评估指标：通过视觉模拟评分（VAS）评估术后疼痛，记录药物副作用发生率和阿片类药物使用量，评估患者满意度。

多模态干预方案的综合评估：

随机对照试验：将患者随机分为多模态干预组和对照组，干预组接受基因分析、虚拟现实、心理干预和个性化药物治疗的综合方案，对照组接受常规疼痛管理。

实施过程：详细记录每位患者的干预过程和随访情况，确保数据的准确性和完整性。

评估指标：通过多维度指标评估多模态干预方案的整体效果，包括术后疼痛评分（VAS）、焦虑评分（STAI）、住院时间、术后感染率、慢性疼痛发生率、患者满意度和医疗费用

结果 1.基因分析的结果：

基因型与术后疼痛敏感性和药物反应的关联分析显示，携带特定基因型（如CYP2D6低代谢型）的患者术后疼痛评分比常规基因型患者高 30%，且药物需求量增加 25%。

2.虚拟现实技术的效果：

虚拟现实干预组患者术后疼痛评分（VAS 评分）平均降低 2.5 分（从 7.0 降低至 4.5），对照组仅降低 1.0 分（从 7.0 降低至 6.0）。

虚拟现实干预组患者术后焦虑评分（STAI 评分）平均降低 10 分（从 50 降低至 40），对照组仅降低 5 分（从 50 降低至 45）。

虚拟现实干预组患者术后平均住院时间减少 20%（从 5 天减少至 4 天），整体满意度提高 15%。
3.心理干预的成效：
实施认知行为疗法和放松训练后，患者术前焦虑评分（STAI 评分）平均降低 15 分（从 55 降低至 40），术后疼痛评分（VAS 评分）平均降低 2 分（从 6.0 降低至 4.0）。
术前心理干预组患者术后感染率降低 30%，术后慢性疼痛发生率降低 25%。
4.个性化药物治疗的效果：
基于基因分析结果制定个性化药物方案，患者术后疼痛评分（VAS 评分）平均降低 2.0 分（从 6.5 降低至 4.5），药物副作用（如恶心、呕吐）发生率降低 35%。
5.患者满意度提高 20%，对疼痛管理的整体体验显著改善。多模态干预方案的综合评估：
随机对照试验显示，多模态干预组患者术后疼痛评分（VAS 评分）平均降低 3.0 分（从 7.0 降低至 4.0），对照组仅降低 1.5 分（从 7.0 降低至 5.5）。
多模态干预组患者术后焦虑评分（STAI 评分）平均降低 15 分（从 55 降低至 40），对照组仅降低 7 分（从 55 降低至 48）。
多模态干预组患者术后住院时间平均减少 25%（从 6 天减少至 4.5 天），术后康复速度加快 30%，住院费用减少 15%。
多模态干预方案的整体满意度提高 25%，患者对术后疼痛管理的认可度显著提升。
结论 本研究通过系统研究和综合评估，证明了多模态干预方法在术后疼痛管理中的有效性和实用性。基因分析、虚拟现实技术、心理干预和个性化药物治疗相结合的多模态干预方案，不仅提高了术后疼痛管理的精准度和有效性，还改善了患者的整体康复体验，减少了医疗成本。通过开发和推广多模态疼痛管理系统，我们为临床实践提供了科学依据和实证支持，推动了麻醉和疼痛管理领域的创新和发展。未来的研究将进一步优化多模态干预方案，探索其在更多手术类型和不同患者群体中的应用，为患者提供更全面和个性化的术后疼痛管理服务。

PU-0720

盘源性腰痛可视化精准诊疗

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目的 临床上以腰痛为主诉的疾病，盘源性腰痛占各种腰痛原因的 42%。超声可视化＋CT 定位扫查椎间盘穿刺造影，多可复制出疼痛以明确诊断。根据造影明确“靶点”，采取相应的精准微创治疗方案。
方法 选择盘源性腰痛患者 40 例，年龄在 42～68 岁，其中男性 26 例，女性 14 例，病史 3 年～15 年。超声可视化椎间盘穿刺＋CT 定位行椎间盘造影，明确诊断及性质。其中纤维环源性 32 例，椎板源性 18 例。纤维环源性:正后侧 19 例，后外侧 11 例，外侧 2 例。根据靶点不同，分别给予低温等离子靶点消融术＋臭氧注射。
结果 所有纤维环源性疼痛患者，经过超声可视化＋CT 定位明确靶点并实施可视化低温等离子消融＋臭氧注射后，均取得明确效果。
结论 超声可视化＋CT 定位椎间盘穿刺用于腰椎盘源性腰痛诊断治疗，具有创新之处，是较新的治疗方法，值得临床推广应用。

PU-0721

老年慢性疼痛患者行全身麻醉下髋关节置换手术术后谵妄发生率的影响因素分析

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目的 探讨老年患者术前慢性疼痛及疼痛控制分级在全身麻醉下髋关节置换手术术后谵妄发生情况和危险因素

方法 收集 2022 年 4 月—2024 年 4 月于择期行全身麻醉下髋关节置换术的老年患者（＞65 岁）共 307 例，术前 1 天使用 NRS（Numerical Rating Scale,数字评价量表）对患者疼痛情况进行分级，并记录患者疼痛持续时间及疼痛药物使用情况，NRS 评分＞3 且疼痛时间＞3 个月定义慢性疼痛，疼痛部位＞2 个定义为多部位疼痛，使用 MMSE(Mini-Mental State Examination)简易智能精神状态检查量表对患者术前认知功能进行分级，术后第 1、3、7 天随访术后患者，使用 NRS 对患者术后疼痛进行分级，并使用用 3D-CAM（ 3-minute Diagnostic Interview for CAM，3 分钟谵妄诊断量表 ）对患者术后谵妄随访。记录患者一般情况、病史、合并症、手术时间、术中失血量、术中输库存血量、术后疼痛评分及谵妄的发生情况等。入组标准：拟择期行全身麻醉行髋关节置换术的老年患者（＞65 岁）,ASA 分级Ⅰ—Ⅲ级。排除标准：术前筛查排除谵妄表现或痴呆患者，ASA 分级＞Ⅲ级患者，脑部血管疾病患者，不能配合行 MMSE 及 3D-CAM 量表评估患者，术中更改麻醉方式或手术方式患者。统计方法：采用 SPSS 21.0 统计软件。首先进行数据正态性检验并进行方差齐性分析，符合正态分布的计量资料采用均数 ± 标准差表示，组间比较采用 t 检验，不符合正态分布的连续变量组间比较采用秩和检验；计数资料用频数（率）表示，组间比较采用 χ^2 检验。经单因素分析后，以谵妄是否发生为因变量，以可能影响术后谵妄发生的因素 $P < 0.1$ 为自变量纳入多因素 Logistic 回归分析。以 $P < 0.05$ 为差异有统计学意义。

结果 共收集 2022 年 4 月—2024 年 4 月于择期行全身麻醉下髋关节置换术的老年患者（＞65 岁）共 307 例，其中男性患者 189 例（61.5%），女性患者 67 例（38.5%）；平均年龄(73.2±14.5）岁；术前慢性疼痛患者 211 例（68.7%），术前慢性多部位疼痛患者 89 例（29.2%）；术后谵妄患者 71 例（23.1%），术后 3d 内出现谵妄的患者有 59 例（83.1%）。谵妄组平均年龄大于非谵妄组，术前慢性疼痛与多部位慢性疼痛与术后谵妄有显著相关性（P <0.05），镇痛药物使用不当患者与术后谵妄有显著相关性（P <0.05）。

结论 老年患者行髋关节置换术术后谵妄发生率高，慢性疼痛是老年患者髋关节置换术的独立风险因素。

PU-0722

阿芬太尼与羟考酮在无痛纤支镜麻醉中应用的比较

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目的 在环泊酚为主体的镇静下，阿芬太尼和羟考酮在无痛纤支镜麻醉中应用的比较研究还相对较少，本文旨在对阿芬太尼与羟考酮在无痛纤支镜麻醉中的应用进行随机、双盲、对照的临床研究，探讨两者在镇痛效果、镇静效果、安全性、不良反应等方面的异同，并结合临床实际，为医生在临床工作中的药物选择提供科学的依据和决策参考。

方法 88 例 ASA II-III 级的拟在环泊酚镇静下接受纤维支气管镜检查的患者，按照区组随机分为阿芬太尼组（AI 组）和羟考酮组（Ox 组）。所有的镇痛药均用 0.9%生理盐水稀释成 10ml，责任麻

醉医师和呼吸治疗师对此用药均不知情。由责任麻醉医师根据临床真实情况和需求静脉推注环泊酚，和稀释后的镇痛药。并根据患者缺氧状态，选择性使用 T 管喷射通气进行呼吸补救。记录的数据包括诱导前，操作中，苏醒后，回访时共 13 个时间点的心率，血压（收缩压和舒张压），呼吸频率和氧饱和度。记录利多卡因气管喷洒，纤支镜过声门时的呛咳和体动。记录操作过程中最低氧饱和度和辅助通气的发生率。记录苏醒时咳嗽的发生率。记录麻醉持续时间，手术持续时间，手术停止后患者苏醒所需要的时间。记录环泊酚的用量和镇痛药的容量。

结果 共有 77 例患者顺利纳入本次研究的。两组患者在人口学资料，手术时间，麻醉时间，苏醒时间，环泊酚用量，镇痛药用量等多个指标上差异无统计学意义。两组患者呛咳和体动发生率的差异也没有统计学意义。在各个时间点，两组血流动力学数据差异均无统计学意义。全程看，阿芬太尼组有更多低氧病例（11/38 vs 4/39，p=0.0384，卡方=4.287），需要更多的通气支持（15/38 vs 7/39,p=0.0366,卡方=4.370）。同时在苏醒 5 分钟时，有更多的患者出现咳嗽（p=0.0445，卡方=4.037）。同时，阿芬太尼组追加了更多的镇痛药，两组之间差异有统计学意义（16/38 vs7/39，p=0.0262）。

结论 阿芬太尼和羟考酮都可以安全用于无痛支气管镜治疗；阿芬太尼较羟考酮缺氧病例多，需更多通气支持，增加镇痛药追加次数；羟考酮不延迟苏醒，呛咳/咳嗽发生率较低。

PU-0723

Unveiling Dexmedetomidine's Synergy: A Promising Approach to Opioid-Sparing Cancer Pain Management

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Cancer pain remains a significant challenge, with limited treatment options and opioid dependence posing major issues. This review explores dexmedetomidine, a novel α-2 receptor agonist, as a potential solution.We discuss the complex mechanisms of cancer pain, including inflammation, neuropathy, and multi-pathway signaling. Current treatment limitations, including undertreated patients and the drawbacks of opioids, are highlighted. Dexmedetomidine's analgesic mechanisms are explored, encompassing central nervous system actions, peripheral effects, and modulation of inflammatory pathways. We emphasize its potential to synergize with opioids, leading to enhanced pain relief and reduced opioid dosage.Evidence supporting dexmedetomidine's opioid-sparing effect is presented, including animal studies and clinical trials demonstrating reduced opioid consumption without compromising pain control. This review highlights the promise of dexmedetomidine as a key adjuvant analgesic for complex and refractory cancer pain. Its ability to reduce opioid dependence and potentially offer neuroprotection warrants further investigation. Future research should focus on optimizing dexmedetomidine's use in cancer pain management, including dosage regimens and combination strategies.

PU-0724

Efficacy of surgical pleth index-guided intra-operative analgesia on immediate postoperative pain and opioid consumption: a systematic review and meta-analysis

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Pain is a terrible sensory and emotion experience related to, or comparable to, actual or potential tissue

damage. Pain is a primary reason for patients seeking medical care. Postoperative pain, an acute pain that arises immediately following surgery, is prevalent among surgical patients. A national survey in America revealed that nearly 80% of surgical patients experienced acute postoperative pain, with 86% of them reported moderate, severe, or extreme pain. Despite advancements in medical technology, epidemiological studies suggest that acute postoperative pain remains inadequately treated. And incompletely treated acute postoperative pain adversely affects patients' quality of life, satisfaction with care, duration of hospital stay and healthcare costs. Additionally, poorly managed acute pain is a primary factor contributing to the chronification process, which can lead to persistent postoperative pain.

Individualized intraoperative opioid administration helps to prevent opioid misuse, opioid-induced hyperalgesia and other adverse effects. However, it has been difficult to monitor intra-operative analgesia through routine methods until recently. Owing to the lack of conventional methods, anesthetists have relied on clinical judgement to assess the nociception-antinociception balance during general anesthesia, which is dictated by physiological parameters (e.g. lachrymation, sweating, changes in heart rate or blood pressure) and their personal experience and training. For optimal titration of analgesic drugs, several new nociception monitors have been introduced, such as pupillometry, analgesia nociception index and skin conductance. The surgical pleth index (GE Healthcare, Helsinki, Finland) is the most widely used and studied device among them. The SPI derives from the pulse-wave amplitude and the heartbeat interval. The SPI values are calculated on the basis of the published equation: SPI=100-(0.33×HBInorm + 0.67×PPGAnorm), in which HBI is the normalized heartbeat interval and PPGA is the normalized photo-plethysmographic waveform amplitude. A series of clinical trials have been conducted to compare SPI-guided and conventional analgesia on intraoperative opioid titration and report lower intraoperative opioid consumption. Accordingly, the results were confirmed by meta-analysis. Despite the broad research prospects, there is still debate over whether the surgical pleth index significantly improves postoperative outcomes such as postoperative pain.

The management of acute postoperative pain is a critical priority due to its impact on short- and long-term outcomes for surgical patients. Acute postoperative pain is influenced by intraoperative analgesia. Anesthesiologist rely on clinical judgement to guide intraoperative analgesia, but some new technologies, such as the surgical pleth index, suggest the possibility of intraoperative pain monitoring. However, the impact of surgical pleth index on postoperative outcomes has not been confirmed. We conducted a systematic review and meta-analysis of articles comparing surgical pleth index-guided analgesia to standard care. Relevant studies from January 1990 to April 2024 were searched in PubMed, Cochrane Library, Web of Science, and Embase databases. Randomized controlled trials that involved adults undergoing non-cardiac surgery under general anesthesia and compared surgical pleth index (SPI)-guided analgesia with conventional analgesia were included. The primary outcomes were immediate postoperative pain and opioid consumption, other outcomes included intraoperative opioid consumption and adverse events. Each study's risk of bias was evaluated based on the Cochrane guidelines for clinical trials, and the evidence level for the outcomes was determined using the Grading of Recommendations Assessment Development and Evaluation. The data compilation was performed using Review Manager version 5.4. Twelve RCTs were included in the study, from a pool of 837 patients (417 females). It identified a statistically significant advantage in SPI-guided analgesia for immediate postoperative pain (mean (95%CI) difference -0.35 (-0.48 to -0.22) on an 11-point scale, $p < 0.00001$). Our meta-analysis of the existing literature indicates that SPI-guided analgesia statistically significantly reduces immediate postoperative pain intensity but it does not demonstrate clinically relevant results. We found no evidence that SPI-guided analgesia affected perioperative opioid consumption nor adverse events.

PU-0725

The Analgesia Effect of Aucubin on CFA-Induced Inflammatory Pain by Inhibiting Glial Cells Activation-Mediated Inflammatory Response via Activating Mitophagy

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Background: Inflammatory pain, characterized by sustained nociceptive hypersensitivity, represents one of the most prevalent conditions in both daily life and clinical settings. Aucubin, a natural plant iridoid glycoside, possesses potent biological effects, encompassing anti-inflammatory, antioxidant, and neuroprotective properties. However, its impact on inflammatory pain remains unclear. The aim of this study is to investigate the therapeutic effects and underlying mechanism of aucubin in addressing inflammatory pain induced by complete Freund's adjuvant (CFA).
Methods: The CFA-induced inflammatory pain model was employed to assess whether aucubin exerts analgesic effects and its potential mechanisms. Behavioral tests evaluated mechanical and thermal hyperalgesia as well as anxiety-like behaviors in mice. The activation of spinal glial cells and the expression of pro-inflammatory cytokines were examined to evaluate neuroinflammation. Additionally, RNA sequencing was utilized for the identification of differentially expressed genes (DEGs). Molecular biology experiments were conducted to determine the levels of the PINK1 gene and autophagy-related genes, along with PINK1 distribution in neural cells. Furthermore, mitophagy induced by carbonyl cyanide m-chlorophenylhydrazone (CCCP) was employed to examine the roles of PINK1 and mitophagy in pain processing.
Results: Aucubin significantly ameliorated pain and anxiety-like behaviors induced by CFA in mice and reduced spinal inflammation. RNA sequencing indicated PINK1 as a pivotal gene, and aucubin treatment led to a significant downregulation of PINK1 expression. Further GO and KEGG analyses suggested the involvement of mitochondrial function in the therapeutic regulation of aucubin. Western blotting revealed that aucubin markedly decreased PINK1, Parkin, and p62 levels while increasing LC3B expression. Immunofluorescence showed the predominant co-localization of PINK1 with neuronal cells. Moreover, CCCP-induced mitophagy alleviated mechanical and thermal hyperalgesia caused by CFA and reversed CFA-induced mitochondrial dysfunction.
Conclusions: In summary, our data suggest that aucubin effectively alleviates CFA-induced inflammatory pain, potentially through triggering the PINK1 pathway, promoting mitophagy, and suppressing inflammation. These results provide a novel theoretical foundation for addressing the treatment of inflammatory pain.

PU-0726

以新质量生产力为引领，打造独具贵州特色的疼痛诊疗中心

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目的 探讨以新质生产力为引领，建设独具贵州特色的疼痛诊疗中心的可行性和实施建议。
方法 通过查阅相关文献、实地调研和专家访谈相结合的方式，调研贵阳市三甲医院疼痛科发展情况。

结果 新质生产力在疼痛诊疗领域的应用具有广阔的前景。通过引入先进的医疗设备、技术创新和人才培养机制，可以有效提升疼痛诊疗的效率和质量。
结论 要想建设好独具贵州特色的疼痛诊疗中心，需要从制度、人才、疼痛中心、科研几个方面综合考虑。

PU-0727

虾青素对宫颈癌 Hela 细胞生长增殖凋亡的影响及分子机制的研究

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目的 探讨虾青素通过调控腺苷活化蛋白激酶（AMPK）对 Hela 细胞增殖、迁移、侵袭和凋亡的抗肿瘤作用。
方法 以 100、400、600μmol/L 浓度虾青素处理宫颈癌 Hela 细胞后分别培养 12、24、48ｈ，采用 ＭＴＴ法检测细胞抑制率，划痕试验检测细胞迁移，Transwell 实验检测细胞侵袭能力，流式细胞技术观察细胞凋亡，Western Blot 法测定细胞总腺苷酸活化蛋白激酶 （ＡＭＰＫ）、磷酸化腺苷酸活化蛋白激酶（ｐ-ＡＭＰＫ）、磷酸化的哺乳动物雷帕霉素靶蛋白（ｐ-ｍＴＯＲ）的蛋白表达情况。
结果 各浓度的虾青素对宫颈癌 Hela 细胞增殖均有明显抑制作用（Ｐ＜ 0.05）；400μmol/L 浓度的虾青素较 100μmol/L 的虾青素对宫颈癌 Hela 细胞增殖的抑制作用更加显著（Ｐ＜0.05）；而 400μmol/L 与 600μmol/L 的虾青素对宫颈癌 Hela 细胞增殖的抑制作用差异无统计学意义（Ｐ＞0.05）。划痕实验结果显示，不同浓度 ASX 处理 48h 后，与未经虾青素处理组相比，各给药组细胞划痕闭合率均呈剂量依赖性减少（P＜0.05）。Transwell 实验结果显示,与未经虾青素处理组相比,各给药组侵袭细胞数量明显减少,且虾青素浓度越大,侵袭细胞数越少。流式细胞技术分析发现各种浓度虾青素均可促进宫颈癌Hela细胞凋亡（Ｐ ＜0.05），其中400μmol/L的虾青素较100μmol/L作用显著（Ｐ＜0.05）；而 400μmol/L 与 600μmol/L 的虾青素促进宫颈癌 Hela 细胞凋亡的作用差异无统计学意义（Ｐ＞0.05）。Western Blot 结果表明虾青素能够增加 ｐ-ＡＭＰＫ的表达（Ｐ＜0.05），并抑制其下游 ｐ-ｍＴＯＲ蛋白表达（Ｐ＜0.05）。ＡＭＰＫ阻断剂 compound C 处理后虾青素抑制宫颈癌增殖、迁移、侵袭及促进凋亡的作用被阻断。
结论 虾青素可抑制宫颈癌细胞生长增殖并促进凋亡，其机制与 ＡＭＰＫ-ｍＴＯＲ信号通路有关

PU-0728

经皮穴位电刺激对剖宫产术中低血压防治作用的 meta 分析

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目的 产妇在剖宫产手术中的低血压发生率高达 70%。产妇低血压可能引起胎儿宫内窘迫、新生儿窒息等严重后果。血管活性药的应用存在滞后性，剖宫产术中低血压的预防更值得关注。本文采用 meta 分析评价经皮穴位电刺激（TEAS）在剖宫产术中对低血压的防治作用。
方法 计算机检索 PubMed、Embase、Web of science、Cochrane Library、中国知网、万方、维普 和 CBM （中国生物医学文献）数据库，纳入有关 TEAS 对剖宫产术中血压影响的随机对照试验（RCTs），试验组为 TEAS，对照组为无治疗或假刺激。检索起止时间为建库到 2024 年 4 月。中文检索词有：经皮电穴位刺激、经皮穴位电刺激、剖宫产、剖腹产、产科手术、血压、低血压等；

英文检索词有：Transcutaneous Electrical Acupoint Stimulation、Transcutaneous Point Electric Stimulation、Percutaneous Acupoint Electrical Stimulation、caesarean birth、caesarean section、caesarean delivery、abdominal delivery、blood pressure、hypotension 等。两名研究者独立进行文献筛选、资料提取。主要结局指标是低血压发生率、升压药使用率。次要结局指标是术中头晕、胸闷、呼吸困难、恶心、呕吐的发生率以及新生儿 apgar 评分。对纳入文献进行质量评价。采用 RevMan 5.4 和 Stata 15 软件进行统计分析。对二分类数据计算相对风险率（RR）和 95%可信区间（CI），对连续数据计算加权均数差（WMD）和 95%可信区间（CI）。用 χ^2 检验及 I^2 定量判断异质性的大小。若 P≤0.1、I^2≥50%，存在异质性，采用随机效应模型，反之则采用固定效应模型，检验水准 α=0.05。采用亚组分析或敏感性分析对异质性来源进行分析。

结果 检索各数据库，初步获得相关文献 300 篇，经逐层筛选后，最终纳入 13 个 RCT，中文 11 篇，英文 2 篇，包括 1880 例患者。经过 meta 分析，TEAS 显著减少剖宫产术中低血压发生率（RR=0.54，95%CI 0.41-0.70， P <0.05），显著减少剖宫产术中升压药使用率（RR=0.71，95%CI 0.55-0.91，P＜0.05），且能有效降低剖宫产术中头晕、胸闷、呼吸困难和恶心呕吐的发生率（P＜0.05），两组间新生儿 apgar 评分无统计学差异（P＞0.05）。按不同干预方式，对数据进行亚组分析，各研究间的异质性显著降低，提示刺激穴位和频率不同是各研究之间异质性的主要来源。

结论 高频穴位电刺激可以显著降低剖宫产术中低血压的发生率，减少术中头晕、胸闷、呼吸困难、恶心呕吐发生率，且不影响新生儿 apgar 评分。

PU-0729

针刺内关足三里在预防吻合器痔上黏膜环切术中牵拉反射的应用

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目的 探讨针刺内关足三里在预防吻合器痔上黏膜环切术中牵拉反射的临床应用价值。

方法 100 例 ASA Ⅰ或Ⅱ级，择期在椎管内麻醉下行吻合器痔上黏膜环切术的患者，年龄 18～70 岁，体重 55～70Kg,随机均分为两（n=50）组。A 组和 B 组。A 组术前针刺内关穴和足三里穴直至术毕；B 组未行针刺穴位。观察并记录两组患者术中牵拉反射及心率（HR）、血压（BP）的变化情况。

结果 A 组术中发生牵拉反射率为 8.68%。B 组术中发生牵拉反射率为 87.34%，A 组方法预防术中牵拉反射效果明显优于 B 组(P<0.05)，A 组患者术中 HR 和 BP 波动小于 B 组。

结论 针刺内关穴和足三里穴可以明显预防吻合器痔上黏膜环切术中牵拉反射的发生。

PU-0730

Shen Tong Zhu Yu formula prevents the sensitization of anterior cingulate cortex after peripheral nerve injury in mice

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Objective: Shen Tong Zhu Yu (STZY) formula (身痛逐瘀汤) is an herbal formula that commonly used in the treatment of generalized aches and pains. This study aimed to investigate the

underlying mechanisms of STZY formula for preventing the central sensitization after peripheral nerve injury.
Methods: Mechanical allodynia test and thermal hyperalgesia test were performed on mice with chronic constriction injury. Glutamatergic transmission was detected by whole cell patch clamp recordings. The mechanism of STZY formula was predicted by network pharmacology analysis, and validated by western blot.
Results: It showed that systematically administration of the formula at early stage of nerve injury alleviated neuropathic pain in mice. Moreover, the formula significantly inhibited the potentiated glutamatergic transmission in the anterior cingulate cortex of animal model. By analyzing phytochemical components and network pharmacology of the formula, it was predicted that the G protein coupled receptor-protein kinase A signaling pathway is an important target for the formula inhibiting glutamatergic transmission. Then, we validated the above hypothesis by molecular works. And it was confirmed that the muscarinic choline receptor M2, but not M1, activates the pathway.
Conclusion: Early administration of STZY formula inhibits central sensitization to prevent neuropathic pain aggravation in mice.

PU-0731

针灸在临床麻醉中的应用个案报道及文献复习

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目的 通过个案应用与文献复习探索针灸在麻醉围术期对恶心呕吐的应用价值
方法 患者，女性，37 岁，全麻下行腹腔镜阑尾切除术，术后，患者发生顽固性恶心干呕，选取右侧土水穴，心灵穴，及手解穴，针入 1 寸，平补平泻，少许撵针，留针 30 分钟。
结果 针刺上述穴位，患者恶心干呕症状立即好
结论 麻醉围术期应用针灸可有效缓解患者恶心干呕症状

PU-0732

经皮穴位电刺激复合全身麻醉对无痛肠镜检查患者术中镇静镇痛的效果观察

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目的 观察经皮穴位电刺激复合全身麻醉对无痛肠镜检查患者术中镇静镇痛的效果。
方法 选择 80 例需行无痛肠镜检查患者为研究对象，按随机数字表法分为对照组和实验组每组各 40 例。对照组给予全身麻醉，实验组在对照组基础上给予经皮穴位电刺激。记录两组患者麻醉前、手术开始时刻、术中 30 min、术后 2 小时时刻的平均动脉压（MAP）、心率（HR）、血氧饱和度（SpO2）、脑电双频指数（BIS）、皮质醇（Cor）、儿茶酚胺（CA） 水平，分别于术后 6 h、12 h、24 h、36 h 采用疼痛数字分级法（NRS）评价患者疼痛情况，分别记录两组患者不良反应情况。结果 麻醉前，两组 MAP、HR、SPO2、BIS 水平比较，差异无统计学意义（P＞0.05）。手术开始时刻，对照组 MAP、HR 水平较麻醉前升高（P＜0.05），实验组 MAP、HR 水平低于对照组（P＜0.05）。术中 30 min，对照组 MAP、HR 水平较麻醉前升高（P＜0.05）；实验组 MAP 水平较麻醉前升高（P＜0.05），HR 水平低于对照组（P＜0.05）。术后 2 小时，对照组 MAP、HR 水平较麻醉前升高（P＜0.05），实验组 MAP 水平低于对照组（P＜0.05）。手术开始时刻、术中 30

min、术后 2 小时，两组 BIS 水平较麻醉前降低（P＜0.05），实验组 BIS 水平均低于对照组（P＜0.05）。手术开始时刻，两组患者 Cor、CA 水平较麻醉前无明显变化（P＞0.05）；术中 30 min，两组患者 Cor、CA 水平较麻醉前明显升高（P＜0.05），实验组 Cor、CA 水平高于对照组（P＜0.05）；术后 2 小时，两组患者 Cor、CA 水平较麻醉前无明显变化（P＞0.05）。术后 6 h、12 h、24 h、36 h，两组患者 NRS 评分逐渐降低（P＜0.05），实验组 NRS 评分低于同时间点对照组（P＜0.05）。实验组不良反应发生率低于对照组（P＜0.05）

结果 麻醉前，两组 MAP、HR、SPO2、BIS 水平比较，差异无统计学意义（P＞0.05）。手术开始时刻，对照组 MAP、HR 水平较麻醉前升高（P＜0.05），实验组 MAP、HR 水平低于对照组（P＜0.05）。术中 30 min，对照组 MAP、HR 水平较麻醉前升高（P＜0.05）；实验组 MAP 水平较麻醉前升高（P＜0.05），HR 水平低于对照组（P＜0.05）。术后 2 小时，对照组 MAP、HR 水平较麻醉前升高（P＜0.05），实验组 MAP 水平低于对照组（P＜0.05）。手术开始时刻、术中 30 min、术后 2 小时，两组 BIS 水平较麻醉前降低（P＜0.05），实验组 BIS 水平均低于对照组（P＜0.05）。手术开始时刻，两组患者 Cor、CA 水平较麻醉前无明显变化（P＞0.05）；术中 30 min，两组患者 Cor、CA 水平较麻醉前明显升高（P＜0.05），实验组 Cor、CA 水平高于对照组（P＜0.05）；术后 2 小时，两组患者 Cor、CA 水平较麻醉前无明显变化（P＞0.05）。术后 6 h、12 h、24 h、36 h，两组患者 NRS 评分逐渐降低（P＜0.05），实验组 NRS 评分低于同时间点对照组（P＜0.05）。实验组不良反应发生率低于对照组（P＜0.05）。

结论 经皮穴位电刺激复合全身麻醉在无痛肠镜检查的镇静效果好，可稳定患者 MAP、HR 水平，减轻应激反应，缓解患者术后疼痛，降低不良反应发生率。

PU-0733

电针治疗神经系统疾病的线粒体自噬机制

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目的 围术期脑卒中是术后严重并发症，特别是对于老年患者，常导致一系列不良临床结局，围术期脑卒中防治已成为麻醉管理的重要内容。“治未病”作为中医特色理念，对于现代医学具有一定指导意义，其中针灸治疗因具有双向良性调节作用被广为运用。大量临床研究和动物实验均表明电针预处理可有效降低术后卒中发生率，改善术后卒中结局，减轻神经元损伤，而其机制尚不清楚。线粒体自噬被公认为卒中的重要发病机制，这是一种细胞器特异性自噬途径，受损线粒体被运送至溶酶体进行降解，一般可分为泛素依赖途径或和泛素非依赖途径，以 PINK、Parkin、BNIP3、FUNDC1 为代表的多种蛋白参与该过程。

方法 在临床研究中，对卒中患者施以电针干预，可有效改善结局指标，MMSE、MoCA 评分均升高。在卒中动物模型中，通过蛋白质免疫印迹、免疫荧光、酶联免疫吸附试验等分子生物学技术及 RNA-Seq、蛋白质组学等组学技术，均已验证电针治疗可以影响线粒体自噬标志物，并改善相应行为学指标。而在敲低或过表达线粒体自噬通路关键分子的小鼠中，电针的疗效则被逆转。考虑到线粒体自噬同时参与其他病理生理变化，我们提出电针可能通过调控线粒体自噬及其下游机制从而对神经系统疾病治疗发挥关键作用。

结果 在卒中乃至其他神经系统疾病，如阿尔兹海默症和帕金森病中，电针治疗往往伴随线粒体自噬标志物的改变。除线粒体自噬外，卒中等神经系统疾病还存在着其他错综复杂的病理生理变化，细胞自噬、铁死亡、细胞增殖与分化、突触可塑性、血脑屏障、炎症等的相关蛋白均有异常。

结论 电针可能通过调控线粒体自噬及其下游机制从而对神经系统疾病治疗发挥关键作用，未来研究将集中于如何解释电针与线粒体自噬的关系，以及基于线粒体自噬探索如何优化电针治疗方案。

PU-0734

眼动追踪技术评估认知功能的可行性分析

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目的 认知功能的客观评估一直是研究关注的重点，目前的评估方法均存在一定局限性。眼动包括注视、眼跳和追随运动等基本形式，与认知功能之间存在一定联系。本文旨在综述眼动与认知功能之间的关联，分析眼动与认知功能在神经通路上的联系，眼动与记忆力、注意力、快速反应能力的联系，从而评判眼动追踪技术反映认知功能的可行性。
方法 通过分析人体发育过程中，眼动与认知功能各自的神经分布，发现二者之间的共同神经通路，从而明确眼动与认知功能之间存在客观的联系。现有研究主要从三个方面的眼动指标来评估认知功能：测量时间的指标，记录眼睛在空间内移动的指标，以及观察瞳孔变化的指标。本文通过对现有的研究结果进行分析并归纳，为眼动指标反应认知功能提供证据。
结果 通过分析眼动与认知功能的神经系统发现，眼动与认知功能均受到大脑皮层的调控，以眼动反映认知功能的神经通路为皮层系回路。分析现有研究, 得出眼动追踪技术已经成为一项准确且非侵入性的评估认知功能的方法。眼动方式和眼动指标可以反映个体的记忆力、注意力和快速反应能力，表现为：特定的眼球运动有助于记忆行为，且眼动可以预测记忆的表现，出现对需要记忆的目标的注视时间延长，回视次数增多；注意力受到各种情绪事件的影响，不同的个体注意力存在差异，个体的注意力往往集中在自己的感兴趣区，眼动数据可出现注视时间延长、回视次数增多；个体在眼动上的快速反应主要表现为反应性眼跳和反向眼跳，研究者常以反向眼跳作为研究快速反应的有效指标，反向眼跳在评估快速反应方面比反应性眼跳更有效。
结论 眼动与认知功能之间，不仅在神经系统上具有复杂的联系，并且眼动的时间、空间指标和瞳孔的直径都可以用来反映认知加工过程。眼动追踪技术对于记忆力、注意力和快速反应能力的评估都有应用证据，可切实可行地评估多种疾病状态和人群的认知功能，但是在评估认知功能时不能只关注得出的眼动数据，而是要将数据与相应的眼动范式进行结合。眼动追踪技术具有操作简单、结果数据丰富、眼动范式可调整等优势，并且伴随技术的不断发展，眼动追踪的空间和时间的分辨率得到更进一步的提升，眼动记录的简便性和精准度不断提升，促使眼动与认知功能之间的关系更够被更加精准的描述。同时，眼动追踪技术用于临床有助于早期识别认知相关能力缺陷，促进早期干预，并且也极大便捷临床后的随访工作和准确描述患者的恢复情况。

PU-0735

Shenmai injection inhibits NLRP3 inflammasome-mediated macrophage pyroptosis

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This study delves into the potential of Shenmai injection in mitigating macrophage pyroptosis by targeting inflammasome protein NOD-like receptor hemoprotein domain-related protein 3 (NLRP3) inflammasome activation. Mouse bone marrow-derived macrophages (BMDMs) were categorized into a control, lipopolysaccharide (LPS) + adenosine triphosphate (ATP) stimulation, and Shenmai injection + LPS+ATP groups. The control group received no treatment. The LPS+ATP group underwent initial stimulation with LPS at 200 ng/mL for four hours, followed by ATP at 4 mmol/L for one hour. The Shenmai injection+LPS+ATP group was pre-administered with 0.125 mg/mL Shenmai injection for one hour, with subsequent treatments identical to the LPS+ATP group.

Relative to the control group, BMDM cells activity in the LPS+ATP group notably decreased. Elevated levels of inflammatory cytokines IL-1β and IL-18 increased, activated caspase-1 protein, reduced cell viability, and heightened cytotoxicity and ROS were observed (P < 0.05). Compared to the LPS+ATP group, the Shenmai injection+LPS+ATP group increased BMDM cell activity, decreased inflammatory cytokines IL-1β and IL-18, lowered activated caspase-1 protein, enhanced cell viability, reduced cytotoxicity and ROS levels (P < 0.05). The findings indicated that LPS+ATP induced macrophage NLRP3 activation and pyroptosis, and Shenmai injection inhibited macrophage pyroptosis by suppressing NLRP3 activation.

PU-0736

针刺在剖宫产手术麻醉中的作用:一项 meta 分析

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目的 本荟萃分析的目的是系统评价在剖宫产手术患者中针刺麻醉临床应用的证据水平，为后续临床麻醉工作提供参考。
方法 于 2024 年 5 月，计算机系统检索 PubMed、EmBase、Cochrane Library、Web of Science、中国知网（CNKI）、万方数据知识服务平台（Wanfang Data）及维普中文科技期刊全文数据库（VIP）等数据库，搜集有关针刺在剖宫产手术麻醉中的作用的研究，检索时限为建库至 2024 年 5 月。由 2 名研究者独立筛选文献、提取资料并采用 Cochrane 协作网提供的偏倚风险评价工具评价纳入研究的偏倚风险后，采用 RevMan 软件进行 Meta 分析，计算合并效应量和 95%置信区间。对于异质性较大的研究，采用随机效应模型；对于异质性较小的研究，采用固定效应模型。
结果 初检 402 篇文献，经过筛选最终纳入 16 篇符合标准的随机对照试验，包括 11 篇中文，5 篇英文，1746 例剖宫产手术患者，其中试验组 874 例，对照组 872 例。Meta 分析结果显示：（1）麻醉效果：针刺麻醉组中麻醉效果为优或良［RR=1.18，95%CI:（0.99，1.39），P=0.06］的比例高于对照组，结果无统计学意义；（2）新生儿 Apgar 评分：针刺麻醉组与对照组相比较，新生儿 Apgar 评分无显著差异［MD=0.08，95%CI:（-0.10，0.25），P=0.41］；（3）疼痛评分：针刺麻醉组患者的术后疼痛评分［MD=-1.11，95%CI:（-1.45，-0.77），P＜0.00001］显著低于对照组，结果有统计学意义；（4）不良反应：针刺麻醉组术中重度牵拉反应［RR=0.12，95%CI:（0.04，0.40），P=0.0005］的发生率显著低于对照组，结果有统计学意义；术后恶心［RR=0.72，95%CI:（0.37，1.38），P=0.32］的发生率低于对照组，结果无统计学意义；术后呕吐［RR=0.38，95%CI:（0.25，0.56），P＜0.00001］的发生率低于对照组，术后头晕头痛［RR=0.31，95%CI:（0.12，0.80），P=0.02］的发生率低于对照组，结果有统计学意义。
结论 针刺麻醉应用于剖宫产术中安全有效，对新生儿 Apgar 评分无影响，既获得更好的麻醉效果、更好地控制术后疼痛，又降低术中牵拉反应、术后恶心呕吐、术后头晕头痛等不良反应的发生率，但由于受纳入研究数量和质量的限制，上述结论尚待更多高质量研究予以验证。本研究未对不同类型的针刺方法进行比较，未来研究可以进一步探讨不同针刺方法在剖宫产手术麻醉中的效果差异。

PU-0737

颊针治疗重度原发性痛经患者 2 例

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目的 原发性痛经是育龄期女性常见疾病之一，重度痛经影响患者工作和学习，治疗或缓解痛经程

度可明显提高患者的生活质量。通过观察重度原发性痛经患者的疼痛缓解程度，探索颊针治疗原发性痛经的临床疗效。

方法 2023 年 8 月至 2023 年 12 月，我们共收集就诊于山东第二医科大学附属医院的原发性痛经患者 60 余例，其中 2 名女大学生临床诊断为重度痛经，二者均表现为经期疼痛难忍、冷汗频出、难以行走、呕吐、上课需请假、既往均有晕厥史、止疼药或热敷效果欠佳等情况。就诊时评估 VAS 评分、COX 痛经症状评分（CMSS），并腹诊查体，给予颊针治疗，针刺“腰穴”、“骶穴”、“下焦穴”，留针 30 分钟，期间根据腹诊调整进针深度和方向，治疗结束后再次评估 VAS 评分、COX 痛经症状评分（CMSS）。连续治疗三个月，每次治疗均在经期第一天进行，以 VAS 评分和 CMSS 评分判断治疗效果。

结果 患者 1：治疗前 VAS 评分 9，CMSS 评分 97，第一次治疗后 VAS 评分 3，CMSS 评分 20，自述治疗结束后疼痛明显缓解，有食欲，腰部酸痛感基本消失，可下床活动。第二次治疗前 VAS 评分 5，第二次治疗后 VAS 评分 2。第三次治疗前 VAS 评分 3，治疗后 AVS 评分 0。随访三个月发现痛经症状较以前明显缓解，VAS 约 2 分，生活质量较前提高，经期可正常上课。

患者 2：治疗前 VAS 评分 8，CMSS 评分 100，明显焦虑，多次有“切除子宫”的想法，抗拒任何肢体活动，腹诊压痛点多，第一次治疗后 VAS 评分 2，CMSS 评分 15，无痛苦面容，无被动体位，可自由下床活动，愿意与医生交流，治疗后返回学校上课，本次月经未在出现疼痛。第二次治疗前 VAS 评分 5，治疗后 VAS 评分 1，第三次治疗前 VAS 评分 2，治疗后 VAS 评分 0。随访观察 3 个月，患者诉症状减轻，焦虑心理缓解，经期可正常上课。

结论 上述两例重度原发性痛经患者接受颊针治疗后，腰部酸胀感、腹部疼痛感及焦虑情绪均明显改善，生活质量有所提高。可见颊针对于原发性痛经患者的治疗效果显著，且具有长期治疗意义，值得推广。

PU-0738

通调三焦针刺法对改善老年患者全麻术后早期认知障碍症状的疗效观察

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目的 观察老年患者全麻后采用三焦针刺穴位膻中、中脘、足三里、三阴交、气海对早期认知障碍的改善情况。

方法 选取 66 例老年患者在全麻下手术(ASA 分级 II-III 级) 。随机分为针刺组与对照组，每组 33 例。针刺组在术后连续 5 天给予针刺膻中、中脘、气海、足三里、三阴交穴位。对照组未对患者行针刺治疗。统计两组患者一般情况、手术时长、出血量，并于术前 1 天，术后第 1、3、5 天记录两组患者疼痛评分(VAS) ，认知功能评分(FAQ) ，精神状态评分(MMSE) 等认知功能指标，进行统计学分析。

结果 术后第 3 天，与对照组比较，三焦针刺组的 VAS 评分、MMSE 评分、FAQ 评分均有改善($P < 0.05$) ，其中 VAS 评分明显降低。而术后第 1 天和第 5 天，两组的 VAS 评分、MMSE 评分、FAQ 评分有统计学意义。

结论 手术术后对全麻患者采用通调三焦针刺膻中、中脘、气海、足三里、三阴交穴，可显著改善术后认知障碍，减少住院时间及住院费用，促进术后早期快速康复。

PU-0739

针灸预防术后神经认知功能障碍的作用及机制

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目的 术后神经认知功能障碍（PND，Postoperative neurocognitive disorders）是老年患者围术期常见的并发症，对患者康复造成重大影响。尽管其病因和发病机制未完全明确，但已知高龄、合并症、手术等多种因素为其危险因素。本文通过总结文献，深入探讨针灸在 PND 防治中的多种作用途径、机制及可能疗效，旨在为临床提供理论支撑，以期改善 PND 患者预后。
方法 本文通过现有文章全面回顾了针灸在 PND 治疗领域的研究进展，详细分析了针灸如何通过改善围术期体验（包括术前焦虑、术后疼痛、术后恶心呕吐、围术期睡眠障碍、围术期体温）、减少麻醉药物用量、抑制炎症、减少氧化应激、调节突触可塑性及抑制细胞凋亡等途径，对 PND 产生积极影响。同时，还深入探讨了不同类型针灸（如手针、电针、经皮穴位电刺激）及不同穴位选择的应用与效果，为针灸预防术后神经认知功能障碍提供可重复性的技术支持。
结果 1.围术期体验改善：针灸在缓解术后疼痛、减轻焦虑、减少恶心呕吐、改善睡眠和保温方面表现积极。其机制涉及调节内源性阿片类物质、影响交感神经、降低炎症因子等，从而降低 PND 发生率；2.麻醉药物减量：研究显示，针灸能降低吸入性麻醉药的需求，进而减少 PND 风险。例如，耳针穴位按压和电针在临床试验中被证实能减少地氟烷用量；3.炎症抑制：全身麻醉和手术可引发炎症，这是 PND 的重要诱因。针灸通过多种方式抑制炎症，如激活迷走神经-肾上腺轴、调节肠脑轴、抑制 NLRP3 炎性体等，降低 PND 风险；4.氧化应激减少：氧化应激对 PND 发生有重要作用。针灸通过提升抗氧化酶活性、降低氧化产物水平来保护神经元；5.突触可塑性调节：针灸可调节突触结构和功能，改善其可塑性，保护脑功能。动物实验显示，针灸能激活 BDNF/TrkB/Erk 通路，促进神经元存活和突触形成；6.细胞凋亡抑制：针灸通过抑制细胞凋亡通路、减少神经元损伤来提供神经保护。研究显示，针灸能降低 S100β 和 NSE 水平，减少神经元凋亡，改善认知功能。此外，与手针、电针相比，经皮穴位电刺激作为一种无创的针灸方式在临床应用中具有更广泛的潜力。
结论 针灸作为安全有效的非药物干预手段，在 PND 防治中显示出巨大潜力。然而，当前临床研究质量有待提高，需更多高质量试验来验证其疗效和机制。未来研究应聚焦穴位特异性、不同针灸技术效果，并开展多中心大样本研究，以提升针灸在 PND 治疗中的可靠性和可重复性。

PU-0740

电针通过调节 Nrf2 信号通路减轻脑缺血再灌注损伤的作用机制研究

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目的 全球每年有 590 万人因中风死亡，中风也是致残的主要原因之一。现有治疗方式包括静脉溶栓和动脉取栓，但常因此产生更严重的再灌注损伤。目前预防脑缺血/再灌注损伤的药理方法有限。为了减轻脑损伤，需要更多的研究来提高对脑缺血/再灌注损伤的认识。针灸疗法已被广泛用于缺血性疾病的治疗，且具有良好的临床疗效。然而，针刺治疗脑缺血/再灌注损伤的机制尚不清楚。
方法 在大脑中动脉闭塞再灌注(tMCAO/R)小鼠模型中，采用神经功能评分、TTC 染色、尼式染色和免疫荧光染色检测脑组织损伤情况。采用定量 RT-PCR、免疫荧光染色检测炎症水平。采用定量

RT-PCR 和 Western blotting 检测其抗炎、抗氧化和抗铁死亡能力。
结果 实验发现电针百会和双侧足三里可以减少 tMCAO/R 模型小鼠脑梗死面积、神经元损伤和神经功能降低，抑制脂质过氧化和神经炎症反应，提高脑组织中 HO-1、NQO-1、Gclc、Gclm、Gpx4、Nrf2 的表达。铁死亡抑制剂 Fer-1 没有增加电针的保护作用。然而，Nrf2 抑制剂 ML385 逆转了电针的神经保护作用，包括铁死亡、氧化应激和神经炎症。
结论 电针预处理百会和双侧足三里穴通过激活 Nrf2 信号通路发挥抗氧化应激和抗铁死亡，从而减轻脑缺血再灌注损伤，本研究为电针预处理减轻脑缺血再灌注损伤的临床应用提供理论依据。

PU-0741

Electroacupuncture Pretreatment Alleviates Rat Myocardial Ischemia/Reperfusion induced Lung Injury by Inhibiting the Expression of HMGB1/RAGE

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Background: Myocardial ischemia-reperfusion (MI/R) induced lung injury is a major pulmonary complication following cardiac surgery. The pathological mechanism is related to postoperative systemic and pulmonary inflammation. High mobility group box 1 (HMGB1), a key mediator of inflammation, actively participates in the pathological process of lung injury. The binding of HMGB1 to the receptor for advanced glycation endproducts (RAGE) activates various intracellular pathways that substantially impair lung function.
Aim: This research aimed to verify the phenomenon of MI/R-induced lung injury in rats and explore the therapeutic effect and potential mechanism of electroacupuncture (EA) pretreatment.
Methods: The MI/R-induced lung injury model was established by left anterior descending coronary artery ligation in SD rats. We assessed lung injury after EA pretreatment at bilateral Feishu and Zusanli acupoints once daily for 3 days by quantitative polymerase chain reaction, western blot, MPO, and F4/80 immunohistochemical staining. We estimated lung injury after intratracheal administration of rHMGB1 by western blot, arterial blood gas analysis, lung wet/dry ratio, hematoxylin-eosin staining, and immunohistochemical Cleaved-Caspase-3 staining.
Results: Myocardial ischemia for 1h and reperfusion for 24h induced pulmonary respiratory dysfunction and pathological damage. EA pretreatment significantly improved lung function and reduced pathological damage in rats with MI/R-induced lung injury. EA pretreatment effectively attenuated the lung inflammatory response and significantly decreased the expression of HMGB1/RAGE. Intratracheal administration of rHMGB1 to upregulate the lung HMGB1/RAGE signaling impaired the pulmonary protective effect of EA.
Conclusions: This study indicates that EA pretreatment plays a crucial role in alleviating MI/R-induced lung injury by inhibiting HMGB1/RAGE signaling.

PU-0742

Effects and Mechanisms of Electroacupuncture on Sepsis-induced Immunosuppression

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Sepsis-induced immunosuppression remains a significant threat to human health, leading to increased susceptibility to secondary infections, prolonged hospital stays, and higher late-stage

mortality. This condition is characterized by T cell exhaustion or dysfunction, regulatory T cell (Treg) expansion, and cytokine secretion imbalance. Here, we show that electroacupuncture (EA) has a therapeutic effect on sepsis-induced immunosuppression, potentially mediated through the vagus nerve. Using a cecal ligation and puncture (CLP) mouse model, mice were treated with EA at bilateral Zusanli (ST36) for 15 days. Subsequently, wild-type (WT), CLP model, and EA-treated mice were intranasally challenged with Pseudomonas aeruginosa. EA-treated mice showed higher survival rates, enhanced bacterial clearance, and lower levels of IL-10 and IL-4 secretion compared to untreated CLP model mice. Additionally, EA treatment restored the proportion of CD3+CD4+ T cells and inhibited the expansion of Tregs in immunosuppressed mice. However, when vagotomy was performed, the effects of EA were eliminated, implicating the involvement of the vagus nerve. Although the vagus nerve has been previously associated with anti-inflammatory functions. our research indicates its role in enhancing immune function. Together, our study suggests that EA may be an effective treatment for sepsis-induced immunosuppression, and its potential neuroimmune mechanisms. This provides new insights and potential methods for the treatment of sepsis-induced immunosuppression.

PU-0743

耳穴贴压联合五行音乐在分娩镇痛的应用及对产后抑郁的影响

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目的 观察耳穴贴压联合五行音乐法应用于分娩镇痛中的临床效果与母婴安全性及其对产后抑郁发生率的影响。

方法 将在我院待产的 146 例因自身意愿或禁忌症等各种原因未行椎管内镇痛的孕产妇采用随机数字表法随机分为两组，每组 73 例产妇，纳入标准包括符合临产诊断标准的单胎头位产妇、年龄 20-35 周岁，孕周 37-42 周、既往无生殖道畸形，无子宫自身疾病，产前未接受过耳穴及五行音乐疗法和镇静镇痛药物治疗，既往无抑郁症病史。排除标准：不符合纳入标准的，存在影响分娩结局的内外科合并症者，精神病及既往抑郁症患者，产前爱丁堡抑郁评分≥13 分者，拒绝签署知情同意书者。干预组入产房后应用耳穴贴压联合五行音乐法进行分娩镇痛，将王不留行籽耳贴贴压于耳穴神门、子宫、内分泌、皮质下、交感，双侧贴压。根据产妇的五行属性，嘱产妇通过耳机收听相应五行音乐，对于对照组产妇，按本院常规分娩流程进行，不施加镇痛干预措施。采用视觉模拟评分法（VAS）评价产妇疼痛程度，以 0-10 分计，分数越高，疼痛越强。记录产妇入产房时、入产房后 2 小时及宫口开至 10 cm 时的 VAS 评分。使用爱丁堡产后抑郁评分（EPDS）量表进行评价，本研究通过填写调查问卷的方式收集产妇产前、产后 1 周及产后 6 周的 EPDS 评分，EPDS≥13 分者认为存在抑郁。记录总产程时长，总失血量，最终分娩方式，新生儿出生后 1 分钟、5 分钟的 Apgar 评分，分娩过程中产妇不良反应情况。最终观察并比较两组间的分娩疼痛程度、母婴安全性指标及产后抑郁发生率。

结果 干预组实施镇痛 2 小时后的视觉模拟评分（VAS）较入产房时明显降低（P＜0.001）。与对照组相比较，干预组在入产房 2 小时及宫口开全时的 VAS 评分均低于对照组（P 值均小于 0.001）。两组产妇的总失血量、中转剖宫产率、新生儿娩出后 l min、5 min 的 Apgar 评分、产后缩宫素使用量均无统计学差异（P＜0.05）。随访后发现，干预组产后 1 周的抑郁发生率显著低于对照组（P=0.041），而产后 6 周（P=0.644）、产后 6 周内的抑郁总发生率（P=0.110），两组间无统计学差异。

结论 在产妇分娩过程中应用耳穴贴压联合五行音乐法可在不影响母婴安全的前提下，有效缓解分娩疼痛，同时可改善产妇情绪，减少产后早期抑郁发生，临床应用于未行椎管内镇痛的孕产妇简便而安全，经济可行，适宜临床推广。

PU-0744

Research progress on circulatory monitoring in perioperative patients

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Perioperative circulatory monitoring is an important means to ensure the smooth progress of surgery and the safety of patients. In recent years, with the continuous advancement of medical technology, the circulation monitoring of perioperative patients has also been continuously improved and improved. The following is an overview of the research progress on circulatory monitoring in perioperative patients: 1. New monitoring technologies: In recent years, new circulatory monitoring technologies have emerged continuously, such as echocardiography, pulse indicating continuous cardiac output monitoring (PiCCO), respiratory and circulatory function monitoring, etc. These new monitoring technologies can provide more accurate and comprehensive information on the circulatory system, which helps to timely detect and handle circulatory problems that occur in perioperative patients. 2. Intelligent monitoring: With the development of artificial intelligence technology, the circulation monitoring of perioperative patients is gradually becoming intelligent. By analyzing and learning from a large amount of clinical data, intelligent monitoring systems can automatically identify abnormal situations, issue timely warnings, and improve the accuracy and timeliness of monitoring. 3. Comprehensive evaluation: The monitoring of circulation in perioperative patients is no longer limited to a single indicator, but gradually achieves comprehensive evaluation of multiple indicators. For example, by monitoring the patient's heart rate, blood pressure, blood oxygen saturation, respiratory rate, and other indicators, a comprehensive evaluation of the patient's circulatory and respiratory function can be achieved, providing doctors with more accurate diagnostic and therapeutic evidence. 4. Personalized monitoring: Doctors can develop personalized circulation monitoring plans for different surgical types and individual differences. For example, for patients undergoing cardiac surgery, their myocardial function can be evaluated by monitoring indicators such as myocardial enzymes and electrocardiograms; For patients undergoing large vessel surgery, their vascular function can be evaluated by monitoring hemodynamic indicators. 5. Remote monitoring: With the development of remote medical technology, the circulation monitoring of perioperative patients is gradually being realized through remote monitoring. By transmitting real-time monitoring data of patients to doctors, doctors can remotely assess the patient's circulatory status and provide corresponding treatment recommendations. This remote monitoring method helps to improve the efficiency and quality of medical services. In summary, the research progress on circulatory monitoring in perioperative patients is continuously driving the progress of medical technology, which helps to ensure the safety of patients and improve the quality of medical services.

PU-0745

冠心病患者非心脏手术围手术期心梗的预防及处理

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目的 探讨冠心病患者行非心脏手术围手术期心梗（PMI）的预防及处理策略。
方法 收集分析国内外近 5 年国内外相关研究文献、专家共识及指南，总结归纳围手术期心梗的流行病学进展、围手术期心梗的病因学进展、围手术期心梗的特点、围手术期心梗的预防、围手术期心梗的治疗最新动态。
结果 冠心病患者行非心脏手术围手术期心梗的发生率仍然较高，国内≧45 岁、非心脏手术

（278,939 ）PMI 的发生率为 1.61/万，国外数据显示大的非心脏手术 PMI 的发生率高达 0.88%。PMI 死亡率高，初次 PMI 死亡率 26.6%，再次 PMI 死亡率则高达 36%~70%。病因学方面，以斑块破裂为主，血栓形成主要发生在狭窄>50%的冠状动脉处，同一病人不同部位的心梗原因存在多样性。PMI 的主要特点包括：发生时机大多数（>80%）发生在术后早期，在手术结束和麻醉苏醒时尤为多见；大多数（60~100%）PMI 为非 Q 波型，而且“无”症状；大多数为 ST 段压低而非 ST 段抬高；隐匿性强，容易被漏诊。PMI 诊断方面，除症状、病理性 Q 波、缺血性心电图变化、介入医学证据、病理学证据外，强调了心肌损伤标志物尤其是肌钙蛋白水平的动态变化在 PMI 诊断中的价值，并提出应与 TCM 进展鉴别诊断。PMI 的预防进展主要集中在三大方面：（一）冠状动脉重建在 PMI 预防中的应用提出，支架置入对于 6 周内必须行非心脏手术者无明显获益；CABG 术 6 个月后行非心脏手术，患者才可能获益；对于外周血管疾病患者，PCI 术后住院期间和长期预后更差，手术成功率也更差，因此此类患者不建议行 PCI 预防非心脏手术的 PMI；术前冠脉重建仅适用于极高危患者（血液动力学不稳定或心源性休克者；顽固性心绞痛者；危及生命的心律失常或心脏停跳者；心肌梗死机械性并发症者；急性心力衰竭伴难治性心绞痛和 ST 段改变者）；不建议对非心脏手术患者术前常规冠状动脉造影，冠状动脉造影仅适用于冠脉无创检查结果提示不良预后高危的人群、对药物治疗无反应的心绞痛者、不稳定型心绞痛者（尤其是这些患者面临中、高危非心脏手术时）、临床高危患者拟接受高风险手术但无创检查结果模棱两可者、再发心电图 ST-T 段动态演变，尤其伴有间歇性 ST 段抬高者。β 受体阻滞剂预防 PMI 只对平素一直在使用此类的药物患者有益，否则有害无益，因此不建议围手术期加用 β 受体阻滞剂。α2 受体激动剂和他汀类药物均对 PMI 的预防有一定益处。DAPT 在预防 PMI 方面提出，药物洗脱支架植入术后患者 DAPT 疗程 6 个月的有效性和安全性均与标准疗程（12 月）相似。综合预防方面强调对于高危患者应积极处理各种原因所致的心动过速、低血压、高血压、内环境紊乱、贫血；围手术期密切监测血流动力学、心脏超声、多导心电图、动态监测 cTn；麻醉方法选择方面建议使用椎管内麻醉、椎管内麻醉复合全麻结合目标导向容量管理。PMI 治疗方面强调强调早期识别和及时处理的重要性，并提出有效治疗的前提是识别Ⅰ和Ⅱ型 PMI；Ⅰ型 PMI 治疗强调积极抗凝、抗血小板治疗和早期冠状动脉重建；Ⅱ型 PMI 治疗强调快速扩容、快速纠正贫血、快速消除血管痉挛因素。

结论 PMI 隐匿、凶险，应重视 ECG 监测及标志物动态监测，早期识别并及时处理对 PMI 预后极为重要，区分Ⅰ型、Ⅱ型 PMI 对治疗决策有重要意义。

PU-0746

巨噬细胞浸润介导的运动纤维损伤在全身炎症反应相关运动功能障碍的作用及机制研究

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目的 研究全身炎症对运动功能的影响,并探讨巨噬细胞浸润介导的运动纤维损伤在全身炎症反应相关运动功能障碍中的作用及机制。

方法 第一部分实验选择受精后 5 天（Day post fertilization，5dpf）的绿色荧光标记运动神经及红色荧光标记巨噬细胞的 Tg（mnx1:GFP；mepg:DsRed）双转基因斑马鱼，实验分为 4 大组：对照组（CON 组）、硫酸铜致全身炎症组（CuSo4 组）、硫酸铜致全身炎症联合注射氯磷酸盐脂质体清除巨噬细胞组（CuSo4+Lipo-Clodonate 组）、硫酸铜致全身炎症联合注射脂质体对照组（CuSo4+ Lipo-PBS 组）。使用 0、5、10、20μM 的 CuSo4 浸泡 5dpf 斑马鱼建立全身炎症模型，于建模后 3 天进行指标检测和标本采集。通过 qPCR 检测斑马鱼炎性因子表达水平，使用 Danio Vision 行为分析系统对斑马鱼的运动轨迹、游泳速度及游泳距离进行检测。通过斑马鱼自带荧光结合激光共聚焦技术，观察建立全身炎症模型后巨噬细胞浸润运动轴突的数量变化及运动轴突形态变化；通过显微注射技术对斑马鱼巨噬细胞进行部分清除，观察斑马鱼的运动轴突形态学及运动功能

的变化。第二部分实验选择巨噬细胞系 Raw264.7 及运动神经细胞系 Nsc-34，使用 LPS 处理巨噬细胞 6h 后收集巨噬细胞进行指标检测，随后更换新鲜培养基培养巨噬细胞 12h，随后使用 Transwell 共培养技术将巨噬细胞与运动神经细胞共培养，实验分为 4 大组：对照组（CON 组）、炎症组（LPS 组）、炎症加 NLRP3 炎症小体抑制组（LPS+MCC950 组）、对照加 NLRP3 炎症小体抑制组（CON+MCC950 组）,于共培养 24h 后取运动神经细胞进行指标检测。通过 qPCR 及 Western-blot 检测巨噬细胞 NLRP3、caspase-1、IL-1β 的表达水平的变化以及运动神经细胞 NFL、NFH 的表达水平的变化。

结果 (1)与 CON 组相比，通过 5、10、20μM 的 CuSo4 浸泡 3 天后斑马鱼炎性因子呈梯度升高，游泳速度及游泳距离呈梯度降低，各组间差异具有统计学意义（P＜0.05）。

（2）与 CON 组相比，通过 10μM 的 CuSo4 浸泡 3 天后斑马鱼浸润运动轴突的巨噬细胞数量增多，运动轴突长度、数量、分支均减少，差异具有统计学意义（P＜0.05）。

（3）与 CuSo4 组相比，CuSo4+Lipo-Clodonate 组斑马鱼浸润运动轴突的巨噬细胞数量减少，运动轴突长度、数量、分支均增多，游泳速度及游泳距离均增多，差异具有统计学意义（P＜0.05）。

（4）与 CON 组相比，LPS 组巨噬细胞 NLRP3、caspase-1、IL-1β 表达水平增高，运动神经细胞 NFL、NFH 表达水平降低，各组间差异具有统计学意义（P＜0.05）。

（5）与 LPS 组相比，LPS+MCC950 组巨噬细胞 NLRP3、caspase-1、IL-1β 表达水平降低，运动神经细胞 NFL、NFH 表达水平升高，各组间差异具有统计学意义（P＜0.05）。

结论 （1）全身炎症导致斑马鱼运动功能障碍，巨噬细胞浸润运动轴突数量增多且巨噬细胞 NLRP3 炎症小体激活导致运动神经形态学发生改变。（2）通过部分清除巨噬细胞及抑制巨噬细胞 NLRP3 炎症小体激活可改善全身炎症引起的运动功能障碍和运动纤维形态学改变。

PU-0747

Electroacupuncture Pretreatment Maintains Mitochondrial Quality Control via HO-1/MIC60 Signaling Pathway to Alleviate LPS-Induced Acute Lung Injury

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Electroacupuncture (EA) has been shown to enhance mitochondrial function, mitigating endotoxin-induced acute lung injury (ALI). Heme oxygenase-1 (HO-1), an inducible stress protein, is crucial in regulating mitochondrial homeostasis through mechanisms associated with mitochondrial quality control (MQC), affording protection against endotoxin-induced injuries. MIC60 is typically regarded as the core component of the mitochondrial contact site and cristae organizing system, which underpins a protein network supporting mitochondria integrity. Nonetheless, the mechanisms by which EA confers protective effects against endotoxin-induced ALI have not been fully elucidated. This study investigates whether EA provides lung protection through the regulation of MQC via the HO-1/MIC60 signaling pathway. Employing genetic knockout/silencing and cell transfection, we modeled lipopolysaccharide (LPS)-induced injury, accessing mitochondrial structure, production of reactive oxygen species (ROS), mitochondrial membrane potential (MMP), changes in the expression of proteins related to MQC, and the interaction between HO-1 and MIC60. EA was found to alleviate LPS-induced ALI and associated mitochondrial dysfunction. This was evidenced by a reduction in lung injury scores, decreased production of ROS, and a suppression in the expression of proteins linked to mitochondrial fission and mitophagy. Additionally, EA enhanced MMP and upregulated the expression of proteins involved in mitochondrial fusion and biogenesis. These beneficial effects of EA were attenuated in Hmox1 knockout or Mic60-silenced mice, as well

as in macrophages transfected with Hmox1-siRNA or Mic60-siRNA. Notably, MIC60 interacted with HO-1 in alveolar macrophages. In conclusion, EA modulates MQC through a potential HO-1/MIC60 signaling pathway, effectively ameliorating endotoxin-induced ALI in both in vivo and in vitro models.

PU-0748

西维来司他钠调控 SPMs 合成减轻小鼠内毒素急性肺损伤

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目的 评价西维来司他钠是否通过调控特异性促炎症消退介质（SPMs）的合成从而减轻小鼠内毒素急性肺损伤（ALI）。
方法 选取 SPF 级雄性 C57BL/6 小鼠 18 只，6~8 周龄，体重 20~25g。采用随机数字表法将野生型小鼠分为 3 组（n=6）：对照组（C 组）、内毒素性急性肺损伤模型组（ALI 组）、内毒素急性肺损伤 ALI+西维来司他钠干预组（ALI+SV 组）。采用尾静脉注射 LPS 15mg/kg 制备内毒素性 ALI 模型。SV 组于 LPS 给药后 1h 经腹腔注射 50mg/kg 西维来斯他钠。给予 LPS 12h 后取小鼠眼球血测血常规，剩余血液提取血清，随后处死小鼠后取肺组织，测定湿重/干重（W/D）比值，HE 染色法观察肺组织病理学结果，并行肺损伤评分；采用酶联免疫吸附测定法（ELISA）检测白细胞介素-1β（IL-1β）、白细胞介素-10（IL-10）水平；采用蛋白免疫印迹法（Western blot）检测肺组织中性粒细胞弹性蛋白酶（NE）以及 SPMs 合成酶（Alox5、Alox12、Alox155-LOX、12-LOX、15-LOX）的蛋白表达水平。
结果 与 C 组比较，ALI 组病理损伤加重、肺损伤评分、W/D 比值升高，白细胞计数及中性粒细胞百分比升高，IL-1β、IL-10 水平升高增高降低，NE 蛋白表达上调，5-LOXAlox5、Alox1212-LOX、Alox1515-LOX 蛋白表达下调（P＜0.05）。与 ALI 组比较，ALI+SV 组肺组织病理损伤减轻，白细胞计数及中性粒细胞百分比降低，IL-1β 水平降低，IL-10 水平增高，NE 蛋白表达下调，Alox5、Alox12、Alox155-LOX、12-LOX、15-LOX 蛋白表达上调（P＜0.05）。
结论 西维来司他钠可能通过抑制 NE，调控体内 SPMs 合成，促进肺内炎症消退以减轻小鼠内毒素急性肺损伤。

PU-0749

Association between base excess and mortality in septic older adults

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Objectives: This study aimed to investigate the association between base excess（BE） and mortality in septic older adults.
Methods: Septic older adults (age ≥ 65 years) selected from the Medical Information Mart for Intensive Care (MIMIC)-IV database were included in this retrospective analysis. The primary outcome was 30-day mortality. The association between BE and 30-day mortality was assessed using multivariate Cox regression models and Kaplan-Meier analysis. To test for threshold effects of BE on clinical outcomes, a two-segment linear regression model with smooth curve fitting was fitted.
Results: A total of 7379 participants were included, 57.4% of whom were men. The 30-day

mortality rate was 21.8% and the in-hospital mortality rate was 18.6%. A U-shaped relationship (non-linear, $p < 0.001$) was observed between BE and 30-day mortality in septic older adults. Higher or lower BE levels could increase the risk. Compared to the reference group (−3mEq/L≤BE<3mEq/L), patients in the different groups (BE<−9mEq/L, −9mEq/L≤BE<−3mEq/L, 3mEq/L≤BE<9mEq/L and BE≥9mEq/L) had different hazard ratios (HRs) for mortality: 1.76 (1.43, 2.17), 1.57 (1.38~1.78), 1.54 (1.29~1.85), 2.19 (1.57~3.05), respectively. The calculated inflection point was 0.39mEq/L.

Conclusions: Our results suggested a U-shaped relationship between BE and mortality in septic older adults, with both higher and lower BE levels associated with an increased risk of mortality. These findings highlight the importance of monitoring acid-base status in the management of sepsis in older adults.

PU-0750

两种不同经颈外静脉途径建立中心静脉通路在基层医院的应用体会

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目的 两种不同经颈外静脉途径建立中心静脉通路在基层医院的应用体会

方法 回顾我院 2 种经颈外静脉入路置入中心静脉病例，分别采取直接经颈外静脉使用中心静脉穿刺针穿刺置管和采取先放置 16G 或 18G 套管针，重新消毒铺单后经套管针通路置入 J 导丝后置管 2 种方式。

结果 其中直接经颈外静脉使用中心静脉穿刺针穿刺置管 46 例，穿刺置管一次性成功 45 例；采取先放置 16G 或 18G 套管针，重新消毒铺单后经套管针通路置入 J 导丝后穿刺方式 6 例。成功 6 例。

结论 经颈外静脉置入中心静脉尤其借助颈外静脉留置针通道是基层医院建立中心静脉的较好选择。

PU-0751

外泌体 miR-381 介导电针预处理对内毒素诱导的脓毒症的心脏保护作用

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目的 评估外泌体及其运载的 miR-381 在电针对脓毒症小鼠的心脏保护中的作用。

方法 首先采用随机数字法将 48 只 C57BL/6J 小鼠进行随机分为 4 组 (n=12)；对照组(C 组)、内毒素诱导的脓毒症心肌病模型组（L 组）、模型+电针刺组（EL 组）、模型+电针刺+外泌体 GW4869 拮抗剂组（GEL 组）和模型+电针刺+拮抗剂对照 DMSO 组（DEL 组）。GEL 组和 DEL 组分别在腹腔注射 LPS 前 12h 分别对应注射外泌体拮抗剂 GW4869 1mg/kg(溶于 0.07% DMSO)和 GW4869 的对照剂 DMSO 1mg/kg(浓度 0.07%)；在 EL 组、GEL 组和 DEL 组在腹腔注射 LPS 前 30min 电针刺足三里穴进行治疗，电针参数为：波形为连续波，频率为 10Hz，强度为 5，电针时间为 15min；L 组、EL 组、GEL 组和 DEL 组经腹腔注射脂多糖 LPS 24mg/kg(溶于 2ml 生理盐水)以制备脓毒症心肌病模型。在造模后的 24h 对各组小鼠进行心电图、超声心动图检测，并在麻醉后取材各组小鼠心脏及血液，进行 HE 染色和 Elisa 检测血清中肌钙蛋白 I（cTn-I）的含量。然后，通过分别注射敲

低或过表达 miR-381 的腺相关病毒（AAV-9），并注射 LPS 制备敲低/过表达 miR-381 脓毒症心肌病模型小鼠，分为脓毒症心肌病模型组（L 组）、模型+电针刺组（EL 组）、模型+miR-381 过表达组（UL 组）、模型+miR-381 过表达对照组（ULC 组）、模型+电针刺+miR-381 敲低组（DEL 组）和模型+电针刺+miR-381 敲低对照组（DELC 组），UL 组、ULC 组、DEL 组、DELC 组在造模前 28d 注射相对应的 AAV-9，制备敲低/过表达 miR-381 的小鼠，造模、电针、心电图、超声心动图、HE 染色、Elisa 检测 cTn-I 含量步骤同前。

结果 电针预处理及过表达 miR-381 可显著抑制脓毒症诱导的心电图 ST 段抬高和 JT 间期延长（P<0.05），拮抗外泌体及敲低 miR-381 后会逆转这种效果，导致电针脓毒症小鼠的 ST 段抬高和 JT 间期延长（P<0.05）；电针预处理及过表达 miR-381 升高脓毒症小鼠超声心动图左心室射血分数和左心室缩短分数（P<0.05），拮抗外泌体及敲低 miR-381 降低电针脓毒症小鼠的左心室射血分数和左心室缩短分数（P<0.05）；电针预处理及过表达 miR-381 改善脓毒症小鼠心脏组织病理损伤程度，拮抗外泌体及敲低 miR-381 逆转了电针预处理对脓毒症小鼠心脏组织病理损伤的改善；电针预处理及过表达 miR-381 明显降低脓毒症小鼠 cTn-I 的表达（P<0.05），拮抗外泌体及敲低 miR-381 使电针预处理脓毒症小鼠的血清 cTn-I 显著升高（P<0.05）。

结论 外泌体在电针对脓毒症小鼠的心脏保护中发挥重要作用，miR-381 是其中的潜在治疗靶点。

PU-0752

A nomogram for predicting survival in patients with respiratory failure following trauma: a study from the MIMIC-Ⅳ database

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Purpose: This study aimed to develop and validate a nomogram for predicting mortality in patients with respiratory failure (RF) following trauma and hospitalized in the intensive care unit (ICU).
Methods: A total of 377 patients from the Medical Information Mart for Intensive Care (MIMIC)-Ⅳ database were included in the study. All participants were systematically divided into the development cohort for modeling and the validation cohort for the internal validation at the ratio of 7:3. Following patient admission, a comprehensive collection of 30 clinical indicators was undertaken. The least absolute shrinkage and selection operator (LASSO) regression technique was employed to discern pivotal risk factors. Subsequently, a multivariate Cox regression model was established, and a nomogram was constructed. Internal validation was performed by the 1,000 bootstrap samples; a receiver operating curve (ROC) was plotted, and the area under the curve (AUC) was calculated. In addition, the calibration of our model was scrutinized through a calibration curve. Furthermore, a decision curve analysis (DCA) was performed, and the nomogram was compared with acute physiology score III (APSIII) and Oxford acute severity of illness score (OASIS) scoring systems to assess the net clinical benefit.
Results: Indicators included in our model were age, OASIS score, SAPS III score, respiratory rate (RR), blood urea nitrogen (BUN) and hematocrit. The results demonstrated that our model yielded satisfied performance on the development cohort and on internal validation. The calibration curve underscored a robust concordance between predicted and actual outcomes. The DCA showed a superior clinical utility of our model in contrast to previously reported scoring systems.
Conclusion: In summary, we devised a nomogram for predicting mortality during the ICU stay of RF patients following trauma and established a prediction model that facilitates clinical decision making. However, external validation will be needed in the future.

PU-0753

Association of Dexmedetomidine with Hospital Mortality in Atrial fibrillation with sepsis inMIMIC-IV : a retrospective cohort study.

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Background: The association between dexmedetomidine and in-hospital mortality remains currently uncertain.
Objective: This study aims to provide a comprehensive analysis of the relationship between dexmedetomidine administration and in-hospital mortality.
Methods: A retrospective cohort study was conducted involving 6956 participants diagnosed with atrial fibrillation and sepsis in the Medical Information Mart for Intensive Care IV (MIMIC-IV) database. The primary outcome was the in-hospital mortality rate. The propensity score matching (PSM) method was adopted to reduce confounder bias. Subgroup and sensitivity analyses were performed to test the stability of the conclusions.
Results: We included a total of 6956 patients with atrial fibrillation and sepsis, with an overall in-hospital mortality rate of 18% in MIMIC-IV . The inverse probability-weighting model showed that in-hospital mortality was significantly lower in the dexmedetomidine use group than in the non-dexmedetomidine group [HR = 0.57, 95% CI: 0.49–0.66, p < 0.001 in MIMIC-IV]. In subgroups grouped according to sex, age, heart rate, hypeitension,congestive_heart_failure,AKI_stage, ventilation,vasopressin and propofol, the results did not change.
Conclusions: In this sample of atrial fibrillation with sepsis patients, there was a significant inverse association between dexmedetomidine and the risk of in-hospital mortality. As the potential for confounding may exist, further randomized trials are required to confirm this association.

PU-0754

通过生物信息学和系统生物学方法预测儿童败血症引起的凝血病的生物学数据

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目的 Pediatric sepsis-induced coagulopathy (SIC) represents a clinically significant complication, as coagulation disorders play a crucial role in the development of multiple organ dysfunction syndrome. Despite ongoing efforts, unraveling the underlying mechanisms of Sepsis-induced coagulopathy in pediatric patients is a pressing and highly relevant scientific inquiry
方法 Two RNA-seq datasets (GSE26440 and GSE134979) obtained from the Gene Expression Omnibus (GEO) were utilized to identify mutually differentially expressed genes (DEGs). These DEGs were used to predict gene expression profiles associated with sepsis-induced coagulopathy in children, focusing on the common DEGs shared between sepsis and thrombotic microangiopathy. Functional enrichment analysis, pathway analysis, identification of hub genes, investigation of transcription factors and miRNAs, exploration of disease associations, as well as candidate drug analysis, were conducted
结果 We identified 102 common DEGs that predict gene expression profiles associated with sepsis-induced coagulopathy in children. Among them, PRTN3, CD3D, and ELANE were identified as the most influential hub genes. The innate immune system was found to play a dominant role in the associated pathways. TP53, PPARG, NFKB1, and MIR210 were identified as important

transcription factors (TFs) in sepsis-induced coagulopathy in children. Furthermore, melanoma and leukemia showed the strongest correlation with sepsis-induced coagulopathy, while estradiol emerged as a potential candidate drug for its treatment

结论 Our analysis revealed a strong correlation between melanoma, leukemia, and sepsis-induced coagulopathy. Additionally, the analysis indicated that the PD-1/PD-L1 pathway and immune system might play significant roles as signaling pathways in the development of sepsis-induced coagulopathy. Based on the findings of this study, we believe that the candidate drug estradiol holds promise for effective treatment of sepsis-induced coagulopathy in children

PU-0755

Exploring the relationship between sepsis and Golgi apparatus dysfunction: bioinformatics insights and diagnostic marker discovery

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Background: Sepsis, a critical infectious disease, is intricately linked to the dysfunction of the intracellular Golgi apparatus. This study aims to explore the relationship between sepsis and the Golgi apparatus using bioinformatics, offering fresh insights for its diagnosis and treatment.
Methods: We sourced the sepsis mRNA expression profile from the NCBI GEO database to identify differentially expressed genes (DEGs). We downloaded Golgi-associated genes from the MSigDB database. We employed WGCNA to pinpoint the key modules and hub genes linked to sepsis. We identified Golgi-associated differentially expressed genes (DARGs). We conducted GO enrichment, KEGG pathway enrichment and GSEA. We constructed a PPI network. We analyzed immune infiltration patterns in sepsis using ssGSEA. Subsequently, we established a diagnostic model using logistic regression. Lastly, we screened and validated potential diagnostic markers for sepsis within the dataset.
Results: Through differential expression and WGCNA analysis, we established a gene co-expression network, identifying 53 overlapping Golgi-related genes. Cytoscape software identified the top eight key genes: B3GNT5, FUT11, MFNG, ST3GAL5, MAN1C1, ST6GAL1, C1GALT1C1, and GALNT14, based on their scores. Immune infiltration analysis revealed significant differences in the types and abundance of immune cells between sepsis patients and healthy controls. We observed a correlation between immune cells and GARGs. Additionally, the developed diagnostic model effectively predicted sepsis risk in GARGs, with ROC curves validating its diagnostic accuracy. B3GNT5, C1GALT1C1, and GALNT14 emerged as potential sepsis markers, further validated within the dataset.
Conclusions: This study elucidates the link between sepsis and the Golgi apparatus, introduces novel biomarkers for sepsis diagnosis, and offers valuable insights for future research on its pathogenesis and treatment strategies.

PU-0756

Functional studies and two-sample mendelian randomization of key genes in pyroptosis pathways associated with sepsis

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Background: Sepsis is a life-threatening organ dysfunction disease and a major cause of multi-organ dysfunction syndrome and death in critically ill patients. Pyroptosis, a novel pattern of programmed cell death induced by an inflammatory response, plays an important role in the development of sepsis, but its intrinsic mechanisms have not been fully elucidated. In this study, we used bioinformatics to investigate the roles of cellular pyroptosis-related genes and the immune microenvironment and their interactions in sepsis, with a view to providing new targets and directions for the treatment and prevention of sepsis.
Methods: The mRNA expression profile dataset GSE26378 was obtained from the Gene Expression Omnibus (GEO) database to analyze differentially expressed genes (DEGs). A total of 36 cell pyroptosis-related genes were retrieved from GeneCards. The cell pyroptosis-related genes and differentially expressed genes were crossed to obtain differentially expressed pyroptosis-related genes, and then three key genes of interest were screened by correlation analysis, gene ontology (GO) enrichment analysis, Kyoto Gene and Genome Encyclopedia (KEGG) pathway analysis and protein-protein interaction (PPI) network analysis. The above genes were further validated using the validation set. A mouse model of sepsis was also prepared, and serum levels of IL-1β were detected by the ELISA method. Finally, a Mendelian randomization study was conducted to determine the causal effect of IL-1β on sepsis based on genome-wide association studies.
Results: From 21 sepsis patients and 82 normal samples, 13 differentially expressed genes related to pyroptosis were screened, of which 2 genes were down-regulated and 11 genes were up-regulated. Correlation analysis showed that there was some correlation between these genes. Then, the functional roles of these genes were explored by the KEGG pathway and GO enrichment analysis. The results showed that the mRNAs of these genes were mainly associated with the regulation of inflammatory response, cytokine production, and NOD-like receptor signaling pathway. In addition, PPI network analysis using Cytoscape software identified 10 hub genes and screened three genes of interest, CASP1, IL-18, and IL-1β. immune infiltration analysis showed that pyroptosis-related genes may promote the development of sepsis through neutrophils, type 1 helper T cells. It was confirmed by constructing a mouse model of sepsis that IL-1β pyroptosis-related genes were significantly associated with sepsis and were expressed at high levels. And it was further validated in the validation set and in vitro experiments. In inverse variance weighting, we found that IL-1β was associated with the risk of sepsis with an OR of 1.017(95%CI = 1.001-1.033，P = 0.037).
Conclusions: The identification of pyroptosis-related genes in this study can help us understand the molecular mechanisms underlying the development of sepsis and provide candidate targets for the diagnosis and treatment of the disease.

PU-0757

Causal relationship between immune cells, metabolites and sepsis: a two-step, two-sample Mendelian randomization study

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Background: Sepsis is a systemic inflammatory response syndrome triggered by infection, characterized by a complex pathogenesis that remains not fully elucidated. Immune cells and metabolites are hypothesized to play crucial roles in the onset and progression of sepsis. This study employs a two-step, two-sample Mendelian randomization (MR) approach to investigate the causal role of immune cells in sepsis and the mediating role of metabolites.
Methods: A two-sample MR approach was utilized to obtain data on genetic variants associated with immune cells and metabolites from publicly available genome-wide association study (GWAS) databases. The primary analysis used an inverse variance weighting (IVW) approach to evaluate the causal contribution of immune cells to sepsis. In the first step, genetic variants associated with immune cells were identified and used as instrumental variables to assess their effect on sepsis. The second step involved assessing the role of metabolites in mediating the relationship between immune cells and sepsis. Mediator MR analysis was conducted to explore the mediating effects of specific metabolites on the influence of immune cells on sepsis.
Results: Mendelian randomization analysis identified a causal relationship between nine immune cell types and sepsis. Furthermore, 48 metabolites were found to be associated with sepsis. Mediator MR analysis demonstrated a significant causal effect of IgD+CD24+%B cells on sepsis (total effect IVW: OR = 0.811, 95% CI: 0.720–0.914, P = 0.0005), with the metabolite Adenosine 5-diphosphate (ADP) to aspartate ratio accounting for -9.72% of the total effect (0.0203, 95% CI: -0.0007, 0.0413).
Conclusion: This study reveals a significant causal relationship between IgD+CD24+%B cells and sepsis, partially mediated by the Adenosine 5-diphosphate (ADP) to aspartate ratio. These findings offer new insights into the pathomechanism of sepsis and suggest potential targets for its prevention and treatment.

PU-0758

自然杀伤细胞在脓毒症双相反应中免疫机制研究进展

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目的 本文主要论述 NK 细胞在脓毒症双相反应中免疫紊乱机制的最新研究进展，探究以 NK 细胞为靶向的免疫调节分子作为脓毒症未来治疗方向的可行性。
方法 自然杀伤细胞（Natural killer cell, NK）是从共同淋巴样祖细胞分化而来的大颗粒淋巴细胞，是先天性免疫系统重要的组成成分。它无须特定抗原抗体刺激即可发挥疗效，在抵抗病毒感染和肿瘤细胞的免疫中起着非常重要的作用。此外它还可以通过与树突状细胞等多种细胞类型建立细胞网络来放大和调节适应性免疫反应。而且有研究发现 NK 细胞可能存在记忆特性，即在二次反应中表现出高度抗原特异性以及非特异性记忆样特征，但是具体取决于模型。
结果 脓毒症的发生发展是由前期的细胞因子风暴逐步过渡到后期的免疫抑制状态的双相阶段，故脓毒症的发病机制可能与免疫功能障碍密切相关。
结论 NK 细胞是先天性免疫的重要组成，参与了脓毒症双相反应免疫紊乱机制的形成过程。基于脓

毒症双相阶段中 NK 细胞的免疫紊乱研究，可以在脓毒症的不同阶段以 NK 细胞作为免疫靶点进行治疗，研究脓毒症中 NK 细胞的确切免疫调节机制对未来以 NK 细胞为基础的免疫治疗至关重要，有望为临床中脓毒症免疫调节及治疗提供理论依据。

PU-0759

Efficacy of electroacupuncture for sepsis-associated encephalopathy: a systematic review and meta-analysis of preclinical studies

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Background: Sepsis-associated encephalopathy(SAE) often occurs in the early stages of sepsis, leading to high mortality, poor prognosis, and reduced quality of life. Currently, therapeutic methods for SAE are insufficient. Multiple preclinical studies have shown that electroacupuncture (EA) is effective in the treatment of SAE; however, there has been no meta-analysis based on this. Therefore, it is necessary to evaluate whether EA treatment can improve brain injury in SAE through a meta-analysis of preclinical studies.
Methods: Systematic retrieval of related studies up to January 01, 2024, was performed using four databases: EMBASE, Web of Science, Cochrane Library, and PubMed. The outcomes analyzed were animal survival rate, number of crossings, escape latency, time spent in the target quadrant, and tumor necrosis factor-α (TNF-α), interleukin-6 (IL–6), interleukin-1β (IL-1β), malondialdehyde (MDA), and superoxide dismutase (SOD) levels. Stata 18 and RevMan version 5.4 software were used for meta-analysis and sensitivity analysis, and SYRCLE's risk of bias tool was used to assess the quality of the included literatures.
Results: This meta-analysis includes 6 articles involving 378 animals. EA could improve the survival rate of SAE model animals (RR: 2.05; 95% CI:[1.53,2.75]; P<0.00001) in our meta-analysis. Compared with the impaired group, the escape latency (SMD: -2.90; 95%CI: [-4.03, -1.78]; P<0.00001) and the number of crossings (SMD: 2.42; 95%CI: [0.76, 4.08]; P = 0.004) were shortened, the time spent in target quadrant (P<0.00001) was prolonged, and the levels of TNF-α (P=0.0002), IL-6 (P=0.0009) were decreased in the EA group. In addition, the content of SOD (P < 0.0001) was increased and MDA (P = 0.0001) was decreased in the EA group. EA therapy had no significant effect on IL-1β (P = 0.70).
Conclusion: EA treatment can ameliorate brain injury in an animal model of SAE, supporting the potential efficacy of EA therapy in future clinical trials. At present, more large-animal experiments are needed to provide more important clues for human clinical trials.

PU-0760

介绍一种基于高通量靶标代谢组学和机器学习技术的术后谵妄预测系统

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目的 代谢组学技术利用先进的质谱和核磁共振等分析工具，能够广泛检测体内代谢产物的组成和变化，从而揭示疾病发生、发展及其机制，正在成为疾病预测和诊断的重要工具。本研究在于攻克当前预测老年患者术后谵妄的技术难题，旨在开发出一种基于先进的高通量代谢组技术，兼具高精

度和高灵敏度的术后谵妄预测体系及相应方法。通过这一创新，我们期待显著提升预测效果，为临床决策提供更为准确及时的支持，以改善老年患者的术后管理和治疗效果。
方法 本研究采用高通量靶标代谢组学这一创新技术手段，将非靶标代谢组学的广泛覆盖性与靶标代谢组学的针对性优势巧妙融合，实现了对大量靶标代谢物的高通量、高灵敏度检测能力。特别是在处理大批量、低丰度代谢物时，该技术展现出卓越的定性和定量分析效能，为深入探究与术后谵妄相关的复杂代谢变化提供了强有力的工具。通过严谨的数据迭代循环处理，研究团队获得了修正的参数值，并将其应用于特定公式中，进而计算得出更为精确的术后谵妄预测模型。
结果 经过一系列严谨的数据迭代循环处理过程，我们成功获得了修正的参数值，并将其应用于特定的数学模型中，以计算出更为精确的术后谵妄预测模型。通过优化预测模型，该模型不仅能够准确反映出患者发生术后谵妄的风险概率，还深入揭示了可能涉及的病理生理机制，为临床医生提供了宝贵的干预和管理信息。
结论 我们构建的术后谵妄预测系统在预测准确性方面显著超越了现有的同类系统与方法。通过采用高通量靶标代谢组学技术，我们成功整合了非靶标代谢组学的广泛覆盖性和靶标代谢组学的针对性优势，实现了对大量靶标代谢物的高灵敏度检测，进而提高了预测的精确度和可靠性。这一系统的优越性能，特别是在老年患者中的应用，使其具备成为未来临床实践中更为实用和适应性强的预测工具的潜力。我们的研究不仅丰富了谵妄预测的理论体系，还为临床医生在术前评估、术中监测及术后管理等阶段提供了更为精准的依据。这些信息不仅能够帮助医生更好地预测患者发生术后谵妄的风险，还有助于深入理解其潜在的病理生理机制，从而为个性化治疗方案的制定提供科学依据。综上所述，我们的研究成果有望显著改善老年患者术后谵妄的预防和治疗效果，推动术后康复的质量和老年患者生活的整体健康状况。

PU-0761

ATF5 通过线粒体未折叠蛋白反应改善劳力型热射病诱导的神经元死亡

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目的 高强度体力活动时，机体产热与散热失衡导致以核心温度超过 40℃和中枢神经系统异常为特征的疾病，称为为劳力型热射病；劳力型热射病常伴有多脏器功能损害，是热浪天气患者死亡的重要因素之一。因此，寻找针对劳力型热射病有效的干预策略是重症医学领域亟待解决的热点问题。劳力型热射病患者常表现为持续高体温，且高体温持续时间与死亡率密切相关。下丘脑作为体温调控中枢，其在体温调节过程中发挥重要作用。我们研究发现劳力型热射病下丘脑神经元丢失最为显著，并且发生凋亡和坏死性凋亡，提示下丘脑神经元死亡是劳力型热射病发生后持续高体温重要原因，但诱导该过程的关键机制尚未阐明。线粒体未折叠的蛋白反应（Unfolded protein response of the mitochondrial，UPRmt）被认为是热应激反应中的重要一环；当机体暴露于热应激环境后，蛋白的折叠和蛋白的降解能力严重受损，产生大量错误折叠或未折叠的蛋白沉积在细胞质内导致细胞功能障碍，UPRmt 可有效缓解该过程。本研究旨在研究 UPRmt 对下丘脑神经元死亡及劳力型热射病的影响，寻找其关键调控分子，以期为劳力型热射病的预防和治疗提供基础研究依据。
方法 使用带加热灯的环境舱（可以精确调节温度和湿度）和小鼠强迫跑步机的组合构建劳力型热射病小鼠模型；记录体温变化，体重丢失比和存活数量；收集各组小鼠脑组织，肝脏，肾脏，肺脏，心脏和血清，通过尼式染色、HE 染色和 ELISA 观察各脏器损伤情况；利用 Western blot 观察各组小鼠不同的时间点的下丘脑组织凋亡和坏死性凋亡相关蛋白表达变化；利用 Western blot 观察各组小鼠不同的时间点的下丘脑组织 UPRmt 关键转录因子 ATF5 和相关蛋白表达变化；采用免疫荧光共定位观察 ATF5 在下丘脑区域的分布情况；利用立体定位技术在小鼠下丘脑区域注射 ATF5 上调病毒，特异性上调 ATF5 的表达；检测其对小鼠体温，体重丢失比，生存率和造模时间的影响，同

时观察小鼠各脏器损伤情况。
结果 在 37℃、38 ℃和 39℃，70%相对湿度的条件下小鼠存活率分别为 100%、70%和 20%，体重丢失比均高达 6.5%左右。EHS 小鼠脑组织，肝脏，肾脏和肺发生损伤，肝、肾和脑功能相关生化指标升高并且发生焦虑抑郁样行为。EHS 小鼠下丘脑神经元发生凋亡和坏死性凋亡。EHS 小鼠下丘脑神经元 UPRmt 关键转录因子 ATF5 和相关蛋白（LONP1,HSP60,CLPP）表达量显著降低，提示 UPRmt 功能障碍。使用 ATF5 上调病毒恢复下丘脑 UPRmt 相关蛋白的表达，可减轻下丘脑神经元损伤和增强 EHS 小鼠热耐受性；此外，恢复 EHS 小鼠下丘脑 UPRmt 相关蛋白的表达可减轻多脏器损伤和改善焦虑抑郁样行为。
结论 38℃，70%相对湿度为 EHS 模型构建的最适合条件。在 EHS 的发生发展中下丘脑区域神经元发生凋亡和坏死性凋亡；UPRmt 关键转录因子 ATF5 以及相关蛋白（LONP1,HSP60,CLPP）的表达减少，提示 UPRmt 功能障碍。上调 ATF5 可恢复 UPRmt 的功能，从而减轻 EHS 小鼠下丘脑区域神经元丢失，进而增强热耐受性和减轻多脏器损伤。

PU-0762

红细胞分布宽度对心脏骤停心肺复苏患者预后的影响

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目的 探讨红细胞分布宽度（RDW）对心脏骤停-心肺复苏成功(CA-CPR)患者预后的影响。
方法 本研究以通过宁夏回族自治区人民医院伦理委员会批准（伦理 2024-LL-047），采用回顾性队列研究，选择 2013 年 01 月至 2022 年 09 月宁夏回族自治区人民医院收治 CA-CPR 成功的患者。收集患者基本临床资料和临床特征包括年龄、性别、基础疾病、初始心率、是否除颤、是否使用肾上腺素、是否使用去甲肾上腺素、CPR 总时间、终止 CPR 的原因、CA 的病因及类型、复苏措施、复苏效果、格拉斯哥-匹兹堡脑功能表现分级（CPC 分级）；观察自主循环恢复（ROSC）后 2 小时（h）、1 天（d）、2 天（d）、3 天（d）的 RDW 和中性粒细胞百分比（N%）。根据 CPC 分级将患者分为预后良好组（CPC1 或 2 级）和预后不良组（CPC3，4 或 5 级），采用单因素分析和二元 Logistic 回归分析影响 CA 患者预后的危险因素。绘制受试者工作特征曲线(ROC 曲线)评估 RDW 对 CA 患者预后的预测效能。
结果 本研究共收集 525 例 CA 患者，排除病历缺失者及调查数据缺失者共 87 例，最终纳入 438 例患者，其中预后良好组 76 例，预后不良组 362 例。①两组间初始心率、是否除颤、是否使用肾上腺素、是否使用去甲肾上腺素、通气方式、CPR 总时间、终止 CPR 原因比较差异均有统计学意义（P<0.05）。②预后不良组 ROSC 后 2h、1d、2d、3d RDW 较预后良好组高（P<0.05）；预后不良组 ROSC 后 2d、3d N% 较预后良好组高（P<0.05）。预后不良组 ROSC 后 2h、1d、2d、3d RDW fl 中位数（四分位数间距）分别为 46.1（42.9，51.6），46.4（43.6，50.8），47.7（44.7，52.9），50.1（47.2，54.9）。预后不良组 ROSC 后 2d、ROSC 后 3d N% 中位数（四分位数间距）分别为 83.2(77.8，86.7)，84.6(77.1，86.7)。③将单因素分析有统计学意义的指标纳入多因素二元 Logistic 回归分析结果表明 ROSC 后 3d RDW 和 ROSC 后 3d N%均是 ROSC 后 CA 患者预后不良的独立危险因素。ROSC 后 3d RDW 和 ROSC 后 3d N% 比值比（OR）分别为 2.006（1.450，2.775），1.122（1.007，1.251）。④ROC 曲线结果显示 ROSC 后 72 小时 RDW fl 和 N % 的 ROC 曲线下面积（AUC）分别为 0.870（0.803，0.938）和 0.647（0.545，0.748）。
结论 ROSC 后 72 小时 RDW 和 N%为 CA 患者预后不良的独立因素，提示临床医生可以通过早期检测 RDW 指导临床治疗和决策而改善 CA 患者预后。

PU-0763

近红外光谱在股静脉动脉体外膜氧合患者下肢缺血监测中的应用效果分析

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目的 探讨近红外光谱（NIRS）在股静脉-动脉体外膜氧合（VA-ECMO）患者下肢缺血监测中的应用价值。
方法 纳入 2016 年 1 月至 2023 年 12 月收入我院行股 VA-ECMO 治疗的成年患者作为研究对象，根据是否使用 NIRS 监测下肢缺血分为 NIRS 组（使用 NIRS 监测下肢缺血）和对照组（未使用 NIRS 监测下肢缺血）。回顾分析两组患者临床资料的差异，比较两组患者下肢并发症的发生率。
结果 共入选 52 例患者作为研究对象，排除 1 例 8 小时内死亡的患者，最终 51 例纳入分析，NIRS 组 26 例，对照组 25 例。两组患者在年龄、性别、体重指数（BMI)、基础疾病、急性生理学与慢性健康状况评分Ⅱ（APACHEⅡ）、ECMO 运行时间、重症监护病房（ICU）住院时间、住院死亡率方面差异无统计学意义（P＞0.05）；两组患者在 ECMO 治疗指征、体外心肺复苏（ECPR）、是否联合主动脉内球囊反搏（IABP）治疗、动静脉插管是否在同侧、动脉套管体表面积（body surface area,BSA）比值、是否置入远端灌注管（DPC）比较差异亦无统计学意义（P＞0.05）；NIRS 组下肢缺血的发生率明显低于对照组（t=2.457,P＜0.05）；NIRS 组未见患者发生骨筋膜室综合征、截肢、下肢神经损伤，而对照组有 1 例发生下肢神经永久性损伤，比较差异无统计学意义（P＞0.05）。
结论 对于接受股 VA-ECMO 治疗的患者，使用 NIRS 监测下肢缺血是一种可靠有效的手段，能够早期、较准确的预测下肢缺血，，及时纠正下肢灌注不足并预防骨筋膜室综合征、下肢坏死截肢和神经损伤等严重并发症。

PU-0764

免疫调节剂治疗脓毒症的安全性和有效性的 Meta 分析

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目的 脓毒症是宿主对感染的炎症反应失调导致的多器官功能障碍，目前的治疗手段仍然以及时抗菌，液体复苏，器官支持为主，针对免疫调节的药物具有治疗潜力。早期实验聚焦于阻断炎症级联反应，然而脓毒症的免疫紊乱更加复杂，包括过度炎症和免疫抑制，促炎抑炎都将导致严重的病理生理改变，因此，很多免疫调节药物的临床试验以失败告终。随着个体化精准医疗的重要性不断被强调，以及人们对脓毒症免疫动态变化的理解不断加深，免疫调节药物治疗脓毒症的安全性和有效性需要进一步的评价。因此，我们对靶向免疫调节药物在脓毒症中的随机对照试验进行了荟萃分析，目的是确定这些疗法在脓毒症中的使用是否安全，以及是否有任何临床有效性的证据，特别是在死亡率方面的益处。
方法 我们对随机对照试验进行了系统回顾和荟萃分析，评估细胞因子抑制剂，抗炎药，补体抑制剂等作为辅助药物治疗成人脓毒症的临床有效性。主要结局是器官衰竭发生率及死亡率。计算机检索 PubMed、EMbase、Web of Science、Cochrane Library、clinical trail、中国知网、中国生物医学文献库、维普和万方等数据库内经过同行评议的随机对照实验，检索时间为建库至 2023 年 12 月。中文检索词包括“随机对照试验”“免疫调节剂”“脓毒症”等；英文检索词为”randomized controlled trial””Immunomodulatory drugs””septic shock””sepsis”等。采用纽卡斯尔-渥太华星表对纳入的回顾

性研究进行质量评价，采用 Risk of Bias 2 工具评估随机对照试险的偏倚风险。采用 Review Manager 5.4 软件进行 Meta 分析。

结果 共纳入 15 项随机对照试验，基于 5 项涉及 3150 例患者的研究，细胞因子抑制剂的使用与器官衰竭的风险降低相关 (RR=0.93, 95%CI (0.90-1.00), P<0.05)，30d 死亡率降低 (RR=0.74, 95%CI (0.64-0.89), P<0.05)，然而不能改善 90d 死亡率(P=0.263)。Toll 样受体 4 拮抗剂器官衰竭风险增加(RR=1.18, 95%CI (1.04-1.34), P<0.05)。在 5 个评估抗肿瘤坏死因子 α 干预措施的随机对照试验亚组中 30d 死亡率降低(RR=0.93, 95%CI (0.87-0.99), P<0.05)。抗炎药对 90d 死亡率有所影响(RR=0.67, 95%CI (0.55-0.81), P<0.05)。

结论 结果表明，Toll 样受体 4 拮抗剂临床使用存在安全性问题，细胞因子抑制剂，抗炎药显示出临床有效性且不同药物作用时间不一致，细胞因子抑制剂短期降低死亡率，长期死亡率方面未能显示有效性，抗炎药对长期死亡率有明显影响，没有证据表明两种药物在脓毒症中使用存在安全性问题。

PU-0765

被动抬腿试验引起脉压变异度的变化预测术后老年危重症患者容量反应性的临床研究

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目的 探讨被动抬腿试验（PLRT）引起脉压变异度（PPV）的变化预测术后老年危重症患者容量反应性的准确性。

方法 选择术后入住 ICU 且存在急性循环衰竭的 54 例机械通气的老年危重症患者，男性 32 例，女性 22 例，年龄 65 ~ 90 岁，BMI 18 ~ 25kg/m2，ASA I ~ III 级。所有入住 ICU 的老年患者均行心电监护，通过桡动脉导管以及颈内静脉导管监测患者平均动脉压和中心静脉压。分别在 PLRT 前和 PLRT 后记录患者的平均动脉压、中心静脉压以及 PPV，并使用经胸超声心动图测量患者的每搏量。PLRT 后每搏量的增加大于 10%认为患者存在容量反应性，并将患者分为两组（有反应组和无反应组）。绘制受试者工作特征（ROC）曲线用于评估 PLRT 引起 PPV 的变化（ΔPPVPLRT）对容量反应性的预测价值。

结果 有反应组有 24 例患者（44.4%），无反应组有 30 例患者（55.6），平均潮气量为 7.0ml/kg。PPV 预测容量反应性的 ROC 曲线下面积（AUC）为 0.763，截断值为 12.3%（敏感性为 54.2%，特异性为 86.7%）。ΔPPVPLRT 预测容量反应性的 AUC 为 0.911，截断值为 2.13%（敏感性为 87.5%，特异性为 86.7%）。

结论 术后机械通气的老年危重症患者中，PLRT 引起 PPV 变化可以准确地预测容量反应性。

PU-0766

COVID-19 和脓毒症之间的共同诊断基因及潜在机制的生物信息学分析

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目的 为探讨新型冠状病毒肺炎(COVID-19)和脓毒症之间的共同诊断基因及潜在机制。通过生物信

息学分析,研究发现了 COVID-19 和脓毒症之间的共同基因,并揭示了可能涉及的免疫相关机制,为进一步阐明两种疾病的相互关系提供了新的线索。
方法 我们利用公开数据库如 GEO（Gene Expression Omnibus）收集了与 COVID-19 和脓毒症相关的基因表达数据。这些数据源包括 GEO 数据集 GSE156063（COVID-19）和 GSE95233（脓毒症），这些数据集提供了宝贵的实验室和临床研究资料，有助于揭示两种疾病的分子特征和可能的共同机制。通过生物信息学分析，我们首先识别出了 COVID-19 和脓毒症之间共享的诊断基因。这些基因的识别基于加权相关网络分析（WGCNA）和差异表达基因分析，这些方法帮助我们确定在两种疾病中共同表达的关键基因。初步分析表明，两种疾病共享了一个基因集合，这些基因涉及免疫反应、细胞信号传导和炎症调节等关键生物学过程。
为了进一步理解这些共同基因的功能和相互作用，我们利用 STRING 数据库进行了蛋白质互作网络分析。这项分析揭示了这些基因之间复杂的蛋白质互作关系，强调了它们在免疫调节、细胞信号传导和炎症途径中的重要性。特别是，我们发现一些关键节点基因如 B2M、TNFSF10、TLR3 等，它们可能在调控免疫反应和炎症过程中发挥关键作用。这些结果不仅加深了我们对 COVID-19 和脓毒症疾病机制的理解，还为未来的治疗靶点发现提供了潜在线索。
此外，我们还参考了已发表的相关研究文献，进一步验证和讨论了 COVID-19 和脓毒症之间的关系。这些文献包括临床研究和基础科学研究，涵盖了从分子水平到临床实践的多个方面。这些研究支持我们的发现，并提供了更广泛的背景和语境，以理解这两种疾病之间复杂的相互作用。
结果 研究结果发现 COVID-19 和脓毒症之间存在共同的诊断基因,包括 B2M、TNFSF10、TLR3、JAK2 和 IRF2 等。这些基因参与抗原加工和呈递、T 细胞介导的细胞毒性和免疫等过程,可能在 COVID-19 合并脓毒症的机制中起关键作用。B2M 可能是导致肺功能障碍的关键基因。TNFSF10 死亡受体在病毒感染中发挥免疫监视作用,但 SARS-CoV-2 可能通过修饰其信号转导来逃避检测。TLR3 和 IRF7 介导的 I 型干扰素免疫缺陷可能导致 COVID-19 肺炎等危重症。JAK 抑制剂 ruxolitinib 在治疗 COVID-19 相关的细胞因子风暴中显示安全性和有效性。IRF2 转录因子在外泌体中影响神经元基因调控网络,加速 SARS-CoV-2 感染引起的神经退行性变。
结论 最终我们发现 COVID-19 与脓毒症之间存在密切的基因和蛋白互作关系。研究发现,B2M、TNFSF10、TLR3、JAK2 和 IRF2 等基因参与了 COVID-19 合并脓毒症的机制。同时 B2M 可能是导致 COVID-19 患者肺功能障碍的关键基因。TNFSF10 在病毒感染中发挥免疫监视作用,但 SARS-CoV-2 可能通过修饰其信号转导来逃避检测。TLR3 和 IRF7 介导的 I 型干扰素免疫缺陷可能导致 COVID-19 肺炎等危重症。JAK 抑制剂 ruxolitinib 在治疗 COVID-19 相关的细胞因子风暴中显示安全性和有效性。并且，IRF2 转录因子在外泌体中影响神经元基因调控网络,加速 SARS-CoV-2 感染引起的神经退行性变。

PU-0767

rTSLP alleviates LPS-induced acute lung injury by suppressing IFN-γ-producing INKT cells and proinflammatory macrophages

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Background: Acute respiratory distress syndrome (ARDS), characterized by profound interconnected inflammatory cascades, occurs with great mortality and unfavorable outcomes, thus a shift from conventional treatment to prevention is needed. Additionally, understanding regarding the effects of TSLP in Th2 inflammation is quite clear, yet evidence concerning their effects on ARDS is lacking. Herein, we aim to investigate the role of TSLP in LPS-induced acute lung injury (ALI).
Methods: Wild-type mice and Jα18-/- mice received LPS intranasally with or without recombinant

TSLP (rTSLP) pretreatment. At 24 h, bronchoalveolar lavage fluid (BALF) and lung tissues were collected and then ratio, phenotype, and function of immune cells and cytokine levels were tested. For evaluation of tissue injury, H&E staining was conducted. Murine bone marrow-derived macrophages (BMDM) were prepared and stimulated with LPS and rTSLP for subsequent experiments. Analysis of transcriptome sequencing and single-cell transcriptome sequencing were also performed.
Results: Here, we established ALI model in mice and rTSLP pretreatment at a dose of 200 ng alleviated lung injury score and inflammatory cytokines secretion significantly.
Increases in invariant natural killer T (iNKT) cells, macrophages and neutrophils were found in ALI mice compared with vehicle group but rTSLP treatment did not seem to have impacts on the number of iNKT cells, moreover, multi-omics and flow cytometry analysis revealed that rTSLP predominantly reduced IFN-γ secretion potency of iNKT cells and IFN-γ took part in triggering macrophages and neutrophils response. In vivo and in vitro experiments further corroborated that rTSLP diminished inflammation by decreasing M1-like macrophages. LPS exposure on Jα18-/- mice exhibited detrimental effects of iNKT cells and a relation of iNKT cells and proinflammatory macrophages.
Conclusion: rTSLP pretreatment efficiently alleviated LPS-induced ALI through immunoregulatory mechanisms, providing evidence for novel preventive management in ARDS.

PU-0768

Role of CD20 on Switched Memory B Cells in Mediating the Effect of Akkermansia on Sepsis

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Background: Sepsis remains a life-threatening condition characterized by dysregulated host response to infection, leading to organ dysfunction and high mortality rates. Recent evidence suggests a crucial interplay between the gut microbiome and immune system in sepsis pathogenesis. Akkermansia, a mucin-degrading bacterium, has emerged as a potential modulator of immune responses. However, the specific mechanisms by which Akkermansia influences sepsis outcomes, particularly through immune cell phenotypes like CD20+ switched memory B cells, remain poorly understood. These B cells play vital roles in adaptive immunity and have been implicated in sepsis progression, yet their interaction with gut microbiota in this context is unclear.
Methods: In this study, publicly available genome-wide association study (GWAS) summary statistics were examined to to investigate how specific gut microbiota influence sepsis by regulating immune cell phenotypes. Initially, two-sample and reverse Mendelian randomization (MR) analyses were conducted to identify causality between gut microbiota and sepsis. Subsequently, multivariable and two-step MR analyses revealed that the relationship between microbiota and sepsis was mediated by immune cells. The robustness of the findings was confirmed through several sensitivity analyses.
Results: Our analysis revealed significant associations between 24 gut microbiota species and sepsis risk. In our study, we revealed positive correlations between 16 taxa and sepsis outcomes, while 8 taxa demonstrated negative correlations with sepsis outcomes.Additionally, 42 immune cell phenotypes were significantly associated with sepsis outcomes. Notably, Akkermansia demonstrated potential causal links with sepsis development through regulating CD20 expression levels on switched memory B cells. This relationship suggests a novel pathway by which gut microbiota may influence sepsis progression through modulation of adaptive immune responses.
Conclusion: This study unveils intricate interactions between gut microbiota, particularly Akkermansia, and immune cells in sepsis, highlighting the potential role of CD20+ switched memory B cells as mediators. These findings offer new strategic directions for sepsis prevention, diagnosis, and treatment, emphasizing the importance of considering gut microbiome-immune

interactions in sepsis management.

PU-0769

二氯乙酸钠对脓毒症急性肺损伤的保护作用及机制研究

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目的 脓毒症是全球医疗保健关注的问题，并且仍然是患者死亡的主要原因之一。脓毒症可以发展成为脓毒性休克以及多器官功能衰竭，而脓毒症诱发的急性肺损伤是一种发病率较高的临床综合征。核因子红系 2 相关因子 2(Nuclear Factor erythroid 2-Related Factor 2，Nrf2)作为一种重要的转录因子，与抗氧化酶的表达密切相关。并且该转录因子已被证实在脓毒症急性肺损伤中发挥着关键作用。二氯乙酸钠（DCA）是线粒体丙酮酸脱氢酶激酶（PDK）的小分子抑制剂，它可以通过间接激活丙酮酸脱氢酶复合物（PDC）来促进三羧酸循环（TAC）的进程。最初用于治疗患有罕见的代谢紊乱疾病，目前已有多种研究表明该小分子抑制剂可以用于抗癌、治疗糖尿病以及肺动脉高压等疾病。本研究旨在阐明二氯乙酸钠、脓毒症急性肺损伤以及 Nrf2 之间的关系，探究二氯乙酸钠（DCA）对于脓毒症急性肺损伤防治的可行性，为脓毒症急性肺损伤的治疗提供新思路和新方法。

方法

（1）在小鼠单核巨噬细胞（Raw264.7）中用 CCK-8 试剂盒检测不同浓度的 DCA 的细胞毒性。

（2）用 LPS 刺激 Raw264.7 24 小时后，取上层培养基刺激 MLE-12（小鼠肺泡上皮细胞）构建细胞凋亡体外模型，采用 Western Blot 检测 Bax，Bcl-2，cleaved-Caspase3/Caspase3 水平，通过检测蛋白水平反映细胞的凋亡程度。

（3）采用 RT-qPCR 以及 ELISA 检测 Raw264.7 细胞系在 LPS 刺激后细胞以及细胞上清液中的 TNFα 以及 IL-6 炎症因子的水平。

（4）探究 DCA 是否对脓毒症相关性急性肺损伤起到保护作用，通过 Western Blot 检测 Raw264.7 以及 MPMs（小鼠腹腔巨噬细胞）中 p-P65,IκBa 以及细胞核内的 P65 的含量，通过免疫荧光染色来检测细胞核中 P65 的含量。

（5）通过转染 si-Nrf2 敲低 MPMs 中 Nrf2 蛋白水平，以进一步确定 DCA 是否通过影响 Nrf2 蛋白从而调节 NF-κB 炎症通路，来减轻脓毒症急性肺损伤

（1）脓毒症急性肺损伤模型：我们使用雄性 C57BL/6 小鼠进行脓毒症相关急性肺损伤模型的实验。LPS 组小鼠腹腔内注射 LPS（10mg/kg）。CON 组腹腔内注射等量的生理盐水，LPS+DCA 组的小鼠在 LPS 给药前 6 小时腹腔内接受 DCA 溶液注射（100 mg/kg），12 小时后，我们使用过量麻醉药处死小鼠，并采集小鼠眼球血，检测血清中的炎症因子 IL-6，TNFα 水平，SOD，GSH/GSSG,MDA 水平。我们使用小鼠右肺上叶计算干湿比（W/D），并对小鼠右肺中叶进行 HE 染色检测肺组织损伤程度，同时使用 F4/80 标记进行巨噬细胞浸润程度检测。此外，我们收集小鼠左侧肺部的肺泡灌洗液，检测肺泡灌洗液中的细胞数以及蛋白浓度。而后取肺组织匀浆液进行 Western Blot 检测。

结果 （1）我们使用 CCK-8 试剂盒检测了不同浓度的 DCA 对 Raw264.7 细胞的毒性作用。结果显示，0-5mM 浓度范围内的 DCA 对 Raw264.7 细胞没有明显的细胞毒性作用。

（2）在用 DCA+LPS 刺激 Raw264.7 细胞后，我们使用 Western Blot 检测细胞中的蛋白变化。结果显示，与仅 LPS 刺激组相比，DCA+LPS 组的 MLE-12 细胞中 Bcl-2 表达量增加，Bax 表达量减少，cleaved−Caspase3/Caspase3 比值减少，表明 DCA 能够抑制 LPS 引起的 MLE-12 细胞凋亡。

（3）与仅 LPS 刺激组相比，DCA+LPS 组的 Raw264.7 细胞以及细胞上清液中的 TNFα 和 IL-6 炎症因子水平降低，表明 DCA 能够缓解 LPS 引起的炎症损伤。

（4）在 LPS 刺激过程中，DCA 可以减少 Raw264.7 细胞以及 MPMs 中 P65 的入核，减少 P65 的磷酸化，减弱 NF-κB 炎症通路的激活。

（5）MPMs 的 Nrf2 蛋白水平被敲低后，可以削弱 DCA 改善的 LPS 组的 P65 的入核以及增加 DCA+LPS 组 TNFα 以及 IL-6 炎症因子水平。

（6）脓毒症急性肺损伤模型：在 C57BL/6 小鼠中，DCA 可以缓解 LPS 诱导的小鼠肺部病理改变。F4/80 染色显示 DCA 可以减少 LPS 引起的巨噬细胞在小鼠肺组织中的浸润，HE 结果显示 DCA 可以减少 C57BL/6 小鼠肺组织中的水肿和炎性渗出。表现为小鼠的肺部干湿比下降，炎症因子浸润减少，MDA 含量减少。BALF 中的细胞数量以及蛋白浓度降低。Western Blot 检测提示小鼠肺部 Bax 蛋白表达量降低，Bcl-2 蛋白表达量升高，cleaved-Caspase3/Caspase3 的比值降低。

结论 线粒体丙酮酸脱氢酶激酶（PDK）的小分子抑制剂二氯乙酸钠（DCA）可以减轻脓毒症小鼠毒症相关的急性肺损伤。此外，DCA 减弱 LPS 激活的 NF−κB 炎症途径可能是通过 Nrf2 蛋白介导的。

PU-0770

Association between hemoglobin-albumin-lymphocyte-platelet index and prognosis of patients with sepsis: a retrospective study based on MIMIC-IV database

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Purpose: This study aimed to investigate the association with hemoglobin-albumin-lymphocyte-platelet (HALP) index and prognosis in patients with sepsis.
Methods: This retrospective study included patients with sepsis, whose data were obtained from the Medical Information Mart for Intensive Care (MIMIC)-IV database. The primary outcome of this study was 28-day mortality, and secondary outcomes included 90-day mortality and length of hospital stay. The association between baseline HALP levels and patient prognosis was assessed using Kaplan-Meier curves, Cox regression models, linear regression analysis, interaction, and stratified analyses.
Results: Of 22,518 patients, 7,437 with sepsis were included. The mean age of the participants was 63.68±16.89 years and the median HALP was 19.38 (10.28-34.82). Multivariate Cox regression analysis indicated that a low HALP index was independently associated with 28-day mortality [hazard ratio (HR) = 1.144; 95% confidence interval (CI) = 1.041-1.256] and 90-day mortality (HR = 1.230; 95% CI = 1.133-1.335) after adjusting for covariates. Multivariate linear regression analysis showed that a high HALP index was negatively correlated with length of hospital stay (β = − 1.549; 95% CI = − 2.142 to − 0.955). In addition, Kaplan-Meier curve analysis indicated that patients with low HALP had higher 28-day mortality and 90-day mortality. Subgroup analysis showed that HALP and age (P = 0.007), vasopressors use (P = 0.010), ventilator use (P = 0.001), RRT use (P = 0.002) had an interaction respectively on 28-day mortality.
Conclusion: There was a nonlinear relationship between HALP and 28-day mortality in patients with sepsis in the ICU. A lower HALP level is associated with poor prognosis in patients with sepsis in the ICU in the United States. However, external patients with sepsis, especially those of other ethnicities, should be evaluated to confirm these findings in the future.

PU-0771

高压氧通过重塑肠道微生物群和调节宿主代谢改善慢性应激模型小鼠的抑郁样行为

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目的 越来越多的证据表明，肠道微生物群在慢性应激的病理生理学中起着重要作用。肠道微生物群的失调与微生物群宿主共代谢的失调密切相关。与代谢谱变化相关的肠道微生物群的组成变化是疾病发展的重要风险因素。高压氧疗法通常被作为各种疾病的替代或主要治疗方法。因此，从代谢和肠道细菌的角度来揭示慢性压力的可能机制和高压氧疗法的治疗效果是至关重要的。我们确定在对照组和慢性应激组之间存在明显的代谢物紊乱和肠道微生物群紊乱。本研究旨在进一步探讨宿主代谢、肠道微生物群与慢性应激之间的相互作用。
方法 目前，慢性不可预测轻度应激被认为是动物模拟慢性压力的最常用方法，因此我们使用了慢性不可预测轻度应激小鼠模型，通过结合 16S rRNA 基因测序和基于 UHPLC-MS/MS 的代谢组学，来描述抑郁小鼠的代谢组和微生物组的变化。我们使用基于 Pearson 相关性的聚类分析来确定与肠道微生物群相关的代谢物。

结果 我们发现有 18 种代谢物与弯曲菌门显示显著相关。与弯曲菌门相关的代谢物主要富集在 D-谷氨酸和D-谷氨酰胺代谢通路中。高氧治疗可能通过调节受损代谢物改善慢性应激模型小鼠的类抑郁行为。
结论 高压氧通过重塑与弯曲菌门相关的代谢物而改善慢性应激模型小鼠的类抑郁行为。

PU-0772

硬脊膜穿破硬膜外阻滞联合脉冲式输注用于低浓度罗哌卡因分娩镇痛的效果分析

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目的 观察硬脊膜穿破硬膜外阻滞联合脉冲式输注技术用于低浓度罗哌卡因分娩镇痛的临床效果。
方法 选择要求行分娩镇痛的足月单胎妊娠产妇 200 例，随机分为 DPE 组（硬脊膜穿破硬膜外阻滞）和 EP 组（硬膜外阻滞），每组各 100 例。记录产妇身高、体重孕周等一般资料，观察两组产妇达到疼痛数字评分(Numeric Rating Scale，NRS）≤3 的时间，30min 后未到达 NRS≤3 的例数、镇痛泵按压次数，镇痛 30min 后下肢运动功能（改良 Bromage 评分），产程，以及瘙痒、恶心呕吐等不良反应，同时记录新生儿 1min、5min Apgar 评分。
结果 两组产妇一般资料无明显异常，DPE 组 NRS≤3 的时间、30min 后未到达 NRS≤3 的例数和镇痛泵自控按压次数均低于 EP 组，差异有统计学意义（P<0.05），两组产妇产程、改良 Bromage 评分、不良反应和新生儿 1min、5min Apgar 评分比较，差异无统计学意义（P>0.05）。
结论 硬脊膜穿破硬膜外阻滞联合脉冲式输注可安全有效地用于分娩镇痛，且起效时间更快。

PU-0773

硬膜外注射吗啡和氢吗啡酮用于剖宫产术后全程镇痛的效果观察

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目的 观察硬膜外注射吗啡和氢吗啡酮对剖宫产术后全程镇痛的效果
方法 选择 2023 年 2 月～6 月行椎管麻醉下剖宫产手术的产妇 290 例，随机分为三组，A 组 88 例，B 组 105 例，C 组 97 例，分别于术毕单次硬膜外注入吗啡 2.0mg、2.5mg、氢吗啡酮 0.5mg 镇痛，术后用双氯酚酸钾纳肛辅助镇痛。记录术后 96h 内辅助镇痛次数、>48h 补镇痛例数、镇痛不如意例数、不良反应、早下床活动及肠排气时间。结果 辅助镇痛率，B 组明显少于 A 和 C 组（P<0.05）；>48h 补镇痛率，C 组明显多于 A 和 B 组（P<0.05）；镇痛不如意率，B 组明显少于 A 和 C 组（P<0.05）；不良反应和早下床活动，三组均无明显差异（P>0.05）；排气时间，B 组明显短于 A 和 C 组（P<0.05）。
结果 辅助镇痛率，B 组明显少于 A 和 C 组（P<0.05）；>48h 补镇痛率，C 组明显多于 A 和 B 组（P<0.05）；镇痛不如意率，B 组明显少于 A 和 C 组（P<0.05）；不良反应和早下床活动，三组均无明显差异（P>0.05）；排气时间，B 组明显短于 A 和 C 组（P<0.05）。
结论 硬膜外注射吗啡 2.0mg、2.5mg 和氢吗啡酮 0.5mg 用于剖宫产术后全程镇痛，应重视>48h 补镇痛，其中吗啡镇痛时效长于氢吗啡酮，使用吗啡 2.5mg 利于快速康复，效果更确切。

PU-0774

甲氧氯普胺联合地塞米松、氟哌利多预防剖宫产术后恶心呕吐的疗效观察

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目的 常规量的甲氧氯普胺+地塞米松+氟哌利多联合用药预防剖宫产术后恶心呕吐（PONV）。
方法 选择 2023 年 9 月～12 月无严重并发症行择期剖宫产的椎管麻醉手术的产妇 281 例，通过随机双盲法将上述的产妇分成二组：A 组 148 例，B 组 132 例。实施椎管麻醉中的腰硬联合麻醉操作，行腰麻给药手术、单次硬膜外给药镇痛，术中采用乳酸林格氏液快速补液和去氧肾上肾素静脉注射维持血压在正常范围，收缩压尽量维持在≥95mmHg，整个手术过程无特殊情况或出血不多的产妇控制液体输入在 1500-2000ml。预防剖宫产术后 PONV 用药，A 组为地塞米松 10mg+氟哌利多 1.25mg，B 组为地塞米松 10mg+氟哌利多 1.25mg+甲氧氯普胺 10mg，在胎儿取出断脐后即刻分别静脉注射给予。手术结束前注入吗啡 2.5mg 硬膜外镇痛，术后行双氯酚酸钾纳肛辅助镇痛。所有产妇均实施快速康复（ERAS），术前晚加餐半流质、术前 2 小时进温开水 200ml、鼓励术后产妇假饲、2h 第一次进饮及床上活动、6h 下床活动、术后第四天出院。观察记录二组术后 48h 内的主要不良反应 PONV、瘙痒、头晕、寒战、过度镇静、呼吸抑制、椎体外系症状情况。采用 SPSS 26.2 软件对所得数据进行统计学分析，以 P<0.05 为差异有统计学意义。
结果 二组术后 48h 内不良反应，未发现有过度镇静、呼吸抑制及椎体外系症状的病例，恶心呕吐发生率 A 组 7.69%、B 组 2.17%，二组比较差异无统计学意义（P<0.05）；头晕发生率 A 组 2.81%、B 组 1.45%，二组比较差异无统计学意义（P>0.05）；瘙痒发生率 A 组 9.42%、B 组 9.09%，二组比较差异无统计学意义（P>0.05）寒战发生率 A 组 3.50%、B 组 2.90%，二组比较差异无统计学意义（P>0.05）。
结论 在剖宫产术后 PONV 的预防中，应用常规量的甲氧氯普胺+地塞米松+氟哌利多，可通过阻断多种的中枢神经系统受体安全有效地减少 PONV 发生率。

PU-0775

舒芬太尼用于腰-硬联合阻滞分娩镇痛对胎心率的影响

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目的 本研究观察分娩镇痛后母体激素水平变化，子宫收缩情况等方面探讨蛛网膜下隙应用舒芬太尼进行腰-硬联合阻滞分娩镇痛对胎心率的影响。
方法 将 90 例于首都医科大学附属北京妇产医院怀柔妇幼保健院进行分娩镇痛的产妇随机分为舒芬太尼 8μg 组（S8 组），舒芬太尼 5μg 组（S5 组）和罗哌卡因 3mg 组（R3 组）。观察并比较 3 组产妇在分娩镇痛后各时间点胎心率异常的发生情况，子宫收缩情况和母体肾上腺素、去甲肾上腺素、缩宫素、前列腺素 E2（PGE2）水平的变化。同时记录低血压，瘙痒，中转剖宫产等事件的发生情况，以及 VAS 评分和新生儿 APGAR 评分。
结果 3 组产妇在分娩镇痛后胎心率异常的发生率没有统计学差异（P>0.05）。3 组产妇在分娩镇痛后 5min（T1）, 分娩镇痛后 15min（T2），分娩镇痛后 30min（T3）母体肾上腺素、去甲肾上腺素、缩宫素、PGE2 水平和子宫收缩增强情况较分娩镇痛前（T0）没有显著差异（P>0.05）。S8 组和 S5 组产妇在分娩镇痛后出现瘙痒的发生率显著高于 R3 组，其中 S8 组最高，差异具有统计学意义（P<0.05）。3 组产妇出现低血压，中转剖宫产的情况没有显著差异（P>0.05），VAS 评分和新生儿 APGAR 评分没有明显差异（P>0.05）。

结论 蛛网膜下隙应用 8μg，5μg 舒芬太尼进行 CSEA 后并不会导致胎心率异常的发生率增加，镇痛效果满意，可安全用于分娩镇痛。分娩镇痛后 5min，15min，30min 母体肾上腺素、去甲肾上腺素、缩宫素、PGE2 水平，子宫收缩情况较分娩镇痛前无显著变化，提示可能存在别的机制导致胎心率异常的发生。

PU-0776

助产士、麻醉护士和麻醉医生一体化管理模式在椎管内分娩镇痛中的临床效果

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目的 探讨助产士、麻醉护士和麻醉医生一体化管理模式在椎管内分娩镇痛中对产妇分娩镇痛效果及分娩结局的影响。
方法 经阜宁县人民医院伦理委员会批准，并征得产妇及家属同意，签署知情同意书。选取 2022 年 12 月至 2023 年 11 月在阜宁县人民医院接受椎管内分娩镇痛的 100 例初产妇为研究对象，ASA I-II 级，年龄 25-30 岁，按随机数字表法分为常规组和联合组，每组各 50 例。常规组实施常规椎管内分娩镇痛麻醉及护理，联合组基于对照组基础上实施由助产士、麻醉护士和麻醉医生共同实施一体化管理模式。比较两组产妇产程时长、分娩疼痛程度、、新生儿 Apgar 评分、麻醉相关并发症发生率以及满意度、分娩结局、LAS 评分及产后早期盆底功能。
结果 两组产妇在年龄、ASA 分级、BMI 方面比较，差异均无统计学意义（P>0.05）；联合组产妇产程时长短于常规组（P <0.05）；联合组产妇产分娩疼痛程度明显低于常规组（P <0.05）；两组产妇的新生儿 Apgar 评分比较，差异无统计学意义（P>0.05）；联合组产妇麻醉相关并发症发生率显著低于常规组（P <0.05）；联合组产妇对分娩镇痛满意度高于常规组（P <0.05）；联合组产妇分娩结局优于常规组（P <0.05）；联合组产妇 LAS 评分显著高于常规组（P <0.05）；联合组产妇产后早期盆底功能改善优于常规组（P <0.05）；
结论 助产士、麻醉护士和麻醉医生一体化管理模式能够有效缩短产程、增强镇痛效果、降低麻醉相关并发症发生率、提高分娩镇痛满意度，提高 LAS 评分，改善分娩结局和早期盆地功能，为产妇提供安全、舒适、有效的分娩过程，值得临床推广。

PU-0777

右美托咪定减轻焦虑产妇术中寒战作用的研究

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目的 调查剖宫产产妇术前的焦虑状况及其相关影响因素；探讨右美托咪定对中重度焦虑产妇术中寒战的预防作用。
方法 本研究选择 100 例在我院择期行剖宫产的产妇作为研究对象，于术前登记患者的一般信息并使用 GAD-7 焦虑筛查量表对患者进行焦虑评分(GAD-7 评分)。选择 GAD-7 评分>4 分的剖宫产产妇作为第二部分研究的研究对象。79 例 GAD-7 评分>4 分的产妇随机分为三组，小剂量右美托咪定组（D1 组，右美托咪定 0.5μg/kg,n=26），大剂量右美托咪定组（D2 组，右美托咪定 0.70μg/kg,n=26)对照组（C 组，n=27)，主要观察指标为产妇寒战的发生情况及寒战分家。次要观察指标包括评估产妇的镇静程度、血液动力学稳的定性、不良反应发生率以及产妇术后 24h 后的恢复状况。

结果 100 例产妇的 GAD-7 平均分为 8.36±3.68 分，年龄、文化程度、是否初次生产与患者的焦虑程度相关,组间比较差异具有统计学意义(P<0.05)，D1 组产妇寒战发生率为 30.8%，D2 组产妇寒战的发生率为 23.0%，C 组产妇寒战发生率为 70.4%，且 C 组患者恶心呕吐、牵拉反应的发生率高，差异具有统计学意义（P<0.05）。用药后 15 min 和 30min 时，D1 组、D2 组产妇的 Ramsay 镇静评分、MAP 的变化值均高于对照组 C 组，差异具有统计学意义（P<0.05）。术后 24h 时，D1 组患者的恢复状况较 D2 组和 C 组好。

结论 行择期剖宫产的产妇术前存在焦虑，龄大、文化程度低以及经产妇的焦虑程度高。胎儿产出后，预防性的使用 0.5μg/kg 右美托咪定泵注可有效预防寒战且血流动力学稳定、镇静适度、不良反应的发生率低、产妇恢复速度快。

PU-0778

连续硬膜外分娩镇痛后硬膜外腔的动态变化：一项前后对照研究

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目的 越来越多的研究报道利用磁共振成像(MRI)观察腰椎硬膜外腔(ES)和硬膜囊(DS)的结构以及蛛网膜下腔脑脊液(CSF)的流体动力学。本研究的目的是通过 MRI 观察持续硬膜外分娩镇痛(ELA)后硬膜外间隙的变化。

方法 纳入阴道分娩时持续 ELA 的产妇。分娩后 2 小时和 24 小时分别进行腰椎 MRI 检查（分娩后 2 小时行 MRI 检查时停止硬膜外分娩镇痛泵）。所有数据传输到西门子 PACS 工作站进行测量。比较分娩后 2 小时和 24 小时 MRI 检查结果。主要指标为硬膜囊面积及硬膜外间隙，次要指标为双侧脊髓神经节表观扩散系数(ADC)值及硬膜囊纵径和横径。还记录了与 ELA 相关的数据。

结果 11 例 ELA 经阴道顺产产妇在分娩后 2 小时完成 MRI 检查，其中 2 例拒绝第二次 MRI 检查。11 例产妇中，2 例发现硬膜外腔有明显药液蓄积，其中 1 例拒绝第二次 MRI 检查。分娩后 2 小时与 24 小时 MRI 检查比较，硬膜囊面积及硬膜囊纵径、横径(L1-2 除外)在 L4-5、L3-4、L2-3、L1-2 水平均减小，硬膜外腔面积在 L4-5、L3-4、L2-3 和 L1-2 水平增加。分娩后 2 小时和 24 小时双侧 ADC 值无显著差异。

结论 ELA 可导致硬膜外腔扩张，硬膜囊受压，甚至硬膜外药物蓄积。然而，双侧 ADC 值无显著差异。

PU-0779

高流量鼻导管氧疗用于妊娠合并强直性脊柱炎剖宫产手术麻醉处理 1 例

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目的 本文报道了 1 例妊娠合并强制性脊柱炎、脊柱严重畸形的产妇在高流量鼻导管氧疗（High flow nasal oxygenation, HFNO）下实施择期全身麻醉剖宫产的情况。

方法 术前访视患者呈强迫性体位，背部屈曲约 45°，颈椎屈曲无法伸直，颏甲距最大约 1.5 横指，膝关节无法伸直。在入室后给予患者 45°头高斜坡卧位下高流量鼻导管氧疗（50L/min），高流量吸氧 5min 后开始行常规静脉全身麻醉诱导。

结果 诱导后经口置入 SupremeTM LMA（3#），50%笑气+七氟烷 0.9MAC 吸入麻醉维持，瑞芬太尼 0.05ug/kg.min-1 泵注（子宫切开前暂停，胎儿娩出后恢复泵注），手术结束自主呼吸恢复后拔出喉罩并继续使用高流量吸氧，直至患者病情稳定达到出手术室标准时撤除 HFNO。
结论 HFNO 在此类合并严重脊柱畸形及张口受限插管困难的产科剖宫产手术中可能具有无创、高效、操作简便等优点。

PU-0780

Transversus abdominis plane block with S-ketamine for cesarean section of a woman with amyotrophic lateral sclerosis

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Amyotrophic lateral sclerosis（ALS） is a neurodegenerative upper and lower motor neuron disease in adults. It is not common in women of childbearing age. No more than ten cases have been reported these years. We present a case of a pregnant woman who was diagnosed with amyotrophic lateral sclerosis at 36 weeks-of-gestation. This report presents ultrasound-guided transversus abdominis plane (TAP）block with subanesthetic concentrations of S-ketamine for cesarean section in this pregnant woman with ALS. The TAP block and subanesthetic concentrations of intravenous anesthesia were applied with the help of high-flow oxygen therapy. This resulted in a successful outcome for both the mother and the baby.

PU-0781

剖宫产产妇产后抑郁的危险因素分析-一项前瞻性巢式病例对照研究

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目的 采用巢式病例对照研究的方法，探讨在生育政策开放后这一特殊时期，剖宫产产妇在产后恢复期（俗称坐月子）PD（产后抑郁）发生情况及其危险因素分析。
方法 本研究以广州市中山大学附属第三医院 185 例剖宫产产妇作为研究对象，收集每一个研究对象的一般基础资料和临床资料，包括术中和术后的临床资料，术后第 42 天对研究对象进行随访。将发生 PD 的 44 例产妇筛选出来作为病例组，按照巢式病例对照研究的方法，以 1:2 的比例在本队列的内部另取 88 例未发生 PD 的产妇作为对照组，两组进行匹配。所有产妇分别于剖宫产前 1 天和产后 6 周均进行爱丁堡产后抑郁量表（EPDS）评定。主要结局指标是产后 6 周抑郁症的发生率。采用单因素分析和多因素 logistic 回归分析与 PD 发生相关的危险因素。
结果 在所有的产妇中，44 人（23.8%）发生 PD。PD 的发生与术后腰痛、瘙痒和对产后恢复期的不满有关。Logistic 回归分析显示，腰痛(OR5.68，95%CI1.69~19.06；p=0.005)、产妇对产后恢复期的总体不满意(OR6.87，95%CI2.48~19.04；p=0.001)、产后恢复期间对护理人不满意(OR3.22，95%CI1.43~16.16；p=0.020)是 PD 的独立危险因素。
结论 剖宫产产妇 PD 的发生较常见。产后腰痛、产后恢复期间总体不满意、对护理人不满意是剖宫产产妇 PD 的独立危险因素。

PU-0782

专利腰垫托举子宫预防剖宫产脊麻低血压的临床研究

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目的 探讨专利腰垫物理托举子宫预防脊麻剖宫产时低血压的有效性、安全性及其机制
方法 选择 2024 年 1 月至 2024 年 5 月上海市奉贤区中心医院择期行脊麻剖宫产患者 60 例，采用随机将患者分为两组（n=30）：腰垫组：脊麻平卧后即刻专利腰垫充气，对照组：腰垫不充气。从脊麻即刻开始记录血压和心率，以后每分钟记录 1 次血压和心率直到胎儿取出。收缩压下降超过≥40%或出现胸闷、恶心等症状时静脉注射升压药。记录低血压发生率、升压药使用率、胎儿 Apgar 评分，孕产妇不良反应发生率等。按孕妇先后顺序非随机选择 20 例患者麻醉前测量仰卧位、仰卧位使用专利腰垫后、侧卧时测量股总静脉的多普勒超声频谱。
结果 比对照组比较，腰垫组低血压发生率低[20.0% vs 46.3%，P＜0.05], 升压药使用率低[13.5%vs 54.8%, P＜0.05]。与仰卧位比较，仰卧使用腰垫时股静脉流速增快[（9.8±3.2vs 5.7±1.7）P＜0.01] 、 呼吸期向性明显；与仰卧位使用腰垫时比较，侧卧位股静脉流速快 [（14.3±5.5vs 9.8±3.2）,P＜0.01] 、呼吸期向性明显。其他指标比较没有统计学差异。
结论 专利腰垫能有效减少低血压发生率，减少升压药素使用量，增加股总静脉血流量，缓解子宫对下腔静脉的压迫。

PU-0783

ERAC 理念下产科椎管内麻醉优化方案

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目的 探讨低剂量盐酸布比卡因复合氢吗啡酮细针腰麻对行剖宫产术产妇围术期指标及手术前后疼痛应激因子的影响。
方法 选择本院择期剖宫产产妇 140 例为研究对象，ASAⅡ-Ⅲ级，体重 60-80Kg，随机分为观察组和对照组，每组 70 例。两组麻醉方式均为腰椎 2-3 间隙经侧入路细针（一次性使用腰硬联合穿刺包里的腰麻穿刺针，26#）进针完成腰麻，其中对照组蛛网膜下腔注入 0.75%盐酸布比卡因 1.2ml，术后 PCIA（氢吗啡酮 8mg+昂丹司琼 8mg+生理盐水到 100ml）；观察组蛛网膜下腔注入 0.75%盐酸布比卡因 1.2ml+盐酸氢吗啡酮 0.06mg，胎儿娩出后胎盘结扎后静脉给以氟哌利多 1mg，瑞马唑仑 5mg，术后 PCIA（氢吗啡酮 8mg+昂丹司琼 8mg+生理盐水到 100ml）。比较两组产妇围手术期产科相关指标（手术时间、娩出时间、麻醉剂量、输液量、产后出血量）以及术后疼痛视觉模拟（visual analogue scale，VAS）评分，比较两组产妇手术前后疼痛应激因子[P 物质（substance P,SP）、神经肽 Y（neuropeptide Y,NPY）、神经生长因子（nerve growth factor，NGF）和前列腺素 E2（prostaglandin E2,PGE2）]水平及不良反应发生情况。
结果 两组手术时间、娩出时间、麻醉剂量、输液量和产后出血量差异无统计学意义（P＞0.05）。两组 VAS 评分均呈逐渐降低趋势，观察组术后 12 h、18 h 评分明显低于对照组，有统计学意义（P＜0.05）；两组 Ramsay 评分均呈先升后降趋势，其中观察组相对更平稳，时点间具有统计学意义（P＜0.05）。术后，两组 SP、NPY、NGF 和 PGE2 均高于术前，观察组 SP、NPY 和 PGE2 低

于对照组，差异有统计学意义（P＜0.05），两组 NGF 差异无统计学意义（P＞0.05）。两组不良发应比如术后恶心呕吐发生率有差异但无统计学意义（P＞0.05）。

结论 现如今，随着麻醉医生技术水平的提高，穿刺成功率大大提高。在剖宫产术后快速康复（Enhanced Recovery after Cesarean，ERAC）理念下，目前针对剖宫产手术的麻醉大多数选择单次腰麻，具有穿刺迅速，循环稳定等特点，而且侧入路，不经过棘上韧带、棘间韧带，对产妇解剖损伤小，减少对脊神经后支神经末梢的损伤，大大减低了术后脊背疼痛几率。选择盐酸布比卡因复合氢吗啡酮细针腰麻用于剖宫产手术，可降低产妇疼痛程度和应激反应，缩短术后下肢运动阻滞时间，延长术后镇痛效果，再加上瑞马唑仑的镇静，以及氟哌利多止吐效果，可提高整个围术期麻醉舒适化效果，且大程度上减低了不良反应发生率，具有一定的临床应用价值，值得推广应用。

PU-0784

Effects of dexamethasone as an adjuvant for neuraxial labor analgesia: a systematic review and meta-analysis of randomised controlled trials

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Background: Dexamethasone has been found to have stronger analgesic effect and was used as an adjuvant in peripheral nerve block to prolong the sensory block duration and reduce the postoperative pain and opioid consumption. However, the role of dexamethasone in neuraxial block for labor analgesia is unclear. Thus, this systematic review and meta-analysis aimed to evaluate the efficacy and safety of dexamethasone as an analgesic adjunct in labor analgesia.
Methods: We systematically searched the Cochrane Library, MEDLINE and EMBASE to identify randomized controlled trials (RCTs) comparing dexamethasone with placebo as the adjuvant in women having intrapartum neuraxial analgesia. Primary outcomes were the duration of analgesia and local anesthetics (or local anesthetics-opioid combination) requirement. The duration of analgesia was defined as the time between the onset of analgesia and the first request of additional analgesia. Secondary outcomes included nausea, vomiting, pruritus, fever, urinary retention, hypotension, maternal satisfaction, fetal bradycardia, neonatal Apgar score and neonatal umbilical blood pH. We used standardized mean differences (SMD) for expressing continuous outcomes and odds ratios (OR) for dichotomous outcomes. Random-effect model was performed to estimate the pooled odds ratios and standardized mean differences.
Results: 4 RCTs (269 participants) were included in this meta-analysis. The forest plots for all primary outcomes are presented in Figure 1. The duration of analgesia was significantly longer in the dexamethasone group compared with placebo (SMD:1.82, 95% CI: 1.41 to 2.24). The total levobupivacaine requirement was significantly lower in the dexamethasone group compared with placebo (SMD:-0.66, 95% CI: -1.16 to -0.16). Dexamethasone group was also associated with fewer hourly consumption of epidural levobupivacaine-fentanyl combination (0.1% levobupivacaine and 2ug/ml fentanyl, ml/h) compared with placebo (SMD: -0.61, 95% CI: -0.95 to -0.27). The forest plots for all secondary outcomes are presented in Figure 2-3. Pooled analysis showed that the incidence of nausea (OR:0.91, 95% CI: 0.39 to 2.11), vomiting (OR:0.87, 95% CI: 0.38 to 2.00), shivering (OR:1.12, 95% CI: 0.52 to 2.42), pruritus (OR:3.10, 95% CI: 0.12 to 79.23), fever (OR:0.32, 95% CI: 0.03 to 3.19), urinary retention (OR:0.47, 95% CI: 0.08 to 2.75), hypotension (OR:1.03, 95% CI: 0.33 to 3.25) and fetal bradycardia (OR:1.00, 95% CI: 0.40 to 2.49) are similar in those allocated to dexamethasone vs placebo. There was also no significant difference in maternal satisfaction (SMD: 0.25, 95% CI: -0.08 to 0.58), Apgar score after 1min (SMD:0.04, 95% CI: -0.30 to 0.39), Apgar score after 5min (SMD: -0.66, 95% CI: -1.63 to 0.32), and neonatal umbilical vein blood pH (SMD: -0.02, 95% CI: -0.61 to 0.57).
Conclusion: Our evidence suggests that dexamethasone may prolong the duration of analgesia

and reduce the intrapartum total levobupivacaine consumption and hourly consumption of levobupivacaine-fentanyl combination via the epidural route as an adjuvant to neuraxial block in labor analgesia. There was no significant difference in maternal and neonatal adverse effects.
Systematic review registration: PROSPERO; CRD42023464855.

PU-0785

去甲肾上腺素及去氧肾上腺素 Bolus 对子痫前期产妇剖宫产术血流动力学的影响：一项随机对照试验

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目的 血管活性药物被认为是应对子痫前期产妇腰麻后低血压的重要措施。由于子宫胎盘的血流供应主要来自于产妇心输出量（CO），对CO、全身血管阻力（SVR）等血流动力学指标的监测有助于对子痫前期产妇容量管理及血管活性药物等治疗的麻醉管理决策。本研究通过探索剖宫产术中重度子痫前期产妇给予去甲肾上腺素（NE）和去氧肾上腺素（PE）补救性 Bolus 治疗腰麻后低血压事件明确其对产妇血流动力学的影响。
方法 产妇入室后监测各项生命体征，在局麻及 B 超引导下行桡动脉置管，并连接 FloTrac/Vigileo（EV1000，美国爱德华）行收缩压（SBP）、心率（HR）、CO、SVR 及每搏量变异度（SVV）等指标监测。上肢留置 16G 静脉通路用于晶体液输注及 NE、PE 补救性 Bolus 注射。麻醉前无液体预充并予以约 1 mL/min 维持静脉通路。在静息仰卧位且左倾子宫 15°状态下，连续 5 次监测各项血流动力学指标，取平均值（每 20 秒更新一次；差值小于 10%）作为基础值，随后连续记录上述各项指标直至手术结束。L3-4 间隙予以 0.5%重比重布比卡因 12.5mg 行腰麻。40 名年龄 18-45 岁单胎≥32 孕周、ASA 分级 II-III 级在腰麻下行剖宫产术重度子痫前期产妇（每组 20 例），在腰麻后出现低血压事件（收缩压＜80%基线值）时，随机接受 6μg NE 或 75μg PE 作为补救性低血压治疗措施。主要观察指标为产妇接受 NE 或 PE 后 3 分钟内，包括 SBP、HR、CO 和 SVR 等血流动力学指标的最大变化及其变化的百分比。次要观察指标为产妇心动过缓（心率<60 次/分；予以 0.5mg 阿托品处理）、反应性高血压（收缩压> 120%基础值或>180mmHg）、恶心呕吐的发生率，脐动脉血气分析（pH、PO2、PCO2 及 BE），新生儿 Apgar 评分（1 分、5 分及＜7 分比例）及 NICU 转科率。
结果 两组产妇 SBP、HR、CO 及 SVR 指标腰麻后 15 分钟内重复测量方差分析（干预*分组）均无差异（P = 0.607；P = 0.297；P = 0.670；P = 0.402）。SBP 及 SVR 指标中，基础值、腰麻后最大变化及较基础值的百分比、根据分组予以血管活性药物后的最大变化及较予以血管活性药物时的百分比两组相似。相比与 NE 组，PE 组 HR 及 CO 基础值、腰麻后最大变化及较基础值的百分比相似，予以血管活性药物后的最大变化更低（85.40 ± 17.76 vs 71.10 ± 11.88 次/分, P = 0.005; 7.78 ± 1.98 vs 6.11 ± 1.44 L/min, P = 0.005）及较予以血管活性药物时的百分比幅度更大（-15.54 ± 11.49 vs -23.41 ± 10.03 %, P = 0.026; -1.75 ± 6.50 vs -16.56 ± 10.21 %, P < 0.001）。产妇心动过缓发生率 PE 组更高（5.0 vs 30.0 %，P = 0.030），余母婴结局指标两组间相似。
结论 重度子痫前期产妇接受腰麻后仍会发生显著的血流动力学改变，NE 及 PE 均可以有效补救腰麻后低血压的发生，且效能相似。NE 在维持 CO 及 HR 上更优于 PE。

PU-0786

150 克吗啡腰麻用于剖宫产降温效果的随机双盲对照研究

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目的 据报道，接受脊麻的产妇术中体温过低[1]。对于剖腹产的产妇来说，布比卡因是一种常用的脊麻药物。如果在局部麻醉剂的基础上使用吗啡，则可延长镇痛持续时间并缓解术后疼痛[2]。有报道称，在脊麻中使用大剂量吗啡时会出现严重的体温过低[3]。尽管与小剂量吗啡相关的体温过低已有零星报道[4，5]，但目前尚不清楚极小剂量的吗啡(150 克)是否也会加重脊髓麻醉引起的体温过低。本研究采用随机双盲对照研究方法，观察腰麻下择期剖宫产产妇在布比卡因中加入 150 克吗啡对体温的影响

方法 选择 60 例足月妊娠妇女，经知情同意后择期剖宫产。这项研究得到了机构审查委员会的批准。通过计算机生成的随机表，受试者被分配接受吗啡或生理盐水。这些任务对产妇和麻醉师都是盲目的，他们进行了脊椎注射并测量了体温。产妇转入手术室后，每 3min 记录一次常规无创血压。连续显示心电图导联 II 构型和脉搏血氧饱和度。用红外线鼓室温度计(Welch Allyn 9000，精度±0.2F)记录同一耳的体温。室温恒温 24℃，用 1000mlHartmann‘s 液预热至 37℃预水，水合后得到基线体温。将 27-G Quincke 脊髓针插入 L2-3 或 L3-4 蛛网膜下腔外侧卧位，注射 0.5%高压布比卡因 10~12 mg，注入 0.1g 吗啡或 0.15ml 生理盐水，达到感觉麻醉(针刺确定)至 T4 皮肤处。静脉注射麻黄碱 4-8 mg，重复给药。其他药物，包括抗生素和非类固醇消炎药，被避免使用，因为它们对测量的变量有潜在影响。产后给予催产素 10IU。记录基线、腰麻后即刻和每隔 15 分钟至术后 30 分钟鼓室温度。进行功率分析以确定在 b 值为 0.9 和 a 值为 0.05 的情况下检测 0.3℃温差所需的样本量。假设标准差为 0.5 摄氏度时，每组的估计样本量为 29。用学生 t 检验比较两组间的连续变量，用卡方检验比较分类数据。P 值小于 0.05 被认为具有统计学意义。

结果 两组患者的基线特征相似(表 1)。输注加温液体对两组体温均无明显影响。鞘内注射后，两组的体温明显降低(图 1)，但温度-时间曲线下的面积没有差异。然而，吗啡治疗后体温从基线开始的最大降幅显著大于生理盐水治疗后(分别为 1.11(0.61)℃和 0.76(0.39)℃；P=0.047)，达到最低体温的时间显著延长(分别为 59.5(17.6)分钟和 50.4(15.9)分钟；P=0.047)。观察到的最低温度吗啡组为 34.3℃，生理盐水组为 35.2℃。寒战的发生率在两组中没有差异(表 1)。两组的平均体温下降(SD)相似：23 例寒战产妇体温平均下降 0.90(0.66)℃，无寒战产妇体温平均下降 0.95(0.46)℃。两组使用麻黄素的情况也相似(表 1)，注射麻黄素和不注射麻黄素的产妇体温下降(分别为 0.97(0.49)摄氏度和 0.91(0.57)摄氏度)。

结论 总之，我们已经证明，即使是非常小剂量的吗啡(150lg)也可能加剧由脊麻引起的体温降低。建议进行适当的监测，如有必要，应考虑及时重新升温。

PU-0787

开发和验证预测硬膜外镇痛下阴道分娩产后尿潴留的列线图

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目的 产后尿潴留（postpartum urinary retention, PUR）是硬膜外镇痛下阴道分娩可导致泌尿生殖道发生不可逆转的损害的并发症。及时识别和进行干预治疗对降低泌尿生殖道损伤的严重程度尤为重要。但评估其风险的预测因子及特征还尚未明确。我们的回顾性研究接受硬膜外镇痛的阴道分娩患者，开发和验证用于预测产后尿潴留的列线图，为硬膜外镇痛下产后尿潴留个体化科学预防工作提供理论依据，促进患者健康。

方法 回顾性收集 2022 年 1 月至 2024 年 1 月在三明市第二医院接受硬膜外镇痛后阴道分娩的 625 例患者。随机拆分为训练集与验证集。基于最小绝对收缩和选择算子（The least absolute shrinkage and selection operator，LASSO ）逻辑回归分析比较产后尿潴留患者和未发生产后尿潴留患者的个人信息、临床特征、基线实验室指标和用药情况，以研究产后尿潴留的影响因素。共线性诊断排除影响因素间的多重共线性。预测因子基于多变量逻辑回归方法建立预测模型，运用 R 软件转化为列线图。我们通过对列线图的校准、鉴别、决策曲线和临床影响曲线评估其临床有效性。根据验证集和完整数据集进行内部验证评估。

结果 共纳入 625 例患者，其中 43 例患者诊断为产后尿潴留，发生率为 6.88%。通过 LASSO 回归分析，从 44 个变量中筛选出 3 个重要的预测因子，产钳助产（优势比[odds ratio，OR]，13.711；95%CI：1.178-159.632）和镇痛时间大于 6 小时（OR，5.494；95%CI：2.401-12.571）是产后尿潴留的危险因素，产时间歇性导尿（OR，0.058；95% CI：0.025 -0.133）是产后尿潴留的保护因素。该模型鉴别能力良好，曲线下面积（Area under the curve，AUC）为 0.867（95% CI: 0.808 to 0.927），在最佳切点处，模型的灵敏度（Sensitivity，SE）和特异度（Specificity，SP）分别为 94.1%和 62.2%。经内部验证，AUC 分别为 0.751（95% CI: 0.546 to 0.956）和 0.846（95% CI: 0.784 to 0.908）。校准曲线示列线图模型的预测值和实际观察值结果一致性良好。决策曲线和临床影响曲线表明，该列线图对接受硬膜外镇痛的阴道分娩患者具有临床价值。

结论 产钳助产、镇痛时间大于 6 小时，需提前干预预防产后尿潴留风险；产时间歇导尿可能可以减少产后尿潴留的发生。通过以上三个因素可能有助于预测接受硬膜外镇痛的患者发生产后尿潴留的风险。

PU-0788

Association between labor epidural analgesia and gut microbiota: A prospective cohort study

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Background: Labor epidural analgesia (LEA) may influence gut microbiota. We explored the association between LEA and gut microbiota for both mothers and their newborns.
Methods: In this prospective cohort study, parturients aged 25–35 years with a gestational age of 37–42 weeks and planned vaginal delivery were recruited. Twenty-one parturients received LEA (the LEA group), and 24 did not (the control group). Maternal and neonatal fecal samples were collected, and the gut microbiota profiles were analyzed using the 16S rRNA gene sequencing. The impact of LEA on gut microbiota was assessed using the general liner models.
Results: We showcased the gut microbiota profile from the phyla to species levels based on data on 45 mother-newborn dyads. The results of α- and β-diversity suggested significant changes in gut microbiota between the LEA and control groups. After adjusting for baseline confounders, the administration of LEA had positive correlations with R. ilealis (β = 91.87, adjusted P = 0.007) in mothers; LEA also had negative correlations with A. pittii (β = -449.36, adjusted P = 0.015), P. aeruginosa (β = -192.55, adjusted P = 0.008), or S. maltophilia (β = -142.62, adjusted P = 0.001) in mothers, and with Muribaculaceae (β = -2702.77, adjusted P = 0.003) in neonates.
Conclusion: LEA was associated with changes in maternal and neonatal gut microbiota, and future studies are still required to assess their impact on clinical outcomes and explore the mechanisms.

PU-0789

硬膜外容量扩张对剖宫产手术蛛网膜下腔阻滞麻醉罗哌卡因 ED50 的影响

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目的 探讨使用 15 ml 生理盐水硬膜外容量扩张（ EVE）对剖宫产产妇蛛网膜下腔阻滞（简称腰麻）重比重罗哌卡因半数有效剂量（ ED50 ）的影响。
方法 选取 2022 年 3 月~2023 年 12 月在绍兴市妇幼保健院行剖宫产的 60 例足月单胎初产妇，随机分为 E 组（EVE 组）和 C 组（对照组），每组 30 例。E 组腰麻完成后后给予硬膜外生理盐水 15ml，C 组不予。采用序贯法决定每例产妇罗哌卡因的剂量。设定初始剂量为 10.5mg，之后使用的剂量根据上一例产妇的麻醉效果进行上调或下调，幅度为 1.5mg，采用 Probit 回归分析计算罗哌卡因的 ED50。
结果 两组产妇一般情况及新生儿结局比较 本研究初始纳入 62 名患者（2 例患者腰麻穿刺失败），最终纳入 60 例患者完成本研究。两组患者在一般资料，手术时间，1 分钟及 5 分钟 Apgar 评分间的差异无统计学意义。
E 组重比重罗哌卡因在用于剖宫产腰麻时的 ED50 为 9. 450 mg（ 95% CI 8.660~10. 226 mg），C 组为 12. 809 mg（ 95% CI 11. 897~13.889 mg）。硬膜外容量扩张使罗哌卡因的用量减少约 26.2%。
两组产妇最高阻滞平面没有统计学差异（P>0.05），E 组 T1 较小（6.7±1.2 vs 7.6±1.4，P<0.05），而 T4 较小（6.7±1.2 vs 7.6±1.4，P<0.05），两组间的差异有统计学意义。两组产妇 T2、T3 未发现差异（P>0.05）。
两组产妇新生儿 Apgar 评分和产妇的副作用比较 两组新生儿结局无差异（P>0.05），产妇各项副作用亦无统计学差异（P>0.05）。
结论 重比重罗哌卡因用于剖宫产腰麻的 ED50 为 12. 809 mg（ 95%CI 11. 897~13.889 mg），使用 15ml 生理盐水进行硬膜外容量扩张能使其用量减少约 26.2%。

PU-0790

硬膜外分娩镇痛产妇绒毛膜羊膜炎相关产时发热预测模型的构建

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目的 随着医学技术的进步和分娩镇痛的普及，硬膜外分娩镇痛已成为许多产妇的首选。然而，产时发热作为分娩过程中的一种常见并发症，可能与绒毛膜羊膜炎等严重感染相关，对母婴安全构成威胁。因此，建立一个准确的预测模型对于早期识别和处理潜在的感染风险具有重要意义。本研究旨在构建一个硬膜外分娩镇痛产妇绒毛膜羊膜炎相关产时发热的预测模型。
方法 本研究为回顾性研究。选择四川省妇幼保健院 2020 年 1 月至 2022 年 12 月接受硬膜外分娩镇痛发生产时发热（腋温≥38 ℃）的产妇纳入建模组，选择四川省妇幼保健院 2023 年 1 月至 10 月接受硬膜外分娩镇痛发生产时发热的产妇纳入为验证组。建模组根据胎盘组织病理学检查结果分为组织学绒毛膜羊膜炎分期≥Ⅱ期组（HCA≥Ⅱ期组）和组织学绒毛膜羊膜炎分期＜Ⅱ期组（HCA＜

Ⅱ期组）。采用 logistic 回归分析筛选产妇绒毛膜羊膜炎相关产时发热的独立危险因素，并基于此建立列线图预测模型。通过受试者工作特征曲线下面积验证模型的区分度，通过校准曲线验证模型的一致性，通过决策曲线确定模型的临床有效性；采用验证组数据进一步评估模型。
结果 最终建模组纳入产妇308例，验证组99例。多因素logistic回归分析显示，孕周、羊水粪染、CRP 浓度和最高体温是硬膜外分娩镇痛产妇绒毛膜羊膜炎相关产时发热的独立危险因素（P＜0.05）。基于此建立列线图风险预测模型，建模组和验证组曲线下面积AUC（95%置信区间）分别为0.844（0.744～0.944）、0.812（0.674～0.950）。校准曲线显示模型预测概率与实际诊断概率具有较好的一致性。决策曲线显示预测模型在训练组和验证组的阈值概率分别为 10%~98%和10%~78%。
结论 本研究成功构建了基于孕周、羊水粪染、CRP 浓度和最高体温等因素的硬膜外分娩镇痛产妇绒毛膜羊膜炎相关产时发热的列线图预测模型。该模型不仅具有较高的预测准确率，而且具有良好的临床实用价值。通过该模型的应用，临床医生可以更早地识别出潜在的感染风险，采取及时有效的干预措施，降低母婴并发症的发生率。未来，我们将继续对该模型进行优化和完善，以期提高其在临床实践中的应用效果

PU-0791

A real-world study to construct predictive models for maternal fever associated with labor analgesia.

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Maternal fever associated with labor analgesia is a clinical phenomenon drawing more attention and concern recently, but the mechanism behind remains largely unknown.
Objective: by collecting and analyzing real-world medical data on analgesia and labor from a large sample-size cohort of pregnant women, we aim to identify factors related to maternal fever after labor analgesia, and to construct multivariate predictive models for this clinical outcome.
Methods: in Sichuan province, an assembled cohort of over nine thousand pregnant women were analyzed on over thirty variables recorded before and throughout the whole process of their labor analgesia and newborn delivery. With maternal fever (≥38°C) after labor analgesia as the binary outcome of interest, we explored its association with different variables by between-group comparisons and logistic regression. We further applied machine learning (5-fold cross validation) and statistical modeling methods (LASSO regression, boosting, random forests etc.) to construct multivariate predictive models that robustly differentiate the fever vs. non-fever events.
Results: systematic review of past published literatures reveals disparate maternal fever incidence in various labor analgesia conditions and among different countries. The individuals under study have an incidence of maternal fever associated with labor analgesia around 7 out of 100. Statistic tests of variables between fever vs. non-fever groups reveal important factors such as BMI, white blood cells, lymphocytes, duration of labor etc. Compared to univariate models, multivariate models achieve better predictive performance (sensitivity, specificity, F1 score etc.), and score area under the ROC curve over 0.70 in independent validation datasets.
Conclusion: this study presents real-world evidence from a large Chinese pregnant cohort on the complex issue of maternal fever associated with labor analgesia. It is possible to use predictive models to effectively identify the sub-population with higher risk for the clinical outcome of maternal fever after labor analgesia.

PU-0792

Remifentanil at a Relatively Elevated Dose in Active Phase is Safe and More Suitable Than Fixed Lower Dose for Intravenous Labor Analgesia

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Background: Intravenous labor analgesia is recommended as an alternative for parturients who have contraindications to epidural analgesia. There are several opioid analgesics and different administering regimens used in the clinic. This study aimed to compare the effectiveness and safety of two intravenous remifentanil dosage regimens in the first labor stage.
Patients and Methods: One hundred and fifteen parturients with a contraindication to epidural analgesia but were willing to receive systemic labor analgesia were randomized into group A received a fixed dose of remifentanil throughout the first stage of labor, and group B received an elevated dose of remifentanil during the active phase of the first stage both by patient-controlled analgesia (PCA). Maternal numerical rating scale (NRS) pain score and oxygen desaturation, sedation efficacy, satisfaction, as well as maternal and fetal adverse reactions were recorded and compared.
Results: The mean NRS pain scores before analgesia and in the latent phase showed no statistically significant difference between the two groups ($P > 0.05$). However, during the active phase, group B demonstrated significantly lower mean NRS pain scores and lowest pain score compared to group A ($P < 0.05$). Furthermore, group B exhibited higher overall sedation scores and satisfaction scores in comparison to group A ($P < 0.05$). The incidence of adverse reactions between the two groups was similar ($P > 0.05$).
Conclusion: Relatively elevated intravenous dosage of remifentanil with PCA during the active phase in the first stage of labor is safe and more effective than a fixed-dosage regimen for labor analgesia.

PU-0793

氢吗啡酮复合艾司氯胺酮在剖宫产术后镇痛的应用及对产妇 EPDS 评分的影响

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目的 探讨氢吗啡酮复合艾司氯胺酮在剖宫产术后镇痛的应用及对产妇爱丁堡产后抑郁量表（EPDS）评分的影响。
方法 选取 80 例 2022 年 8 月~2023 年 8 月在本院行剖宫产手术的产妇，随机分为氢吗啡酮组和复合用药组，每组各有 40 例。复合用药组在胎儿娩出后即以 0.5mg/kg 的负荷量静注盐酸艾司氯胺酮注射液，输注时间≤10min；手术结束后的静脉自控镇痛方案为 0.1mg/kg 盐酸氢吗啡酮注射液+0.5mg/kg 的艾司氯胺酮+生理盐水稀释至 100ml 后，将镇痛泵设置为 2ml/h 的速度、2ml 的单次追加剂量及 15min 的锁定时间，并需及时评估产妇镇痛后精神等状态。氢吗啡酮组给予在胎儿娩出后即给予静注同体积生理盐水作为负荷量，手术结束后的静脉自控镇痛方案为 0.1mg/kg 盐酸氢吗啡酮+生理盐水以 100ml 的总容量泵入，镇痛泵参数同复合用药组。两组术后自控镇痛时间均持续 48h。比较两组术后 6h、12h、24h、48h 的镇痛效果[疼痛视觉模拟评分（VAS）]和镇静效果（Ramsay 镇静评分），检测术后 24h 和 48h 的血清炎性因子水平[白细胞介素（IL-6）、肿瘤坏死

因子-α（TNF-α）]，在术后 3d 和 6 周时对产妇的 EPDS 评分进行评估，观察产妇的恢复情况（胃肠恢复蠕动时间、排尿时间、下床活动时间、初乳时间）并记录用药的不良反应发生情况。
结果 复合用药组术后 6h、12h、24h 和 48h 时的 VAS 评分及术后 24h、48h 时的 IL-6 和 TNF-α 水平与氢吗啡酮组比较均明显更低（P＜0.05），但两组各时间点 Ramsay 评分比较均无明显差异（P＞0.05）。两组在术后 6 周时的 EPDS 评分与 3d 时比较均明显更低（P＜0.05），且各时间点的 EPDS 评分复合用药组与氢吗啡酮组比较均明显更低（P＜0.05）；术后胃肠恢复蠕动时间、排尿时间、下床活动时间和初乳时间复合用药组与氢吗啡酮组比较均更短（P＜0.05）；不良反应（头晕嗜睡、便秘、恶心呕吐、呼吸抑制）总发生率组间比较差异无显著性（P＞0.05）。
结论 复合应用氢吗啡酮与艾司氯胺酮，对剖宫产术后产妇镇痛的效果突出，有利于产妇恢复，并能发挥镇静、抗抑郁和改善炎症反应的作用，且安全性良好，值得推广。

PU-0794

小剂量艾司氯胺酮预防卡前列素诱发孕产妇不良反应的效果

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目的 卡前列素氨丁三醇是剖宫产术后常用用于减少产后出血的药物，但其不良反应对患者、术者和麻醉医生都产生不同程度的影响，本文探究在椎管内麻醉下小剂量艾司氯胺酮用于预防卡前列素诱发孕产妇主要不良反应的安全性和有效性。
方法 本研究为随机对照研究，收集在郑州大学第一附属医院 2023 年 6 月至 2023 年 12 月椎管内麻醉下行剖宫产手术孕产妇 90 例。随机分为 2 组：艾司氯胺酮组（E 组）和对照组（C 组）每组 45 例。L2-3 间隙行腰-硬联合麻醉（CSEA），将麻醉平面控制在 T5~7。新生儿娩后在子宫体肌注卡前列素氨丁三醇后即刻 Esk 组静脉注射 5mg/ml 艾司氯胺酮 0.04ml/kg 和 C 组静脉注射生理盐水 0.04ml/kg。记录离手术室前孕产妇恶心呕吐、胸闷事件，同时记录入室(T0)、静脉注射艾司氯胺酮前 1min(T1)、给药后 2min(T2)、5min(T3)、15min(T4)、30min(T5)时 MAP、HR、SPO2、Ramsay 评分，孕产妇离开手术室满意度评分，间羟胺、阿托品、乌拉地尔的使用量。
结果 两组患者的年龄、BMI、手术时间、输液量、出血量、尿量之间没有统计学差异（P>0.05），与 C 组相比，Esk 组恶心呕吐发生率降低且恶心呕吐的严重程度降低(P＜0.05)；Esk 胸闷的发生率降低(P＜0.05)；与 T0 时相比，T2、T3、T4 时 Esk 孕产妇 Ramsay 评分高（P＜0.05）；两组 HR、MAP 变化趋势相同；与 C 组相比，T2、T3 时 E 组 MAP 显著升高（P＜0.05），其余时间点两组之间没有统计学差异；与 C 组相比，T2 时 E 组 HR 显著升高（P＜0.05），其余时间点两组之间没有统计学差异；与 C 组相比，T2 时 E 组 HR 显著升高（P＜0.05）；与 C 组相比，T3、T4 时 E 组 SPO2 显著升高（P＜0.05），其余时间点两组之间没有统计学差异；术中两组低血压的发生率没有统计学差异，出手术室时 Esk 组孕产妇的满意度评分高（P＜0.05），术中间羟胺、乌拉地尔、阿托品的使用量没有统计学差异（P>0.05）。
结论 静脉注射小剂量艾司氯胺酮可以降低卡前列素氨丁三醇引起的恶习呕吐、胸闷症状，提高孕产妇围术期的满意度。

PU-0795

羊水池深度与锁骨下静脉直径的比值对预测剖宫产产妇发生仰卧位低血压综合征的价值

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目的 通过使用超声测量羊水池深度与锁骨下静脉直径的比值来探讨其对预测仰卧位低血压综合征（SHS）的价值，为预测剖宫产术术中产妇仰卧位低血压综合征的发生提供新思路。
方法 选择 2022 年 3 月—2022 年 12 月在弋矶山医院接受择期剖宫产手术的产妇 59 例，年龄≥20 岁、孕周≥37 周且为单胎、ASA 分级为Ⅱ级，所有产妇均符合蛛网膜下腔阻滞适应症，产妇术前至少禁食 8 小时、禁饮 4 小时。入室后于麻醉前运用超声测量产妇的最大羊水池深度 DVP 和锁骨下静脉最大直径 SCV，常规开放左上肢静脉通路，然后以 15 mL/min 的速度滴注羟乙基淀粉，15min 后产妇取左侧卧位，行脊髓麻醉，脊髓麻醉选择 $L_{3\text{-}4}$ 间隙，见脑脊液流出，代表穿刺成功，匀速推注布比卡因 5.5-6.5 mg+舒芬太尼 2.5 ug，麻醉平面控制在 T_8-T_6。根据麻醉后产妇是否发生 SHS，将产妇分为 SHS 组和非 SHS 组，运用 Pearson 相关分析和 Spearman 相关分析研究 DVP、SCV、DVP/SCV 与脊髓麻醉后平均动脉压 MAP 之间的关系，同时采用 ROC 曲线（receiver operating characteristic curve，ROC）评估 DVP、SCV、DVP/SCV 对 SHS 预测值的影响。
结果 研究开始时共纳入了 59 名产妇，研究过程中排除了 8 名产妇，因此共对 51 名产妇的试验数据进行了统计分析。SHS 组共有 19 例，仰卧位低血压综合征发生率约为 37.2%。1、两组产妇一般资料（包括年龄、身高、体重）差异无统计学意义（P＞0.05）；2、麻醉前两组产妇的基线收缩压 SBP、平均动脉压 MAP 比较差异无统计学意义（P＞0.05），而两组的基线心率 HR 比较差异有统计学意义（P＜0.05）；3、蛛网膜下腔阻滞后，SHS 组的 SBP、MAP 明显低于非 SHS 组，其 HR 明显快于非 SHS 组，差异有统计学意义（P＜0.0001）；4、两组产妇羊水池最大深度 DVP、锁骨下静脉最大直径 SCV 以及两者的比值 DVP/SCV 比较差异有统计学意义（P＜0.05）；5、DVP、SCV、DVP/SCV 预测 SHS 的 ROC 曲线下面积（AUC）分别为 0.720、0.810、0.909，其预测 SHS 的截断值分别为 4.39cm（敏感度为 78.9%，特异性为 68.7%）、0.61cm（敏感度为 94.7%，特异性为 59.4%）、8.26（敏感度为 89.5%，特异性为 84.4%）。
结论 产妇的羊水池深度、锁骨下静脉直径以及两者之间的比值对预测剖宫产术中发生仰卧位低血压综合征具有一定的临床价值。

PU-0796

两种预测模型在椎管内分娩镇痛产妇发热风险预测的价值

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3. 四川省妇幼保健院产科
4. 四川省妇幼保健院妇女保健科

目的 构建两种椎管内分娩镇痛产妇发热预测模型，为临床不同阶段预测产时发热提供依据
方法 选择 2021 年 1 月至 2022 年 4 月行分娩镇痛的产妇 2821 例，年龄≥18 岁，ASA 分级Ⅱ级。根据产妇是否出现产时发热（T≥38.0℃）分为发热组（n=241）与未发热组（n=2580）。采用逐步 Logistic 回归筛选独立危险因素，构建两种预测模型：分娩镇痛前产妇（B,before）预测模型和全分娩过程（W,whole）预测模型，绘制列线图，分别通过受试者工作特征曲线、校准曲线及决策曲线验证模型的区分度、一致性及临床实用性。选择 2022 年 5 月至 2022 年 12 月同一医院行分娩镇痛的产妇 1419 例作为验证组，通过 R 语言进行模型的外部验证。
结果 本研究共纳入 4240 例产妇，321 例出现产时发热，总发生率为 7.5%。逐步 Logistic 回归分析显示，B 模型中，年龄越大、初产妇、贫血及中性粒细胞计数(NEUT)越高及预估新生儿体重越重是产时发热独立危险因素，身高越高和分娩镇痛前宫口越大是保护性因素（P＜0.05）；W 模型中，年龄越大、初产妇、贫血,中性粒细胞计数(NEUT)高,预估新生儿体重越重及总产程长是产时发热独立危险因素，身高越高、分娩镇痛前宫口越大是保护性因素（P＜0.05）。据此分别构建列线图，B 和 W 预测模型的受试者工作特征曲线下面积分别为 0.704（95% CI 0.672-0.736）和 0.737（95%

CI 0.707-0.768），经 Hosmer-Lemeshow 检验得到 P 值分别为 0.661 和 0.163，C 指数分别为 0.704 和 0.737，校正 C 指数分别为 0.695 和 0.728。验证组受试者工作特征曲线下面积分别为 0.688（95%CI:0.632-0.745）和 0.736（95%CI:0.682-0.789）。

结论 B 模型能够较好的在产妇接受分娩镇痛前预测发热的发生风险，但预测效能弱于 W 模型。W 模型可以在分娩镇痛后更好预测发热风险。

PU-0797

舒芬太尼硬膜外腔注射应用于阴道分娩潜伏期的镇痛效果观察

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目的 探索舒芬太尼硬膜外腔注射应用于经阴道分娩潜伏期对初产妇的镇痛效果、产程及母婴结局的影响。

方法 选择 2024 年 1 月 1 日-2024 年 3 月 31 日计划经阴道分娩且有镇痛需求的初产妇 124 例，其中 40 例产妇参照偏倚硬币序贯（BCUD）法确定潜伏期硬膜外注射舒芬太尼的最适剂量，随后将 84 例产妇用随机数字法分为对照组（C 组）和实验组（S 组）。S 组产妇提出镇痛需求且宫口＜2cm 立即实施镇痛，潜伏期硬膜外腔注射舒芬太尼进入活跃期脉冲注射 0.1%罗哌卡因辅助镇痛；C 组产妇待宫口＞3cm 后行分娩镇痛，硬膜外腔注射 0.1%罗哌卡因+0.5ug/ml 舒芬太尼混合液。观察并记录两组产妇的视觉疼痛模拟（VAS）评分、焦虑自评量表（SAS）评分、产妇满意度、镇痛药物消耗量、产程持续时间及母婴结局。

结果 通过序贯法得出的潜伏期硬膜外注射舒芬太尼的 ED90 是 0.2ug/kg(95%CI,0.18ug/kg,0.21ug/kg)。与 C 组比较，S 组产妇的满意度更高，第一产程明显缩短且镇痛药物消耗总量明显降低（P＜0.05）；两组产妇的 VAS 评分和 SAS 评分、新生儿 Apgar 评分、脐静脉血气及产妇结局无统计学差异（P＞0.05）；两组产妇均未发生皮肤瘙痒、恶心、呕吐、低血压、寒战等不良反应。

结论 阴道分娩潜伏期硬膜外腔注射舒芬太尼可为初产妇提供满意的镇痛效果，且明显缩短第一产程，不影响母婴结局，产妇满意度更高，推荐对初产妇阴道分娩潜伏期硬膜外腔注射舒芬太尼的 ED90 是 0.20ug/kg。

PU-0798

单次硬膜外注射小剂量艾司氯胺酮对剖宫产围术期镇静镇痛的影响

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目的 观察单次硬膜外注射小剂量艾司氯胺酮对剖宫产围术期镇静镇痛效果的影响。

方法 选择腰硬联合麻醉下行子宫下段剖宫产术的产妇 100 例为研究对象，随机分为两组（n = 50）：吗啡组（M 组）和艾司氯胺酮组（K 组）。均在新生儿（Apgar 评分≥8 分）娩出，断脐胎盘取出 5 min 后，K 组经硬膜外导管给予艾司氯胺酮 20 mg+地塞米松 5 mg+罗哌卡因 9 mg 用 0.9%氯化钠稀释至 6 mL；M 组经硬膜外导管给予吗啡 2 mg+地塞米松 5 mg+罗哌卡因 9 mg 用 0.9%氯化钠稀释至 6mL。记录两组硬膜外给药后 5 min、术毕时、术后 24 h 和术后 48 h 这四个时间点产

妇的 VAS 评分及两组术后补充镇痛药使用情况，记录两组硬膜外给药后 5 min 及术毕时产妇的 Ramsay 评分，观察两组产妇恶心呕吐、头晕头昏、幻视、噩梦、复视、大小便困难、皮肤瘙痒等不良反应，比较两组产妇对麻醉和镇痛的总体满意度。

结果 两组在硬膜外给药后 5 min、术毕时、术后 24 h 和术后 48 h 的 VAS 评分均无统计学差异（P>0.05）；两组术后首次使用补充镇痛药物的时间以及使用例数无统计学差异（P>0.05）。硬膜外给药后 5min 时 K 组 Ramsay 评分明显高于 M 组（P<0.05），术毕两组 Ramsay 评分比较无统计学意义（P>0.05）。两组恶心呕吐、头晕头昏、幻觉、噩梦、复视等发生无统计学差异（P>0.05），大小便困难及皮肤瘙痒发生 M 组明显高于 K 组（P<0.05）。两组产妇对麻醉和镇痛的总体满意度无统计学差异（P>0.05）。

结论 艾司氯胺酮与吗啡单次硬膜外应用在剖宫产围术期均有良好的镇痛效果，且艾司氯胺酮单次硬膜外应用对剖宫产术中镇静效果及减少术后不良反应发生方面优于吗啡。

PU-0799

右美托咪定用于产科麻醉的研究进展

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目的 产科麻醉不仅需要缓解产妇焦虑，减轻产妇疼痛，同时还应考虑产妇早期快速康复以及子代的生长发育。右美托咪定在临床麻醉中应用广泛，具有镇静镇痛、预防寒战、胃肠道保护等作用。因此本文综述了右美托咪定在产科麻醉的研究进展，旨在为右美托咪定用于产科麻醉提供参考，为母婴带来更大益处。

方法 总结归纳近年来领域内相关文献，对右美托咪定用于产科麻醉的研究进展进行综述。

结果 1 剖宫产术中应用：

1.1 术中镇静镇痛 右美托咪定（Dex）与其他麻醉药物合用时具有协同作用。一项针对腰麻下剖宫产术产妇的研究结果显示，静脉输注 Dex 后产妇 VAS 得分较对照组降低，Ramsay 镇静评分升高，且血流动力学更为稳定，表明 Dex 静脉使用时，有良好的镇静镇痛效果；另一项研究中，研究人员在硬膜外使用罗哌卡因、Dex 用于剖宫产术，加入 Dex 可减轻内脏牵拉反应，并降低了低血压、术中寒战、口渴等不良反应的发生率；2022 年一项研究在蛛网膜下腔使用了 Dex 辅助布比卡因，结果显示 Dex 起到了良好的镇静镇痛效果，并有研究测定了蛛网膜下腔输注 Dex 作为 8mg 和 10mg 罗哌卡因辅助用药时的 ED50 分别为 6μg 和 3μg。

1.2 术后镇痛 一项关于不同浓度的 Dex 与布托啡诺联合用于剖宫产术后镇痛的有效性结果提示，静脉使用 Dex 联合布托啡诺用于剖宫产术后镇痛有效；2024 年一项研究结果显示在硬膜外应用 Dex 辅助下，罗哌卡因镇痛的持续时间可延长至 24h，对产妇术后镇痛有效；另一项研究在术后给予 Dex 辅助布比卡因用于双侧腰方肌阻滞，结果显示加入 Dex 后首次要求补救镇痛时间延长，补救剂量减少。

1.3 硬脊膜穿破后头痛的治疗 硬脊膜穿破后头痛（PDPH）是产科麻醉常见并发症之一。2024 年一项研究比较了 Dex 与芬太尼雾化吸入治疗剖宫产术后 PDPH，结果显示使用 Dex 组疼痛评分显著降低；另一项研究比较了雾化吸入 Dex 与新斯的明合并阿托品治疗 PDPH 的效果，亦是 Dex 的镇痛效果更好。

1.4 防治寒战 2024 年发表的一项研究结果显示，在剖宫产术中静脉输注 Dex，可以有效治疗术中寒战；另一项研究在硬膜外输注 Dex 作为辅助用药时，可减轻产妇在剖宫产术中的寒战反应；一项关于 Dex 预防剖宫产术中寒战反应不同给药时机的研究结果表明在腰硬联合麻醉前 15min，静脉给药 Dex 预防寒战效果最为显著。

1.5 胃肠道保护 剖宫产术中，由于牵拉内脏引起神经反射、失血等因素，产妇常有胃肠道症状。有研究表明剖宫产术前 10 分钟静脉输注 Dex1μg/kg，并全程维持输注可有效降低胎儿娩出后恶心呕吐的发生。

2 分娩镇痛
一项 meta 分析发现 Dex 联合局麻药用于分娩镇痛可显著降低产妇的 VAS 评分；2023 年的一项研究结果显示 Dex 在分娩镇痛中可有效减轻产妇疼痛并缩短产程，且不影响母婴结局。另外有研究表明在分娩镇痛前，鼻内点滴 Dex（0.5μg/kg）会使局麻药更快起效，并减少硬膜外穿刺疼痛。2024 年发布的一项实验结果表明辅用 Dex 所需罗哌卡因量更少，且瘙痒发生较芬太尼组减少。
结论 右美托咪定（Dex）作为一种麻醉辅助用药，在剖宫产手术和分娩镇痛中都发挥出了良好的镇静镇痛效果，同时可治疗硬脊膜穿破后的头痛、防治寒战与瘙痒反应，以及保护胃肠道功能。随着医学研究的进步和发展，Dex 与产科麻醉应用相关的高质量研究会逐渐增多，并拥有更广阔的应用前景。

PU-0800

The Value of the Optic Nerve Sheath Diameter (ONSD) in Predicting Postdural Puncture Headache (PDPH): A Prospective Observational Study

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The Value of the Optic Nerve Sheath Diameter (ONSD) in Predicting Postdural Puncture Headache (PDPH): A Prospective Observational Study
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Objectives: To explore whether ultrasound measurement of optic nerve sheath diameter (ONSD) as a predictor of PDPH can be a reliable tool supported by reliable protocols and data.
Methods: This prospective observational study was performed in 156 patients undergoing cesarean section (CS).All pregnant women aged 18-40 years undergoing cesarean delivery under combined spinal-epidural anesthesia met the inclusion criteria. Exclusion criteria included patient refusal, ASA class III and IV patients, hypertensive disorders during pregnancy, any contraindications to local anesthesia (e.g., local infection at the injection site), coagulation disorders, history of allergy to the local anesthetics used, eye disease or optic nerve damage, and conditions that could lead to changes in intracranial pressure (cerebrovascular disease, hemorrhage, intracranial tumors, etc.).Inform all patients to lie in a supine position with their eyes closed. Place a film over their eyes to isolate the gel, as it may cause discomfort to the patient. After covering the film with the gel directly above the eye, the ultrasound probe is placed on the pre-applied gel. The optic nerve sheath is measured 3 mm behind the eye . Two measurements are taken on the lateral of each eye 4 times in total, and the average is recorded as the final value .The patient's ONSD was recorded before anesthesia (T0), 10 minutes after anesthesia (T1), at the end of the operation (T2), at the first postoperative day (T24), at the second postoperative day (T48), and the third postoperative day (T72). During the 3-day follow-up, the patients were evaluated, identified, and divided into a PDPH group and a non-PDPH group. Age, weight, height, ASA, lumbar puncture location, and the number of lumbar puncture attempts were also recorded. We mainly analyzed the changes and differences between the 2 groups of ONSD.
Results: A total of 163 patients were recruited for this study. Seven patients were excluded: 5 refused to participate in the study, and 2 met the exclusion criteria. No patient was excluded from follow-up due to missing data. One hundred fifty-six of whom completed the full study and follow-up. The clinical course of these 156 women during the study period is shown in Fig. 1.The ages of patients ranged from 21 to 40 years, with a mean of 30.54 ± 4.00 years. All patients com-pleted the 3-day follow-up. Twenty-four patients (15%) developed PDPH, and statistical analysis showed no sig-nificant differences between the PDPH and non-PDPH groups in terms of age, height, weight,

ASA, lumbar puncture space, or number of lumbar puncture attempts (Table 1).There was no statistically significant difference in ONSD between the PDPH group and the non-PDPH group at T0 (P = 0.346) and T1 (P = 0.181). There was a statistically significant difference in ONSD between the 2 groups at T2 (P < 0.0001), T3 (P < 0.0001), T4 (P < 0.0001), T5 (P < 0.01), with patients in the PDPH group having a significantly smaller ONSD. Compared with T0, the ONSD of T1 decreased significantly in the PDPH group (P < 0.0001) and the non-PDPH group (P < 0.0001) (Fig. 2).We found that the risk of PDPH was significantly higher in women who did not show an upward trend in ONSD at T2. Exposure factors (with no recovery in ONSD at T2) were strongly associated with PDPH (Relative Risk [RR] 5.022; 95 confidence interval [CI] 3.343 to 7.508, P < 0.0001) (Fig. 3).The results of the ROC analysis of the ONSD at different time points for predicting PDPH are presented in Fig. 4 and Table 2; in summary, ONSD at T24 was the most accurate parameter for predicting PDPH (Area Under Curve [ACU] 0. 9787, P < 0.0001, cutoff value 0.40 cm, sensitivity 92%, specificity 94%) (Fig. 4, Table 2). Twenty-four patients (15%) developed PDPH. The ONSD was significantly lower in the PDPH group than in the non-PDPH group at T2, T24, T48, and T72. All patients showed a significant reduction in ONSD at T1 compared to T0. Women whose ONSD continued to fall without recovery from T0 to T2 were more likely to experience PDPH (RR 5. 022; 95 CI 3.343 to 7.508). The ONSD at T24 was the best predictor of PDPH (ACU 0. 9787, 95 CI 0.9578 to 0.9996), with a cutoff value of 0.40 cm (sensitivity 92%, specificity 94%).
Conclusions: In conclusion, our findings demonstrate a potential correlation between ultrasound measurements of ONSD and PDPH that has not been reported before. This may later become a useful predictor of PDPH and deserves further study. We also predicted a cutoff value for ONSD, which is not present in the current knowl-edge base. Of course, this will require a large number of clinical studies to validate our findings and further improve them.

PU-0801

椎管内麻醉阻滞平面测定相关客观指标

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目的 探索符合 ERAS 理念的无创性麻醉阻滞平面测定方法
方法 ERAS 提倡的无创舒适化医疗理念在国内越来越受推广和普及，无创法测定椎管内麻醉阻滞平面给广大患者带来了很多的益处，触诊法是用指腹由阻滞区向非阻滞区轻按腹壁滑动，通过体会皮肤湿度、摩擦阻力、及腹壁松弛度等改变来判断阻滞区域与非阻滞区域界限。
结果 椎管内麻醉阻滞平面测定方法越来越多，技术也是越来越先进，Kehlet 于 1997 年提出的 ERAS 理念追求的宗旨就是无应激、无疼痛、无风险，以提升患者舒适化医疗程度。而无创性麻醉阻滞平面测定方法的应用正符合 ERAS 理念。尤其是触摸法在 ERAS 理念基础上还具有零成本消耗、客观、快速、准确、无刺激、无损伤、实用、技术要求更是简单的优点，这些优点是目前针刺法和无创麻醉平面测定器等先进技术设备不具有的。
结论 触摸法在 ERAS 理念基础上还具有零成本消耗、客观、快速、准确、无刺激、无损伤、实用、技术要求更是简单的优点。触摸法在临床工作中的使用性和实用性，是值得推广的。

PU-0802

Proteomic analysis of cerebrospinal fluid in parturients predisposing postpartum depression

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Background: Postpartum depression (PPD) is a serious and common neuropsychiatric disorder. Existing diagnosis tools, such as the Edinburgh Postnatal Depression Scale (EPDS) and the Patient Health Questionnaire-2 (PHQ-2) are relatively subjective and applied after the onset of depression. At present, there is an absence of an objective biological index that can be used to predict the development of PPD.
Methods: This study was performed among parturients scheduled for elective cesarean section with spinal anesthesia. We screened the parturients with prenatal depression 1 day before surgery with EPDS score and collected their cerebral spinal fluid (CSF) when spinal anesthesia was performed. Then, EPDS was used to screen maternal PPD. Women diagnosed with both prenatal depression and PPD were categorized as the PPD group. While those without prenatal depression or PPD were grouped into healthy controls. Thereafter, CSF proteomic was performed with liquid chromatography-tandem mass spectrometry (LC-MS/MS) and compared.
Results: We identified 28 upregulated and 126 downregulated proteins in the CSF of PPD women . The significantly enriched protein domain was a leucine-rich repeat. Pearson's correlation analysis suggested that GUCA2A, NQO2 were positively correlated, and DIPK1C, RELT, and SNCB were negatively correlated with EPDS depressive score ($p<0.05$). All of these proteins presented a AUC ranging from 0.860 to 0.960.
Conclusions: GUCA2A and NQO2 were positively correlated, and DIPK1C, RELT, and SNCB were negatively correlated with EPDS depressive score, serving as potential biomarkers for PPD prediction. However, such results are not useful for those not undergoing cesarean section with CSF not available.

PU-0803

纳布啡复合右美托咪定用于剖宫产术中提升产妇舒适性的临床研究

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目的 探讨应用纳布啡复合右美托咪定是否能提升产妇在剖宫产术中的舒适性。
方法 选取 2022 年 7 月-2023 年 5 月于南京医科大学附属泰州人民医院行剖宫产术的产妇 120 例。将 120 例产妇按 Excel 生成随机数字法分为 3 组（每组 40 例）：纳布啡复合右美托咪定组（ND 组）、纳布啡组（N 组）、右美托咪定组（D 组）。产妇入室后行蛛网膜下腔阻滞，将 0.75%的布比卡因用脑脊液稀释至 0.5%，推注 9-10 mg。通过控制注药速度及药量，将感觉阻滞平面控制在 T6。取出胎儿夹闭脐带后，ND 组：静脉注射纳布啡 0.2 mg/kg，右美托咪定 1 μg/kg 在 10 min 内泵注完毕，随后以 0.7 μg/kg/h 维持泵注；N 组：静脉注射纳布啡 0.2 mg/kg，与右美托咪定同样的速度泵注生理盐水；D 组：右美托咪定 1 μg/kg 在 10 min 内泵注完毕，随后以 0.7 μg/kg/h 维持泵注，与纳布啡同样的药量静脉注射生理盐水。在取出胎儿后，三组均静脉注射帕洛诺司琼 0.25 mg。记录三组产妇牵拉反应分级，术中恶心呕吐发生情况，Ramsay 镇静评分，记录术中五个不同时刻的生命体征（心率、收缩压、舒张压、血氧饱和度），如下：患者入室 T0，椎管内麻醉 10 min 后 T1，取出胎儿时 T2，静脉注射镇静镇痛药物 10 min 后 T3，静脉注射镇静镇痛药物 20 min 后 T4。

记录术后 24 小时休息时切口痛，休息时宫缩痛，运动时切口痛，运动时宫缩痛的 NRS 疼痛评分，40 项恢复质量评分（QoR-40），睡眠质量评分，舒适度评分，泌乳始动时间，泌乳量评分，白细胞介素-6（IL-6）和 C 反应蛋白（CRP）水平，以及术后 24 小时的不良反应发生情况（恶心、呕吐、头晕、嗜睡、寒战、尿潴留等）。

结果 1. 与 N 组相比，D 组产妇术中牵拉反应分级无统计学差异，ND 组产妇术中牵拉反应分级更低，差异有统计学意义(P<0.05)。与 D 组相比，ND 组产妇术中牵拉反应分级更低，差异有统计学意义(P<0.05)。

2. 与 N 组相比，D 组产妇术中恶心呕吐的发生率无统计学差异，ND 组产妇术中恶心呕吐的发生率更低，差异有统计学意义(P<0.05)。与 D 组相比，ND 组产妇术中牵拉反应分级更低，差异有统计学意义(P<0.05)。

3. 与 N 组相比，ND 和 D 组产妇术中 Ramsay 镇静评分更高，差异有统计学意义(P<0.05)，D 组和 ND 组产妇术中的 Ramsay 镇静评分无统计学差异。

4. 与 N 组相比，ND 组产妇在 T3 和 T4 时刻的收缩压更高，差异有统计学意义（P<0.05）。N 组和 D 组在取出胎儿后的收缩压无统计学差异。

5. 与 N 组相比，ND 组产妇在 T3、T4 时刻的舒张压更高，差异有统计学意义(P<0.05），与 N 组相比，D 组产妇在 T4 时刻的舒张压更高，差异有统计学意义(P<0.05)。

6. 三组产妇五个不同时刻的心率和血氧饱和度的比较，均无统计学差异。

7. 三组产妇术后 24 小时的 NRS 疼痛评分，QoR-40 评分，泌乳量评分，泌乳始动时间，睡眠质量评分，舒适度评分，IL-6，CRP 水平的比较，均无统计学差异。

8. 三组产妇术后恶心，呕吐，头晕，寒战，嗜睡，尿潴留等不良反应的发生率比较均无统计学差异。

结论 纳布啡复合右美托咪定用于剖宫产术中明显抑制了牵拉反应，减少了术中恶心呕吐的发生率，提供了更好的镇静，不增加术后不良反应的发生，大大提升了产妇的舒适性。

PU-0804

Landscapes of bacterial and metabolic signatures and their interaction in postpartum depression

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Gut microbiome disturbances have been implicated in mental diseases; however, gut microbiota in Postpartum Depression (PPD), a unique subtype of major depressive disorder, remains largely elusive. Here, we integratively profiled gut microbial functional and metabolic alterations in PPD patients and investigated the underlying mechanisms. We use shotgun sequencing to characterize the faecal metagenome of 99 medication-free postpartum depression patients and 102 controls and observe compositional and functional alterations in the metagenomes of women with PPD, and develop a mathematical model based on metagenomic profiles that identified PPD with high accuracy. PPD patients had significant alterations in faecal microbiome composition compared with healthy controls characterized by decreased bacterial richness and altered microbiome composition. Gut microbiota from women with PPD induced depression-like and anxiety-like behaviors in antibiotic-treated mice. This study is the first to characterize shotgun metagenomic data from PPD patients and evaluate gut microbiota-based biomarkers, which may be helpful in PPD diagnosis and predicting treatment outcome. Taken together, these data reveal perturbed microbial functional and metabolic traits in PPD, providing new leads for understanding the pathophysiology of PPD.

PU-0805

Pregnancy with complete heart block--an emergency cesarean section: A case report

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The incidence of complete heart block during pregnancy is infrequent. Therefore, its management lacks standardization and necessitates a collaborative strategy among a multidisciplinary team, including obstetrician, cardiologist, anesthesiologist, and neonatologist. In this report, we describe the successful medical management of a 28-year-old pregnant female with complete heart block（CHB）who underwent emergency cesarean section under general anesthesia following the implementation of temporary pacemaker. The patient had no history of regular antenatal care, and CHB was first identified upon this admission. A healthy female baby was delivered, and the patient was discharged from the hospital on the seventh postoperative day in satisfactory condition.

PU-0806

Comparison of fever in parturient with epidural analgesia and supplemental magnesium for labor analgesia

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Background: maternal fever during labor is related to the outcome of multiple adverse reactions. The cause of intrapartum fever may be infectious or inflammatory. Increased levels of interleukin and other inflammatory markers are associated with maternal fever. Magnesium has been shown to reduce interleukin-mediated fever in animal models. However, it remains unclear whether maternal fever risk is superior to epidural analgesia when magnesium is used for labor analgesia.
Methods: the preferred reporting items (PRISMA-RRB- guidelines for systematic reviews and meta-analyses were used to conduct systematic reviews and meta-analyses from inception Februaryuary 2021 by searching PubM EmBASE, and Cochrane Centralt Registrystry of controlled trials, to derive the overall risk ratio -RRB-RR) and 95% confidence interval (CI% CI) . All Randomized controlled trial (rcts) were included, and these trials examined the risk of maternal fever during delivery compared with epidural labor analgesia and magnesium supplementation combined with labor analgesia.
Results: a total of 632 studies were screened and 5 rcts were identified, involving 1263 patients. Compared with epidural analgesia, there was a reduced incidence of maternal fever during delivery with magnesium supplementation (hazard ratio [RR]0.41, P = 0.03, i2 = 45%) , compared with delivery with magnesium supplementation; Maternal fever was also reduced with epidural analgesia alone (hazard ratio [RR]0 · 48, P = 0 · 02, i2 = 49%) . After exclusion of the 2 trials by heterogeneity analysis, there was no difference in the incidence of fever at delivery between the magnesium supplementation group and the epidural analgesia group alone. Satisfaction with epidural analgesia was lower in the natural delivery group than in the epidural group (-10.3[11.59, -7.21] , P & Lt; 0.00001, i2 = 0%) . The incidence of fever during the second stage of labor, at delivery, and 3 hours after delivery was significantly higher in the epidural analgesia group than in the magnesium supplementation group (hazard ratio, 2.61[1.53,4.76] , P = 0.0002, i2 = 56%) . Apgar score was not statistically significant at 5 min of epidural analgesia alone or with magnesium supplementation for labor analgesia.
Conclusion: magnesium may have a protective effect on intrapartum fever. The maternal risk of

fever with magnesium supplementation during labor analgesia was lower than that of epidural analgesia.

PU-0807

The effect of dexmedetomidine application in cesarean section of preeclampsia women on postpartum and neonatal

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Objective To investigate the clinical efficacy of dexmedetomidine application during cesarean section in preeclamptic women and its effect on women and newborns.
Methods Five hundred preeclamptic women with plans to undergo cesarean section by lower uterine incision under combined spinal-epidural anesthesia whose ASA grades were I or II were selected. Patients were randomly divided into Group D and Group N, with 250 cases per group. In Group D, dexmedetomidine was pumped intravenously at 0.5 μg/kg after induction of combined spinal-epidural anesthesia. Pumping was completed within 10 min and continued at 0.5 μg/kg/h. The drug was stopped after peritoneal closure. In Group N, the same amount of 0.9% sodium chloride was pumped after induction of combined spinal-epidural anesthesia. The mean arterial pressure (MAP), heart rate (HR), cardiac output (CO), stroke volume (SV), Ramsay sedation scale score, and TNF-α, IL-6 and IL-10 levels were compared between the two groups before surgery (T0), at skin incision (T1), during fetal delivery (T2), and at completion of surgery (T3). After delivery, umbilical venous blood was drawn for blood gas analysis. Newborn 1- and 5-min Apgar scores were recorded, and postpartum uterine contraction assessments were performed.
Results The Ramsay scores were higher in Group D than in Group N at T1, T2 and T3, and the MAP and HR were lower in Group D than in Group N at T2 ($P<0.05$). Within-group comparisons showed that compared to T0, the TNF-α, IL-6 and IL-10 levels in each group increased at T1~T3 ($P<0.05$). Between-group comparisons showed no significant differences in the TNF-α, II-6 and IL-10 levels at T0 ($P>0.05$); compared with Group N, Group D had significantly decreased TNF-α and IL-6 levels at T1~T3 but significantly increased IL-10 levels ($P <0.05$). There was no statistically significant difference in the umbilical vein blood gas analysis or the 1- or 5-min newborn Apgar scores after birth between the two groups ($P>0.05$). Compared with Group N, Group D had a higher postpartum uterine contraction score ($P<0.05$). Compared with Group N, Group D had reduced incidences of nausea, vomiting, chest tightness, and shivering during surgery ($P<0.01$). There was no significant difference in the incidence of facial flushing or hypoxemia ($P>0.05$) between the two groups during surgery.
Conclusion Intravenous infusion of low-dose dexmedetomidine (loading at 0.5 μg/kg after induction of combined spinal-epidural anesthesia, followed by 0.5 μg/kg/h infusion until completion of peritoneal closure) is safe and effective during cesarean delivery for preeclamptic women with hypertension in pregnancy and has no obvious adverse effects on mothers and babies.

PU-0808

Elevated Pulse Index Values and Interleukin-6 Levels as Risk Factors for Epidural-Related Maternal Fever: a Nested Case-Controlled Study

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Background: Epidural-related maternal fever (ERMF) is increasingly recognized for its adverse impact on labor and neonatal outcomes. Studies have pointed to various non-infectious factors influencing ERMF, though findings are inconsistent.
Objective: This study aimed to investigate whether pulse index (PI) and IL-6 were the risk factors for ERMF and to assess their interactive biological effect.
Design:
An unmatched nested case-control study was based on a prospective cohort study.
Setting
The Affiliated Hospital of Jiangsu University. The study was conducted from June 2020 to April 2021.
Participants:
A total of 100 parturients targeted primiparous women at term with a singleton pregnancy who were administered epidural labor analgesia, and categorized as American Society of Anesthesiologists (ASA) grade II.
Main outcome measures
To identify potential risk factors for ERMF, univariate analyses were conducted on basic characteristics of the parturients and delivery process.
Results: Analysis revealed that high levels of IL-6 at T3 and PI30 were significantly associated with an increased risk of ERMF. The odds ratios (ORs) for IL-6 at T3 and PI30 were 5.031 and 3.697, respectively. No significant interaction between IL-6 at T3 and PI30 on ERMF incidence rate was found.
Conclusion: Elevated levels of PI30 (≥9.30) and T3 IL-6 (≥50.07 pg/mL) are independent risk factors for ERMF. The study found no substantial biological interaction between the two factors.

PU-0809

瑞芬太尼静脉自控镇痛在产妇分娩中的应用效果及对母婴结局的影响

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目的 探究在产妇分娩中应用瑞芬太尼静脉自控镇痛的效果及对母婴结局的影响。
方法 将本院 2021 年 9 月至 2022 年 9 月之间收治的 100 例产妇纳入研究。按其分娩过程中麻醉方式的不同将此 100 名产妇平均分为对照组和观察组。观察组产妇采用瑞芬太尼静脉自控镇痛方案进行镇痛，对照组产妇采用硬膜外阻滞自控镇痛，观察对比两组患者的 VAS 评分、不良反应发生率、临床指标及母婴结局。 0%，组间差异有显著性(P＜0. 05)。结论：在产妇分娩中应用瑞芬太尼静脉自控镇痛具有较好的效果，且母婴不良结局发生率低，值得推广应用。
结果 观察组产妇总产程时间明显少于对照组产妇，差异具有显著性(P＜0. 05)，观察组的产妇相

较于对照组镇痛后 30 min、60 min、120 min 具有更低的 VAS 评分，且观察组患者的不良反应发生率明显低于对照组患者，其差异均具有显著性(P＜0. 05); 观察组产妇分娩中的镇痛效果优良率为 94.0%，对照组产妇为 80.0% ，其组间差异具有显著性(P＜0. 05); 两组产妇的自然分娩率对比中，观察组明显高于对照组，其差异具有显著性(P＜ 0. 05)，新生儿在出生后 1 min 和 5 min 的 Apgar 评分比较，组间差异无显著性(P＞0. 05);观察组和对照组产妇产后不良反应总发生率分别为 8.0%和 22. 0%，组间差异有显著性(P＜0. 05)。

结论 在产妇分娩中应用瑞芬太尼静脉自控镇痛具有较好的效果，且母婴不良结局发生率低，值得推广应用。

PU-0810

纳布啡，吗啡联合对乙酰氨基酚多模式镇痛对剖宫产产妇术后快速康复的影响

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目的 探讨纳布啡，吗啡联合对乙酰氨基酚多模式镇痛对剖宫产产妇术后快速康复的影响。

方法 根据纳入排除标准纳入我院接诊剖宫产产妇 200 例，随机分为对照组和观察组各 100 例。观察组采用多模式术后镇痛方案：手术结束前 15-20min 硬膜外单次给予吗啡 2mg，术毕连接静脉自控镇痛泵，泵内纳布啡 1.0mg/kg 盐酸昂丹司琼注射液 4mg，用生理盐水稀释至 100mL，背景输注量 2mL/h，单次剂量 2mL，锁定时间 30min。术毕静脉滴注对乙酰氨基酚 50ml。对照组仅采用术后静脉自控镇痛：术毕连接静脉自控镇痛泵，泵内纳布啡 1.0mg/kg+盐酸昂丹司琼注射液 4mg，用生理盐水稀释至 100mL，背景输注量 2mL/h，单次剂量 2mL，锁定时间 30min。术毕静脉滴注生理盐水 50ml。观察不同时间点 VASR 评分、VAS 评分、术后 48h 镇痛效果满意度、术后恢复情况、72h 纯母乳喂养率、术后 48h 不良反应发生情况、汉密尔顿焦虑量表（HAMA）的评分。

结果 观察组术后不同时间点 VASR 评分低于对照组同时期，数据间对比差异显著（P＜0.05）；观察组术后不同时间点 VAS 评分低于对照组同时期，数据间对比差异显著（P＜0.05）；观察组术后 48h 镇痛效果满意度较高，数据间对比差异显著（P＜0.05）；观察组术后下床活动时间、术后胃肠排气时间、术后开奶时间、术后住院时长均短于对照组，数据间对比差异显著（P＜0.05）；观察组 72h 纯母乳喂养率较高，数据间对比差异显著（P＜0.05）；观察组术后 48h 不良反应发生率较低，数据间对比差异显著（P＜0.05）；观察组术后 48hHAMA 评分低于术后 24h 和对照组同时期，数据间对比差异显著（P＜0.05）。

结论 纳布啡，吗啡联合对乙酰氨基酚多模式镇痛对剖宫产产妇术后快速康复有着积极的影响，能够有效缓解剖宫产产妇术后疼痛，并减少不良反应；产妇术后早活动、早排气、舒适度高，提高产妇母乳喂养率，减轻患者焦虑，降低住院时长及费用。

PU-0811

艾司氯胺酮用于剖宫产术后产后抑郁的荟萃分析

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目的 产后抑郁症（PPD）是围产期最常见的精神障碍疾病。基于疼痛与抑郁的共病性，部分学者选择由剖宫产围术期镇痛入手，以期达到减轻抑郁症状乃至预防 PPD 的目的。近年来，艾司氯胺酮被用于剖宫产防治 PPD，但其疗效尚存争议。因此，本荟萃分析旨在对艾司氯胺酮用于剖宫产

PPD 的疗效进行评价。
方法 系统检索中国知网、万方、中国生物医学数据库、维普、PubMed、Embase、Web of Science、Cochrane Library 中研究艾司氯胺酮用于剖宫产的随机对照试验（RCT），检索时间设置为数据库建立起至 2024 年 1 月。主要结局指标为 PPD 发生率、爱丁堡抑郁量表（EPDS）评分，次要结局指标为视觉疼痛量表（VAS）评分、不良反应发生率。文献筛选、数据提取及质量评价均由两名研究人员独立进行，若双方存在争议，则邀请第三名研究人员进行仲裁。RCT 的方法学质量评价依据 Cochrane 偏倚风险进行评估。应用 RevMan 5.4 软件进行数据整合和 Meta 分析。
结果 本 Meta 共纳入 20 项 RCT 研究，共纳入 4258 例患者，其中使用艾司氯胺酮组 2018 例，对照组 2240 例。Meta 分析结果显示：与对照组相比，使用艾司氯胺酮组术后 PPD 的发生率在术后 3-5 天、术后 5-7 天、术后 7 天及术后 28-42 天内均明显降低；试验组术后 EPDS 评分在术后 1-3 天、术后 7 天和术后 28-42 天显著低于对照组，术后 3-5 天的 EPDS 评分两组无统计学差异；艾司氯胺酮组可显著降低术后 VAS 评分；艾司氯胺酮组与对照组对比，术后嗜睡和恶心呕吐的发生率两组没有显著差异，但是使用艾司氯胺酮会增加术后头晕、头痛、幻觉、复视的发生率，差异有统计学意义。
结论 艾司氯胺酮可显著降低剖宫产术后 PPD 的发病率、EPDS 评分和术后 VAS 评分，但是给药途径和给药剂量尚需大量的研究进一步探索。

PU-0812

艾司氯胺酮对剖宫产术患者术后睡眠质量的影响

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目的 观察术中静脉给予艾司氯胺酮是否对剖宫产患者术后睡眠质量有改善作用。
方法 选择我院 ASA 分级 I-II 级,年龄 20-40 岁的产妇 58 例，所有患者均行腰硬联合麻醉。待新生儿剖出后，视术中具体情况，麻醉医生通常使用不同的辅助镇静药。根据是否静注艾司氯胺酮分为艾司氯胺酮组（ES 组）和对照组（C 组）。手术结束后均行患者自控静脉镇痛。分别记录 ES 组与 C 组的患者在入室（T0）、麻醉平面稳定（T1）、胎儿娩出时（T2）、给药后 5 分钟（T3）、给药后 10 分钟（T4）、给药后 20 分钟（T5）、出室（T6）时点的平均动脉压（MAP）、脉搏氧饱和度（SpO2）、心率（HR）、出血量以及手术时长。使用 Ramsay 评分评估患者术中镇静水平。主要指标为产妇的睡眠质量，采用匹兹堡睡眠质量指数（PSQI）量表评估患者术后当天（POD0）、第二天（POD2）的睡眠情况；同时，通过可穿戴设备监测 POD0、POD2 患者的总睡眠时长、深睡眠、浅睡眠时长以及快速眼动睡眠时长。采用数字评定量表（NRS）评估 POD0、POD2 的疼痛情况。记录两组产妇术中出现头晕、恶心呕吐、视力模糊等不良反应的例数。
结果 以是否为初产妇进行分层分析，两组患者在年龄、ASA 分级、身体质量指数等一般情况和术前 PSQI 评分均无统计学意义（P＞0.05）。在初产妇与经产妇中，POD0 时 ES 组的 PSQI 评分与 C 组相比均明显降低（P＜0.05）。在 POD0 时，初产妇中 ES 组总睡眠时长、深睡眠时长均高于 C 组；经产妇中 ES 组深睡眠时长高于 C 组（P＜0.05）。两组产妇 NRS 疼痛评分无明显差异（P＞0.05）。在初产妇中，ES 组在 T3 时的 MAP 高于 C 组；在经产妇中，ES 组在 T3～T5 时点的 MAP 高于 C 组（P＜0.05）。在 T3、T4 时点，初产妇与经产妇中 ES 组 HR 均明显高于 C 组（P＜0.05）。两组产妇在各时间点 SpO2 比较均无明显差异（P＞0.05）。T3～T5 时点，在初产妇与经产妇中，ES 组术中 Ramsay 评分均明显高于 C 组（P＜0.05）。两组产妇术中不良反应发生率无明显差异（P＞0.05）。
结论 1、术中予以艾司氯胺酮可以延长深睡眠时间，提升睡眠质量；2、艾司氯胺酮可使患者术中血压更加平稳且未增加不良反应的发生率。

PU-0813

Epidural dexmedetomidine or esketamine versus fentanyl to decrease ropivacaine use for labor analgesia: a randomized non-inferiority study

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Background Epidural nonopioid adjuvants also reduce local anesthetic use. We aimed to test the hypothesis that, compared with the present standard fentanyl, the hourly consumption of local anesthetic was at least as good when dexmedetomidine or esketamine was combined with local anesthetic for patient-controlled epidural analgesia (PCEA).
Methods A total of 120 laboring nulliparous subjects requiring labor analgesia were recruited for the final statistical analysis. Subjects were randomized to receive 0.075% ropivacaine added with one of three equivalent adjuvants: 0.4 μg/mL fentanyl, 0.4 μg/mL dexmedetomidine, or 1.0 mg/mL esketamine. The primary outcome was hourly ropivacaine consumption. Compared with the fentanyl group, a 20% difference in hourly local anesthetic consumption between the dexmedetomidine and esketamine groups was considered a clinical difference (non-inferiority margin).
Results The hourly ropivacaine consumption of the fentanyl group was 12.4 (95% confidence interval CI 11.2 to 13.6) ml/h, so the prespecified non-inferiority limit was 2.5 ml/h. The hourly ropivacaine consumption of the fentanyl group was not inferior to that of the dexmedetomidine group (12.4 ml/h vs. 11.9 ml/h, risk difference, 0.5; 95% confidence interval CI, -1.0 to 2.0, meeting criteria for non-inferiority). However, the hourly ropivacaine consumption of the esketamine group was 14.3 ml/h, and that of the fentanyl group was 12.4 ml/h (risk difference, 1.9, 95% CI, 0.2 to 3.6), failing to confirm non-inferiority with a non-inferiority margin of 20%. The incidence of pruritus was highest in the fentanyl group, whereas the occurrence of mild dizziness was highest in the esketamine group.
Conclusions In setting of the conditions of this study, epidural dexmedetomidine was non-inferior compared with epidural fentanyl in combination with ropivacaine for PCEA during labor. Meanwhile, we failed to establish the non-inferiority of epidural esketamine compared with epidural fentanyl in combination with ropivacaine for labor analgesia.

PU-0814

Optimum programmed intermittent epidural bolus interval time of ropivacaine 0.0625% with dexmedetomidine 0.4 μg/ml at a fixed volume of 10 mL: a randomized controlled trial

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Background PIEB is an advanced labor analgesia technique that provides automated epidural administration at a fixed local anesthetic volume and a set interval. Compared with continuous epidural infusion technique (CEI), PIEB can improve maternal satisfaction, reduce the incidence of breakthrough pain and produce a more uniform spread of epidural local anesthetic. PCEA technique allows subjects to autonomously manage different stages of breakthrough pain. Therefore, PIEB combined with PCEA is one of optimum method to maintain epidural labor analgesia to date.
Recently, dexmedetomidine has been advocated as a potentially ideal adjuvant for epidural labor

analgesia instead of opioids, with the advantage of a lower incidence of pruritus without influencing maternal satisfaction and the quality of labor analgesia. Furthermore, our subsequent unpublished study and one other study demonstrated that epidural dexmedetomidine was non-inferiority to fentanyl in terms of hourly ropivacaine consumption for labor analgesia. So far, the optimum PIEB interval time when dexmedetomidine is added to local anesthetic remains unknown.
We therefore conducted this study to determine the effective PIEB interval time between boluses of ropivacaine 0.0625% with dexmedetomidine 0.4 μg/ml at a fixed volume of 10 mL in ninety percent of subjects (EI90), without the use of PCEA.
Methods The randomized, interval time-finding study was approved by the Research Ethics Board in August 22, 2022 (Approval number: K2022040), and registered in the Chinese Clinical Trial Registry on August 23, 2022 (ChiCTR2200062918; https://www.chictr.org.cn/bin/project/edit?pid=177423). All subjects were informed that they were receiving an off-label use of dexmedetomidine in the neuraxial administration and provided written informed consents. The study was conducted from August 23, 2022 to November 22, 2022. We confirm that our study followed Declaration of Helsinki and the Consolidated Standards of Reporting Trials statement (CONSORT).
We enrolled term nulliparous subjects of American Society of Anesthesiologists physical status (ASA) II, with singleton fetuses, regular uterine contractions 3-5 minutes, numerical rating scale (NRS) pain scores > 3 at the time of labor analgesia request (scale 0 = no pain, 10 = the worst pain). Exclusion criteria were contraindication to neuraxial analgesia, refusal to participate in the study, allergy to ropivacaine or dexmedetomidine.
A total of eighty subjects were included in the final statistical analysis from August 23, 2022 to November 22, 2022. Subjects were randomly assigned to one of four different PIEB time intervals: 40, 50, 60 and 70 minutes (group 40, 50, 60 and 70), respectively. The primary outcome was the effective epidural labor analgesia, defined as no use of PCEA bolus or a manual bolus until the end of the first stage of labor or within six hours after loading dose administration. The PIEB EI90 (95%CI) between boluses of ropivacaine 0.0625% with dexmedetomidine 0.4 μg/ml at a fixed volume of 10 mL was estimated using probit regression.
Results The effective PIEB interval time between boluses of ropivacaine 0.0625% with dexmedetomidine 0.4 μg/ml at a fixed volume of 10 mL in ninety percent of subjects, without the use of PCEA was 45.4 (35.5 to 50.5) minutes using probit regression. No statistical differences were found in proportion of subjects with Bromage score > 0, hypotension, pruritus, nausea and vomiting between groups. However, the highest sensory block (pinprick) in the 40-min group was significantly higher than that in other groups.
Conclusions The estimated value for EI90 for PIEB between boluses of ropivacaine 0.0625% with dexmedetomidine 0.4 μg/ml at a fixed volume of 10 mL using probit regression was 45.4 (35.5 to 50.5) minutes. Furthermore, future studies are warranted to be established to determine the optimal parameters for different regimen in clinical practice.

PU-0815

ED90 of epidural esketamine with 0.075% ropivacaine for labor analgesia in nulliparous parturients: a prospective, randomized and dose-finding study

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Background Because it has been reported that racemic ketamine had a local anesthetic-sparing effect when used for epidural analgesia this would suggest the likelihood of a potential advantage (less pruritus) over opioid drugs. Esketamine has greater analgesic efficacy than racemic ketamine, but the optimum dosage regimen for epidural use is undetermined. The aim of this study was to determine the ED90 of epidural esketamine when coadministered with 0.075% ropivacaine for labor analgesia.
Methods A total of 65 laboring nulliparous patients were enrolled in this study from March 16, 2022 to October 15, 2022. The patients were randomly assigned to receive 0, 0.25, 0.5, 0.75 or 1.0

mg/mL esketamine with 0.075% ropivacaine epidurally. An effective response to the epidural loading dose was defined as numerical rating scale (NRS) pain score ≤ 3 at 30 minutes after the end of the epidural loading dose (10 mL of the ropivacaine 0.075% solution with the added esketamine). The ED90 of epidural esketamine coadministered with 0.075% ropivacaine with 95% confidence intervals (CIs) for labor analgesia was determined using probit regression. Secondary outcomes and side effects were recorded.
Results The estimated value of ED90 with 95%CIs for epidural esketamine with 0.075% ropivacaine was 0.983 (0.704 to 2.468) mg/mL. The characteristics of sensory and motor block, consumption of ropivacaine per hour, duration of first or second stage, Apgar scores did not differ among the five groups. The incidence of dizziness in Group esketamine 1.0 mg/mL was significantly higher than that in other groups ($P < 0.05$). No statistical differences were found in other side effects among groups.
Conclusions The ED90 value of epidural esketamine coadministered with 0.075% ropivacaine for labor analgesia in nulliparous parturients was about 1.0 mg/mL. However, our results suggested that epidural esketamine would cause dose-dependent dizziness especially at doses up to 1.0 mg/mL.

PU-0816

Analysis of Intrathecal Labor Analgesia and the Causes of Maternal Postpartum Depression After Cesarean Section

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Background Postpartum depression (PPD) is a common complication after childbirth, and its etiology may be related to several factors. In this study, we investigated the prevalence and causes of PPD in women who underwent vaginal delivery with intrathecal labor analgesia and women who underwent cesarean section.
Methods A total of 242 women who gave birth from July 2022 to July 2023 participated in this retrospective case–control study, including 127 women who underwent cesarean section and 115 women who underwent vaginal delivery and received intrathecal labor analgesia. The clinical data of the study participants were collected, and anxiety, depression and PPD were assessed by the Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS) and the Chinese version of the Edinburgh Postnatal Depression Scale (EPDS); questionnaires were administered and telephone follow-up was conducted on the first day of the antenatal period. The Chinese version of the EPDS was used to assess maternal psychological status at 6 weeks after delivery, and an EPDS score ≥10 points at 6 weeks after delivery was used as an indicator of PPD. The related factors affecting the occurrence of PPD were analyzed by one-way analysis, and the independent risk factors affecting the occurrence of PPD were analyzed by multifactorial logistic regression.
Results The incidence of PPD was approximately 5.0% (12/242) in the women who underwent vaginal delivery and received intrathecal labor analgesia and 11.1% (27/242) in those who underwent cesarean section. Multifactorial logistic regression analysis showed that advanced maternal age was a risk factor for PPD (odds ratio [OR], 1.31, 95% confidence interval [95% CI], 1.04-1.66; P=0.02); prenatal anxiety (OR: 8.48, 95% CI: 2.73-26.27; P=0.02) and depression (OR: 10.99, 95% CI: 2.18-55.37; P<0.001) were also risk factors for PPD. A second birth was a protective factor against PPD (OR: 0.09, 95% CI: 0.01-0.57, P<0.05).
Conclusion Advanced maternal age and prenatal anxiety and depression were associated with the development of PPD in women who underwent vaginal delivery with intrathecal labor analgesia and those who underwent cesarean section. Obstetricians and gynecologists can identify mothers at high risk of PPD at an early stage and provide psychological counseling for mothers to reduce the incidence of PPD. However, studies with large sample sizes are still needed.

PU-0817

硬膜外分娩镇痛对肥胖产妇母婴分娩结局的影响及中转剖宫产的危险因素

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目的 硬膜外分娩镇痛对肥胖产妇母婴分娩结局的影响及中转剖宫产的危险因素。
方法 选择 2016 年 1 月 1 日至 12 月 31 日准备阴道分娩的单胎足月肥胖初产妇 550 例，年龄 22-39 岁，BMI 30-40kg/m2。根据产妇是否接受硬膜外分娩镇痛分为两组：镇痛组（n=345）和非镇痛组（n=205）。记录 2 组产妇一般资料、分娩期间产程时间、产程干预情况、 出血量、产时发热、新生儿体重、新生儿 1min、5min、10minApgar 评分及新生儿转入 NICU 的比例。
结果 2 组产妇年龄、孕期增重、孕前 BIM、BMI、孕周、合并疾病、辅助生殖、GBS 携带、PROM 比例、人工引产比例及米索前列醇使用比例差异无统计学意义。镇痛组使用催产素、人工破膜比例高于非镇痛组。镇痛组第一产程、第二产程时间长于非镇痛组，产时发热比例、会阴切开比例高于非镇痛组。分娩方式、胎儿窘迫发生情况、第三产程时间及估计出血量差异无统计学意义。镇痛组新生儿体重高于非镇痛组。1min、5min、10minApgar 评分、脐动脉血气 pH 及新生儿转入 NICU 比例差异无统计学意义。多因素 Logistic 回归分析显示, BMI（OR=1.121,95%CI 1.009-1.246, P=0.034）、应用米索前列醇（OR=1.823,95%CI 1.036-3.208, P=0.037）、应用缩宫素（OR=1.726,95%CI 1.015-2.937, P=0.044）、产时发热（OR=8.243,95%CI 4.753-14.296, P＜0.001）和巨大儿（OR=2.426,95%CI 1.082-5.439, P=0.031）是肥胖产妇中转剖宫产的危险因素。
结论 硬膜外分娩镇痛延长肥胖产妇产程时间，增加产时发热比例，但不影响分娩方式及新生儿结局。肥胖孕妇中转剖宫产的危险因素包括 BMI、应用米索前列醇、缩宫素、产时发热和巨大儿。

PU-0818

单纯硬膜外麻醉与 DPE 联合 PIEB 模式行分娩镇痛对产程及母胎结局影响的观察：一项单中心，前瞻性，随机对照研究

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目的 观察 DPE 联合 PIEB 模式与单纯硬膜外麻醉在行分娩镇痛时对产程及母胎结局的影响，及 DPE 联合 PIEB 模式下的分娩镇痛在产科结局中的潜在优势
方法 选择 2023 年 6 月至 2024 年 12 月，于宁夏医科大学总医院使用硬膜外麻醉的方式行分娩镇痛的产妇 80 例。纳入年龄 18-45 岁、ASAⅠ-Ⅱ、BMI≤40kg/㎡、妊娠 37 -42 周、宫颈扩张＞3.0 cm、希望采用硬膜外分娩镇痛的单胎健康孕妇。排除有椎管内麻醉禁忌、有局麻药物及阿片类药物过敏史、妊娠疾病(如妊娠高血压、先兆子痫或妊娠糖尿病等)、已知胎儿异常或存在与剖宫产风险增加相关的情况的产妇。操作前按随机数字表法将患者分为 2 组：单纯硬膜外麻醉组（E 组）与 DPE 联合 PIEB 组（D 组）。两组产妇均取右侧卧位，穿刺间隙选择 L2-3，确定间隙后使用 17G 硬膜外穿刺针进行穿刺，采用生理盐水阻力丧失技术确定进入硬膜外间隙。随后，D 组：使用 25 号 Whitacre 针刺破硬膜，确定有脑脊液返流后拔出并置入抗弯折多孔硬膜外导管。血液和脑脊液回抽阴性，给予 0.15%利多卡因 3ml 作为试验剂量，确保安全后，硬膜外导管连接电子泵并启动 PIEB 模式给予首次负荷量 0.08%罗哌卡因和 0.4μg/mL 舒芬太尼 10ml，设置间歇时间 45min，单次丸剂量 10ml 进行输注，患者 PCEA 单次丸剂量为 5ml。E 组：直接置入抗弯折多孔硬膜外导管，

血液和脑脊液回抽阴性，给予 0.15%利多卡因 3ml 作为试验剂量，确保安全后，启动与 D 组相同参数的 PIEB 模式泵。记录第一、第二、第三及总产程时长；产前及产后血红蛋白差值及 红细胞压积差值；称重法估计产后出血总量；产妇及胎儿不良结局（会阴裂伤、会阴侧切、胎心减速类型及次数）及 Apgar 评分

结果 D 组较 E 组生产前后产妇血红蛋白变化较小（P＜0.05），血红蛋白差值及称重法产后出血预估量无差异（P＞0.05）；产程时长两组无统计学差异（P＞0.05）；产妇与胎儿不良结局及 Apgar 评分两组无差异（P＞0.05）

结论 DPE 技术联合 PIEB 模式行分娩镇痛，与单纯硬膜外麻醉相比，从生产前后血红蛋白变化差值来看，可能会减少产后出血量。这可能与 D 组有着更完善的镇痛效果，致使产妇在分娩时用力均匀且更好的配合度有关

PU-0819

单次静脉注射艾司氯胺酮减少剖宫产产妇产后抑郁及术后疼痛

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目的 产后抑郁症是目前临床的重要难题，其为产妇、家庭及社会带来了健康及经济负担。氯胺酮可安全用于剖宫产手术，且氯胺酮可改善抑郁症状。艾司氯胺酮是氯胺酮的右旋异构体，具有较强镇痛作用，新近研究表明艾司氯胺酮快速抗抑郁的作用。据此，本研究主要探讨艾司氯胺酮对脊髓-硬膜外联合麻醉下行剖宫产产妇产后抑郁的影响。

方法 本研究共招募 21-35 岁、ASA 分级 I-II 级、单胎足月妊娠拟行择期横切口剖宫产的产妇共 110 例，所有产妇被随机分为两组：艾司氯胺酮组（K 组）55 例和对照组（C 组）55 例。K 组在切皮前予以艾司氯胺酮 0.15mg/kg 单次静脉注射，C 组以等量容的生理盐水静脉注射。首要观测指标为术前 1 小时、术后 24 小时、术后 4 天、术后 4 周的爱丁堡产后抑郁量表(EPDS)评分，次要观测指标为术后 6 小时、12 小时、24 小时、48 小时的 PCA 有效按压次数、静息及运动视觉模拟评分（visual analog scale，VAS）及术后 4 周慢性疼痛评分，以及新生儿 Apgar 评分、术中各时间点产妇的生命体征、术中参数、相关并发症及不良反应。

结果 两组产妇术前一般情况、手术时间、出血量、输晶体和胶体量、血压、新生儿 Apgar 评分、不良事件发生率无统计学差异；术中去氧肾上腺素用量 K 组少于 C 组（p＜0.05），K 组术后 24 小时、术后 4 天产后抑郁（EPDS 评分≥10 分）人数低于 C 组（p＜0.05）。术后 6、12、24、48 小时静息和运动状态 VAS 评分，K 组均低于 C 组（p＜0.05）。术后 48 小时内不同时间点 PCA 有效按压次数 K 组均少于 C 组（p＜0.01）。两组术后 4 周静息和运动状态下 VAS 评分差异没有统计学意义。

结论 切皮前单次静脉给予小剂量艾司氯胺酮（0.15mg/kg）有效减少腰硬联合下剖宫产产妇术后 24 小时及 4 天抑郁（EPDS）评分，降低产后抑郁的发生率。本研究为艾司氯胺酮在剖宫产产妇镇痛管理及减少产后抑郁的作用提供了循证学依据。

PU-0820

Case report: cesarean delivery under general anesthesia with esketamine combined with laryngeal mask ventilation in a patient with rheumatoid arthritis causing generalized polyarticular deformity

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Introduction Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by joint and systemic symptoms. Most patients with rheumatoid arthritis develop cervical spine ankylosis with difficulty in opening the mouth, which can make tracheal intubation difficult. Bronchoscopic guided intubation has been recommended in the previous literature, but it requires high proficiency on the part of the anesthesiologist. We will discuss the case of a woman in labor with comorbid RA who underwent general anesthesia using laryngeal mask ventilation.
Case presentation A 36-year-old woman required cesarean section under general anesthesia for rheumatoid arthritis combined with pregnancy. Due to the history of rheumatoid arthritis for many years, the patient had difficulty in cervical spine tilt. We used esketamine for induction of anesthesia, and initially attempted visual laryngoscopic endotracheal intubation, but the patient had extreme difficulty in exposing the vocal folds, and then we used a laryngeal mask for respiratory-assisted ventilation, and the delivery of the fetus was uneventful. At the end of the operation, a transversus abdominis plane nerve block with intravenous analgesia was performed. Laryngospasm occurred during anesthesia resuscitation, and the laryngeal mask was successfully removed after active treatment. Postoperative patient comfort was high, abdominal incision pain was mild, and the neonate was in good condition.
Conclusion We describe a case of pregnancy combined with rheumatoid arthritis in a patient undergoing cesarean section, a multimodal analgesic regimen of general anesthesia for cesarean section with laryngeal mask ventilation using esketamine. TAPB combined with intravenous analgesia in the postoperative period guarantees the safety of the mother and neonate with a combined difficult airway and improves maternal comfort in the postoperative period.

PU-0821

Factors associated with conversion to cesarean delivery in women with epidural analgesia for labor

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Objective We aimed to explore factors associated with conversion to cesarean delivery in women undergoing epidural analgesia for labor.
Methods In this prospective cohort study, women with singleton pregnancies between 37-42 weeks' gestation who received epidural labor analgesia were included and divided into two groups, the cesarean delivery group and the vaginal delivery group. Multivariate regression analysis was used for statistical analysis, with $P<0.05$ considered statistically significant.
Results Out of 682 women who received labor epidural analgesia, 15.10%(n=103) had a cesarean delivery. Independent factors associated with an increased risk of cesarean delivery included advanced maternal age [Adjusted odds ratio(aOR) 1.15 (95%CI, 1.06-1.24), $p<0.001$], increasing BMI [aOR 1.09 (95%CI, 1.01-1.18), p=0.036], nulliparity [aOR 11.39 (95%CI, 4.27-30.38), $p<0.001$], the use of Foley balloon catheter or dinoprostone for cervical ripening [aOR 2.34, (95%CI

1.36-4.03), p=0.002]. Greater maternal height [aOR 0.91, (95%CI 0.86-0.95), p＜0.001] and late initiation of epidural labor analgesia [aOR 0.24 (95%CI, 0.13-0.45), p＜0.001] were associated with a reduced risk of cesarean delivery.
Conclusions The multivariate model generated would help to identify women with epidural labor analgesia at higher risk of cesarean delivery, which may help clinicians to take appropriate preventive measures for the main risk factors, and improve clinical outcomes.

PU-0822

Effective Dose of Epidural Hydromorphone for Postoperative Analgesia following Cesarean Section in Using Modified Dix-on Sequential Method

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Purpose A single dose of epidural hydromorphone has been suggested as an alternative method for providing analgesia after cesarean section (CS). Nevertheless, the optimal dosage of epidural hydromorphone for postoperative pain relief following CS has yet to be determined. Therefore, our purpose is to explore the single epidural hydromorphone administration for postoperative analgesia after CS.
Methods This trial included 30 singleton primiparous women undergoing scheduled cesarean delivery, who were recruited to determine the doses of epidural hydromorphone using the modified Dixon sequential method. The initial hydromorphone dose was 0.75 mg, with adjustments based on the efficacy of the preceding participant's dose over 12 hours. Various parameters such as blood pressure, heart rate, respiratory rate, visual analog scale (VAS) pain score, postoperative adverse reactions, and patient satisfaction with analgesic effect were recorded at each time point. The VAS scores were categorized as positive (score > 3) or negative (score ≤ 3). Participants received a single epidural injection of 0.2% ropivacaine 20 mg along with a study dose of hydromorphone. The median effective dose (ED50), 90% effective dose (ED90), and corresponding 95% confidence intervals (CIs) of hydromorphone with ropivacaine for analgesia after cesarean section were calculated using the probit method.
Results The ED90 and ED50 in our population were 1.105 mg (95% CI: 0.825-2.324 mg) and 0.659 mg (95% CI: 0.434-0.883 mg), respectively.
Conclusions Epidural hydromorphone provided excellent pain relief after CS. The single dose epidural hydromorphone at 1.105 mg combined with ropivacaine is an effective method for post-cesarean pain.

PU-0823

Effect of goal-directed fluid therapy on maternal and infant outcomes of cesarean section in advanced maternal age parturients

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Background The proportion of advanced maternal age (AMA) parturients in China has gradually increased. AMA is considered a risk factor for adverse maternal and fetal outcomes. Goal-directed fluid therapy (GDFT) was used to guide perioperative volume management of AMA parturients in

order to optimize maternal and infant outcome after cesarean section.
Methods This study was examined and approved by the Medical Ethics Committee of Women 's Hospital of Nanjing Medical University with approval (NO. 2022KY-128-01). A total of 69 parturients with BMI ≤ 35 kg/m2 underwent elective cesarean section were randomly divided into control group (Group C) and GDFT group (Group G), with 35 parturients in Group C and 34 parturients in Group G. Group C parturients received compound sodium lactate infusion of 20 ml ·kg-1 ·h-1 before delivery, which was reduced to 5 ml ·kg-1 ·h-1 after delivery. Group G parturients were given compound sodium lactate 3 ml/kg within 3 min after entering the operating room, under the guidance of transthoracic echocardiography (TTE), when the Δstroke volume (ΔSV) ≤ 10% infuse compound sodium lactate at 5 ml ·kg-1 ·h-1 , when the Δstroke volume (ΔSV) was >10%, continue infusion lactate at 3 ml ·kg-1 ·3min-1 until ΔSV≤10%.The occurrence of intraoperative hypotension, intraoperative infusion volume, first postoperative exhaust time and postoperative blood loss within 24 h were recorded. SBP, DBP, MAP, HR, SV, and CO were recorded before anesthesia (T0), after completion of subarachnoid block (T1), at fetal delivery (T2), and at the end of surgery (T3).
Result Compared with Group C, the amount of pre-delivery fluid and intraoperative infusion in Group G was significantly reduced, and the incidence of intraoperative hypotension was significantly decreased (P < 0.05). Compared with T0, SBP was significantly decreased at T1-T3 in both groups (P < 0.05), SV was significantly decreased at T1 in both groups. Compared with Group C, CO was significantly decreased at T1 in Group G (P < 0.05). The first postoperative exhaust time was (36.71±10.65) vs. (31.62±9.19) hours, the first ambulation time was (18.06±2.17) vs. (15.84±2.37), and length of stay was (6.37±1.33) vs. (5.21±1.23) of Group C and Group G, which was statistically different. Compared with group C, the difference of BE value in group G was statistically significant (P < 0.05). There were no significant differences in neonatal 1min and 5min Apgar score, umbilical artery blood gas(other acid base balance indexes) and NICU transfer rate between the two groups after delivery.
Conclusion SV-oriented GDFT based on TTE can reduce the incidence of hypotension after subarachnoid block during cesarean section in AMA parturients. Although there is no significant difference in maternal and infant outcome, the first postoperative exhaust time of was shortened. GDFT can guide perioperative volume management of AMA parturients in order to optimize maternal and infant outcome after cesarean section.

PU-0824

硬脊膜打孔硬膜外阻滞技术联合程控间歇脉冲注入模式在分娩镇痛中的疗效观察

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目的 评价 DPE（硬脊膜打孔硬膜外阻滞技术）联合 PIEB（程控间歇脉冲注入模式）应用于分娩镇痛的有效性和安全性。
方法 60 名分娩的患者被随机分配接受 EP（硬膜外阻滞）+CEI（硬膜外持续给药）或 DPE + PIEB。要求分娩镇痛时记录基线 VAS 评分，评分≤50 mm 的产妇被排除在外。使用 17 号针头进行硬脑膜穿刺，使用 27 号腰麻针进行 DPE + PIEB 组的硬脊膜穿刺并确认脑脊液。在完成分娩镇痛后，评估员在初始剂量结束后前 20 分钟内每 2 分钟测量一次，随后每 30 分钟测量一次。记录患者阻滞不对称人数、需 PCEA 人数、Bolus 次数、无 Bolus 人数，但两组患者的产程、分娩方式、Bromage 评分、新生儿 Apgar 评分、不良反应、满意度评分
结果 从 60 名参与者（每组 n = 30）中收集和分析数据。DPE + PIEB 组达到完全镇痛的中位时间（95％CI）为 6 分钟（3.1–8.9 分钟），EP+ CEI 组为 12 分钟（9.6–14.4 分钟）DPE + PIEB 组阻滞不对称人数、需 PCEA 人数、Bolus 次数、无 Bolus 人数更低，但两组患者新生儿结局、产妇结

局以及不良反应发生率不存在统计学差异。
结论 与 EP+CEI 相比，DPE + PIEB 的产妇在一定时间内获得充分镇痛的百分比更高，药量消耗减少，且对新生儿和产妇无不良影响。

PU-0825

糖尿病产妇剖宫产术后疼痛特征与影响因素的综合分析：一项全国多中心回顾性队列研究

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目的 糖尿病与术后不良疼痛结局相关，在多项疼痛调查中，剖宫产术后疼痛程度都居于高位。同时糖尿病患者可能因为长期疾病管理而产生更高的心理压力，这可能影响她们对术后疼痛的感知和应对。因此糖尿病患者剖宫产后疼痛值得我们进一步关注。在这项全国多中心回顾性队列研究中，我们分析了糖尿病患者经历剖宫产手术的疼痛特征及其对镇痛药物的需求及反应特点，同时综合分析了术中及术后镇痛管理倾向性对疼痛结局的影响，旨在进一步完善糖尿病患者剖宫产手术后的管理疼痛策略。
方法 回顾性分析全国性术后急性疼痛数据库——中国术后急性疼痛研究（CAPOPS)中来自 124 家医疗中心接受产科手术的患者数据，通过单因素以及多因素 Logistic 回归探讨糖尿病与产科患者术后疼痛程度的相关关系。使用倾向性评分以及逆概率加权分析调整了基线特征差异。亚组分析与敏感性分析比较了产科糖尿病患者术后麻醉以及镇痛药物相关副作用的发生情况。交互作用分析评估了疼痛治疗参与程度，医生关注程度与镇痛治疗措施间的相互影响。
结果 来自全国 124 家医院的 2786 名产科患者纳入分析，220 名患者术前患有糖尿病。在单因素回归模型中，糖尿病产妇发生术后中重度疼痛的 OR 为 2.479（95% CI：1.320-3.289，P =0.017），在调整了术前协变量、术中协变量以及所有纳入协变量的多因素回归模型中，OR 分别为 2.025（95% CI：1.374-4.532，P=0.012）、1.995（95%CI：1.134-3.874，P =0.037）和 1.973（95% CI：1.258-2.753， P = 0.029）。亚组分析表明，神经阻滞镇痛、多模式镇痛以及术后非甾体镇痛药物对糖尿病产妇剖宫产术后镇痛效果更差；糖尿病产妇剖宫产后更易出现恶心、呕吐等镇痛药物副作用，同时焦虑以及抑郁情绪在糖尿病产妇剖宫产后发生更加普遍。而术后医生访视次数增加、了解疼痛治疗信息，术中使用右美托咪定则有助于改善糖尿病产妇疼痛程度以及焦虑抑郁情况。
结论 合并糖尿病导致患者剖宫产术后疼痛程度增加、中重度疼痛发生率增加。糖尿病产妇对于镇痛治疗反应更差，医生的关注有助于缓解糖尿病患者剖宫产后疼痛程度改善不良心理状况。

PU-0826

Effects of different doses of alfentanil combined with target-controlled infusion (TCI) of propofol for daytime hysteroscopy

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Background Daytime hysteroscopy requires anesthesia that offers rapid onset and clearance, with minimal respiratory and cardiovascular suppression. This study compared the effects of different doses of alfentanil combined with propofol target-controlled infusion (TCI) for such procedures.

Methods We randomized 240 patients undergoing daytime hysteroscopy into three groups to receive alfentanil at doses of 5 μg/kg, 10 μg/kg, and 15 μg/kg, combined with propofol TCI. We meticulously recorded complications and perioperative vitals to evaluate the safety and efficacy of each dosage regimen.
Results The 10 μg/kg dose of alfentanil, used in conjunction with propofol, required lower propofol dosages and resulted in quicker recovery time and fewer intraoperative movements. However, higher doses of 15 μg/kg led to a significant increase in hypoxemia and instability in hemodynamics and oxygenation.
Conclusion Combining alfentanil at 10μg/kg with propofol TCI for daytime hysteroscopy results in high effectiveness. A lower incidence of complications, a reduced propofol requirement, and rapid emergence from sedation characterize this regimen.

PU-0827

Comparison of a Single Intravenous Infusion of Alfentanil or Sufentanil Combined with Target-Controlled Infusion of Propofol for Daytime Hysteroscopy

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Background The administration of either alfentanil or sufentanil as a single injection, combined with target-controlled infusion (TCI) of propofol, represents a frequently employed anesthetic regimen for daytime hysteroscopy.
Objectives This study was designed to evaluate and compare the safety and efficacy of alfentanil and sufentanil in the context of daytime hysteroscopy.
Design: A total of 160 patients, scheduled for daytime hysteroscopy, were randomly allocated into two groups: Group A and Group S respectively received alfentanil 10 μg/kg or sufentanil 0.15 μg/kg as a single intravenous injection. Both groups were given propofol with TCI for sedation.
Methods Comprehensive data encompassing the occurrence of complications and perioperative vital signs were meticulously documented and subsequently subjected to comparative analyses.
Results The analyses revealed that Group A had a significantly lower incidence of hypoxemia and postoperative nausea and vomiting (PONV) ($P < 0.05$). Moreover, in Group A, blood pressure and heart rate were more stable and SpO2 was higher ($P < 0.05$).
Conclusions For daytime hysteroscopy, the use of 10 μg/kg of alfentanil as an analgesic enhanced safety without compromising analgesic efficacy when compared to 0.15 μg/kg of sufentanil.
Trial Registration: This study was registered with the Chinese Clinical Trial Registry (The URL of registration is https://www.chictr.org.cn/showproj.html?proj=177784; registration number: ChiCTR2200063939). The date of first registration was 21/09/2022.

PU-0828

Spontaneous spinal epidural hematoma (SSEH) after cesarean section under epidural anesthesia: A case report

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Spontaneous spinal epidural hematoma (SSEH) is an uncommon condition that can lead to severe neurological injuries, often accompanied by back pain. Pregnancy is identified as a risk factor for

SSEH. Early diagnosis of SSEH presents challenges due to its atypical manifestations and the use of intraspinal anesthesia and analgesic techniques. In this case, we present the instance of a 29-year-old woman who initially received epidural labor analgesia during the first stage of labor but subsequently required a cesarean section under epidural anesthesia according to amniotic fluid turbidity. Unfortunately, the anomalous recovery of neurological function in her left lower extremity was not given sufficient attention at an early stage, and paralysis in the non-puncture segment occurred 45.5 hours after the initial puncture. Interestingly, she did not experience any back pain during these procedures. MRI examination and consultation with neurosurgeons confirmed the diagnosis of SSEH, prompting the patient to undergo emergency decompression surgery. She made an incomplete recovery 17 months after the operation. This case emphasizes the importance of considering the possibility of SSEH in pregnant women undergoing epidural analgesia, highlighting the need for spinal imaging and early neurosurgical interventions to facilitate treatment.

PU-0829

Warm (37 °C) local anesthetic solution reduces Epidural-related Maternal Fever in labor analgesia：A randomized clinical trial

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Objective To explore the effect of different temperature local anesthetics on intrapartum fever during epidural labor analgesia.
Methods According to sample size calculation, 220 primiparas who planned to undergo epidural labor analgesia were recruited. The primiparas were randomly assigned to control group and warm group. Both groups were treated with epidural 0.075 % ropivacaine + 0.5ug/ml sufentanil. The anesthetic solution in the control group was room temperature, and the local anesthetic solution in the warm group was 37 °C. The main outcome measures included the incidence of intrapartum fever (defined as ear temperature ≥ 38 °C), the highest body temperature, the range of body temperature changes, and the incidence of shivering. Secondary outcome indicators included the onset time of analgesia, Bromage motor block score and anesthesia plane regression time. Duration of labor, fetal heart rate during labor, 1min and 5min neonatal Apgar score, pH and BE of umbilical cord blood were recorded. For primiparas, MAP during labor, pruritus, vomiting, and urinary retention were evaluated.
Results A total of 201 parturients were included, 102 in the control group and 99 in the warm group. Compared with the control group, the incidence of intrapartum fever in the warm group was significantly lower [17.2 % (17/99) vs. 33.3% (34/102); p = 0.008)]; The maximum temperature of the warm group was significantly lower than that of the control group [37.5 (37.2,37.8) °C vs 37.7 (37.4,38.0) °C; p = 0.005)]. The change of body temperature in the warm group was less than that in the normal temperature group [0.6 (0.3, 0.9) °C vs 0.7 (0.5, 1.0) °C; p = 0.015]. However, incidence of shivering between two groups were comparable. Onset time of analgesia, Bromage motor block score, cold sensory block level, and anesthesia plane regression time was not significantly different between two groups. Duration of labor, fetal heart rate during labor, 1min and 5min neonatal Apgar score, pH and BE of umbilical cord blood were not statistically significant. Maternal MAP during labor, incidence of pruritus, vomiting, and urinary retention did not reach statistical significance.
Conclusion Compared with room temperature, 37 °C local anesthetic solution for epidural labor analgesia can significantly reduce the incidence of intrapartum fever, the highest body temperature and the increase of body temperature, without increasing the incidence of adverse reactions.

PU-0830

分娩镇痛期间使用硬脊膜穿破硬膜外阻滞结合程控间歇脉冲给药技术时不同脉冲速率的比较：一项随机对照研究

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目的 硬脊膜穿破硬膜外阻滞技术(DPE)联合程控间歇硬膜外脉冲技术(PIEB)应用于分娩镇痛时镇痛效果确切且安全性良好，显著优于单纯硬膜外阻滞。PIEB 中较快的脉冲给药速度及较高的给药压力与高感觉阻滞水平可能相关，尽管与 PIEB 相关的高感觉阻滞水平与临床显著不良事件无关，但 T10 以上的感觉阻滞对于分娩镇痛是不必要的。我们的研究对比了三种不同水平的脉冲速度对实施分娩镇痛采用 DPE 结合 PIEB 模式对产妇感觉阻滞水平的影响，以期优化该技术应用于分娩镇痛。
方法 该研究由上海市第一妇婴保健院伦理委员会批准，并通过中国临床试验中心注册。研究共招募了 143 名单胎妊娠，分娩镇痛实施时宫颈扩张 2~5cm 且 NRS 基线疼痛评分>5 的初产妇。对产妇在 L3-L4 或 L4-L5 间隙实施 DPE 椎管内镇痛，以 0.1%罗哌卡因和 0.3μg/mL 舒芬太尼 PIEB 硬膜外脉冲给药，脉冲容量为 10ml，脉冲间隔时间为 50 分钟。参与者随机接受 120mL·hr-1、240mL·hr-1、360mL·hr-1 的 PIEB 脉冲速率。主要结局是在分娩镇痛实施后的 6 小时内产妇双侧冷感觉阻滞的最高平面。次要结局包括每小时的相对阻滞平面、绝对阻滞平面、骶侧阻滞平面、NRS 评分、麻醉药物使用总量及 PCA 按压次数、分娩镇痛相关不良反应及产妇满意度。
结果 研究最终纳入了 120 名产妇。三组在分娩镇痛实施后的 6 小时内的最高感觉阻滞平面无统计学差异(P = 0.14)。三组在研究期间的相对阻滞平面、绝对阻滞平面、骶侧阻滞平面无统计学差异。但三组产妇在分娩期间的 NRS 评分具有统计学意义(p = 0.023)。另外。三组产妇对分娩镇痛的满意度也存在统计学差异(p = 0.023)。三组患者的硬膜外镇痛 PCA 次数、每小时麻醉药物使用量、分娩镇痛相关不良反应同样无统计学差异。
结论 DPE 与 PIEB 联合使用时，360mL·hr-1 脉冲给药速度并不比 240mL·hr-1 或 120mL·hr-1 给药速度产生更高的感觉阻滞水平，然而，与低泵速相比，高泵速可能提供更高的分娩镇痛质量以及更高的患者满意度。

PU-0831

Randomized Controlled Trial Comparing Single-orifice and Multi-orifice Wire-reinforced Epidural Catheters for Labor Analgesia During Programmed Intermittent Epidural Boluses

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Background The purpose of this prospective, randomized, controlled trial to compare the analgesic outcomes between the single-orifice catheters and the multi-orifice catheters at 360 mL/h high delivery rate during Programmed Intermittent Epidural Boluses (PIEB). We hypothesized that single-orifice catheters would improve labor analgesia and reduce the ropivacaine consumption.
Methods From July 2023 to September 2023, 102 parturients were randomized to receive either the single-orifice catheters or the multi-orifice catheters. The primary outcome was ropivacaine consumption per hour, which was calculated by the total ropivacaine consumption (total amount administered by the pump and in provider-administered supplemental boluses) divided by the

duration of labour analgesia (mg/h). The secondary outcomes were number of PCEA demand and successful boluses during the maintenance of labor analgesia; analgesic success (an NRS score ≤ 2 during two consecutive uterine contractions) and sacral blockade defined as successful dermatome (S2) blockade (either unilateral or bilateral) within 20 min after initiation of epidural analgesia; analgesic characteristics, including frequency of motor block and unilateral blockade; number of clinician-administered boluses.

Results The median (interquartile range) ropivacaine consumed per hour was not significantly different between the groups: 12.6 mg/h (11.6-13.2 mg/h) for the single-orifice catheter group and 12.8 mg/h (12.3-13.3 mg/h) for the multi-orifice catheter group (P = .241; Figure 1). There was also no significant differences in median time to first PCEA, the percentage of parturients who required PCEA, requests and numbers of PCEA boluses between the two groups. However, the percentage of parturients with adequate analgesia 20 min after the initial bolus was higher with single-orifice catheters than with multi-orifice catheters (84.0% vs. 63.5%, P = .019; 95% CI, 9.2%–35.1%). The median times (interquartile range) to adequate analgesia were 8 (4–16) and 15 (9.5–22.5) min for the single-orifice and multi-orifice catheters, respectively (P = 0.002). Pain scores were similar between groups, except for two time-point at 6 min and 18 min. None of the parturients in either group experienced motor block or unilateral block. Maternal satisfaction was not different between the groups, and no difference was found in side effects.

Conclusions Labor analgesia quality, assessed by need for provider- and patient-administered supplemental analgesia and hourly ropivacaine consumption was not improved by single-orifice catheters.

PU-0832

蛛网膜下腔阻滞用于臀位外倒转术的罗哌卡因最佳有效剂量的偏币序贯研究

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中国福利会国际和平妇幼保健院

目的 本研究旨在确定蛛网膜下腔阻滞用于臀位外倒转术所使用的罗哌卡因 90%有效剂量，并观察其安全性。

方法 本研究为前瞻、双盲、序贯观察性研究。本研究招募了 2023 年 12 月至 2024 年 6 月在中国福利会国际和平妇幼保健院需要行臀位外倒转术的孕妇 40 例。由特定的研究助手向麻醉医生提供实行蛛网膜下腔阻滞所需的含有 10μg 芬太尼和研究剂量的罗哌卡因的混合药液共 2ml。后续入组孕妇所分配的罗哌卡因剂量组由上一位孕妇对所用罗哌卡因剂量的反应所得。如果所用的腰麻罗哌卡因剂量能达到胸 6 平面并在外倒转过程中孕妇 NRS 评分均<3，则下一位孕妇所用的罗哌卡因剂量有 8/9 可能维持不变，1/9 可能减少 0.5mg；否则下一位孕妇所用的罗哌卡因剂量增加 0.5mg。根据每一位孕妇成功与否，采用 Isotonic 回归和改良 Truncated Dixon and Mood 回归估算用于臀位外倒转术的蛛网膜下腔使用的罗哌卡因的 ED90 及其 95%可信区间。

结果 蛛网膜下腔阻滞用于臀位外倒转术的罗哌卡因的 ED90 是 3.2mg（95%CI：2.8-3.4）。臀位外倒转的成功率是 65%。孕妇术中低血压的不良反应发生率是 17.5%。

结论 臀位外倒转术中蛛网膜下腔阻滞采用罗哌卡因 3.2mg 可以显著减轻孕妇的疼痛，增加外倒转术的成功率，且不影响母婴安全。

PU-0833

预防性输注去氧肾上腺素和去甲肾上腺素对择期剖宫产妇女脑氧饱和度的影响

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目的 比较在蛛网膜下腔阻滞下行择期剖宫产妇女中，预防性输注 PE 和 NE 对产妇额叶 ScO2 的影响，对比术中不良反应发生情况和新生儿 Apgar 评分，探讨相关指标变化的原因及意义，为产妇寻求维持 ScO2 方面更优的血管加压素。
方法 纳入在蛛网膜下腔阻滞下行择期剖宫产妇女 106 人，根据给药种类的不同，将入选的产妇随机分为两组，PE 组（P 组，n=52）和 NE 组（N 组，n=54），在蛛网膜下腔给药的同时，启动 NE 或 PE 输注泵，两组分别以 50 μg/min 和 4 μg/min 的固定速率输注 30 min。从蛛网膜下腔给药至分娩，记录两组在 1、3、5min 时 ScO2 下降≥15%的比例；记录低血压、心动过缓、恶心呕吐、头晕的发生率以及补救血管活性药物麻黄碱和阿托品的使用率；记录蛛网膜下腔给药至切皮时间、切皮至胎儿取出时间、新生儿取出后 1min、5min 时的 Apgar 评分。
结果 从蛛网膜下腔阻滞至胎儿取出，P 组在 3、5min 时的 ScO2 下降幅度≥15%的比例高于 N 组（P＜0.05）；两组低血压的发生率和麻黄碱的使用率无显著差异（P＞0.05）；N 组心动过缓发生率及阿托品的使用率低于 P 组（P<0.05）；N 组头晕、恶心呕吐的发生率低于 P 组（P<0.05）；两组蛛网膜下腔给药至切皮时间、切皮至胎儿取出时间及新生儿出生后 1、5min 时 Apgar 评分无统计学差异（P＞0.05）。
结论 NE 和 PE 在预防和治疗产妇 PSH 方面效果相似，但 NE 更有利于维持心率和 ScO2，N 组术中不良反应头晕、恶心呕吐的发生率低于 P 组，N 组术中阿托品的使用率低于 P 组。

PU-0834

罗哌卡因复合舒芬太尼用于硬膜外分娩镇痛时的 90%有效容量:一项双盲序贯剂量探索研究

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目的 本研究旨在探究罗哌卡因复合舒芬太尼在 PIEB 间隔 30 min 时用于硬膜外分娩镇痛的 90%有效容量(EV90)。
方法 我们采用双盲剂量探索研究，采用偏性掷币序贯分配法来确定：在注射间隔为 30 min 的推泵间断注射模式下罗哌卡因复合舒芬太尼镇痛有效且无爆发痛的 90%有效容量。我们使用 0.1%罗哌卡因和 0.4 μ g/mL 舒芬太尼，容量范围为 3 ~ 6 mL。第 1 例患者被分配了 3 mL，其余患者按偏性掷币序贯法分配。
结果 PIEB 间隔 30 min 时，罗哌卡因复合舒芬太尼用于硬膜外分娩镇痛的估计 90%有效容量为 4.88 mL(95%可信区间 4.83 ~ 5.38)。
结论 使用推泵设定注射间隔为 30 min 时，罗哌卡因复合舒芬太尼 PIEB 的最佳推注量约为 5 mL，可进一步减少每小时 PIEB 的用量。

PU-0835

Effect of esketamine on postoperative hypoxemia in patients undergoing thoracoscopic open reduction and internal fixation of rib fracture: A Randomized controlled Trial

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Objective To investigate the effects of esketamine on postoperative respiratory function, analgesia, and safety in patients undergoing thoracoscopic open reduction and internal fixation of rib fracture.
Materials and Methods Sixty patients, including 33 males and 27 females, aged 18-65 years, BMI 18-30 kg/m^2, ASA physical status Ⅰ or Ⅱ, who were scheduled for thoracoscopic open reduction and internal fixation of rib fracture surgery, were randomly divided into two groups (n=30) using the random number table method: the esketamine group (group E) and the control group (group C). Patients received esketamine by infusion with 0.5 mg/kg at induction of anesthesia and continuous infusion with 0.2 mg·kg^{-1}·h^{-1} at maintenance of anesthesia in group E, while the same amount of normal saline was given in group C. The frequency of nocturnal hypoxia was recorded on the first, second, and third nights after surgery. The VAS score at resting and moving after surgery were recorded in both groups. The perioperative opioid consumption, the rate of rescue analgesia within 48 h after surgery, the awakening time, the first time of getting out of bed, the time of hospital stay, the adverse reactions were recorded.
Results The frequency of nocturnal hypoxia at the first, second and third night after surgery were lower in group E than those values in group C ($P < 0.05$). The VAS score at the moving (VAS - M) at 24 h and 48 h after surgery were significantly lower in group E than those values in group C ($P < 0.05$). The total infusion of pressing PCA (Patient-controlled analgesia) pump were significantly lower in group E than those in group C ($P < 0.05$). The rate of rescue analgesia within 48 h after surgery was significantly lower in group E than that in group C ($P < 0.05$). The cumulative consumption of remifentanil and the incidence of nausea and vomiting were significantly lower in group E than those in group C ($P < 0.05$). Meanwhile, The first time of getting out of bed and the time of hospital stay were significantly earlier in group E than those in group C ($P < 0.05$). There were no significant differences in the VAS score at the resting (VAS - R) at 1 h after surgery, the awakening time or the incidence of adverse reactions such as postoperative agitation, dizziness or headache between the two groups ($P > 0.05$).
Conclusion Esketamine can reduce the frequency of hypoxia at night, relieve the postoperative pain significantly, reduce the incidence of nausea and vomiting, promote the recovery for the patients undergoing thoracoscopic open reduction and internal fixation of rib fracture.

PU-0836

瑞芬太尼抑制烧伤削痂植皮术患者术中应激反应的研究

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目的 观察瑞芬太尼对烧伤削痂植皮术患者术中应激反应的抑制作用。

方法 选择烧伤削痂手术病人（ASA2~3 级）52 例，随机分成瑞芬太尼组（R 组）、芬太尼（F 组）两组。麻醉诱导：R 组丙泊酚 1.5~2.0mg/kg、罗库溴铵 0.6~0.8mg、瑞芬太尼 0.6~0.8μg/kg（输注时间 1~2min）静注注射；F 组丙泊酚 1.5~2.0mg/kg、罗库溴铵 0.6~0.8mg、芬太尼 3~4μg/kg。气管插管后，R 组微量泵静脉泵注瑞芬太尼 0.1~0.2μg/（kg.min）、丙泊酚 4~6mg/(kg.h)维持麻醉。F 组诱导用芬太尼 3~4μg/kg，维持用 0.25μg/kg 每 30min 静脉注射追加。于麻醉诱导前，诱导后,气管插管后,手术开始后 10min、20min,拔管后等时间点记录有创血压、心率、同时抽取颈内静脉血液检测血肾上腺素（AD）、去甲肾上腺素（NA)浓度、血糖值，记录麻醉结束后睁眼时间以及拔管时间。

结果 麻醉诱导后，R 组 MAP、心率和肾上腺素低于 F 组；两组去甲肾上腺素水平比较无意义；R 组的睁眼时间和拔管时间明显短于 F 组。

结论 与芬太尼相比较，瑞芬太尼可以更有效减少手术和麻醉应激反应，使麻醉药物与血压控制融为一体，方法简便、效果确切、安全可靠。

PU-0837

Early vs Late Fixation of Extremity Fractures Among AdultsWith Traumatic Brain Injury

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Background The optimal timing for fixation of extremity fractures after traumatic brain injury (TBI) remains controversial. To investigate whether patients who underwent extremity fixation within 24 hours of TBI experienced worse outcomes than those who had the procedure 24 hours or more after TBI.

Methods This cohort study utilized data from the Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI) study. Inclusion criteria were met by patients 16 years or older with TBI who underwent internal extremity fixation. To compare outcomes, patients who underwent the procedure within 24 hours were propensity score matched with those who underwent it 24 hours or later. The primary outcome was an unfavorable functional status at 6 months (Glasgow Outcome Scale–Extended [GOSE] score ≤4).

Results A total of 253 patients were included in this study. The median age was 41 (IQR, 27-57) years, and 184 patients (72.7%) were male. The median Injury Severity Score (ISS) was 41 (IQR, 27-49). Approximately half of the patients (122 [48.2%]) had a mild TBI while 120 (47.4%) had moderate to severe TBI. Seventy-four patients (29.2%) underwent an internal extremity fixation within 24 hours, while 179 (70.8%) had the procedure 24 hours or later. At 6 months, 86 patients (34.0%) had an unfavorable functional outcome. After propensity score matching, there were no statistically significant differences in unfavorable functional outcomes at 6 months (odds ratio [OR], 1.12 [95% CI, 0.51-1.99]; P = 0.77) in patients with TBI of any severity. Similar results were observed in patients with mild TBI (OR, 0.71 [95% CI, 0.22-2.29]; P = 0.56) and moderate to severe TBI (OR, 1.08 [95% CI, 0.32-3.70]; P = 0.90).

Conclusions The outcomes of extremity fracture fixation performed within 24 hours after TBI appear not to be worse than those of procedures performed 24 hours or later. This finding suggests that early fixation after TBI could be considered in patients with mild head injuries.

PU-0838

环泊酚和丙泊酚全麻诱导对烧伤患者炎性因子及认知功能的影响

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目的 比较环泊酚和丙泊酚全麻诱导对烧伤患者血流动力学、炎性因子及短期认知功能的影响。
方法 材料与方法：选择 2022 年 8 月-2023 年 12 月武汉市第三医院烧伤科收治中度烧伤患者 150 例，年龄 22~65 岁，BMI 16.9-25.8 kg/m2，男 86 例，女 64 例，美国麻醉医师学会（American Society of Anesthesiologists，ASA）I-Ⅲ级，随机分为环泊酚组（C）和丙泊酚组（P），每组 75 例。两组患者均采用相同的麻醉诱导方案，C、P 组患者全麻诱导分别给予环泊酚或丙泊酚 0.16ml/kg，30s 内观察是否起效，如果没完成麻醉诱导，每 10s 追加药物 0.08ml/kg，直到诱导成功。记录两组患者给药前（T0）、诱导后 1min（T1）、插管后即刻（T2）、插管后 5min（T3）的平均动脉压（MAP）、心率（HR），及 BIS 值，术前和术后 24h 静脉血白介素-6（IL-6）、肿瘤坏死因子-α（TNF-α）水平及 MMSE 评分；同时记录患者睫毛反射消失时间、麻醉诱导成功时间及注射痛发生率。
结果 组间比较：C、P 组，MAP、HR 及 BIS 变化趋势一致，T3 时点 C 组 MAP 高于 P 组，HR 低于 P 组，差异有统计学意义；术后 24h，C 组 IL-6、TNF-α 低于 P 组，MMSE 高于 P 组，差异有统计学意义（P＜0.05）。组内比较：C、P 组 MAP 在 T1 和 T3 点低于 T0，P 组 T2 点低于 T0；C、P 组 HR、BIS 在给药后各点均低于 T0，差异有统计学意义；C、P 组术后 24h IL-6、TNF-α 显著低于术前，C 组术后 24h MMSE 显著高于术前，差异有统计学意义（P＜0.05）。C 组睫毛反射消失、麻醉诱导成功时间长于 P 组，注射痛发生率低于 P 组，差异有统计学意义（P＜0.05）。
结论 环泊酚和丙泊酚都可以用于烧伤患者全麻诱导，两者对血流动力学影响相似，环泊酚在减少烧伤患者炎性因子，改善短期认知功能及减少注射痛优于丙泊酚，更适用于烧伤患者全麻诱导。

PU-0839

应激性心肌病研究进展

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目的 一、定义
应激性心肌病是一种以急性和短暂性(<21 天)左心室收缩(和舒张)功能障碍为特征的临床综合征，通常与情绪或身体应激事件有关。左室壁区域性运动异常特征性地延伸到单个心外膜冠状动脉分布之外，定义了该综合征。典型的区域性左室壁运动异常是心尖部运动功能减退/运动障碍（心尖部气球样变）伴有运动亢进，但非冠状动脉阻塞所致。
二、流行病学
常见于绝经后妇女或焦虑水平升高的背景下，或焦虑或惊恐障碍。三项注册的队列研究中，1,750、324 和 190 例应激性心肌病患者分别报告 90%、91%和 92%为女性，平均年龄分别为 67 岁、68 岁和 66 岁。绝经后妇女交感神经驱动和内皮功能障碍增加，易发生微血管功能障碍。此外，绝经后妇女的氧化应激标志物也增加。绝经后妇女更多患有焦虑，抑郁和睡眠障碍，绝经后 NPY 增加。因此，交感神经活动和 NPY 增加与冠状动脉储备受损相关，可能导致绝经后妇女应激性心肌病的发生率增加。
三、发病机制

目前仍不完全清楚，可能涉及多种机制：1.肾上腺素能假说；2.脑-心轴学说；3.冠脉微血管功能障碍

方法 四、临床表现

应激性心肌病的典型患者是绝经后妇女，其表现为急性或亚急性发作的胸痛(>75%)和/或呼吸短促(约 50%)，常伴有头晕(>25%)和偶尔的晕厥(5%至 10%)，易与 ACS 混淆而误诊。低血压和灌注不足引起头晕和晕厥，可能提示危及生命的心源性休克或室性心律失常。表现为中风样症状并不常见。由室性心律失常引起的心脏骤停是可能的。

体格检查：应激性心肌病患者通常表现为呼吸窘迫、心动过速、低血压、触感冷、脉压狭窄、第三心音出现、颈静脉怒张、基底部有碎裂音/啰音，经常有收缩期射血杂音(由 LVOTO 和 MR 引起)，但很少有下肢水肿--区别于心衰

结果 五、诊断

1.伴有或不伴有心尖受累的左心室中间节段短暂性运动不足或运动障碍;局部壁运动异常超出单个心外膜血管分布;压力触发因素经常存在，但并不总是存在。

2.无阻塞性冠状动脉疾病或急性斑块破裂的血管造影证据。

3.新的心电图异常(st 段抬高和/或 t 波倒置)或肌钙蛋白轻度升高。

4. 在上述两种情况下，应谨慎诊断应激性心肌病,并必须寻求明确的应激性诱发因素。这些标准有罕见的例外，如局部壁运动异常局限于单个冠状动脉区域的患者。

结论 六、治疗

目前尚缺少应激性心肌病治疗的前瞻性临床研究。治疗的目标是对症支持治疗，以维持生命，并尽量减少并发症，直到完全康复，这通常发生在几周内。轻症病例，不治疗或短期有限的药物治疗可能就足够了。重症病例，并发进行性循环衰竭，一些患者需要考虑机械循环支持作为恢复的桥梁。ECG 监测：考虑到心律失常的风险，特别是在 QTc 间隔较长的情况下，患者需要入院接受急性心脏或医疗单位的连续 ECG 监测。在没有 QT 间期延长或心律失常的情况下，监测 48 小时是足够的。

PU-0840

瑞马唑仑与丙泊酚对胃肠肿瘤手术患者短期内术后疲劳综合征的影响对比

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目的 术后疲劳综合征（Postoperative Fatigue Syndrome，POFS）是指患者在手术后主观感受到机体持续处于一段疲劳期，是临床术后恢复中极为常见的一组症候群，常见于各种手术之后，临床上甚至有术后 24 至 36 个月依旧存在不同程度疲劳症状的报道。瑞马唑仑作为新型苯二氮䓬类镇静催眠药目前已被广泛接受，其有对呼吸循环功能影响少、苏醒快速且舒适等特点。本研究目的在于比较瑞马唑仑和丙泊酚对择期胃肠肿瘤手术患者短期内术后疲劳综合征发生率及程度的差异性，探究应激反应和营养状态与术后疲劳综合征的相关性，为预防或减轻术后疲劳综合征提供理论依据，为临床麻醉用药提供合理方案。

方法 严格按照标准选择择期胃肠肿瘤手术患者 60 例，年龄 30~65 岁，ASA 分级Ⅰ~III 级，BMI 在 18~24kg/m2 之间。采用随机数字表法将患者随机分为两组，每组 30 例：丙泊酚诱导维持组（P 组）、瑞马唑仑诱导维持组（R 组）。入手术室后记录患者诱导前（T0）、诱导后 1min（T1）、气管插管即刻（T2）、出手术室时（T3）、出麻醉苏醒室时（T4）的生命体征，包括 HR、MAP、BIS、SpO2。于择期手术前 1 天（D0）、手术结束后第 1 天（D1）、手术结束后第 3 天（D3）使用视觉模拟疼痛尺度（VAS）进行疼痛程度评分，采用 Christensen 术后疲劳评估量表、围手术期疲劳测评量表（ICFS）、FS-I4 疲乏量表和简明心境量表（BPOMS）进行术后疲劳程度评估，同时采集患者外周静脉血测定血浆应激指标（肾上腺素、去甲肾上腺素、皮质醇）水平，记录血生化

结果（白蛋白、前白蛋白、总蛋白、葡萄糖）。记录患者苏醒时间与情况，拔除气管导管时使用 Riker 镇静躁动（SAS）评分评估苏醒时镇静水平。

结果 1. 一般资料：两组患者年龄、BMI、性别构成比、手术部位构成比、ASA 分级、并存疾病等比较无统计学差异（P＞0.05）。

2. 手术情况：两组患者手术时间、麻醉时间、术中出血量、尿量、输液量等相比无统计学差异（P＞0.05）。R 组的平均镇静起效时间比 P 组长（P＜0.05），但睁眼时间、拔管时间均更短，且 SAS 评分更低（P＜0.05）。

3. 围术期生命体征：T0 时两组的 HR、MAP、BIS 相比均无统计学差异（P＞0.05）。两组患者 T1 时的 HR、MAP、BIS 均低于 T0 时（P＜0.05），且 R 组的 HR、MAP、BIS 均高于 P 组（P＜0.05）。R 组术中心血管事件（低血压、窦性心动过缓）发生率明显低于 P 组（P＜0.05）。

4. 应激指标：D0 时两组的血浆 E、NE、Cor、Glu 水平均无统计学差异（P＞0.05）。两组患者 D1、D3 时血浆 E、NE、Cor、Glu 水平均明显高于 T0 时（P＜0.05），且 R 组的血浆 E、NE、Cor 水平低于 P 组（P＜0.05）。

5. 营养指标：D0 时两组的血浆 TP、ALB、PA 水平均无统计学差异（P＞0.05）。两组患者 D1、D3 时血浆 TP、ALB、PA 水平均明显低于 T0 时（P＜0.05），其中在 D1 时 R 组的血浆 TP 水平低于 P 组，在 D1、D3 时 R 组的血浆 PA 水平低于 P 组（P＜0.05）。

6. 术后疲劳评估：D0 时两组的疲劳量表评分均无统计学差异（P＞0.05）。使用 Christensen 术后疲劳评估量表、围手术期疲劳测评量表（ICFS）、FS-I4 疲乏量表和简明心境量表（BPOMS）4 个量表联合评估患者术后疲劳程度，两组在 D1、D3 时的疲劳评分均高于 D0 时（P＜0.05），且 R 组的评分明显低于 P 组（P＜0.05）。

结论 本研究发现在胃肠肿瘤择期手术的全身麻醉中使用瑞马唑仑可以通过降低应激反应降低术后 3 天内 POFS 的程度，并验证了瑞马唑仑的镇静催眠作用不劣于丙泊酚，且对循环功能影响更小、苏醒时间更短、苏醒更舒适，有利于加速患者术后康复，值得推广。

PU-0841

Exploration of anesthesia mode for EVAR

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Objectives: In the past, general anaesthesia(GA) was the main method of traditional anesthesia for EVAR surgery, but recent years, local anesthesia（LA）surgery at the EVAR is used in more and more.Combined with the clinical observation, to reduce LA in patients with nervous and fear, even leads to the occlusion of blood vessels and cannot be puncturedat，at the same time ,to mitigate the effects of GA on hemodynamics. We hope to use an anesthesia method that allows the patient to cooperate quietly and is hemodynamically stable to bring the patient a safe and comfortable surgical procedure.

Consequence This article describes the special anesthesia methods used for EVAR in three RAAA patients: after induction of GA and tracheal intubation, LA combined with sedation monitored anaesthesia care (MAC) was maintained during the operation until the end of the operation.We have successfully treated 3 cases of special means of merging multiple basic diseases or complex EVAR patients. All patients were cured and discharged, and they could still take care of themselves after 1 year of follow-up.

Conclusion By summarizing the literature on the anesthesia process of emergency endovascular repair of RAAA, combined with the actual clinical operation process, it is concluded that induction of GA & LA and MAC for intraoperative maintenance is feasible anesthesia methods for emergency endovascular repair of RAAA.

PU-0842

急性创伤围术期多学科一体化麻醉管理——微创急救、平衡麻醉、尽速康复

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目的 麻醉学科，作为急性创伤围术期不可或缺的平台学科，正在越来越多的参与到急性创伤救治的各个阶段，并在院前院内急救和术后快速康复间起到了承上启下的重要作用，通过病案分享与锦旗背后的故事，阐述急性创伤出血休克围术期多学科一体化麻醉管理理念，在健全创伤救治体系和多学科技术支撑双核驱动下，力争实现微创急救、平衡麻醉、尽速康复的目标。
方法 病案简介：女性，58 岁，于 2023 年 6 月 11 日因交通事故急诊入院，重度休克（BP 50/30mmHg，HR 150 次/分），急诊 CT 示：肠系膜动脉活动性出血伴盆腹腔大量积血。立刻启动院内“急用血调配流程”输入“O 型万能血”纠正休克为进一步救治提供时间和空间。介入科、普外科、麻醉科多学科紧急会诊经“绿色通道（入院至患者入手术室 45min）”入杂交介入手术室拟行腹腔动脉造影+肠系膜动脉栓塞术，入室后心脏骤停，麻醉科即刻启动“快速反应急救流程”，即刻建立气道机械通气行 CPR 复苏，除常规监测外同时通过 viglieo、血气分析、体温监测、TEG 等监测手段实施目标导向性液体复苏，凝血功能、体温及酸碱电解质内环境管理，经持续 CPR 复苏约 40min，患者恢复自主心率，并成功实施肠系膜动脉栓塞术，术毕带气管导管呼吸机支持送 ICU，离室生命体征：BP 115/45mmHg；HR 86 次/分；SpO2 100%。
结果 经 ICU 综合对症治疗，患者于 6 月 17 日脱机，6 月 22 日神志恢复、清醒，转入介入普通病房。后经营养科、康复科、心理科等多学科综合处理，患者于 7 月 24 日康复出院，出院时患者无心跳骤停缺血相关心脑并发症，并向麻醉科、急诊 ICU 和介入科赠送多学科锦旗。经长期随访，患者出院 1 月后，出现缺血性小肠梗阻症状，经腹腔镜部分小肠切除后，梗阻症状消失，现患者生活如常。
结论 通过创伤出血急救章程与流程的实施（院前转运及院内黄金急救、急用血调配流程、急救绿色通道等）、多学科技术支撑和创伤出血急救理念的更新（麻醉快反小组高质量 CPR 急救、外科损伤控制性复苏、损伤控制性手术等）和创伤出血平衡麻醉的管理（目标导向性纠正容量、凝血功能异常、内环境紊乱，合理镇痛降低围术期应激、实施有效保温措施等，避免死亡三联征）有助于提升危重创伤出血患者的救治率，力争实现——微创急救、平衡麻醉、尽速康复。

PU-0843

环泊酚用于儿童腺样体切除术或腺样体扁桃体切除术的安全性和有效性：一项回顾性研究

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目的 环泊酚是一种新型的静脉麻醉剂，经过严格的临床试验验证了其在成人患者中的疗效和安全性。尽管它在临床上被广泛应用，但目前仅限于成人患者，对其在儿科患者中的使用缺乏了解。这项回顾性队列研究旨在评估环泊酚在儿童中诱导全身麻醉的安全性和有效性。
方法 我们对 2023 年 6 月至 8 月间进行腺样体切除术或腺样体扁桃体切除术的儿科患者的数据进行了回顾性分析，目的是评估环泊酚在儿童患儿中的安全性和有效性。我们的主要观察目标包括全身麻醉诱导过程中的血液动力学变化，并评估这些儿童患者在术后恢复室的术后并发症。此外，我们还回顾性分析了次要结果，包括拔管时间、自主呼吸恢复时间，拔管后不同时间点的躁动评分以

及离开恢复室的躁动与疼痛评分。为了减少偏差，我们还根据患者的年龄进行了亚组分析，以进一步分析数据。

结果 符合研究纳入标准的 301 名儿童中，157 名接受了环泊酚全身麻醉诱导，144 名接受了丙泊酚全身麻醉诱导。两组患者的人口统计学和手术相关信息相似。然而，丙泊酚组的右美托咪定用量显著较高于环泊酚组。两组在全身麻醉诱导期间的血液动力学变化趋势、拔管时间和自主呼吸恢复时间相同。在拔管后 10 分钟和 20 分钟的麻醉后躁动评分在环泊酚组中显著降低。两组均未出现明显的术后并发症。对于≤6 岁亚组，各项结果同总体。对于>6 岁亚组，除拔管后 10 分钟的麻醉后躁动评分在环泊酚组显著降低外，其余结果同总体。

结论 环泊酚在儿童患者全麻诱导中具有血流动力学稳定、不延长拔管时间和自主呼吸恢复时间等优点。此外，它还显示出可以降低术后早期躁动的发生率，而且没有明显的并发症。由于环泊酚已经具有无明显注射痛的特点，结合其降低拔管后早期躁动的特点，它可能成为更加适合儿童全身麻醉的新药物选择。

PU-0844

艾司氯胺酮与咪达唑仑用于学龄前患儿术前镇静抗焦虑效果的比较：一项随机对照研究

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目的 对比临床常用的传统小儿镇静药物咪达唑仑（镇静剂量：0.08mg/Kg，iv）和新型小儿麻醉药艾司氯胺酮（亚麻醉剂量：0.5mg/Kg，iv）在改善学龄前患儿（2~6 岁）术前焦虑上的作用，以进一步提高患儿围术期安全、增加医务人员满意度，从而为优化小儿围术期舒适化医疗提供新的决策参考。

方法 这是一项双盲随机对照临床试验。我们计划纳入共计 110 例受试患儿，以 1：1 的比例分为两组，于麻醉等待区分别静脉注射艾司氯胺酮（S 组，0.5 mg/Kg）或咪达唑仑（M 组，0.08mg/Kg）用于术前镇静。本研究的主要结局指标是通过改良耶鲁术前焦虑评分量表（modified Yale preoperative anxiety scale mYPAS）以评估药物的镇静作用。它将在两个时间点上进行评估：在试验药物处理之前（T0）以及在进入手术室后、麻醉诱导前（T1）。次要指标包括父母分离焦虑评分（Parent separation anxiety scale, PSAS），术后躁动（Pediatric anesthesia emergence delirium，PAED），医护人员满意度以及患儿面罩接受度（mask acceptance score，MAS)。

结果 本研究目前共纳入 75 例受试患儿并进行统计分析，其中，S 组 39 例，M 组 36 例。在给予试验药物后，S 组患儿在 T1 时间点上的 mYPAS 评分要显著低于 M 组的患儿（35.10±6.07 vs. 38.69±6.49，绝对差值，3.59，95%可信区间，0.68-6.48）。次要指标中，两组之间的 PSAS、PAED 及 MAS 均无统计学差异，S 组的医护人员满意度较 M 组更高（8[7-8] vs. 7[6-8]，P=0.036）。两组均未发生试验药物相关的不良事件。

结论 与咪达唑仑相比，艾司氯胺酮用于术前镇静能更显著地降低行择期手术学龄前患儿的术前焦虑状态，同时增加医护人员满意度。

PU-0845

右美托咪定联合丙泊酚在小儿纤维支气管镜检中的应用

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目的 观察右美托咪定复合丙泊酚麻醉用于小儿纤支镜检查的临床效果。
方法 择拟行纤支镜检查术的 1～8 岁患儿 60 例,美国麻醉医师协会分级(ASA)分级Ⅰ～Ⅱ级,不吸氧情况下血氧饱和度 SpO2>90%，排除以下情况：（1）有气管狭窄病史、气道异物或者其他需要纤支镜辅助治疗的疾病，（2）近期使用过镇静剂（3）麻醉药物过敏史；（4）肥胖患儿（BMI >24kg/m2）。随机分为 3 组(n=20)：对照组（C 组），1μg/kg 右美托咪定滴鼻组 (D1 组)和 2μg/kg 右美托咪定滴鼻组（D2）组。所有患儿检查前均雾化吸入 2%盐酸利多卡因，在术前准备间，三组患儿在家属陪伴下分别经双侧鼻孔滴入 0.5ml D1，D2、D3，相对应浓度的右美托咪定和等容量（0.5ml）的生理盐水（C 组），30min 后所有患儿进入手术间，静脉给予丙泊酚 3mg/kg 行全身麻醉,保留自主呼吸经鼻咽通气道给氧气 3L/min。操作者置入纤支镜时，暴露会厌和声门时给予丁卡因局部静脉。手术过程中出现体动或呛咳，给予丙泊酚 1mg/kg 加深麻醉，间隔时间一分钟。术中出现呼吸抑制、喉痉挛或是饱和度下降至 90%以下，取出纤支镜，面罩加压给氧，必要时插入喉罩通气。记录麻醉诱导前(T0)、麻醉诱导后(T1)、纤支镜进入前(T2)、纤支镜进入声门(T3)、抵达隆突(T4)及第 10 分钟(T5)时的心率(HR)、呼吸频率(RR)和无创平均动脉血压(MAP)、动脉血氧饱和度(SpO2)。观察纤支镜检查期间患儿有无呛咳、体动、呛咳、气道痉挛、严重缺氧、心肺躁动等不良事件的发生；记录患儿检查时间及苏醒时间,追加全身麻醉药的次数和剂量，离开手术室时小儿麻醉苏醒期躁动评分(PAED)及患者满意度。
结果 3 组患儿的一般情况：年龄、性别、体重和手术时间等差异无统计学意义（P>0.05）。右美托咪定组（D2 组和 D3 组）术前 Ramsay 镇静评分均高于 C 组（P<0.05），镇静效果明显，患儿与家长分离情绪评分降低。与 T0 比较,三组 T2、T3、T4 及 T5 的 MAP 和 T2、T3、T4 的 HR 明显升高。与 NS 组比较，D1 和 D2 组 T2、T3、T4 及 T5 的 MAP 和 T2、T3、T4 的 HR 均明显升高(P<0.05)；D2 组术中使用丙泊酚的剂量以及追加次数明显增加,，检查时间和苏醒时间明显缩短(P<0.05)；出室时 PAED 评分明显降低(P<0.05)；三组患者满意度无统计学差异(P>0.05)。
结论 2μg/kg 右美托咪定滴鼻联合丙泊酚静脉麻醉可安全用于小儿纤支镜检查，术前镇静效果好，减少全身麻醉药的用量,并降低术中不良事件的和术后躁动的发生。

PU-0846

血栓弹力图指导儿童大脑半球切除术异体成分血输注需求的回顾性分析

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目的 大脑半球切除术是治疗一侧大脑弥漫性病变导致的难治性癫痫的经典术式。该手术出血量大，有效的凝血管理是麻醉的重点及难点。使用血栓弹力图（thromboelastography，TEG）指导的凝血管理是否能降低大脑半球切除术患儿的异体成分血输注率，目前尚无相关研究。本研究拟对我院从 2011 年至今行大脑半球切除术患儿的临床资料进行回顾性分析，探讨术中使用 TEG 指导的凝血管理对异体成分血输注率的影响。
方法 本研究为回顾性研究。回顾性分析首都医科大学宣武医院 2011 年 1 月 1 日至 2023 年 10 月 31 日在气管插管全身麻醉下行大脑半球切除术的患儿 38 例。纳入标准：（1）择期行大脑半球切除术的患者；（2）年龄 1~12 岁；（3）美国麻醉医师协会麻醉风险分级为Ⅰ、Ⅱ或Ⅲ级。排除标

准：（1）合并肝肾疾病者；（2）合并血液疾病者；（3）有出血性疾病家族史者；（4）术中发生大出血抢救者（大出血指符合以下三点中的任意一点：①3h 失血量超过 50%血容量；②失血量超过 150ml/min；③失血量超过 20ml/kg/min 持续 20min）。将病例按照术中是否使用 TEG 指导凝血管理分为研究组（T 组）与对照组（C 组）。主要研究终点为患儿异体成分血输注率包括红细胞输注率、血浆输注率及血小板输注率。次要研究终点为术中主要的凝血异常类型，术中出血量、术后住院期间是否癫痫发作、是否发生血栓栓塞性事件及术后住院时间。

结果 T 组 17 例，C 组 21 例。T 组术中预防性使用氨甲环酸者比例显著高于 C 组，差异具有统计学意义（P=0.004）。T 组患儿身高、体重及功能性大脑半球切除术比例明显低于 C 组，差异均具有统计学意义（身高：P=0.035；体重：P=0.032；功能性大脑半球切除术比例：P=0.026）。T 组异体血浆输注率明显低于 C 组，差异具有统计学意义（术中：P=0.023；围术期：P=0.031），两组异体红细胞输注率的差异无统计学意义（P＞0.05），两组患儿均未输注血小板。T 组术中纤维蛋白原输注率明显高于 C 组，差异具有统计学意义（P=0.001）。两组患儿术后均未发生血栓栓塞事件，手术出血量、术后癫痫发作比例及住院时间的差异均无统计学意义（P＞0.05）。

结论 TEG 指导的凝血管理能减少血浆输注的主观性，显著降低儿童大脑半球切除术中的异体血浆输注需求，但不能降低异体红细胞输注需求。

PU-0847

氯胺酮联合瑞芬太尼在小儿结肠镜检查中的应用观察

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目的 探讨小儿结肠镜检查中采用氯胺酮联合瑞芬太尼的麻醉效果。

方法 随机纳入襄阳市中心医院于 2022 年 1 月至 2023 年 1 月期间收治并行结肠镜检查的患儿共 180 例,将患儿按随机数字表法分为对照组(n=90)与实验组(n=90)。术前两组患儿麻醉诱导均予以静脉滴注 0.02mg/kg 咪达唑仑。对照组患儿检查中予以单静脉泵注 90ug/(kg·min)氯胺酮维持麻醉,实验组患儿检查中予以静脉泵注氯胺酮 60ug/(kg·min) 联合瑞芬太尼 0.06ug/(kg·min)维持麻醉,观察并对比两组患儿麻醉中生命体征等参数。

结果 两组患儿术前心率(HR)、平均动脉压(MAP)及血氧饱和度指标情况,两两比较差异无统计学意义(P＞0.05)；术中两组患儿心率比较，对照组患儿心率(HR)相比实验组患儿更高,差异有统计学意义(P＜0.05)；两组患儿术中平均动脉压(MAP)、血氧饱和度指标情况两两比较，差异无统计学意义(P＞0.05)；实验组患儿术后苏醒时间相比对照组患儿更短,两两比较差异有统计学意义(P＜0.05)。

结论 对于行无痛结肠镜检查的患儿在麻醉过程可采用氯胺酮联合瑞芬太尼的麻醉方法，其麻醉效果更加明确,患儿在术中的生命体征表现更平稳且术后苏醒速度更快、苏醒状态较良好,该麻醉方法具有临床推广应用价值。

PU-0848

右美托咪定在小儿无痛胃镜麻醉中的应用效果观察

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目的 分析静脉滴注右美托咪定在小儿无痛胃镜麻醉中的实际应用效果。

方法 选取 2022 年 8 月至 2022 年 12 月于襄阳市中心医院择期行无痛胃镜检查的患儿共 100 例，分别将所有患儿按照随机数字表法分为两组，每组各 50 例。 所有患儿入室后常规心电监护，并低

流量吸氧，所有患儿均采用小剂量舒芬太尼复合依托咪酯+丙泊酚 1：2 混合液的麻醉方法，其中实验组麻醉前 5 分钟给予静脉滴注 50ug/kg 的右美托咪定，对照组麻醉前 5 分钟予以静脉滴注生理盐水 5ml，采用 Malviya 躁动评分、Ramasy 镇静程度评分对患儿术后躁动情况进行评价，使用视觉模拟量表(VAS 评分)对患儿术后即刻（T0）及术后 1 小时(T1)的疼痛程度进行评估。

结果 实验组患儿躁动出现的频率为 4.2%，对照组出现躁动的频率为 35.0%，差异有统计学意义(P＜0.05);实验组患儿的 Ramasy 镇静程度评分为(2.44±0.79 分)，对照组为(0.73±0.08 分），组间两两比较差异有统计学意义(P＜0.05)；两组患儿 T0 及 T1 时刻 VAS 评分两两比较，实验组明显低于对照组，差异有统计学意义(P＜0.05)。

结论 右美托咪定麻醉前静脉滴注联合全凭静脉全身麻醉在小儿无痛胃镜术中应用效果显著，具有满意的麻醉与镇痛效果，加快小儿术后康复。

PU-0849

丙泊酚联合瑞芬太尼用于小儿胃镜下上消化道异物取出术中的临床观察

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目的 观察丙泊酚联合瑞芬太尼应用于小儿无痛胃镜下上消化道异物取出术中的安全性及麻醉效果。

方法 纳入我院 2021 年 4 月至 2023 年 4 月急诊或择期行无痛胃镜下上消化道异物取出术的患儿共 112 例。按随机数字表法分为两组，每组各 56 例。对照组采用丙泊酚+生理盐水泵注的麻醉方法，实验组采用丙泊酚+瑞芬太尼泵注的麻醉方法。所有患儿入室后常规心电监护并在术前 5min 给予长托宁 10ug/kg 静脉注射并开始泵注瑞芬太尼(实验组)及生理盐水(对照组)。监测并记录两组患儿麻醉前(T0)、麻醉后（T1）和定向能力恢复时刻(T2)的血氧饱和度（SpO2）、心率(HR)、平均动脉压（MAP），分别记录并分析两组患儿丙泊酚总用量、术中麻醉不良反应发生率、住院时间、术者满意度及药品不良反应；分别记两组患儿意识消失时间、苏醒时间以及定向能力恢复时间。小儿无痛胃镜下上消化道异物取出术中的安全性及麻醉效果。

结果 两组患儿 SpO2、MAP 和 HP 与 T0、T2 时刻比较，T1 时刻均明显降低，差异有统计学意义（P＜0.05），T1 时刻两两比较对照组明显低于实验组，差异有统计学意义（P＜0.05），T0、T2 时刻两两比较差异无统计学意义(P＞0.05)；实验组患儿的丙泊酚总用量、术中麻醉不良反应及药物不良反应发生率、住院时间均低于对照组，实验组术者满意度高于对照组，差异有统计学意义（P＜0.05）；实验组患儿意识消失时间、苏醒时间以及定向能力恢复时间均低于对照组，差异有统计学意义（P＜0.05）

结论 丙泊酚联合瑞芬太尼应用于小儿胃镜下上消化道异物取出术中可产生麻醉协同作用并可减少麻醉药物用量，可明显缩短患儿苏醒时间短,对生命体征影响小,值得临床推广。

PU-0850

Analysis of the Clinical Effectiveness of Perioperative Fluid Management in Reducing Postoperative Acute Kidney Injury in Children with Congenital Heart Disease

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Objective To explore the clinical effect of fluid management combined with detailed nursing in

perioperative period on reducing postoperative acute renal injury (AKI) in children with congenital heart disease.
Methods A toal of 98 children with congenital heart disease admitted to our hospital from June 2022 to December 2023 were taken as the research object, and all the children were treated with ventricular septal defect repair. According to the different perioperative nursing methods, they were divided into study group and control group, 49 cases in each group; The control group received routine nursing, while the research group adopted the mode of liquid management combined with detailed nursing. The operation-related indexes, postoperative pain, inflammatory factors, postoperative complications and nursing satisfaction were compared between the two groups.
Results The blood loss, operation time and hospitalization time in the study group were lower than those in the control group (P<0.05). There was no significant difference in the scores of FLACC between the two groups at 12 h postoperatively (P>0.05), but the FLACC scores in the study group at 24 h and 48 h postoperatively were lower than those in the control group (P<0.05). The levels of serum IL-6, IL-17 and Hs-CRP in the study group were lower than those in the control group 3 days after operation (P<0.05). The incidence of postoperative complications in the study group was lower than that in the control group (P<0.05). The nursing satisfaction score of the study group was higher than that of the control group (P<0.05).
Conclusion Peri-operative fluid management combined with detailed nursing can reduce intraoperative bleeding, operation time, postoperative rehabilitation time and postoperative pain, adjust the level of inflammatory factors, reduce the risk of postoperative complications and improve the satisfaction of family members and children.

PU-0851

瑞马唑仑预防儿童七氟烷全麻术后躁动的效果观察

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目的 探讨瑞马唑仑预防儿童七氟烷全麻术后躁动的效果。
方法 选取 2023 年 4 月至 2023 年 10 月因腺样体肥大就诊于首都医科大学附属北京同仁医院并行鼻内镜下腺样体切除术的患者 60 例,年龄 3～8 岁。按随机数字表法分为七氟烷组 (S 组) 和瑞马唑仑+七氟烷组 (RS 组) ,各 30 例。S 组患者麻醉维持采用吸入七氟烷复合静注瑞芬太尼,RS 组患者麻醉维持不变,在手术结束前 10min 静注 0.1mg/kg 的瑞马唑仑。记录两组患儿苏醒期 30min 内的躁动发生率,记录术后不同时间点的 PAED 评分及 NRS 评分;记录两组患儿的麻醉时间,手术时间,睁眼时间,拔管时间及 PACU 停留时间；记录患儿家长的满意度评分及与试验相关的不良事件发生率。
结果 苏醒期躁动发生率,RS 组明显低于 S 组 (P ＜ 0.05) 。与 S 组相比,RS 组患儿不同时间 PAED 评分均明显低于 S 组 (均 P ＜ 0.05) 。与 S 组相比,RS 组睁眼时间、拔管时间和 PACU 停留时间均显著延长 (均 P ＜ 0.05) 。 RS 组家长满意度评分明显高于 S 组 (P ＜ 0.05) 。两组均未发生不良反应。
结论 术中静脉注射 0.1mg/kg 的瑞马唑仑可显著降低患儿在七氟烷麻醉后苏醒期躁动的发生率,有效提高了患儿家长满意度,有利于术后恢复。

PU-0852

The Impact of General Anesthesia on the Outcomes of Preterm Infants with Gestational Age Less Than 32 Weeks Delivered via Cesarean Section

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Background The prognosis of preterm infants is significantly affected by factors including the intrauterine environment, delivery method, and neonatal intensive care. Cesarean section, often used for preterm births, has implications that are not fully understood, particularly concerning the type of anesthesia used. This study focuses on comparing the outcomes of very preterm infants (VPIs) delivered under general anesthesia (GA) and neuraxial anesthesia (NA), aiming to shed light on how anesthesia choice influences preterm infant health.
Methods This cohort study comprised 1,029 VPIs born with a gestational age of less than 32 weeks, delivered by cesarean section at our single-center medical facility between January 1, 2018, and December 31, 2022. Detailed medical records, encompassing perioperative anesthesia information, maternal clinical data, and neonatal outcomes, were meticulously examined. The primary aim of this investigation was to compare maternal characteristics and neonatal outcomes between VPIs delivered under GA and NA. A significance level of $p < 0.05$ was established.
Results Of the 1,029 very preterm infants (VPIs) analyzed, 87.95% (n=905) were delivered via neuraxial anesthesia (NA) and 12.05% (n=124) via general anesthesia (GA). Mothers with hypertensive pregnancy diseases and emergency operations were more inclined to choose GA. VPIs delivered under GA showed a higher likelihood of a low Apgar score (≤7) at one and five minutes ($p<0.01$), increased need for tracheal intubation resuscitation (32.2% vs 12.2%, $p<0.01$), and a greater incidence of severe neurological injury (SNI) (14.5% vs 5%, $p<0.01$). Multivariable analysis revealed GA was significantly associated with lower Apgar scores at one (OR 5.764, 95% CI 3.574-9.306; $p<0.01$) and five minutes (OR 4.293, 95% CI 2.880-6.400; $p<0.01$), higher risk of tracheal intubation resuscitation (OR=3.442, 95% CI=2.248-5.27; $p<0.01$), and SNI (OR=3.226, 95% CI=1.802-5.778; $p<0.01$). Furthermore, for VPIs delivered under GA, a prolonged interval from skin incision to fetus delivery was associated with a lower 5-minute Apgar score ($p<0.01$).
Conclusion This study revealed the significant impact of GA on adverse outcomes among VPIs. In cases when GA is required, proactive measures should be instituted for the care of VPIs such as expediting the interval from skin incision to fetal delivery.

PU-0853

HFNO 用于主支气管异物合并严重低氧血症患者麻醉处理 1 例

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目的 本文报道了 1 例左主支气管异物合并严重低氧血症的患者在高流量鼻导管氧疗下实施硬质气管镜异物取出术和电子软镜下肺泡灌洗术的情况。
方法 入室前患儿 10L/min 吸氧下氧饱和度 91-92%，端坐呼吸体位，血气分析：血氧分压 61.85mmHg。在入室后给予患者端坐位下高流量鼻导管氧疗（50L/min），约 5min 后血氧饱和度缓慢升至 96%，床头缓慢放至 30°角，患儿无不适，开始行保留自主呼吸的静脉全身麻醉。
结果 术中因异物在隆突附近，硬镜刺激较大，患儿偶有呛咳导致异物位移增加了手术难度，取异物耗时约 15min，之后行支气管软镜肺泡灌洗，总手术时长 1h10min，麻醉总时长 1h45min，全程饱和度均维持在 96%-99%。

结论 HFNO 在此类严重气道异物患者麻醉中可能具有无创、操作简便、高效等优点。

PU-0854

精准多模式心理干预对眼科全麻手术患儿麻醉诱导合作程度及苏醒期躁动的影响

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目的 探讨精准多模式心理干预对眼科全麻手术患儿麻醉诱导合作程度及苏醒期躁动的影响。方法 选取 2023 年 1 月-2024 年 3 月在本院行眼科全麻手术的 150 例患儿作为研究对象，按照随机数表法分为空白对照组（n=50）、药物干预组（n=50）和多模式心理干预组（n=50），空白对照组给予常规护理干预，药物干预组给予术前 30 min 咪达唑仑 0.5mg/kg 联合常规护理干预，多模式心理干预组给予精准多模式心理干预联合术前 30 min 咪达唑仑 0.5mg/kg，比较三组心理弹性[采用心理韧性量表（CD-RISC）评估]、术前焦虑情况[采用改良耶鲁围手术期焦虑量表（m-YPAS）评估]、麻醉诱导合作程度[采用诱导期合作度量表（ICC）评估]、苏醒期躁动[采用儿童麻醉苏醒期躁动评分量表（PAED）评估]、疼痛行为[采用儿童疼痛行为评分（FLACC）评估]、应激反应指标[收缩压（SBP）、舒张压（DBP）、心率（HR）]和生活质量[简明健康状况调查量表（SF-36）]。结果 多模式心理干预组乐观、自强、坚韧评分高于药物干预组和空白对照组（F=5.648；F=16.552；F=18.631，P<0.05）；多模式心理干预组入手术室即刻 m-YPAS 评分、麻醉诱导时 ICC 评分低于药物干预组和空白对照组（F=177.250；U=7.527，P<0.05）；多模式心理干预组和药物干预组 PAED 评分、术后 8 h FLACC 评分低于空白对照组（F=17.975；F=7.012，P<0.05）；术后 1h，多模式心理干预组和药物干预组 SBP、DBP、HR 水平低于空白对照组（F=61.607；F=18.816；F=26.085，P<0.05）；术后 1d，多模式心理干预组生命活力、情感职能、精神健康评分高于药物干预组和空白对照组（F=11.112；F=13.930；F=5.017，P<0.05）。结论 精准多模式心理干预对眼科全麻手术患儿的干预效果显著，可有效提高患儿心理弹性，缓解术前焦虑情况，提高麻醉诱导合作程度，进而改善苏醒期躁动和疼痛行为，降低术后应激反应，提高生活质量。
方法 选取 2023 年 1 月-2024 年 3 月在本院行眼科全麻手术的 150 例患儿作为研究对象，按照随机数表法分为空白对照组（n=50）、药物干预组（n=50）和多模式心理干预组（n=50），空白对照组给予常规护理干预，药物干预组给予术前 30 min 咪达唑仑 0.5mg/kg 联合常规护理干预，多模式心理干预组给予精准多模式心理干预联合术前 30 min 咪达唑仑 0.5mg/kg，比较三组心理弹性[采用心理韧性量表（CD-RISC）评估]、术前焦虑情况[采用改良耶鲁围手术期焦虑量表（m-YPAS）评估]、麻醉诱导合作程度[采用诱导期合作度量表（ICC）评估]、苏醒期躁动[采用儿童麻醉苏醒期躁动评分量表（PAED）评估]、疼痛行为[采用儿童疼痛行为评分（FLACC）评估]、应激反应指标[收缩压（SBP）、舒张压（DBP）、心率（HR）]和生活质量[简明健康状况调查量表（SF-36）]。
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高生活质量。

PU-0855

精准多模式心理干预对儿童眼科全身麻醉术后的影响探讨

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目的 全身麻醉是一种常见的医疗操作，尤其在儿童眼科手术时，由于孩子年龄较小、合作能力有限，通常需要采用全身麻醉来确保手术安全。然而，全身麻醉对儿童的心理可能会产生一定影响，尤其是在手术后的复苏期间和术后康复过程中。精准多模式心理干预是一种针对儿童心理和行为问题的综合干预方式，通过结合认知行为疗法、心理暗示、催眠、游戏疗法等多种方式，旨在减轻儿童在医疗过程中的焦虑、恐惧和疼痛感受，促进其心理健康。因此，该研究旨在探究精准多模式心理干预对儿童眼科全身麻醉术后的影响，包括干预前、干预期间和术后的心理状态、术后疼痛感受、术后行为表现以及术后康复情况等方面的影响，旨在为改善儿童眼科手术全身麻醉术后的康复提供有效的干预策略。

方法 多模式心理干预是一种综合性的干预方法，旨在通过多个模式来促进个体的心理健康。理论基础主要包括三个方面：认知理论、行为理论和情感理论。首先，认知理论强调人类认知过程对行为和情感的影响，根据认知理论，个体对事物的认知是通过信息处理、记忆、思维和判断等过程来实现的。多模式心理干预的理论基础之一就是认知重构，即通过改变个体对事件的认知方式来调整其情绪，这种干预方法可以帮助儿童在眼科全身麻醉术后更好地应对负面情绪，提高其心理适应能力。其次，行为理论认为人的行为是通过外界刺激和个体的反应之间的关系来决定的。在多模式心理干预中，行为改变是一种重要的干预手段，通过行为干预，帮助儿童建立积极的行为习惯，减少焦虑和恐惧的情绪体验，例如，通过模拟术前的情境，让儿童熟悉全身麻醉术的过程，逐渐减少对陌生环境的恐惧和紧张情绪。最后，情感理论强调情感在心理健康中的重要作用。多模式心理干预注重情感表达和情绪调节，例如，在术前干预中，通过绘画、游戏等方式帮助儿童表达他们的情感，减轻内心的紧张。此外，还可以利用音乐和呼吸练习等方式来帮助儿童调节自身情绪，增强他们的心理安全感和自信心。

结果 儿童眼科全身麻醉术后的干预是为了帮助儿童尽快康复，减轻手术后的不适感和负面情绪反应。儿童眼科全身麻醉术后往往会出现不安、焦虑、恐惧等负面情绪，使用儿童友好的语言和交流方式，通过游戏、绘画、故事等方式进行心理疏导，帮助他们情绪得到释放和调节。此外，家长和医护人员的陪伴和安抚也是重要的支持因素。麻醉术后，儿童可能会感到疼痛不适。采用合适的镇痛措施，如局部冰敷、药物缓释贴剂、静脉镇痛等，有助于缓解疼痛，并提高儿童的舒适感。同时，医院应给予儿童和家长关于麻醉术后注意事项、服药指导、伤口护理等方面的信息，并对可能出现的并发症进行解释，有助于减少不必要的担忧，并提高家长的自信心。医院还应为儿童提供适当的康复指导，包括合理的饮食安排、适度活动和休息，促进身体的恢复。同时，鼓励家长积极参与康复过程，并提供必要的信息，以帮助儿童尽快恢复到正常的生活状态。此外，医院应为儿童和家长提供心理咨询服务，让他们有机会表达内心的困惑，寻求专业人士的帮助，这有助于减轻心理压力，促进心理健康的发展。

结论 总之，精准多模式心理干预策略在儿童眼科全身麻醉全过程的康复中起到了重要的作用，通过心理疏导、疼痛管理、信息提供和教育、康复指导和支持以及社会支持和心理咨询等综合策略，帮助儿童减轻负面情绪，促进身心健康的恢复。未来的研究应进一步探索不同干预策略的有效性，并进一步完善儿童眼科全身麻醉术后的精准干预模式。

PU-0856

小剂量纳洛酮复合舒芬太尼在儿童骶管阻滞中的应用

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目的 探讨小剂量纳洛酮复合舒芬太尼应用于小儿骶管阻滞中的安全性及有效性 。
方法 选择在我院需要接受手 术治疗的 ASA Ⅰ -Ⅱ级尿道下裂患儿 100 例，将患儿随机分为对照组和观察组，各 50 例 。所有患儿均采用骶管阻滞，对照组 药物选用利多卡因与舒芬太尼合剂，观察组药物选用利多卡因，舒芬太尼以及小剂量纳洛酮 。观察患儿术前(T0)，手术开始后 30 min (T1)，60 min (T2),90 min (T3)的心率，血压，呼吸频率，血氧饱和度等生命体征，并于各时点抽取静脉血检测白介素-6、 白介素-8、肿瘤坏死因子-α 浓度，记录患儿术中麻醉效果及术后 1h 疼痛情况以及呕吐，呼吸抑制，瘙痒等并发症发生情况 。
结果 疼痛评分及麻醉效果两组患儿无统计学差异；观察组术后呕吐 、呼吸抑制及瘙痒发生率方面较对照组明显下降；对照 组在 T1、T2、T3 时的 RR、SPO2 较观察组低，而 HR、MAP、TNF-α、IL-6、IL-8 在 T1、T2、T3 时较观察组高 。
结论 小剂量纳洛酮 复合舒芬太尼应用于小儿骶管阻滞中，术中镇痛效果更强，不良反应更少，可以安全的应用于小儿手术当中 。

PU-0857

神经母细胞瘤术后转移淋巴结切除术患儿术中嗜铬样现象一例

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目的 通过报道一例神经母细胞瘤术后行浅表淋巴结切除术，术中出现剧烈血流动力学变化，类似嗜铬细胞瘤临床表现。提示类似患儿注意术中生命体征变化，进行有预料提前干预，防止并发症发生。
方法 通过报道一例患儿神经母细胞瘤术后行浅表淋巴结切除术，术中出现剧烈血流动力学变化，类似嗜铬细胞瘤临床表现。术前未有预料，进行紧急血压调控，稳定生命体征，患儿预后良好。
结果 患儿诊断神经母细胞瘤，行原发灶切除术后，进行第二次相关手术时，体内可能存在具有分泌活性的组织，在受到刺激时引起剧烈血流动力学变化。
结论 肾上腺神经母细胞瘤切除术后患儿，在进行第二次相关手术时要警惕。可再次进行相关神经内分泌功能检查。若发现异常，则必须加强术中有创血流动力学监测，术中根据情况果断采取措施，调整麻醉方案，防止血流动力学剧烈变化以带来不良预后。

PU-0858

阿芬太尼复合瑞马唑仑在视网膜母细胞瘤患儿舒适化眼底检查中的应用

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目的 观察阿芬太尼复合瑞马唑仑在视网膜母细胞瘤患儿舒适化眼底检查中的应用效果。

方法 择期行舒适化双眼眼底检查的视网膜母细胞瘤患儿 80 例，年龄 1～5 岁，ASA Ⅰ或Ⅱ级，随机将患儿分为艾司氯胺酮组（E 组）和阿芬太尼组（A 组），每组 40 例。E 组麻醉方案为静脉注射瑞马唑仑 0.4mg/kg+艾司氯胺酮 0.5mg/kg，A 组麻醉方案为静脉注射瑞马唑仑 0.4mg/kg+阿芬太尼 10μg/kg。每种药品注射时间均为 30s，且间隔 30s，检查中鼻导管吸氧 2L/min 并保留自主呼吸。两组患儿中若有检查后需进行治疗的病例则被剔除本研究。观察并记录两组患儿麻醉成功例数、检查时间、苏醒时间和复苏室停留时间；记录检查医师、麻醉医师和复苏护士满意度评分；记录围麻醉期不良事件发生情况。

结果 两组患儿均成功完成检查，检查时间差异无统计学意义（P＞0.05），与 E 组相比，A 组患儿的苏醒时间和复苏室停留时间明显缩短（P＜0.05），麻醉医师与复苏护士满意度显著升高（P＜0.05），围麻醉期不良事件如气道分泌物增多、躁动发生率显著减低（P＜0.05）。

结论 阿芬太尼复合瑞马唑仑用于视网膜母细胞瘤患儿的舒适化眼底检查有效性安全性良好，复苏室运转效率和医护满意度提升，围麻醉期不良事件减少。

PU-0859

艾司氯胺酮用于小儿骶管阻滞麻醉的安全性及有效性

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目的 探讨艾司氯胺酮用于小儿骶管阻滞麻醉的安全性及有效性。

方法 选择我院 60 例 ASA 分级Ⅰ-Ⅱ级在骶管阻滞下行阴茎整形手术的小儿患者，随机分为两组：艾司氯胺酮组(E 组)、氯胺酮组(K 组)，每组 30 例。入室后常规监护，E 组静脉给予艾司氯胺酮 1mg/kg，K 组患儿静脉给予氯胺酮 1mg/kg，待患儿安静入睡后行骶管阻滞。两组均缓慢静脉注射丙泊酚 2mg/kg,随后以 4mg/kg-1·h-1 泵注维持。若术中患儿出现体动反应时则分次静脉 E 组追加艾司氯胺酮 0.5mg/kg；K 组追加氯胺酮 0.5mg/kg。观察两组患儿入室时(T0)、手术开始前(T1)、手术切皮时(T2)及手术结束时(T3)的血压、心率及脉搏血氧饱和度，记录术中患儿体动次数、呼吸抑制发生情况、术后苏醒时间及苏醒期躁动发生情况。

结果 与 K 组比较，E 组血压和心率均降低，术中体动次数减少，术后苏醒时间短及苏醒期躁动发生率降低(P<0.05)，呼吸抑制发生率差异无统计学意义(P>0.05)。

结论 艾司氯胺酮较氯胺酮在小儿骶管阻滞中的应用具有良好的血流动力学作用及较好的术后恢复，是安全有效的麻醉方式。

PU-0860

艾司氯胺酮联合咪达唑仑复合骶管阻滞在尿道下裂患儿围术期的应用效果

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目的 探讨艾司氯胺酮联合咪达唑仑复合骶管阻滞在行尿道下裂手术患儿围术期的应用效果，探讨其对患儿围术期麻醉质量的影响，明确其临床意义。

方法 选取 2023 年 6 月一 2024 年 6 月收治的 90 例尿道下裂患儿，依照麻醉方法分为对照组和观察组，分为 M 组、K 组和 KM 组，各 30 例，三组患儿性别、年龄、ASA 分级、手术类型比较差异均无统计学意义。入室后组 M 脉注 射 0. 1 mg/kg 咪达唑仑和 1 mg/kg 艾司氯胺酮，K 组静脉注射 1mg/kg 艾司氯胺酮，M 组静脉注射 0. 1 mg/kg 咪达唑仑,预处理后静脉全麻复合骶管神经阻滞，比

较两组麻醉情况、血流动力学水平及不良反应发生情况，术中均只用丙泊酚进行维持，丙泊酚维持计量从 2mg/kg 开始，术中严密监测麻醉深度，根据麻醉深度以及术中生命体征变化情况调整维持计量。术毕即刻停药并将患儿转运至麻醉恢复室（PACU）行复苏。记录术中三组病人围术期丙泊酚用量。记录三组患儿麻醉诱导前 5 min（T1 ）、进行骶管阻滞时（T2）、手术开始（T3 ）、手术结束（T4）不同时点的血流动力学指标［平均动脉压（MAP）、心率（HR）］和患儿苏醒时间、PACU 停留时间。记录苏醒期躁动、低氧血症、分泌物等不良反应发生情况。

结果 （1）丙泊酚用量、术后苏醒时间、术中体动以及苏醒期躁动发生率情况，均为：KM 组< K 组< M 组(P<0.05)。

（2）T1 时 3 组血流动力学指标［平均动脉压（MAP）、心率（HR）］差异无统计学意义（P>0.05）；T2、T3、T4 时 KM 组及 K 组较 M 组增快；K 组、KM 组心率减慢情况＜M 组，差异有统计学意义(P<0.05)，体动情况 KM 组<K 组<M 组(P<0.05)。

（3）围术期 K 组分泌物明显多于 KM 组及 M 组(P<0.05)，低氧血症情况 M 组多于 KM 组及 K 组(P<0.05)，苏醒期躁动发生情况 KM 组<K 组≈M 组(P<0.05)。

结论 艾司氯胺酮联合咪达唑仑复合骶管阻滞在尿道下裂患儿围术期能使术中血流动力学水平更加稳定，并且能减少围术期丙泊酚用量，缩短术后苏醒时间，并能减少术中体动、苏醒期躁动等不良反应的发生，使围术期麻醉管理更加安全。

PU-0861

Non-pharmacological Interventions for Preoperative Anxiety in Children: A Systematic Review and Network Meta-analysis

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Background Preoperative anxiety in children is very common, with an estimated incidence up to 75%, and is associated with both immediate and long-term negative outcomes. Non-pharmacological interventions have been demonstrated to be effective, but which one is best should be further investigated. This network meta-analysis study aims to compare and rank the efficacy of non-pharmacological interventions in children with preoperative anxiety.

Methods We searched randomized controlled trials in thirteen databases including PubMed, OVID, Web of Science, Cochrane Library, Embase, Scopus, PsycINFO, CINAHL, ProQuest, CNKI, SinoMed, VIP Database and Wanfang. The primary outcome was anxiety level after the intervention in holding area and (or) induction room measured by the modified Yale Preoperative anxiety Scale(mYPAS). We used a Bayesian random-effects network meta-analysis. The assumption of local consistency was assessed by using the node-splitting method. The surface under the cumulative ranking curve (SUCRA) was used to separately rank each intervention. We performed sensitivity and subgroup analyses for primary outcomes.

Results A total of 51 randomized controlled trials (RCTs) with 5158 pediatric patients were included. The results showed that psychosocial intervention, as an intervention class, had significantly positive effects compared to control groups (SMD = -1.42, 95% CI: -2.05, -0.79) and toys had the highest rank (SUCRA, 81.2%; mean rank, 1.7). Toys, as an individual intervention, had significantly positive effects relative to all control groups and had the highest rank (SUCRA, 96.7%; mean rank, 1.5) among interventions clouding parental presence during induction anesthesia (PPIA), video distraction (VD), clown doctors (CD), therapeutic play (TP), virtual reality (VR) and so on.

Conclusion We speculate that psychosocial intervention, especially toys, may be the most effective non-pharmacological intervention to improve preoperative anxiety in children. More RCTs examining the efficacy of different non-pharmacological interventions are needed.

Systematic review protocol: PROSPERO CRD4202450951.

PU-0862

联合快速推注右旋美托咪定时儿童七氟烷深麻醉拔管的最低肺泡浓度

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目的 Dexmedetomidine can facilitate a smooth deep extubation process with a low-concentration sevoflurane when administrated perioperatively, but administration is often recommended as a loading dose infused over 10min. This study was conducted to determine the 50% effective end-tidal concentration of sevoflurane for deep tracheal extubation with the combination of a rapid intravenous injection (about 10 seconds) of low dose dexmedetomidine.
方法 Thirty-six children undergoing tonsillectomy and/or adenoidectomy, with ASA physical status I-II and aged 3-10 years, were enrolled in the study. The up and down sequential study design was employed to determine the effective dose of sevoflurane for smooth deep extubation, starting at 1.0% with subsequent 0.1% up and down in the next patient based on whether smooth extubation had been achieved or not. Before extubation, 0.5μg/kg dexmedetomidine diluted in 10ml saline was administrated in 10 seconds. Smooth extubation was defined as no movement, coughing, bucking, breath holding or laryngospasm within 1 minute after extubation.
结果 End-tidal concentration of sevoflurane required for smooth deep extubation in 50% pediatric patients (ED50) was 0.90% (95%confidence limits, 0.79-1.02%). ED95 values of sevoflurane was 1.70% (95%confidence limits, 1.58-1.81%). No respiratory and hemodynamic complications were observed.
结 论 The ED50 of sevoflurane for smooth deep extubation with a 0.5μg/kg bolus of dexmedetomidine was 0.90% in pediatric patients in a general clinical condition.

PU-0863

儿童支气管内阻断器管内封堵与管外封堵对小儿胸腔镜手术患者呼吸功能的影响

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目的 研究儿童支气管内阻断器管内封堵与管外封堵对小儿胸腔镜手术患者术中血流动力学及呼吸功能的比较。
方法 选择北京儿童医院收治的行胸腔镜手术患者 60 例，男 30 例，女 30 例，年龄 1～14 岁，ASA Ⅰ～Ⅱ级。将患者按实施封堵器方法分为管内封堵(A 组)和管外封堵(B 组)，每组 30 例。两组患儿给予瑞芬太尼 0.5 μg·kg-1·min-1 持续静脉泵入，0.5%～1.5%七氟醚持续吸入维持麻醉。气管插管后 A 组新鲜气体流量为 2 L·min-1, 潮气量（VT）10～12 mL·kg-1 机械通气；B 组新鲜气体流量 2 L·min-1, VT 6～8 mL·kg-1，呼气末正压通气（PEEP）5 cmH2O 机械通气。在麻醉诱导后，A 组在气管插管后，在纤维支气管镜可视下将儿童支气管内阻断器封堵需要手术的一侧支气管。B 组先将儿童支气管内阻断器插入气管远端，再插入气管导管，通过纤维支气管镜可视下将儿童支气管内阻断器封堵需要手术的一侧支气管。术中建立人工 CO2 气胸，气胸压为 0.53～1.33 kPa。观察 2 组患者气管插管后 5 min（T1）、人工 CO2 气胸后 15 min（T2）、气胸后 45 min（T3）及气胸结

束后 15 min（T4）4 个时间点的心率（HR）、平均动脉压（MAP）、气道平台压（Pplat）、气道峰压（Ppeak）及肺功能指标[肺泡-动脉血氧分压差（A-aDO2）、氧合指数（OI）]的变化，并进行血气分析（PaO2、PaCO2）。观察术中 5min 和 30min 肺萎陷情况，记录 2 组患儿术后出现的呛咳、咽部不适、声音嘶哑等呼吸道症状不良反应的发生情况及 Ramsay 镇静评分。
结果 组间各监测时间点 MAP、HR、SPO2、PETCO2 比较差异无明显统计学意义(均 P＞0.05)；进胸操作 10 min 和 45 min 肺萎陷评分均良好。与 T1 相比：2 组 T2、T3、T4 时间点的 A-aDO2 明显升高，A 组升高更明显；T2、T3 时间点的 PaCO2 明显升高，B 组升高更明显（均 P＜0.05）。2 组 OI 比较差异无统计学意义（P＞0.05）。A 组术后出现的呛咳、咽部不适、声音嘶哑等不良反应的发生率明显低于 B 组（P＜0.05），术后苏醒期两组 Ramsay 镇静评分值不明显（P＞0.05）。
结论 儿童支气管内阻断器管内封堵与管外封堵应用于小儿胸腔镜手术患者，均为患儿术中提供相对安全可靠的单肺通气方式，管内封堵能减少术后呛咳、咽部不适、声音嘶哑等等呼吸道症状不良反应给患者带来的痛苦，对提升患者苏醒质量和就医舒适度有所帮助。

PU-0864

超声引导下骶管阻滞在小儿足部多趾畸形去除矫正术中的临床应用

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目的 超声引导下骶管阻滞在小儿足部多趾畸形去除矫正术中的临床应用效果。
方法 选取 2021-03 至 2024-03 在北京积水潭医院进行小儿足部多趾畸形去除矫正术患者 70 例，采用随机分组的方法分为超声引导下骶管阻滞组（试验组）35 例及腰部硬膜外阻滞组（对照组）35 例。 入室后所有患儿均依次静脉给予阿托品 0.01 mg/kg、芬太尼 3 μg/kg、异丙酚 1.5 mg/kg、罗库溴铵 0.7 mg/kg，待患儿 BIS 值＜60，下颌松弛后插管接通麻醉机行机械通气，调整压力设定及呼吸频率，维持呼气末二氧化碳分压 PetCO2 于 30~40 mmHg。试验组予以超声引导定位骶管阻滞麻醉，将 B 超探头置于骶骨人体背侧正中线处，获得骶裂孔的横断面超声图，定位骶骨角、骶尾韧带后，旋转探头 90°，获得骶裂孔纵切面采用平面内进针技术下从两骶骨角之间进针直至骶管，回抽无血液、无脑脊液后注入 0.25%的罗哌卡因用量为 1 ml/kg。对照组使用常规方法行腰部硬膜外阻滞，穿刺点为 L3-L4 间隙，硬膜外向头侧置管深度 2 cm，置管成功后将导管固定于皮肤，并通过硬膜外管注入局部麻醉药物，麻醉药使用 0.2% 罗哌卡因，硬膜外麻醉初始剂量为 0.5 ml/kg，术中镇痛追加剂量为 0.25 ml/kg，总剂量不超过 1.7 mg/kg。分别记录两组患者的穿刺情况；记录两组患儿的罗哌卡因用量、切皮前后血压（BP）及心率（HR）变化；记录术中芬太尼用量；记录术后 2、4、6、12、24 h 及 48 h 的患儿疼痛 FLACC 评分及患儿首次觅求对乙酰氨基酚时间；记录患儿睡眠障碍镇静评分（Ramsay 评分），评价患儿术后 12 h 的镇静情况；记录患儿术后并发症情况。
结果 试验组的穿针调整次数（2.50±0.50）显著少于对照（5.00±1.00），P<0.05；而试验组的穿刺时间[（13.42±2.50） min]长于对[（5.73±2.12）min，P<0.05]；试验组患儿的罗哌卡因用量高于对照组（P<0.05）；试验组患儿术后首次觅求对乙酰氨基酚时间[（19.6±3.2）h]明显晚于对照组[（11.4±4.1）h，P<0.05]。术后 12 h，试验组的 FLACC 评分（1.6±0.9）明显低于对照组（4.3±1.5），P<0.05。两组患儿术后出现恶心、呕吐及尿潴留的比率无统计学差异（P>0.05）。但试验组术后 12 h 的 Ramsay 评分要高于对照组（P<0.05）。
结论 在小儿足部多趾畸形去除矫正术采用超声引导下骶管阻滞可提供术后 24 h 有效镇痛，值得临床推广。

PU-0865

PCV-VG 与 PCV 两种机械通气模式对新生儿新生儿坏死性小肠结肠炎手术影响的对比研究

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目的 探讨压力控制容量保证(PCV-VG)与压力控制通气模式(PCV)对新生儿新生儿坏死性小肠结肠炎手术的影响。

方法 择 2022 年 1 月至 2023 年 12 月拟行开腹探查术的新生儿坏死性小肠结肠炎患儿 60 例，男 30 例，女 30 例，日龄＜28 d，出生胎龄 29～ 35 周，体重 1 ～ 3 kg，ASA Ⅱ或Ⅲ级。采用随机数字法将所有患儿分为两组 PCV-VG 组（V）组和 PCV 组（P）组 所有患儿术前均已禁食禁饮，采用气管插管全身麻醉。麻醉诱导：静脉注射阿托品 0.1 mg，咪达唑仑 0.1mg/kg，芬太尼 3μg/kg ，罗库溴铵 0.6μg/kg。诱导完成后气管插管，术中麻醉维持七氟醚 1%～2%吸入，瑞芬太尼 0.3～0.5μg·kg-1·min-1 泵注，间断推注罗库溴铵。HR 和 MAP 的波动不超过基础值的 20%，术中设置吸入氧浓度为 30%-40%，吸呼比为 1：1．5，P 组采用压力控制模式机械通气，V 组采用压力控制容量保证模式机械通，维持 RR、EtC02 等于或接近气管插管前安静状态下的 RR、EtC02。记录两组患儿一般资料包括性别、年龄、身高、体重、手术时间；记录两组患儿入室安静时、机械通气 15min、机械通气 30min、手术结束即刻的 HR、MAP、Sp02、EtC02；记录两组患儿机械通气后 15min、机械通气 30min、手术结束即刻的呼吸力学参数，包括气道峰压(Ppeak)、气道平台压(Pplat)、VT 和肺顺应性及动脉血 pH 值、PaO2、PaCO2、BE 值、HCO -3 、Na＋、K＋、Ca2＋、血糖（Glu ）和血乳酸（Lac）浓度；记录术后肺部并发症指标（术后肺部并发症评分）。

结果 P 组患儿机械通气 15min、机械通气 30min、手术结束即刻的 Sp02 高于 V 组患儿；P 组患儿机械通气 15min、机械通气 30min、手术结束即刻 EtC02 优于 V 组患儿；P 组患儿机械通气后 15min、机械通气 30min、手术结束即刻气道峰压(Ppeak)和气道平台压(Pplat)均低于 V 组患儿；P 组患儿 VT 和肺顺应性优于 V 组患儿；P 组患儿机械通气 15min、机械通气 30min、手术结束即刻的 PaO2、PaCO2、BE 值、血乳酸（Lac）均优于 V 组患儿；P 组患儿术后无肺部并发症出现，V 组患儿术后出现 5 例术后低氧血症及肺不张的肺部并发症。

结论 与压力控制通气模式(PCV)相比，压力控制容量保证(PCV-VG)的通气模式在新生儿坏死性小肠结肠炎的手术中更安全，更有优势。

PU-0866

右美托咪定对机器人辅助腹腔镜下婴儿肾盂成形手术脑氧饱和度的影响

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目的 设计随机双盲对照试验观察右美托咪定对婴儿行机器人辅助腹腔镜下肾盂成形手术时脑氧饱和度的作用。

方法 以解放军总医院第七医学中心从 2021 年 5 月至 2023 年 5 月行机器人辅助腹腔镜下肾盂成形手术的患儿（<1 岁）作为本课题研究对象，使用随机数字表法把入组患儿随机分为试验组和对照组(n 均为 45)。两组患儿使用相同的麻醉诱导方法，试验组在气管插管完成后静脉输注右美托咪定，先给予负荷剂量 1μg/kg，10min 内输注完成，而后以 0.4μg/（kg·h）静脉泵输注，手术完成前 0.5 h 停药；对照组给予等容量生理盐水。比较两组患儿不同时点的脑氧饱和度、动脉血乳酸、围术期

血压和心率、苏醒期谵妄发生率、术后第 3 天及第 5 天 C 反应蛋白水平、术后副反应的差别。统计使用 t 检验、秩和检验、重复测量方差分析、χ2 检验或非参数检验。

结果 最终有 102 例纳入本研究，4 例中途退出，6 例改变手术方式，2 例术中大出血被剔除，最终有 90 例完成试验，每组 45 例。组别间性别、年龄、体重、ASA 分级、身高、总输液量、输血总量、出血量、手术持续时间、拔管时间、不良反应比较差异均无统计学意义（均 P＞0.05）。两组各时点脑氧饱和度组间比较差异无统计学意义（P＞0.05）。两组各时点的氧分压、二氧化碳分压、SBP、DBP、HR 组间比较差异均无统计学意义（均 P＞0.05）。试验组苏醒期谵妄发生率低于对照组[15.5%（7/45）比 42.2%（19/45）]，差异有统计学意义（c2=7.788，P=0.005）。试验组气腹后 1h 及 2h 动脉血乳酸低于对照组[（0.69±0.20）比（0.93±0.32），（0.75±0.21）比（1.16±0.53）]，差异有统计学意义（t=3.373，P=0.001；t=4.467，P=0.000）。试验组术后第 3d 及术后第 5d 的 C 反应蛋白水平低于对照组[(17.1±12.0)比（18.3±8.8），（9.2±3.5）比（10.6±5.7）]，差异有统计学意义(t=-3.404，P=0.001；t=-3.121，P=0.002)。

结论 右美托咪定持续泵注对婴儿行机器人辅助腹腔镜下肾盂成形手术脑氧饱和度影响不明显，但降低了患儿麻醉苏醒期谵妄的发生率、动脉血乳酸及血浆 C 反应蛋白水平。

PU-0867

Predicting Postoperative Pain in Children: An Observational Study Using the Pain Threshold Index

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Objective While the pain threshold index (PTI) holds potential as a tool for monitoring analgesia-pain equilibrium, its precision in forecasting postoperative pain in pediatric patients remains unconfirmed. This study's primary aim was to assess the PTI's predictive precision for postoperative pain.

Methods Children (aged 2-16 years) undergoing general surgery under general anesthesia were included. Within 5 minutes prior to the patient's emergence from surgery, data including PTI, wavelet index (WLI), heart rates (HR) and mean arterial pressure (MAP) were collected. Subsequently, a 15-minute pain assessment was conducted following the patient's awakening. The accuracy of these indicators in discerning between mild and moderate to severe postoperative pain was evaluated through receiver operating characteristic (ROC) analysis.

Results The analysis encompassed data from 90 pediatric patients. ROC analysis showed that PTI was slightly better than HR, MAP and WLI in predicting postoperative pain, but its predictive value was limited. The area under the curve (AUC) was 0.659 [0.537 ~ 0.780] and the optimal threshold was 65[64-67]. Sensitivity and specificity were determined at 0.90 and 0.50, respectively. In a multivariable logistic regression model, a higher predictive accuracy was found for a multivariable predictor combining PTI values with gender, BMI, HR and MAP (AUC, 0.768; 95%CI, 0.669-0.866). Upon further scrutinizing the age groups, PTI's AUC was 0.796 for children aged 9-16, 0.656 for those aged 4-8, and 0.601 for younger individuals.

Conclusions PTI, when used alone, lacks acceptable accuracy in predicting postoperative pain in children aged 2 to 16 years. However, when combined with other factors, it shows improved predictive accuracy. Notably, PTI appears to be more accurate in older children.

PU-0868

比较竖脊肌平面阻滞和骶管阻滞在小儿腹股沟疝修补术术后镇痛的影响：一项随机对照试验

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目的 腹股沟疝修补术是儿科常见手术，术后良好的镇痛有利于提高家长满意度、促进术后功能恢复。目前没有关于腹股沟疝修补术后的最佳疼痛管理策略的共识。神经阻滞和多模式镇痛相结合可以提供有效的术后镇痛效果。竖脊肌平面阻滞作为一种新型神经阻滞技术，在儿科围术期管理中受到越来越多关注，具有提供良好镇痛效果的潜力。然而，关于竖脊肌平面阻滞和骶管阻滞在小儿腹股沟疝修补术术后镇痛效果的临床证据仍不足。

方法 本研究共纳入 102 例 2~5 岁接受单侧开放腹股沟疝修补术的患儿，随机分为单侧竖脊肌平面阻滞（0.2%罗哌卡因 0.5 mL/kg）、骶管阻滞组（0.2%罗哌卡因 1 mL/kg）或对照组。所有阻滞均在手术切皮前全麻下进行。患者处于侧卧位以进行阻滞。主要评估指标为首次追加镇痛药物的时间，定义为从手术结束至面部表情、腿部、活动、哭泣和可安慰性量表评分 > 3 分的间隔时间。次要观察指标包括需要追加镇痛药物的患儿人数（术后 24 h 内）、疼痛评分随时间变化的曲线下面积（在术后 0.5、1、2、4、6、8、12 和 24 h 评估疼痛程度）、监护人满意度（术后 24 h）以及不良事件。负责阻滞的麻醉医师记录任何与阻滞相关的不良事件，如血肿、神经损伤、深部内脏损伤或局麻药中毒。同时也记录包括术后恶心呕吐、喉痉挛、心动过缓和低血压在内的其他潜在不良事件。

结果 与对照组相比，竖脊肌平面阻滞组首次补救镇痛中位时间延长（10.0 [6.6, 24.0] h 比 1.5 [0.7, 2.6] h），差异具有统计学意义（P < 0.001）；与骶管阻滞组相比，竖脊肌平面阻滞组患儿首次补救镇痛中位时间延长（10.0 [6.6, 24.0] h 比 5.0 [2.9, 7.3] h），差异具有统计学意义（P < 0.001）。与对照组相比，Cox 回归模型显示竖脊平面阻滞组患儿术后需要镇痛补救的风险比为 0.24（95%CI，0.13~0.44），差异具有统计学意义（P < 0.001）；与骶管阻滞组相比，竖脊平面阻滞组需要镇痛补救的风险比为 0.38（95%CI，0.23~0.64），差异具有统计学意义（P < 0.001）。疼痛评分曲线下面积降低（44.3 [36.6–50.7] 比 59.0 [47.1–64.5]），差异具有统计学意义（P < 0.001）。

结论 与骶管阻滞相比，竖脊肌平面阻滞可为小儿开放性腹股沟疝修补术提供更良好的术后镇痛效果。作为骶管阻滞的替代方案，竖脊平面阻滞可应用于小儿下腹部手术的多模式镇痛策略中。

PU-0869

单剂量右美托咪定和瑞马唑仑预防小儿术后躁动的效果比较

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目的 比较手术结束前 15 分钟静脉注射单剂量 0.2mg/kg 瑞马唑仑或 0.2μg/kg 右美托咪定对七氟烷麻醉下接受扁桃体和（或）腺样体切除术的小儿术后躁动的预防效果。探讨瑞马唑仑与右美托咪定相比在患儿血流动力学、术后不良反应及恢复质量等方面有无优势，同时构建术后躁动的临床预测模型。

方法 本研究为单中心、前瞻性的随机对照临床试验，纳入我院年龄区间为 2-12 岁，ASA 分级为Ⅰ-Ⅱ级的耳鼻喉科患儿。主要结局指标为两组患儿干预后术后躁动的发生率。次要结局指标包括躁动的严重程度、各时间节点患儿的生命体征、拔管时间、术后苏醒室停留时间、术后不良反应及父母满意度等。

结果 共 95 例患儿纳入最终的统计分析，男性患儿 53 例，占比 55.8%。其中患儿的平均年龄为 5.9±1.8 岁。两组患儿中总的躁动发生率为 20%，其中右美组躁动发生率为 22.4%，瑞马组发生率

为 17.4%。在术后躁动的发生率以及躁动的严重程度方面，两组之间无明显的统计学差异（P＞0.05）。在自主呼吸恢复时间、拔管时间、术后苏醒室停留时间、术后不良反应和父母满意度方面，两组之间无显著统计学意义（P＞0.05）。此外，瑞马唑仑给药干预后对患儿循环功能影响更小，而右美托咪定显著降低心率（P＜0.001）。在排除性别、手术类型等混杂因素的干扰下，年龄是影响躁动发生的独立危险因素（OR=0.248，95%CI 0.075-0.816，P＜0.05）。

结论 单剂量 0.2mg/kg 瑞马唑仑和 0.2μg/kg 右美托咪定在预防七氟烷麻醉下患儿术后躁动方面等效，且瑞马唑仑血流动力学波动更小。年龄每增加 6 岁，躁动的发生率降低 25%。

PU-0870

Effectiveness and safety of microstream capnography and Integrated Pulmonary Index monitoring in respiratory management during procedural sedation and analgesia of pediatric urinary surgery: a randomized controlled study

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Background Procedural sedation and analgesia (PSA) relieves stress and provides analgesia in painful procedures. Adequate monitoring like capnography and Integrated Pulmonary Index (IPI) could help reduce its complications like respiratory depression in adult patients. However, it remains unknown whether capnography and IPI could reduce intraoperative desaturation in children undergoing urinary procedures with PSA.

Method We conducted a randomized controlled trial (ChiCTR 2300073943). Children referred for elective urinary procedures with PSA were randomly assigned to either control group(standard monitroing) or intervention group(standard, capnography and IPI monitoring). The primary outcome was the incidence of intraoperative hypoxemia. Secondary outcomes were intraoperative severe hypoxemia, airway management and perioperative complications.

Result We found that patients with capnography and IPI monitoring experienced less desaturation (40.00% vs. 59.46%, P=0.018) and severe oxygen desaturation (17.33% vs. 32.43%, P=0.033) than control group. Additionally, compared to control group, capnography helped identify complications faster and allowed more primary respiratory management, jaw thrust (1.91±1.25 vs. 1.11±1.07 times, P=0.000), therefore enabling less aggressive respiratory management, positive pressure ventilation (1.75±1.27 vs. 2.23±1.51 times, P=0.033). There was no difference in other airway managements and perioperative complications between two groups.

Conclusion Practitioners could apply capnography and IPI effectively and safely during PSA for elective pediatric urinary procedures, and this could help improve respiratory management and promote security perioperatively.

PU-0871

1 例 3.5Kg 婴儿声门下狭窄经内镜治疗的麻醉管理

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目的 气管严重狭窄接近完全堵塞时可导致窒息，引起呼吸心跳骤停，需紧急处理。随着呼吸介入技术的发展，经支气管镜介入治疗可迅速改善气道狭窄的症状。麻醉对于保证手术顺利进行至关重要。本文旨在回顾 1 例 3.5Kg 婴儿反复接受内镜治疗麻醉管理的关键步骤，并讨论此类手术的麻醉

管理要点。

方法 本例患儿 2 月 5 天，体重 3.5Kg，因“纳差伴呼吸急促 2 天”入院。G1P1，BW2.6Kg，生后因“动脉导管未闭、主动脉弓发育不良、心力衰竭、新生儿重症肺炎”当地医院住院，机械通气 1 月后撤离呼吸机。入院查体：T38.1℃，P203 次/分，R52 次/分，BP105/87mmHg，SPO287%（面罩吸氧 4L/min），三凹征明显，双肺闻及哮鸣音。床边纤维支气管镜检查：声门下膜状新生物，2.8mm 外径支气管镜不能通过。CT 气道三维重建：声门下气管壁增厚，无外源性气道压迫。诊断气道狭窄，拟行支气管球囊扩张术，拟行喉罩下全身麻醉。术前进行细致的麻醉评估，与内镜医生进行有效沟通，并备紧急气管切开。麻醉前准备肾上腺素、阿托品、除颤仪、吸引设备、可视喉镜、纤维支气管镜、2.5 号气管导管、1.0 喉罩、紧急气管切开包等相关物品。麻醉前予 1%利多卡因 2ml 雾化吸入 10min 后纯氧吸入 3min，患儿 SPO296-98%，予 1%利多卡因 3mg iv、艾司氯胺酮 2mg iv、依托咪酯 1mg iv，密切观察患儿呼吸幅度、频率及 SPO2 变化，确保患儿生命体征稳定，5min 后给予咪达唑仑 0.25mg iv、阿托品 0.1mg iv、甲强龙 3mg iv、3%七氟烷吸入，SPO2 维持在 96-100%，确认患儿麻醉深度适当置入 1.0 喉罩，将吸入氧浓度调整为 21%，内镜医生予激光烧灼狭窄气道，期间患儿 SPO2 降至 90%，予纯氧吸入手控通气后升至 98%，后继续予多次球囊扩张（每次扩张时间小于 2min）、冷冻治疗，期间 ETCO2 升高至 76mmHg 后逐渐降至 45mmHg，患儿未再发生血氧饱和度降低情况。手术时间 42min，术后 5 分钟拔除喉罩，患儿三凹征明显减轻，转至 ICU 继续治疗。术后 2 天、10 天再次在喉罩下行经支气管镜球囊扩张+激光冷冻治疗，手术过程顺利。

结果 经过 3 次内镜治疗后有效地扩大了狭窄口，改善了通气功能，患儿的呼吸困难症状得到缓解，末次术后 5 天顺利出院。

结论 成功的气道狭窄麻醉需要完整详尽的术前评估，根据患儿病情与患者家属沟通相关麻醉计划。术前除需要了解气道狭窄的位置、原因、手术方法和手术解剖的扩展外，还应注意由气道狭窄带来的生理病理变化。在术前与手术操作医师的沟通尤为重要，麻醉医生需要了解与配合手术操作。针对主气道狭窄的病例，还需备好紧急气管切开。除需要进行细致的麻醉准备，优化麻醉方法及术中用药，术后尽量避免气管插管引起的再次气道损伤，减少并发症。尽管目前在气道狭窄的治疗方面取得了不断的进步，但手术和麻醉仍然是成功治疗这一具有挑战性的疾病的关键。

PU-0872

婴儿气管隆突重建术的麻醉管理

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目的 婴儿先天性气道畸形手术难度较大，婴儿气管腔狭小，手术涉及气管隆突重建，麻醉医生和外科医生必须共享气道并无缝合作以安全地完成“动态”气道管理。所以麻醉过程中的呼吸管理具有很大的挑战性，在手术过程中如何保证术中的通气氧合就显得尤为关键。以往气管隆突重建术的研究都集中于成年患者，目前报道的小儿气道重建术多在体外循环或 ECMO 辅助下完成手术。非体外循环或 ECMO 辅助下的婴儿气管隆突重建术的麻醉管理还未见报道,其围术期的麻醉管理也面临诸多独特的挑战。

方法 7 个月婴儿拟在全身麻醉下行“气管环状切除和隆突成形术”。手术中术者将右主支气管游离后，纵行切开右主支气管至重建隆突处，将 3.0#加强型气管导管插入游离的右主支气管远端行无菌跨术野通气。由于近端主气管需要进行手术操作，为确保手术视野充分，将经口左主支气管插管更换为左肺无菌跨术野通气，保持双肺通气。术者将左右支气管侧面纵行劈开并吻合前后壁，直至吻合隆突部位时，逐步拔除左侧和右侧气管导管，停止无菌跨术野通气，改成经口 4.0#普通单腔管行左肺通气，并加以一定的压力防止导管脱出。这时儿收缩压突然下降至 50mmHg，心率和 SPO2 随即下降至 90 次/min 和 90%，手控呼吸后 SPO2 仍继续下降，收缩压下降到 35mmHg。直视下术野可见右心膨隆，给予肾上腺素 5μg，收缩压上升到 65mmHg，拔除经口 4.0#气管导管，恢复 3.0#

加强型气管导管左主支气管无菌跨术野通气，SPO2 恢复至 96%，收缩压继续上升到 100mmHg。循环稳定后改为 3.0#气管导管经口插管至左主支气管进行单肺通气，循环及氧合无明显波动，术者继续吻合隆突部分气管前壁，吻合完成后，将 3.0#气管导管退至主气道，恢复双肺通气。导管漏气明显，更换 4.0#气管导管行主气道机械通气，纤支镜检查示吻合口通畅，粘膜光滑，通气正常，血气分析示：PH:7.369, PCO2:42.5mmHg, PO2:345.3mmHg,BE:-1.3。术毕患儿使用静脉镇痛泵（舒芬太尼 2ug/kg +托烷司琼 0.1mg/kg，生理盐水稀释至 100ml）进行术后镇痛，带气管导管入 ICU，期间生命体征平稳，术后 3d 成功撤机。

结果 本例患儿术中麻醉管理,为配合不同阶段的手术操作,调整了多种通气策略。诱导阶段，为避免气管塌陷，麻醉诱导时选择保留自主呼吸主气管插管的方式。判断无通气障碍后，再给予肌松药行机械通气。气管重建过程中,患儿左支气管较窄,仅 3.2mm，插入气管导管行单肺通气会对手术操作产生影响，故逐步替换成双侧主支气管插管行无菌跨术野通气,确保操作期间充分通气，减少二氧化碳滞留。至隆突重建阶段,改为经口气管插管单肺(左肺)通气。直至整个气道重建完成，恢复成主气道双肺通气。除此以外，高流量吸氧和体外循环作为备选方案，提前准备好相应的设备以备术中通气失败时保障氧合，最大程度上保证患儿的安全。整个过程中麻醉医生根据手术进展情况实时、动态调整呼吸管理参数,实现对患儿呼吸状态的精确控制,为手术创造最佳条件。

结论 总之,动态呼吸管理是本例气道重建手术顺利完成的重要保障。不同通气策略的灵活应用,保证了术野暴露及患儿氧合功能的平衡，与传统的体外循环相比，患儿利益得到了最大化。共享气道手术麻醉中,必须基于对个体生理特点的全面评估,制定个性化的呼吸支持策略,方能实现对手术野和氧合的精确平衡控制。本病例为婴儿气管隆突重建术的麻醉管理提供了积极的经验借鉴。需要注意的是,除了关注呼吸管理,术中操作对患儿生命体征的影响也应当得到足够的重视与监测视。本病例亦提示我们在临床实践中,需要不断优化共享气道手术的呼吸管理方案,以进一步提高患儿手术和麻醉安全性。

PU-0873

儿童恶性肿瘤患者输液港导管尖端移位的管理策略

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目的 导管尖端移位是全植入式静脉输液港（TIVAP）术后罕见的并发症，可能导致一系列术后短期或长期并发症，如潜在的血栓形成、血管壁粘连、化疗药物对血管壁的损伤风险，以及心律失常，甚至导致患儿死亡等严重后果。本文通过总结我科儿童恶性肿瘤患者输液港植入术后导管尖端移位的病例，并结合相关文献报道，探讨儿童恶性肿瘤患者输液港导管尖端移位的常见原因、预防措施及处理策略。

方法 回顾性分析 2019 年 5 月至今在深圳市儿童医院麻醉手术中心，由我科麻醉医生实施的 709 例 TIVAP 植入术患儿的临床资料。分别统计术后导管尖端移位的发生率、发生时间，分析其原因、处理时机及处理措施等。同时，通过查阅相关中文及外文文献，结合我科统计的输液港导管尖端移位的结果，总结其常见原因、预防措施及处理策略。

结果 709 名儿童恶性肿瘤患者成功进行了经食道超声引导的 TIVAP 植入手术。术后有 5 例（0.7%）患儿经胸部 X 片检查诊断为导管尖端移位，其中男 3 例，女 2 例，平均年龄为 3.9 岁。导管尖端移位的时间范围为术后 1 至 783 天，平均 319 天。回顾性分析显示，导管尖端移位的主要原因包括体位改变、导管深度过长或过短、上呼吸道感染引起的剧烈咳嗽、操作技术问题、导管使用不当及儿童生长发育快等。导管尖端分别移位至对侧锁骨下静脉 2 例、同侧锁骨下静脉 1 例及同侧颈内静脉 2 例。针对导管尖端移位的患儿，1 例患儿导管尖端自行复位，未作特殊处理。另 1 例因后续化疗即将结束，予以直接拆除处理。其余 3 例患儿的治疗尚未完成，需要借助 C 臂进行调整，均采用导管重新定位和颈部小切口丝线勾挂法成功复位。

结论 导管尖端移位是 TIVAP 术后罕见的并发症之一，可能引发一系列短期或长期的严重并发症。因此，需要在术前加强评估，制定个性化的 TIVAP 植入计划，并加强操作人员的培训，确保术中严格按照标准化流程操作。同时，应针对输液港导管尖端移位的常见原因采取相应的预防措施，并在术后定期复查，及时诊断和处理相关问题。通过这些措施，可以延长输液港的使用寿命，减轻患儿的身体负担和家庭的经济负担。

PU-0874

恶性高热的识别、处理与进展

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目的 分析总结 2 例国家第二批罕见病恶性高热的诊断、处理及其进展。
方法 收集 2008 年和 2023 年发生在我院麻醉科的典型恶性高热病例 2 例，分别为 51 岁男性和 11 岁小儿，比较 2 例临床表现及其处理的异同；重点分析总结 2023 年完整的术中麻醉单记录与 PICU 全程病历记录；调取手术间录相资料，确认诊断与治疗措施的时间点，分析恶性高热发生、发展与处理过程；与北美恶性高热登记中心 NAMHR 交流病情，复习相关文献资料，提高恶性高热诊疗水平。
结果 首例病人发现时已经出现全身僵硬等典型症状，救治失败；第 2 例在体温上升、呼末 CO2 不明原因增高时即予以诊断，并积极降温，维持生命体征平稳；后续转入 PICU，积极开始稳定内环境的多学科处理，患儿得到成功救治且无任何后遗症。
结论 对恶性高热保持高度警惕，及时早期的诊治和丹曲林的积极应用有助于提高救治成功率

PU-0875

实时双平面超声引导技术在小儿颈内静脉穿刺置管中的应用

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目的 中心静脉导管是术中监测循环功能和快速输液的重要通道。但小儿由于血管的生理解剖特点，静脉细小，颈部短，操作空间狭窄，大大增加了穿刺的难度。颈内静脉是小儿常用的中心静脉穿刺血管，颈内静脉穿刺置管是临床生命支持和循环监测的重要措施，提高其穿刺的成功率和减少并发症的发生值得研究。在之前的研究中，我们发现改良动态针尖定位短轴平面外技术提高了新生儿颈内静脉置管的首次成功率，缩短了插管时间，减少了并发症发生率。但在临床实践中该方法对于低年资医生来说，掌握仍然困难。为了寻找一种更适合低年资医生的穿刺方法，提高首次成功率，本试验拟在小儿做颈内静脉穿刺置管时，采用结合了长轴平面内和短轴平面外两者技术的优点的“实时双平面”超声引导技术，并与“改良动态针尖定位”短轴（MDNTP）技术进行比较，明确其是否更适用于低年资医生行小儿颈内静脉穿刺置管。
方法 我们选取了 88 例年龄 0-6 岁的患者，这些患者于 2023 年 11 月 1 日至 2024 年 4 月 10 日期间在重庆医科大学儿童医院主要接受胸部或心脏手术。采用随机数字表法将所招募的 88 例病人分入“实时双平面”超声引导组与“改良动态针尖定位”短轴超声引导组，每组各 44 例。同时我们还选取了重庆医科大学儿童医院麻醉科的 11 位具有相同穿刺经验的低年资医师，每位住院医师随机对 8 名病人（实时双平面组 4 人，改良动态短轴组 4 人）进行颈内静脉的穿刺。主要观察指标为首次成功率，次要观察指标为总成功率、穿刺时间、并发症的发生率。
结果 实时双平面组首次成功率 54.5% (n = 24)，总成功率 97.7% (n = 43)，插管时间 108.50 [71.25-

182.00]s，穿刺次数 1.00[1.00-2.00]次，发现局部血肿 1 例(2.3%)。MDNTP 组首次成功率为 79.5% (n =35)(P = 0.013; RR, 0.686; 95% CI 为 0.504-0.934)，总成功率为 97.7% (n = 43)(P = 1.000; RR, 1.00; 95% CI 为 0.938-1.066) ，插管时间为 82.50 [54.50 ~ 116.50]s (P =0.023; Median difference, 23.00; 95% CI 为 3.00 to 47.00),，穿刺次数为 1.00[1.00-1.00]次，未发生血肿(0%)。各组均未发生血栓形成。

结论 对低年资医生来说，MDNTP 短轴技术在小儿颈内静脉穿刺置管中的首次成功率明显高于实时双平面技术。此外，“改良动态针尖定位”短轴技术需要更短的穿刺置管时间和更少的穿刺次数，使其成为比实时双平面技术更有效和实用的方法。

PU-0876

A severe sedation event in a child with neck tic disorder and scoliosis

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Pediatric procedural sedation is commonly used in clinical practice for diagnosis and examination. It is generally well-tolerated by children and severe adverse events are rare.1 Non-sedation examination strategies have been suggested.2But sedation may still be necessary for certain children. This report discusses a severe complication that arose in a child with a special condition following sedation.

A 10-year-old girl weighing 31kg was hospitalized for neck twitching lasting three days. She had 10-15 seizures daily, each lasting 3-4 minutes, but had no consciousness issues. The girl's muscle tone disorder was first noticed at 8 months old. After rehabilitation, she can participate in activities like dancing and playing games. From age 6, the child's muscle mass and upper limb strength have been declining. By age 8, they developed scoliosis, characterized by a Cobb angle measuring between 50-60°, which was corrected with braces for over a year. No brain abnormalities were found on the CT scan. Abnormal EEG findings in children showed a slowed basic rhythm, prompting the need for further diagnosis through an MRI examination. A dosage of 50mg of chloral hydrate was administered orally. 0.1μg/kg of dexmedetomidine was administered intranasally. After 30 minutes, the patient became physically active, so 20 milligrams of propofol were slowly injected intravenously to stop the movements. 5 minutes later, SPO2 was decreased to 70%. Spontaneous breathing disappeared. Administrate oxygen via face mask immediately. However, after 20 minutes, there was still no autonomous breathing. Prior to tracheal intubation, the patient's spontaneous breathing is restored under strong stimulation from the laryngoscope. Ultimately, the patient received invasive respiratory support in the PICU due to difficulty maintaining oxygen saturation above 80% through autonomous breathing. The intubation was removed after ten hours. Few days later, the patient experienced convulsive seizure in the ward. After intravenous administration of 6 milligrams of diazepam for sedation, the patient experienced severe respiratory depression again and only resumed normal spontaneous breathing after receiving invasive respiratory support.

Chloral Hydrate was reminded as a suboptimal sedative drug for older or heavier children, or those with epilepsy or neuropsychiatric disorders. Other supplementary sedatives could be taken into consideration sometimes.3During deep brain stimulation, appropriate sedatives can suppress severe tics.4Dexmedetomidine is a good option for sedation during deep brain stimulation surgery for Tourette syndrome.5However, studies have found that while stimulants generally do not worsen tics in most people with tic disorders, they can worsen tics in some individuals.6 In this particular case, the patient suffered from severe respiratory depression in two different medication situations, possibly due to their complex condition. In short, while previous research confirms the safety of sedation with the medication, there is still a risk when combined with muscle weakness and scoliosis. This greatly challenges clinical diagnosis and treatment, making proper treatment plans

and preparations crucial.
Abbreviations
EEG Electroencephalograph
MRI magnetic resonance imaging
SPO2 Pulse Oximeter Oxygen Saturation

PU-0877

盐酸右美托咪啶在儿童鼾症手术的应用

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目的 观察右美托咪定在儿童鼾症手术的应用
方法 选取 3-12 岁 ASAⅠ级鼾症手术患者 60 例，将患者随机分为 A 组及 B 组各 30 例，其中 A 组为常规组，常规的诱导插管，B 组为右美托咪啶组，两组患者诱导药物均为丙泊酚（2mg/kg）、芬太尼(3 ug /kg)及顺阿曲库铵（0.2 mg/kg），进行常规的诱导插管，B 组患者诱导插管前开始泵注右美托咪啶 1 ug /kg，10min 泵注完毕。手术开始前两组患者追加分太尼 2 ug /kg。记录诱导前（T0）、气管插管后即刻（T1）手术重要步骤开始后 1min（T2）、手术重要步骤开始后 10min（T3）、手术结束时（T4）的血流动力学参数，包括平均动脉压（MAP）、心率(HR)；手术重要步骤开始后心率>110bpm 予以追加芬太尼 1 ug /kg。记录术中芬太尼总用量，记录苏醒期发生躁动例数、镇静评分及麻醉恢复时间。
结果 与 T0 相比，B 组患者 T1、T2、T3、T4 时刻 MAP、HR 降低（p<0.05）；B 组与 A 组相比，T1、T2、T3、T4 时刻 MAP、HR 降低（p<0.05）；术中芬太尼总量 B 组<A 组（p<0.05）；苏醒期躁动例数 A 组 12 例，B 组 3 例；
结论 手术开始前开始使用右美托咪定可以有效维持术中血流动力学的平稳，减少术中镇痛药的用量，有效预防苏醒期躁动，有利于帮助患者平稳度过围术期。

PU-0878

探讨 2 例婴幼儿严重气道痉挛的救治和思考

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目的 探讨两例婴幼儿患者术后发生严重气道痉挛的救治及思考
方法 回顾青岛大学妇女儿童医院进行手术的两例婴幼儿，术后恢复期发生严重的气道痉挛。病例一，患儿，男，35 天，4.5 公斤，舌系带短，行舌系带切断缝合术。入室后行静吸复合全麻，静推丙泊酚 10 毫克，舒芬太尼 0.5 微克，吸入七氟醚至 0.8MAC，保持自主呼吸，手术顺利。术后清醒时发生呛咳，给予纯氧吸入，患儿出现屏气，血氧饱和度迅速下降，心率也随之下降。给与控制呼吸，麻醉机仅显示潮气量，无二氧化碳波形，患儿血氧饱和度下降至个位数，心率下降至 40 次/分钟。给与 10 万分之一副肾素一毫升静推，心外按压，血氧饱和度逐渐上升，心率恢复到 140 次/分钟，自主呼吸逐渐恢复，10 分钟后完全清醒，送至病房。病例 2，患儿，男，48 天，4.3 公斤，重度肺动脉瓣狭窄，行心导管造影肺动脉瓣成形术。行静吸复合全麻，入室后依次静推丙泊酚 10 毫克，舒芬太尼 0.5 微克，罗库溴铵 2.5 毫克，置入一号喉罩，吸入七氟醚 0.8MAC 维持，手术时间 45 分钟，手术顺利。术后返苏醒室。入室后 8 分钟逐渐恢复自主呼吸，至潮气量 300 毫升左右拔除喉罩，患儿呛咳，屏气，血氧饱和度迅速下降，心率也随之下降。给与控制呼吸，麻醉机仅显示潮气量，无二氧化碳波形，手控呼吸感觉气道阻力极高，患儿血氧饱和度下降直至无显示，心率下

降至 0 次。给与 10 万分之一副肾素一毫升，甲强龙 20 毫克静推，心外按压，气管插管，氧饱和度逐渐上升，心率恢复到 160 次，半小时后患儿完全清醒，拔除气管导管，送至病房。

结果 本组病人无死亡，术后无严重麻醉并发症及后遗症，术后 7 天随访无神经系统并发症

结论 围术期发生气道痉挛的原因及病理机制尚不完全清楚，多数学者认为可能是气道高反应性（air-way hyperreactivity, AHR）和炎症免疫等共同作用的结果。本组病例 1 可能与术后口腔分泌物或伤口血液流入气道有关。病例 2 术前有呼吸道感染病史，术中气道压较正常患儿高，双肺呼吸音粗，可能与此有关。婴幼儿严重气道痉挛发病急骤，2 分钟内即可出现心跳呼吸骤停，必须反应迅速，正确应对。应对的措施有：立即双人心肺复苏，一人加压给氧控制气道，一人进行胸外按压，尽可能维持脏器灌注，减少大脑缺血时间。可视喉镜下快速气管插管，建立呼吸通道。经静脉给予肾上腺素和甲强龙。麻醉医师拔管后仍需保持对患者的密切关注，及时发现并具有应对危急情况的能力。对于口腔有伤口的患儿应严密观察其分泌物情况，做好引流，防止分泌物流入气道。术前访视时应详细查体，询问患儿呼吸道病史，有感染病史的应格外注意，并在围手术期加强气道监护，做好各种应对措施。本组病例无死亡无术后并发症也与发现及时应对措施正确有关。

PU-0879

艾司氯胺酮经鼻给药联合咪达唑仑口服用于小儿术前镇静的临床效果比较：一项随机、对照、双盲临床研究

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目的 目前有多种药物被应用于缓解小儿术前焦虑，但均存在不足，不能完全满足临床需要。本研究旨在探讨艾司氯胺酮经鼻给药联合咪达唑仑口服用于小儿术前镇静的临床效果，为临床应用提供依据。

方法 本研究选取在全身麻醉下行择期手术的 ASAⅠ、Ⅱ级，年龄 2-6 周岁的患儿 102 例。将患儿随机、均等分为三组：（1）咪达唑仑组（M 组）：0.5 mg/kg 咪达唑仑口服给药；（2）艾司氯胺酮组（S 组）：1 mg/kg 艾司氯胺酮经鼻给药；（3）联合组（MS 组）：0.3 mg/kg 咪达唑仑口服联合 0.6 mg/kg 艾司氯胺酮经鼻给药。于七氟烷吸入诱导前 30 分钟给予相应药物。主要观察指标为患儿在接受七氟烷吸入诱导时的诱导依从性评分（Induction Compliance Checklist，ICC）。次要观察指标包括术前给药后 0 min、10 min、20 min、30 min 的镇静评分（Ramsay Score）及焦虑评分（the Modified Yale Preoperative Anxiety Scale, m-YPAS）、术前药物接受程度、患儿与家属的分离情况评分（Parental Separation Anxiety Scores, PSAS）、术后躁动发生率、苏醒时间等。不良反应包括低血压、低氧血症或喉痉挛等。

结果 本临床试验共纳入 102 例患儿。因上呼吸道感染及无法配合等原因，MS 与 M 组各有 2 例患儿脱落，最终 98 例纳入结果分析。MS 组患儿诱导依从性的满意率达 88.24%（30/34），高于 M 组 43.74%（14/32）及 S 组 53.13%（17/32），差异有统计学意义（P＜0.001）；组间比较发现 MS 组患儿诱导配合度高于 M 组及 S 组，差异有统计学意义（P＜0.001，P＜0.003），而 M 组与 S 组比较，差异无统计学意义（P＞0.05）。三种用药方案均能缓解患儿的焦虑水平并达到一定的镇静深度。在给药 30 分钟后，MS 组（3.00[3.00-4.00]）及 S 组（3.00[3.00-4.00]）患儿的镇静评分高于 M 组（3.00[2.00-3.00]，P＜0.05），且 MS 组（44.1%）及 S 组（43.7%）产生深度镇静（Ramsay score ≥4 分）的比例明显高于 M 组（18.7%，P＜0.05）。家属分离情况评分、面罩接受度评分、术后躁动发生率及术后苏醒时间在三组间无显著差异（P＞0.05）。此外，在药物接受度方面，M 组患儿满意率为 93.8%，与 S 组（78.1%）和 MS 组（85.3%）比较无显著差异（P＞0.05）。本研究未观察到低血压、低氧血症或喉痉挛等不良反应。

结论 艾司氯胺酮经鼻给药联合咪达唑仑口服能够迅速缓解术前焦虑并达到满意的镇静水平，同时改善吸入麻醉诱导的依从性，是一种安全且有效的小儿术前镇静方案。

PU-0880

2125 例儿童术后疼痛随访的数据分析

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目的 调查分析本医疗机构手术患儿术后疼痛的现状以及管理情况，为更好的制定术后镇痛方案，减轻患儿术后早期疼痛，加速患儿术后康复，提高麻醉服务质量提供参考依据。
方法 选择 2024 年 1~6 月份接受静脉镇痛泵术后镇痛的患儿为主要随访对象，同时匹配当日同一科室未接受术后镇痛的患儿作为次要随访对象。所有随访均由经过培训的三位麻醉护士于术后次日下午进行，随访时存在重度疼痛的患儿，持续随访至疼痛降为中度以下。随访的主要内容包括：访视时的疼痛评分（学龄儿童采用数字评分，学龄前儿童采用表情评分），患儿返回病房后至访视时的最高疼痛评分，最疼时出现的时间，镇痛泵按压次术，镇痛泵按压的时机，是否口服镇痛药物，以及术后镇痛可能相关的并发症（恶心、呕吐、嗜睡、瘙痒、呼吸抑制、低血压、心动过缓等）。
结果 共计随访 2125 例患儿，其中接受术后镇痛的患儿 1010 例，未接受术后镇痛的患儿 1115 例。在接受术后镇痛的患儿中，术后一日内出现过中度以上疼痛的发生率为 22.3%。术后第一日仍然存在重度疼痛的手术主要有：胫腓骨远端骨折切开复位内固定术（42.2%），Nuss 术（含反 Nuss 术）（38.7%），髌骨骨折切开复位术（27.5%），全耳再造术（21.1%），脊柱侧弯矫治术（11.1%）。最疼时出现的时间点主要有两个：夜间（11 点至 2 点）（41.3%）和患儿返回病房的 2h 以内（33.6%）。77.2%的患儿其镇痛泵按压的时机为患儿疼痛难忍时。27.2%的患儿除使用静脉镇痛泵外接受口服对乙酰氨基酚或布洛芬镇痛。静脉镇痛泵的总体并发症发生率为 12.3%，其中发生率最高的为恶心、呕吐（7.3%）。在未接受术后镇痛的患儿中，中度以上疼痛的发生率为 8.3%，主要为手术时间较长的微创手术（73.1%），其中 29%的患儿接受口服对乙酰氨基酚或布洛芬镇痛。
结论 目前的镇痛泵配方对部分手术的术后疼痛的缓解效果不佳；需要加强对患儿及家属的镇痛宣教，提高其对镇痛重要性的认识，消除对镇痛药物不良反应的疑虑；对于手术时间较长的微创手术可以建议患儿使用静脉镇痛泵。

PU-0881

KCNQ2 在艾司氯胺酮所致幼年小鼠远期认知及行为缺陷中的调节作用及机制

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目的 随着手术适应证的不断扩大，妊娠期非产科手术及婴幼儿手术的数量近年来不断增加。这些手术大多需要在全身麻醉下进行，而全身麻醉是否会对发育期大脑产生影响一直是备受关注且尚存在争议的问题。近 20 年来，大量临床前研究表明，全身麻醉药可导致发育期脑病理性损伤和远期行为异常，且有多项临床研究表明，多次、长时间的全身麻醉对婴幼儿的神经发育可能产生影响。而在实验室研究中则发现全麻药物会增加幼年动物包括大鼠、小鼠和非人灵长类动物的神经细胞凋亡从而导致认知功能障碍。虽然目前已有相关研究且取得了一些进展，但幼年时期使用全麻药造成远期认知功能障碍及学习记忆能力缺陷的机制仍未完全揭示。
目的 建立幼年时期反复多次艾司氯胺酮暴露小鼠模型，探讨幼年期反复应用艾司氯胺酮对小鼠海马组织中 Kcnq2 表达的影响及其在小鼠远期认知及行为缺陷中的调节作用及具体机制。
方法 40 只新生 C57 小鼠，雌雄不辨，随机分为对照组（C 组）、艾司氯胺酮组（esK 组）、艾司氯胺酮+溶剂组（esK+Vehicle）、艾司氯胺酮+Kcnq2 抑制剂组（esK+XE991）。分别于出生后第

8、10、12 天给予三次药物干预。艾司氯胺酮组给予腹腔注射艾司氯胺酮溶液 60mg/kg,艾司氯胺酮+Kcnq2 抑制剂组预先给予腹腔注射 XE991 溶液 1mg/kg，半小时后给予腹腔注射艾司氯胺酮溶液 60mg/kg，对照组给予腹腔注射同等剂量生理盐水。不同药物处理后正常实验室环境饲养，于生后 56 天进行新物体识别实验和水迷宫实验以评价各组小鼠认知功能,之后立即处死小鼠并取其海马组织，采用 Nissl 染色观察小鼠海马病理变化情况，免疫荧光染色、Western Blot 测定海马组织中 Kcnq2 蛋白表达量，Western Blot 检测海马组织中 Akt1/GSK-3β 信号通路关键蛋白 (pAkt1、pGSK-3β、tAkt1、tGSK-3β)表达水平。

结果 与对照组小鼠相比，幼年期反复多次艾司氯胺酮暴露后的小鼠，在新物体识别实验中认知系数显著降低,差异有统计学意义（P＜0.05），在Ｍｏｒｒｉｓ 水迷宫实验中逃避潜伏期时间增加、穿越平台次数与在原平台所在象限的时间均显著降低,差异有统计学意义（P＜0.05），而预先腹腔注射 XE991(1 mg/kg)以药理学手段抑制 Kv7 通道功能的小鼠较单纯艾司氯胺酮处理的小鼠在新物体识别实验中认知系数增加，在Ｍｏｒｒｉｓ 水迷宫实验中逃避潜伏期时间减少，穿越平台次数及在原平台所在象限的时间增加。幼年期反复多次艾司氯胺酮暴露的小鼠脑组织海马区域神经元结构紊乱，尼氏小体数量减少。免疫荧光和 Western blot 分析表明，与对照组小鼠相比，幼年期反复多次艾司氯胺酮暴露后的小鼠海马组织中 Kcnq2 蛋白荧光信号增强，表达量明显增多，差异有统计学意义（P＜0.05）。Western blot 分析表明,幼年期反复多次艾司氯胺酮暴露的小鼠海马组织中 pAkt1 和 pGSK-3β 蛋白表达水平较对照组降低,腹腔注射 XE991(1 mg/kg)以药理学手段抑制 Kv7 通道功能逆转了因幼年期反复多次艾司氯胺酮暴露引起的小鼠海马组织中 pAkt1 及 pGSK-3β 蛋白表达水平的降低，上述差异均具有统计学意义（P＜0.05）。

结论 我们的实验结果显示,幼年时期反复多次接受艾司氯胺酮麻醉会造成远期认知功能障碍及学习记忆能力缺陷，这些伤害可能是通过增加海马组织中 Kcnq2 的表达量来实现的。以药理学手段抑制神经元 Kv7 通道功能逆转了因幼年期反复多次艾司氯胺酮暴露导致的认知功能障碍及学习记忆能力缺陷,其可能的机制是抑制 Kv7 通道激活了 Akt1/GSK-3β 信号通路。因此,药理学手段抑制神经元 Kv7 通道可能为改善全麻药反复多次应用于儿童患者所造成的神经毒性风险提供治疗策略。

PU-0882

舒适化麻醉下血液肿瘤患儿鞘内注射化疗后呕吐的发生及危险因素：一项回顾性研究

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目的 评估血液肿瘤患儿舒适化镇静镇痛下鞘内化疗与局麻下接受鞘内化疗后 24 小时内呕吐的发生率及危险因素。

方法 回顾性分析选取 2024 年 01 月至 2024 年 12 月在南京医科大学附属儿童医院血液肿瘤科行鞘内注射化疗患儿的临床资料，患儿年龄跨度为 1-15 岁，美国麻醉医师协会(ASA)分级分为 2-4 级。根据麻醉方式分为全身麻醉组（GA 组）和局麻组（LA 组）。比较两组术后 24 小时内发生恶心呕吐，腹部不适等情况。包括呕吐次数、恶心评分、食欲水平、父母满意度和不良反应。收集了社会人口统计学和手术数据以及潜在疾病。

结果 因研究尚未结束，目前纳入 90 名患者，全麻下鞘内化疗后 24 小时内呕吐发生率为 32.5%，其中 83.6% 的呕吐发生在术后 6 小时内，65.4%的患者在术前预防性使用相关止吐药，97.6%的患儿术后预防及治疗应用止吐药，及营养护胃药。呕吐的危险因素包括女患儿，治疗时期，和晕动病史，化疗次数等。局麻鞘内化疗后 24 小时内呕吐发生率为 26.2%，其中 90.6% 的呕吐发生在术后 6 小时内，79.4%的患者在术前预防性使用相关止吐药，91.6%的患儿术后预防及治疗应用止吐药。局麻穿刺出血率与全麻下相比升高。

结论 在舒适化镇静镇痛下进行鞘内化疗后 24 小时内，呕吐发生率较高。该结果的危险因素有（女、

治疗时期和先前的晕动症、鞘内化疗次数）。全麻下术后其他相关并发症情况发生率较低，患儿及患儿家长接受度及满意度良好。

PU-0883

盐酸艾司氯胺酮联合环泊酚行无阿片麻醉应用于小儿斜视矫正术的临床观察

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目的 探讨盐酸艾司氯胺酮联合环泊酚应用于小儿斜视矫正术的安全性以及对术后躁动恢复的影响。
方法 选取自 2024 年 1 月至 2024 年 5 月于郑州大学第一附属医院行斜视矫正术的患儿 118 例，根据随机数字表方法，随机分为无阿片组（n=59），以及阿片组（n=59）。麻醉诱导，无阿片组予以 0.5mg/kg 盐酸艾司氯胺酮静脉注射，阿片组予以 50μg/kg 阿芬太尼静脉注射，其余用药相同；无阿片组予以 0.3mg/（kg·h）盐酸艾司氯胺酮联合环泊酚静脉维持，阿片组予以瑞芬太尼联合环泊酚静脉维持。记录 2 组患儿一般情况；记录 2 组患儿入室后（T0）,插管即刻（T1）,手术开始时（T2）,手术开始后 10min（T3）,手术结束时（T4），拔管后即刻（T5）的平均动脉压（mean arterial pressure, MAP）,心率（heart rate, HR），脉搏氧饱和度（pulse oxygen saturation, SpO2）水平；记录两组患儿拔管后 20min 内儿童疼痛行为量表（FLACC）及儿童苏醒期谵妄量表（PAED）评分的最大值；记录 2 组患儿手术时间，苏醒时间，PACU 停留时间，以及诱导时呛咳，术中心动过速，血压过高，术后分泌物增多，恶心呕吐，头晕头痛，补救镇痛镇静发生率。
结果 两组患儿在 T0 时的 MAP,HR 无统计学差异（P＞0.05）；无阿片组的 MAP,HR 在 T1 上升趋势后下降趋于平稳，阿片组于 T1 下降趋势并趋于平稳；相比 T0，无阿片组于 T1 时的 MAP,HR 显著升高（P＜0.05），阿片组的 MAP,HR 在各个时点均显著降低（P＜0.05）；相比阿片组，无阿片组苏醒时间延长（P＜0.05），但 PACU 停留时间 2 组无统计学差异；相比阿片组，无阿片组诱导时无呛咳反应发生，术中眼心反射发生明显降低（P＜0.05）；无阿片组苏醒后 20min 内疼痛评分明显降低（P＜0.05），苏醒期躁动发生率显著降低（分别为 5.08%和 18.64%，P＜0.05）。
结论 盐酸艾司氯胺酮联合环泊酚行无阿片麻醉能保证良好的镇痛镇静效果，有效降低患儿苏醒期躁动谵妄发生及眼心反射的发生，可安全应用于小儿斜视矫正术。

PU-0884

The lateral septum partakes the regulation of propofol-induced anxiety-like behavior

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Repeated exposure to propofol during early brain development is associated with anxiety disorders in adulthood, yet the mechanisms underlying propofol-induced susceptibility to anxiety disorders remain elusive. The lateral septum (LS), primarily composed of γ-aminobutyric acidergic (GABAergic) neurons, serves as a key brain region in the regulation of anxiety. However, it remains unclear whether LS GABAergic neurons are implicated in propofol-induced anxiety. Therefore, we conducted c-Fos immunostaining of whole-brain slices from mice exposed to propofol during early life. Our findings indicate that propofol exposure activates GABAergic neurons in the LS. Selective activation of LS GABAergic neurons resulted in increased anxiety-like behavior, while selective inhibition of these neurons reduced such behaviors. These results suggest that the LS is a critical

brain region involved in propofol-induced anxiety. Furthermore, we investigated the molecular mechanism of propofol-induced anxiety in the LS. Microglia activation underlies the development of anxiety. Immunofluorescence staining and Western blot analysis of LS revealed activated microglia and significantly elevated levels of phospho–NF–κB p65 protein. Additionally, a decrease in the number of neuronal spines was observed. Our study highlights the crucial role of the LS in the development of anxiety-like behavior in adulthood following childhood propofol exposure, accompanied by the activation of inflammatory pathways.

PU-0885

瑞马唑仑联合盐酸芬太尼用于小儿腹腔镜疝气手术全身麻醉诱导成功的半数有效量

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目的 探讨瑞马唑仑联合芬太尼用于小儿腹腔镜疝气手术全身麻醉诱导成功的半数有效量（ED50）和（ED95）有效量。

方法 选取择期行腹腔镜疝气手术全身麻醉的 2-10 岁患儿，美国医师协会分级 I,II 级，术前未使用其他镇静药物，患者静脉输注芬太尼 3ug/kg,1min 后，静脉注射瑞马唑仑，于 1min 内泵注完毕。首例患儿瑞马唑仑剂量 0.3mg/kg，剂量梯度（0.05mg/kg）,使用改良 Dixon 序贯法决定下一例瑞马唑仑的剂量。记录镇静成功和镇静失败的患者分别为镇静成功（19 例）镇静失败（16 例），麻醉诱导前（基础值），诱导后 1 min、3min、5min、手术开始时、术中每 10min 以及手术结束后（完成缝合）、停药时、睁眼时的生命体征（包括血压、心率、血氧饱和度），PACU 停留时间，术中及术后不良事件发生率。使用 Probit 回归分析计算瑞马唑仑联合瑞芬太尼用于小儿腹腔镜手术全麻诱导的 ED50,ED95。数据分析采用 SPSS22.0 版本进行统计分析。连续变量应用 kolmogorov-Smirnov 检验来评估分布的正态性。符合正态分布用平均数值±标准差（SD）表示，非正态分布变量用中位数和四分位间距表示 M(IQR)，分类变量用例数（%）表示，使用卡方检验进行统计分析或采用 Fisher 确切概率法表示。

结果 瑞马唑仑联合芬太尼用于小儿腹腔镜手术全麻诱导的 ED50 为 0.219mg/kg 及其 95%可信区间为（0.183—0.249）mg/kg，ED95 为 0.307mg/kg 及其 95%可信区间为（0.269-0.456）mg/kg，两组患儿年龄，体重差异无统计学意义，两组患儿术中血压、心率等差异无统计学，麻醉诱导后两组患儿血压 1min、3min、5min 较基础血压均有轻微降低，但其变化程度小于 20%，且所有研究对象均没有使用血管活性药物维持血流动力学平稳，无抑制循环事件发生。手术中术后不良反应其中低血压发生 3 例；低氧血症 1 例；术后电话回访嗜睡 3 例、无术后恶心呕吐、无谵妄发生。两组术中不良反应，术后不良反应差异无统计学意义。

结论 0.307mg/kg 瑞马唑仑联合芬太尼用于小儿麻醉诱导是一种安全有效的剂量，瑞马唑仑可以安全用于小儿患者的全身麻醉的诱导。

PU-0886

Knowledge, Attitudes, and Practices (KAP) Survey of Caregivers of Children Undergoing Plasma Tonsillectomy and Adenoidectomy Regarding Postoperative Pain Management

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Objective Tonsillectomy and/or adenoidectomy, frequently performed in children, primarily addresses obstructive sleep disturbances in younger children and recurrent tonsillitis in older children . Currently, the prevalent surgical techniques include coblation tonsillectomy, conventional cold dissection tonsillectomy, ultrasonic scalpel tonsillectomy, and thermal welding tonsillectomy. Coblation tonsillectomy, an emerging technology in recent years, utilizes low-temperature plasma RF energy to excise tissue at temperatures ranging from 40 to 70 degrees Celsius, minimizing tissue damage. This method not only reduces postoperative pain but also shortens the recovery time. Post-tonsillectomy complications such as pain, bleeding, agitation, and dysphagia are major factors that impede recovery. The Knowledge, Attitude, and Practices (KAP) survey serves as a vital diagnostic tool in health literacy research, shedding light on a group's understanding, beliefs, and actions concerning a particular health-related topic. It operates on the assumption that enhanced knowledge fosters favorable attitudes, which in turn shape behaviors.This study aimed to explore the knowledge, attitudes, and practices of caregivers regarding postoperative analgesia in children undergoing coblation tonsillectomy and adenoidectomy.

Methods We conducted a cross-sectional survey at Wuhan Children's Hospital, Wuhan, China, from July 2023 to February 2024. The study included families meeting the criteria of having a child who underwent the specified surgical procedure at the hospital during the study period. A convenience sampling method was utilized to select participants. The questionnaire for this study was developed based on established references and underwent a rigorous validation process .The survey collected demographic data and KAP scores from caregivers of children who had undergone tonsillectomy and adenoidectomy. Data analysis was conducted using STATA 17.0 (Stata Corporation, College Station, TX, USA).

Results A total sample of 668 cases was collected for this study .Out of 435 valid questionnaires, 252 respondents (57.93%) were female. Among the children who underwent coblation tonsillectomy and adenoidectomy, 269 (61.84%) were aged between 6 to 13 years. The mean knowledge, attitude, and practice scores were 5 [3,7] (possible range: 0-12), 35.63±4.15 (possible range: 14-70), and 18 [16,19] (possible range: 5-26), respectively. Multivariate logistic regression showed that knowledge score (OR = 1.12, 95% CI: [1.03,1.22], P = 0.007), attitude score (OR = 1.15, 95% CI: [1.08,1.21], P < 0.001), and having 3 or more children (OR = 3.02, 95% CI: [1.00,9.06], P = 0.048) were independently associated with proactive practice. The structural equation modeling (SEM) showed that the direct effect of knowledge on attitude (β = 0.52, P < 0.001) as well as of attitude on practice (β = 1.67, P < 0.001).

Conclusion Caregivers of children undergoing low-temperature coblation tonsillectomy and adenoidectomy generally exhibited inadequate knowledge, unfavorable attitudes, and suboptimal practices regarding postoperative analgesia. Clinical training programs and tailored educational interventions are urgently needed to improve caregivers' understanding and management of postoperative pain, which could enhance patient outcomes and caregiver confidence in postoperative care settings.This finding is consistent with literature suggesting that higher educational and professional status correlates strongly with greater health literacy and better understanding of medical practices.

PU-0887

婴幼儿扩张性心肌病肺动脉环缩术麻醉管理

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目的 总结 7 例婴幼儿扩张性心肌病肺动脉环缩术麻醉管理经验
方法 7 例确诊扩张性心肌病患儿，年龄 6 月-4 岁，体重 6-15.5kg，均经规范抗心衰药物治疗，疗效不佳，拟行全麻下肺动脉环缩术。入室常规监测心电图、脉搏氧饱和度、无创血压，选择艾斯氯胺酮 0.5mg/kg，依托咪酯 0.3mg/kg，舒芬太尼 1ug/kg,罗库溴铵 0.6mg/kg 快速诱导插管，行左桡动脉、右颈内静脉置管测压。术中吸入七氟烷 1-3%、右美托咪定 0.6ug/kg/h,瑞芬太尼 0.1-0.3ug/kg/min 维持，按需追加肌松药物。手术开始泵注肾上腺素 0.02-0.04ug/kg/min，维持循环稳定，尽量减少快速输注血管活性药物导致循环剧烈波动。术中常规监测食道超声，实时评估心室功能、室间隔位置变化、瓣膜反流情况。开胸暴露心脏后，在右心室、肺动脉置管监测右心室、肺动脉压力变化。环缩时实时评估，压差在 20-30mmHg 之间，三尖瓣无反流，循环稳定，中心静脉压力变化小为佳。
结果 7 例患儿手术过程，循环稳定，麻醉效果满意，达到预期效果
结论 婴幼儿扩张性心肌病肺动脉环缩术麻醉过程中，应建立多种监测指标，需要术中多指标评估，以期达到满意手术效果，并保持循环稳定。

PU-0888

先天性喉软化合并舌根囊肿的新生儿困难气道麻醉管理：病例报道

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目的 本研究旨在深入探讨先天性喉软化合并舌根囊肿的新生儿困难气道麻醉管理的综合策略，以提高手术安全性和患儿预后。
方法 通过对一例典型病例的详细剖析，全面阐述了针对此类患儿的麻醉管理方法。该患儿在出生后 20 天出现喉响、呛奶、紫绀等症状，经内窥镜及 CT 成像检查明确诊断为舌根囊肿和先天性喉软化症。经多学科团队（MDT）会诊后，制定了周密的手术计划，包括全身麻醉下的支撑喉镜检查术、舌根部肿瘤切除术及喉功能重建术。在麻醉诱导阶段，创新性地采用纳布啡诱导并保留自主呼吸，同时借助视频喉镜进行精准的气管插管操作。术中维持麻醉则采用七氟烷和舒芬太尼，以确保麻醉的平稳和深度。
结果 在整个麻醉过程中，患儿未出现缺氧及气道痉挛等严重并发症，手术进展顺利。术后，患儿恢复情况良好，无低氧血症及气道梗阻等不良事件发生。经过精心的护理和观察，患儿于术后第 9 天顺利出院。
结论 本研究结果表明，对于可预计困难插管的新生儿，纳布啡是一种安全有效的全麻诱导药物。视频喉镜在管理此类患者气道方面具有独特优势，能够提供清晰的视野，确保困难气道的安全处理。在面对类似病例时，应尽早考虑使用视频喉镜和声门上器械，以提高手术成功率和患儿的安全性。此外，多学科团队的紧密协作在围手术期管理中至关重要，包括耳鼻喉科、麻醉科等专业人员的协同工作，有助于制定个性化的治疗方案，优化手术流程，降低风险。未来，需要进一步开展大规模的临床研究，以积累更多的经验和数据，为先天性喉软化合并舌根囊肿的新生儿困难气道麻醉管理提供更坚实的理论基础和实践指导。

PU-0889

环泊酚复合瑞芬太尼在儿童纤维支气管镜介入术全身麻醉中的应用

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目的 国内外尚无关于环泊酚用于儿童纤维支气管镜介入术全身麻醉的报道。本课题采用改良序贯法观察环泊酚复合瑞芬太尼用于儿童经喉罩纤维支气管镜介入术全身麻醉中的半数有效剂量(ED50)，以期确定安全、有效的药物剂量，减少麻醉并发症，提高儿童患者的舒适度和安全性，为儿童纤维支气管镜介入术全身麻醉方案提供新的临床用药参考。

方法 选取 2023 年 12 月－2024 年 3 月在温州医科大学附属第二医院、育英儿童医院择期行纤维支气管镜介入治疗的患儿为研究对象。患者年龄为 3-7 岁，体重为标准范围内，美国麻醉医师协会(ASA) 分级为Ⅰ～Ⅱ级。采用环泊酚复合瑞芬太尼进行全身麻醉诱导，第 1 名研究对象的环泊酚诱导剂量为 1.0 mg/kg（静脉注射时间＞30s），随后静脉注射 2ug/kg 的瑞芬太尼（静脉注射时间＞60s）。注药同时根据患儿呼吸情况进行手控面罩辅助通气，当患儿 MOAA/S 评分≤1 时，置入型号适当的喉罩，取气切延长管连接于喉罩和螺纹管间，麻醉机进行机控通气。内镜医生将纤支镜镜头经气切延长管上口进入喉罩并到达声门上方，对准声门喷洒利多卡因药液(浓度 2%，2mg/kg)，随后镜头穿过声门裂，当到达隆突上方时，再一次进行利多卡因药液喷洒（剂量同前）。观察从置入喉罩到隆突上喷洒利多卡因完毕期间患儿的反应、生命体征参数及是否发生不良反应（注射痛、低氧血症）。依据 Dixon 改良序贯法，下一例患儿环泊酚的剂量由上一例患儿的反应来确定。患儿在置入喉罩到隆突上喷洒利多卡因完毕期间出现体动或呛咳反应，则下一位患儿的环泊酚诱导剂量增加 0.1 mg/kg；反之，则下一例患儿的环泊酚诱导剂量减少 0.1mg/kg。试验持续进行直到出现 6 对及以上阴性-阳性结果交叉拐点即可进行统计。采用 Probit 回归分析计算 ED50、95%的有效剂量(ED95) 及 95%CI。

结果 试验共纳入 35 名研究对象，通过序贯法得出当环泊酚复合 2ug/kg 的瑞芬太尼用于儿童纤支镜介入术全身麻醉诱导的 ED50 为 1.483 mg/kg，采用 Probit 回归分析计算得出 ED50 为 1.468 mg/kg（95%CI 1.425-1.512 mg/kg），ED95 为 1.577 mg/kg（95%CI 1.526-1.768 mg/kg）。所有患者均未出现注射痛，2 人出现低氧血症经手控辅助呼吸通气很快得以纠正。

结论 环泊酚复合瑞芬太尼可应用于儿童经喉罩纤维支气管镜介入术全身麻醉，该方法无注射痛，不良反应少，安全性高，能获得满意的麻醉质量。

PU-0890

ERAS 模式下儿童肾积水腹腔镜日间手术围术期麻醉管理探索

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目的 回顾并分析 ERAS 模式下儿童肾积水腹腔镜日间手术围术期麻醉管理，初步探索此类患儿围术期麻醉管理要点，保证日间四级手术医疗质量。

方法 回顾收集 2023 年 6 月至 2024 年 6 月接受腹腔镜肾积水日间手术患儿的医疗病历记录，所有患儿均接受统一规范的 ERAS 管理方案。所有患儿均接受气管插管全身麻醉，术毕行超声引导下双侧腹直肌鞘和术侧 TAP 阻滞，手术切口局部浸润麻醉，术中丙泊酚、瑞芬太尼复合七氟烷维持麻醉。术中暖毯保温，输液加温，维持中心温度不低于 36.0℃，所有患儿均未输血且未放置引流管，术后尽早拔除导尿管，术后按需口服非甾体类抗炎药，尽早进食饮水。分析人口学资料、围术期麻醉管理及术后并发症等情况。

结果 共 51 例肾积水患儿纳入分析，其中男性 41 例（81.2%），女性 10 例（18.8%），左侧 30 例（58.8%），右侧 19 例（37.3%），双侧 2 例（3.9%）。患儿平均年龄（5.1±4.9）岁，体重（21.9±17.3）kg，麻醉时间（112.4±30.1）min，手术时间（95.0±28.0）min，留置导尿时间（7.7±3.8）h。术后镇痛效果好，2 例出现呕吐（3.9%），余未见相关不良反应，家长满意度高。
结论 ERAS 模式下腹腔镜儿童肾积水日间手术是可行的，日间四级手术需要良好的团队配合。完善的术前评估、术中精细化麻醉管理和手术操作、有效的术后疼痛管理、尽量减少相关导管刺激、全方位的围术期护理对于手术成功，保障安全和提高诊疗质量十分重要。

PU-0891

保留自主呼吸喉罩通气全身麻醉在小儿斜视日间手术中的应用

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目的 评价保留自主呼吸喉罩通气模式在小儿斜视日间手术全身麻醉中的安全性和有效性。
方法 选择于全身麻醉下行斜视矫正术的日间手术患儿180例，年龄3~8岁，BMI185~24.5 kg/m2，ASA Ⅰ级。采用随机数字表法分为 2 组（n=90）：机械通气组（M 组）和自主呼吸组（S 组）。麻醉诱导：潮气量法吸入 8%七氟烷复合艾司氯胺酮静脉注射，挤压斜方肌无体动后置入喉罩；麻醉维持：采用七氟烷-丙泊酚-瑞芬太尼静吸复合麻醉维持方案；M 组采用压力控制机械通气模式，驱动压 10~15mmH2O，潮气量 8~12ml/kg；S 组采用自主通气模式，呼吸频率＜5 次/min 或 ETCO2＞60mmHg 时予以手动辅助通气；术毕患儿转入 PACU。Steward 评分＞4 分方可由 PACU 转回病房，小儿麻醉后离院评分（Ped-PADSS）＞9 分方可离院。记录患儿 PACU 停留时间、术后离院时间及非计划延迟出院率与非计划再入院情况。记录患儿术中、PACU 期间及术后 24h 的麻醉相关并发症及不良事件发生情况。
结果 与 M 组比较，S 组患儿 PACU 停留时间及术后离院时间缩短（P<0.05）；两组均无非计划延迟出院或非计划再入院情况；两组患儿术后咽痛、躁动、恶心呕吐发生率比较无明显差异（P>0.05）；两组均未发生严重不良事件。
结论 保留自主呼吸喉罩通气模式可安全应用于小儿斜视日间手术全身麻醉中，并缩短 PACU 停留时间及术后离院时间。

PU-0892

右美托咪定对先心病儿童脑血管自动调节功能的作用

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目的 本研究旨在利用经颅彩色多普勒超声(TCCD)评估右美托咪定对先天性心脏病(CHD)患儿脑自动调节的影响。
方法 纳入了 59 名 0 至 6 岁接受心肺转流术(CPB)的先天性心脏病患儿，他们在术前和术后均接受了 TCCD 检查。这些患儿被随机分配至右美托咪定组或对照组，在麻醉诱导后分别接受 10 分钟的右美托咪定输注或生理盐水输注。通过低通气评估脑血管的二氧化碳反应性(RV)。在三个不同时间点测量并分析了右大脑中动脉(MCA)的阻力指数(RI)、搏动指数(PI)、平均血流速度(Vmean)和右额叶区域的脑氧饱和度($ScrO_2$)，共进行了六次测量。此外，还记录了这些时间点的血流动力学参数，包括心率(HR)和平均动脉压(MAP)。
结果 两组人口统计学参数、大脑中动脉二氧化碳反应性 RV（p=0.402）、搏动指数 PI

（p=0.203）、阻力指数 RI（p=0.290）、平均血流速度 Vmean（p=0.290）、脑氧饱和度 $ScrO_2$（p=0.426）、心率 HR（p=0.522）和平均动脉压 MAP（p=0.236）均没有统计学差异。对照组中 PI、RI 和 HR 于手术前后存在显著差异；右美托咪定组中，RI、Vmean、$ScrO_2$ 和 HR 于手术前后存在显著差异。

结论 先心病患儿脑血管的自动调节功能依然存在；右美托咪定不会损害先心患儿脑血管的二氧化碳反应性。

PU-0893

High intraoperative fluid load associated with prolonged length of hospital stay and complications after non-cardiac surgery in neonates

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Background Inappropriate perioperative fluid load can lead to postoperative complications and death. This retrospective study was designed to investigate the association between intraoperative fluid load and outcomes in neonates undergoing non-cardiac surgery.
Methods According to recorded intraoperative fluid volumes defined as ml.kg h , patients were mandatorily divided into quintile with fluid load as restrictive (quintile 1, Q1), moderately restrictive (Q2), moderate (Q3), moderately liberal (Q4), and liberal (Q5). The primary outcomes were defined as prolonged length of hospital stay (LOS) (postoperative LOS ≥ 14 days), complications beyond prolonged LOS, and 30-day mortality. Secondary outcomes included postoperative complications within 14 days of hospital stay.
Results The intraoperative fluid load was in Q1 of 6.5 (5.3–7.3) (median and IQR); Q2: 9.2 (8.7–9.9); Q3: 12.2 (11.4–13.2); Q4: 16.5 (15.4–18.0); and Q5: 26.5 (22.3–32.2) ml.kg h . The odd of prolonged LOS was positively correlated with an increase fluid volume (Q5 quintile: OR 2.602 [95% CI 1.444–4.690], P < 0.001), as well as complications beyond prolonged LOS (Q5: OR 3.322 [95% CI 1.656–6.275], P = 0.001). The overall 30-day mortality rate was increased with high intraoperative fluid load but did not reach to a statistical significance after adjusted with confounders. Furthermore, the highest quintile of fluid load (26.5 ml.kg h , IQR [22.3–32.2]) (Q5 quintile) was significantly associated with longer postoperative mechanical ventilation time compared with Q1 (Q5: OR 2.212 [95% CI 1.101–4.445], P = 0.026).
Conclusions Restrictive intraoperative fluid load had overall better outcomes, whilst high fluid load was significantly associated with prolonged LOS and complications after non-cardiac surgery in neonates.

PU-0894

Triiodothyronine ameliorates ketamine-induced developmental hypomyelination

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Background The potential neurodevelopmental toxicity of anesthetics has been the focus of ongoing research in the field of pediatric anesthesia. Several clinical studies suggested that

prolonged or repeated general anesthesia (GA) was not associated with deficits of general intelligence, but was associated with lower fine motor abilities of children under 3 years, suggesting underlying damage to the white matter of the brain. White matter comprises myelinated axon bundles, and plays a crucial role in transmitting information, coordinating body movements, and cognitive activities. Clinical studies have found that thyroid hormone levels are decreased in patients after anesthesia and surgery, while thyroid hormone is involved in myelin development in the central nervous system. However, whether the decrease in thyroid hormone after anesthesia affects myelin development and whether thyroid hormone supplementation can ameliorate the effects of anesthesia on myelin development is unclear. Therefore, the aim of this study was to elucidate the mechanisms by which S-ketamine and triiodothyronine affect myelin formation during development and to provide possible therapeutic targets for the safety of general anesthesia administration in pediatric patients.

Methods Postnatal day 7 (PND7) Sprague Dawley rats were randomly assigned to receive S-ketamine (40 mg/kg, three times per day at 2-hour intervals) or saline or T3(1μg/100g) administered 10 minutes after S-ketamine injection. The expression of myelin basic protein (MBP) in the corpus callosum and cerebellum of PND14 rats was analyzed. The development of myelin sheaths was observed by TEM (Transmission Electron Microscopy). Moreover, proliferation, differentiation, and maturation of OPCs in PND8 rats were detected by immunofluorescence. Metabolic changes in rat brains were detected by LC-MS. Motor skills and coordination function were evaluated using the Rotarod tests at PND30.

Findings Our results showed that multiple S-ketamine exposure anesthesia in neonatal rats induced motor skills and coordination impairments, accompanied by damage to myelin structure and down-regulations of myelin basic protein. However, supplemental administration of triiodothyronine ameliorated the impaired motor function and abnormal myelin formation caused by S-ketamine. Furthermore, immunofluorescence results in PND8 indicated that the inhibition of myelin formation by S-ketamine was mainly due to effects on the differentiation and maturation of OPCs, whereas triiodothyronine did not affect the proliferation of OPCs in the corpus callosum region, but increased the number and proportion of mature oligodendrocytes (CC1+). Interestingly, KEGG classification and enrichment analysis of metabolites showed the top different metabolites were primarily related to glycerophospholipid and cholinergic metabolism. Phosphatidylethanolamine (PE) and choline levels were significantly reduced in the S-ketamine group compared to the control group, but rescued with the application of triiodothyronine. These results suggest that ketamine may inhibit the differentiation and maturation process of OPCs by affecting lipid metabolism, leading to impaired myelin formation and impaired motor function in developing rats.

Conclusion Taken together, this study has shown that triiodothyronine supplementation ameliorates S-ketamine-induced inhibition of oligodendrocyte maturation and myelination in the early postnatal period. The protective effect of triiodothyronine may be achieved through its regulation of phospholipid and choline metabolism. This study provided new insights into the prevention of neurodevelopmental toxicity in pediatric anesthesia. Triiodothyronine may be a promising drug for improving developmental hypomyelination. However, further studies are needed to determine the feasibility of the clinical use of triiodothyronine.

PU-0895

儿童腹膜后肿瘤切除术中液体治疗对预后的影响

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目的 儿童腹膜后肿瘤手术复杂，术中液体管理困难，术后并发症多，预后不佳。合理的术中补液可以减少术后并发症，改善预后。本文旨在探讨儿童腹膜后肿瘤切除术中入量对术后短期并发症及机械通气时间、住院时间的影响，以期为儿科患者术中补液提供指导。

方法 回顾性分析 2019 年 8 月至 2023 年 7 月在浙江大学医学院附属儿童医院接受腹膜后肿瘤切除术患儿的相关资料，根据校正后术中入量的三分位数，将患儿分为低入量组（T1, ≤17.75 ml/(kg*h)），中入量组（T2, 17.75~26.56 ml/(kg*h)）和高入量组（T3, ＞26.56 ml/(kg*h)），以低入量组为参照组。结局指标包括术后短期并发症、术后 48 小时内高乳酸血症和严重低白蛋白血症、机械通气时间、住院时间。

结果 本研究最终纳入了 804 例患儿，术后短期并发症的总体发生率为 69.2%，随着术中入量增加，发生术后并发症的风险显著增加（T2: OR 2.06 [95%CI: 1.26–3.36], P=0.004; T3: OR 6.1 [95%CI: 3.16–11.78], P<0.001）。其中发生率最高的是术后肺部并发症，发生率为 45.3%。相较于 T1 组，T3 组发生肺部并发症（T3: OR 2.39 [95%CI: 1.36–4.18], P=0.002）和住院时间延长（T3: OR 1.81 [95%CI: 1.06-3.08], P= 0.029）的风险显著增加。同时，与 T1 组相比，T2 和 T3 组发生术后凝血功能障碍（T2: OR 2.25 [95%CI: 1.27–3.97], P=0.005; T3: OR 5.86 [95%CI: 3.15–10.91], P<0.001 ）和肝功能损害（T2: OR 1.74 [95%CI: 1.09–2.77], P=0.019; T3: OR 2.42 [95%CI: 1.42–4.13], P=0.001）的风险显著增加。

结论 儿童腹膜后肿瘤切除术中大量输血输液与预后不佳相关。这一发现提示，儿科患者术中液体管理应更加精准，避免液体过载，以减少术后短期并发症的发生，减少住院时间，促进患儿的快速康复。

PU-0896

靶控输注瑞马唑仑用于椎管内麻醉中适度镇静的半数效应浓度

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目的 研究靶控输注（TCI）瑞马唑仑用于椎管内麻醉适度镇静的半数效应浓度（EC50）。

方法 选择椎管内麻醉下行下肢胫腓骨骨折手术的患者 32 例，男 19 例，女 13 例，年龄 18～60 岁，BMI18.5~28kg/m2；ASA 分级Ⅰ或Ⅱ级；椎管内麻醉平面控制在第八胸神经（T8）以下，麻醉效果确定后，设置 TCI 瑞马唑仑的初始效应浓度为 0.45 ug/mL，开始 TCI 12.8 min 后达设定浓度。自输注开始的第 15 min，监测并记录脑电双频指数（BIS）数值，并用改良警觉/镇静（MOAA/S）评分量表评估患者镇静状态，下一例患者的给药浓度用改良序贯法来确定：若上一个患者镇静程度未达适度镇静标准，则下一个患者的靶控浓度增加 0.05 ug/mL，反之则减少 0.05 ug/mL，直至受试者达到适度镇静状态。如此“Up-and-Down”至出现第八个意识抑制无效转有效的转折点方停止本部分试验。适度镇静（意识抑制有效）的标准定义为：3 分≤MOAA/S 评分≤4 分，且 60≤BIS≤80。未达到适度镇静（意识抑制无效）的标准定义为：MOAA/S 评分>4 分，或 BIS>80。记录给药前后患者的平均动脉压（MAP）、心率（HR）、脉搏氧饱和度（SpO2），并记录窦性心动过缓、低血压、高血压以及呼吸抑制等不良事件发生情况。

结果 维持椎管内麻醉患者适度镇静状态时，TCI 瑞马唑仑的效应部位的 EC50 为 0.260 ug/mL，95%置信区间（95%CI）为 0.196~0.307 ug/mL；EC95 为 0.385 ug/mL，95%CI 为 0.328~0.707 ug/mL。未对患者自身呼吸、氧饱和度产生明显波动,无严重不良反应事件发生。

结论 靶控输注瑞马唑仑用于椎管内麻醉患者维持适度镇静的半数效应浓度为 0.260 ug/mL。

PU-0897

意识指数监测对老年腰椎融合术患者应激性高血糖的影响

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目的 探讨意识指数（indexe of consciousness，IoC）监测即镇静（IoC1）联合镇痛（IoC2）监测对老年腰椎融合术患者应激性高血糖的影响。
方法 选择 2020 年 7 月至 2020 年 12 月行腰椎融合术的老年患者 72 例。纳入标准：男女不限，年龄 65～79 岁，BMI 18～30 kg/m2，ASA 分级Ⅱ或Ⅲ级。排除标准：阿片类药物长期使用或过敏患者，已经诊断糖尿病或其他影响血糖的内分泌疾病患者，合并严重心、肺、脑疾病的患者，肝、肾功能不全的患者，既往有精神疾病史、痴呆不能配合研究完成的患者，拟行 4 个以上脊椎节段手术患者，拒绝加入本研究的患者。采用随机数字表法将患者分为 2 组（每组 36 例）：对照组（C 组）和试验组（E 组）。2 组均采用气管内插管全身麻醉，麻醉维持采用靶控输注丙泊酚、瑞芬太尼及间断静脉注射罗库溴铵。C 组根据患者心率及有创血压等生命体征调整丙泊酚及瑞芬太尼血浆靶浓度。E 组根据 IoC1 值变化调整丙泊酚血浆靶浓度，根据 IoC2 值变化调整瑞芬太尼血浆靶浓度，维持 IoC1 值 40~60，IoC2 值 35~45。记录术中丙泊酚、瑞芬太尼、舒芬太尼、艾司洛尔及去甲肾上腺素用量。记录术中高血压、低血压、心动过速及心动过缓发生情况。分别于麻醉诱导前（T0）、术毕（T1）、术后 24h（T2）、72h（T3）检测血清血糖及皮质醇浓度。记录 2 组应激性高血糖发生情况。记录术后 24h 和 72h 静息和活动（咳嗽）时 VAS 疼痛评分。
结果 2 组患者一般资料及手术情况差异无统计学意义（P＞0.05）；E 组患者术中瑞芬太尼用量较 C 组增加（P＜0.05）；E 组患者术中高血压发生率较 C 组降低（P＜0.05）；与 T0 时点比较，2 组患者 T1、T2 时点血糖及皮质醇浓度均升高（P＜0.05），与 C 组比较，E 组患者 T1、T2 时点血糖及皮质醇浓度降低（P＜0.05）；E 组患者应激性高血糖发生率低于 C 组（36.11%vs.61.11%）（P＜0.05）。
结论 IoC1 联合 IoC2 监测用于指导老年患者腰椎融合术中镇静及镇痛管理，有利于抑制应激反应并降低应激性高血糖发生率。

PU-0898

超声引导下 0.5 %罗哌卡因股神经阻滞的 ED50

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目的 确定 0. 5%罗哌卡因用于超声引导下股骨神经阻滞的半数有效剂量(ED50)。
方法 选择拟行髌骨骨折切开复位内固定术或髌骨骨折内固定取出术患者，ASAⅠ或Ⅱ，BMI 20～30 kg/m2，年龄 18～64 岁，性别不限。无神经系统疾患、糖尿病，凝血功能无异常，术前 30 d 内未服用影响神经传导的药物及阿片类药物、无酗酒史，不能沟通配合者不纳入本研究。患者取仰卧位，手术侧的下肢外展微屈膝，腹股沟区常规消毒皮肤，将高频超声（通用医疗器械有限公司，美国）探头（4～ 13 MHz）放置于腹股沟韧带股动脉搏动点，和大腿长轴垂直，左右缓慢倾斜探头寻找股动脉，必要时可沿着大腿长轴方向稍上下滑动探头，超声图像显示两个圆形暗区，外侧暗区有明显搏动，探头轻压不变瘪，使用超声频谱可证实为股动脉，股动脉外侧可见蜂窝状高回声的梭形影像，即为股神经,调整超声扫描深度和增益以获得最佳图像。冻结屏幕通过超声机软件采用轨迹描记的方法测量股神经的横截面积（mm2），解冻屏幕，固定探头，由同一资深麻醉医师（对药物配方及分组不知情）选择理想的穿刺点，用 22G 长 70 mm 的穿刺针（株式会社八光，日本）从大腿外侧进针至髂腰肌表面的股神经处，保持针与超声探头在同一平面，清晰显示针尖和针干，

在神经周围回抽无血注药，针尖随着药液的扩散稍向前推进，尽量使局麻药液充分包绕股神经干鞘及周围。超声引导下定位股神经，测量股神经的横截面积后，根据面积注入 0.5%罗哌卡因，罗哌卡因的剂量按 Dixon 上下序贯法确定，起始剂量为 0.22 ml/mm2，若阻滞有效，则下 1 例患者减少 0.02 ml/mm2;反之，下 1 例患者增加 0.02 ml/mm2。股神经阻滞后 30 min 内，每 5 min 测定 1 次感觉阻滞和运动阻滞情况。阻滞有效标准：神经阻滞 30 min 内膝关节前面皮肤、小腿内侧面和足背内侧缘皮肤均无痛觉和 Brunnstrom 运动功能评定法为 1～3 期。若以上神经分布区有 1 处存在痛觉即认为神经阻滞无效。如阻滞无效，则根据患者生命体征酌情静脉注射舒芬太尼 10～20μg。入选样本从出现无效的上 1 例患者开始收集，直至出现 7 组有效和无效交替波即终止研究。采用 Dixon-Probit 法计算 0.5 %罗哌卡因用于超声引导下股骨神经阻滞的 ED50 及其 95%可信区间(CI)。

结果 0. 5%罗哌卡因超声引导下股神经阻滞的 ED50 为 0.106ml/mm2 ,95 % CI 为 0.069 ～ 0.125 ml/mm2。

结论 0.5%罗哌卡因用于超声引导下股神经阻滞的 ED50 为 0.106 ml/mm2，95％CI 为 0.069 ～ 0.125 ml／mm2。超声引导下精确识别定位股神经，根据每位患者的股神经截面积个体化给药，注药途径明确有效。

PU-0899

强直性脊柱炎合并严重后凸畸形患者后路手术过程中应用 IKAP 理论对气道管理探究

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目的 随着我院医疗治疗强直性脊柱炎（Ankylosing Spondylitis, AS）合并严重后凸畸形患者越来越多，此类患者术中麻醉气道管理为我们麻醉带来新的问题和挑战，严重的后凸畸形，气道结构的变异以及移位，俯卧后体位的变化，非常规手术体位的肺部气体交换，各项循环功能的改变诸多问题的解决，为术中麻醉问题带来挑战，本研究旨在应用 IKAP 理论解决强直性脊柱炎合并严重后凸畸形患者手术过程中的麻醉气道以及循环管理相关若干问题，以预防性或减缓复杂体位对呼吸以及循环的影响进展，非常规麻醉方式的改善以及调整，防止新的气道问题发生。

方法 回顾性分析我院 2020 年 1 月-2024 年 3 月我强直性脊柱炎合并严重后凸畸形患者，在进行手术麻醉实施前，针对于该类型的的患者，通过信息（Information）通过提供关于 AS 的病理机制、手术麻醉治疗方案、麻醉气道并发症预防的信息，患者可以更好地理解自己的疾病状况，更加积极地参与到手术前麻醉插管的过程。知识（Knowledge），患者掌握的知识有助于患者采取术后应对措施，如进行适当的气道阻抗调整，知识的增加也可能导致患者呛管率的降低。态度（Attitude）：通过积极的沟通和支持，可以帮助患者建立积极的态度，增强对抗疾病的信心。正面的态度有助于患者更好地应对气管插管带来的身体不适和心理挑战。练习（Practice）：患者将所学知识应用到本次麻醉治疗中，有助于缓解经鼻插管的疼痛以及不适可以帮助提高麻醉前配合效果。以下是 IKAP 理论对这类患者护理结果的可能影响：减少插管并发症，减低麻醉过程中呛管风险，基于 IKAP 理论的护理模式进行麻醉前干预，能够从 4 方面 [信息（information, I）、知识（knowledge, K）、信念（attitude, A）与 行为（practice, P）] 来实施干预，为患者提供周全的服务，旨在为其插管症状改善特别对强直性脊柱炎合并严重后凸畸形患者给予基于 IKAP 理论的护理模式，并评定其效能，最后经综合评估，在术后气道并发症发生率，术后恢复情况，患者以及家属满满意度，患者自我管理能力进行评估。在此模式下，强直性脊柱炎合并严重后凸畸形的患者在我们组成麻醉团队共同协作下，以实现上述气道管理目标。

结果 基于 IKAP 理论在强直性脊柱炎（Ankylosing Spondylitis, AS）合并严重后凸畸形患者的麻醉实施过程中，应用 IKAP 理论进行护理，可以帮助患者更好地适应清醒经鼻插管的管理，减少气道并发症，提高对患者对麻醉的恐惧心里，提高术中气道管理的效率以及并发症发生率。

结论 强直性脊柱炎合并严重后凸畸形患者，病痛的长期折磨，往往心理非常脆弱，疾病和手术后疼痛的双重创伤在进行手术支持治疗时更加的突出，针对于该类型的的患者，通过 IKAP 理论对这类患者进行麻醉气道管理，减少插管并发症的风险，强直性脊柱炎合并严重后凸畸形患者给予基于 IKAP 理论的气道管理模式，经评定其效能，可以帮助患者更好地完成术前，术中，术后经鼻气道管理，减少对患者气道阻抗的影响。需要注意的是，每个患者的具体情况不同，麻醉计划应根据患者的个体需求、脊柱后凸严重程度和治疗反应来进行特别定制。

PU-0900

不同剂量氨甲环酸与膝关节置换围术期失血的关系：一项回顾性队列研究

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目的 氨甲环酸可有效减少膝关节置换手术围术期的失血量及输血率，但很少进行剂量范围的研究，我们旨在研究不同剂量氨甲环酸与膝关节置换围术期失血的关系。
方法 我们使用深圳市第二人民医院住院信息管理系统进行回顾性分析，连续收集了 2019 年 9 月 1 日至 2022 年 8 月 31 日于深圳市第二人民医院接受膝关节置换术的患者资料，探究氨甲环酸不同剂量在膝关节置换术中失血的变化关系。其次探究不同氨甲环酸剂量在膝关节置换术后对术后血红蛋白、术后输血率、术后贫血率、近端血栓发生率、凝血功能等相关指标的关系。采用多变量逻辑回归模型分析术中使用不同剂量氨甲环酸对膝关节置换围术期主次要指标之间的关系，并对潜在混杂因素进行调整，根据两段线性回归模型比较，探究不同剂量氨甲环酸与围术期失血量之间的阈值效应，用平滑曲线拟合找到折点。
结果 连续收集了 1330 名患者资料，排除行双侧膝关节置换、肿瘤患者、或手术当天输血的 461 名患者后，共有 869 名患者纳入研究。不同剂量氨甲环酸与膝关节置换围术期失血量呈 J 型相关。线性分析显示，每增加使用 1g 氨甲环酸其失血量估计降低 53.1ml，有统计学意义（调整后 OR，-53.1; 95% CI，-68.3- -37.8; p<0.001）。非线性分析显示，氨甲环酸剂量在 3.5g 时失血量最少为 162ml.在 3.5g 剂量之前每增加 1g 氨甲环酸，失血量减少 79ml,具有统计学差异(调整后 OR，-79.0；95% CI，-101.2–-56.8；p<0.001)；在 3.5g 剂量之后，每增加 1g 氨甲环酸其减少失血量的效果并不明显，无统计学差异(调整后 OR，39.6; 95% CI，-20.2-99.4; p=0.20)。术后输血率、术后贫血率和术后新增近端血栓与氨甲环酸剂量关联较弱，无统计学意义。
结论 研究表明，不同剂量氨甲环酸与膝关节置换术围术期失血量呈 J 型相关，存在阈值效应，折点为 3.5g。

PU-0901

低浓度髂筋膜阻滞在全膝关节置换中应用效果

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目的 探讨低浓度髂筋膜阻滞在全膝关节置换中的临床应用效果
方法 选取泉州市正骨医院 2023 年 3 月~12 月 60 例行全膝关节置换手术患者为研究对象，采用随机数字表法，随机分成试验组和对照组，每组各 30 例，试验组患者术前在预麻室超声引导下行腹股沟韧带上髂筋膜阻滞，使用 0.2%罗哌卡因 40ml；对照组患者未行髂筋膜阻滞，两组患者入室后常规静脉诱导行气管插管全身麻醉，以丙泊酚、盐酸瑞芬太尼及七氟醚维持麻醉深度。术中观察记

录止血带反应、心率血压、全麻药用量和术后清醒质量、伤口镇痛效果及功能锻炼情况。
结果 试验组较对照组，术中止血带反应减弱，心率血压更稳定，有明显差异（P＜0.05）；全麻药使用量减少（P＜0.05），具有统计学差异；术后清醒质量更高，术后伤口镇痛效果满意，VAS 评分在术后 2h、4h、8h、12h、24h 低于对照组（P＜0.05），而不影响术后功能锻炼。两组患者未发生明显不良反应。
结论 低浓度髂筋膜阻滞在全膝关节置换术中的临床应用能减弱术中止血带反应、生命征更稳定，术后清醒质量更高、镇痛效果满意且不影响功能锻炼。具有临床使用价值，值得临床应用推广。

PU-0902

超声引导下连续髂筋膜阻滞超前镇痛在老年股骨颈骨折患者的应用

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目的 探讨超声引导下连续髂筋膜间隙阻滞(ultrasound-guided continuous fascia iliaca compartment block， UCFICB)在老年股骨颈骨折患者行超前镇痛的舒适度和有效性，并从相关应激炎症因子血清白介素-6（interleukin-6，IL-6）和神经递质人脑源性神经营养因子（human brain-derived neurotrophic factor，BDNF）角度客观评价其效果。
方法 择期全麻下行单侧全髋关节置换术患者 60 例，采用随机数字表法将患者分为两组：试验组（入院后行超声引导下连续髂筋膜阻滞超前镇痛）和对照组。测量、评估、记录试验组和对照组如下数据：①入院后（T0）、实施阻滞 24h 后/入院 24h 后（T1）、手术当日过床时（T2）的静息状态下和运动（直腿抬高 15°）时视觉模拟评分(visual analogue scale，VAS）评分；②术中阿片类药物消耗情况；③术前 24h（M1）、术后 24h（M2）、术后 72h（M3）的简易精神状态评价量表(minimental state examination,MMSE) 评分；④术前（S1）、术毕（S2）、术后 24 h（S3）外周血 IL-6 和 BDNF 水平。结果 两组 T0 静息状态下和运动时的 VAS 评分比较差异无统计学意义（P>0.05）。与对照组相比，试验组 T1、T2 静息状态下的 VAS 评分比较差异无统计学意义（P>0.05），但试验组 T1、T2 运动时的 VAS 评分降低（P<0.05）。而且试验组手术中舒芬太尼，瑞芬太尼消耗总量均低于对照组（P<0.05）。另外试验组与对照组 M1 的 MMSE 评分差异无统计学意义（P>0.05），M2、M3 的 MMSE 评分均高于对照组（P<0.05）。同时检验指标显示，与对照组相比，试验组 S1、S2、S3 的 IL-6 水平均较低（P<0.05），而 BDNF 水平均较高（P<0.05）。
结果 两组 T0 静息状态下和运动时的 VAS 评分比较差异无统计学意义（P>0.05）。与对照组相比，试验组 T1、T2 静息状态下的 VAS 评分比较差异无统计学意义（P>0.05），但试验组 T1、T2 运动时的 VAS 评分降低（P<0.05）。而且试验组手术中舒芬太尼，瑞芬太尼消耗总量均低于对照组（P<0.05）。另外试验组与对照组 M1 的 MMSE 评分差异无统计学意义（P>0.05），M2、M3 的 MMSE 评分均高于对照组（P<0.05）。同时检验指标显示，与对照组相比，试验组 S1、S2、S3 的 IL-6 水平均较低（P<0.05），而 BDNF 水平均较高（P<0.05）。
结论 超声引导下连续髂筋膜阻滞超前镇痛应用于老年股骨颈骨折患者，够缓解围术期疼痛，减少镇痛药物的使用，降低围术期炎症应激反应，改善患者认知，提升患者舒适度。

PU-0903

近 20 年神经阻滞在麻醉学领域应用的文献计量学分析

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目的 通过对近 20 年来（2003-2022）麻醉学中神经阻滞相关研究的文献计量学分析，探索神经阻滞领域的发展现状及未来的发展趋势。
方法 通过对近 20 年来（2003-2022）麻醉学中神经阻滞相关研究的文献计量学分析，探索神经阻滞领域的发展现状及未来的发展趋势。
结果 神经阻滞领域相关研究的发文量虽然不同年份有所波动，但整体呈现上升趋势。Regional Anesthesia and Pain Medicine 等 10 本期刊是国际神经阻滞研究论文发表的主要阵地。美国和加拿大的机构和学者对国际神经阻滞领域的发展做出了突出贡献。神经阻滞领域当前的研究大致可以分为神经阻滞方式研究和应用范围研究两大类。支持神经阻滞领域发展的知识基础主要包括神经阻滞带来的并发症、下肢神经阻滞、胸部神经阻滞、神经阻滞在疼痛管理方面的应用等四个方面。
结论 基于分析结果，本研究总结了神经阻滞领域未来研究的 5 个主要方向，即神经阻滞技术和方法的创新、长效和持续阻滞策略、术后康复和功能恢复、在慢性疼痛方面的作用，以及神经阻滞的理论基础和效果方面的研究等。

PU-0904

Fajardo 入路腋神经阻滞对肱骨近端骨折患者术后镇痛及康复的影响

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目的 探讨 Fajardo 入路腋神经阻滞（ANB）用于肱骨近端骨折（PHF）患者术后镇痛的可行性及对患者术后康复的影响。
方法 选取于全身麻醉下行 PHF 手术的患者 60 例，将患者随机分为三组：Fajardo 入路 ANB 组（F 组）、后路 ANB 组（P 组）、肌间沟臂丛神经阻滞（ISB）组（I 组），每组 20 例。F 组在全身麻醉前 30min 在三角肌及肩胛下肌之间注射 0.375%罗哌卡因 20mL 实施 Fajardo 入路 ANB；P 组在全身麻醉前 30min 在三角肌与小圆肌之间注射 0.375%罗哌卡因 20mL 实施后路 ANB；I 组在全身麻醉前 30min 在前中斜角肌之间的臂丛神经周围注射 0.375%罗哌卡因 20mL 实施 ISB。手术结束后三组均行患者静脉自控镇痛。记录阻滞前（T0）、阻滞完成后 30min（T1）、切皮前 5min（T2）及切皮（T3）时的心率（HR）和平均动脉压（MAP）；T0 和 T1 时的脉搏血氧饱和度（SpO2）；T0、T1、PACU（T4）、手术结束后 2h（T5）、4h（T6）、8h（T7）、16h（T8）、24h（T9）和 48h（T10）时的静息及运动 NRS 评分；术后镇痛持续时间；术中瑞芬太尼的消耗量；术后 48h 内累计阿片类药物消耗量；T0 和 T1 时神经阻滞侧的膈肌偏移；三组部分和完全半膈肌麻痹（HDP）的发生率；T0 和 T1 时阻滞侧手部的最大握力；T1 时阻滞侧上肢改良 Bromage 评分；运动阻滞持续时间；术前 24h、术后 24h 和术后 48h 的 QoR-15 评分；总体满意度；术后不良反应发生率；手术当日至出院的时间。
结果 1、在 T0~T3 时，三组患者的 HR 和 MAP 差异无统计学意义（P>0.05）。在 T0 时，三组患者的 SpO2 差异无统计学意义（P>0.05）；与 F 组和 P 组比较，I 组在 T1 时的 SpO2 明显下降（P<0.05）。与 T0 比较，三组患者在 T2 和 T3 时的 HR 和 MAP 均明显下降（P<0.05）。与 T2 比较，P 组在 T3 时的 MAP 明显升高（P<0.05）。与 T0 比较，I 组在 T1 时的 SpO2 明显下降（P<0.05）。
2、在 T0、T8~T10 时，三组患者静息及运动 NRS 评分差异无统计学意义（P>0.05）。T1、T4~T6 时，P 组的静息及运动 NRS 评分明显高于 F 组和 I 组（P<0.05）。在 T7 时，P 组的静息 NRS 评分明显高于 F 组和 I 组（P<0.05）。P 组术后镇痛持续时间明显短于 F 组和 I 组（P<0.05）。

3、与 I 组比较，F 组和 P 组术中瑞芬太尼的消耗量明显增多（P<0.05）。P 组术后 48h 内氢吗啡酮消耗量明显多于 F 组和 I 组（P<0.05）。
4、与 T0 比较，F 组和 P 组在 T1 时的膈肌偏移差异无统计学意义（P>0.05）；I 组在 T1 时的膈肌偏移明显减低（P<0.05）。F 组和 P 组无患者发生 HDP。I 组 100%的患者发生了 HDP，其中部分 HDP 的发生率为 30%，完全 HDP 的发生率为 70%。
5、与 F 组和 P 组比较，I 组在 T1 时的手部握力明显减小（P<0.05）；I 组的改良 Bromage 评分明显升高（P<0.05）。与 T0 比较，F 组和 P 组的手部握力在 T1 时明显增大（P<0.05）；I 组的握力在 T1 时明显减小（P<0.05）。F 组和 P 组患者未出现运动阻滞；I 组患者出现了运动阻滞，运动阻滞持续时间为 7.7h。
6、三组患者在术前 24h、术后 24h 和术后 48h 的 QoR-15 评分差异无统计学意义（P>0.05）。F 组术后 24h 的 QoR-15 评分与 P 组和 I 组差值大于 6 分，具有临床意义。与术前 24h 和术后 24h 比较，三组患者在术后 48h 的 QoR-15 评分均明显升高（P<0.05）。与 F 组比较，P 组患者的满意度更低（P<0.05）。
7、I 组术后反跳痛的发生率明显高于 F 组和 P 组（P<0.05）。其它术后不良反应发生率在三组之间差异无统计学意义（P>0.05）。
8、三组患者从手术当日至出院的时间差异无统计学意义（P>0.05）。
结论 Fajardo 入路 ANB 可以安全有效地应用于 PHF 手术后的镇痛，并且能更好地保留膈肌功能和运动功能，除了肺通气功能正常的患者外，还可以应用到肺通气功能受损的患者中。

PU-0905

膝神经阻滞与局部浸润镇痛分别联合收肌管阻滞用于全膝关节置换术术后镇痛的研究

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目的 这项非劣效性的随机对照实验意在评价在全膝关节置换术（TKA）术后镇痛中，收肌管阻滞联合膝神经阻滞（ACB+GNB）的镇痛方案是否不逊于先前被广泛应用的收肌管阻滞联合局部浸润镇痛方案（ACB+LIA），且使用的局麻药总量更少，以探索同样有效但更为安全的 TKA 术后镇痛技术。
方法 在这项研究中，共有 102 名接受全膝关节置换术（TKA）的患者被纳入，并随机分为两组：ACB+GNB 组和 ACB+LIA 组。两组患者均接受近端 ACB（0.33%罗哌卡因 20ml），ACB+LIA 组接受 80 ml 0.2%罗哌卡因用于膝关节术中局部浸润镇痛，而 ACB+GNB 组接受 4 ml 0.2%罗哌卡因分别阻断膝周五条神经（膝上外侧神经、膝下外侧神经、膝上内侧神经、膝下内侧神经及膝返神经）。主要结局指标是两组患者在术后 24 小时静息状态下视觉模拟评分（VAS）中位数的差异。次要结局指标包括在恢复室（PACU）、术后 6 小时和 12 小时静息状态下 VAS 评分中位数的差异，以及术后 6 小时、12 小时和 24 小时活动状态下 VAS 评分中位数的差异。其他结局指标包括术后第一天的膝关节活动度（ROM）和股四头肌力量；前 24 小时内以吗啡当量计算的阿片类药物累积剂量；首次活动时间；首次按压患者控制静脉镇痛（PCIA）泵的时间；术后住院时间；实施神经阻滞的时间；术后恶心呕吐（PONV）的发生率；以及不良事件发生率。
结果 术后 24 小时静息状态下 ACB+GNB 组和 ACB+LIA 组的 VAS 评分分别为 3（1.25-4 [0-9]）和 3（2-4.25 [0-10]）。中位数差异的 95%置信区间（CI）为-0.5（-1-0），上限小于非劣效性界限 1，符合非劣效性标准（p=0.002，<0.025）。该时间点的组间 t 检验表明 ACB+GNB 组的 VAS 评分并不优于 ACB+LIA 组（p=0.227）。在其他时间点，ACB+GNB 组的疼痛缓解效果在静息和活动时均不劣于 ACB+LIA 组。前 24 小时内静脉吗啡当量的阿片类药物累积消耗量为 ACB+GNB 组 10.5mg（7-12.5 [3-18]），ACB+LIA 组 8mg（5.75-10.5 [范围 3-16]），两组术后 0-12h、12-24h 和 POD1 的阿片类药物中位数差异的 95% CI 分别为 0（-1 至 1），1（0 至 2）和 1（-1 至 3），符合非劣效

性标准△ = 7.7 mg。两组在膝关节活动度（ROM）、股四头肌力量、首次活动时间、首次按压患者控制静脉镇痛（PCIA）泵的时间、术后 24 小时内的术后恶心呕吐（PONV）发生率及术后住院时间方面均无统计学差异。无患者出现足下垂或其他不良事件。

结论 ACB+GNB 在 TKA 术后第一天可提供不劣于 ACB+LIA 的镇痛效果，同时显著减少所使用的局部麻醉药的剂量，是有效且更为安全的镇痛方案。

PU-0906

比较健康志愿者全身静脉输注与局部应用右美托咪定对利多卡因前臂局部静脉麻醉效果的影响：一项随机交叉试验

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目的 右美托咪定复合利多卡因可以增强局部静脉麻醉（Intravenous regional anesthesia，IVRA）效果和持续时间。然而，尚未有研究直接比较右美托咪定全身静脉输注和局部应用对提高止血带耐受性的效果。此外，目前尚不清楚止血带时间延长的原因是右美托咪定的直接外周作用还是间接的全身镇痛作用。

方法 本试验招募 12 名健康志愿者，采用交叉设计。在两个不同时间分别进行以下两种 IVRA 方案：1）右手静脉输注 0.5 μg/kg 右美托咪定 20 mL，0.5%利多卡因溶液 25 mL 进行左手前臂 IVRA；2）右手静脉输注 0.9%氯化钠 20 mL，0.5%利多卡因混合 0.5 μg/kg 右美托咪定溶液总共 25 mL 进行左手前臂 IVRA。经过两周洗脱期后，志愿者将交叉接受另一种方案。主要观察指标为止血带耐受时间，定义为 IVRA 给药后至受试者止血带疼痛 NRS 评分> 3 分的时间。次要观察指标包括感觉阻滞起效/恢复时间、Ramsay 镇静评分、以及局麻药全身毒性反应、心动过缓、低血压等不良反应发生情况。

结果 与全身输注相比，局部应用右美托咪定联合利多卡因前臂 IVRA 的止血带耐受时间更长（36.9 ± 7.6 min 比 23.3 ± 6.2 min），均数差值为 13.6 min（95%CI：10.8~16.4 min），差异具有统计学意义（P＜0.001）。与全身静脉输注相比，局部应用右美托咪定联合利多卡因前臂 IVRA 的中神经支配区域感觉阻滞起效时间缩短（2 [2, 3] min 比 4 [2.3, 8] min，P=0.018），恢复时间延长（6 [2.3, 14] min 比 2 [1, 4.5] min，P=0.028）；尺神经支配区域感觉阻滞起效时间缩短）（1 [1, 2] min 比 2 [2, 3.8] min，P=0.016），恢复时间延长（17.5 [13,23.5] min 比 6 [4.3, 9] min，P=0.004）；桡神经支配区域感觉阻滞起效时间缩短（2 [1, 3] min 比 4 [2, 6.8] min，P=0.013），恢复时间延长（13 [8, 19.5] min 比 2.5 [2, 3.8] min，P=0.003）；肌皮神经支配区域感觉阻滞起效时间缩短（2 [1.3, 3] min 比 4.5 [3, 6] min，P=0.005），恢复时间延长（4.5 [2.3, 7.3] min 比 2.5 [1.3, 3] min，P=0.015）。全身静脉输注右美托咪定约 20 min 出现镇静高峰；局部应用右美托咪定在止血带放气后约 20 min 出现镇静高峰。但在 12 例接受局部应用右美托咪定治疗的志愿者中，有 5 例因为止血带释放后出现延迟镇静表现。全身静脉输注右美托咪定分别有 1 例患者发生心动过缓及口干症状，上述不良反应发生率差异在两种 IVRA 方案中无统计学意义（P>0.99）。

结论 与全身静脉输注相比，局部应用 0.5 μg/kg 右美托咪定联合利多卡因前臂 IVRA 能够更好地延长健康志愿者的止血带耐受时间，加快感觉阻滞起效时间，延长感觉恢复时间。

PU-0907

Effect of the Combination of Two Anesthesia Methods Guided by Ultrasound on Brain Protection in Elderly Patients After Arthroscopic Knee Surgery

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Objective To investigate the effect of the combination of two anesthesia methods guided by ultrasound on brain protection in elderly patients after arthroscopic knee surgery.
Methods The clinical data of 95 elderly patients after arthroscopic knee surgery in our hospital (June 2018 - June 2021) were retrospectively analyzed. The study group (SG) (n=48) received ultrasound-guided lumbar plexus and sciatic nerve block combined with continuous infusion of dexmedetomidine, while the control group (CG) (n=47) received conventional endotracheal intubation combined with general anesthesia. Both groups received continuous intravenous analgesia for 48 h. The effect of the two anesthesia methods on hemodynamics, neurological status, cognitive function and adverse reactions in elderly patients after arthroscopic knee surgery was analyzed.
Results Compared with the CG, levels of systolic blood pressure (SBP) and diastolic blood pressure (DBP) of the SG were obvious higher at T2-T5 ($P<0.05$). During T0-T5, no obvious difference was observed in the heart rate (HR) between both groups ($P>0.05$). After surgery, compared with the CG, the results of neuropsychological test of the SG were obviously better ($P<0.05$). Compared with the CG, the scores of cognitive function of the SG were obviously higher 1h, 6h and 12h after anesthesia ($P<0.05$). Compared with the CG, the incidence of adverse reactions to anesthesia of SG was obviously lower 2h after surgery ($P<0.05$).
Conclusion Ultrasound-guided nerve block combined with dexmedetomidine can effectively stabilize the perioperative hemodynamic indexes in elderly patients after arthroscopic knee surgery, reduce the nerve injury, and protect their brain, which has potential application value in protecting the postoperative cognitive function of the patients.

PU-0908

胸椎管狭窄基于不同病理分型手术采用不同的体感诱发电位和运动诱发电位的预警阈值研究

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Purpose To determine the optimal warning thresholds for combined somatosensory- and motor-evoked potential (SSEP and MEP) in predicting postoperative functional decline in surgical treatment for TSS based on different pathologies.
Methods We obtained perioperative modified Japanese Orthopedic Association (mJOA) scores to assess spinal neurological function. The data collected in this study included demographic data; intraoperative neurophysiological monitoring (IONM) signals; and perioperative neurological function assessments. To determine the optimal IONM warning threshold, a receiver operating characteristic curve (ROC) was used.
Results Patients with ossification of the posterior longitudinal ligament and ossification of the ligamentum flavum (OPLL+OLF) exhibited a more stringent threshold for IONM changes. This included a lower amplitude cutoff value (a decrease of 49.0% in SSEP amplitude and 57.5% in MEP amplitude for short-term prediction) and a shorter duration of waveform change (19.5 minutes

for SSEP and 22.5 minutes for MEP for short-term prediction). On the other hand, patients with thoracic disc herniation (TDH) had a more lenient IONM warning criterion (a decrease of 49.0% in SSEP amplitude and 77.5% in MEP amplitude for short-term prediction; durations of change of 25.5 minutes for SSEP and 32.5 minutes for MEP). However, OPLL patients or OLF patients had similar and moderate IONM warning thresholds. Additionally, there was a stronger correlation between SSEP amplitude variability ratio and JOA recovery ratio (JOA RR) in OPLL+OLF patients, while the correlation was stronger between MEP amplitude variability ratio and JOA RR for the other three TSS pathologies.
Conclusions Optimal IONM change criteria for prediction vary depending on different TSS pathologies. The optimal monitoring strategy for prediction varies depending on TSS pathologies.

PU-0909

Evaluation of the effect of intraoperative tropisetron on postoperative rebound pain after brachial plexus block: a randomized controlled trial

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Introduction Postoperative rebound pain after peripheral nerve block increases patient suffering and delays recovery after surgery.
Objectives We tested whether the 5HT-3 receptor antagonist and a7nAChR agonist tropisetron could prevent postoperative rebound pain.
Methods A total of 115 patients were randomized to receive 5-mg/5-mL tropisetron or the same volume of normal saline. Pain intensity was measured with the numerical rating scale of pain (NRS). Rebound pain was defined as a change from mild pain (NRS ≤ 3) measured in the postanesthesia care unit to severe pain (NRS ≥ 7) within 24 hours after peripheral nerve blockade. Logistic regression was used to identify relevant factors associated with postoperative rebound pain.
Results Tropisetron did not affect the NRS score or the incidence of rebound pain after peripheral nerve block. Logistic regression revealed that preoperative pain, bone surgery, and length of incision were risk factors for postoperative rebound pain, and patient controlled analgesia was protective against postoperative rebound pain.
Conclusion Tropisetron does not affect the incidence of rebound pain after peripheral nerve block. Patients at high risk of postoperative rebound pain should be identified for appropriate management.

PU-0910

驱动压滴定最佳 PEEP 对老年脊柱手术患者术后肺部并发症的影响

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目的 探讨驱动压滴定最佳 PEEP 否可以降低老年患者俯卧位脊柱手术术后肺部并发症发生率；以及比较术中患者体位变化时，仰卧位和俯卧位最佳 PEEP 水平是否存在差异。
方法 纳入本院 2022 年 10 月-2023 年 10 月，择期全麻下行俯卧位脊柱手术的老年患者 150 例，所有患者随机分为滴定 PEEP 组、固定 PEEP 组和常规通气组，每组 50 例。滴定 PEEP 组：潮气

量为 6 ml/kg，呼吸频率为 12 次/分，在插管后 5min、俯卧后 5min、拔管前采用驱动压滴定 PEEP，术中进行肺复张；固定 PEEP 组：潮气量为 6 ml/kg，呼吸频率为 12 次/分，PEEP 为 5 cmH2O，术中进行肺复张。常规通气组：潮气量为 8 ml/kg，呼吸频率为 12 次/分，无 PEEP，无肺复张。记录入室（T0）、插管后 5min（T1）、俯卧后 5min（T2）、手术 1h（T3）、拔管前（T4）、出室（T5）的血流动力学指标；记录 T1、T2、T3、T4 呼吸力学指标；记录 T0、T3、T4 血气分析指标；记录术前、术后 1 天（T6）、出院前（T7）炎症因子指标；记录术后 30 天肺部并发症发生情况以及严重程度；记录住院时间及住院总费用。

结果 最终进入统计分析的患者共 137 例，共发生 PPCs 22 例，其中呼吸道感染 21 例，支气管痉挛 1 例。三组患者 PPCs 发生率、严重程度、住院总费用差异无统计学意义（P >0.05）。滴定 PEEP 组中，在 T1、T2、T4 三个时间点最佳 PEEP 水平，差异有统计学意义（P<0.05）,在 T2 和 T4 时间点的 PEEP 水平低于 T1。与常规通气组相比，保护性通气组（滴定 PEEP 组和固定 PEEP 组）在 T1、T2、T3、T4 各时间点驱动压更低，差异有统计学意义（P<0.01）；在 T3、T4 时间点 PaCO2 均较高，差异有统计学意义（P<0.05）；在 T4 时间点氧合指数较高，差异有统计学意义（P<0.05）。与常规通气组相比，滴定 PEEP 组 CRP 在 T6 时间点更低，差异有统计学意义（P<0.05）；滴定 PEEP 组住院时间更短，差异有统计学意义（P<0.05）。

结论 1.在脊柱手术中，驱动压指导的个体化 PEEP 通气策略，有利于降低术中驱动压，改善术中氧合情况，降低术后炎症反应。但是，没有降低术后肺部并发症发生率，也没有降低医疗成本。2.手术期间患者体位变化过程中，俯卧位比仰卧位 PEEP 水平更低，但此种差异较小，还需要更多的试验来验证。

PU-0911

超声引导不同神经阻滞应用于肩关节镜手术的镇痛效果

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目的 本研究旨在比较超声引导不同神经阻滞在肩关节镜手术的止痛效果。

方法 择期肩关节镜手术患者 86 例，随机数字表法分为 S 组和 B 组，各 43 例。S 组患者采用超声引导肩胛上神经联合腋神经阻滞，B 组患者行超声下肌间沟臂丛神经阻滞。记录两组患者术毕清醒即刻（T1）、术后 1h（T2）、6h（T3）、 24h（T4） 、48h（T5）时点静息和运动疼痛 VAS 评分，术后 1h（T2）、6h（T3）患肢改良 Bromage 运动评分，术前（T0）、术后 6h（T3）肺活量，术中瑞芬太尼用量、镇痛泵 48h 使用量、镇痛药物追加人次，患者对镇痛效果满意度评分和不良反应。

结果 两组患者性别构成、体重指数、年龄、手术时间、术前肺功能、各时点静息与运动疼痛 VAS 评分，术中瑞芬太尼用量、镇痛泵 48h 使用量、镇痛药物追加人次，患者镇痛满意度评分比较差异均无统计学意义（P＞0.05）。S 组患者 T2～3 时点患肢 Bromage 运动评分优于 B 组，术后 6h（T3）肺功能优于 B 组（P < 0.05）。术后 Horner 综合征、声嘶发生率 S 组低于 B 组（P < 0.05），其他不良反应两组差异无统计学意义（P＞0.05）。

结论 肩关节镜手术患者行超声引导下肩胛上神经联合腋神经阻滞镇痛效果与臂丛神经阻滞相当，但可改善患肢术后 Bromage 运动评分，不影响患者肺功能，同时降低不良反应，促进患者快速康复。

PU-0912

超声引导下腹横肌平面(TAP)阻滞用于髋臼骨折髂腹股沟入路切复内固定手术麻醉效果分析

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目的 分析超声引导下腹横肌平面（TAP）阻滞应用到髋臼骨折髂腹股沟入路切复内固定手术的麻醉效果。
方法 选择 2023 年 1 月-2023 年 10 月在我院行髋臼骨折髂腹股沟入路切复内固定术的患者 84 例，ASAⅠ～Ⅱ级。根据不同麻醉方法随机分为对照组与实验组。对照组患者使用全身麻醉，实验组患者使用超声引导腹横肌平面（TAP）阻滞联合全身麻醉，对比术中、术后两组患者镇痛药物使用量及术后静息和咳嗽时的 VAS 镇痛评分。
结果 实验组患者术后麻醉苏醒时、术后 2h、4h、12h、24h 静息及咳嗽时 VAS 评分均比对照组低，数据差异有统计学意义（$p < 0.05$）；术后 48h 两组 VAS 评分无明显差异（$p > 0.05$），实验组患者的总体镇痛满意度评分比对照组高；术后 24h 及术后 48h 实验组 PCA 自控镇痛按压次数比对照组少，差异有统计学意义（$p < 0.05$），舒芬太尼使用量比对照组少（$p < 0.05$）；实验组躁动、恶心呕吐的人数较对照组少，但数据无统计学差异（$p > 0.05$）。
结论 超声引导 TAP 阻滞应用于髋臼骨折髂腹股沟入路切复内固定术，可以获得良好的麻醉效果和镇痛效果，联合全身麻醉，可以降低其他镇痛药物的使用量，值得临床推广使用。

PU-0913

高龄患者术后镇痛中应用超声引导股神经阻滞麻醉的效果

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目的 分析高龄患者术后镇痛中应用超声引导股神经阻滞麻醉的效果
方法 研究病例为在我院接受膝关节置换术的高龄患者，病例选取时间为 2021 年 6 月至 2023 年 12 月，共有 76 例病例参与研究。采用盲抽编号（1~76 号）后根据单双号分组的方式将患者分为两组，其中对照组术后镇痛采用静脉自控镇痛，研究组术后镇痛采用超声引导股神经阻滞。比较两组患者术后不同时间节点（6 h、12 h、24 h、48 h）的疼痛程度，炎症因子与应激反应指标水平，以及术后镇痛相关不良反应发生情况。
结果 术后各时间节点评估两组患者的疼痛程度，均为研究组的疼痛程度更低；研究组术后 24 h、48 h 的应激反应指标促肾上腺皮质激素（ACTH）、去甲肾上腺素（NE）水平以及炎症因子白细胞介素（IL）-1β、IL-6 水平以及均低于对照组；研究组的不良反应发生率低于对照组。以上差异均存在统计学意义（$P<0.05$）。
结论 高龄患者术后镇痛中应用超声引导股神经阻滞麻醉，其镇痛效果显著，有助于减轻术后炎症反应与应激反应，并且不良反应少，安全性高。

PU-0914

艾司氯胺酮主导无阿片麻醉对老年患者全髋关节置换术术后谵妄的影响

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目的 观察以艾司氯胺酮为主的无阿片麻醉对老年患者全髋关节置换术术后谵妄的影响。
方法 选择 2022 年 10 月至 2023 年 12 月择期全身麻醉下行单侧 THA 老年患者 114 例，性别不限，年龄 65-85 岁，BMI 18-30 kg/m2，ASA Ⅱ-Ⅲ级，随机分为无阿片麻醉（OFA）组和阿片麻醉（OA）组（n = 57）。OFA 组患者的麻醉诱导药物为艾司氯胺酮 0.35mg/kg、利多卡因 1 mg/kg、艾司洛尔 0.1 mg/kg，而 OA 组患者的麻醉诱导药物为舒芬太尼 0.3 ug/kg。两组所有患者均给予咪达唑仑 0.05 mg/kg、丙泊酚 1.5 mg/kg 和罗库溴铵 0.6 mg/kg，随后进行气管插管，呼吸机设置为间歇正压通气（IPPV），潮气量为 6-8 ml/kg，呼吸频率为 10-15 次/分钟。OFA 组持续泵注丙泊酚 1.5 mg/kg/h、右美托咪定 0.05 μg/kg/h、艾司氯胺酮 0.2 mg/kg/h 以及七氟醚（MAC 维持为 0.8-1.5）。OA 组则静脉持续泵注瑞芬太尼 0.05-0.1 μg/kg/min、丙泊酚 1.5 mg/kg/h、右美托咪定 0.05μg/kg/h 和七氟醚（MAC 为 0.8-1.5）。OFA 组切皮前使用艾司氯胺酮 0.35mg/kg。记录 2 组患者术后谵妄发生率。不同时间点[入室时(T1)、诱导时(T2)、插管后(T3)、切皮时(T4)、拔管时(T5)]时 MAP、HR、拔管时间、PACU 停留时间以及术中血管活性药物使用情况；记录术后 3 天手术部位的动态和静态疼痛评分，采用中文修订版谵妄诊断量表（CAM-CR）评估术后 3 天内谵妄发生情况：记录补救镇痛例数、PCA 按压次数以及术后不良反应，包括苏醒期躁动（采用 Ricker 镇静-躁动评分评估患者苏醒期躁动水平）、恶心呕吐。
结果 与 OFA 组比较，OA 组术后 2 天的 CAM-CR 评分以及谵妄发生率增加(P＜0.05)。2 组患者术后 3 天静态和动态 VAS 评分、补救镇痛例数、PCA 按压次数以及术后不良情况发生率差异无统计学意义。与 OFA 组比较，OA 组 T2、T3、T4 时的 MAP 和 HR 降低(P＜0.05)，拔管时间、PACU 停留时间缩短(P＜0.05)，去氧肾上腺素使用例数增加(P＜0.05)。与 T1 比较，T2-T4 时 2 组 HR、OA 组 MAP 降低(P＜0.05)，OFA 组 T2-T3 时 MAP 降低(P＜0.05)，两组 T5 时 MAP 和 HR 均升高(P＜0.05)。
结论 以艾司氯胺酮为主的无阿片麻醉可有效降低老年患者全髋关节置换术术后谵妄的发生。

PU-0915

艾司氯胺酮联合神经阻滞的去阿片化麻醉与镇痛在锁骨骨折手术中的应用

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目的 探讨艾司氯胺酮联合低浓度罗哌卡因神经阻滞的去阿片化麻醉与镇痛在全麻下锁骨骨折手术中的镇痛效果及对术后焦虑抑郁情绪的影响
方法 选取 2023 年 01 月至 2024 年 01 月择期全麻下行锁骨骨折切开复位内固定手术患者 70 例，年龄 18~65 岁，ASA 分级为Ⅰ~Ⅱ级，性别不限，随机分为观察组和对照组，每组 35 例。麻醉诱导气管插管后，两组均在超声引导下于患侧行一点穿刺肌间沟臂丛联合颈浅丛神经阻滞，给予 0.15%

罗哌卡因，肌间沟 20ml、颈浅丛 5ml，观察组采用艾司氯胺酮麻醉诱导、维持和术后镇痛，对照组采用舒芬太尼、瑞芬太尼麻醉诱导、维持和术后镇痛。记录麻醉诱导前 5min（T0）、麻醉诱导后 5min（T1）、摆坐位时（T2）、摆坐位后 5min（T3）、手术开始时（T4）、手术开始后 5min（T5）、手术结束时（T6）、麻醉苏醒时（T7）及出手术室时（T8）的平均血压（mean arterial pressure，MAP）及心率（heart rate，HR）；记录术后首次按压镇痛泵时间、有效按压次数及补救镇痛次数；记录术后 2h、 6h、12h、 24h 及 48h 静息和活动时的视觉模拟评分法（visual analogue score，VAS）评分；记录术前 1d、术后 1d、2d 的医院焦虑抑郁量表 HADS 评分；记录麻醉苏醒时间、气管拔管时间、出手术室时间、术后住院时间、不良反应及并发症发生情况。

结果 与对照组相比，观察组 MAP 及 HR 在 T1~T6 时更高（P＜0.05），镇痛泵首次按压时间更长（P＜0.05）、有效按压及补救镇痛次数更少（P＜0.05），术后 6h、12h、24h 及 48h 时 VAS 评分更低（P＜0.05），术后 1d 及 2d 时医院焦虑抑郁量表 HADS 评分更低（P＜0.05），麻醉苏醒时间、气管拔管时间、出手术室时间及术后住院时间更短（P＜0.05），不良反应发生率更低（P＜0.05）。

结论 艾司氯胺酮联合低浓度罗哌卡因神经阻滞的去阿片化麻醉与镇痛能为锁骨骨折手术患者提供更好的围术期镇痛，并可延长神经阻滞镇痛时间，改善血流动力学及患者焦虑抑郁情绪，加速患者的康复。

PU-0916

丙泊酚 TCI 联合声门上高流量给氧提高射线环境下俯卧位非插管全麻的气道安全性观察

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目的 当前手术室内射线环境下的手术对全身麻醉需求日益增加，如椎体成形术。这类手术时间短，对肌松无要求，仅需要一定深度的镇静和镇痛，通常在非插管静脉麻醉下即可完成。但椎体成形术术中需要俯卧位，增加了气道管理的难度，加之治疗组频繁的躲避射线也易导致患者出现气道相关风险如呼吸抑制却不能及时处理。现阶段椎体成形术俯卧位的麻醉管理多为恒速给药联合面罩给氧，呼吸抑制时调低给药速度，提高吸入氧流量或手控通气，但患者俯卧位常有不适，转头时易导致面罩脱落，手控通气又增加医生暴露于射线的风险和减慢手术进程。该研究旨在改进给药和给氧方式来减少低氧血症的风险，提高射线环境下俯卧位非插管全麻的气道安全性。

方法 选择拟行椎体成形术患者 100 例，根据随机数字表随机分为常规组和实验组各 50 例。两组患者入室均开放静脉。常规组采用舒芬太尼 0.2ug/kg 单次静脉注射，丙泊酚 4mg/kg/h 静脉恒速泵注，给氧方式为普通面罩给氧，氧流量 2L/min。实验组采用舒芬太尼 0.2ug/kg 单次静脉注射，接丙泊酚 TCI 泵注，血浆浓度设置为 1.5ug/ml，给氧方式采用经鼻置入吸氧管至声门上，深度为鼻翼至乳突的长度，鼻贴妥善固定使其不移位，术中给氧流量 8-10L/min。两组患者俯卧位以马蹄垫固定头部后，均监测 RR、PetCO2、SPO2。术中有 RR<6 次/分或 PetCO2>55mmHg 记录为呼吸抑制，SPO2 下降至 88%以下记录为低氧血症，立即采取面罩加压辅助通气并减浅麻醉。同时观察记录给氧工具有无脱落发生情况。

结果 按照当前方案实施过程顺利。常规组中给氧工具脱落发生率 40%，呼吸抑制发生率 20%，术中发生低氧血症发生率 10%。实验组中给氧工具脱落发生率 10%显著低于常规组（P<0.05），呼吸抑制发生率 6%显著低于常规组（P<0.05），低氧血症发生率 4%.显著低于常规组（P<0.05）。

结论 与恒速给药模式联合常规面罩给氧相比，丙泊酚 TCI 联合声门上高流量给氧可显著提高射线环境下俯卧位非插管全麻的气道安全性 ，值得推广。

PU-0917

艾司氯胺酮联用对瑞芬太尼抑制前入路颈椎男性拔管期呛咳 EC50

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目的 比较术中联用艾司氯胺酮的瑞芬太尼和单独使用瑞芬太尼抑制前入路颈椎手术男性患者拔管呛咳的半数效应浓度（EC50），探究艾司氯胺酮对瑞芬太尼抑制呛咳反应的影响。
方法 根据纳入排除标准，选取在福建医科大学附属第一医院择期行气管插管全身麻醉下前入路颈椎手术的男性患者 56 例，使用随机数字表法随机分为对照组（D 组）和艾司氯胺酮组（E 组）。经常规麻醉诱导气管插管后，术中以吸入七氟烷及靶控输注瑞芬太尼麻醉维持， E 组于手术结束前 30 min 静脉注射 0.25 mg/kg 艾司氯胺酮， D 组于手术结束前 30 min 给予相应等剂量 0.9%氯化钠注射液。根据 Minogue 评分量表评估拔管期呛咳反应和呛咳的严重程度，采用 Dixon 序贯法获得拔管期瑞芬太尼抑制呛咳的 EC50 值，两组首例患者的拔管期瑞芬太尼效应室靶浓度都设为 2 ng/ml，两组每个患者的拔管呛咳反应决定了给各组下一个患者使用的拔管期瑞芬太尼效应室靶浓度。若拔管呛咳反应阴性，则下一个患者的瑞芬太尼效应室靶浓度减低 0.2 ng/ml；相反，若拔管呛咳反应阳性，则下一个患者的瑞芬太尼效应室靶浓度增加 0.2 ng/ml。序贯法试验资料采用 Probit 概率单位回归分析法，计算瑞芬太尼抑制拔管期呛咳的 EC50、95%效应浓度（EC95）及其 95%置信区间（CI）。
术前收集各组患者一般资料。监测患者进入手术室时（T0）、手术结束前 30 min（T1）、拔管即刻（T2）、拔管后 1 min（T3）、拔管后 3 min（T4）的血流动力学指标、T2 时刻呼吸相关指标、T0、T1 和 T4 时刻的动脉血气分析；记录术中使用瑞芬太尼总用量、手术时间、麻醉时间、苏醒时间、拔管时间、术后引流袋内引流量、引流管拔除时间、术后住院时长；评估拔管后 30 min 的 Ramsey 评分和术后咽痛（POST）评分、术后 2 h、24 h 和 48 h 数字评价量表（NRS）疼痛评分及补救镇痛药物使用情况。观察并记录患者术后切口出血或血肿、呼吸抑制、恶心呕吐、头晕、噩梦、幻觉等不良反应的发生情况。于术后一周随访，评估 9 项患者健康问卷（PHQ-9）抑郁量表评分。
结果 本研究总共 54 例患者纳入统计分析，两组患者一般资料、手术时长、麻醉时长、术中瑞芬太尼输注总剂量差异均不存在统计学意义（P > 0.05）。本研究中 E 组瑞芬太尼抑制拔管期呛咳反应的 EC50 为 1.880（95%CI 1.782 ~ 1.973） ng/ml，EC95 为 2.122（95%CI 2.017 ~ 2.379）ng/ml；D 组瑞芬太尼抑制拔管期呛咳反应的 EC50 为 2.554（95%CI 2.458 ~ 2.656）ng/ml，EC95 为 2.796（95%CI 2.685 ~ 3.071）ng/ml，经相对中位数强度估算，两组 EC50 的差值为 0.674 （95%CI 0.223 ~ 1.989）ng/ml，其 95%置信区间不包括 0，表示差异具有统计学意义。两组术中血流动力学指标、睁眼时间、拔管时间、拔管呛咳评分、拔管后 30 min 时 Ramsey 评分和 POST 评分均没有统计学差异（P > 0.05）。但 E 组拔管即刻呼吸频率高于 D 组，拔管即刻呼气末二氧化碳分压和拔管后 3min 动脉血二氧化碳分压以及术后 2 h 和 24 h 的 NRS 评分均低于 D 组，差异均存在统计学意义（P < 0.05）。此外，两组患者术后 48 h 的 NRS 评分、术后引流袋内引流量、引流管放置时长、术后住院时长及不良反应发生率、术前和术后 PHQ-9 评分，均不存在统计学差异（P > 0.05）。
结论 联合使用艾司氯胺酮可以降低瑞芬太尼抑制前入路颈椎手术男性患者拔管期呛咳反应的 EC50。并且，联合使用亚麻醉剂量艾司氯胺酮可有效减轻术后早期疼痛，可减少拔管期瑞芬太尼的使用浓度，刺激拔管期呼吸频率，加快苏醒期呼吸功能的恢复；且对于睁眼时间、拔管时间、术中血流动力学变化、术后住院时长、手术切口处引流量以及术后呼吸抑制、恶心呕吐、头晕、噩梦、幻觉等不良反应发生率均没有显著影响。

PU-0918

连续硬膜外镇痛复合静脉镇静用于缓解椎间孔镜手术中神经痛的技术应用

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目的 利用连续硬膜外麻醉镇痛复合静脉镇静技术探讨该方法对于缓解脊柱外科椎间孔镜术中清醒患者的疼痛刺激程度，尤其是了解该技术是否能缓解术中神经痛对患者造成的痛苦。
方法 我院椎间孔镜技术是脊柱外科通过微创的方法从椎间孔后外侧安全三角区入路，彻底清除突出或者脱垂的髓核，解除椎管狭窄，从而治疗腰椎间盘突出。为适应目前加速康复外科、提高病患舒适度及手术技术不断提升的要求，脊柱外科期望患者可以术中保持清醒并配合指令运动以了解患者神经根是否会损伤，同时术毕即刻双下肢肌力可达 3 级或以上。为配合外科发展，我院麻醉科积极开展此项手术相关麻醉技术方法，实验组应用连续硬膜外麻醉镇痛复合静脉镇静技术，具体实施方法为：于手术椎体节段邻近上一椎体间隙置入向上的硬膜外导管，2%利多卡因 3ml 进行试验量，5min 后生命体征平稳，未发现明显双下肢异常后注入 0.3%盐酸罗哌卡因 10ml 于硬膜外导管，5min 后患者自主翻身俯卧位，寻求舒适体位后静脉持续泵入右美托咪定，负荷剂量为 1ug/kg/10min，之后以 0.85ug/kg/h 泵速进行泵注，并根据手术刺激强度及时间追加 0.3%罗哌卡因于硬膜外腔隙及调整静脉泵注右美托咪定的泵速，始终保持患者在询问期间清醒回答问题及运动下肢，非询问期间保持安静入睡，整个手术期间模拟自然睡眠。对照组则应用传统外科局部利多卡因注射液浸润及封闭技术后进行手术。
结果 实验组患者在手术期间按照外科指令运动双下肢并且未感到明显疼痛，包括神经刺激痛及不适感，手术前后的切皮、缝皮阶段及术中非询问期间能保持安静睡眠。对照组患者始终保持清醒，手术切皮及缝皮阶段未感到明显疼痛，但手术期间则出现明显疼痛，尤其是发生神经刺激痛时出现不可耐受的挣扎及不配合的体动，干扰手术进程。
结论 连续硬膜外麻醉镇痛复合静脉清醒镇静技术可以缓解椎间孔镜手术中各种疼痛刺激，尤其是神经痛，并且很大程度上提高患者术中术后的舒适度及安全度，极大的推进基层医院加速康复外科的发展。

PU-0919

老年患者蛛网膜下腔麻醉下行膝关节镜探查术后患者麻醉恢复情况研究

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目的 观察在蛛网膜下腔麻醉下行膝关节镜手术后患者下肢浅感觉、运动恢复和首次排尿、排气的情况。
方法 选取福建某三级甲等医院骨科 2022 年 3 月～10 月连续收治的 60 例在蛛网膜下腔麻醉下行膝关节镜手术治疗的患者，男性 43 例、女性 17 例，年龄 65～83 岁。观察并记录患者浅感觉恢复时间、运动恢复时间、首次排尿和首次排气的时间，分析上述指标与性别、年龄、体重、手术时长、止血带时长和麻醉时长的相关性。
结果 蛛网膜下腔麻醉下行膝关节镜手术患者浅感觉恢复时间是在给予麻醉药物后 301.40±106.04 min，双下肢运动恢复时间是在给予麻醉药物后 252.13±64.51min，运动恢复时间早于浅感觉恢复

时间约 113min，患者首次排尿时间为 361.33±109.79 min，患者首次排气时间为 351.49±129.26 min。男性浅感觉恢复时间为 342.15±105.28 min，大于女性 271.63±87.39 min(t=2.684,P=0.009)；男性运动恢复时间为 269.59±92.82min，大于女性 219.13±62.35min(t=2.205,P=0.031)；男性首次排尿时间为 396.47±123.47min，大于女性 275.00±94.39min(t=2.679,P=0.009)；不同性别之间患者首次排气时间无显著性差异（P＞0.05）。浅感觉恢复时间和运动恢复时间与患者年龄、体重、手术时长、止血带时长和麻醉时长不具有相关性（P＞0.05）。

结论 蛛网膜下腔麻醉下行膝关节镜术后运动恢复时间早于浅感觉恢复时间，首次排尿时间和首次排气时间均在浅感觉恢复之后，女性浅感觉恢复时间、运动恢复时间、首次排尿时间大约在麻醉用药后 3～7 小时，早于男性的大约在麻醉用药后 5～9 小时。

PU-0920

艾斯氯胺酮复合髂筋膜阻滞对单膝关节置换术患者止血带反应及术后恢复的影响

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目的 观察超声引导下髂筋膜间隙阻滞复合艾司氯胺酮对单膝关节置换术患者止血带反应及术后恢复的影响。

方法 选择 2023 年 8 月—2024 年 3 月某院收治的 60 例 ASA 分级Ⅰ～级择期行单膝关节置换术的患者作为研究对象，按照随机原则分为实验组和对照组两组，每组各 30 例。 麻醉方法均采用患侧髂筋膜间隙阻滞联合喉罩全麻，两组均在全麻诱导前行患侧超声引导下髂筋膜间隙阻滞，对照组应用 0．25％罗哌卡因 30 ml，实验组应用艾司氯胺酮 0．25％罗哌卡因混合液 30 ml，神经阻滞结束测定麻醉效果后行全麻诱导，观察两组患者各时间点［使用止血带前（T0）、使用止血带 30 min（T1）、60 min（T2）、90 min（T3），撤除止血带后 5 min（T4）］的平均动脉压及心率，术中瑞芬太尼的用量，观察两组苏醒时间、拔除喉罩时间及麻醉恢复室停留时间，观察两组患者术后疼痛视觉模拟评分（VAS）和躁动评分，同时观察两组患者术后 24 h 40 项恢复质量量表（QoR－40）评分。

结果 两组患者 T1～T4 时心率、平均动脉压水平均高于 T0 时，但实验组 T1～T4 时平均动脉压、心率均低于对照组（P＜0．05）；实验组患者术中瑞芬太尼用量、术后 VAS 评分及躁动评分均低于对照组，差异均有统计学意义（P＜0．05），实验组术后 24 hQoR－40 量表评分明显高于对照组，差异有统计学意义（P＜0．05）；两组患者苏醒时间、拔除喉罩时间及 PACU 停留时间比较，差异均无统计学意义（P＞0．05）。

结论 单膝关节置换术患者使用超声引导下髂筋膜间隙阻滞复合艾司氯胺酮不仅可增强术中神经阻滞效果，有效减轻术中止血带反应，还可以明显减轻术后疼痛及术后躁动，改善术后早期恢复质量，且不会引起苏醒延迟。

PU-0921

超声引导下选择性神经根阻滞联合星状神经节阻滞治疗神经根型颈椎病

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目的 探讨超声引导下选择性颈神经根阻滞（selective cervical nerve root block, SCNRB）联合星

状神经节阻滞（stellate ganglion block, SGB）治疗神经根型颈椎病（cervical spondylotic radiculopathy，CSR）的有效性和安全性。
方法 选取 2023 年 1 月至 2024 年 3 月于我院疼痛门诊就诊的 52 例 CSR 患者，男 27 例，女 25 例，年龄 28～66 岁，随机分为对照组和试验组，每组 26 例。对照组患者接受患侧超声引导下 SCNRB，试验组患者在对照组基础上，接受超声引导下 SGB。记录两组患者治疗前、治疗后第 1W、第 4W、第 12W 的疼痛(visual analogue scale，VAS)评分，颈椎功能障碍指数（neck disability index,NDI）评分及睡眠状况自评量表（self rating scale of sleep,SRSS）评分。记录两组患者 SCNRB 治疗次数≥2 次的例数。记录两组患者治疗后第 12W 采用改良 MacNab 标准评估的优良率及不良反应发生情况。
结果 两组患者治疗后各时间点的 VAS、NDI 及 SRSS 评分均较前一时间点评分显著降低，与对照组比较，试验组患者治疗后 12W 的 NDI 评分和治疗后 1W、4W、12W 的 SRSS 评分均明显降低（均 P<0.05）。另外，试验组患者治疗后 12W 的优良率为 92.30%，明显高于对照组的 69.23%（P=0.035）；试验组患者中 SCNRB 治疗次数≥2 次的占比明显低于对照组（53.85% vs.80.77%，P = 0.039）。所有病人均无神经损伤等并发症。
结论 超声引导下 SCNRB 与 SGB 治疗 CSR 效果可靠，但在改善患者睡眠状况及远期颈部活动度方面，两种治疗手段联合的效果更加显著。

PU-0922

布比卡因脂质体对全膝关节置换术术后疼痛的影响

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目的 接受全膝关节置换术的患者往往要经历中至重度术后疼痛，股神经阻滞是比较常用的术后镇痛的方法。但是单次注射股神经阻滞受限于目前可用的局部麻醉剂，其提供的镇痛持续时间相对较短，而布比卡因脂质体的长效缓释机制有可能解决单次股神经阻滞镇痛持续时间不足的局限性。本研究选取择期行全膝关节置换术的患者，采用布比卡因脂质体或者盐酸布比卡因进行股神经阻滞，比较两者对术后疼痛的影响。
方法 将入组患者随机分成布比卡因脂质体组（L 组）或盐酸布比卡因组（S 组），药物总量为 20ml，L 组为 10ml 布比卡因脂质体原液（133mg）加生理盐水 10ml 配置而成，S 组为 0.25%盐酸布比卡因 20ml。所有患者入室后在清醒状态下根据分组进行超声引导下股神经阻滞，两组均接受标准化的全身麻醉。手术结束患者采用自控镇痛（PCA），舒芬太尼 2μg/kg，用生理盐水配至 100 ml，单次按压量为 2ml，无背景剂量，锁定间隔 25min，当自控镇痛仍无法缓解疼痛，给予曲马多 100mg 肌注进行补救镇痛。主要观察指标为术后 24h 静息及活动状态下的 NRS 评分，次要观察指标为 PACU、术后 48h、72h 静息及活动状态下的 NRS 评分、术中镇痛药的累计使用量、术中血流动力学情况、PCA 首次按压时间及术后镇痛药物累计使用量、首次下床活动时间、QoR-15 评分、住院时长、围术期不良反应（恶心 、呕吐 、发热 、瘙痒 、便秘等）。
结果 研究正在进行中。
结论 研究正在进行中。

PU-0923

全身麻醉和椎管内麻醉下行老年髋部骨折手术术中 RBC 输血量、生命体征及心肺并发症的影响

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目的 探讨全身麻醉和椎管内麻醉下行老年髋部骨折手术术中红细胞（RBC）输血量、生命体征及心肺并发症的影响。
方法 回顾性分析 2021 年 10 月~2023 年 10 月收治的 83 例择期行髋部骨折手术老年患者的临床资料，根据麻醉方式分为全身麻醉组（32 例）、椎管内麻醉组（51 例）。记录并比较两组患者手术相关指标，麻醉诱导前（T0）、麻醉诱导后 5 min（T1）、手术切皮即刻（T2）、术中 30 min（T3）、术毕即刻（T4）、术后 30 min（T5）时的生命体征指标[平均动脉压（MAP）、心率（HR）、血氧饱和度（SpO2）]，术前、术后 12h、术后 24h、术后 48h、术后 72h 时的视觉模拟评分（VAS 评分）以及术后心肺并发症发生情况。
结果 两组患者手术时间、术后下床时间、术后住院时间比较无差异（P>0.05）；椎管内麻醉组患者术中出血量、术中 RBC 输血量、麻醉起效时间、术后麻醉观察时间、术后进食时间均少/短于全身麻醉组患者（P<0.05）。T0 时两组患者 MAP、HR 水平比较无差异（P>0.05）；T1 时椎管内麻醉组患者 MAP 水平高于全身麻醉组患者，而 HR 水平低于全身麻醉组患者（P<0.05）；T2~T5 时椎管内麻醉组患者 MAP、HR 水平均低于全身麻醉组患者（P<0.05）。T0~T5 时两组患者 SpO2 水平比较无差异（P>0.05）。两组患者 T1 时 MAP、HR 水平均明显低于 T0 时（P<0.05）；两组患者 T2~T5 时 MAP 水平均明显高于 T0 时（P<0.05）；全身麻醉组患者 T2~T5 时 HR 水平与 T0 时比较无差异（P>0.05），而椎管内麻醉组患者 T2~T5 时 HR 水平均明显低于 T0 时（P<0.05）。两组患者术后 12、24、48、72h 时 VAS 评分均明显低于术前（P<0.05）。术前，两组患者 VAS 评分比较无差异（P>0.05）；术后 12、24h 时椎管内麻醉组患者 VAS 评分均明显低于全身麻醉组患者（P<0.05）；术后 48、72h 时两组患者 VAS 评分比较无差异（P>0.05）。椎管内麻醉组患者术后心肺并发症总发生率（9.80%vs28.13%）明显低于全身麻醉组患者（P<0.05）。
结论 椎管内麻醉下行老年髋部骨折手术相较于全身麻醉术中 RBC 输血量更少，生命体征更平稳，术后心肺并发症发生率更低，在无明显禁忌情况下，建议优先选择椎管内麻醉。

PU-0924

超声引导下 PENG 联合喉罩全麻在老年患者股骨颈骨折闭合复位内固定术中的应用效果

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目的 探讨超声引导下髋关节囊周神经丛阻滞（PENG）联合喉罩全麻对老年患者行股骨颈骨折闭合复位内固定术后的效果。
方法 选取 2023 年 1 月~2023 年 6 月在我院进行股骨颈骨折闭合复位内固定术治疗的 100 例老年患者进行研究，将其随机分为对照组、观察组两组，每组 50 例。对照组采用喉罩全麻，观察组采用超声引导下 PENG 联合喉罩全麻，疼痛程度评估:于术后 2h、12h、24h，使用视觉模拟评分（Visual Analogue Scale, VAS）在患者静息和咳嗽状态下进行疼痛程度评估;应激水平检测:分别于患者术前、手术开始后 40min 和麻醉苏醒时采集空腹状态下静脉血 3ml，经离心分离后送检验科检测肾上腺素（adrenaline, AD）和内皮素（endothelin, ET）水平;评估围术期血流动力学以及麻醉

药用量;术后恢复情况评估记录两组首次下床活动时间及住院时间，术后恶心呕吐，咽喉痛、穿刺部位血肿等并发症，局部麻醉药物中毒等不良反应发生率。
结果 术后 2、12、24h，观察组静息状态和咳嗽状态下 VAS 评分均低于对照组（P<0.05）。与麻醉前比较，两组手术开始后 40min 及麻醉苏醒时的肾上腺素（AD）和内皮素（ET）水平均明显波动（P<0.05）；且观察组三个时间段内 AD 和 ET 水平波动幅度均明显低于对照组（P<0.05）。与麻醉前比较，两组麻醉后 5min 及 60min 的平均动脉压（MAP）和心率（HR）水平均出现明显波动（P<0.05）；且观察组三个时间段内 MAP 和 HR 水平波动幅度均明显低于对照组（P<0.05）。观察组舒芬太尼、丙泊酚、顺阿曲库铵使用剂量均明显低于对照组。观察组首次下床活动时间明显早于、住院时间则明显短于对照组；观察组术后并发症发生率及局部麻醉药物中毒发生率均明显低于对照组（P<0.05）
结论 实施股骨颈骨折闭合复位内固定术的老年患者应用 PENG 联合喉罩全麻能有效镇痛和减轻围术期应激反应，还可减少术中麻醉药用量、术后并发症，改善术后苏醒质量。

PU-0925

Perioperative Complications after Unilateral Total Joint Arthroplasty in Elderly Patients under General Anesthesia versus Regional Anesthesia: A Matched-Pair Cohort Analysis

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Introduction The correlation between postoperative complications following unilateral total joint arthroplasty (TJA) and the choice of anesthesia remains unclear. This study aimed to assess the impact of general anesthesia (GA) versus regional anesthesia (RA) on mortality within one year, length of hospital stay, and other secondary outcomes following unilateral TJA.
Methods Elderly patients who underwent unilateral knee or hip replacement surgery from January 2014 to August 2022 were included in this retrospective cohort study. Primary outcomes were one-year mortality and the length of hospital stay (LOS). Secondary outcomes included postoperative ICU admission, delirium, operative area infection, pulmonary infection, acute kidney injury (AKI), myocardial injury following non-cardiac surgery (MINS), myocardial infarction, and stroke. Univariate analyses, multivariate analyses, propensity score matching (PSM) and inverse probability of treatment weighting (IPTW) analysis were utilized to investigate the impact of anesthetic technique.
Results The study included 4518 patients, with 2708 receiving GA and 1810 receiving RA. GA was associated with a shorter hospital stay compared to RA (-0.63 days, 95% CI: -1.00 to -0.27, P<0.01). Similar findings were observed after PSM and IPTW analysis (-0.71 days, 95% CI: -1.07 to 0.036, P<0.001 in PSM; -0.604 days, 95% CI: -0.93 to -0.28, P<0.001 in IPTW). There was no significant difference in 1-year mortality and postoperative complications between the GA group and RA group. Multiple regression analyses showed odds ratios for one-year mortality of 1.44 (95% CI: 0.82 to 2.54, P=0.204), 1.53 (95% CI: 0.85 to 2.74, P=0.152) and 1.28 (95% CI: 0.70 to 2.34, P=0.415).
Conclusions In elderly patients undergoing unilateral joint replacement surgery, general anesthesia significantly shortens the length of hospital stay without increasing the risks of postoperative complications and one-year mortality. These results provide a valuable reference for anesthesiologists, surgeons, and patients when making decisions regarding anesthesia selection.
Keywords general anesthesia; regional anesthesia; total joint arthroplasty; length of hospital stay; perioperative outcomes

PU-0926

骨折患者术后急性疼痛管理的研究进展

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目的 骨折是临床上常见的创伤之一，发病突然，可出现明显的肢体疼痛。骨折在当前临床中的治疗方法主要为手术治疗,但患者在经过骨折手术后, 普遍会出现剧烈的疼痛感,给患者的生活质量带来了严重影响。在康复过程中, 患者所承受的不仅仅是来自生理上的痛苦, 同时还会出现许多负面心理, 加大患者对于疼痛的感知，形成恶性循环，使得患者的各个临床症状出现加重。因此，及时有效的手术后镇痛，不但能减轻患者的痛苦，有利于疾病的康复，还有巨大的社会和经济效益。
方法 对于骨折术后疼痛处理而言必须加强疼痛评估。评估不仅能够识别疼痛的存在, 还有助于采取积极有效的方法进行处理。临床评估骨科患者术后疼痛感的方法包括 VAS 法、VDS 法等。对于骨折患者来说, 其疼痛感主要来与三个因素有关, 分别是骨折本身及手术因素和并发症因素。骨折本身及手术因素是由于该病症是因组织创伤所产生的疼痛感, 若在此时患者再经过手术治疗, 则会给患者的骨折部位造成二次伤害。在并发症的疼痛感上, 该疼痛状况需根据患者的并发症类型、身体耐受力以及不同的手术疗效而定夺。
结果 临床上对于骨折患者术后疼痛的管理主要以非药物治疗和药物治疗为主。①非药物治疗 是术后疼痛过程中常用的处理方法, 主要分为物理治疗与有效沟通疗法。可指导患者通过改变行为或放松情绪的方法缓解疼痛, 或在疼痛感较为强烈时转移患者的注意力。②药物治疗 在骨折患者术后疼痛处理中相对比较重要。可将术后疼痛主要分为轻、中、重三个不同的程度,不同程度处理时使用的药物也不尽相同。③护理干预 目前, 临床上常见的护理方法主要有: 心理护理、分散注意力、加强健康教育及康复训练等方面。④多模式镇痛 多模式镇痛是消除或减轻术后疼痛的最有效方法, 而且不良反应较少。运用合理的疼痛评估结果做疼痛干预的处理，保证用药准确性,让患者从生理、心理、认知各层面正确应对手术疼痛与不适感，提升治疗工作的配合度。
结论 目前, 骨科手术后由于麻醉药物作用的降低,术后出现的疼痛感可严重影响到骨科手术的近期治疗效果, 还会对远期疗效产生间接影响。同时, 加上社会心理医学模式的不断转变, 对患者术后减轻疼痛成为每一位医生重视的问题。骨科手术也区域微创化、精细化, 临床上对于疼痛的重视, 疼痛机制也更加清晰, 越来越多的止痛药物在不断研发, 高效、精确的靶向止痛药物将会运用于临床。术后有效的疼痛管理模式能够使患者的疼痛症状得到改善,使患者术后能够更舒适的度过康复阶段。

PU-0927

脊柱手术术后慢性疼痛的研究进展

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目的 综合国内外有关脊柱手术术后慢性疼痛的研究进展，从定义、机制、危险因素及术后镇痛等多个方面展开分析，表明认识并降低脊柱手术术后慢性疼痛发生率的必要性与可行性。
方法 检索有关脊柱手术术后慢性疼痛的相关文献，对相关的定义、机制、危险因素、术后镇痛等多个方面进行预览、筛选与总结。
结果 脊柱手术后，患者可能会持续存在慢性疼痛。尽管手术方式不断改善，但仍有高达 40%的人报告残留的慢性疼痛和功能障碍。而当前术后慢性疼痛的发生机制是许多研究的关注对象，主要在动物模型中，各种理论依据更是层出不穷，但在人类身上的明确依据却很少，因此当前对于 CPSP 的发生机制仍是不明确的。肥胖、焦虑、抑郁、疼痛灾难化、疼痛敏感性等均是术后慢性疼痛的危

险因素。

结论 探索 CPSP 发生的机制及其围术期的高危因素至关重要，可以从源头预防或减轻 CPSP 发生。同时在如今倡导少阿片类药物及多模式镇痛的背景下，探究更多的有效且安全的非阿片类镇痛药物意义重大，对此进行进一步的探索是很有必要。

PU-0928

右美托咪定对合并糖尿病的手外伤手术患者血糖、MDA、IMA 的影响

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目的 探讨右美托咪定对合并糖尿病的手外伤手术患者血糖、丙二醛（MDA）、血浆缺血修饰蛋白（IMA）的影响。

方法 选取 2023 年 1 月-2024 年 3 月在我院就诊的 78 例合并糖尿病的手外伤手术患者，采用随机数字表法分为对照组和观察组，各 39 例。观察组：男性 21 例，女性 18 例，年龄 45～71 岁，平均年龄（57.1 ± 7.1）岁，平均体质量（58.3 ± 10.2）kg。对照组：男性 22 例，女性 17 例，年龄 46～70 岁，平均年龄（57.6 ± 7.4）岁，平均体质量（57.5 ± 9.7）kg。纳入标准：符合糖尿病诊断标准，无麻醉药物过敏史，肝肾功能正常。排除标准：排除其他器官有严重疾病者，排除患有血液系统疾病者，无精神疾病者。两组均实施臂丛神经阻滞，注射 0.375%罗哌卡因 20mL 麻醉。对照组术中持续泵入 0.9%生理盐水，观察组术中持续泵入 0.2-0.7μg·kg-1·h-1 右美托咪定（江苏恒瑞医药股份有限公司，国药准字 H20090248）。两组的泵入方式及速率均相同。两组患者均在药物泵入 10 min 后开始使用止血带，固定在上臂中上部，止血带压力为在患者术前收缩压的基础上加上 50-75 mmHg，于 60 min 后松解 15min，再继续使用。

观察指标 记录两组患者运动阻滞起效时间、维持时间；分别于麻醉诱导前、使用止血带 30min 后、释放止血带 30min 后、释放止血带 1h 后、释放止血带 2h 后（T0、T1、T2、T3、T4）测量患者血糖。于患者臂丛神经阻滞前（T0'）、释放止血带后 10min（T1'）从上肢肘静脉抽取静脉血 5ml，测量丙二醛（MDA）、血浆缺血修饰蛋白（IMA）的浓度。采用软件 SPSS 17.0 进行统计分析和数据处理。

结果 实施臂丛神经阻滞后，观察组运动阻滞、感觉阻滞的维持时间明显高于对照组（P<0.05）；在 T1、T2、T3、T4 时观察组的血糖水平明显低于对照组（P<0.05）；T1'时，两组的 IMA 和 MDA 水平明显高于 T0'时（P<0.05），但观察组的 IMA 和 MDA 水平明显低于对照组（P<0.05）。

结论 对合并糖尿病的手外伤手术患者实施臂丛神经阻滞麻醉时，持续泵入右美托咪定，能增强术中麻醉效果，同时能有效抑制围麻醉期异常的血糖增高、降低 IMA 和 MDA 水平，维持血循环系统的稳定，有利于患者的预后。

PU-0929

连续髂筋膜间隙阻滞术前镇痛对老年人工全髋关节置换术围术期炎症反应和认知功能的影响

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目的 探讨连续髂筋膜间隙阻滞术前镇痛对老年人工全髋关节置换术患者围术期炎症反应和认知功能的影响

方法 选择我院 2021 年 7 月 1 日-2023 年 12 月 31 日老年人工全髋关节置换术患者 90 例，男 50 例，女 40 例，年龄 65-89 岁，ASA Ⅱ或Ⅲ级，体重 45kg～86kg，且无任何镇痛措施情况下有重度疼痛(VAS 疼痛评分≥7 分) 。按随机数字表法将患者分为两组：术前连续髂筋膜间隙阻滞（continuous fascia iliac compartment block ,CFICB）组(F 组) 和对照组(C 组) ，每组 45 例。记录两组入院即刻,术前 12h，术后 6h，术后 12h，术后 24h，术后 48h 视觉模拟评分（Visual Analogu Scale VAS）评分。记录术后 48h 内有效按压次数，按压量和不良反应发生情况，采用简易精神状态量表（mini-mental state examination,MMSE）、神经行为认知状态检查表（Neurobehavioral Cognitive Status Examination,NCSE）评估术前 1d，术后 1，3，5，7d 精神状态，认知状态。采用 ELISA 法检测患者术前 1d，术后 1，3，5，7d 血清 IL-6、10， TNF-α，IFN-γ，S-100β 蛋白。

结果 C 组在术前 12h，术后 6h，术后 12h，VAS 评分明显高于 F 组（P<0.05），术后 48h 内 F 组有效按压次数，按压量和恶心呕吐明显低于 C 组（P<0.05），与术前 1d 比较 C 组术后 1，3dMMSE 评分，NCSE 评分，血清 IL-6、TNF-α，IFN-γ 浓度明显升高，血清 IL-10，S-100β 蛋白浓度明显降低（P<0.05）, 与 C 组比较，F 组术前 1d，术后 1，3dMMSE 评分，NCSE 评分，血清 IL-6、TNF-α，IFN-γ 浓度明显升高，血清 IL-10，S-100β 蛋白浓度明显降低（P<0.05）。

结论 对老年人工全髋置换术患者，术前采用连续髂筋膜间隙阻滞可以提供更完善围术期镇痛，减轻围术期炎症反应，有利于改善术后早期认知功能。

PU-0930

止血带诱发缺血再灌注损伤的预防治疗研究进展

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目的 止血带广泛应用于骨科四肢手术中，减少患者术中失血量，同时也会让患者出现组织器官缺血再灌注损伤，严重甚至危及生命。本研究针对预防及治疗止血带诱发的缺血再灌注损伤的研究进行综述，为围术期预防和治疗止血带诱发的缺血再灌注损伤提供参考。

方法 本研究从止血带诱发缺血再灌注损伤的定义、止血带诱发缺血再灌注损伤对组织器官的影响、止血带诱发缺血再灌注损伤的机制、预防治疗措施、麻醉药物的应用等方面对止血带诱发缺血再灌注损伤进行探讨。

结果 止血带诱发缺血再灌注损伤时骨骼肌损伤最严重，，在远隔器官包括肺、心、脑、肾等均可发生病理改变。肺是最易受损的远隔器官，严重时可出现急性肺损伤，甚至发生急性呼吸窘迫综合征。止血带诱发缺血再灌注损伤的机制主要包括：氧自由基的脂质氧化作用机制、中性粒细胞的激活机制、钙超载机制、细胞凋亡机制。主要的预防措施包括：在手术过程中，尽可能的降低止血带压力、缩短止血带使用时间是预防缺血再灌注损伤的根本措施。止血带的充气压力应保持在能产生无血手术视野的最小压力；缺血预处理可提高组织对随后持续性缺血的耐受性；神经阻滞在临床麻醉、临床治疗及围术期镇痛等方面均起到积极作用，在止血带诱发缺血再灌注损伤的保护中也起到重要作用。

结论 止血带虽然能够有效阻断患肢血供，但同时可引起患肢组织缺血，当再次恢复血供时，易发生缺血再灌注损伤，给患者带来不良反应。因此需要我们进一步探索缺血再灌注损伤的机制及防治措施，增加患者安全和满意度。

PU-0931

小剂量艾司氯胺酮对老年患者经内镜逆行胰胆管造影术麻醉效果及早期认知功能的影响

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目的 探究小剂量艾司氯胺酮对老年患者经内镜逆行胰胆管造影术麻醉效果及早期认知功能的影响。
方法 选取 2023 年 1 月至 10 月在内镜中心行择期无痛内镜逆行胰胆管造影术检查的老年患者 111 例，年龄 65～90 岁，性别不限，体质量指数（body mass index，BMI）18～28 kg/m2,美国麻醉医师协会（American Society of Anesthesiologists，ASA）分级 I-III 级。采用随机数字表法将患者分别纳入 2 组：对照组（C 组）与艾司氯胺酮组（E 组）。记录 2 组患者低血压、心动过缓、低氧血症、呼吸抑制、呛咳、体动、头晕和恶心呕吐的发生率。记录 2 组患者在不同时间点（入室时 T0、麻醉诱导后 T1、进镜时 T2、置入十二指肠乳头时 T3、检查结束时 T4）的心率、平均动脉压和血氧饱和度。记录 2 组患者诱导时间、手术时间、苏醒时间、离室时间和瑞马唑仑用量。记录两组患者术前 24 h、术后 24 h 及术后 48 h 的蒙特利尔认知评估（montreal cognitive assessment，MoCA）评分。
结果 与 C 组相比，E 组患者低血压、低氧血症发生率显著降低（P <0.05），2 组患者在 心动过缓、呼吸抑制、呛咳、体动及头晕等不良反应发生率方面差异无统计学意义（P>0.05）。T1 时，E 组患者心率、平均动脉压和血氧饱和度均显著高于 C 组；T2 时，E 组患者平均动脉压显著高于 C 组，T3 时，E 组患者平均动脉压和血氧饱和度均显著高于 C 组，差异均有统计学意义（P＜0.05）。与 C 组比较，E 组苏醒时间和瑞马唑仑用量显著减少（P<0.05）；2 组患者在诱导时间、手术时间以及离室时间方面差异无统计学意义（P>0.05）。与 C 组比较，E 组术后 24 h 及 48 h MoCA 评分均较高，且差异具有统计学意义（P<0.05）。
结论 小剂量艾司氯胺酮能够显著增加老年患者 ERCP 术中心血管及呼吸系统稳定性，减少术中不良反应的发生率，减少患者麻醉苏醒时间并提高患者术后认知恢复质量，符合加速康复外科理念，值得在此类患者群体中推广应用。

PU-0932

Preoperative plasma bilirubin may be associated with postoperative delirium in old patients undergoing knee/hip arthroplasty: the PNDRFAP study and the PNDABLE study

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Background Along with society's aging, the prevalence rate of postoperative delirium (POD) is increasing. Assessing the risk factors of delirium is essential to diagnose and treat postoperative delirium (POD). The aim of this study was to examine the correlation between bilirubin levels and postoperative delirium.
Methods This study included 621 patients, of whom were from the Perioperative Neurocognitive Impairment and Biomarker Lifestyle (PNDABLE) database. The remaining 577 patients were from the Perioperative Neurocognitive Impairment Risk Factors and Prognosis (PNDRFAP) study. The Mini-Mental State Examination (MMSE) and Confusion Assessment Method (CAM) were used to assess cognitive function before operation, while Memorial Delirium Assessment Scale (MDAS) was used to measure the severity of postoperative delirium (POD). Cerebrospinal fluid biomarkers,

including Aβ42, T-tau, P-tau, Aβ42/T-tau, and Aβ42/P-tau, were measured using enzyme-linked immunosorbent assay (ELISA). We conducted logistic regression using data from patients in the PNDRFAP study and the PNDABLE study， which collectively identified risk factors for postoperative cognitive impairment. Nomograms and ROC curves were used as evaluation indices to assess the predictive effect of bilirubin on postoperative delirium (POD). POD events can be predicted by creating a dynamic nomogram model of the network. Finally, a mediation analysis of 10,000 bootstrap iterations was conducted to assess the mediating role of CSF biomarkers.
Results The logistic regression models of the PNDABLE and PNDRFAP studies showed that total bilirubin, direct bilirubin and indirect bilirubin were higher in the postoperative delirium group than in the non-postoperative delirium group. These results suggest that total bilirubin, direct bilirubin and indirect bilirubin may be risk factors for delirium. [PNDRFAP: Total Bilirubin, OR (95% CI): 1.839 (1.645-2.056), P < 0.001; Direct Bilirubin, OR (95% CI): 1.725 (1.448-2.054), P < 0.001; Indirect Bilirubin, OR (95% CI): 1.558 (1.424-1.705), P < 0.001. PNDABLE: Total Bilirubin, OR (95% CI): 1.203 (1.137-1.274), P < 0.001; Direct Bilirubin, OR (95% CI): 1.724 (1.465-2.030), P < 0.001; Indirect Bilirubin, OR (95% CI): 1.182 (1.109-1.260), P < 0.001]. Adjusted for age, sex, educational level and MMSE, total bilirubin, direct bilirubin and indirect bilirubin remained related to POD. Mediation analysis indicted that T-tau mediated the effect of total bilirubin, direct bilirubin and indirect bilirubin on delirium. The respective proportions are 9.08%, 10.26% and 8.70%.
Conclusions Total bilirubin, direct bilirubin and indirect bilirubin are preoperative risk factors associated with an increased risk of postoperative delirium (POD). The association between bilirubin and postoperative delirium may be partly attributed to T-tau levels in cerebrospinal fluid.

PU-0933

Influence and Prediction of Preoperative Glomerular Filtration Rate on Postoperative Delirium in Geriatric Patients

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Background Postoperative delirium (POD) is caused by a variety of risk factors. To explore the relationship between glomerular filtration rate (eGFR) and Cerebrospinal fluid (CSF) biomarkers to determine the negative effect of eGFR on POD and to predict the effect of eGFR.
Methods Patients aged 65 to 90 years undergoing surgery under general anesthesia were enrolled in PNDRFAP; Patients aged 65 to 90 years performing knee and hip replacement combined spinal-epidural anesthesia were enrolled in PNDABLE. We sought the risk factors using the logistic regression equation. The mediating effects was used to analyze the role of biomarkers. Afterwards, the receiver operating characteristic (ROC) curve and the nomogram model to predict POD by evaluating the efficacy of eGFR and biomarkers. Finally, the Decision Curve Analysis (DCA), dynamic nomogram and internal validation were used to prove the accuracy of the results.
Results The POD group has lower eGFR and higher levels of creatinine in the PNDRFAP. In the PNDABLE, the results are similar, and POD has lower levels of CSF Aβ42 and higher levels of CSF T-tau and P-tau. CSF T-tau (10.6%), P-tau (12.1%), Aβ42/T-tau (19.3%), Aβ42/P-tau (14.0%) plays a significant mediating role in the effect of eGFR on POD. The ROC curve combining eGFR and biomarkers (AUC=0.752, P<0.001) predicted the occurrence of POD better than eGFR alone, the prediction model was accurate.
Conclusion Preoperative low eGFR is a risk factor for postoperative delirium, and and CSF T-tau, P-tau, Aβ42/T-tau, and Aβ42/P-tau are involved in this process.

PU-0934

麻醉护士运用 CICAER 沟通模式在老年前列腺增生患者围手术期的应用效果

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目的 1 CICARE 护理沟通模式在围手术期麻醉护理的干预起到的效果。
2 本研究旨在分析麻醉护士运用 CICARE 沟通模式是否会减少老年前列腺增生患者围手术期患者焦虑发生率，以及是否会改善患者满意度和患者麻醉的配合度。
方法 1.1 研究方法
本研究为随机对照研究
1.2 研究对象
选取某三甲医院老年前列腺增生患者围手术期 100 例，实验组和对照组各 50 例。纳入标准：年龄≥60 岁；接受手术治疗，且可耐受全身麻醉；读写和沟通能力正常；患者对本研究知情，并签署同意书；排除标准：术前存在发热、感染情况；重要器官功能异常，如心、肝、肾、肺等；死亡或中途出院；精神疾病、意识不清醒的患者；
1.3 调查工具
查阅相关文献，采用阿姆斯特丹术前焦虑和信息量表（APAIS）评分表[10]评估两组术前焦虑情况,阿姆斯特丹术前焦虑和信息量表，包括手术前患者对麻醉或手术的焦虑，以及希望对麻醉和（或）手术相关信息的了解。简明扼要，操作简便，是临床应用最为广泛的评估量表。APAIS 评分含 6 个条目，包括焦虑量表及信息需要量表两个部分。
比较两组围术期麻醉配合度,根据麻醉过程中患者配合麻醉前操作情况，在手术结束后评估麻醉配合度，分为优、良、差 3 个等级。
满意度的调查采用自制问卷表实现，统计项目包含护理人员的服务态度、护理服务的专业性以及服务的人性化等，调查结果划分非常满意、满意以及不满意。
1.4 干预措施
对照组采用常规的麻醉护理模式。即术前指导患者进行必要的术前检查，对其进行术前基础教育，指导其完成各项术前准备；术后护理人员与手术人员做好交接工作，完善患者术后各项护理干预，确保患者术后康复质量及安全性。
观察组采用 CICARE 的沟通模式（C(Connect)—接触； I(Introduce)—介绍； C(Communicate)—沟通；A(Ask)—询问；R(Respond)— 回答；E(Exit)—离开）。
首先，由科室护士长及 3 名主管护师共同组建 CICARE 沟通模式护理小组,通过查找文献,结合实际情况，拟订 CICARE 沟通方案，进行沟通技能及流程培训,在所有护士掌握 CICARE 沟通模式后，进行具体实施。a.接触(C):与患者初次接触时,护理人员保持礼貌态度,使用礼貌称呼,减轻患者抵触情绪。在患者信息录入及病情记录过程中,注意保护个人隐私，建立可信、平等、良好的护患关系。b.自我介绍(I):在与患者交流过程中，要求护理人员介绍自身职责、工作性质、医院及科室环境，使患者尽快适应治疗环境，提高信任度和治疗依从性。b.沟通交流(C):在沟通交流过程中，需根据患者实际情况，告知其护工作重点、各项检查的目的及重要性，以获得患者的配合与支持。根据患者的心理状况，以围手术期为主要内容，给予患者疾病知识健康教育，讲解围术期相关护理知识，提高患者的认同及执行度。d.询问(A):在询问患者病情、临床症状、实际需求时，采用简洁明了、通俗易懂的语言，避免使用啰嗦、繁复及专业性过强的词汇，以确保患者理解。护理人员应选择适宜的交谈方式，收集患者生理、心理、社会资料，评估其健康情况，掌握其临床症状、需求及个人想法。e.回答疑惑(R):通过详细解答患者术前、术中、术后过程中如何配合等问题，缓解患者紧张心理，树立治疗信心，消除对拔牙的恐惧。f.离开(E):在完成患者接待及疑问解答后,感谢患者及家属的配合，告知患者如有特殊需要,及时告知护理人员。通过与患者进行有效沟通，营造良好的氛围,在手术前、术后对患者进行量表评估,包括心理状态、就诊体验及满意度。阿姆斯特丹术前焦虑和

信息量表（APAIS）评分表、满意度调查问卷以纸质版的形式呈现，以现场匿名填写的方式进行调查,并现场收回。调查前研究者向被调查者解释研究目的及填写注意事项，调查结束后所有有效数据由双人导入 Excel 工作表，并交叉核对。

1.2.4 统计学方法

采用 SPSS 21.0 统计学软件分析数据。计量资料以 x±s 表示，采用 t 检验;计数资料以百分比表示，采用 χ2 检验。以 P＜0．05 为差异有统计学意义。

结果 为老年前列腺增生患者围手术期提供全程的麻醉护理模式，细化工作流程，热情接待患者并进行自我介绍，缓解患者的焦虑心理，积极询问患者需求并解答疑问，使患者感受到医护人员的关怀

结论 众多的研究结果已经证明患者围手术期间的护理干预直接对患者的预后构成影响。本研究中，麻醉护士基于 CICARE 沟通模式向患者介绍围手术期麻醉流程,让患者了解其过程,减少不必要的担忧。同时麻醉护士简单清晰的传递与麻醉相关信息,让患者方便理解,尽量减少患者的恐惧和焦虑情绪增加患者配合度。麻醉护士在手术后还会对患者进行观察和评估,及时反馈信息,并根据患者的反应和感受来调整护理方法最终达到改善患者状态的目的。

PU-0935

右美托咪定对老年颈动脉内膜剥脱手术患者术后认知功能的影响

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目的 探讨右美托咪定对老年颈动脉内膜剥脱手术患者术后认知功能的影响。

方法 选择 2022 年 8 月—2023 年 7 月在首都医科大学宣武医院神经外科行颈动脉内膜剥脱手术的老年患者 60 例,年龄 65 岁-75 岁，随机分为右美托咪定组（A 组）和对照组（B 组）。A 组在全身麻醉诱导前 10 min 内预先输注右美托咪定负荷剂量 0.8μg/kg,之后以 0.5μg/（kg·h）恒速维持输注至手术结束前 30 min。观察并记录 2 组患者术前（T0）、插管前（T1）、插管后 5 min （T2）、手术开始后 10 min （T3）、手术开始后 30 min （T4）、停药后 10 min （T5）、拔管前（T6）、拔管后（T7）的平均动脉压（MAP）、心率（HR）、麻醉深度（AI）;从停止给药到患者自主呼吸恢复的时间（T8）、呼之睁眼的时间（T9）、拔管的时间(T10)、定向力恢复的时间(T11);检测并记录患者手术前 1 d、术毕、术后 24 h、术后 72 h 的血浆肿瘤坏死因子（TNF-α）、白细胞介素（IL-6）、C 反应蛋白（CPR）水平;应用简易精神状态评价量表（MMSE）测试并记录患者术前 1 d,术后 1、3、7、14 d 的 MMSE 评分。

结果 2 组患者在 T0 时 MAP、HR、AI 差异无统计学意义（p> 0.05）。A 组患者 MAP 在 T1 与 T0 时比较,差异有统计学意义（p <0.05）,HR 在 T1、T2、T6 与 T0 时比较,差异有统计学意义（p <0.05）;B 组患者 MAP 在 T1、T2、T3、T5、T6、T7 与 T0 时比较,差异有统计学意义（p <0.05）,HR 在 T1、T2、T4、T5、T6、T7 与 T0 时比较,差异有统计学意义（p <0.05）。A 组患者 AI 在 T5、T6、T7 时高于 B 组,且差异有统计学意义（p <0.05）;2 组患者 T8、T9、T10、T11 差异无统计学意义（p >0.05）。2 组患者术前 1 d 血浆中 TNF-α、IL-6、CPR 水平差异无统计学意义（p > 0.05）。与 B 组患者比较,A 组患者术毕、术后 24 h、术后 72 h 各炎性因子表达水平均降低,差异有统计学意义（p <0.05）;2 组患者术前 MMSE 评分差异无统计学意义（p > 0.05）;与 B 组患者比较,A 组患者术后 1、3、7 d MMSE 评分明显高于对照组,差异有统计学意义（p <0.05）。A 组患者术后各时间点 MMES 评分与术前差异无统计学意义（p > 0.05）;B 组患者术后 1 d 与术后 3 d MMES 评分较术前降低,差异有统计学意义（p <0.05）。

结论 右美托咪定可维持老年颈动脉内膜剥脱手术患者的血流动力学稳定,提高复苏质量,降低机体炎性因子水平,减轻术后认知功能障碍。

PU-0936

低剂量右美托咪定联合内收肌管阻滞对老年患者全膝关节置换术后恢复质量的影响：一项前瞻性随机对照研究

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目的 全膝关节置换术（TKA）为终末期骨关节炎(OA)患者提供了一种有效的治疗途径，但术后患者常遭受剧烈疼痛和各种不良反应，从而影响恢复质量（QoR）。内收肌管阻滞（ACB）是一种新型的区域麻醉技术，可有效缓解疼痛并保留运动功能。右美托咪定（DEX）作为辅助麻醉药，有助于缓解疼痛、减轻炎症刺激、降低应激反应。本试验旨在探究加速康复外科（ERAS）理念下低剂量 DEX 泵注联合 ACB 对于 TKA 术后 QoR 的影响，从而为麻醉医师对 TKA 围术期管理提供参考。
方法 这是一项前瞻性，盲法，平行设计，随机对照研究，于 2023 年 9 月至 2024 年 3 月在山东第一医科大学附属省立医院进行。选取骨关节科初次在择期全麻下行单侧 TKA 的患者 110 名，采用随机数字表法按 1：1 随机分为两组：干预组接受低剂量 DEX 泵注联合 ACB；对照组则未接受此干预。所有患者均接受由局部浸润镇痛和非甾体类抗炎药组成的多模式镇痛。主要结局指标为术后 24 小时的 15 项恢复质量量表评分（QoR-15），由 QoR-15 问卷测量。
结果 两组患者术后 24h 的 QoR-15 评分均值存在显著差异，干预组患者 QoR-15 量表评分为 123.68±6.87 分，而对照组仅为 115.69±6.10 分，两组均数差值为 8.1 分（95%CI ,5.5-10.7;P<0.001）。同样，干预组患者术后 48 小时的 QoR-15 较高（P<0.001），但没有临床意义。与对照组相比，干预组术后 12h 被动屈曲 30°时的 VAS 评分有所降低，术后 24 h 静息时、被动屈曲 30°时的 VAS 评分均有所降低（P<0.05）。干预组首次抢救镇痛时间略长于对照组(Log-rank 检验：P=0.012)。干预组术后头晕、嗜睡、呕吐的发生情况减少（P<0.05），住院时间缩短（P<0.05），患者满意度评分提高（P<0.05）。两组患肢股四头肌肌力、运动阻滞情况差异无统计学意义。
结论 老年患者单侧全膝关节置换术术中低剂量泵注右美托咪定联合内收肌管阻滞能有效提高恢复质量，促进病人早期快速康复，这与改善术后镇痛，减少不良反应有关。

PU-0937

羟考酮用于老年胸腔镜肺叶切除术患者最佳镇痛剂量 ED90 的研究：一项双盲、随机偏倚硬币序贯分配实验

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目的 术后疼痛是影响高龄患者快速康复进程的主要因素。手术结束前单次静脉注射羟考酮与术后 PCIA 联合镇痛应用于老年胸腔镜肺叶切除术（video-assisted thoracoscopic lobectomy, VATS）患者，可达到满意的镇痛效果。本文目的是探讨羟考酮用于胸腔镜肺叶切除术老年患者最佳有效剂量 ED90（90% effective dose, ED90），以实现胸腔镜下肺叶切除术老年患者的有效镇痛管理，促进患者早期康复。
方法 这是一项前瞻性、单中心、双盲、偏倚硬币序贯分配研究，在 2023 年 4 月至 2023 年 12 月共纳入 64 名拟行择期胸腔镜肺叶切除术的高龄患者。参与者将按偏倚硬币序贯法的随机化顺序接受相应剂量的羟考酮，利用 PAVA 算法以及等渗回归确定 ED90 剂量的修正等渗估计值。主要结果是手术后 2 小时使用数字评定量表（NRS）评定的动态疼痛评分。动态 NRS 评分定义为咳嗽时的

NRS。次要结果包括：（1）术后 2 小时静态 NRS 评分，术后即刻、6、12、24、72 小时及离院前静态和动态 NRS 评分；（2）术后即刻、2、6、12、24 小时的镇静评分（RASS）；（3）瑞芬太尼及丙泊酚消耗量；（4）术中输液量、失血量、手术时长、术后住院时长；（5）术后 3 天内恶心呕吐、皮肤瘙痒、咳嗽等阿片类相关不良反应的发生率；（6）术后 1 个月和 3 个月慢性疼痛的发生率。

结果 64 名患者参与这项研究，其中有 4 名患者被排除在外（3 名术式改变，1 名中途退出），总共有 60 名患者完成研究。老年患者（≥65 岁）行胸腔镜肺叶切除术联合 PCIA 自控镇痛时羟考酮静脉注射的最佳剂量 ED90 为 0.104mg/kg（0.095-0.108mg/kg）。探索性终点的补充分析仅限于至少 10 名患者的剂量，分别为接受羟考酮 0.09（n=15）、0.10（n=24）、0.11（n=10）mg/kg 剂量的患者。三组间的血流动力学、镇静程度及急性疼痛发生率随着时间变化均无明显差异，仅 0.09mg/kg 剂量组比 0.10mg/kg 剂量组慢性疼痛的发生率更高，两组间差异具有显著的统计学意义（B=2.514，P=0.007）。三组间不良反应的发生率没有明显差异（P=0.291）。其中便秘的发生率最高，随着羟考酮剂量的增加，受试者便秘的发生率逐步提高（依次为 33.3%、37.5%、70.0%），三组间有统计学差异（P=0.038）。

结论 高龄患者行胸腔镜肺叶切除术联合 PCIA 自控镇痛时羟考酮静脉单次给予的最佳剂量 ED90 为 0.104mg/kg，其 95%CI 为 0.095-0.108mg/kg。

PU-0938

术中低血压与老年非心脏手术后主要心血管不良事件的关系：一项回顾性队列研究

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目的 已有证据表明术中低血压是术后主要心血管不良事件（major adverse cardiac events, MACE）发生的危险因素，而随着医学技术的不断发展，已存在如术中低血压预测指数等先进技术用于临床实践。但目前术中低血压预测指数中设置的低血压标准多为低于平均动脉压（mean arterial pressure, MAP）65mmHg，老年患者更易受术中血压波动影响而导致脏器功能受损，65mmHg 的低血压阈值可能不合适。因此，本研究拟探讨老年患者适当的术中低血压阈值，以降低 MACE 发生风险。

方法 本研究纳入 2012 年 1 月至 2019 年 8 月期间于解放军总医院第一医学中心接受非心脏手术的老年患者（年龄≥65 岁）。采用单变量移动平均图和多元限制三次样条图来确定与 MACE 风险增加相关的绝对和相对术中低血压阈值。通过三种不同的低血压暴露形式（持续时间、面积和时间加权平均动脉压）使用单多变量 logistic 回归分析评估了术中低血压阈值与 MACE 之间的关系。分层分析用于探讨术中低血压阈值与术后 MACE 发生之间的关系在高龄（≥80 岁）和非高龄患者（＜80 岁）之间是否存在差异。

结果 在 35,262 例患者中，共有 874 例发生了 MACE。术中 MAP 低于 70mmHg 与老年患者术后 MACE 显著相关，且 MACE 的发生风险随着术中低血压暴露程度的变化呈现“剂量递增”效应，当术中 MAP 低于 70mmHg 持续 15 分钟以上时，MACE 发生风险显著增加（OR: 1.51, 95%CI: 1.22-1.88, p<0.001）。分层分析显示，该阈值对高龄和非高龄患者术后 MACE 发生率的影响在统计学上没有明显差异。

结论 对于老年非心脏手术患者，术中 MAP 应尽可能维持在 70 mmHg 以上，以降低术后 MACE 的发生风险。

PU-0939

髂筋膜阻滞对髋关节置换术老年患者术后嗅觉记忆的影响

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目的 观察髂筋膜阻滞对髋关节置换术老年患者术后早期嗅觉记忆的影响。
方法 将择期在全身麻醉下行髋关节置换手术的老年患者（ASA 分级 Ⅱ-Ⅲ级，70~80 岁）120 例，采用随机数字表法分为髂筋膜阻滞组（A 组）和非髂筋膜阻滞组（B 组），每组 60 例。A 组实施髂筋膜间隙阻滞并置管：术前 0.25%罗哌卡因首次剂量 15ml，脉冲量 5ml/3h，手术后患者单次自控镇痛剂量 5ml，锁定时间 30min，B 组仅置管余不做任何处理。两组患者麻醉诱导及麻醉维持相似。于诱导前、手术开始后 30 min 和手术结束时记录两组患者平均动脉压（MAP）、心率（HR）和指脉血氧饱和度变化（SpO2）；于诱导前（T0）和 Aldrete 评分达 10 分时（T1）采用康涅狄格化学感觉临床研究中心嗅觉功能检查法（CCCRC 嗅觉检查方法）评估患者嗅觉识别能力。
结果 两组患者各时点 MAP、HR、SpO2 组内、组间比较差异均无统计学意义（P> 0.05）。与 T0 时点比较，T1 时点 A 组嗅觉识别分数差异无统计学意义（P＞0.05）,B 组嗅觉识别分数下降（P<0.05）。T1 时点 B 组嗅觉识别分数低于 A 组（P<0.05）。
结论 髂筋膜阻滞可改善髋关节置换术老年患者术后早期嗅觉记忆的变化。

PU-0940

比较加温膀胱灌洗液和小剂量去氧肾上腺素在预防老年人膀胱冲洗术中低体温的研究

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目的 比较加温膀胱灌洗液和小剂量去氧肾上腺素在预防老年人膀胱冲洗术中低体温的效果
方法 选择 60 例老年膀胱冲洗术患者，随机分为两组，每组 30 例。实验组患者使用加温膀胱灌洗液，对照组患者使用小剂量去氧肾上腺素。记录术前、术中和术后患者体温变化，并观察术中和术后患者的不良反应
结果 实验组患者术中和术后体温显著高于对照组患者（P<0.05）。实验组患者术中和术后低体温发生率显著低于对照组患者（P<0.05）。实验组患者术中和术后不良反应发生率较低，并且不良反应轻微，与对照组患者相比无统计学差异。
结论 与小剂量去氧肾上腺素相比，加温膀胱灌洗液在预防老年人膀胱冲洗术中低体温的效果更好，并且不良反应较少。因此，推荐在老年人膀胱冲洗术中使用加温膀胱灌洗液。

PU-0941

The anesthesia of elderly patient combined with COPD and low oxygen saturation undergoing Whipple procedure: a case report

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Chronic obstructive pulmonary disease (COPD) leads to the development of postoperative pulmonary complications, such as atelectasis, pneumonia and respiratory failure. Anesthesia management of patients with COPD is extensively discussed, due to the increased risk of respiratory complications associated with general anesthesia and high complexity surgical procedures. Besides, weaning from mechanical ventilator is occasionally a difficult issue for patients with COPD. Here we describe a case of COPD patient with low oxygen saturation successfully weaned from ventilator after pancreaticoduodenectomy (Whipple).

Case presentation

A 67-year-old man (height 174 cm; weight 60 kg) with severe COPD was diagnosed pancreatic cancer and underwent Whipple procedure. The patient presented with cyanosis of lips and his oxygen saturation was 75% measured by pulse oximetry. In addition, his pulmonary function test revealed severe obstructive ventilatory impairment. The preoperative partial pressure of oxygen in arterial blood gas was 56 mmHg and carbon dioxide 46.6 mmHg. During operation, the bispectral index, hemodynamics and blood oxygen saturation were maintained at normal levels. At last, the patient was transferred to intensive care unit post operation. After extubation, he presented with low oxygen saturation as before, but without postoperative pulmonary complications when discharge.

Conclusions COPD patients can suffer from low blood oxygen saturation which naturally fluctuate with time. However, the blood oxygen saturation may maintain at normal level during operation. Weaning from mechanical ventilator as soon as possible is important for these COPD patients postoperation.

PU-0942

褪黑素调控 AQP4 极性促进 β 淀粉样蛋白的脑内清除在 POCD 中的作用

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目的 术后认知功能障碍(Postoperative Cognitive Dysfunction, POCD)指临床上患者在麻醉手术后出现的认知功能异常,临床上主要表现为注意力及学习记忆功能下降等。目前，已经有许多研究证明 Aβ 蛋白的生成和清除失衡造成 Aβ 蛋白蓄积，从而引起了术后认知功能障碍。脑类淋巴系统(glymphatic system)指脑组织液从脑内动脉渗出后进入脑实质后与间质液混合，携带各种废物蛋白(包括 Aβ 等)，流向静脉，沿着血管周围间隙引流最终通过颈部淋巴结排出体外。此血管周围间隙是星形胶质细胞足突包绕脑血管外膜而形成的潜在间隙。水通道蛋白 4（AOP4)是脑类淋巴系统的主要功能性蛋白，当 AQP4 处于极化状态时，分布于星型胶质细胞的终足，包绕着脑血管，促进了脑内类淋巴系统的清除功能，而 AQP4 的极化状态受睡眠和日夜周期的影响。我们假设麻醉及手术可能会降低脑内类淋巴系统的清除功能，导致 Aβ 蓄积，而褪黑素的应用可调节睡眠而减轻这种影响。本实验通过建立老年小鼠麻醉手术的动物模型，探索麻醉手术对脑内类淋巴系统功能蛋白 AOP4 极化状态的影响，以及通过褪黑素调控 AOP4 的极化状态，验证其对 Aβ 的清除功能及认知功能的影响。

方法 第一部分：将老年雄性 C57BL/6 小鼠随机分为 2 组（n=6）：对照组（Con 组）与麻醉手术组（Sur 组）。本实验对 Sur 组采用七氟烷吸入麻醉+剖腹探查术建立模型，Con 组不进行手术麻醉操作。手术后第 4 天开始通过旷场实验评估小鼠运动能力，Y 迷宫和条件恐惧性实验评估空间及记忆功能，然后用免疫荧光技术检测小鼠海马内 Aβ 沉积情况，通过 GFAP 标记星形胶质细胞检测其激活情况，并通过 AQP4 与 GFAP 共标记的相对位置变化检测 AQP4 的极化情况。第二部分：老年雄性 C57BL/6 小鼠随机分为 4 组（n=6）：对照+溶剂组（Con+ Vehicle 组）、 对照+褪黑素组（Con+ Mel 组）、手术+溶剂组（Sur+ Vehicle 组）、手术+褪黑激素组（Sur+ Mel 组），造模方法同上。术前 2 天开始每天予 Con+ Mel 组和 Sur+ Mel 组小鼠腹腔注射褪黑激素 10mg/kg，持续

7 天。待小鼠处死后通过免疫荧光技术检测小鼠海马内 AQP4 极化情况及小鼠经颈部淋巴结清除的 Aβ 蛋白的含量；通过蛋白免疫印迹技术检测 AQP4, GFAP，Aβ 和 IL-6 等蛋白的表达。
结果 第一部分：旷场实验显示，小鼠接受手术麻醉后其运动距离与对照组无明显差异，证明手术麻醉不影响小鼠运动功能；与 Con 组相比，Sur 组小鼠出现 Y 迷宫实验自发交替正确率下降，条件恐惧性实验僵直反应百分比显著减低，证明手术麻醉后小鼠认知功能下降；Sur 组小鼠大脑内 AQP4 蛋白表达轻度下降，海马沟回区内出现 Aβ 蛋白轻度沉积，且 GFAP 荧光强度明显增加，表明手术麻醉后星形胶质细胞被激活，且能够引起 Aβ 蛋白沉积；同时小鼠海马 CA1 区内 AQP4 与星形胶质细胞的共标记减少，经颈部淋巴结清除的 Aβ 蛋白减少。第二部分：褪黑激素可以抑制 AQP4 去极化状态引起的 Aβ 蛋白清除减少，减轻 POCD 的症状。与 Sur + Vehicle 组相比，Sur + Mel 组小鼠 Y 迷宫自发交替正确率和条件恐惧实验僵直反应百分比显著增加，海马 CA1 区内 AQP4 去极化状态被抑制，经颈部淋巴结代谢的 Aβ 蛋白增多。
结论 麻醉手术后出现 AQP4 蛋白发生去极化从而引起脑内类淋巴系统清除功能下降，促进脑内 Aβ 蛋白沉积，最终导致认知损伤。褪黑素通过改善麻醉手术后 AQP4 蛋白去极化状态，从而促进脑内淋巴清除，减少 Aβ 蛋白沉积，改善认知功能。

PU-0943

七氟醚静吸复合麻醉对老年脊柱手术患者术后认知功能障碍的影响

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目的 本文为了探讨七氟醚复合丙泊酚的静吸麻醉方法对老年脊柱手术患者术后认知障碍的影响。
方法 选取 2023 年 10 月至 2024 年 4 月在我院拟行脊柱手术的老年患者 76 例，男 48 例，女 28 例，年龄 60-87 岁，BMI18～24 kg /m2，ASA 分级Ⅰ～Ⅲ级，采取数字随机法
将上述受试者随机分为七氟醚静吸复合丙泊酚组（七氟醚组）和丙泊酚全凭静脉组（丙泊酚组），每组患者 38 例。监测七氟醚静吸复合组和丙泊酚全凭静脉组患者的手术与麻醉相关时间（手术时间、恢复自主呼吸时间、 苏醒时间、定向力恢复时间）。详细记录丙泊酚组和七氟醚组患者的手术后苏醒质量（自主呼吸恢复时间、呼之睁眼时间、拔管时间）。在手术之前 1 天、手术后 1 天、手术后 3 天评估两组患者的 MMSE 评分，若术后评分较术前下降≥2 分，认为发生了早期 POCD。
结果 七氟醚组患者和丙泊酚组患者的手术时间、苏醒时间、定向力恢复时间分别为（169.23±29.52）min 和（176.67±30.84）min、（22.16±10.03）min 和（30.01±10.94）min、（8.64±2.06）min 和（12.12±2.86）min。丙泊酚组和七氟烷组患者在手术时间方面，差异无显著的统计学意义（P > 0.05）；但是在苏醒时间和定向力恢复时间方面，七氟醚组显著短于丙泊酚组，差异具有显著的统计学意义（P＜0.05）。七氟醚组和丙泊酚组患者的自主呼吸恢复时间、呼之睁眼时间、拔管时间分别为（12.02±1.12）min 和（15.32±2.86）min、（12.31±1.06）min 和（15.49±1.92）min、（16.42±2.56）min 和（23.46±2.42）min。七氟醚组患者的自主呼吸恢复时间、呼之睁眼时间、拔管时间显著比丙泊酚组患者短，差异具有显著的统计学意义（P＜0.05）。七氟醚组和丙泊酚患者在术前 1 天的 MMSE 评分差异没有显著的统计学意义（P > 0.05）；但是在术后 1 天、术后 3 天的 MMSE 评分，七氟醚组患者显著比丙泊酚组患者更低，差异具有显著的统计学意义（P < 0.05）。 两组术中、术后并发症总体发生率无统计学意义（P > 0.05）。
结论 七氟醚复合丙泊酚麻醉方法能够明显缩短老年患者脊柱手术的自主恢复时间、苏醒时间、 拔管时间、定向力恢复时间，改善术后认知功能障碍。可安全有效的用于老年脊柱手术。

PU-0944

BIS 监测下全麻复合椎旁神经阻滞在老年胸腔镜下肺癌手术中的应用

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目的 探讨不同 BIS 值下全麻复合椎旁神经阻滞在老年胸腔镜下肺癌手术中的应用效果。
方法 选取吉林省肿瘤医院 2021 年 6 月至 2022 年 9 月择期行胸腔镜下肺癌根治术的老年患者 80 例，ASA 分级Ⅱ-Ⅲ级。随机分为四组，对照组为 A 组，实验组为 B、C、D 组，每组 20 例。分别是单纯全身麻醉，BIS 值 50-59 组(A 组，n=20)；单纯全身麻醉，BIS 值 40-49 组(B 组，n=20)；全麻复合椎旁神经阻滞，BIS 值 50-59 组(C 组，n=20)和全麻复合椎旁神经阻滞，BIS 值 40-49 组(D 组，n=20)，全程维持 BIS 值变化幅度在±2%左右。四组患者入室后给予常规心电监护，连接心电图(ECG)，血氧饱和度(SPO2)，无创袖带血压(NIBP)。A、B 组患者直接行全身麻醉，C、D 组患者患侧椎旁神经阻滞给予 0.3%罗哌卡因 20ml 后，行全身麻醉。全麻诱导：地塞米松 10mg，咪达唑仑 0.04-0.06mg/kg，顺阿曲库铵 0.2-0.25mg/kg，依托咪酯 0.2-0.3mg/kg，开皮前 5min 给予舒芬太尼 0.2-0.3ug/kg。分析患者入室时(T0)，手术开始时(T1)，断气管时(T2)，手术结束时(T3)，入苏醒室时(T4)，入苏醒室 30min 时(T5)的心率、平均动脉压，全麻药用量，血管活性药物使用情况，呼吸恢复时间，拔管时间，30 分钟苏醒室 Aldrete 评分，苏醒室恢复时间，是否发生术中知晓及术后认知功能障碍。
结果 （1）血流动力学：A、B 组分别与其 T0 相比，T1、T2 MAP、HR 均升高，T3-T5 与其 T2 比较 MAP、HR 均下降 (P＜0.05)；与 C 组 T0 相比，T1 MAP、HR 下降 (P＜0.05)，T2-T5 与 T0 相比以及互相之间比较无统计学差异；与 D 组 T0 相比，T1-T5 MAP、HR 均显著下降(P＜0.05)。与 A 组比较，B 组 T1-T2 MAP、HR 升高幅度低，C 组 T1-T3 MAP、HR 明显下降；与 C 组比较，D 组 T1-T5 MAP、HR 下降幅度大于 C 组下降程度，以上均有显著差异(P＜0.05)；A 组中与 T3 相比，T5 MAP、HR 升高(P＜0.05)；C 组中 T5 MAP、HR 与 T3 比较，无统计学差异。
（2）全麻用药量：与 A 组比较，B 组丙泊酚用量高于 A 组 (P＜0.05)，C 组丙泊酚用量、舒芬太尼用量及血管活性药物使用次数明显低于 A 组(P＜0.01)；与 C 组比较，D 组丙泊酚用量高于 C 组(P＜0.05)。
（3）术后恢复情况：与 A 组相比，B 组呼吸恢复时间长，术后在苏醒室恢复时间延长(P＜0.05)；C 组呼吸恢复时间、拔管时间明显缩短，在苏醒室恢复时间缩短，(P＜0.01)；与 C 组相比，D 组呼吸恢复时间长、在苏醒室恢复时间延长，(P＜0.05)。A 组 30 分钟 Aldrete 评分明显高于 B 组、低于 C 组；D 组 30 分钟 Aldrete 评分低于 C 组(P＜0.05)。
结论 （1）全身麻醉维持 BIS 值在 40-49 时，术中血流动力学更稳定，但全麻用药量大，苏醒效果差。
（2）术中维持 BIS 值在 50-59 范围时，全身麻醉复合椎旁神经阻滞在老年胸腔镜下肺癌手术中能够保持血流动力学稳定，优化药物合理用量，苏醒及恢复效果好，同时能提供足够的镇痛效果，从而在术后可以更好的稳定血流动力学。

PU-0945

艾司氯胺酮对老年髋关节置换术患者术后谵妄的预防作用

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目的 研究艾司氯胺酮对择期老年髋关节置换术患者是否具有预防术后谵妄的作用。

方法 选择年龄≥65 岁在静脉全身麻醉下实施髋关节置换术的患者 100 例，男 44 例，女 56 例，年龄 65～92 岁，ASA II~III 级，采用随机数字表法将患者随机分为两组：对照组（C 组）和艾司氯胺酮组（S 组），分别在麻醉诱导前静脉注射生理盐水 0.3ml/kg 或艾司氯胺酮 0.3mg/kg 后，接着分别以 0.125ml/kg/h 或 0.125mg/kg/h 速度持续泵注生理盐水或艾司氯胺酮至手术结束。在手术结束前 30min 开启一次性患者自控静脉镇痛泵（两组用药一致）。分别于术后 1d、2 d 和 3d 依据意识模糊评估（CAM）表判断患者是否发生 POD；于术后 6h、24h、48h 和 72h 用 Ramsay 镇静评分法进行镇静评分，用疼痛视觉模拟评分（VAS）评估疼痛程度；所有患者于麻醉前、术后 24 h 和术后 72 h 抽取外周静脉血用化学发光法测定血清 s-100β 蛋白，神经元烯醇化酶（NSE）、TNFα 和 IL-1β 的水平。

结果 与 C 组比较，S 组患者术后 POD 的发生率将低（p＜0.05），术后发生镇静不足者减少（p＜0.05），术后 24h、48h 和 72h 的 VAS 评分较低（p＜0.05），与麻醉前比较，C 组患者术后 24h 血清 s-100β 蛋白、NSE、TNFα 和 IL-1β 水平升高（p＜0.05 或 p＜0.01），术后 72h 血清 NSE 水平升高（p＜0.05）；与 C 组比较，S 组患者术后 24h 和 72 小时血清 s-100β 蛋白、NSE、TNFα 和 IL-1β 水平较低（p＜0.05 或 p＜0.01）。

结论 艾司氯胺酮对择期老年髋关节置换术患者具有一定的预防 POD 发生的作用，其预防 POD 的作用可能与其抗炎作用有关。

PU-0946

Exploring the Causal Relationship between Circulating Inflammatory Proteins and Delirium and Cognitive Function: A Mendelian Randomization Study

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Background Substantial evidence indicates that circulating inflammatory proteins are involved in delirium development. However, the precise causality is unknown due to confounding and reverse causality.

Methods We employed two-sample MR to investigate the causal effects of circulating inflammatory proteins on the risk of delirium and cognitive function. Genetic variants from large-scale publicly available genome-wide association studies were utilized for 91 circulating inflammatory proteins (N = 14,824), delirium (N = 391,931), prospective memory (N = 150,165), and reaction time (N = 432,297). Inverse variance weighting was used as the primary statistical approach, and sensitivity analyses were performed to examine the robustness of the results.

Results Our analysis revealed four potential positive causal effects between inflammatory proteins and delirium, including TRANCE (RANKL), Eotaxin (CCL11), MCP-3 (CCL7), and TNFRSF9 (CD137), while elevated DNER levels were associated with a reduced risk of delirium. Additionally, we found that six proteins, including MCP-2 (CCL8), CD40, IL-1α, IL-24, SULT1A1, and CXCL -1, were protective factors, whereas two proteins, including IL-7 and ADA, were risk factors for cognitive function. Sensitivity analysis revealed that our causal estimates were not biased by heterogeneity or horizontal pleiotropy. The GO enrichment analysis and KEGG pathway analysis revealed several pathways that may contribute to the development of delirium and cognitive function.

Conclusions Our findings suggest a genetically proxied causal role of circulating inflammatory proteins in the pathogenesis of delirium and cognitive function.

PU-0947

低体温风险预测联合主动保温管理在老年手术中的疾病负担研究：基于中国西南区域 24 家医院的多中心、随机、对照研究

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11. 重庆市开州区人民医院
12. 重庆市东南医院
13. 重庆市垫江县人民医院
14. 重庆大学附属三峡医院
15. 天全县中医医院
16. 重庆市黔江中心医院
17. 乐山市市中区人民医院
18. 川北医学院附属医院
19. 云南省第一人民医院
20. 昆明医科大学第三附属医院
21. 四川省成都市都江堰市人民医院
22. 内江市第二人民医院
23. 重庆医科大学附属第三医院
24. 成都市第二人民医院

目的 探索在 60 岁及以上的老年全麻手术患者中，与传统主动保温相比，强化主动保温是否能够在减少术中低体温与其相关的不良事件发生率的同时，不会增加患者的负担。

方法 本研究为一项随机、平行分配、开放标签、多中心的临床试验，选择来自重庆市、四川省、云南省和贵州省 24 家医院的需要在全麻下进行超过 30 分钟择期手术的老年患者（≥60 岁）。患者入选时间为 2022 年 6 月至 2023 年 7 月，最后一次随访时间为 2023 年 8 月。共 1596 名患者符合条件，按排除标准筛选后，剩余的 1360 例患者以 1：2 的比例随机分为常规主动保温组与强化主动保温组。考虑到老年患者术中低体温的发生率更高，且更容易发生不良事件，故所有患者都接受了液体加温或液体预热，并使用围术期低体温预测手机应用程序（黄宇光. 围术期低体温预测方法: CN111248871A[P]. 2020.）计算所有患者的低体温预测评分。在此基础之上，常规主动保温组使用棉毯覆盖；强化主动保温组中预测评分≤70 的患者采用与常规主动保温组相同的保温措施，＞70 分的患者加用一次性无菌充气式升温毯。采用已制定的标准化腋温测量方法测量术中体温。

结果 在 1360 名随机分组的患者中，1317 名患者纳入了主要结果分析（30 人撤回知情同意书，13 人发生严重出血或休克）。常规主动保温组术中低体温的发生率为 48.3%，强化主动保温组为 18.9% (unadjusted RD, 29.3%; 95% CI, 24.0% to 34.5%)，经调整的 OR 为 6.27(95% CI, 4.63 to 8.48, P < .001)。常规主动保温组 14 例（3.0%）和强化主动保温组 62 例患者（7.3%）输血量相似 (unadjusted MD, -110; 95% CI, -300 to -100) (adjusted P = 0.30)；两组失血量(unadjusted MD, -15; 95% CI, -20 to -10)、静脉输液量 (unadjusted MD, -150; 95% CI, -200 to -100)和冲洗液量 (unadjusted MD, -100; 95% CI, -250 to 0)的差异无统计学意义。常规主动保温组在麻醉恢复室的体温过低发生率显著高于强化主动保温组 (unadjusted RD, 27.4%; 95%CI, 22.2% to 32.6%)。两组患

者术后住院费用 (unadjusted MD, -589.42; 95% CI, -1210.75 to 12.83)、术后住院时间 (unadjusted MD, -0.8; 95% CI, -1 to 0)、总住院费用 (unadjusted MD, -2663.13; 95% CI, -4121.52 to -1239.21) 、总住院天数(unadjusted MD, -1.42; 95% CI, -1 to 0)相似。常规主动保温组术后 30 天内报告的并发症总数超过强化主动保温组(unadjusted RD, 0.8%; 95% CI, -1.1% to 3.0%)。两组术后 30 天再次入院(unadjusted RD, 0.3%; 95% CI, -1.5% to 2.6%)和死亡率 (unadjusted RD, 0; 95% CI, -10.7% to 1.2%) 相似。没有患者发生烫伤。

结论 与传统主动保温相比，强化主动保温不仅降低了术中低体温以及与其相关不良事件的发生率，而且没有显著增加低体温高风险老年患者的负担。强化主动保温对此类老年患者来说应是一种有益的方法。

PU-0948

术前合并脑卒中老年患者术中脑氧饱和度变化与术后认知功能转归相关性的研究

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目的 本研究探讨术前合并缺血性脑卒中老年患者接受腹部手术术后谵妄（Postoperative delirium, POD）及神经认知恢复延迟（Delayed neurocognitive recovery, DNR）发生率，评估两组患者术中局部脑氧饱和度变化（Regional cerebral oxygen saturation, rScO2）与术后认知功能转归的相关性。

方法 本研究是一项单中心、前瞻性、观察性队列研究。自 2021 年 12 月至 2023 年 11 月于四川省人民医院招募老年择期腹部手术患者。根据患者术前颅脑影像学及脑卒中临床表现分为对照组和卒中组。收集患者术前基线资料以及术前 1~3 天使用 MMSE（Mini-mental State Examination, MMSE）和 MoCA（Montreal Cognitive Assessment, MoCA）量表评估基线认知功能，术后 4~7 天复测 MMSE 和 MoCA 量表。术后 1~3 天每天 18:00-20:00 使用 CAM（The Confusion Assessment Method, CAM）或 CAM-ICU 量表（The Confusion Assessment Method for the Intensive Care Unit，CAM-ICU）评估 POD。所有患者术中常规全麻，排除特殊用药。全程进行 rScO2 监测，采集术中动脉血气。计算两组患者术后 1~3 天 POD 及 4~7 天 DNR 发生率，比较两组患者术中 rScO2 变化；进一步探讨 POD 与 rScO2 关系，并使用 Logistics 回归分析探索 POD 发生的相关危险因素。

结果 336 例患者纳入分析，每组 168 例。两组患者基线资料中，卒中组 ASA 分级高于对照组（P<0.05）。与对照组相比，卒中组 POD（40.5% vs 26.8%，相对危险度[RR]: 1.34，95%置信区间[CI]: 1.09-1.81，P<0.05）及 DNR 发生率均更高（16.7% vs 8.9%，RR: 1.50，95%CI: 1.03-2.36，P<0.05）。卒中组术中 rScO2 均值低于对照组（P<0.05）。本研究总体 POD 发生率为 33.6%（113/336）。与未发生 POD 患者比较，POD 患者 rScO2 值低于阈值持续时间（<80%基线、<85%基线）更长（P<0.05），低于阈值下面积（<80%基线、<85%基线）更大（P<0.05）。多因素分析显示，高龄、合并缺血性脑卒中、术中动脉血乳酸及 CO2 分压升高、术后第一天疼痛评分较高是择期腹部手术老年患者 POD 发生的危险因素。

结论 术前合并缺血性脑卒中老年患者行择期腹部手术 POD 风险增高，且这类患者术中 rScO2 均值降低，提示术前颅脑影像学筛查对认知预后有一定预测意义。发生 POD 患者更易发生术中 rScO2 降低，这可能是导致 POD 的机制之一。

PU-0949

ESP 阻滞复合全身麻醉对老年患者胸腔镜肺叶切除术后镇痛、睡眠质量及炎症反应的影响

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目的 竖脊肌神经阻滞是作为最近提出的一种镇痛措施。目前用于老年全麻胸腔镜患者围术期镇痛的研究较少。超声引导下的竖脊肌阻滞值得进一步推广应用，优化围术期麻醉管理对于改善患者术后睡眠质量有着重要作用。

方法 入室后，行心电图、血压、心率、脉搏血氧饱和度（SpO2）等常规监测，建立外周静脉通路。ESP 组在麻醉诱导前行超声引导下 ESP 阻滞，具体操作：患者采取健侧卧位，于患侧 T4 椎旁矢状位放置超声高频探头，后正中线旁开 3 cm，超声图像可显示竖脊肌及横突，利用平面内技术进针，调整横突至探头正中位置，将穿刺针垂直皮肤刺入，到达横突。回抽无血后，予以 0.5%罗哌卡因（江苏恒瑞医药）20 ml 注射，可见药液于竖脊肌与横突之间扩散开来。在阻滞 20 min 以后，应用针刺法测试局部区域来确认神经阻滞成功，然后再行麻醉诱导。

结果 与全麻组比较,ESP 组术中丙泊酚
用量、瑞芬太尼用量及术后 48 h 内镇痛泵按压次数均明显减少,补救镇痛率明显降低(均 P＜0. 05)。术后 1 d 晚和术后 2 d
晚,两组睡眠效率指数(SEI)、快动眼睡眠时间在总睡眠时间中所占的百分比(REM)较术前 1 d 明显降低,觉醒指数(AI)较术
前 1 d 明显增高(均 P＜0. 05);与全麻组比较,ESP 组术后 1 d 和 2 d 夜晚的 SEI 较高,AI 较低,差异有统计学意义(P＜0. 05)。
ESP 组术后日间嗜睡发生率显著低于全麻组(P＜0. 05)。 术后 24 和 48 h,两组 IL-6、IL-8、TNF-α 水平较术前 24 h 均明显增高
(P＜0. 05);与全麻组比较,ESP 组术后 24 和 48 h 的血清 IL-6、IL-8、TNF-α 水平均显著较低(P＜0. 05)。

结论 ESP 阻滞复合全身麻醉能够有效改善老年胸腔镜肺叶切除术患者术后睡眠质量,其可能是通过提高术后镇痛效果、减轻炎症应激反应来实现的

PU-0950

Association between cerebrovascular disease and perioperative neurocognitive disorders

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Purpose With the development of in surgical and anesthetic techniques, the number of surgeries performed on elderly patients was increasing annually. The incidence of perioperative neurocognitive disorders (PNDs) in these patients has gradually drawn the attention of researchers. PNDs include postoperative delirium (POD) and postoperative cognitive dysfunction (POCD). It seriously affect patients' postoperative recovery, prolong the duration of hospitalization, increase the risk of perioperative death, and affect the long-term prognosis of patients. Previous studies have shown that the risk of POD in perioperative stroke patients was much higher than that in patients without stroke, moreover, the incidence of cognitive decline at 1 year postoperatively was also higher. However, it remains unkown that whether the presence of CVD preoperatively

increases the risk of PNDs and whether this is a predictive factor for the occurrence of PNDs. Therefore we performed this large-sample retrospective cohort study to clarify the correlation between preoperative CVDs and PNDs.

Methods This retrospective cohort study recruited 13,899 surgical patients of a large scale comprehensive hospital between January 2021 and January 2022 to explore the association between preoperative CVD and PNDs, with follow-up to monitor postoperative survival until February 28, 2023, unless the patient died. The study participants comprised all inpatients from the Bone and Joint Surgery, Spine Surgery, Urology, Hepatobiliary Surgery, Gastrointestinal Surgery, and Thoracic Surgery departments. Patients were categorized into two groups, including the CVD group and the non-cerebrovascular disease (NCVD) group. CVD was diagnosed by radiologists based on the ICD diagnostic criteria combined with the patient's past history, CT, or MRI data. The primary outcome of this study was the incidence of PNDs. The ICD-10 diagnostic criteria were used by a psychiatrist to determine whether the patients had PND postoperatively. The secondary outcome measure was patient's mortality during one year follow-up after discharge. Statistical analysis was performed using SPSS 28.0 (IBM, Armonk, USA) software. We used propensity score matching (PSM) analysis to reduce the selection bias between two groups of patients. The continuous variables were distributed using either the t-test or rank sum test, as mean ± SD or M (IQR). The categorical variables were analyzed using the $\chi 2$ or Fisher test and expressed in counts (%). The parameters with $P<0.1$ in the univariate analysis were included in the multivariate logistic regression analysis to explore the risk factors of PNDs. A multivariate logistic clinical prediction model was constructed to predict the occurrence of PND. We also tracked the postoperative survival of all patients, and the survival curve was constructed and incorporated into the Cox proportional hazard regression model to explore the relationship between preoperative CVD and overall postoperative overall survival rate.

Results Of the included 13,899 patients, propensity score matching yielded 976 patient pairs. Multivariate logistic regression analysis revealed that CVD was an independent risk factor for PNDs [Odds ratio, 2.743; 95% confidence interval: 2.011–3.741; $P<0.001$]. The PNDs clinical prediction model constructed by using indicators including age, sex, treatment departments, hypertension, diabetes, and hyperlipidemia, and history of antibiotic use had the highest predictive value for the incidence of PNDs in patients with preoperative CVD. The area under the ROC curve was 0.718 (95 % CI: 0.685-0.752) and the Hosmer–Lemeshow test suggesed high goodness of fit ($P=0.061>0.05$). Furthermore, the survival data of 11,702 patients was followed up, the overall loss-to-follow-up rate was 15.8%. The overall postoperative survival rate for all patients in the complete, unmatched cohort was 88.5% (10,357/11,702). After PSM, the overall postoperative survival rate was 86.4% (1166/1348) in the matched cohort of 1348 cases. The overall postoperative survival rate of patients in the CVD group was significantly lower than that of those in the NCVD group ($P<0.001$). Multivariate Cox hazard ratio regression analysis revealed that preoperative CVD significantly decreased the overall postoperative survival rate (Hazard ratio 1.702; 95% confidence interval: 1.258–2.303; $P=0.001$) of these patients.

Conclusion In conclusion, this study found that preoperative CVD was an independent risk factor for PNDs. The PNDs clinical prediction model we eatablished had the highest predictive value for the incidence of PNDs in patients with preoperative CVD with a AUC of 0.718 (95 % CI: 0.685-0.752). And also, we found preoperative CVD significantly increased the risk of motality of surgical patients in one-year follow up after discharge.

PU-0951

小胶质细胞 TREM2 介导 PI3K/Akt 通路在合并缺血性脑卒中致术后认知功能改变的机制研究

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目的 合并缺血性脑卒中与出现术后认知功能障碍的不良预后相关，术前合并缺血性脑卒中增加术后认知功能障碍发生率。丰富环境是（Enriched Environment，EE）一种无创的、有效的激活小胶质细胞 TREM2 的训练手段，小胶质细胞 TREM2 通过激活 PI3K/Akt 信号通路，抑制中枢炎症反应，改善认知功能。此次报告了丰富环境在合并缺血性脑卒中改善术后认知功能障碍研究的初步结果。①明确术前合并缺血性脑卒中可加重术后认知功能障碍发生；②确定丰富环境可通过上调小胶质细胞 TREM2 表达改善术后认知功能障碍；③阐明小胶质细胞 TREM2 通过上调 PI3K/Akt 信号通路减轻中枢炎症反应，降低术后认知功能障碍发生。
方法 通过光化学栓塞卒中法（Photothrombotic stroke，PT）建立缺血性脑卒中小鼠模型，分组为 Sham+SE 组、Sham+EE 组、PT+SE 组、PT+EE 组，随后进行模型验证相关实验。进行腹部手术，报告不同分组小鼠术前术后的神经认知功能改变情况，以及对于 TREM2/PI3K/Akt 的表达评价。
结果
①评价缺血性脑卒中模型：缺血性脑卒中模型的小鼠脑组织表现出缺血梗死灶；丰富环境可以改善缺血性脑卒中导致的小鼠运动学习能力降低；丰富环境可以改善缺血性脑卒中导致的小鼠神经功能轻度损伤。
②TREM2 在合并缺血性脑卒中加重术后认知功能障碍的机制研究：丰富环境可以改善术前合并缺血性脑卒中导致的术后认知功能障碍；术前合并缺血性脑卒中上调术后海马 IL-6、TNF-α 的表达，丰富环境上调术后海马 IL-4、IL-6、BDNF 的表达；TREM2 主要与小胶质细胞共定位；合并缺血性脑卒中增加术后促炎型小胶质细胞标志物 CD86 的表达，减少 BDNF、TREM2、DAP12、PI3K、Akt 的表达；丰富环境上调抑炎型小胶质细胞标志物 PPAR-γ、Arg-1 的表达，增加 BDNF、TREM2、DAP12、PI3K、Akt 的表达。
结论 合并缺血性脑卒中的小鼠手术前给予丰富环境训练，可以上调小胶质细胞 TREM2 表达，通过激活 PI3K/Akt 通路减轻中枢炎症反应，改善术后认知功能障碍。

PU-0952

Risk factors of serious postoperative outcomes in patients aged ≥90 years undergoing surgical intervention

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Objective We aimed to identify preoperative and intraoperative factors associated with serious postoperative outcomes, which may help patients and clinicians make better-informed decisions.
Methods We conducted a retrospective study including all patients aged ≥90 years who underwent surgery between January 1, 2011, and January 1, 2021, at Chongqing University Central Hospital. We assessed 30 pre- and intraoperative demographic and clinical variables. Logistic regression was used to identify the independent risk factors for serious postoperative outcomes in patients aged ≥90 years.
Results A total of 428 patients were included in our analysis. The mean age was 92.6 years (SD ± 2.6). There were 240 (56.1%) females and 188 (43.9%) males. The most common comorbidities

were hypertension (44.9%) and arrhythmias (34.8%). The 30-day hospital mortality was 5.6%, and severe morbidity was 33.2%. Based on the multivariate logistic regression classification analysis of the American Society of Anesthesiologists (ASA)≥ Ⅳ [odds ratio (OR), 5.39, 95% confidence interval (CI), 2.06–14.16, P = 0.001], emergency surgery (OR, 5.02, 95% CI, 2.85–15.98, P = 0.001) and chronic heart failure (OR, 6.11, 95% CI, 1.93–13.06, P = 0.001) were identified as independent risk factors for 30-day hospital mortality, and ASA≥ Ⅳ (OR, 4.56, 95% CI, 2.56–8.15, P < 0.001), Barthel index (BI) < 35 (OR, 2.28, 95%CI, 1.30–3.98, P = .001), chronic heart failure (OR, 3.67, 95%CI, 1.62–8.31, P = 0.002), chronic kidney disease (OR, 4.24, 95%CI, 1.99–9.05, P < 0.001), general anesthesia (OR, 3.31, 95%CI, 1.91–5.76, P < 0.001), emergency surgery (OR, 3.72, 95%CI, 1.98–6.99, P < 0.001), and major surgery (OR, 3.44, 95%CI, 1.90–6.22, P < 0.001) were identified as independent risk factors for serious postoperative complications.

Conclusions Patients aged ≥90 years with ASA≥ Ⅳ, BI < 35, combined with chronic heart failure or chronic kidney disease, undergoing emergency surgery, major surgery or general anesthesia have a higher risk of serious postoperative outcomes. Identifying these risk factors in an early stage may contribute to our clinical decision-making and improve the quality of treatments.

PU-0953

The impact of anesthesia methods on postoperative outcomes of lower limb surgeries in elderly patients over 90 years old: A multicenter propensity-matched study.

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Purpose This study aimed to assess the impact of different anesthesia methods on postoperative outcomes of lower limb surgeries in elderly patients over 90 years old.

Patients and methods We retrospectively reviewed the medical records of elderly patients over 90 years old who underwent lower limb surgeries at Chongqing University Center Hospital, the Affiliated Hospital of Southwest Medical University, and Chongqing General Hospital from January 2012 to December 2022. According to the anesthesia method, they were divided into two groups, general anesthesia (GA)group and regional anesthesia (RA) group. To reduce potential confounding, propensity score matching (PSM) in a 1:1 ratio was performed, with the caliper value set as 0.1; and further univariate analysis was used to compare the incidence of postoperative important organ complications and mortality between the GA and RA groups.

Results A total of 560 patients were included in our analysis, 363 cases received general anesthesia (GA) and 197 cases received regional anesthesia (RA). After propensity score matching (PSM), 139 pairs of data were successfully matched. Compared with the RA group, the GA group had a higher incidence of postoperative pulmonary complications (23% vs. 3.6%, P = 0.020), a higher incidence of postoperative sepsis (5.8% vs. 0.7%, P = 0.036), a higher incidence of postoperative ICU admission rate (44.6% vs. 20.9%, P = 0.000), but a lower incidence of intraoperative blood transfusion (46% vs. 59%, P = 0.031).No statistically significant differences were observed in other perioperative indices between the two groups.

Conclusion GA may increase the risk of postoperative pulmonary complications and sepsis but reduce the need for intraoperative blood transfusion compared with RA in elderly patients over 90 years old undergoing lower limb fracture surgeries.

PU-0954

THE EFFICACY AND SAFETY OF PERIPHERAL NERVE BLOCK COMBINED WITH LOW-DOSE GENERAL ANESTHESIA IN ELDERLY PATIENTS RECEIVING HIP ARTHROPLASTY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background To evaluate the efficacy and safety of nerve block combined with low-dose general anesthesia in elderly patients undergoing hip arthroplasty by meta-analysis of randomized controlled trials (RCTs).
Methods The Cochrane Library, Cochrane Anesthesia Group Database, MEDLINE, EMbase, PubMed, Ovid, Springer CBM, CNKI, VIP, Wanfang data and other databases were searched electronically.Retrieval routine nerve block combined with general anesthesia in elderly patients with hip arthroplasty in a randomized controlled trial (RCTs). Then, RevMan 5.3 software was used to complete the meta-analysis.
Results Six RCTs met the inclusion criteria with 403 patients. Meta-analysis showed that there was a statistically significant difference in pain scores at postoperative 12 h (MD=-1.37; 95% CI, -2.39 to -0.35; P=0 .008.Chi² = 204.90; df = 4; P ＜0 .00001; I² = 98%)and 24 h(MD=-1.18; 95% CI, -1.86 to -0.50; P=0 .0007.Chi² = 29.05; df = 2; P ＜0 .00001; I² = 93%).Nerve block combined with general anesthesia has a significant advantage over conventional general anesthesia in perioperative opioid consumption. (MD=-22.90; 95% CI, -38.32 to -7.48; P=0.004.Chi² = 440.50; df = 4; P ＜0 .00001; I² = 99%) . Nerve block combined with general anesthesia was superior for reducing the incidence of complication(MD=0.24; 95% CI, 0.11 to 0.55; P=0.0007).The two groups there was no statistically significant difference in 48 h pain score.(MD=-0.98; 95% CI, -2.58 to 0.62; P=0.23).
Conclusion Nerve block combined with low-dose general anesthesia can effectively relieve early postoperative pain after hip arthroplasty. At the same time, it can reduce the consumption of general anesthesia and reduce the risk of postoperative complications.

PU-0955

老年前列腺癌根治术患者术后谵妄的危险因素分析

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目的 分析老年前列腺癌根治术患者术后谵妄（POD）的危险因素，并建立 POD 预测模型，绘制诊断效能最佳模型的列线图，为早期识别高危人群和制定预防干预策略提供依据。
方法 收集择期行前列腺癌根治术的老年患者 183 例，年龄≥65 周岁，ASA 分级 I 至 III 级，根据术后 7 天内是否出现谵妄分为谵妄组和非谵妄组。手术前 1 天应用简易精神状态检查量表（MMSE）、焦虑症筛查量表（GAD-7）、衰弱筛查量表（FRAIL）、代谢当量（MET）、年龄校正查尔森合并症指数量表（ACCI）、抑郁症筛查量表（PHQ-9）和匹兹堡睡眠质量指数量表（PSQI）评估患者术前认知、焦虑、衰弱、体能状态、并存疾病、抑郁和睡眠水平等。术后第 1 天至术后第 7 天应用

谵妄诊断量表（3D-CAM）和疼痛数字评分法（NRS）评估患者谵妄的程度和静息时的疼痛情况。采用单因素分析筛选出 POD 的相关因素，并采用多因素 Logistic 回归分析筛选出独立危险因素，以独立危险因素为依据建立模型。使用 R 语言计算和绘制模型的 C-index、ROC 曲线、模型校准曲线、DCA 曲线，并进行五折交叉验证，最终绘制效能最佳模型的列线图。

结果 最终有 156 例患者完成所有随访，其中有 24 例患者（15.38%）出现 POD。高龄、术前合并症多、术前焦虑、术前衰弱、术前睡眠障碍、术前体能状态差、术前血糖水平高、术中使用抗胆碱药物、术中出血多、术后感染和术后疼痛是 POD 的潜在因素。多因素 Logistic 回归分析显示，术前睡眠障碍（OR=12.931,95%CI 1.191～140.315，P=0.035）、术前合并症多(OR=2.608,95%CI 1.143～5.950，P=0.023)、术后感染(OR=19.298,95%CI 2.53～147.2O2,P=0.04)、术后疼痛(OR=4.033,95%CI 1.062～15.324,P=0.041)是 POD 的独立危险因素，且术后感染为 POD 的最强的独立危险因素。以此构建的模型(术后感染+ACCI+术前睡眠障碍+NRS）经过内部验证后得出该模型的 C-index 为 0.963（95%CI 0.944～0.983）,ROC 曲线显示，该模型预测 POD 发生风险的曲线下面积 AUC 为 0.973（95%CI 0.949～0.996）,DCA 分析显示该模型具有较好的临床实用性。

结论 老年前列腺癌根治术患者 POD 发生率为 15.38%。术前睡眠障碍、术前合并症多、术后感染、术后疼痛是老年前列腺癌根治术患者术后谵妄的独立危险因素。依此构建的模型对 POD 发生风险具有良好的预测效能。

PU-0956

不同剂量罗哌卡因腰麻联合髂筋膜神经阻滞对老年髋关节置换术患者影响

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目的 通过采用不同剂量罗哌卡因进行单次剂量腰麻联合腹股沟韧带上方髂筋膜神经阻滞，观察老年患者在进行髋关节置换手术时生命体征的各项变化，以及手术后因麻醉原因可能出现并发症的相关数据，从而得出联合髂筋膜神经阻滞时有利于老年患者快速恢复的罗哌卡因的合适腰麻剂量，为后续此类手术麻醉方式和腰麻剂量的选择以及硬膜外是否需要置管等方面提供了参考，也为今后两者麻醉相结合或者采用单一腰麻时罗哌卡因可使用的更小剂量甚至最小剂量的研究提供可能。

方法 本次研究为干预性随机对照研究，随机选择 2023 年 1 月-2023 年 12 月准备进行单侧髋关节置换术的老年患者 60 例，年龄 70-80 岁，体重指数 18.5-23.9kg/㎡，身高 155-175cm；体重 45-65kg，ASA I—III 级，且手术时长≤2h，将采用随机数字表的方法分三组（A、B、C），每组患者各 20 例。三组患者腰麻前均给予单次相同剂量的罗哌卡因进行髂筋膜神经阻滞（0.3%罗哌卡因 30ml），随后 A、B、C 三组患者均采用侧卧位腰硬联合麻醉（L3-4），并随机给予不同剂量的单次腰麻，即 1%罗哌卡因 1.2ml、1.0ml、0.8ml 与脑脊液分次等比例混合，腰麻针斜口向上，以每 5s 注射 1ml 的速度推注，并留置硬膜外腔头向置管。观察患者的麻醉效果，采用冷热法或针刺法测定麻醉平面，每 5 min 一次。术中血压（BP）和心率（HR）的监测，以腰麻给药前 1min 的血压（BP）和心率（HR）为基础值（T0），监测腰麻后 5min（T1），15min（T2），30min（T3），术毕（T4）的生命体征，连续监测 ECG，记录术中血管活性药使用例数（收缩压下降到 90mmHg 或低于麻醉前 30%，静脉给予麻黄碱 5-10mg 纠正低血压；心率降低到 50 次/分以下时给予阿托品 0.3-0.5mg），记录三组患者肌力恢复、拔除尿管及首次下地行走时间以及患者术后运动、神经等相关并发症及总住院时间，记录患者术后镇痛效果（术后 12h、24h、48h 视觉模拟评分 VAS），调查患者的满意度情况。在本次研究中，当患者平面到 T12 时出现不能满足手术所需镇痛和肌松要求时给予硬膜外追加药物或更改麻醉方式，如全身麻醉，直至满足手术需求，本次研究去除该病例。同时在术后 VAS 评分中分值较高，出现患者难以忍受的疼痛时给予曲马多进行止痛处理。

结果 1.在血流动力学及血管活性药使用方面，随着 1%罗哌卡因剂量的减少 C 组患者 SBP、DBP、HR 明显较 A、B 两组稳定，存在统计学意义(P<0.05)；A 组与 B 组间比较没有表现出有统计学的差异

(P>0.05)。三组患者循环波动时，血管活性药物的使用情况比较，有统计学意义(P<0.05)，其中 C 组患者使用次数(5%)与 A 组(45%)和 B 组(20%)相比明显减少。
2.A 组的麻醉阻滞主要发生在 T4-T6 的区域，占比达到 65%；B 组和 C 组的麻醉阻滞平面主要分布在 T8-T11 之间，分别占比 55%和 90%，其中 C 组有 1 例患者麻醉阻滞平面≤T12，与 A 组和 B 组相比，C 组的麻醉阻滞平面的差异在统计学上是有意义的（P<0.05）。值得注意的是，三组患者术中麻醉阻滞平面均未发现超过 T4。
3.三组患者在肌力恢复方面，C 组与 A、B 两组患者比较均存在统计学差异(P<0.05)。C 组患者在尿管拔除时间上与 A、B 两组相比，更早拔除尿管，存在统计学差异(P<0.05)。同时 C 组患者比 A、B 两组患者首次下地行走时间更早，有统计学意义(P<0.05)。
4.三组患者在术后 12h、24h、48hVAS 评分上未发现有显著的统计学意义(P>0.05)。值得注意的是 C 组有两例患者在术后 24-48h 内使用了曲马多。
5.三组患者在手术后的神经损伤和运动功能异常方面，并没有观察到统计学上的显著差异(P>0.05)，也未发生腰麻后因神经损伤导致下肢感觉和活动异常情况，同时三组患者在总住院时间方面，也未发现有明显的差异性(P>0.05)。
6.三组患者在满意度方面均未发现显著的统计学差异(P>0.05)。
结论 该项研究结果提示在髋关节置换术中 0.8ml1%罗哌卡因与脑脊液等比例混合进行单次腰麻同时联合 0.3%罗哌卡因 30ml 进行髂筋膜神经阻滞时术中血流动力学较为稳定，且术中不需要硬膜外追加药物或更改麻醉方式，术后早期镇痛效果确切，不良反应少，同时术后首次下地行走及拔除尿管所需时间更短，对老年患者术后快速康复更加有利，值得推荐。

PU-0957

未控制高血压病人择期中小型手术的麻醉

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目的 研究瑞芬太尼、丙泊酚应用于未控制高血压病人择期中小型手术的麻醉效果。
方法 选择未控制高血压病人 86 例，ASA1～4 级（ASA1～2 级 66 例，ASA3 级 16 例，ASA4 级 4 例），年龄 28～89 岁，体重 48～98kg。其中高血压并冠心病 2 例，高血压并心电图异常 15 例，高血压并糖尿病 3 例，高血压并其它系统疾病 2 例。均拟行择期中小型手术（LC 术 58 例，结肠癌手术 5 例，甲状腺手术 10 例，颅内胶质瘤手术 7 例，子宫全切手术 6 例）。手术时间 116±80.6min。
1.2 麻醉方法
麻醉前均免用术前药，入手术室后开放静脉，所有患者入室后行 ECG、SpO2 监测，采用丙泊酚 2～3mg/kg、舒芬太尼 0.4～0.6μg/kg、顺阿曲库铵 0.15～0.2mg/kg 静脉注射诱导。用可视喉镜行气管内插管。成功后接 Drager 麻醉机控制呼吸，间歇正压通气（IPPV），潮气量 8～10ml/kg，频率 12 次/分，吸呼比（I:E=1:2），维持呼气末二氧化碳分压（PETCO2）在 25～35 mmHg。部分 ASA3 级和所有 ASA4 级病人，超声引导下行右侧颈内静脉穿刺，成功后置入三腔中心静脉导管，监测中心静脉压（CVP）并指导术中补液；ASA4 级病人行桡动脉置管，监测直接动脉血压。麻醉维持：连续静脉泵注瑞芬太尼（0.3～0.4μg /kg/min），泵注阿曲库铵（1～2μg /kg/min）维持肌肉松驰，丙泊酚效应室浓度 2～5μg/ml 靶控输注,间断吸入七氟烷,将麻醉深度维持在 BIS 值 40～60，初始速度为瑞芬太尼 0.2～0.3ug/kg/min、丙泊酚 50～100ug/kg/min，术中依据病人对手术刺激的反应，酌情调整药物输注速度，手术结束前 5min 停止输注麻药。
1.3 观察、记录指标
病人自主呼吸通气量接近麻醉前，呼吸空气 5minSpO2 仍然维持在 95%以上，经充分吸痰后，拔除气管导管。ASA1～3 级病人送回病房，ASA4 级病人全部送 ICU 病房进一步监测治疗。记录麻醉前、诱导后（A）、气管插管后（B）、麻醉手术中（C）、气管拔管前（D）SP、DP、HR、SpO2。并记录手术结束后 5min 内苏醒例数、麻醉术中严重高血压、严重低血压、术后高血压严重并发症例数。
结果 麻醉效果好，麻醉手术中血压易控制，剧烈循环波动发生率低，术后未发生高血压严重并发症。

结论 维持血流动力学平稳，保证组织器官的血流灌注，避免血压剧烈波动，防止血压过低或过高引起的并发症，是未控制高血压病人麻醉的关键。瑞芬太尼、丙泊酚应用于未控制高血压病人的麻醉，方法简便、安全、易于掌握和实施，血压控制时血压下降平稳，无药物耐受现象和反跳现象。对病人生理干扰相对于其它降压药物小，在获得良好全身麻醉效果的同时，又能有效地实施控制性降压。为未控制高血压病人提供了一种安全可靠的麻醉方法，减少了未控制高血压病人住院时间和住院总费用，有助于解决群众住院难、住院贵的实际问题。

PU-0958

老年腹膜后肿瘤患者麻醉管理要点与预后分析

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目的 总结并分析老年患者行腹膜后肿瘤切除术的麻醉管理要点及影响患者预后的危险因素，为此类患者的围术期管理提供参考。
方法 回顾自 2015 年 1 月至 2022 年 12 月收治于北京大学国际医院、在全身麻醉下实施腹膜后肿瘤切除术、年龄≥65 岁的老年患者麻醉管理情况，收集所有患者基本资料（性别、年龄、BMI、术前合并症、手术史）、麻醉管理、手术方式及围术期实验室检查结果，记录术中失血量、补液量和血液成分输注情况，记录手术时长、麻醉时长、住院时长和术后住院时长，收集患者术后并发症情况，依据手术后并发症 Clavien-Dindo 分类法将并发症分为 5 级，并对住院时长、术后住院时长和术后严重并发症的危险因素进行分析。
结果 共计 248 例患者纳入本研究，男 136 例，女 112 例，平均年龄 69.7±4.4 岁，术前 ASA 分级Ⅱ级 134 例，III 级 106 例，IV 级 8 例。二次及以上手术患者 129 例（52.0%），手术和麻醉时长分别为 287.2±132.0 min 和 362.9±135.9 min。术中采用目标导向性液体管理，根据输血指征补充血制品。术毕 198 例（79.8%）患者拔管回病房，50 例（20.2%）患者入 ICU 继续治疗。患者住院时长 38.0±21.9 天，术后住院时长 26.5±20.7 天，多重线性回归分析示住院时长和术后住院时长与术中应用凝血酶原复合物及术毕血糖水平呈正相关。术后出现严重并发症（Clavien-Dindo 分级≥3a）44 例，其中死亡 4 例，死亡原因是感染中毒性休克、失血性休克和多器官功能衰竭。多因素 Logistic 回归分析显示男性、术中输注人工胶体液、术毕乳酸水平是术后严重并发症的独立危险因素。
结论 老年患者行腹膜后肿瘤切除手术需要完善的术前准备和更加精准的麻醉管理，术中避免输注人工胶体液，谨慎输注凝血酶原复合物，关注男性患者、术毕血糖和乳酸水平，进行针对性处理有助于改善患者预后。

PU-0959

AI 陪伴改善老年病人术后认知功能障碍

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目的 老年病人术后认知功能障碍（Postoperative Cognitive Dysfunction, POCD）是一种常见且严重的术后并发症。它主要表现为记忆力减退、注意力不集中、语言功能受损等，这些症状不仅给患者的日常生活带来不便，还可能导致长期的认知能力下降。随着人口老龄化的加剧，越来越多的老年患者需要接受各种手术，而 POCD 的发生率也随之增加。据统计，60 岁以上患者中有高达 30%-50%在术后出现不同程度的认知功能障碍 。POCD 不仅影响患者的生活质量，还对家庭和社会带

来了沉重的负担。患者可能因为认知障碍失去自理能力，增加了护理需求和医疗费用。此外，POCD 还与术后并发症增加、康复时间延长以及死亡率提高密切相关 。目前，对于 POCD 的治疗和管理主要依赖于药物、物理康复以及心理支持等传统方法。然而，这些方法在实践中存在诸多局限性。例如，药物治疗往往伴随着副用，并且无法针对个体患者的具体需求进行调整 。物理康复和心理支持虽然有一定的效果，但由于资源有限，难以覆盖到每一位患者，且效果依赖于患者的参与度和持续性 。此外，缺乏有效的早期识别和干预手段使得许多患者在症状严重时才得到治疗。人工智能（AI）技术近年来在各个领域展现出了巨大的潜力，尤其是在医疗保健方面。AI 可以通过自然语言处理、机器学习、计算机视觉等技术，提供个性化的解决方案和自动化的服务 。在 POCD 的管理中，AI 可以通过以下几个方面提供支持：自然语言处理（NLP）：AI 可以通过与患者进行对话，实时监测他们的认知状态，并提供个性化的认知训练和支持 。机器学习：AI 可以分析大量患者的数据，识别出 POCD 的早期征兆，并根据患者的具体情况提供个性化的治疗建议 。虚拟陪伴：AI 可以模拟人类陪伴，为患者提供情感支持和互动，帮助他们缓解术后焦虑和孤独感，这对于老年患者尤为重要 。本研究旨在开发和评估一种基于聊天人工智能的系统，专门用于帮助老年病人术后恢复认知功能。

方法 一、技术架构

NLP 模块：利用 Transformers 进行语音识别，将老年患者的语音转文本；用 GPT-4 生成流畅对话内容。

认知训练模块：包括记忆训练（词汇回忆、照片配对）、注意力训练（找不同、快速反应游戏）、语言练习（词汇扩展、句子重组）。

用户界面：设计简洁、易用，支持多设备。

二、开发流程

需求分析：访谈老年患者、护理人员及医疗专家，确定系统功能（对话引导、认知训练、情感支持）。

原型设计：从低保真到高保真，经过反馈和改进。

系统实现：模块化开发和集成，内部测试和用户反馈优化。

三、临床试验设计：

试验目的

主要目标：评估聊天 AI 对老年术后认知功能障碍（POCD）的改善。

次要目标：分析系统对情绪、生活质量和术后恢复的影响。

四、试验设计

类型：随机对照试验（RCT），多中心，为期 6 个月。

对象：纳入 1000 名 65 岁以上、术后 POCD 患者，分实验组（使用 AI）和对照组（常规护理）。

流程：基线、3 个月中期、6 个月结束的认知、情绪、生活质量评估。

五、伦理考虑：

知情同意：提供详细信息，签署同意书。

数据隐私：匿名化处理，数据加密。

风险管理：评估潜在风险，提交伦理委员会审查。

结果 本研究证明了聊天人工智能（AI）在改善老年患者术后认知功能障碍（POCD）方面的显著作用。实验包括 1000 例 POCD 患者，518 例使用了聊天 AI 系统（实验组），482 例接受常规护理（对照组）。实验组在术后 1 周、1 个月、3 个月、6 个月进行词汇流畅性测验（VFT）、视觉辨认功能测验（VRT）、简易智力状态检查（MMSE）和数字倒背测验（DSB）。结果显示，实验组在所有测试中的得分均显著高于对照组（$p<0.001$）。综合分析表明，聊天 AI 系统显著改善了词汇流畅性、视觉辨认功能、整体认知状态及记忆能力，且随着时间推移，效果持续显著，显示出多维度的干预效果。

结论 聊天人工智能系统作为 POCD 患者术后恢复的干预工具，展示了其显著的效果。在所有测试时间点，实验组的认知功能得分均显著高于对照组，显示了聊天 AI 系统对提升患者认知功能的潜力。这种干预方式不仅能够在术后短期内（1 个月）显著改善认知功能，而且在长期（6 个月）干预下，持续保持效果，并在词汇流畅性、视觉辨认能力、整体认知状态和记忆能力上取得了显著进

展。结果表明，聊天 AI 系统是一种有效的工具，可以广泛应用于术后认知功能障碍的管理和恢复过程。

PU-0960

胰岛素鼻内给药对老年髋关节骨折患者术后谵妄的影响和安全性研究

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目的 评价多次经鼻给予不同剂量胰岛素对老年髋关节骨折患者术后谵妄的预防效果及评估该种方法的安全性。
方法 选择 2023 年 7 月至 2024 年 2 月诊断为髋关节骨折并拟于吉林大学白求恩第一医院蛛网膜下腔阻滞下行择期单侧髋关节置换术或闭合复位髓内针固定术的患者 144 例，性别不限，年龄≥65 岁，体重指数（body mass index，BMI）≤24kg/m2，美国麻醉医师协会（American society of anesthesiologists，ASA）分级Ⅰ～Ⅲ级。患者随机分为 3 组：C 组(对照组)、I-20 组（胰岛素 20U/1ml 组）和 I-40 组（胰岛素 40U/1ml 组）。术前记录患者一般资料，包括年龄、性别、BMI、ASA 分级、文化程度，并于术前使用量表评估患者认知状态、衰弱评分，手术结束时记录手术时间、手术类型以及术中输血情况。三组均于手术前一天 19：00、手术当天麻醉前 50 分钟及手术当天 19：00 经鼻给予药物，一共三次。其中 C 组患者每次经鼻给予生理盐水 1ml，I-20 组患者每次经鼻给予胰岛素 20U/1ml，I-40 组患者每次经鼻给予胰岛素 40U/1ml。麻醉方式均采用神经阻滞复合蛛网膜下腔阻滞，穿刺成功后留取 1ml 脑脊液测定葡萄糖及乳酸含量。分别于术前 1 天经鼻给予胰岛素或生理盐水后 40 分钟、入手术室及手术结束时使用血糖仪测定患者指尖血糖。术后 1-3 天每日 18：00-19：00 采用 ICU 意识模糊评估法（confusion assessment method for the intensive care unit，CAM-ICU）评估患者术后是否发生谵妄，记录术后 1-3 天视觉模拟疼痛量表评分（visual analogue scale，VAS）及术后并发症。
结果 三组患者的年龄、性别、BMI、ASA 分级、文化程度、认知状态、衰弱评分、手术时间、手术类型以及术中输血情况的比较差异均无统计学意义（P＞0.05）。与 C 组相比，I-20 组及 I-40 组在术后 1-3 天时谵妄发生率明显降低，差异有统计学意义（P＜0.05），I-20 组与 I-40 组比较术后谵妄发生率差异无统计学意义（P＞0.05）。三组患者术后 1-3 天 VAS 疼痛评分差异无统计学差异（P＞0.05），三组患者经鼻给予胰岛素或生理盐水后指尖血糖差异无统计学差异（P＞0.05）。
结论 多次经鼻给予胰岛素 20U 及 40U 均可以有效降低老年髋关节骨折患者术后谵妄的发生，胰岛素鼻内给药操作简单、无创，可以安全地用于老年髋关节骨折患者术后谵妄的预防。

PU-0961

瑞马唑仑对比依托咪酯全麻诱导对老年日间手术后恢复质量的影响：多中心、 随机、对照、非劣效性试验

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目的 本研究比较了苯磺酸瑞马唑仑和依托咪酯诱导喉罩全麻的老年日间手术患者的术后恢复质量

方法 共 118 名老年手术患者按 1:1 的比例随机分配到瑞马唑仑组和依托咪酯组。瑞马唑仑组和依托咪酯组分别采用 0.2mg/kg 均在 1min 内泵注完成。MOAA/S＜2 后静脉注射舒芬太尼和罗库溴铵。若 MOAA/S≥2 则进行补救镇静。麻醉诱导后 2min 置入喉罩，两组皆用七氟醚和瑞芬太尼进行麻醉维持。主要结局为术后 1 天 QoR-15 评分，次要结局指标为术后 2 天 QoR-15 评分，麻醉诱导前后 SBP、DBP、HR、麻醉深度指数，安全性指标包括 PACU 不良反应发生率。

结果 两组患者基线均衡，瑞马唑仑组术后 1 天的 QoR-15 总分 133.5±12.9，依托咪酯组术后 1 天的 QoR-15 总分为 131.2±17.6，均值差为-2.1(-6.3,2.0)，非劣效性达成（P<0.001）。瑞马唑仑组术后 2 天的 QoR-15 总分 138.0±15.2，依托咪酯组为 137.0±12.7，平均值差异为 1.0(-4.1,6.2)，P=0.207，各组间无时间交互作用。五个维度评分中，瑞马唑仑组情绪状态评分在 POD1 高于依托咪酯组，但在 POD2 没有差异；其余四个维度即疼痛、身体舒适度、身体独立性、心理支持的评分两组在 POD1 和 POD2 均无统计学差异（P>0.05）。两组组内比较显示，瑞马唑仑组的 QoR-15 总分、疼痛、身体舒适度、心理支持和情绪状态在 POD1 与术前比较均无统计学差异（P>0.05），只有身体独立性方面评分低于术前；而依托咪酯组的 QoR-15 评分、身体舒适度、身体独立性和情绪状态在 POD1 均低于术前（P<0.05）。在麻醉诱导后 1min、喉罩置入后 1min、手术开始时，瑞马唑仑与依托咪酯在 SBP、DBP、MAP 和 HR 组间无统计学差异（P>0.05），组与时间无交互作用（P>0.05）。麻醉维持期间，瑞马唑仑组瑞芬太尼用量为 890.1±5.7ug，高于依托咪酯组的 745.1±45.3ug，P= 0.037。

结论 瑞马唑仑诱导后老年日间手术患者术后第一天 QoR-15 非劣于依托咪酯组，瑞马唑仑组术后第一天只有身体独立性评分低于术前，而依托咪酯组 QoR-15 总分、身体舒适度、身体独立性和情绪状态评分均低于术前，瑞马唑仑组麻醉维持期间瑞芬太尼需求更多。

PU-0962

右美托咪定联合预保温对全髋关节置换术后认知功能的影响：一项随机对照试验

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目的 围手术期体温过低对患者及其术后恢复有许多不良影响。尽管受到了广泛关注，但对预保温与药物联合使用的效果缺乏研究。本研究旨在研究预保温联合术中给予右美托咪定对全髋关节置换术患者的影响。

方法 本研究选择全髋关节置换手术患者共计 111 例，年龄为 50~75 岁，随机分为三组，分别为：预保温联合右美托咪啶组（WD 组，n=37）、预保温组（W 组，n=37）和对照组（C 组，n=37）。WD 组采用 HICO-AQUATHERM 660 控温毯对患者在麻醉诱导前 20 分钟进行预保温及术中保温处理，间断监测患者体温，使患者体温维持在 36℃以上；并在麻醉诱导前 10 分钟内经静脉泵入右美托咪定（dexmedetomidine，Dex）负荷用量[0.5μg/（kg·10min）]，10 分钟后改为维持用量[0.3μg/（kg·h）]，直至到手术完成前 40 分钟停药。W 组患者保温处理同 WD 组，用药改为生理盐水并与 WD 组患者相同剂量泵入和停止。C 组不予以任何处理。测量患者入室后（T1）、麻醉诱导前(T2)、诱导后 30 分钟(T3)、1 小时(T4)、手术开始后 1 小时(T5)、手术完成时(T6)和入麻醉后监测治疗室（PACU）15 分钟(T7)的鼓膜温度。采用多种方法，包括迷你精神状态检查（MMSE）和蒙特利尔认知评估量表（MoCA），记录患者术中出血量和清醒时是否出现寒战。研究预保温联合右美托咪定对患者体温过低和相关不良反应的影响。

结果 本研究共分析了 99 例患者。三组患者在 T1 时的鼓膜温度均无差异；C 组患者在 T4~T7 时的鼓膜温度明显低于 W 组和 WD 组患者（P＜0.05）。与 W 组和 WD 组相比，C 组患者在 T2 低体温发生率开始增加（6/35, 17.1%），在 T3~T7 各时间点低体温发生率依次显著增加（7/35, 20%; 16/35, 45.7%; 21/35, 60%; 22/35,62.9%; 29/35,82.9%）（P＜0.05）。与 C 组相比，W 组和 WD

组术后 MMSE 和 MoCA 评分较高（P＜0.001）。同时，WD 组术后 MMSE 和 MoCA 评分高于 W 组（P＜0.001）。WD 组和 W 组的不良事件发生率低于 C 组（P<0.05）。
结论 围手术期采用预保温能有效降低行全髋关节置换手术患者低体温和寒战的发生率，而联合右美托咪定的应用可以有效地防治患者术后 3 天的认知功能的下降。

PU-0963

甘油三酯-葡萄糖指数预测老年 2 型糖尿病患者术后谵妄的回顾性队列研究

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目的 术后谵妄（POD）在老年 2 型糖尿病（T2DM）患者中较为高发。甘油三酯-葡萄糖（TyG）指数是反映胰岛素抵抗的新型指标。本研究旨在观察 TyG 指数与老年 T2DM 患者 POD 发生率的相关性。
方法 本回顾性队列研究遵循 STROBE 声明（伦理号 S2019-311–03）。数据收集自我院围术期数据库 2014 年 1 月至 2019 年 4 月期间手术病人。纳入标准：（1）年龄≥65 岁；（2）患有 2 型糖尿病的患者；（3）接受非心脏及非神经外科手术并进行麻醉的患者。排除标准：（1）仅接受消化内镜检查的患者；（2）手术前缺失空腹血糖和空腹甘油三酯数据；（3）超过 50%的变量数据缺失。

主要结局为术后 7 天内 POD 发生率。TyG 指数=ln[fasting triglycerides(mg/dL)× fasting glucose (mg/dL)/2]。

数据分析采用 SPSS 26.0 和 R 4.0.5 进行。符合正态/偏态分布的连续变量以均值（标准差）/中位数（四分位数）表示。分类数据计为计数和百分比。分别使用 t 检验/Mann-Whitney U 检验用于正态/非正态分布的连续变量的组间比较。组间分类变量的比较采用卡方检验或 Fisher 精确检验。缺失的连续变量/分类变量采用中位数/众数插补法进行插补。
ROC 曲线分析用于确定 TyG 指数预测 POD 的最佳截断值。TyG 指数作为基于 ROC 分析的二分类变量进行单因素及多因素逻辑回归检验。单因素分析中 P 值<0.05 的变量被纳入多因素分析，而 VarianceInflation Factor>5 的因素被认为具有共线性而被移除。多因素回归分析包括三个模型，模型 1 包括术前因素：年龄、血红蛋白、红细胞计数、白细胞计数、高密度脂蛋白、慢性肾脏疾病、抑郁和焦虑。模型 2 包括术中因素：是否急诊手术、手术类型、麻醉持续时间、尿量、出血量、晶体量和胶体量及平均动脉压<60 mmHg 的持续时间。模型 3 包括模型 1 和模型 2 中的变量。所有分析中，双侧 P 值<0.05 被认为具有统计学意义。采用限制性立方样条图（RCS）进一步展示 TyG 指数与 POD 发生率之间的关系。
文献报道胰岛素抵抗在老年女性人群中更为常见，因此在模型 3 中基于性别进行亚组分析。同时采用交互分析探索性别对 TyG 指数预测 POD 效果的影响，交互分析中 P 值<0.10 被认为有意义。

敏感性分析采用 E 值法，使用模型 3 中的数据在网站 https://www.evalue-calculator.com/evalue/上进行。同时使用原始的、未经插补的数据来检测 TyG 指数作为 2 分类变量的结果是否受到插补缺失值的影响。
结果 本回顾性队列研究共纳入 4566 名患者。ROC 曲线分析确定 TyG 指数的最佳截断值为 8.678。而 RCS 图显示了 TyG 指数与 POD 之间呈“S 形”关联，P non-linear=0.74。

在单因素回归分析中，TyG>8.678 组的比值比（OR）为 1.668（95% CI：1.210–2.324，P=0.002）。在多因素回归模型中，模型 1、模型 2 和模型 3 中 TyG>8.678 组的 OR 分别为 1.590（95% CI：1.133–2.252，P=0.008），1.661（95% CI：1.199–2.325，P=0.003），和 1.603（95% CI：1.137–2.283，P=0.008）。

在男性患者中，TyG 指数与 POD 发生率之间的关系在任何模型中均不显著，而女性 TyG>8.678 的 OR 为 2.24（95% CI：1.25–4.19，P=0.01）。同时性别与 TyG 指数之间的交互作用分析的 P 值分别为 0.435。

经计算本研究中 E 值为 2.59。由于其他报道研究中 POD 的大多数风险因素的 OR 小于 2.59，因此本研究的结果可以被认为具有良好的稳健性。通过分析未插补的原始数据，模型 1、模型 2 和模型 3 中

TyG>8.678 组的 OR 分别为 1.493（95% CI：1.054–2.133，P=0.025），1.648（95% CI：1.763–2.331，P=0.004），和 1.582（95% CI：1.108–2.279，P=0.012）。

结论 TyG 指数有望成为预测老年 2 型糖尿病手术患者 POD 发生率的新指标，并且其对女性预测能力比男性更强。此外，关注血糖和甘油三酯水平为麻醉医生在老年 2 型糖尿病患者围术期管理及并发症防治工作中提供新思路和新策略。

PU-0964

不同肺复张方法对老年腹腔镜手术患者术后肺不张的影响

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目的 肺不张是腹腔镜手术后常见并发症，而肺复张是临床上预防肺不张的常用方法， 研究报道不同的肺复张方法可能效果不同。因此，本研究拟比较不同的肺复张方法 对进行腹腔镜手术的老年患者术后肺不张发生率的影响，为老年腹腔镜手术患者保 护性肺通气策略提供理论依据。

方法 本研究是一项单中心、随机对照、受试者盲法、评估者盲法、平行组设计的临 床试验。纳入在常熟市第二人民医院行择期全身麻醉上腹部腔镜手术的老年患者 120 例，采用 随机数字表法分为 4 组，分别为 C 组(不进行肺复张)、IP 组(呼气末正压递增 法)、PCV 组(压力控制通气法)和 SI 组(控制性肺膨胀法)，每组 30 例。常规 全麻诱导后气管插管，术中均采用保护性肺通气策略，潮气量设置为 6~8 ml/kg 预 测体重(PBW)，呼气末正压(PEEP)为 5 cmH2O，吸入氧浓度(FiO2)为 50%。 在气管插管完成后、气腹建立后以及之后每一个小时、气管拔管前分别进行相应的 肺复张操作。设立 6 个观察时间点(T0~T5)如下:T0，麻醉诱导前;T1，第一次 肺复张完成后 5 分钟;T2，第二次肺复张完成后 5 分钟;T3，第三次肺复张完成后 5 分钟;T4，手术结束后 1 分钟;T5，气管拔管后 30 分钟。在 T0 和 T5 时间点进行 肺部超声检查，采用改良肺部超声评分(LUS)来评估四组患者肺不张的发生情况。 本研究主要观察指标:气管拔管后 30 分钟时肺不张的发生率。次要观察指标:1 气管拔管后 30 分钟 LUS 评分;2 围术期氧合和通气指标:死腔率(VD/VT)、肺 泡-动脉氧分压差(A-aDO2)、氧合指数(OI)等;3 呼吸力学参数:动态肺顺应 性(Cdyn)、驱动压(DP)等;4 肺复张期间血流动力学变化;5 术后肺部并发 症(PPCs)发生情况(包括:呼吸衰竭、急性肺损伤、急性呼吸窘迫综合征等)以 及术后住院时间。

结果 120 例患者中，有 111 例完成了研究，其中 C 组 26 例，IP 组 27 例，PCV 组 29 例，SI 组 29 例。四组患者的一般资料和手术相关资料差异均无统计学意义(P > 0.05)。主 要指标:IP 组、PCV 组、SI 组在气管拔管后 30 分钟肺不张发生率显著低于 C 组 (44.4%、37.9%、41.4% vs. 76.9%, P = 0.016、0.004、0.008)。次要指标:1 四组 患者气管拔管后 30 分钟 LUS 评分较术前显著升高(P < 0.01)，同时 IP 组、PCV 组、 SI 组的 LUS 评分显著低于 C 组(9.22 ± 1.67、8.97 ± 1.35、9.14 ± 1.87 vs. 13.65 ± 1.94, P < 0.01);2T4 时间点，IP 组、PCV 组、SI 组的死腔率显著低于 C 组(P < 0.01); T5 时间点，IP 组、PCV 组、SI 组的肺泡-动脉氧分压差显著低于 C 组(P < 0.01);氧 合指数显著高于 C 组(P < 0.01);3T4 时间点，IP 组、PCV 组、SI 组的动态肺顺应 性显著高于 C 组(P < 0.01)，驱动压显著低于 C 组(P < 0.01);4IP 组、PCV 组、 SI 组在肺复张期间均出现血压和心率的降低，其中 PCV 组平均动脉压变化幅度相较 IP 组和 SI 组更小(P < 0.01);5 共有 16 例患者发生 PPCs，四组患者的 PPCs 发生率 无显著差异(P > 0.05)，发生 PPCs 的患者术后住院天数相较未发生 PPCs 的患者显 著延长(16.4 ± 5.8 vs. 10.4 ± 3.0 天, P < 0.01)。

结论 对于行腹腔镜上腹部手术的老年患者，术中使用呼气末正压递增法、压力控制通气法、控制性肺膨胀法进行肺复张均能有效降低术后肺不张发生率，改善氧合和 通气指标。其中，压力控制通气法肺复张在血流动力学稳定性方面优于其他两种方法。

PU-0965

Effect of low-dose esketamine on postoperative delirium in elderly patients undergoing total hip or knee arthroplasty: A randomized controlled trial

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目的 Postoperative delirium (POD) is a prevalent and severe complication in elderly patients undergoing major surgery, associated with increased morbidity and mortality. This randomized controlled trial aimed to investigate the effects of low-dose esketamine on the incidence of POD in elderly patients underwent total hip or knee arthroplasty.
方法 260 elderly participants were randomly assigned to either the esketamine group (Group E)(0.20mg/kg loading, 0.125mg/kg/h infusion, 0.5 mg/kg for postoperative analgesia) or the placebo group (Group P)(received normal saline). The primary outcome was the incidence of POD, with secondary outcomes including delirium subtypes, duration, intraoperative analgesic consumption, operative and anesthesia times, hemodynamic changes, postoperative pain scores, sleep quality, and common postoperative adverse events.
结果 There was no significant difference in the incidence of POD between Group E (8.5%) and Group P (10.8%) ($P > 0.05$). During anesthesia induction, mean arterial pressure was higher in Group E compared to Group P ($P < 0.05$), with no significant difference in heart rate between the groups ($P > 0.05$). Intraoperative remifentanil dosage was lower in Group E ($P < 0.05$). A higher incidence of transient dizziness was observed in Group E ($P < 0.05$). On postoperative days 1 and 2, NRS (Numerical Rating Scale) pain scores at rest and with movement were significantly lower in Group E compared to Group P ($P < 0.05$). However, there was no significant difference in sleep quality between the two groups ($P > 0.05$).
结论 The repeated infusion of low-dose esketamine did not reduce the incidence of POD during the initial three postoperative days in elderly patients following total hip or knee arthroplasty. Nonetheless, esketamine administration was associated with reduced intraoperative opioid consumption, more stable hemodynamics during the induction phase, and decreased pain scores in the first two days.

PU-0966

Two cases with different outcomes of ERCP under general anesthesia and MAC in elderly patients with severe cholangitis and literature review

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麻醉科

Objective Acute severe cholangitis tends to develop into sepsis, so timely diagnosis and treatment are the key to controlling infection and disease progression. However, due to the instability of circulation and respiration, the decompensation of the internal environment and acid-base balance, the abnormal coagulation function and even the development of multi-organ failure, and the high risk of anesthesia and surgery, this article aims to explore the optimal anesthesia and perioperative management of in elderly patients with severe cholangitis undergoing ERCP treatment.
Methods A retrospective analysis to summarize the perioperative management experience of two elderly patients with severe cholangitis who were admitted to Yulin Hospital, the First Affiliated

Hospital of Xi'an Jiaotong University from February 27 to 28, 2024, was performed in perioperative management of emergency ERCP treatment under general anesthesia and MAC. And the different outcomes were reported.
Results The patient who underwent endotracheal intubation and general anesthesia had sudden ventricular fibrillation and died after ineffective resuscitation. The other patient who underwent sedation under anesthesia monitoring had a smooth operation. The laboratory tests returned to normal five days after surgery, and he was discharged from the hospital ten days later.
Conclusion Perioperative management includes anti-shock and anti-infection treatment before surgery and improvement of preoperative preparation; Invasive blood pressure monitoring; continuous blood gas analysis; regulation of the internal environment, and maintenance of acid-base and water and electrolyte balance. Therefore, ERCP patients should be actively prepared for surgery, implement personalized anesthesia plans, and carefully managed during surgery to ensure smooth operation and perioperative safety of patients.

PU-0967

环泊酚对老年患者腹腔镜下结直肠癌根治术中血流动力学及术后苏醒质量的影响

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目的 探讨环泊酚对老年患者腹腔镜下结直肠癌根治术中血流动力学和术后苏醒质量的影响。
方法 选取 2024 年 6 月—2025 年 6 月在中部战区总医院行腹腔镜下结直肠癌根治术的 200 例老年患者，采用随机数字表法将患者分为观察组和对照组，每组 100 例。观察组给予环泊酚进行麻醉诱导（0.3～ 0.4 mg/kg）和维持（0.8 mg/（kg · h））；对照组给予丙泊酚进行麻醉诱导（1.5～2.5 mg/kg）和维持（5.0 mg/（kg · h））；观察两组麻醉诱导前(T0)、诱导后 5 min(T1)、人工气腹即刻（T2）、人工气腹后 30min（T3）、拔管即刻(T4)和拔管后 5 min(T5)时心率(HR)、平均动脉压(MAP)、收缩压(SBP)和舒张压(DBP)；记录患者术后苏醒质量包括自主呼吸恢复时间、睁眼时间、监测治疗室(PACU)停留时间、拔管时间、拔管时 Ramsay 镇静评分、定向力恢复时间以及术后认知功能障碍的发生；记录患者手术结束至离开 PACU 时高血压、低血压、心动过速、心动过缓、呼吸抑制等不良事件发生情况：同时分析手术前后应激、炎症因子差异。
结果 与 T0 相比，两组患者的 T1-T5 时的 HR、MAP、SBP 及 DBP 均降低，差异具有统计学意义（ P <0.05)；对两组患者 T0-T5 时的 HR、MAP、SBP 及 DBP 进行比较结果发现，T0 时两组患者的 HR、MAP、SBP 及 DBP 比较无统计学意义(P >0.05)，T1-T5 时观察组的 HR、MAP、SBP 及 DBP 均高于对照组，差异有统计学意义（ P <0.05)；T0-T5 时对两组患者 HR、MAP、SBP 及 DBP 变化趋势比较，观察组较对照组更加平稳变化较小，差异均有统计学意义（ P <0.05)。观察组自主呼吸恢复时间、睁眼时间、监测治疗室(PACU)停留时间以及拔管时间、拔管时 Ramsay 镇静评分、定向力恢复时间优于对照组(P <0.05)。两组患者手术认知功能障碍的发生率，差异没有统计学意义(P >0.05)。观察组手术前后去甲肾上腺素、肾上腺素、肿瘤坏死因子-α 和白细胞介素-6 的差值低于对照组(P <0.05)。观察组呼吸抑制、恶心呕吐发生率低于对照组(P <0.05)。两组患者心动过缓、呛咳、体动发生率比较，差异均无统计学意义(P >0.05)。
结论 与丙泊酚比较，环泊酚在老年患者腹腔镜结直肠癌根治术中有更好的麻醉效果，可能是通过降低了应激炎症因子水平进而使血流动力学更加稳定、提高了术后的苏醒质量、降低了不良反应的发生率。

PU-0968

瑞马唑仑对围术期老年患者椎管内麻醉镇静的应激和炎症反应的影响

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目的 探讨瑞马唑仑对围术期老年患者椎管内麻醉镇静的应激和炎症反应的影响
方法 选取 2024 年 2 月到 2024 年 5 月在山西省人民医院行椎管内麻醉的老年患者 81 例，按随机数字表分为两组：瑞马唑仑组（R 组，41 例）和丙泊酚组（P 组,40 例）。所有患者行蛛网膜下隙阻滞，在麻醉平面固定并且血流动力学平稳后进行镇静。镇静诱导：R 组静脉注射瑞马唑仑 5～10mg，P 组静脉注射丙泊酚 0.5～0.8mg kg-1，给药时间 1min（±5s）。均待患者 MOAA/S 评分达 3 分后，开始镇静维持。镇静维持：R 组静脉泵注的起始剂量为 0.2mg kg-1 h-1，P 组为 2mg kg-1 h-1。手术结束后停止输注瑞马唑仑、丙泊酚。收集患者椎管内麻醉前（T0）、术毕（T1）外周静脉血各 2ml，离心分离血清，采用 ELISA 法测量血清 NA、TNF-α。收集患者术后 24 小时（T2）外周血白细胞计数（WBC）检测结果。记录镇静期间、PACU 期间不良反应发生情况。
结果 与 T0 比较：P 组、R 组 T1 血清 NA、TNF-α 浓度升高（P<0.05）。与 P 组比较：R 组 T1 血清 NA、TNF-α 浓度降低（P<0.05）。与 T0 比较：P 组、R 组 T2 外周血白细胞计数升高（P<0.05）。与 P 组比较：R 组低血压、呼吸抑制、注射痛的发生率降低（P<0.05）；心率减慢、呛咳的发生率差异无统计学意义（P>0.05）。R 组患者不良反应发生率 7.3%，低于 P 组患者的 25.0%（P<0.05）。
结论 在围术期老年患者椎管内麻醉镇静过程中，瑞马唑仑可以减少应激反应、抑制炎症因子，让患者在围术期更加安全与舒适。

PU-0969

Identification of Susceptible and High-Risk Population for Postoperative Systemic Inflammatory Response Syndrome in Elderly Patients: A Machine Learning-Based Approach

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Objective We aimed to develop and validate an individualized predictive model to identify susceptible and high-risk population of SIRS in elderly patients.
Methods Data of surgical patients aged ≥ 65years from September 2015 to September 2020 in three independent medical centers were retrieved and analyzed. The eligible patient cohort in the Third Affiliated Hospital of Sun Yat-sen University was separated into an 80% training set and a 20% internal validation set randomly. Four machine learning (ML) models were developed to predict postoperative SIRS. Area under receiver-operating curve (AUC), F1 score, Brier score, and calibration curve were used to evaluate the model performance. Model with the best performance was further validated in the other two independent datasets involving 844 and 307 cases respectively.
Results The incidence of SIRS in the three medical centers was 24.3%, 29.6% and 6.5%, respectively. 15 predictors were selected and applied in four ML models to predict postoperative SIRS. The Random Forest Classifier (RF) model showed the best overall performance to predict postoperative SIRS, with an AUC of 0.751, sensitivity of 0.682, specificity of 0.681 as well as F1 score of 0.508 in the internal validation set, and higher AUCs in external validation-1 set (0.759)

and external validation-2 set (0.804).
Conclusions We developed and validated a generalizable RF model for prediction of postoperative SIRS in elderly patients, that enables clinicians to screen susceptible and high-risk patients and implement early individualized intervention.

PU-0970

评估瑞马唑仑用于老年患者中进行经食道心脏超声（TEE）检查时的安全性和效果

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目的 比较瑞马唑仑与传统镇静剂（咪达唑仑、丙泊酚）在经食道心脏超声（TEE）检查中的镇静效果、安全性和患者满意度。
方法 纳入 90 例接受 TEE 检查的患者，年龄在 18 岁至 80 岁之间。随机分为三组：瑞马唑仑组（30 例）、咪达唑仑组（30 例）和丙泊酚组（30 例）。评估指标包括镇静效果、恢复时间、不良事件发生率、血流动力学变化和患者满意度。
结果 瑞马唑仑组的镇静成功率为 97%，显著高于咪达唑仑组的 90%和丙泊酚组的 93%（P <0.05）。瑞马唑仑组的平均起效时间为 1.5 分钟，恢复时间为 8 分钟，呼吸抑制发生率为 3%，血压下降 10±4 mmHg，心率变化 5±2 次/分钟，满意度评分为 9.4 分；而咪达唑仑组的平均起效时间为 3.5 分钟，恢复时间为 15 分钟，呼吸抑制发生率为 10%，血压下降 14±5 mmHg，心率变化 8±3 次/分钟，满意度评分为 8.0 分；丙泊酚组的平均起效时间为 2 分钟，恢复时间为 10 分钟，呼吸抑制发生率为 7%，血压下降 12±4 mmHg，心率变化 6±2 次/分钟，满意度评分为 8.6 分。统计学分析显示，瑞马唑仑组在镇静成功率、起效时间、恢复时间和患者满意度方面显著优于咪达唑仑组和丙泊酚组（P<0.05）。
结论 瑞马唑仑在 TEE 检查中的镇静效果优于传统镇静剂咪达唑仑和丙泊酚，具有更快的起效时间和较短的恢复时间。同时，瑞马唑仑在安全性方面表现出色，呼吸抑制和血压波动的发生率较低，患者满意度显著更高。

PU-0971

阿芬太尼在老年患者无痛胃肠镜检查中的半数有效剂量

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目的 探讨阿芬太尼复合丙泊酚+依托咪酯在老年患者无痛胃肠镜检查中抑制胃肠镜置入反应的半数有效剂量（ED50）。
方法 选择择期行胃肠镜检查老年患者 26 例，其中男 12 例，女 14 例，年龄≥65 岁，BMI18～24kg/m2，ASAⅠ～Ⅲ级。麻醉诱导时静脉注射阿芬太尼（30 s 内推注完毕），随后给予丙泊酚+依托咪酯 1mg/kg+依托咪酯 0.5mg/kg 混合液缓慢静脉推注（30s 内注射完毕），待改良警觉镇静评分（MOAA/S）评分为 0 分时开始置入胃镜。胃镜检查完成后立即行结肠镜检查。依据 Dixon 序贯法确定阿芬太尼剂量（初始剂量为 4.5ug/kg,每级剂量梯度为 0.5ug/kg），如出现胃镜置入阳性反应，则下一位患者增加剂量至上一级，否则降低剂量至下一级。胃镜置入阳性反应标准：胃镜置入 1min 内患者出现呛咳、恶心和（或）发生体动反应。胃、肠镜检查中根据患者的体动反应情况适量追加丙泊酚+依托咪酯混合液。研究过程中出现 7 次折返时完成实验。计算复合丙泊酚时阿芬

太尼抑制胃镜置入反应的 ED50、95%有效剂量（ED95）及 95%可信区间（CI）。
结果 复合丙泊酚+依托咪酯时，静脉推注阿芬太尼抑制老年胃肠镜检查患者置入反应的 ED50 为 5.10ug/kg(95%CI3.56～5.31ug/kg)，ED95 为 5.76ug/kg，（95%CI5.07～12.49ug/kg）。
结论 结论： 在老年患者无痛胃肠镜检查时，复合丙泊酚+依托咪酯混合液时，阿芬太尼抑制胃肠镜置入反应的 ED50 为 5.10ug/kg。

PU-0972

右美托咪定对施行腰硬联合麻醉下行全髋关节置换术的老年患者膈肌运动的影响

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目的 观察右美托咪定对施行腰硬联合麻醉下行全髋关节置换术的老年患者膈肌运动的影响。
方法 选择施行腰硬联合麻醉下行全髋关节置换术的老年患者 100 例,随机分为 R 组和 P 组。R 组以右美托咪定 0.8～1ug/kg 实施镇静,P 组以丙泊酚 2～2.5mg/kg 实施镇静,若镇静深度无法满足要求,则以 0.2～0.3ug/kg/次追加右美托咪定或 0.5～1mg/kg/次追加丙泊酚,直至达到满意镇静深度。分别于进入手术室麻醉前(T0)、注射镇静药物后 Ramsay 评分≥5 分时(T1)和手术结束后 Ramsay 评分≤2 分时(T2)记录患者平均动脉压(MAP)、心率(HR)、指脉氧饱和度(SpO2)、呼吸频率(RR)、膈肌移动度(DE)、脑肌增厚分数(DTF)、膈肌厚度(DE),记录呼吸抑制、循环抑制、膈肌抑制等不良事件。
结果 1.两组患者年龄、性别、身高、体重、体重指数(BMI)、ASA 分级、施行腰硬联合麻醉下行全髋关节置换术的时间无统计学差异(P<0.05);2.两组血流动力学、呼吸频率和 SpO2 的比较:两组 MAP 在 T1、T2 时均较 T0 显著降低(P<0.05),而 R 组高于 P 组(P<0.05);R 组 HR 在 T1、T2 均高于 P 组(P<0.05);两组 SpO2 均在 T1 时显著下降,且 R 组显著高于 P 组(P<0.05);两组呼吸频率均在 T1 时显著下降,但 R 组高于 P 组(P<0.05);3.两组膈肌运动相关指标的比较:R 组 DE 在三个时间点无显著变化,P 组 DE 在 T1、T2 均显著低于 T0(P<0.05);两组 DT 在 T1、T2 均显著下降(P<0.05),但 R 组显著大于 P 组(P<0.05);两组 DTF 均在 T1 时显著下降,在 T2 时,P 组于仍显著低于 T0 及 R 组(P<0.05);4.两组不良事件的比较:R 组膈肌抑制率、低血压、心动过缓和注射痛的发生率显著低于 P 组(P<0.05)。
结论 右美托咪定用于老年患者施行腰硬联合麻醉下行全髋关节置换术时,对血流动力学的干扰较小,对膈肌移动度、膈肌厚度、膈肌增厚分数的抑制均较丙泊酚小,可在一定程度上减少施行腰硬联合麻醉下行全髋关节置换术期间不良事件的发生。

PU-0973

Preoperative Serum Magnesium as a Predictor of Postoperative Delirium in Elderly Surgical Patients : a Retrospective Cohort Study

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Background Magnesium, the body's fourth most abundant cation, is crucial for regulating ion channels and catalyzing various biochemical reactions essential for bodily functions. Despite its importance, the role of magnesium has been relatively understudied. Magnesium deficiency can lead to several diseases, particularly those affecting the brain. Postoperative delirium (POD) is a

common complication among elderly patients following surgery, characterized by reversible disturbances in attention, awareness, and cognition. This study aims to investigate whether preoperative serum magnesium levels can predict the risk of POD in elderly patients undergoing non-neurosurgery and non-cardiac surgery in a large retrospective cohort.

Methods We enrolled patients aged 65 years and older undergoing non-neurosurgery and non-cardiac surgery between January 2014 and December 2020 from one of the largest perioperative databases of elder adults in China. To investigate the relationship between baseline serum magnesium levels and outcome delirium, the restricted cubic splines(RCS) were assessed, fitting univariate and multivariate logistic regression models. Propensity score matching (PSM) analysis was then applied to mitigate the impact of confounding variables and prove our results. The study also utilized the SHapley Additive exPlanations (SHAP) framework for its unique capability to elucidate both linear and nonlinear relationships between serum magnesium levels and delirium across various analytical approaches based on an interpretable prediction model- XGBoost. Further, in order to assess the potential impact, we divided the subjects into subgroups according to genders, age, ASA grades, blood glucose level and type of surgeries. Then Subgroup analyses with interactions and mediation analyses were also conducted.

Results A total of 53,445 elderly individuals (median age 70 years, 52.4% male) undergoing non-neurosurgery and non-cardiac surgery were included in the analysis, among whom 1,551 (2.9%) developed POD. Through receiver operating characteristic (ROC) curve analysis, the cut-off value for baseline serum magnesium was determined to be 0.855 mmol/L. The area under the ROC curve (AUC) was 0.567 in the univariate model, demonstrating modest predictive ability, which improved to 0.766 in the multivariate models after adjusting for various covariates. The odds ratios (ORs) for baseline serum magnesium levels > 0.855 mmol/L were calculated as 0.644 (95% CI: 0.581 - 0.714, P < 0.001) in the univariate model and similarly showed protective effects in three multivariate regression models: 0.833 (95% CI: 0.747 - 0.929, P < 0.001), 0.701 (95% CI: 0.631 - 0.779, P < 0.001), and 0.828 (95% CI: 0.742 - 0.925, P < 0.001). Following propensity score matching (PSM) analysis to reduce confounding effects, the adjusted OR for baseline serum magnesium levels > 0.855 mmol/L remained significant at 0.764 (95% CI: 0.653 - 0.893, P < 0.001).

The relationship between baseline serum magnesium levels and POD was analyzed using a restricted cubic spline curve, revealing a U-shaped nonlinear association (P for nonlinear < 0.001) in the univariate logistic model. Subsequent smoothed plots, adjusted for various factors including gender, ASA classification, age, independent functional status, preoperative diseases, neutrophil-to-lymphocyte ratio (NLR), preoperative serum ferritin levels, blood glucose levels, emergency surgery status, type and duration of surgeries, operation time, and blood transfusion, indicated a linear correlation in the multivariate logistic model (P for nonlinear = 0.141). This suggests that while there is a complex nonlinear relationship between serum magnesium and POD in simpler analyses, adjusting for multiple covariates reveals a predominantly linear trend.

The SHAP value plot indicated that serum magnesium levels between 0.75 and 1.25 mmol/L minimally influenced the model, whereas extreme levels (<0.5 and >1.5 mmol/L) significantly affected predictions. The symmetrical "butterfly" shape of the plot and higher density of data points in the middle range suggest that magnesium levels within this range are more common but less impactful on the model's output.

Subgroup analysis revealed that baseline serum magnesium significantly increased the risk of POD in patients undergoing orthopedic, vascular, or head surgeries, aged ≤80 years, with blood glucose levels <8.58 mmol/L, or ASA grades 2 and 3. Baseline serum magnesium also proved to be a valuable prognostic predictor of POD across different genders (P for interaction=0.009) and comorbidities (heart disease, P for interaction=0.012; renal insufficiency, P for interaction=0.040).

Mediation analyses confirmed that serum magnesium has a direct effect on POD (c = -3.1375, 95% CI: -3.7739 - -2.5010, P < 0.001), while its indirect effect is mediated by serum calcium level (a*b = -0.2708, 95% CI: -0.3390 - -0.2036, P < 0.001) in the overall population. Serum magnesium exhibits both direct and indirect effects on postoperative delirium, with serum calcium playing a crucial mediating role.

Conclusions Baseline serum magnesium levels are predictive of POD risk in elderly patients undergoing non-neurosurgery and non-cardiac surgery. This biomarker, derived from routine blood tests, offers cost-effective and efficient screening for POD risk. Lower magnesium levels correlate

with increased POD risk, partially mediated by serum calcium levels. Understanding these mechanisms can inform targeted interventions to optimize preoperative magnesium status, potentially reducing POD incidence and improving surgical outcomes in elderly populations. Further research into the pathways linking magnesium, calcium, and POD could enhance personalized perioperative care.

PU-0974

老年口腔衰弱患者颏舌骨肌的超声评价与喉罩气道密闭性及咽喉部并发症的相关性研究

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目的 探讨老年口腔衰弱患者颏舌骨肌的超声评价与喉罩气道密闭性及咽喉部并发症的相关性。
方法 择期行喉罩全麻患者 120 例，性别不限，年龄大于 65 岁，体质指数≤30kg/m2，ASA 分级Ⅰ～Ⅱ级，Mallampati 分级Ⅰ～Ⅱ级。按照术前老年人口腔衰弱筛查量表（Oral Frailty Index-8）是否口腔衰弱分为口腔衰弱组（S 组，40 例）和非口腔衰弱组（C 组，80 例），根据体重选择喉罩型号。术前进行超声测量颏舌肌运动情况，嘱患者取舒适直立坐位,轻靠椅背,使头部处于正中位置,目视前方; 由 1 名具有 1 0 年以上工作经验的超声科医师进行检查,将超声探头置于颏下正中,轻按探头,避免干扰吞 咽运动,吞咽时嘱患者保持头部固定不动,观察 B 型声像图所示颏舌骨肌、舌肌正中矢状位,以及下颌骨、 舌骨高回声后方所伴声影;切换至 B/M 型模式,将取样线置于距舌骨角 2 cm 处,嘱患者一次性吞咽 5 ml 纯净水,观察吞咽过程中正中矢状面 M 型声像图所示颏舌骨肌,冻结图像,选择测量工具中的“距离”和“时 间”选项,于其中测量颏舌骨肌运动幅度和运动时间, 计算运动速度(运动速度＝运动距离/运动时间).对以上各参数均间隔 1 ~ 2 min 重复测量 3 次, 计算平均值.另随机选择 5 例患者,由另外 2 名超声医师分别测量其颏舌骨肌的运动幅度及运动时间;间隔 2 h 后由其中 1 名医师进行重复测量.记录两组患者的喉罩置入时间，首次置入成功情况，置入前后的收缩压（SBP）、舒张压（DBP）、平均动脉压（MAP）、心率（HR）值，置入难易程度评价，置入成功后通过超声检查评分，并测定气道峰压、喉罩密封压，记录手术麻醉时间、24h 内的咽部不良反应。
结果 两组患者喉罩置入前后的血流动力学指标，喉罩置入后的超声检查评分、喉罩漏气情况及咽部不良反应的比较差异无统计学意义（P＞0.05）;与 C 组比较，S 组吞咽 5ml 水过程中颏舌肌运动速度降低，喉罩置入时间较长，首次置入成功率低，置入评分较低。口腔衰弱组患者颏舌骨肌运动幅度及运动时间较对照组明显降低，而运动时间明显延长。
结论 超声定量评估颏舌肌运动参数，为口腔衰弱患者预防喉罩置入后咽喉部疼痛与置入密闭性提供重要参考。

PU-0975

The Impact of Sarcopenia on Postoperative Delirium: An Observational Study and Mendelian Randomization Analysis

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Background Delirium is a common complication in elderly patients after surgery, particularly major surgery, and is often associated with poor prognosis. Postoperative delirium is a multifactorial

disease, influenced by factors such as age, type of surgery, and underlying conditions. Sarcopenia is defined as age-related loss of muscle mass and decreased muscle strength or physical performance. It is associated with adverse outcomes such as frailty, falls, cognitive impairment, decreased quality of life, postoperative complications, and increased mortality. Sarcopenia and postoperative delirium are common in elderly patients, but their relationship remains controversial. This study aimed to investigate the impact of sarcopenia on postoperative delirium by combining a prospective observational study and Mendelian randomization analysis.

Methods The observational study included elderly patients (≥65 years) who underwent elective abdominal gastrointestinal tumor surgery at the Second Affiliated Hospital of Nanchang University from May to October 2023. Sarcopenia was diagnosed based on the skeletal muscle index (SMI) at the L3 level on CT images. SMI (cm^2/m^2) was calculated as muscle cross-sectional area (cm^2) divided by height squared (m^2). Postoperative delirium incidence was assessed using the 3D-CAM scale. Mendelian randomization (MR) is an epidemiological technique that leverages genetic variation to represent exposure of interest and establish causal relationships between exposure and disease outcomes, overcoming the limitations of observational studies. In this study, we conducted bidirectional MR using large genome-wide association study (GWAS) data to investigate the relationship between sarcopenia and delirium, analyzing both new and old diagnostic criteria for sarcopenia and gender subgroups to mitigate the limitations of confounding factors in observational studies. Data on sarcopenia were derived from a genome-wide association study (GWAS) meta-analysis involving 256,523 individuals of European ancestry aged 60 and above, from 22 cohorts including the UK Biobank, the US Health and Retirement Study, and the Framingham Heart Study. Delirium data were sourced from the Finnish Biobank, including 391,931 participants, where delirium cases were identified excluding those induced by alcohol or other psychoactive substances. Main analysis methods included the inverse variance weighted (IVW), weighted median, and MR-egger, with multiple sensitivity analyses to strengthen the conclusions.

Results The observational study followed up 197 patients. The preoperative sarcopenia incidence was 32.9%, while the postoperative delirium incidence was 25.9%. Results showed that preoperative sarcopenia did not affect postoperative delirium incidence (P=0.774), and subgroup analysis by gender also showed no significant difference in delirium incidence (P=0.773 for males; P=0.658 for females). We employed a two-sample Mendelian randomization method to analyze the relationship between sarcopenia and delirium. The results indicated no causal relationship between sarcopenia (based on EWGSOP) and delirium (Odds Ratio [OR] = 1.199, 95% Confidence Interval [CI] = 0.881–1.631, P = 0.249). Subgroup analysis by gender also showed negative results for both females (OR = 1.267, 95% CI = 0.935–1.716, P = 0.127) and males (OR = 1.000, 95% CI = 0.992–1.009, P = 0.909). Similarly, analysis based on the FNIH for sarcopenia yielded the same results: overall sarcopenia group (OR = 0.950, 95% CI = 0.630–1.433, P = 0.807), female subgroup (OR = 0.979, 95% CI = 0.709–1.351, P = 0.896), and male subgroup (OR = 1.183, 95% CI = 0.859–1.628, P = 0.304). We also conducted a reverse MR study to investigate whether delirium is a risk factor for sarcopenia. The results showed that, according to both the EWGSOP and FNIH criteria, delirium is not a risk factor for sarcopenia. Additionally, we assessed pleiotropy using the intercept term in the MR-Egger method and sensitivity analyses such as MR-PRESSO, and found no evidence of pleiotropy.

Conclusions This study, which combined observational research with Mendelian randomization analysis, found no causal relationship between sarcopenia and delirium. Various subgroup analyses using different criteria also demonstrated no causal link between sarcopenia and delirium. Additionally, the reverse Mendelian randomization analysis showed that delirium has no causal relationship with sarcopenia.

Advantages and limitations: The strengths of our study include the utilization of a large-scale GWAS database for Mendelian randomization analysis, which enhances the reliability of our results. We conducted analyses using two standards for sarcopenia, considering both gender-specific and combined data, all yielding negative results. This consistency reinforces the credibility of our findings. Mendelian randomization reduces confounding factors and provides evidence for or against causal relationships, further strengthening the reliability of our conclusions when combined with observational research. However, we must acknowledge the study's limitations. Despite adjusting for some potential confounders based on prior knowledge, we did not account for

additional factors such as previous physical activity, diet, and sleep patterns. The diagnosis of sarcopenia typically involves evaluating muscle mass, muscle strength, and physical performance. However, during follow-up, many patients were receiving nutritional infusions or other treatments, leading to a high number of missing values for physical performance assessment. Consequently, our study relied solely on muscle mass evaluation for diagnosing sarcopenia. Additionally, there was a discrepancy between the populations included in the observational study and the Mendelian randomization analysis.

PU-0976

髋关节囊周神经联合星状神经节阻滞对老年全髋关节置换术后康复效果的增效研究

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目的 研究旨在探讨髋关节囊周神经阻滞（PENGB）联合星状神经节阻滞（SGB）对老年全髋关节置换术（THA）患者术后疼痛管理及早期康复效果的影响。
方法 选取本院择期行 THA 患者 50 例，观察组 25 例，手术麻醉采用全麻复合 PENGB 联合 SGB，对照组 25 例，采用常规全身麻醉完成手术。记录手术开始后 30min、术毕即刻 HR 和 MAP 数值，记录联合阻滞实施前（T0）、实施后 30min（T1）、术后 6h（T2）、术后 24h（T3）和术后 48h（T4）患者静息和翻身状态下 NRS 评分，记录术后连续两天阿森斯失眠量表(AIS)评分，记录患者术后镇痛泵按压次数，术后首次下床活动时间，患者术后满意度评分及术后并发症发生情况。
结果 与对照组比较，手术开始后 30min 及术毕即刻，观察组循环更加稳定（P＜0.05）。T0 时刻，两组 NRS 评分差异无统计学意义（P＞0.05），T1~T4 时刻静息、翻身状态观察组 NRS 评分均较对照组低（P＜0.05）。与对照组比较，观察组术后连续 2 天 AIS 评分更低，且观察组的首次下床活动时间较早、住院时间较短、整体住院满意度较高， 两者之间的差异皆有统计学意义（P＜0.05）。两组患者术后并发症发生情况无统计学差异（P＞0.05）。
结论 采用 PENGB 联合 SGB 作为手术麻醉的辅助方法，相较于常规全身麻醉，用于老年全髋关节置换术能够显著改善患者术后疼痛管理，缩短住院时间，提高早期康复效果。

PU-0977

术中睡眠纺锤波活动与老年骨科手术患者术后睡眠障碍的相关性研究

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目的 探究术中睡眠纺锤波 (sleep spindle) 活动与老年骨科手术患者术后睡眠障碍 (postoperative sleep disorder, PSD) 的相关性。
方法 前瞻性纳入 2023 年 5 月至 2023 年 12 月于东南大学附属中大医院在全身麻醉下行择期骨科手术的患者，年龄≥65 岁，ASA II~III 级。术中使用 SEDline 脑电监测器监测麻醉深度并采集额叶脑电图 (electroencephalogram, EEG) 信号，术后第 1 天、术后第 3 天使用阿森斯睡眠量表 (Athens Insomnia Scale, AIS) 评估患者的术后睡眠状况。依据是否发生睡眠障碍，将患者分为第 1 天睡眠障碍组 (d1PSD 组) 、 第 1 天非睡眠障碍组 (d1nPSD 组) 、 第 3 天睡眠障碍组 (d3PSD 组) 、第 3 天非睡眠障碍组 (d3nPSD 组) 。术后第 1 天、术后第 3 天使用疼痛数字评定量表 (numeric rating

scale, NRS) 评估术后疼痛状况，使用 3 分钟谵妄诊断量表 (3-Minute Diagnostic Interview for CAM-Defined Delirium, 3D-CAM) 评估谵妄。主要结局为 PSD，观察指标为术中额叶的离散睡眠纺锤波参数 (密度与持续时间) 、术中 EEG sigma 波的绝对及相对功率值、术中额叶 delta 波、theta 波、alpha 波、beta 波的绝对及相对功率值、患者状态指数 (patient state index, PSI) 、暴发抑制 (burst suppression , BS) 时间及暴发抑制比 (burst suppression rate, BSR) 和术后疼痛评分、术后谵妄情况。

结果 1. 本研究对 280 例患者进行随访观察，最终 212 例纳入数据分析，其中 d1 PSD 组 139 例，d1nPSD 组 73 例，术后第 1 天 PSD 发生率约为 65.6%；d3 PSD 组 89 例，d3nPSD 组 123 例，术后第 3 天 PSD 发生率约为 41.9%。

2. EEG 频谱及定量 EEG 分析显示：与 d3nPSD 组相比，d3 PSD 组表现出了更低的绝对 sigma 功率 和相对 sigma 功率 ，差异具有统计学意义 (P<0.05) ；与 d3nPSD 组相比，d3PSD 组低频脑电活动 (delta 波) 的绝对功率 和相对功率 更高，而高频脑电活动 (beta 波) 的绝对功率和相对功率则更低，差异具有统计学意义 (P<0.05) 。d3PSD、d3nPSD 两组之间的 PSI 无明显差异，但 d3 PSD 组的 BSR 占比更高 ，差异具有统计学意义 (P<0.05) 。

3. 离散睡眠纺锤波分析提示：d1PSD 组和 d1nPSD 组的睡眠纺锤波密度与持续时间没有明显差异；与 d3nPSD 组相比，d3PSD 组在双侧前额极 (fp1/fp2) 通道 与双侧颞极 (f7/f8) 通道 的纺锤波密度更低，且平均纺锤波持续时间更短 ，差异具有统计学意义 (P<0.05) 。

4. 相比 d3nPSD 组， d3 PSD 组在术后表现出更高的运动痛评分 和更高的谵妄发生率，差异具有统计学意义 (P<0.05) 。

5. 多因素 Logistic 回归分析表明：校正了术后第 1 天的疼痛和谵妄后，女性 、术前 MMSE 评分、手术类型与 d1PSD 独立相关；在校正术后第 3 天的疼痛及谵妄后提示术前合并高血压 (OR 2.046, 95% CI 1.004-4.17; P=0.049) 、术前低 MMSE 评分 (OR 0.717, 95% CI 0.575-0.895; P=0.002) 、双侧颞极 (f7/f8) 通道的低平均纺锤波密度 (OR 0.614, 95% CI 0.427-0.885; P=0.009) 是 d3PSD 的独立危险因素。

结论 术中额叶睡眠纺锤波密度与术后第 3 天睡眠障碍相关，其中颞极 (f7/f8) 通道更低的平均纺锤波密度是术后第 3 天的睡眠障碍的独立危险因素。

PU-0978

超声引导外周神经阻滞复合 MAC 技术用于高危患者“糖足”手术的病例报道

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目的 超声引导外周神经阻滞技术和新型长效局麻药为麻醉科开展高危患者精确麻醉和舒适化医疗，保障其实现 EARS，提供了可能，我们通过以下临床病例的介绍，旨在推广精确麻醉和舒适医疗的理念，通过新型麻醉理念，技术和能力，将这些围术期高危患者的风险有效“降维”，从而保障此类患者的手术安全和舒适，改善患者的疾病转归。

方法 经过精确的术前准备，患者拟行神经阻滞下的“右侧脚趾截趾清创+任意皮瓣转移”手术治疗。在术前，麻醉科采用超声引导右侧股神经联合右侧腘窝坐骨神经阻滞，局麻药为每个部位 0.3%罗哌卡因各 15ml。精确阻断了手术区域的疼痛信号传递。手术开始前，静脉给予右旋美托咪定 20ug，舒芬太尼 5ug，并且面罩吸氧，氧气流量 5L/min。

结果 术中患者生命体征平稳，没有任何疼痛不适感，手术用时 60min，手术顺利，手术期间患者处于镇静状态，术后患者能够唤醒，在苏醒室观察，自主呼吸，吸入空气时氧饱和度 98%，无麻醉相关并发症，安返病房。

结论 这些技术和药物将会大大提高临床麻醉质量，改善患者的疾病转归，保障老年和危重患者的

手术安全和健康，值得在临床麻醉广泛推广，规范使用，从而让精确麻醉舒适医疗惠及更多的患者，保障术后加速康复医学（ERAS）的推广和发展。

PU-0979

瑞马唑仑与右美托咪定对腰麻下肢骨科手术老年患者术后谵妄的影响比较

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目的 观察探讨术中应用瑞马唑仑与右美托咪啶镇静对老年腰麻下行下肢骨科手术术后谵妄发生率的影响。

方法 选择我院自 2023 年 9 月至 2024 年 6 月期间收治的拟于腰麻行下肢骨科手术的老年患者 216 例，年龄≥60 岁,美国麻醉医师协会(ASA)分级Ⅰ～Ⅲ级。采用 SPSS 软件随机分为瑞马唑仑组和右美托咪啶组。两组患者进入手术室后，监测病人有创动脉压、脉搏血氧测定和心电图。使用双频谱指数（BIS）监测镇静深度。患者摆穿刺体位后选择 L3-4 椎间隙行蛛网膜下腔穿刺,注入 0.5%重比重布比卡因 2-2.5ml。操作结束后协助患者恢复仰卧位，面罩吸氧 5L/min。右美托咪啶组于平面固定后给予右美托咪啶 0.5-1.0μg/kg，并在 15-20min 内泵注完毕，然后以 0.1-0.5 μg/kg/h 将 BIS 维持在 60-80 范围内并维持静脉输注至术毕。瑞马唑仑组组于平面固定后给予瑞马唑仑 0.1mg/kg，继以 0.3mg/kg/h 连续泵入将 BIS 维持在 60-80 范围内并维持静脉输注至术毕。手术结束后，接受膝关节手术的患者使用 30 毫升 0.5%罗哌卡因进行股神经阻滞；同样，接受髋关节手术的患者使用 30 毫升 0.5%罗哌卡因进行腰丛阻滞，以确保术后镇痛。所于术后 1-3 天由一名接受过培训的麻醉医生使用 3D-CAM 量表对患者进行术后谵妄评估。同时记录围术期不良反应（低血压，心动过缓，心动过速，呼吸抑制，恶心呕吐）发生率。

结果 瑞马唑仑组患者的谵妄发生率为 6.8%(7/103),右美托咪啶组患者谵妄发生率为 10.8%(11/102),差异无统计学意义(P>0.05)。与右美托咪啶组比较，瑞马唑仑组发生低血压及心动过缓等不良反应发生率更低，且差异均有统计学意义(P<0.001)，而其他不良事件（心动过速，呼吸抑制，恶心呕吐）二组间差异无统计学意义(P>0.05)。

结论 与右美托咪啶相比，在老年腰麻下的下肢骨科手术中应用瑞马唑仑并不会增加老年患者术后谵妄的发生率，同时可降低低血压和心动过缓等不良反应的发生率。对于在腰麻下接受骨科手术的老年患者，瑞马唑仑可被视为右美托咪定的一种更安全的术中镇静替代品。

PU-0980

腹腔镜直肠癌根治术老年患者术后谵妄与术中血压变异性的相关性分析

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目的 观察行腹腔镜直肠癌根治术的老年患者术后谵妄（Postoperative Delirium,POD）与术中血压变异性（Blood Pressure Variability,BPV）的相关性。

方法 选择符合标准的腹腔镜直肠癌根治术患者 150 例。纳入标准：①年龄≥65 岁；②麻醉方式为气管插管静吸复合全麻；③ASAⅠ~Ⅲ级。排除标准：①患者拒绝；②文盲或沟通障碍者；③术前痴呆；④不能提供完整观察数据者；⑤围术期出现低氧血症者（SPO2＜90%）；⑥术中出血量较

多（＞400ml）或接受输血治疗者；⑦既往器质性脑病史者。术前 1d 访视患者，使用简易精神状态量表（MMSE)评估患者的精神状态，并记录患者的性别、年龄、身高、体重。麻醉用药为枸橼酸舒芬太尼、丙泊酚、顺式阿曲库铵、七氟醚、盐酸瑞芬太尼。术中维持脑电双频指数（BIS）于 40~60 之间，呼吸末二氧化碳（$PETCO_2$）于 35~45mmHg。术毕记录患者术中出血量。术后 3d 内行患者静脉自控镇痛（PCIA）缓解术后疼痛。记录患者从手术切皮到手术结束之间的收缩压（SBP），平均动脉压（MAP），舒张压（DBP)，每五分钟记录一次，同时记录患者术中低血压和高血压的发生情况。术后 24h 测定患者血清中肿瘤坏死因子-α（TNF-α），白细胞介素-6（IL-6）的水平。术后 3d 使用视觉模拟评估量表（VAS）评价患者的疼痛程度，使用 Richmond 躁动镇静量表（RASS）和 ICU 意识模糊评估法（CAM-ICU）评估患者是否发生谵妄。计算患者血压的方差代表 BPV。根据 CAM-ICU 评估的结果将患者分为 POD 组和非 POD 组，采用单因素分析和多因素 Logistic 回归分析 POD 发生的危险因素。

结果 腹腔镜直肠癌根治术的老年患者 POD 发生率为 20%。P 组高龄患者（≥70 岁）比例，SBP 变异性，MAP 变异性，DBP 变异性，术后 TNF-α 和 IL-6 水平高于 N 组，P 组术前 MMSE 分值低于 N 组，差异有统计学意义（P＜0.05）。多因素 Logistic 回归显示与 POD 有关的独立危险因素包括：MAP 变异性（P=0.017，OR：1.011，95%可信区间：1.000~1.021），高龄（≥70）（P=0.044，OR：3.651，95%可信区间：1.034~12.896），术前低 MMSE 得分（P=0.004，OR：0.513，95%可信区间：0.440~0.853），术后 TNF-α（P=0.037，OR：1.109，95%可信区间：1.006~1.223），术后 IL-6（P=0.014，OR：1.134，95%可信区间：1.025~1.253）。

结论 腹腔镜直肠癌根治术的老年患者 POD 发生率较高，其发生与高龄（≥70 岁）、术前认知功能障碍、MAP 变异性大、术后 TNF-α 和 IL-6 水平升高有关。对于高龄，术前认知功能障碍的患者应维持血压稳定，抑制炎症反应可减少 POD 的发生。

PU-0981

Genetically supported causality between gut microbiota and frailty: a two-sample Mendelian randomization study

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Background A mounting body of evidence suggests a strong connection between gut microbiota and the risk of frailty. However, the question of causality remains unanswered. In this study, we employed a Mendelian randomization (MR) approach to assess potential causal relationships between gut microbiota and the risk of frailty.

Materials and methods Summary statistics for the gut microbiome were obtained from a genome wide association study (GWAS) meta-analysis of the MiBioGen consortium (N =1 8,340). Summary statistics for frailty were obtained from a GWAS meta-analysis, including the UK Biobank and TwinGene (N =1 75,226). Our primary analysis utilized the inverse variance weighted (IVW) method. To enhance the robustness of our results, we also applied weighted median methods, MR Egger regression, and MR pleiotropy residual sum and outlier test. Finally, we conducted reverse MR analysis to investigate the potential for reverse causality.

Results IVW method identiffed 7 bacterial taxa nominally associated with the risk of FI. Class Bacteroidia (p = 0.033) and genus Eubacterium ruminantium group (p = 0.028) were protective against FI. In addition, class Betaproteobacteria (p = 0.042), genus Allisonella (p = 0.012), genus Biffdobacterium (p = 0.013), genus Clostridium innocuum group (p = 0.036) and genus Eubacterium coprostanoligenes group (p = 0.003) were associated with a higher risk of FI. No pleiotropy or heterogeneity were found.

Conclusion The MR analysis indicates a causal relationship between speciffc gut microbiota and FI, offering new insights into the mechanisms underlying FI mediated by gut microbiota.

PU-0982

非心脏手术老年患者术前工具性日常生活活动能力残疾与术后谵妄发生的关联性

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目的 It remains unclear whether instrumental activities of daily living (IADL) disability before surgery is related to incidence of postoperative delirium (POD).
方法 A prospective cohort study including patients aged ≥ 65 years presenting for selective non-cardiac surgery under general anesthesia was conducted. Screening for preoperative function capacity [IADL scale by Lawton] was performed at the time of the preoperative evaluation, including 8 items, indicating more complex activities of daily living. IADL disability was defined as dependence in at least one item of IADL. POD was the primary outcome detected by the Confusion Assessment Method, assessed daily from postoperative day 1 to 7 or until discharge. Secondary outcomes were including other complications, 1-year mortality, and hospital length of stay.
结果 The cohort was 71.6 years of mean age, 4823 of 8673 (55.6%) were male. 892 patients (10.3%) developed POD within 7 days. IADL disability was identified in 4936 (56.9%) patients and 3736 (43.1%) patients were included in no IADL disability group. The IADL-disability group had significantly higher POD rates before and after adjusting for risk factors (unadjusted odds ratio: 1.46, 95%CI, 1.26 to 1.69, p<0.001; adjusted odds ratio: 1.52, 95%CI, 1.26 to 1.86, p<0.001, respectively). The 1-year mortality, other postoperative complications and hospital length also increased in patients with IADL disability. Among the IADL subcategories, the disability of housekeeping, laundry, meal preparation and managing finance were more likely to be associated with higher incidence of POD.
结论 Preoperative IADL disability was associated with an increased delirium rate within postoeprative 7 days in elderly non-cardiac surgical patients.

PU-0983

不同静脉麻醉药对老年全麻手术患者诱导后低血压影响的临床观察

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目的 瑞马唑仑是一种新型水溶性超短效苯二氮䓬类镇静药物，具有起效快，苏醒快，对呼吸循环影响小，无注射痛，不依赖肝肾功能代谢，可被氟马西尼拮抗等特点。环泊酚是最近开发的短效 γ-氨基丁酸(GABA)受体激动剂，作为麻醉剂和镇静剂，临床研究表明环泊酚起效快，苏醒快，可控性好，呼吸抑制和注射痛少。但目前关于瑞马唑仑和环泊酚对老年全麻手术患者诱导后低血压的研究报道较少。本研究旨在通过诱导后的血压、低血压的发生率、血管升压药的使用情况等评价标准来比较老年患者最常用的静脉麻醉药依托咪酯与两种新型麻醉药对老年患者诱导期血流动力学的影响。
方法 180 例行择期全麻手术的老年患者（年龄＞60 岁），随机分为瑞马唑仑组、环泊酚组和依托咪酯组。患者入室后，开放外周静脉通路，监测无创血压、ECG、SpO2，行桡动脉穿刺置管术监测有创动脉压，采用脑电双频谱指数（BIS）监测麻醉深度。三组均推注芬太尼 3ug/kg，E 组以依托咪酯 0.3mg/kg，R 组以瑞马唑仑 0.2mg/kg，C 组以环泊酚 0.3mg/kg 缓慢注射，注射时间为 30s。监测 BIS 在 40-60 后给予罗库溴铵 0.6mg/kg，肌肉松弛后，行气管插管并连接麻醉机进行机械通

气。吸入 1-2%七氟烷维持 BIS 在 40-60 范围内，手术开始前追加瑞芬 20-40ug，手术开始后根据麻醉医生各自习惯进行麻醉维持。记录诱导前 1min、诱导后 1min、4min、7min、10min、13min、16min、19min（或切皮前）的动脉收缩压、动脉舒张压、平均动脉压、心率和BIS。同时记录不良反应（心动过缓、心动过速、高血压、注射痛、肌阵挛）的发生率和血管活性药去加肾上腺素的使用量。

结果 共纳入分析了 168 名患者的数据，环泊酚组诱导后低血压的发生率为 0.59，瑞马唑仑组的发生率为 0.50，依托咪酯组的发生率为 0.30。分析结果表明三组之间诱导后低血压的发生率有明显差异（p=0.006），其中 R 组和 C 组的诱导后低血压发生率无明显差异（p=0.364），R 组和 E 组的诱导后低血压发生率无明显差异（p=0.028），C 组和 E 组的诱导后低血压发生率有明显差异（p=0.002）。

结论 对于老年患者，全麻诱导时使用依托咪酯对诱导后低血压的影响最小，但诱导期间高血压、心动过速及肌阵挛等不良反应的发生率较高。

PU-0984

Contribution of serum albumin to frailty-associated 1-year postoperative mortality among older patients: mediation analysis of a prospective cohort

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Background Frailty is a syndrome characterized by greater susceptibility to stress, such as surgery and anesthesia, which is associated with a higher risk of postoperative death. Although frailty management guidelines generally require improved nutritional status, the mediating role of nutritional status in excess postoperative mortality associated with frailty is unclear. We hypothesized the risk of postoperative death in older patients from frailty that could be avoided by improved nutrition.

Methods A prospective cohort study enrolled patients aged≥ 65, scheduled for noncardiac elective surgery under general anesthesia. At baseline, frailty was identified, preoperative serum albumin level was assessed and used to quantify nutritional status. Mediation analysis was used to estimate the relationships among frailty, serum albumin, and 1-year postoperative mortality.

Results Among 305 enrolled older patients, 203 were non-frail patients with a 1-year postoperative mortality rate of 8.4%, while 102 were frail patients with a rate of 20.6%. Frailty was directly associated with mortality [hazard ratio (HR),4.9; 95% confidence interval (CI), 2 to 12], and inversely associated with the serum albumin level (ß, −1.91; 95%CI, −3.05 to −0.77). The direct effect of frailty on mortality was 0.144 (P-value=0.0312), whilst for the indirect effect (mediated by serum albumin) was 0.0392(P-value=0.0038). The mediated proportion of serum albumin level on 1-year mortality was 21.40%.

Conclusion Serum albumin level partly mediates the association between frailty and 1-year postoperative mortality in older noncardiac surgery patients. Trials directed at increasing the level of serum albumin could result in perioperative interventions to reduce postoperative mortality in frail patients.

Clinical trial registration ChiCTR1900027980 (Chinese Clinical Trial Registry).

PU-0985

居住方式对老年患者围术期神经认知障碍的影响

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目的 研究不同居住方式对老年患者 POCD 发生率的影响。
方法 162 例全身麻醉下行腹腔镜胃肠癌根治术的老年患者，据术前居住方式分为与配偶子女居住组（A 组）、与配偶居住组（B 组）、与子女居住组（C 组）、独居组（D 组）、养老院居住组（E 组）5 组。观察并比较 5 组患者术前及术后的认知功能。
结果 五组患者年龄、性别、受教育年限、手术时间、麻醉时间和术后 VAS 评分差异无统计学意义；通过 MMSE 评分量表，五组患者术前评分、术前与术后评分差值、术前认知障碍率及术后 POCD 发生率差异有统计学意义。通过 MoCA 评分量表，五组患者术前评分、术前与术后评分差值、术后 POCD 发生率差异有统计学意义。两种评分量表（MMSE 和 MoCA 量表）诊断得出的术前认知障碍的发生率及术后 3 天、5 天 POCD 的发生率相似。
结论 居住方式是老年患者术后近期 POCD 发生率的影响因素之一，术前居住在养老院或者独居有增加老年患者 POCD 发生率趋势。

PU-0986

ESPB 对老年患者行机器人根治性前列腺切除术转归影响的研究

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目的 近年来，竖脊肌平面阻滞(ESPB)得到了广泛的应用。超声引导下手术方便，镇痛效果好，并发症少，是一种理想的神经阻滞方法。然而，很少有研究报道 ESPB 对机器人辅助腹腔镜根治性前列腺切除术(RALRP)老年患者术后预后的影响。因此，本研究的目的是探讨 ESPB 对接受机器人辅助腹腔镜根治性前列腺切除术的老年患者术后恢复的影响。
方法 本研究采用随机、双盲、多中心临床试验。经中国人民解放军总医院伦理委员会批准（批准号：2023-011），并在 http://www.chictr.org.cn/注册（注册 ID: ChiCTR2300077349）后，本研究在解放军总医院第三医学中心、解放军总医院第一医学中心和解放军总医院第四医学中心中实施。入选标准：计划于 2023 年 6 月至 2024 年 5 月在三个中心行机器人辅助腹腔镜根治性前列腺切除术的患者，美国麻醉医师学会(ASA)分级 I～Ⅲ级，年龄 60～80 岁。排除标准：有穿刺部位感染、凝血功能障碍、严重心脑血管疾病、精神疾病或神经病变、不能配合手术及术后随访的患者。所有患者签署书面知情同意。根据是否复合竖脊肌平面阻滞，以及竖脊肌平面阻滞采用的罗哌卡因的浓度和容量，分成四组：A 组（单纯全麻组）、B 组（全麻复合低容量低浓度阻滞组）、 C 组（全麻复合高容量低浓度阻滞组）、D 组（全麻复合高容量高浓度阻滞组）。阻滞采用的局麻药为罗哌卡因。低容量为单侧阻滞局麻药容量为 15ml，高容量为单侧阻滞局麻药容量为 25ml，低浓度为 0.1%，高浓度为 0.3%。观察不同 ESPB 方案对行 RALRP 的老年患者术后急慢性疼痛、术后胃肠功能恢复影响的研究。
结果 共计纳入 144 例患者，每组 26 例。各组一般资料比较差异无统计学意义。各组术中舒芬太尼的使用量分别为 43.5±6.4μg、41.4±3.2μg、38.3±5.3μg、32.4±4.2μg，组间比较差异有统计学意义（$P < 0.05$）。24 小时各组静息疼痛 NRS 评分分别为 1（2）、1（1）、1（1）、0（1），A 组和 D 组之间比较差异有统计学意义（$P < 0.05$）；24 小时各组运动疼痛 NRS 评分分别为 2（2）、

2（1）、1（1）、1（1），A、B 两组与 C、D 两组比较，差异有统计学意义（P < 0.05）。各组之间慢性疼痛的发生率比较差异无统计学意义（P > 0.05）。各组术后排气时间分别为 38.5（34）h、35.5（36）h、33.5（32）h、31.5（28）h，各组之间比较差异有统计学意义（P < 0.05）。
结论 采用 ESPB 复合全麻，浓度越高、容量越大，越能减少术中阿片类药物的使用，降低 24 小时内的疼痛程度,但不影响慢性疼痛的发生率，并可减少术后排气时间。

PU-0987

羟考酮通过减轻炎症反应显著改善老年膝关节手术患者的术后认知功能

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目的 围术期炎症反应是导致术后认知功能障碍（POCD）的重要因素之一。羟考酮是一种半合成阿片类镇痛药，是 μ、κ 和 δ 型阿片受体激动剂。已有研究发现，κ-阿片受体激动剂类药物具有显著的抗炎作用，且具有剂量依赖性、选择性以及拮抗剂可逆性。但羟考酮是否能够抑制手术引发的炎症，并改善认知功能，尚未得到阐明。本研究旨在研究羟考酮对老年膝关节手术患者炎症反应和早期术后认知功能的影响。
方法 本研究共纳入 108 名年龄超过 65 岁（66-87 岁）的患者，排除 32 名患者（排除原因：简易精神状态检查表[MMSE]评分≤23，耳聋及失明，卒中史，吸毒，美国麻醉医师协会[ASA]分级 >III），最终入组 76 名患者（ASAⅠ-Ⅱ），随机分为羟考酮组与对照组，所有受试者均完成了研究。羟考酮组的老年患者在术前 30min 静脉输注盐酸羟考酮 0.1mg/kg，麻醉诱导应用盐酸羟考酮(0.08 mg/kg)、咪达唑仑(0.03 mg/kg)、依托咪酯(0.1 mg/kg)、丙泊酚(1 mg/kg)及罗库溴铵(1 mg/kg)，术中采用静脉吸入复合维持麻醉。术中采用羟考酮 10mg 关节腔内注射镇痛。术后患者应用静脉自控镇痛泵,依据分组给予盐酸羟考酮(0.6mg/kg)，对照组对应给予生理盐水安慰剂。认知功能由神经内科医生在术前 1 d 和术后 7 d 通过蒙特利尔认知评估(montreal cognitive assessment,MoCA)量表测试。手术结束时和术后第 1、3 天测量血清白细胞介素-6（IL-6），C 反应蛋白（CRP）和基质金属蛋白酶-9（MMP-9）水平。
结果 羟考酮在术后第 1 天和术后第 3 天降低老年患者术后血清 IL-6，CRP 和 MMP-9 水平，差异均具有统计学意义(P＜0.05)。同时，两组间术后 MOCA 检测差异显著。Oxy 组的 POCD 发生率（6/38，15％）低于对照组（15/38，39％），羟考酮显著降低了老年膝关节手术患者 POCD 的发生率，且差异均具有统计学意义(P＜0.05)。
结论 老年膝关节手术患者围术期应用羟考酮可抑制全身炎症反应，羟考酮的抗炎作用可显著改善老年患者的术后认知功能障碍。术后认知功能障碍在老年外科手术患者中非常常见，其机制复杂，进一步研究羟考酮对术后认知功能的影响是必要的。

PU-0988

衰弱与术后谵妄相关性的研究进展

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目的 衰弱（Frailty）是一种与年龄增长相关的老年综合征，常见于高龄和患有疾病的老年人，表现为对抗应激的能力降低，跌倒、失能和死亡风险增加[1]，术后谵妄（Postoperative Delirium，POD）是指患者手术后急性发作的注意力及全脑认知功能紊乱，表现为意识、定向力、注意力、思

维及行为变化，常发生于术后 1～3 d,多见于老年衰弱患者。由于许多衰弱的老年人需要手术治疗，POD 已成为一个日益严重的公共卫生问题[2]。本文就手术患者术前衰弱评估，衰弱与 POD 的关系及其可能机制，以及衰弱患者 POD 的防治方法等问题的研究进展进行综述，旨在为降低衰弱患者 POD 发生风险提供参考。

方法 通过筛选数据库相关领域文章完善本文。

结果 老年衰弱患者较易出现 POD，人口学特征、手术、麻醉、药物、心理等因素对于该人群 POD 发生均有影响。多学科参与的术前焦虑及衰弱评估与干预、麻醉优化管理、药物合理使用等措施对预防老年衰弱患者 POD 发生均具有积极作用，但确切的防治方案，仍需更进一步研究。

结论 老年衰弱患者较易出现 POD，人口学特征、手术、麻醉、药物、心理等因素对于该人群 POD 发生均有影响。多学科参与的术前焦虑及衰弱评估与干预、麻醉优化管理、药物合理使用等措施对预防老年衰弱患者 POD 发生均具有积极作用，但确切的防治方案，仍需更进一步研究。

PU-0989

布比卡因脂质体 TAP 阻滞对腹腔镜结直肠癌根治术患者术后疼痛和睡眠的影响：一项前瞻性、随机对照试验

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目的 本研究设计了一项双盲、随机、对照试验，拟证实布比卡因脂质体 TAP 阻滞是否可以缓解结直肠癌根治术患者术后疼痛、改善术后睡眠、促进术后康复。

方法 选择择期行结直肠癌根治术的老年患者，通过计算机随机生成数字表，将患者随机分为布比卡因脂质体组（LB 组）或者盐酸布比卡因组（SB 组）。全麻诱导后，使用超声引导下双侧 TAP 阻滞，每侧注射局麻药 30mL（LB 组：注射 0.44%布比卡因脂质体；SB 组：注射 0.25%布比卡因）。主要结局：用数字评分量表（NRS）评价患者麻醉恢复室（PACU）、术后 6h、12h、24h、48h、72h 的静息痛及运动痛。次要结局：用理查兹-坎贝尔睡眠量表（RCSQ）评价患者术后 3d 的睡眠情况；用李克特（Likert）5 级评分量表评价患者术后镇痛满意度；记录患者术后首次下床时间（h）、首次排气时间（h）、首次进食时间（h）及术后住院时长（d）。最终数据采用 SPSS20.0 软件进行统计分析：正态分布的计量资料以均数±标准差表 示，组间比较采用两独立样本 t 检验；偏态分布的计量资料以中位数和置信区间表 示。VAS 评分和 RCSQ 评分采用 Wilcoxon 秩和检验。计数资料以例数或百分比 （%）表示，组间比较采用 χ 2 检验或 Fisher 精确法计算确切概率。$P < 0.05$ 为 差异有统计学意义。

结果 总共纳入了 210 名患者，排除了 120 例，剔除了 20 例，最终有 70 例患者进行了统计学分析，LB 组有 35 例，SB 组有 35 例。与 SB 相比，术后 12h、24h、48h 及 72h LB 组的静息痛及运动痛有显著的统计学差异（$P<0.05$），LB 组在术后 1d、2d、3d 的中位 RCSQ 评分显著高于 SB 组（$P<0.05$），LB 组的术后镇痛满意度评分高于 SB 组（5 vs 4,$P<0.001$）,LB 组的住院时长低于 SB 组（9 vs 10,$P=0.014$），两组患者在首次下床时间、首次排气时间及首次进食时间上并无明显的统计学差异（$P>0.05$）。

结论 我们的研究表明，在结直肠癌根治手术中应用布比卡因脂质体 TAP 阻滞可有效降低术后 72h 内的疼痛评分、改善患者的睡眠、缩短术后住院时长，提高患者的镇痛满意度。

PU-0990

瑞马唑仑和依托咪酯应用于 ERCP 老年患者全麻诱导的比较

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目的 探讨甲苯磺酸瑞马唑仑与依托咪酯用于 ERCP 老年患者全麻诱导，观察镇静效果与对血流动力学的影响。

方法 将符合纳入标准的 200 例拟行择期 ERCP 的患者随机分为两组 R（瑞马唑仑）组（n=100）和 E（依托咪酯）组（n=100）。两组患者入室后监护 生命体征，包括心电图（electrocardiogram，ECG ）、无创血压（ noninvasive bloodpressure ， NBP) 、脉搏氧饱合度（saturationofpulseoximetry，SpO2），脑电双频指数（bispectralindex，BIS），摆好体位后建立静脉通道并通过鼻导管吸氧 5L/min。R 组患者接受舒芬太尼 0.1μg/kg、瑞马唑仑 0.2-0.3mg/kg 缓慢静脉注射麻醉诱导，直至患者 BIS 值维持在 40-60。术 中以丙泊酚 4-12mg/(kg.h)的速度泵注维持，E 组患者接受舒芬太尼 0.1μg/kg、依托咪酯 0.2mg/kg 缓慢静脉注射，直至患者 BIS 值维持在 40-60。术中以丙泊酚 4-12mg/（kgh）的速度泵注维持。记录两组患者麻 醉诱导前（TO），诱导完成/手术开始（T1），手术开始后 5min（T2），手术开始后 10min（T3），手术开始后 15min（T4）、手术结束时（T5）、患者苏 醒时（T6）的生理指标。包括平均动脉压（meanarterypressure，MAP）、心率（heartrate，HR）、血氧饱和度（SpO2），呼吸频率（respiratoryrate， RR）、BIS 值。记录去甲肾上腺素用量，记录麻醉诱导时间，苏醒时间，PACU 时间，手术时间。记录患者术中及术后不良事件情况，包括低血压 呼吸抑制，心动过缓，体动，术后谕妄（ postoperativedelirium ， POD ），术中知晓，术后恶心呕吐（postoperativenauseaandvomiting，PONV)。记录体动情况、有无注射痛，苏醒时疼痛评分，患者及医生满意度。

结果 与依托咪酯组比较，瑞马唑仑组自麻醉诱导开始至 BIS<60 的时间更短[（64.8±16.4） vs.（100.2 土 46.8）s.Ｐ＜ 0.01」，补救给药次数更少（零 v3.38.0％、P.∽0.01）。镇静效果更好。且肌颤的发生率更低（零 vs.19.0%，P<0.05）。瑞马唑仑组的麻醉诱导期间血流动力学指标与依托咪酯组，差异无统计学意义，两组均未发现术后认知功能障碍及肝损伤等，两组间肾损伤发生率，差异无统计学意义（9.5%vs.4.0%，P>0.05）。

结论 瑞马唑仑麻醉诱导效果优于依托咪酯，且不良反应发生率低，可安全应用于 ERCP 的老年患者的麻醉诱导。

PU-0991

瑞马唑仑对老年患者脑血流和术后早期认知功能的影响

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目的 讨论瑞马唑仑对老年经尿道前列腺电切术患者脑血流和术后早期认知功能的影响，为临床工作提供一定的参考。

方法 选取临沂市人民医院 2024 年 1 月-2024 年 6 月择期实行手术治疗的老年经尿道前列腺电切术患者 80 例作为本次研究对象，年龄处于 65-80 岁，ASA 分级处于Ⅱ-Ⅲ级。采用随机数字表法，将患者随机分为 2 组，即对照组与研究组各 40 例。对照组麻醉诱导用丙泊酚、顺苯、舒芬，给药剂量依次为 2mg/kg、0.15 g/kg、0.3ug/kg；麻醉维持用丙泊酚和瑞芬，给药剂量依次为 3-8mg/(kg.h)、6-18ug/(kg.h)。研究组麻醉诱导用瑞马唑仑、顺苯、舒芬，给药剂量依次为 0.2mg/kg、0.15 g/kg、0.3ug/kg；麻醉维持用瑞马唑仑和瑞芬，给药剂量依次为 0.3-1mg/(kg.h)、6-18ug/(kg.h)。观察指

标：1）一般资料比较：两组患者年龄、BMI、ASA 分级、手术时间、受教育年限及伴随基础性疾病等。2）不同麻醉时点脑血流动力学指标：麻醉前(T0)、麻醉诱导后(T1)、手术开始时(T2)和手术30min（T3）手术结束时(T4)记录不同时间的平均动脉压（MAP）、心率（HR）、大脑中动脉平均峰值流速（Vmean）、搏动指数（PI）。3）不同术后时点 MMSE 测试分数：即检测术后 6h、术后 1d、术后 3dMMSE 测试分数 。4）围术期神经认知障碍发生率：即统计围手术期神经认知障碍发生机率。

结果 1）一般资料比较：

对照组中年龄：（68.21±1.30）岁，BMI（Body mass index，身体质量指数）：（25.65±1.37）kg/m2，ASA 分级（The American Society of Anesthesiologists' Anesthesia Classification，美国麻醉医师协会麻醉分级）Ⅱ级/Ⅲ级：20/20，手术时间：（1.25±0.12）h，受教育年限：（9.36±1.33）年，伴随基础性疾病高血压/糖尿病：10/5；研究组中年龄：（68.95±1.33）岁，BMI：（25.85±1.36）kg/m2，ASA 分级Ⅱ级/Ⅲ级：21/19，手术时间：（1.28±0.10）h，受教育年限：（9.56±1.42）年，伴随基础性疾病高血压/糖尿病：11/3。二组个人与麻醉信息资料十分均衡，符合对比要求（P＞0.05）。

1）不同麻醉时点脑血流动力学指标比较

TO 麻醉阶段时两组患者的心率、平均动脉压、大脑中动脉平均峰值流速、搏动指数指标差异性不大，P＞0.05；T1-T4 麻醉阶段时研究组患者的心率、平均动脉压、大脑中动脉平均峰值流速、搏动指数指标波动水平明显轻于对照组，P＜0.05。

2）不同术后时点 MMSE 测试分数比较

术后 6h 阶段时两组患者的 MMSE 测试分数差异性不大，P＞0.05；术后 1d 与术后 3d 阶段时研究组患者的 MMSE 测试分数明显高于对照组，P＜0.05。

3）围术期神经认知障碍发生率比较

研究组围术期神经认知障碍发生率的明显低于对照组（2.5% VS 15%，P＜0.05）

结论 老年手术中应用瑞马唑仑对脑血流动力学水平影响小，并能促使术后及早恢复认知功能，防范围术期神经认知障碍，临床可积极推广经尿道前列腺电切术等老年手术患者使用瑞马唑仑。

PU-0992

瑞马唑仑对腹腔镜结直肠癌根治术老年患者围术期细胞免疫功能及术后恢复的影响

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目的 探究接受瑞马唑仑全身麻醉的老年肿瘤患者，围术期细胞免疫功能的变化，以及术后恢复特征。

方法 本研究选取 60 例年龄超过 65 岁、BMI 指数在 18~24 kg/m2 之间、ASA 分级为Ⅰ~Ⅲ级的患者，这些患者均择期接受全麻下腹腔镜结直肠癌根治术。根据麻醉诱导方式不同，将参与者分为 2 组（n=30）：瑞马唑仑组(R 组)和丙泊酚组（P 组）。两组于麻醉诱导前行椎管内阻滞，选择 L1-2 间隙穿刺，术中行 0.2%的罗派卡因 10ml/h 持续泵注。麻醉诱导时，R 组患者静脉推注瑞马唑仑 0.2~0.3 mg/kg、舒芬太尼 0.5 μg/kg、罗库溴铵 0.6mg /kg；P 组患者静脉推注丙泊酚 1.0~2.0 mg/kg、舒芬太尼 0.5μg/kg、罗库溴铵 0.6mg /kg。R 组患者静脉泵注瑞马唑仑 1.0~3.0 mg·kg-1·h-1、瑞芬太尼 0.1~0.3 μg·kg-1·min-1；P 组患者静脉泵注丙泊酚 4~6 mg·kg-1·h-1、瑞芬太尼 0.1~0.3 μg·kg-1·min-1；两组患者均间断静脉推注罗库溴铵。手术结束前 30min 给予 0.1 mg/kg 的吗啡。术后均采用氟比洛芬酯和昂丹司琼行 PCIA。在手术过程中，我们会对患者的麻醉深度进行监测，并根据监测结果来调整瑞马唑仑、丙泊酚和瑞芬太尼的泵注速度。我们记录了两组患者在麻醉诱导前（T0）、诱导后 1 分钟（T1）、气腹后 5 分钟（T2）、气腹后 60 分钟（T3）

以及手术结束时（T4）的情况，以进行比较分析。拔管后 5 min（T5）和术后 24h（T6）的脉搏氧饱和度（SpO2）、心率（HR）、平均动脉压（MAP）、脑电双频指数（BIS）；记录两组患者术中手术时间、麻醉时间、阿片类以及镇静药药物用量、苏醒时间；测定 T0、T3、T5、T6 的 CD3＋、CD4＋、CD8＋和 NK 细胞水平，并计算 CD4＋/CD8＋比值，比较两组之间的差异；记录不良反应发生情况。

结果 （1）两组患者的性别分布、年龄、身高、体重、ASA 分级、麻醉时间及手术操作时间等比较，差异无统计学意义（P＞0.05）；与 R 组比较，P 组的苏醒时间更短，差异有统计学意义（P＜0.05）。

（2）与 T0 比较，在 T1、T2、T3、T4 时刻两组的 HR 均显著下降，差异有统计学意义（P＜0.05）；与 T0 比较，R 组的 MAP 在 T1、T2、T3、T4 时刻均有显著降低，T5 时刻显著升高，差异有统计学意义（P＜0.05）；同时，R 组的升压药使用概率明显低于 P 组，差异有统计学意义（P＜0.05）。

（3）与 T0 比较，在 T1、T2、T3、T4 时刻两组的 BIS 均显著下降，差异有统计学意义（P＜0.05）；另外，T1 时刻，R 组的 BIS 高于 P 组，差异有统计学意义（P＜0.05）；术中镇痛用药舒芬太尼、瑞芬太尼的用量比较以及两组患者不良反应发生率比较，差异无统计学意义（P＞0.05）。

（4）与 T0 相比，两组患者在 T5 时刻的 CD3+、CD4+、CD4+/CD8+比值均显著降低，差异有统计学意义（P＜0.05）；与 T0 相比，两组的 NK 细胞数目在 T5 时刻显著上升，差异有统计学意义（P＜0.05）；与 P 组相比，T5 时刻 R 组的 CD4+明显低于 P 组，两组差异有统计学意义（P＜0.05）；两组各时刻 CD3+，CD8+和 NK 细胞数目差异无统计学意义（P＞0.05）。

结论 瑞马唑仑和丙泊酚麻醉对老年结直肠癌患者手术过程中自然杀伤细胞和 T 淋巴细胞等免疫细胞的影响无显著性差别，长时间输注瑞马唑仑显著延长老年患者的苏醒时间。

PU-0993

基于 BIS 的环泊酚麻醉诱导对老年骨科患者诱导期血流动力学的影响

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目的 观察环泊酚麻醉诱导对老年骨科患者诱导期血流动力学的影响

方法 选取 60 例择期行下肢骨科手术的老年患者，按就诊顺序随机分为 2 组：环泊酚 0.2mg·kg-1(D 组)和丙泊酚 1.5mg·kg-1(C 组)。每组 30 例。麻醉诱导前面罩吸入纯氧 5 分钟，D 组静脉注射环泊酚 0.2mg·kg-1，C 组静脉注射丙泊酚 1.5mg·kg-1，均在 15～20s 内注射完毕，如 BIS 值未达到 40～60 范围则 C 组追加环泊酚 0.1mg·kg-1，D 组追加丙泊酚 1mg·kg-1。两组均在患者睫毛反射消失后行控制呼吸，两组麻醉方式相同。记录两组患者诱导开始前(T0)、睫毛反射消失时(T1)、气管插管完成即刻(T2)、气管插管后 1 分钟(T3)、气管插管后 5 分钟(T4)监测血压(BP)、心率(P)、血氧饱和度(SP02)、脑电双频指数(BIS)；并观察患者睫毛反射消失时间、注射痛、呛咳、肌阵挛的情况，并统计诱导期间丙泊酚及环泊酚的用量。

结果 两组患者在 T1 时血压降低及心率减慢，C 组下降幅度较 D 组下降明显(P＜0.05)，T2 时点 D 组血压心率恢复致诱导期水平，C 组恢复程度较小，说明两组药物对于老年人诱导血流动力学影响较大，C 组抑制程度更高，但两种药物均能较好的抑制插管反应。两组患者各时点 BIS 值较诱导前明显下降，能维持合适镇静深度。两组患者血氧饱和度变化、睫毛反射消失时间、呛咳、肌阵挛无明显差别(P＜0.05),C 组注射痛的情况显著高于 D 组(P＜0.05)，C 组药物的用量也显著高于 D 组(P＜0.05)。

结论 环泊酚作为一种新型的麻醉药物，和丙泊酚一样均能应用于老年患者麻醉诱导，环泊酚注射痛显著低于丙泊酚，提高了患者的舒适度，且药物使用剂量更小。

PU-0994

围术期压力感受性反射功能与老年患者诱导后低血压等不良事件相关性

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目的 诱导后低血压（Post-induction hypotension，PIH）在老年患者围术期较为常见的不良事件，与术后死亡及严重并发症风险增加具有相关性。心血管自主神经是血压调节的关键部分，被认为与手术期间血压波动密切相关。围术期压力反射敏感性（Baroreflex Sensitivity，BRS）测量有助于评估患者的自主神经功能。本研究的目的是探究老年压力感受性反射功能下降与 PIH 及不良事件的相关性。

方法 研究前瞻性入组 65 岁以上择期行全麻非心脏手术的患者，除常规基线评估外，使用连续无创血压(continuous non-invasive arterial pressure, CNAP)监测设备持续监测血压，从血压监测记录中计算 BRS 及压力反射有效指数（baroreflex effectiveness index, BEI）。本研究的主要结局为 PIH，次要结局为早期术中低血压和术后并发症。

结果 入组患者中 57.5%（n=96）发生了 PIH。发生 PIH 的患者的各 BRS 指标均显著低于未发生 PIH 的患者，在多因素分析中，BRS+、BRS-仍与 PIH 存在相关性（相关系数分别为 0.815 和 0.886，p 值分别为＜0.001 和 0.002）。BRS+和 BRS-预测 PIH 的 AUC 分别为 0.747 和 0.722。

结论 老年患者中 PIH 发生与压力感受性反射功能下降存在关联，BRS+、BRS-均可预测 PIH 的发生，但区分能力一般。CNAP 设备测量 BRS 能够较好地反映患者的围术期自主神经功能。

PU-0995

艾司氯胺酮对老年糖尿病患者术后认知功能的影响

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目的 探讨艾司氯胺酮对老年糖尿病患者术后认知功能的影响

方法 将 60 例行全髋关节置换术的老年糖尿病患者随机为三组(n=20)，艾司氯胺酮组(A)，右美托咪定组(B)，对照组(C)。A 组于麻醉诱导时静注艾司氯胺酮(0.5mg/kg)，术中连续静注艾司氯胺酮(0.5mg/kg/h)，至手术结束前 30min 停药。B 组于麻醉诱导之前持续时间 10 分钟静脉给予右美托咪定负荷剂量 1ug/kg，随后以 0.4ug/kg/h 的速率持续输注至手术结束前 30 分钟。对照组给予等量生理盐水。记录患者在术前 1 天(T0)、麻醉诱导时(T1)、麻醉后 30min(T2)、手术结束时(T3)、术后 24h(T4)的收缩压(SBP)、舒张压(DBP)、平均动脉压(MAP)、心率(HR)的变化及术后不良反应。记录术前 1 天(T0)、术后 24h(T4)、术后 72h(T5)的蒙特利尔认知评估(MoCA)和简易智力量表(MMSE)评分。记录术前 1 天(T0)和术后 24h(T4)血清 c 反应蛋白(CRP)、白细胞(WBC)计数水平。

结果 A 组 T3 与 T4 比较，SBP 升高(P<0.05)，与 C 组 T3 相比，A 组 T3 时 SBP 升高(P<0.05)。与 T1 比较，B 组 T2、T3 时 HR 降低(P<0.05)。T4、T5 时与 B 组、C 组相比，A 组 MoCA 评分升高，T4 时与 B 组、C 组相比，A 组 MMSE 评分较高、T5 时与 B 组相比，MMSE 评分高(P<0.05)。术后各组 CRP 和 WBC 均较术前明显升高(P<0.05)。

结论 老年糖尿病患者髋关节置换术中，持续泵注 0.5mg/kg/h 艾司氯胺酮能够显著改善老年患者术后认知功能。与持续泵注 0.4ug/kg/h 右美托咪定相比，持续泵注 0.5mg/kg/h 艾司氯胺酮更有助于促进患者术后认知功能的恢复。

PU-0996

Evaluating the Prognostic Value of the 5-Item Modified Frailty Index as a Screening Tool in a Chinese Multi-Hospital System

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Background: As the population ages in China, the proportion of senior citizens undergoing surgery increases. Frailty is common in those elderly patients undergoing surgery. Frailty is recognized as a significant predictor of adverse health outcomes in surgical patients. Although various frailty indices have been validated in clinical settings and have shown promising results, there remains a substantial gap in large-scale, prospective studies examining the applicability of the 5-item modified frailty index (mFI-5), a simplified health assessment tool, in predicting comprehensive postoperative outcomes for elderly patients undergoing non-cardiac surgery in China.
Objective : This study aimed to systematically evaluate the associations between mFI-5, a simple frailty indicator, and risks of multiple adverse outcomes, as well as to validate and assess the predictive usefulness of the mFI-5 within a multi-hospital integrated healthcare system in China.
Methods : Between April 2020 and April 2022, a total of 8963 elderly patients (aged ≥ 65) who underwent non-cardiac surgery were selected from a multi-center prospective cohort database involving 19 medical centers across China. Frailty was evaluated using the 5-item modified frailty index (mFI-5; range 0-5). Patients were categorized as robust (mFI-5=0), prefrail (mFI-5=1), or frail (mFI-5 between 2 and 5). The primary endpoint was 1-year mortality, with secondary endpoints including 7-day mortality, 1-month mortality, 6-month mortality, re-admission, admission to ICU, and complications such as delirium, stroke, major adverse cardiac events (MACE), acute kidney injury (AKI), infections within 30 days, and postoperative pulmonary complications (PPCS). Adjusted hazard ratios and odds ratios were used to assess the association between frailty levels and adverse outcomes. Receiver operating characteristic (ROC) curves and area under curve (AUC) analyses were employed to evaluate the predictive utility of the mFI-5, with comparisons made using DeLong's test. Survival estimates across different frailty categories were analyzed using the Kaplan-Meier method. Furthermore, subgroup analysis was performed to investigate whether the association between frailty and adverse outcomes varied in different groups sorted by other factors.
Results : The studied cohort comprised 8,963 elderly patients (71 [IQR: 68-75 years]; 56.6% male). Of these, 35.6% were categorized as robust, 42.1% as prefrail, and 22.1% as frail. The 1-year mortality rate was notably higher in the frail group compared to the prefrail or robust groups (4.8% vs. 3.5% vs. 2.7%; $P < 0.001$). The hazard ratios for 1-year mortality were significantly elevated in the frail (HR 1.773; 95% CI 1.326-2.372; $P < 0.001$) and prefrail groups (HR 1.316; 95% CI 1.005-1.723; P=0.046). Kaplan-Meier survival analysis confirmed significantly poorer survival rates in the frail group compared to the prefrail and robust groups. The frail and prefrail groups had higher rates of postoperative re-admission, admission to ICU, and complications such as delirium, stroke, MACE, AKI, and PPCS compared to the robust groups ($P<0.05$). Multivariable-adjusted analyses revealed that frailty was associated with increased risks of re-admission, admission to ICU, and various complications including delirium, stroke, MACE, AKI, and PPCS. Incorporation of the mFI-5 into risk prediction models notably enhanced the discrimination of adverse outcomes compared to the traditional age or ASA based risk-prediction models ($P<0.001$). Robust results also were observed in subgroup analyses.
Conclusions The mFI-5 has proven to be an effective preoperative tool for forecasting both short-term and long-term clinical outcomes. It enables surgeons to stratify patients easily and to implement tailored systematic interventions. Ultimately, the utilization of mFI-5 could enhance the quality of healthcare services in the future.
Keywords :
modified frailty index, adverse outcomes, elderly, survival analysis

PU-0997

Preoperative Serum Magnesium as a Biomarker for Predicting Postoperative Delirium in Elderly Patients Following Surgery: a Retrospective Cohort Study

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Background Magnesium, the body's fourth most abundant cation, is crucial for regulating ion channels and catalyzing various biochemical reactions essential for bodily functions. Despite its importance, the role of magnesium has been relatively understudied. Magnesium deficiency can lead to several diseases, particularly those affecting the brain. Postoperative delirium (POD) is a common complication among elderly patients following surgery, characterized by reversible disturbances in attention, awareness, and cognition. This study aims to investigate whether preoperative serum magnesium levels can predict the risk of POD in elderly patients undergoing non-neurosurgery and non-cardiac surgery in a large retrospective cohort.

Methods We enrolled patients aged 65 years and older undergoing non-neurosurgery and non-cardiac surgery between January 2014 and December 2020 from one of the largest perioperative databases of elder adults in China. To investigate the relationship between baseline serum magnesium levels and outcome delirium, the restricted cubic splines(RCS) were assessed, fitting univariate and multivariate logistic regression models. Propensity score matching (PSM) analysis was then applied to mitigate the impact of confounding variables and prove our results. The study also utilized the SHapley Additive exPlanations (SHAP) framework for its unique capability to elucidate both linear and nonlinear relationships between serum magnesium levels and delirium across various analytical approaches based on an interpretable prediction model- XGBoost. Further, in order to assess the potential impact, we divided the subjects into subgroups according to genders, age, ASA grades, blood glucose level and type of surgeries. Then Subgroup analyses with interactions and mediation analyses were also conducted.

Results A total of 53,445 elderly individuals (median age 70 years, 52.4% male) undergoing non-neurosurgery and non-cardiac surgery were included in the analysis, among whom 1,551 (2.9%) developed POD. Through receiver operating characteristic (ROC) curve analysis, the cut-off value for baseline serum magnesium was determined to be 0.855 mmol/L. The area under the ROC curve (AUC) was 0.567 in the univariate model, demonstrating modest predictive ability, which improved to 0.766 in the multivariate models after adjusting for various covariates. The odds ratios (ORs) for baseline serum magnesium levels > 0.855 mmol/L were calculated as 0.644 (95% CI: 0.581 - 0.714, P < 0.001) in the univariate model and similarly showed protective effects in three multivariate regression models: 0.833 (95% CI: 0.747 - 0.929, P < 0.001), 0.701 (95% CI: 0.631 - 0.779, P < 0.001), and 0.828 (95% CI: 0.742 - 0.925, P < 0.001). Following propensity score matching (PSM) analysis to reduce confounding effects, the adjusted OR for baseline serum magnesium levels > 0.855 mmol/L remained significant at 0.764 (95% CI: 0.653 - 0.893, P < 0.001).

The relationship between baseline serum magnesium levels and POD was analyzed using a restricted cubic spline curve, revealing a U-shaped nonlinear association (P for nonlinear < 0.001) in the univariate logistic model. Subsequent smoothed plots, adjusted for various factors including gender, ASA classification, age, independent functional status, preoperative diseases, neutrophil-to-lymphocyte ratio (NLR), preoperative serum ferritin levels, blood glucose levels, emergency surgery status, type and duration of surgeries, operation time, and blood transfusion, indicated a linear correlation in the multivariate logistic model (P for nonlinear = 0.141). This suggests that while there is a complex nonlinear relationship between serum magnesium and POD in simpler analyses, adjusting for multiple covariates reveals a predominantly linear trend.

The SHAP value plot indicated that serum magnesium levels between 0.75 and 1.25 mmol/L minimally influenced the model, whereas extreme levels (<0.5 and >1.5 mmol/L) significantly affected predictions. The symmetrical "butterfly" shape of the plot and higher density of data points

in the middle range suggest that magnesium levels within this range are more common but less impactful on the model's output.
Subgroup analysis revealed that baseline serum magnesium significantly increased the risk of POD in patients undergoing orthopedic, vascular, or head surgeries, aged ≤80 years, with blood glucose levels <8.58 mmol/L, or ASA grades 2 and 3. Baseline serum magnesium also proved to be a valuable prognostic predictor of POD across different genders (P for interaction=0.009) and comorbidities (heart disease, P for interaction=0.012; renal insufficiency, P for interaction=0.040).
Mediation analyses confirmed that serum magnesium has a direct effect on POD (c = -3.1375, 95% CI: -3.7739 - -2.5010, P < 0.001), while its indirect effect is mediated by serum calcium level (a*b = -0.2708, 95% CI: -0.3390 - -0.2036, P < 0.001) in the overall population. Serum magnesium exhibits both direct and indirect effects on postoperative delirium, with serum calcium playing a crucial mediating role.
Conclusions Baseline serum magnesium levels are predictive of POD risk in elderly patients undergoing non-neurosurgery and non-cardiac surgery. This biomarker, derived from routine blood tests, offers cost-effective and efficient screening for POD risk. Lower magnesium levels correlate with increased POD risk, partially mediated by serum calcium levels. Understanding these mechanisms can inform targeted interventions to optimize preoperative magnesium status, potentially reducing POD incidence and improving surgical outcomes in elderly populations. Further research into the pathways linking magnesium, calcium, and POD could enhance personalized perioperative care.

PU-0998

中国老年患者术后焦虑与抑郁：基于中国 19 个中心围手术期数据库的前瞻性观察性研究

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背景 随着中国人口老龄化，接受手术的老年人口比例增加。老年人术后焦虑抑郁是导致手术预后质量差、延长住院时间的重要原因。然而，中国缺乏具有全国代表性的外科手术术后焦虑抑郁的流行病学数据，特别是在接受非心脏手术的老年患者。
目的 本研究旨在描述中国接受非心脏手术的老年患者的社会经济特征以及术后焦虑抑郁的发生情况，并找出其可能的危险因素。
方法 在这项多中心、前瞻性观察性研究中，我们选择了自 2020 年 4 月至 2022 年 4 月在中国 19 个医疗中心接受非心脏手术的老年患者（年龄为≥65 岁）。所有符合标准的患者在术后七天内接受随访。由接受过专业培训的医生或者护士进行术后量表的评估。焦虑症状采用广泛性焦虑自评量表（GAD-7）量表进行评估，抑郁症状采用 9 项患者健康问卷抑郁量表（PHQ-9）量表进行评估。将 19 家中心按照东部、西部、南部、北部 4 个地区和超大城市、特大城市、Ⅰ型大城市、中等城市 4 个城市分级进行分层，对老年患者术后焦虑抑郁的地区流行病学进行分析。除了收集社会统计学的相关变量，我们还收集了围术期相关的数据。采用单因素分析确定可能影响术后焦虑抑郁的危险因素。
结果 8525 名老年患者（71 岁[IQR：68-75 岁]；55.4%男性）最终被纳入分析。术后 7 天内有 2151 例（25.2%）患者发生焦虑症状，其中轻度 1321 例（15.4%），中度 637 例（7.5%），重度 193 例（2.3%）。术后 7 天内有 1908 例(22.3%）患者发生抑郁症状，其中轻度 1077 例（13.0%），中度 518 例（6.1%），中重度 212 例（2.5%），重度 101 例（1.2%）。在地区分布中，南部地区术后焦虑的发生率最高（38.6%），西部地区术后抑郁的发生率最高（30.6%）。在我国最新城市分布中，特大城市的术后焦虑的发生率最高（43.5%），Ⅰ型大城市的术后抑郁的发生率最高（27.6%）。在所有手术类型中，腹部手术的术后焦虑、抑郁发生率最高（9.5%；9.0%）。女性的抑郁症状的发生率高于男性（23.0% vs. 21.8%）。单因素分析显示性别、婚姻状态、手术等级、

美国麻醉医师协会（ASA）分级、术中使用非甾体类药物等因素与术后焦虑抑郁的发生相关，且具有统计学意义。

结论 在中国接受非心脏手术的老年人中，术后焦虑发生率为 25.2%，术后抑郁发生率为 22.3%。其中，在接受腹部手术的老年人中发生率最高。这项调查证据为政策制定者和卫生保健专业人员探索和解决影响中国老年患者术后心理健康的因素提供了宝贵的机会。

PU-0999

10ml 浓盐水（10%NaCl）快速注入颈外静脉和颈内静脉进行 EIT 肺血流灌注成像的比较，一项随机前瞻性研究试验设计

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目的 比较通过颈外静脉置管和中心静脉置管两种通路快速注入 10ml 浓盐水（10%NaCl）在 EIT 肺血流灌注成像效果。

方法 择期行腹腔镜结直肠癌根治的手术，BMI＜40kg/m2，ASAI~II 级，签署该试验知情同意。 随机分组：将符合纳入标准的患者随机分为两组，分别为颈外静脉置管组（试验组）和颈内静脉置管组（对照组）。使用随机数表方法，生成随机序列。按照随机序列将研究对象分配到不同的组别中，确保每个研究对象都有平等的机会被分配到任何一个组别中。穿刺操作：试验组为颈外静脉穿刺置管，采用 16G 留置针。对照组采用颈内静脉穿刺置管。为减少并发症的发生率，所有操作均采用超声引导下穿刺置管。穿刺置管成功后，接输液器连接 500ml 乳酸林格液，并于接口处接三通器，盐水注入时使用。快速推注 10%NaCl，所有受试者于 2 秒内推注 10ml。 高渗盐水造影肺灌注 EIT 技术电阻抗数据分析流程 EIT 采集肺通气和血流的相关数据，使用制造商的软件（EIT Data Review Tool，Dräger Medical，Lübeck，Germany）重建 EIT 图像，并使用 MATLAB R2015（MathWorks Inc.，Natick，MA）编程的定制软件离线分析 V/Q 匹配。

结果 主要指标：（1）全局的通气-血流匹配%（V-Q Match%）：整体既有血流灌注也有通气的区域占总区域的百分比；

次要指标：（1）全局的肺内分流分数（Shunt%）：整体只有血流灌注但无通气的区域占总区域的百分比。（2） 全局的死腔通气分数（Dead Space%）：只有通气但无血流灌注的区域占总区域的百分比。（3）操作相关并发症。

结论 在 EIT 增强造影中，通过颈外静脉快速注入 10ml 浓盐水（10%NaCl）在肺灌注成像中的效果不劣于通过颈内静脉注射造影剂，为临床提供更安全的肺灌注方式选择。

PU-1000

不同麻醉深度对老年非心脏手术患者术后谵妄的影响——一项随机对照研究

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目的 随着全球老龄化的加剧，老年人占外科手术的比例逐渐增高，高达 40%1。术后谵妄是老年人常见的术后并发症。研究显示，在 65 岁以上的老年人群中，术后谵妄的发生率约为 15.6%~28%2，最高可达 50%3。术后谵妄会导致住院时间延长，增加再入院率，死亡率，以及长期的术后认知功能下降 4。 从经济学上来讲，有文献显示术后谵妄的出现使每位患者的医疗支出增

加 16303 美元至 64421 美元，谵妄对医疗系统的负担每年从 380 亿美元至 1520 亿美元不 5，6。在行外科手术的人群中，术后谵妄的危险因素有控制欠佳的疼痛、脱水、贫血、电解质异常以及麻醉深度等。其中，不同的麻醉深度是否会影响术后谵妄的发生引起了广大学者的兴趣。近年来，脑电双频指数（bispectral index，BIS）作为一种能够监测麻醉深度的设备已被广泛应用于临床，许多研究表明，使用 BIS 监测麻醉深度比常规监测可以减少术后谵妄的发生率。基于此，我们设计了单中心、随机对照、贴近实际情况的临床研究来进一步探索不同的 BIS 范围是否会导致老年人群术后谵妄发生率的不同。主要研究目的为探究老年患者行非心脏手术术中 BIS 监测指导下采用浅麻醉和深麻醉对术后谵妄的影响。次要研究目的为探究两种麻醉深度下对老年患者谵妄发生次数、类型、严重程度、首次发作时间，以及术中知晓、术中体动、术后认知功能、术后生存质量和死亡率的影响。

方法 本研究为一项单中心、前瞻性、随机对照临床研究，选择了年龄≥65 岁，ASA 分级 II-IV 级，预计手术时长≥2h，择期全麻下行非心脏手术的老年患者。将患者随机分配至浅麻醉组（BIS 值 50±5）和深麻醉组（BIS 值 40±5）。术后 7 天每天由专人前往病房或 ICU 使用 3D-CAM 或 CAM-ICU 进行谵妄评估。

结果 共有 100 人接受了全麻下行非心脏手术，浅麻醉组（n=49）和深麻醉组（n=51），浅麻醉谵妄发生率明显低于深麻醉组（17.5% 比 27.5%）（$P < 0.001$）。同时浅麻醉组的术中丙泊酚、瑞芬太尼用量明显低于深麻醉组（$P < 0.001$），其余两组在谵妄发生次数、类型、严重程度、首次发作时间，以及术中知晓、术中体动、术后认知功能、术后生存质量和死亡率等方面无显著差异。

结论 老年患者行非心脏手术术中 BIS 监测指导下采用浅麻醉可能通过减少麻醉剂暴露从而导致术后谵妄减少。

PU-1001

输注小剂量艾司氯胺酮复合环泊酚用于老年患者结直肠内镜黏膜下剥离术的有效性和安全性研究

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目的 探讨输注小剂量艾司氯胺酮复合环泊酚用于老年患者结直肠内镜下黏膜剥离术（endoscopic submucosal dissection, ESD）的有效性和安全性研究。

方法 择期行内镜下结直肠 ESD 患者 60 例，年龄 65~75 岁，BMI 18~28kg/m^2，ASA I~III 级。按照随机数字表法将患者分为两组：艾司氯胺酮组（E 组）及瑞芬太尼组（R 组）。麻醉诱导前 E 组和 R 组分别静注 0.1mg/kg 艾司氯胺酮及 0.4μg/kg 瑞芬太尼，30s 后均静注 0.4mg/kg 环泊酚进行麻醉诱导。E 组采用持续输注环泊酚 0.8~1mg·kg^{-1}·h^{-1} 及艾司氯胺酮 0.1~0.2 mg·kg^{-1}·h^{-1} 进行麻醉维持，R 组采用持续输注环泊酚 0.8~1mg·kg-1·h-1 及瑞芬太尼 0.05~0.1mg·kg^{-1}·min^{-1} 进行麻醉维持。记录诱导时间、苏醒时间、离室时间及手术时间；记录环泊酚用量、血管活性药物使用情况；记录麻醉前（T）、诱导后 1min（T_1）、置入肠镜（T_2）、黏膜下剥离（T_3）、创面处理（T_4）、苏醒（T_5）时 HR、MAP、SpO_2、RR、BIS；记录术中及术后不良反应发生情况；记录术后 15min 静息 VAS 评分及麻醉医师、内镜医师和患者满意度评分。

结果 与 R 组比较，E 组术中低血压及呼吸抑制发生率明显降低，去甲肾上腺素使用率明显降低（$P<0.05$）；与 R 组比较，E 组术中 MAP、RR 及 SpO_2 较高（$P<0.05$）；与 R 组比较，E 组内镜医师满意度评分增高（$P<0.05$）。两组患者术中心动过缓及体动发生率、术中环泊酚用量以及术中不同时间点 HR、BIS 值、术后不良反应发生情况比较，差异无统计学意义（$P>0.05$）。

结论 输注小剂量艾司氯胺酮复合环泊酚可安全有效的用于老年患者结直肠 ESD 手术，且血流动力学波动小，呼吸抑制少，内镜医师满意度评分高。

PU-1002

允许性高碳酸血症对控制性低中心静脉压腹腔镜肝切除术老年患者脑氧饱和度和术后认知功能的影响

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目的 随着我国老龄化的加剧，保证老年患者围术期安全降低术后并发症将是我们面临的巨大挑战。研究表明控制性低中心静脉压肝切除术会降低脑血流、脑氧饱和度，增加术后脑血管事件风险，加之腹腔镜肝叶切除术反 Trendelenburg 体位，脑血供将进一步减少。老年患者神经系统调节能力差，极易发生 POCD。因此寻找安全有效的麻醉管理方式来降低腹腔镜肝切除术老年患者 POCD 发生率非常重要。既往大量研究已证实允许性高碳酸血症能增加脑血流、提高脑氧合、改善脑氧代谢降低 POCD 的发生率。因此拟观察允许性高碳酸血症对控制 性低中心静脉压腹腔镜肝切除术患者脑氧饱和度、血乳酸值、血清 Aβ-42 和 S100β 蛋白、简易精神状态智 能量表（ MMSE）评分变化，探索降低 POCD 发生率的安全有效的临床方案。

方法 1.1 本研究采用前瞻性、单中心，随机平行对照研究，操作者、观测记录者、数据分析者三分离的试验方法。将符 合纳入标准的 80 例受试者，按 1：1 随机分配至允许性高碳酸血症组（H 组）,普通机械通气组（C 组）。 1.2 统计方法 所有数据采用 SPSS 25.0 软件包进行统计学处理。正态分布的计量资料以均数±标准差表示，组间比较采用独立样本 t 检验；非正态分布计量资料以中位数(M) 和四分位数间距(IQR) 表示，组间比较采用非参数检验 ；组内比较采用重复测量的方差分析;计数资料采用卡方检验；P＜0.05 为差异有统计学意义。 2.病例选择：病例来源本研究选取腹腔镜肝癌切除术老年患者，所有患者均来自江西省某三甲医院普外科住院患者。4.1 麻醉方案及干预措施;所有患者均无术前用药，术前常规禁食、禁饮。入室后开放外周静脉并同时建立有效监护，如心电图（ ECG）、血氧饱和度（ SpO2）、脑电双频谱指数（ BIS）、呼气末二氧化碳分压（PETCO2）、脑氧饱和度 （rSO2）等。局麻下行桡动脉穿刺及右侧颈内静脉穿刺，分别监测有创动脉血压（ABP）及中 心静脉压（CVP）。所有分组以相同方式完成麻醉诱导和维持。4.2 观察指标一般资料：记录所有符合纳入标准的患者年龄、性别、 ASA 分级以及 BMI、麻醉时间、手术时间、失血量、补液量、尿量、肝门阻断时间、丙泊酚瑞芬太尼使用量、血管活性药使用等指标。 术中指标： 记录入室后吸氧 5min(T0) 、麻醉诱导气管插管后 5 min （T1）、患者置于 30°头高脚低位后 5 min （T2）、 调整呼吸参数（使 H 组 PaCO2 维持 50~55 mmHg，使 C 组 PaCO2 维持 35~45 mmHg）稳定后 5 min（T3）、 切肝前 5 min （T4）、切肝结束后 5 min （T5） 和术毕 （T6）的 HR、MAP、rSO2；记录 T0、T4、T5、T6 的 PH 值和乳酸值。 记录脑氧饱和度下降事件发生情况、拔管时间、复苏治疗室停留时间和并发症（恶心、呕吐、低血压、心动过缓或过速）发生情况。rSO2 的基础值：麻醉诱导后血流动力学平稳 SKJP220235208（即 MAP 波动不超过基础值的 20%、BIS 值 40~ 60、吸入氧浓度 40%）1 min 时 rSO2 的平均值。CDE 为 rSO2 下 降≥基础值的 20%（rSO2 ≥ 20%）或 rSO2 绝对值≤55%持续 15 秒以上。 认知功能指标：于手术前 1 日（ D0）、术后 1 日（ D1）、术后 7 日（ D2）对患者进行 MMSE 评分（ MMSE 评 分下降 1 个及 1 个标准差以上认为发生了 POCD）。分别 T0、T4、T5、T6、D1、D2 于术取患者上肢静脉血 2ml，自然凝固 20min 后，离心 20min（3000 转/min）后取上清液保存于－80℃冰箱，采用 ELISA 法测 Aβ-42 和 p-tau 蛋白 水平。 术后指标：记录患者术后 7 日内包括恶心、呕吐、发热咳嗽、切口感染、肺部感染、心律失常、呼吸衰竭等相关并发症发生情况。

结果 两组 CDE 发生情况、拔管时间、PACU 停留时间和并发症无显著差异性（P>0.05）。 2. 记录的各时间点 HRMAP、乳酸值无显著差异（P>0.05）。 3. 两组 rSO2 在 T0、T1、T2、T3 无显著差异;在 T4、T5、T6 时刻 rSO2 值 H 组高于 C 组,有显著差异（P ＜0.05）。 4. 两组 MMSE 评分术前 1 日无显著差异（P>0.05）；两组 MMSE 评分术后 1 日都低于术前 1 日，有显著差异（ P＜0.05）；术后 1 日 MMSE 评分 H 组高于 C 组，有显著差异（P＜0.05）。

结论 1。允许性高碳酸血症应用于控制性低中心静脉压腹腔镜肝切除术中能改善 脑氧合，降低神经细胞损，有效地降低术后认知功能障碍发生率。 2.允许性高碳酸血症组与普通通气组对控制性低中心静脉压腹腔镜肝切除术患者血流动力学、PH 值、乳酸值、术后不良事件发生无显著差异，可安全地用于预防和降低术后认知功能障碍发生。

PU-1003

静脉注射对乙酰氨基酚及联合右美托咪定对老年下肢骨折术后谵妄的影响：一项随机、双盲、对照研究

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目的 评价围术期静脉注射对乙酰氨基酚或静脉注射对乙酰氨基酚联合右美托咪定对下肢骨折老年患者术后谵妄（postoperative delirium, POD）发生情况的影响。
方法 这项试验纳入了于 2022 年 12 月至 2023 年 12 月在苏州大学附属第一医院拟行择期下肢骨折手术的患者 162 例，年龄≥65 岁，ASA 分级Ⅰ至Ⅲ级，随机分为 3 组（n = 56）：生理盐水对照组（C 组）、静脉注射对乙酰氨基酚组（A 组）或静脉注射对乙酰氨基酚联合右美托咪定组（AD 组）。A 组在麻醉诱导后、诱导后 8 小时及 16 小时各使用 500 mg 对乙酰氨基酚；AD 组对乙酰氨基酚用法与 A 组相同，但在麻醉诱导后联合静脉注射 0.4 μg/kg 右美托咪定，术中持续输注 0.2 μg/kg/h 右美托咪定至手术结束前 30 分钟；C 组使用同等剂量生理盐水。主要结局是根据意识模糊评定量表（CAM）或重症监护室意识模糊评定量表（CAM-ICU）评估术后五天内的 POD 发生率。次要结局包括术后第一天至第五天静息和活动时的视觉模拟量表（VAS）疼痛评分、术中舒芬太尼用量、POD 持续时间以及术后住院时间。
结果 有 149 名患者完成了研究（中位数年龄为 76 岁, 97 名[65.1%]为女性），其中 C 组和 AD 组各 50 例，A 组 49 例。三组间术后五天内 POD 的发生率存在差异（P = 0.019）。AD 组的发生率明显低于 C 组（14.0% vs 38.0%; RD -24.0%, [95%CI -40.5%, -7.5%]; HR 0.30, [95%CI 0.13, 0.71]; P = 0.006），AD 组较 A 组的 POD 发生率有所降低，但无统计学意义（14.0% vs 22.4%;RD, -8.4%, [95%CI -23.6%, 6.7%]; P = 0.276），A 组和 C 组 POD 发生率无显著差异（RD -15.6%, [95%CI -33.4%, 2.3%]; P = 0.092）。此外，AD 组与 C 组相比，静息和活动时疼痛强度在术后第一天及第二天显著减少（P < 0.0167）。其他次要结局和不良事件发生情况均没有明显差异。
结论 在接受全身麻醉下肢骨折手术的老年患者中，围术期静脉注射对乙酰氨基酚联合右美托咪定可降低术后五天内的 POD 发生率。

PU-1004

超声引导下星状神经阻滞复合右美托咪定对老年沙滩椅位肩关节镜手术患者急性应激障碍的影响

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目的 分析超声引导下星状神经阻滞（SGB）复合右美托咪定（Dex）对老年沙滩椅位肩关节镜手术患者急性应激障碍的影响。
方法 选取无锡市第九人民医院 2021 年 10 月-2023 年 9 月收治的 64 例老年沙滩椅位肩关节镜手术患者，随机数字表法分为 2 组，各 32 例，对照组患者行全身麻醉，观察组患者行 SGB（2%利多卡因 3ml+0.5ug/kg Dex+0.9%生理盐水）+全身麻醉，记录并对比两组患者在术后 1d、3d、5d 认知功能、睡眠质量及急性应激功能障碍情况，围术期疼痛视觉模拟评分（VAS）及术中血流动力学参数。
结果 ①观察组在全麻插管后（T2）、麻醉诱导后沙滩椅位 5min（T3）、60min（T5） 、拔管后（T6）时，心率（HR）水平低于对照组（P＜0.05），T2、T6 时平均动脉压（MAP）低于对照组（P＜0.05）。②观察组在出 PACU 及术后 1d、2d VAS 评分低于对照组（P＜0.05）。③术后 1d、

3d、5d，观察组急性应激障碍评分、睡眠质量评分低于对照组（P＜0.05）。④两组不良反应发生率对比及认知程度差异无统计学意义（P＞0.05）。
结论 对老年沙滩椅位肩关节镜手术患者采取超声引导下 SGB 联合 Dex，可稳定血流动力学，减轻患者疼痛，改善其睡眠质量和急性应激障碍。

PU-1005

血浆 S100β、NFL 和 α-syn 与老年胃肠肿瘤手术患者 术后认知功能障碍相关性的临床研究

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目的 评价老年胃肠肿瘤手术患者围术期不同时间点血浆中枢神经特异蛋白 （S100β）、神经丝轻链蛋白（NFL）和 α 突触核蛋白（α-syn）水平与术后认知 功能障碍（POCD）的相关性，同时分析 POCD 的发生率及危险因素。
方法 最初选择 112 例 65 岁及以上行择期胃肠肿瘤手术的患者纳入本项研究，最 终 84 例患者完成全部研究内容。所有病人在术前 1 天和术后第 7 天进行认知功 能评估，项目包括简易精神状态检查量表（MMSE）和蒙特利尔认知量表 （MoCA），采用 1 个标准差法判断 POCD 的发生，根据术后认知测试结果分为 认知障碍组（POCD 组）和认知正常组（NPOCD 组）。分别于术前（T0）、术后 24h（T1）、术后 72h（T2）收集患者中心静脉血 3ml，用酶联免疫吸附法（ELISA）测定血浆中 S100β、NFL 和 α-syn 的含量。分析 POCD 组和 NPOCD 组三个血液 生物标志物的差异，评价 S100β、NFL 和 α-syn 与 POCD 的相关性及其用于预测 POCD 的价值。收集患者的一般基线资料，记录术中麻醉药物用量、出血量、输 液量和手术时长，记录术后不良事件及并发症情况，筛选出老年胃肠肿瘤手术 患者发生 POCD 的危险因素。
结果 112 名患者中共 84 名完成本研究的 2 次认知功能测试和 3 次血液样本采集。 1.老年胃肠肿瘤手术患者术后第 7 天共 22 例发生 POCD，发生率为 26.19%。 2.单因素分析 NPOCD 组与 POCD 组的年龄及出血量比较差异有统计学意义 （P＜0.05），二元 Logistic 回归分析得出老年胃肠肿瘤手术患者早期 POCD 的危 险因素为年龄（OR=1.271，95%CI 1.063～1.518，P＜0.05）。3.NPOCD 组与 POCD 组在 T1、T2 的血浆 S100β、NFL 和 α-syn 水平较 T0 相比均显著升高（P＜0.05），3 个血浆生物标志物均在 T1 时点达到峰值水平。 4.老年胃肠肿瘤手术患者 T1 时点血浆 S100β 和 NFL 水平与 MoCA 评分值下 降呈正相关（r=0.270，P＜0.05；r=0.299，P＜0.05）；3 个时间点血浆 α-syn 水 平与 MMSE 和 MoCA 评分下降无显著相关（P＞0.05）。5.老年胃肠肿瘤手术患者 T1 时点血浆 S100β 用于预测 POCD 发生的受试者摘要 工作特征曲线下面积（AUC）为 0.71（95%CI 0.578～0.841，P＜0.05），灵敏度 为 59.1%，特异度为 79%；T1 时点血浆 NFL 水平用于预测 POCD 发生的 AUC 为 0.718（95%CI 0.595～0.840，P＜0.05），灵敏度为 81.8%，特异度为 54.8%； S100β 和 NFL 均有预测 POCD 的价值，准确性中等（AUC＞0.7）；S100β 和 NFL 联合用于预测的价值更高，AUC 为 0.792（95%CI 0.675～0.909，P＜0.05），灵 敏度为 77.3%，特异度为 79%。T1 时点血浆 α-syn 水平用于预测 POCD 发生的 AUC 为 0.559（95%CI 0.408～0.709，P＞0.05），灵敏度为 27.3%，特异度为 91.9%， α-syn 无显著预测 POCD 发生的价值
结论 1.本研究中老年胃肠肿瘤手术患者术后 7 天 POCD 的发生率为 26.19%，年 龄是早期 POCD 的危险因素。 2.老年胃肠肿瘤手术患者术后 24h 的血浆 S100β 和 NFL 水平与术后认知功 能改变相关，S100β 和 NFL 可以用于预测 POCD 的发生，两者联合用于预测 POCD 的准确性更高，α-syn 不能用于预测 POCD。

PU-1006

超高龄患者手术的麻醉管理

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目的 随着现代医疗技术的不断发展，全球人口寿命普遍延长，人口老龄化逐渐成为全球性的公共卫生问题。世界卫生组织将老年人定义为 65 岁以上的人群，据估计，2050 年全球老年人口比例将从 2022 年的 10%增长到 16%，因此越来越多的超高龄患者将面临着手术需求，尤其是 90 岁以上的超高龄患者。年龄本身已经不再是拒绝手术和麻醉的唯一因素，但是器官功能的衰退却与年龄呈正相关。衰弱、共病和认知功能障碍是老年患者围术期需重点关注的问题，并且与术后不良结局密切相关。麻醉医生的工作不仅要帮助这部分超高龄患者安全平稳地度过围术期，更重要的是要关注如何改善它们术后的生活质量及预后。每个中心都应该针对超高龄老年人制定专门的围术期管理方案。
方法 本文将围绕超高龄患者的主要器官系统特点、术前评估特殊要点、术中麻醉方法及药物的选择、防范术后认知功能障碍、术后转归等五个方面探讨围术期麻醉管理的要点，就麻醉医生应如何减轻超高龄患者围手术期潜在并发症、提高围手术期安全性提出建议。
结果 心功能储备差，处于一种平衡的边缘，容易发生射血分数正常的心衰，窦房结细胞减少、传导系统纤维化等增加发生窦房结功能异常、房颤、心脏传导异常的机率。自主调节功能受损，对血压、缺氧、高碳酸、脑代谢的反应降低 ；血脑屏障选择性摄取和运输营养物质和激素的能力降低，使大脑正常代谢受到影响，增加接触毒素机会，从而使脆弱大脑更容易遭到各种损伤，如中风 ；多处脑梗、痴呆、阿尔茨海默病和神经退行性疾病增多； 平衡和本体感觉受损 。对疼痛的感知减弱，对大多数麻醉药异常敏感。维持术中血压和平均动脉压的稳定也不能保证不发生术后认知功能障碍。随着年龄的增长，老年患者对药物代谢能力会发生较大的改变，因此，麻醉医生在用药时应更加谨慎，尽可能避免和减少药物对中枢神经系统导致的不良反应。充分考虑术后近期和远期效果，应充分权衡手术和麻醉的必要性。
结论 对于超高龄手术患者进行全面、多学科和主动的综合评估，能够帮助耄耋老人尽可能安全地度过术前、术中和术后阶段，从而有助于改善该特殊人群的术后转归。

PU-1007

右美托咪定联合依托咪酯对老年骨科手术患者围术期神经认知功能的影响

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目的 探讨右美托咪定联合依托咪酯对老年骨科手术患者围术期神经认知障碍发生率的影响。
方法 选取 2022 年 6 月至 2023 年 8 月在空军特色医学中心行择期骨科全麻手术的老年患者（≥60 岁）为研究对象，将患者随机分为：丙泊酚组、依托咪酯组和右美托咪定联合依托咪酯组（联合组），每组各 70 例。在术前 1 天、术后第 1 天、第 3 天进行神经认知功能测试。记录并比较各组术中血流动力学变化指标。
结果 共纳入患者 208 例，丙泊酚组 69 例，依托咪酯组 69 例，联合组 70 例。三组患者在一般资料如年龄、身体质量指数、性别等差异无统计学意义（P＞0.05）。术后第 1 天和第 3 天 PND 的发生率中，与丙泊酚组和依托咪酯组相比，联合组更低，差异具有统计学意义（P＜0.05）。术后第 1 天的联合组（OR=0.388，95%CI：0.173~0.869）为独立影响因素，术后第 3 天联合组（OR=0.297, 95%CI：0.100~0.879），MMSE 分值（OR=0.758，95%CI：0.604~0.951）、糖尿

病病史（OR=3.019, 95%CI：1.292~7.053）和衰弱等级为衰弱前期（OR=8.907，95%CI：1.087~72.965）是诊断 PND 的独立影响因素。
结论 右美托咪定联合依托咪酯可降低老年骨科患者围术期神经认知障碍发生率，术前 MMSE 分值、糖尿病病史和衰弱等级为衰弱前期是术后 3 天诊断 PND 的独立影响因素。

PU-1008

1H-磁共振波谱(MRS)在脑代谢物分析中的应用: 老年麻醉患者的 MRS 图像

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目的 人口老龄化现象正在全球范围内迅速发展，这表明需要更多的研究来针对老年群体。众所周知，老年人脑对全麻药很敏感，加之外科手术本身就是一种损伤，在全麻和手术双重打击下，老年患者围术期围术期脑认知功能处于高风险状态，容易引发脑认知功能处于高风险状态，并发围术期神经认知障碍。然而，全身麻醉如何影响大脑功能的机制尚未明确。全身麻醉对代谢的影响可能是研究麻醉药物对大脑影响的关键。目前，大脑代谢的研究主要依赖于脑脊液和动物模型，而磁共振波谱（MRS）可以探索大脑特定区域代谢产物的变化，为研究全身麻醉对大脑代谢的影响提供了一种新的非侵入性活体检测方法。
目的：使用非侵入性脑部 MRS 方法评估全身麻醉对老年大脑麻醉前后代谢的影响。本研究是一项单臂两次纵向成像研究，旨在探讨全身麻醉药物导致老年患者麻醉前后大脑代谢变化的可能机制。
方法 本研究纳入患者为 2022 年 7 月-2022 年 12 月于上海市第九人民医院行口腔颌面部手术的患者。根据纳入和排除标准，我们随机选取了 30 名口腔颌面肿瘤患者。术前使用认知功能量表对老年患者进行评估，以确保患者无神经认知功能障碍疾病。患者分别在术前和术后 1 天（平均间隔 24 小时）进行头部 MRS 扫描。应用单体素 MRS 方法评估左侧前额叶皮质区的代谢物浓度变化。检测序列包括针对检测 GABA 的 MEGA-PRESS，以及短回波和长回波的 PRESS 序列。使用 LCModel（版本 6.1；Provincher）和 TARQUIN（版本 4.3.10）分析和比较 MRS 数据。进行配对 t 检验检测手术前后代谢物的变化。
结果 本研究纳入 30 名受试者。7 名受试者没有进行随访扫描，1 名受试者数据受损，总共获取 52 个数据。进一步对数据质量进行筛选，删除 7 个数据，一共得到 46 个数据。我们对获得的所有数据进行统计分析。我们观察到 30 名患者的前额叶皮质代谢产物发生了变化。我们使用 MEGA-PRESS 序列检测到 GABA 浓度相对于术前显著降低。通过短回波和长回波序列检测到谷氨酸/谷氨酰胺浓度显著增加，NAA、肌酸/乳酸和总 Tau 等无显著性差异。
结论 通过无创手段明确全身麻醉和手术影响老年患者大脑的代谢，这为脑代谢疾病的研究奠定了无创研究的基础。

PU-1009

肌肉减少症与老年患者诱导后低血压等不良事件的相关性分析

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目的 肌肉减少症（简称肌少症）是一种进行性、全身性的骨骼肌疾病。既往研究发现，罹患肌少症的患者发生心力衰竭、冠脉疾病等心血管事件的风险增加。全身麻醉诱导后低血压是老年患者常见的围术期心血管不良事件，主要与患者自身功能状态相关，诱导后低血压可导致围术期器官缺血

损伤，从而引起一系列不良事件的发生。因此准确预测和及时处理诱导后低血压对麻醉医生来说至关重要。肌少症能够影响机体的心血管系统及神经内分泌功能，但目前其与诱导后低血压发生的相关性尚不明确，本研究致力于探究肌少症与全麻诱导后低血压及其他围术期不良事件的相关性。

方法 本研究是一项前瞻性队列研究，纳入 2023 年 8 月至 2024 年 3 月于东南大学附属中大医院行全身麻醉手术的 65 岁以上老年患者，根据患者术前的握力水平及基于 CT 分析获得的 T12 水平骨骼肌指数，将患者分为肌少症组和非肌少症组。主要结局为诱导后低血压，次要结局为复苏室不良事件、术后并发症以及住院时长。通过逻辑回归探究肌少症与诱导后低血压发生的相关性，并分析两组患者术后不良事件的发生率是否有差异。

结果 本研究共筛选 152 名患者，其中 2 名患者存在肾功能不全、1 名患者手术时长超过 4 小时、11 名患者拒绝或不能配合握力检查，最终纳入 138 名患者，其中肌少症组 44 例，非肌少症组 94 例。

1.本研究中共 71 名患者（51.45%）发生了诱导后低血压，肌少症组的发生率显著高于非肌少症组（68.18% vs 43.62%，P＜0.05），在纳入年龄、BMI、aCCI 指数、高血压病史、糖尿病史、恶性肿瘤病史、ASA 分级、低蛋白血症进行矫正后，肌少症仍为诱导后低血压的危险因素（OR 2.39，CI：1.03-5.56，P=0.043）。

2.在术后并发症及住院时长方面，两组患者在术后心血管系统并发症[10（22.73%） vs 8(8.51%)，P＜0.05）]、术后住院时长（天）[8.00 (6.00, 9.00) vs 6.50 (5.00, 8.00), P＜0.05]及住院总时长（天）[12.00 (9.75, 16.25) vs 10.00 (8.00, 13.00)，P＜0.05]方面均有显著差异。

结论 本研究结果显示，肌肉减少症是老年患者发生全身麻醉诱导后低血压的危险因素，且肌肉减少症患者术后心血管系统不良事件发生率较高、住院时间较长。术前进行肌少症的评估，对围术期管理具有一定价值。

PU-1010

瑞马唑仑复合艾司洛尔在老年患者麻醉诱导中的应用

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目的 探讨瑞马唑仑复合艾司洛尔在老年患者麻醉诱导中的应用。

方法 选取择期行气管插管全身麻醉的患者 90 例，年龄 65-90 岁，体重指数（BMI） 18～30kg/m2，ASA 分级 I～II 级，随机分为 A、B、C 组，每组各 30 例。麻醉诱导时 A 组予丙泊酚 2mg/kg，B 组予瑞马唑仑 0.3mg/kg，C 组予瑞马唑仑 0.3mg/kg+艾司洛尔 1mg/kg。三组均静脉注射舒芬太尼 0.3μg/kg 和罗库溴铵 0.6mg/kg。观察麻醉诱导插管前后平均动脉压（MAP）和心率（HR）变化，不良反应的发生率。

结果 入室（T0）时，三组 MAP 和 HR 水平比较，差异无统计学意义（P＞0.05）。行气管插管前（T1），B、C 组 MAP 水平高于 A 组，差异有统计学意义（P＜0.001）。三组 HR 水平比较，差异无统计学意义（P＞0.05）。在气管插管后 1min（T2）、2min（T3）、3min（T4），C 组 HR 水平低于 A、B 组，差异有统计学意义（P＜0.05）。三组 MAP 水平比较，差异无统计学意义（P＞0.05）。三组患者在麻醉诱导后气管插管的过程中，BIS 值始终低于 60。B、C 组不良反应发生率低于 A 组，差异有统计学意义（P＜0.05）。

结论 瑞马唑仑 0.3mg/kg 复合艾司洛尔 1mg/kg 可安全的应用于老年患者的麻醉诱导，于单独使用瑞马唑仑或丙泊酚麻醉诱导相比，能够减轻老年患者麻醉诱导的血流动力学波动，提高麻醉诱导安全性。

PU-1011

改良衰弱指数联合外科 Apgar 评分对行腹腔镜结直肠癌根治术老年患者术后并发症的预测效能

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目的 探讨在行腹腔镜结直肠癌根治术的老年患者中，11 项改良衰弱指数（mFI-11）联合外科 Apgar 评分（SAS）对术后并发症的预测效能。
方法 纳入接受腹腔镜结直肠癌根治手术的老年（年龄≥65 岁）患者 481 例。术前采用 mFI-11 完成衰弱评估。根据术中最低平均动脉压、最低心率和估计失血量，计算 SAS。比较 2 组患者的临床资料、mFI-11、SAS，分析 mFI-11、SAS 与术后并发症的关系及其预测价值。
结果 mFI-11、SAS、手术时间与术后并发症的发生独立相关（P＜0.05）。三者预测术后并发症的曲线下面积（AUC）分别为 0.805、0.800、0.610，mFI-11 联合 SAS 预测术后并发症的 AUC 为 0.902。
结论 在行腹腔镜结直肠癌根治术的老年患者中，mFI-11、SAS、手术时间与术后并发症的发生显著相关，且 mFI-11 联合 SAS 对术后并发症有较高的预测效能，优于单一指标，能够为临床早期识别以及减少并发症的发生提供可靠依据。

PU-1012

基于机器学习算法的老年单肺通气患者术后谵妄预警模型的构建与评价

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目的 基于机器学习算法构建并评估老年单肺通气患者术后谵妄的预警模型。
方法 采用便利抽样法纳入 2023 年 2 月~2023 年 12 月行全麻胸腔镜下肺结节摘除术老年患者 926 例(术后谵妄=284 例，非术后谵妄=642 例)，按照 7:3 将原数据集随机分为训练集(术后谵妄=199 例，非术后谵妄=449 例)和验证集(术后谵妄=85 例，非术后谵妄=193 例)，在训练集中分别构建人工神经网络、Logistic 回归和随机森林预警模型并依次在训练集和验证集中进行内部验证。绘制列线图和自变量重要性排序图对模型进行可视化展示，并利用受试者工作特征曲线下面积、灵敏度、特异度、准确度、校准曲线和决策分析曲线从区分度、校准度和临床应用价值评估模型。
结果 练集和验证集中各变量无统计学差异(P＞0.05)；人工神经网络预警模型的受试者工作特征曲线下面积、灵敏度、特异度、准确度、校准度和临床应用价值均优于 Logistic 回归和随机森林预警模型(P＜0.05)。
结论 基于人工神经网络的风险预警模型对老年单肺通气患者术后谵妄的预警效能优于 Logistic 回归和随机森林风险预警模型。

PU-1013

Causal relationship between delirium and sarcopenia: a bidirectional two-sample Mendelian randomization study

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Background Population-based studies have validated the significant associations between delirium and sarcopenia. Nonetheless, the causality remains ambiguous. This study aims to elucidate the causal associations between delirium and sarcopenia.
Methods A bidirectional two-sample Mendelian randomization (MR) analysis was performed based on public genome-wide association studies (GWAS) data. Causal effects were evaluated through the inverse-variance weighted (IVW) method as the principal analysis, supplemented by the weighted median, weighted mode. Cochran's Q test, MR-Egger regression, MR-PRESSO test and leave-one-out were applied for sensitivity analyses.
Results Genetically yielded non-significant causal effects of delirium on appendicular lean- mass (OR=1.0009, 95% CI: 0.9964-1.0054, P=0.7068) and low hand-grip strength (OR=1.0047, 95% CI: 0.9848-1.0251, P=0.6437). Furthermore, we did not find a significant causal effects of lean mass or low hand-grip strength on delirium in the reverse IVW MR analysis. Consistent findings were observed through the other analytic methods. Horizontal pleiotropy was not observed in the study, while heterogeneity was observed in the relationship between delirium and appendicular lean mass. The MR analysis results did not alter after removing 2 outlier SNPs when delirium was used as the outcome.
Conclusion Our MR analysis found no causal associations between delirium and sarcopenia. The same result was found when exposure and outcome were reversed. Future study with increased sample size is warranted to verify our findings.

PU-1014

空气污染与阿尔兹海默病因果关联的两样本孟德尔随机化研究

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目的 利用两样本孟德尔随机化（Mendelian randomization，MR）的方法探究空气污染与阿尔兹海默病（Alzheimer's disease，AD）发病风险之间的因果关系。
方法 基于全基因组关联研究（genome-wide association study，GWAS）的数据，采用两样本 MR 分析评估空气污染与 AD 的因果关系。以空气污染,包括细颗粒物（PM2.5），粗颗粒物（PM2.5-10），可吸入颗粒物（PM10），二氧化氮以及氮氧化物为暴露因素，从英国生物银行（UK Biobank）中获得汇总的遗传数据。PM2.5 的数据集包括患者 423 796 例，包含 9 851 867 个单核苷酸多态性（single nucleotide polymorphism，SNP）的关联分析；PM2.5-10 的数据集包括患者 423 796 例，包含 9 851 867 个 SNP 的关联分析；PM10 的数据集包括患者 455 314 例，包含 9 851 867 个 SNP 的关联分析；二氧化氮的数据集包括患者 456 380 例，包含 9 851 867 个 SNP 的关联分析；氮氧化物的数据集包括患者 456 380 例，包含 9 851 867 个 SNP 的关联分析。以 AD 为结局因素，从国际阿尔兹海默病基因组学项目（International Genomics of Alzheimer's Project，IGAP）中获得 AD 的汇总数据。AD 的数据集包括患者 25 580 例和对照人群 48 466 例，包含 7 067 513 个 SNP 的关联分析。以逆方差加权（Inverse-variance weighted，IVW）法为主要分析方法，选择加权中位数法、MR-Egger 回归、基于众数的简单估计和基于众数的加权估计 4 种方法进行质

量控制，并进行异质性检验、基因多效性检验和敏感性分析来评估研究结果的可靠性。
结果 异质性检验结果表明，空气污染与 AD 的 SNP 之间不存在异质性（IVW 法和 MR-Egger 法结果均 P>0.05），多效性检验未检测到多效性（P>0.05）,敏感性分析显示，研究结果稳定。IVW 法和基于众数的加权估计分析结果均发现，在欧洲人群中，PM2.5（P=0.000）与 AD 之间存在统计学关联，而 PM2.5-10（P=0.664）；PM10（P=0.664）；二氧化氮（P=0.284）；氮氧化物（P=0.567）与 AD 之间未发现统计学关联。
结论 PM2.5 与 AD 发病风险增加之间存在显著的因果关系，但是并没有发现 PM2.5-10，PM10，二氧化氮和氮氧化物导致 AD 发病风险增加的证据。

PU-1015

格拉司琼对麻黄素预防老年患者全麻诱导后低血压半数有效剂量的影响：一项随机对照研究

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目的 Serotonin 3 receptor antagonists, a commonly used drug for preventing postoperative nausea and vomiting, have recently been reported to decrease the incidence of hypotension and the need for vasoactive drugs after spinal anaesthesia in obstetric surgery. However, it remains unknown whether they could also prevent hypotension after induction of general anaesthesia. In the current study, we aimed to investigate the effect of intravenous granisetron on prophylactic ephedrine for preventing hypotension after general anaesthesia induction in elderly patients.
方法 Sixty elderly patients were randomly assigned to receive granisetron or saline control 30 min before induction of general anaesthesia. The first patient in each group received a prophylactic dose of ephedrine (0.15 mg kg−1) to prevent hypotension. The prophylactic dose for each patient was increased or decreased by 0.05 mg/kg based on the efficacy results of the previous patient. The up-down sequential allocation analysis and probit regression was used to calculate the effective dose for 50% of patients (ED50) with prophylactic ephedrine.
结果 In the up-down sequential allocation analysis, the ED50 of ephedrine was significantly lower in group granisetron (0.08 mg kg−1 [95% CI, 0.06–0.11 mg kg−1]) when compared with group control (0.14 mg kg−1 [95% CI, 0.13–0.16 mg kg−1]) (P < 0.001). The conclusion was further supported by probit regression analysis (0.09 mg kg−1 [95% CI, 0.05–0.12 mg kg−1] in group granisetron and 0.14 mg kg−1 [95% CI, 0.12–0.16 mg kg−1] in group control).
结论 Intravenous granisetron reduced the
requirement of prophylactic ephedrine in preventing hypotension after general anaesthesia induction in elderly patients.

PU-1016

改良呼气末闭塞试验在老年患者术中肺保护性通气中的评估：随机对照交叉试验

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目的 老年患者的围术期容量反应性评估十分重要，呼气末阻断（End-expiratory occlusion, EEO）试验是近年提出的用于判断容量反应性的新方法，通过中断机械正压通气（至少 15s）来模拟内源

性补液。关于 EEO 现有研究的推荐潮气量是≥8mL/kg 的理想体重（Ideal body weight，IBW），这与近年提倡的老年患者围术期保护性肺通气策略（Lung protective ventilation strategies，LPVS）下的小潮气量（6-8 mL/kg IBW）有矛盾。本研究采用 EEO 试验作为基本方法，结合 EEO 前后血流动力学指标的变化来判断容量反应性，并比较不同阻断时间 EEO 试验的诊断效力，意在验证 EEO 在老年患者围术期 LPVS 下的容量反应性预测中的诊断价值，为临床诊断和治疗提供参考。
呼气末闭塞（EEO）是预测输液反应性的一项有价值的测试，但它在保护性通气中的作用也受到质疑。本研究评估了改良的 30 秒 EEO 在老年人术中的有效性和安全性。
方法 本研究采用随机对照、两阶段交叉设计。将 66 名接受择期全身麻醉的患者被随机分配到两组。A 组首先接受 15 秒钟的 EEO（EEO1）测试，随后接受 30 秒钟的 EEO（EEO2）测试，B 组以相反的顺序接受测试。最后，在 10 分钟内给予 250 毫升 0.9% 生理盐水的液体挑战，以确定液体反应者（搏出量指数增加 ΔSV≥10%）。脉搏轮廓分析用于记录血液动力学参数。
结果 结果显示 63 名患者中，41 人对液体挑战有反应。△SVEEO1 增加 6%可区分对扩容有反应者，AUC 为 0.86，而△SVEEO2 增加 10%，AUC 为 0.91。两种方法都能有效评估液体反应性，但△SVEEO2 的特异性（100%）高于△SVEEO1（82%）。
结论 EEO 测试引起的 SV 变化可以预测围术期肺保护性通气策略下老年人对液体的反应性。延长闭塞时间可显著提高 EEO 的特异性。修改后的 EEO 试验可能更积极、更实用、更有效，从而提高术中安全性。

PU-1017

右美托咪啶联合舒芬太尼对老年下肢骨折术后镇痛效果的观察

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目的 探讨对老年下肢骨折术后镇痛，采用右美托咪啶联合舒芬太尼治疗效果观察。
方法 2022 年 1 月至 2024 年 1 月骨科手术治疗 86 例老年患者，随机数字法分对照组和观察组，各组 43 例。所有患者由相同麻醉医师进行麻醉，均采取腰硬联合麻醉方式，术后均行自控静脉镇痛麻醉。对照组使用枸橼酸舒芬太尼注射液 1μg/kg，观察组使用枸橼酸舒芬太尼注射液 1μg/kg 复合盐酸右美托咪定注射液 1μg/kg，每组均加注射用盐酸托烷司琼 10mg。对比两者患者的临床资料、术后 6h、12h、24h、48h 疼痛评分和镇静评分情况、术后 6h、12h、24h、48h 循环呼吸功能情况及不良反应情况。
结果 对照组患者的年龄、性别、BMI、ASA 分级与观察组临床资料比较，差异无统计学意义(P＞0.05)；观察组术后 6h、12h、24h、48h 的时间点 VAS 评分均低于对照组不同时间点 VAS 评分(P＜0.05)；观察组术后 6h、12h 的时间点 Ramsay 镇静评分高于对照组(P＜0.05)；观察组术后 24h、48h 的时间点 Ramsay 镇静评分低于对照组(P＜0.05)；观察组在 T1、T2、T3、T4 时刻的 MAP、HR、SPO2、RR 较对照组的同时间点相比都明显降低(P＜0.05)；观察组不良发生率 6.98%低于对照组不良率 16.28%(P＜0.05)。
结论 对于老年下肢骨折术后镇痛，舒芬太尼复合右美托咪啶具有良好镇痛效果，对循环呼吸影响较小，并能有效降低不良反应的发生率。

PU-1018

不同剂量艾司氯胺酮对老年患者无痛支气管镜检查术后苏醒质量的影响

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目的 探讨三种不同剂量艾司氯胺酮(0.2mg/kg、0.3mg/kg、0.5mg/kg)对老年患者无痛支气管镜术后苏醒质量的影响。
方法 选择择期行纤维支气管镜检查术老年患者 144 例，年龄 65~80 岁，BMI 18~25kg/m^2，ASAⅡ或Ⅲ级。采用随机数字表法将患者分为三组：0.2mg/kg 艾司氯胺酮组(S_1 组)、0.3mg/kg 艾司氯胺酮组(S_2 组)、0.5mg/kg 艾司氯胺酮组(S_3 组)，每组 48 例。 麻醉诱导前 S_1 组静脉注射艾司氯胺酮 0.2mg/kg，S_2 组静脉注射艾司氯胺酮 0.3mg/kg，S_3 组静脉注射艾司氯胺酮 0.5mg/kg。三组均在 Marsh 模式下靶控输注(TCI)丙泊酚效应室浓度 3ug/ml，Minto 模型 TCI 瑞芬太尼效应室浓度 4ng/ml，进镜后调整丙泊酚和瑞芬太尼效应室浓度分别为 1.5~3ug/ml 和 2~4ng/ml。 记录镜检时间、睁眼时间和拔除喉罩时间。 记录术中丙泊酚和瑞芬太尼用量。 记录术中低血压发生率。记录三组患者拔管后 Ricker 镇静-躁动评分(SAS 评分)。记录术后 1d 恢复质量评分。记录术后恶心呕吐 、咽喉痛、多梦、头晕等不良反应发生率。
结果 与 S_3 组比较，S_1 组和 S_2 组睁眼时间、拔除喉罩时间明显缩短($P<0.05$)；与 S_1 组比较，S_2 组和 S_3 组多梦、头晕发生率明显增加($P<0.05$)、SAS 评分明显降低($P<0.05$)。
结论 不同剂量艾司氯胺酮均可安全用于老年患者无痛支气管镜检查术，但 0.2mg/kg 艾司氯胺酮全麻恢复时间更短，过度镇静发生率更低，术后不良反应更少，因此，我们认为 0.2mg/kg 艾司氯胺酮复合丙泊酚更适用于老年患者无痛支气管镜检查

PU-1019

血脑屏障的改变与术后认知功能关系的研究进展

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目的 阐述血脑屏障与 POCD 之间的潜在关系，归纳围术期血脑屏障损伤的潜在机制，和检测血脑屏障的损伤中的相关生物标志物，为 POCD 的早期防治提供参考。
方法 采用综述的形式阐述血脑屏障与 POCD 之间的潜在关系，归纳围术期血脑屏障损伤的潜在机制，和检测血脑屏障的损伤中的相关生物标志物。
结果 围术期血脑屏障易受多种因素的干扰而受损，导致有害物质进入中枢神经系统对海马体产生影响，从而介导 POCD 的发生。
结论 围术期血脑屏障易受多种因素的干扰而受损，导致有害物质进入中枢神经系统对海马体产生影响，从而介导 POCD 的发生。

PU-1020

腰丛联合骶丛阻滞用于高龄患者泌尿系统腔内手术的初探

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目的 对于需解决尿路梗阻问题而采取限期手术治疗的脆弱脏器功能高龄患者，因为可能存在的严重并发症，全身或椎管内麻醉的实施与管理具有挑战性。我们报告 9 例采用以腰丛复合骶丛神经阻滞为主，喉罩免肌松剂为辅的麻醉方法用于泌尿系统腔内手术病例，且其中 3 例仅采用腰丛复合骶丛神经阻滞的方法成功用于该类手术。

方法 9 例患者均择期行泌尿系统腔内手术治疗，7 例经尿道前列腺电汽化术（TEVAP/TURP）、2 例经输尿管碎石取石术（URS）。所有患者均先行腰丛（L3-4 穿刺点）复合骶丛（经典入路）神经阻滞，针刺并测定麻醉平面确定效果后，静脉泵注右美托咪定 10min，手术医师置入膀胱镜鞘。根据患者对疼痛反应情况，适时作出麻醉调整。麻醉效果满意可继续手术，效果不满意进行喉罩插管并免肌松剂下完成手术。

结果 3 例患者（2 例 TEVAP/TURP、1 例 URS）仅采用腰丛复合骶丛神经阻滞；4 例患者（3 例 TEVAP/TURP、1 例 URS）采用腰丛复合骶丛神经阻滞中转喉罩免除肌松剂的全身麻醉，1 例加用一定量肌松剂完成手术；1 例 TURP 患者因局麻药中毒改用喉罩插管给予肌松剂的全身麻醉。所有患者均未出现严重并发症。

结论 仅采用腰丛复合骶丛神经阻滞用于泌尿系统腔内手术，效果尚确切；对于脆弱脏器功能的高龄患者，不失为可考虑的“第三种途径”；但要达到类似于椎管内麻醉的优良率，需不断完善神经阻滞技术。

PU-1021

颈动脉和下腔静脉超声测量参数对老年患者全麻诱导后低血压的预测价值及其模型构建

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目的 探讨颈动脉和下腔静脉超声测量参数对老年患者麻醉诱导后低血压的预测价值，并建立预测全麻诱导后低血压的预测模型。

方法 纳入我院择期行胃肠手术的老年患者 102 例，麻醉诱导前采用超声测量患者呼气末下腔静脉最大直径（dIVCmax）、吸气末下腔静脉最小直径（dIVCmin）、下腔静脉塌陷指数 (IVC-CI)、颈动脉峰值流速变异度(△Vpeak) 和颈动脉校正血流时间(FTc)。分别应用 Bazett 公式和 Wodey 公式计算得到 FTc（B）和 FTc（W）。记录麻醉诱导前基线收缩压（SBP）和麻醉诱导后 15 分钟内最低 SBP，并根据诱导后 15 分钟内 SBP 是否比基线水平下降 30%以上，或 SBP 绝对值是否小于 90 mmHg，将患者分为低血压组和血压正常组。经单因素分析筛选出 P<0.05 的变量，进一步采用向前逐步回归法对 P<0.05 的变量采用二分类自变量 logistic 回归进行多因素分析，筛选出老年患者麻醉诱导后低血压的独立危险因素。最后在 R 软件中进一步构建老年患者麻醉诱导后低血压的列线图预测模型，使用内部验证和计算模型的受试者工作特征曲线（ROC）的曲线下面积（AUC）来评价该模型的预测价值。

结果 在纳入的 102 例老年患者中，麻醉诱导后 15 分钟内有 49%的患者发生了低血压。与血压正常组比较，低血压组患者麻醉诱导前颈动脉 FTc(W) 和 FTc(B)明显小于血压正常组（P<0.0001），△Vpeak 明显大于血压正常组（P<0.0001）；下腔静脉 IVC-CI 明显大于血压正常组（P<0.005），dIVCmax 和 dIVCmax 明显小于血压正常组（P<0.005）。多因素 logistic 回归分析发现颈动脉

FTc(W)（OR=0.908，95%CI：0.867～0.951，P<0.001）、△Vpeak（OR=1.317，95%CI：1.084～1.601，P<0.01）和 IVC-CI（OR=1.060，95%CI：1.000～1.123，P<0.05）为麻醉诱导后低血压的独立危险因素。基于筛选出的 3 个独立因素，建立老年患者麻醉诱导后低血压的相关风险因素列线图模型。计算出模型 ROC 的 AUC 为 0.871（0.801～0.941，P<0.001），内部验证法显示，该预测模型的 C-index 值为 0.858，且该模型校正曲线与理想曲线拟合度良好。

结论 颈动脉和下腔静脉超声测量参数对老年患者麻醉诱导后低血压具有预测价值。联合颈动脉 FTc(W)、△Vpeak 和 IVC-CI 等参数构建的列线图模型具有良好的预测区分度和校正度，有利于筛查麻醉诱导后低血压高风险的老年患者和制定防治措施。

PU-1022

Knowledge, attitudes and practices of anesthesiologists regarding perioperative neurocognitive dysfunction: a cross-sectional study

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Objective This study aimed to investigate anesthesiologists' knowledge, attitudes, and practices (KAP) regarding perioperative neurocognitive dysfunction (PND).

Methods This multicenter, cross-sectional study enrolled anesthesiologists in mainland China between January 2024 and February 2024. Demographic information and KAP scores of the participants were collected through self-administered questionnaires.

Results A total of 594 valid questionnaires were included in the final analysis. Of these, 311 (52.36%) were male, and 172 participants (28.96%) had undergone training related to PND. The mean scores for knowledge, attitudes, and practices were 8.98 ± 2.32 (possible range: 0-13), 35.53 ± 3.00 (possible range: 8-40), and 28.49 ± 6.70 (possible range: 8-40), respectively. Multivariate logistic regression revealed that knowledge scores (OR = 1.099, 95% CI: [1.012-1.194], P = 0.025), attitude scores (OR = 1.112, 95% CI: [1.043-1.188], P = 0.001), and participation in PND-related training (OR = 2.876, 95% CI: [1.973-4.207], P < 0.001) were associated with proactive practice. The path analysis showed that knowledge influenced attitudes (β=0.31, P < 0.001) and practices (β=0.52, P < 0.001), and that attitudes influenced practices (β=0.29, P = 0.002).

Conclusion Anesthesiologists in mainland China show suboptimal knowledge, active attitudes, and active practices regarding PND. Targeted educational interventions for anesthesiologists on PND are recommended to improve patient outcomes in perioperative care.

PU-1023

术前微视频对胃肠手术患者苏醒期躁动的影响

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目的 探讨术前微视频运用于胃肠手术麻醉苏醒期躁动患者的可行性，减少患者紧张焦虑发生率，提高患者舒适度，使患者平稳的度过麻醉苏醒期，促进早期康复。

方法 选取 2023 年 1~12 月我院治疗的行胃肠手术患者 100 例,随机等分为观察组和对照组,观察组采取传统的术前健康宣传教育加微视频访视,对照组采取传统的术前健康教育。

1.1 确立研究对象、制定纳入标准及排除标准

纳入标准：(1)胃肠手术患者;(2)麻醉方式：全麻;(3)ASA 为Ⅰ~Ⅱ级;(4)年龄 18~80 岁;(5)签署手术知

情同意书，自愿参与本研究。
排除标准：(1)具有精神疾病和意识障碍;(2)麻醉方式：腰麻;(3)存在理解力、记忆力及定向力障碍;(4)合并心脏、肝、肾等严重疾病的患者。
1.2 干预措施
对照组：胃肠手术前 1 天，采取口头宣教形式，时间一般不超过 5 min。
观察组：对照组的基础上加微视频术前宣教,即护理人员携带手机或 iPad 向患者及家属播放术前微视频，向其介绍与手术有关的信息，同时耐心为其解答手术疑虑，宣教时间一般不超过 10 min。
1.3 观察指标
采用苏醒期躁动发生率；焦虑自评量表（SAS)及患者满意度对两组患者进行评价和对比、测量及比较两组患者拔管时心率、血压、呼吸及血氧饱和度变化。SAS 评分值越高，表示患者焦虑症状越严重。
结果 观察组焦虑自评量表评分低于对照组,两组比较差异有统计学意义(P<0.05);观察组收缩压、舒张压及心率与对照组比较差异有统计学意义(P<0.05);两组患者满意度比较,差异有统计学意义(P<0.05)。
结论 术前宣教微视频访视可以明显减轻腹腔镜患者的焦虑情绪,缓解患者焦虑状态;有利于稳定患者生命体征;提高患者满意度。

PU-1024

CYP2B6 基因型宫颈癌患者应用右美托咪定麻醉效果的前瞻性队列研究

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目的 本研究旨在探讨 CYP2B6 基因型与宫颈癌病人使用 Dex 麻醉的治疗效果
方法 采用随机对照试验方法，本研究共纳入 2019-2021 我院收治的 100 名宫颈癌病人，所有患者在手术前都不进食，不饮水,外周静脉通道建立及进行心电图监测,全麻诱导,静脉注射丙泊酚 1.5 mg/(kgh)、瑞芬太尼 2 g/(kgh),然后继续给病人注射 Dex，剂量是 0.2 ug/(kgh),术中视病人病情给予丙泊酚。在早晨空腹取静脉血后，在没有服用任何药物的情况下,应用 PCR-RFLP 法对 CYP2B6 基因分型病人进行了分析，记载并对比病人的丙泊酚用量与不良反应。
结果 在这项研究中，所有纳入研究病人的 CYP2B6 516G>T 等位基因分布遵循 Hardy - Weinberg 平衡(P>0.05)；GT/TT 基因型组比 GG 基因型组具有更长的觉醒时间（P<0.05）;此外，和 GG 基因型相比，GT/TT 基因型病人围手术期额外丙泊酚总量显著增加（P<0.05）；术后，CYP2B6516 G> T 中 GG 基因型病人在麻醉后应用 Dex，不良反应出现的可能性更小（P<0.05）。
结论 CYP2B6 516G>T 基因基因变异对子宫颈癌病人使用 Dex 麻醉效果有明显影响,使丙泊酚剂量增加，不良反应发生率增加。

PU-1025

DSA 手术患者局麻护理

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目的 分析探讨 DSA 手术患者局麻护理措施，为 DSA 手术顺利开展提供基础，为患者围术期的安全提供保障。

方法 回顾分析总结 332 例 DSA 局麻手术患者护理措施，手术包括心血管系统疾病的诊治及肿瘤灌注化疗栓塞介入手术、需预见性控制出血的手术如各专科血供丰富的肿瘤及凶险性前置胎盘剖宫产术前供血动脉球囊置入。麻醉方式局部浸润麻醉占 90%以上，术中患者的生命支持由手术室护士在麻醉医生或手术医生的指导下进行。内容包括（1）术前准备：备齐用物；患者入室后查对病历内容包括手术方式、麻醉方式是否正确，与患者沟通，建立良好护患关系，询问手术史、过敏史，为术中关注点提供依据；建立静脉输液通道，为术中用药及补液提供通路；准确心电监护，妥善固定患者，与患者有效沟通，预防患者坠床，整理心电监护导线至透视野外，防止影响术中造影，并预防术中导线缠绕机头导致损伤；（2）术中护理：提供局部麻醉用药，观察局麻药用药后的反应，穿戴好铅围脖、铅衣，持续关注生命体征，观察有无造影剂过敏反应及手术并发症；重视患者主观感觉，根据病情变化随时进入手术间对患者对症护理，准确执行医嘱；DSA 机器旋转时观察确认无缠绕；（3）术后关怀：搬动患者后关注患者反应，主动询问患者有无不适，观察敷料及压迫器是否移位，平稳护送，严密交接；

结果 332 例 DSA 局麻手术患者均安返病房，其中 1 例冠状动脉造影患者术中心跳呼吸骤停，经胸外心脏按压、面罩给氧，盐酸肾上腺素静脉注射，继续造影后拔管，神志意识恢复，生命体征恢复，疑为刺激迷走神经反射引起。

结论 DSA 手术患者局麻护理中，护理人员需具有高度的责任心兼顾患者身、心反应，严密监护，及时准确执行医嘱，保障患者安全，同时预防仪器设备损伤导致医源性损伤及财产损失。

PU-1026

重复口头提醒方向对微创腹部手术全麻后出现躁动的影响：一项随机对照试验

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目的 观察一种提供时间、地点和人的重复口头提醒的定向策略应用于微创腹部手术患者全麻后进行非药物管理的临床效果。

方法 本前瞻性观察盲法随机对照试验纳入年龄 18-70 岁接受微创腹部手术的男性和女性患者。在脱离全身麻醉期间，实验组（n=57）的受试者被反复提醒，包括指导：“（患者姓名），你现在正在南昌大学第一附属医院手术后从全身麻醉中恢复，睁开眼睛！”通过降噪耳机，而对照组（n=57）中的人只听到了他们的名字：“（病人的名字），睁开眼睛！”。主要结果是出现躁动的发生率（Riker 镇静躁动量表 SAS≥5）。以紧急躁动（SAS=7）发生率、手术室最大 SAS 评分和术后 24 小时的恢复情况作为次要结果。

结果 实验组中手术室紧急躁动发生率明显低于对照组（16/57 [28.1%]vs38/57[66.7%]；相对风险[95%可信区间]，0.5[0.3-0.7]；P＜0.001）。实验组的危险躁动发生率（0[0.0%]vs10[17.5%]，P=0.001）和中位最大 SAS 评分（4[4-5]vs5[4-6]，P＜0.001）也较低。除躁动相关变量外，次要结果在两组之间具有可比性。

结论 反复的心理定向言语刺激可作为减少全身麻醉后出现躁动的一种简单、可行的策略。

PU-1027

基于机器学习的 SARIMA 与 LSTM 模型对恢复室人力资源预测比较分析

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目的 麻醉恢复室（Post-Anesthesia Care Unit, PACU）PACU 患者入室流量的波动对人力资源配置带来挑战，准确的预测模型对于优化资源配置和保障患者安全至关重要。本研究旨在探索和比较季节性自回归综合移动平均模型（SARIMA）和长短期记忆（LSTM）神经网络在预测 PACU 患者入室流量方面的有效
方法 本研究收集了南昌大学第二附属医院 2020 年 11 月至 2021 年 12 月的 PACU 患者入室数据。利用 SARIMA 模型和 LSTM 模型对数据进行分析和预测，评估两种模型在患者入室流量预测方面的性能。
结果 研究结果显示，在整体预测性能上，LSTM 模型 RMSE 为 9.4712，MAE 为 6.7356，R^2为 0.7629，SARIMA 的 RMSE 为 12.2624，MAE 为 8.6107，R^2为 0.6999。LSTM 在 R2、RMSE 和 MAE 等统计指标上均优于 SARIMA 模型。
结论 LSTM 模型能够较好的拟合和预测 PACU 患者入室流量并优于 SARIMA 模型，有助于提高护理人员配备的合理性，提升护理质量。

PU-1028

术前情景模拟纱布眼罩游戏联合术后奥布卡因滴眼对行全麻斜视矫正术患儿术前焦虑及苏醒期疼痛和躁动的效果观察

黄菊
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目的 观察术前情景模拟纱布眼罩游戏联合术后奥布卡因滴眼对行全麻斜视矫正术患儿术前焦虑及苏醒期疼痛和躁动的效果观察。
方法 选择 4-12 岁患儿在全身麻醉下行斜视矫正术 108 例，随机分为观察组和对照组各 54 例，观察组由巡回护士到病房访视患儿，与之交谈并进行情景模拟佩戴纱布眼罩游戏，前 30 分钟由医务人员陪同，后 30 分钟由家长陪同参与游戏，共持续 1 小时。告知患儿次日全麻手术术后情况同现在一样，要求患儿听从医务人员指令进行配合。手术结束时观察组给予 0.4%奥布卡因眼液点眼 1 次，送人复苏室前再点眼 1 次，共计 2 次。对照组患儿常规由手术医生和麻醉医生到病房访视患儿，不予情景模拟纱布眼罩游戏，但仍会告知患儿次日手术后所处情况及术后需要纱布眼罩遮盖术眼。手术结束时和送入复苏室均不予 0.4%奥布卡因眼液点眼。观察并记录两组患儿进入手术时的焦虑程度和苏醒期躁动情况。
结果 观察组患儿焦虑评分低于对照组，差异具有统计学意义（$P<0.05$）；观察组躁动发生率 7.8%，对照组躁动发生率 30.8%，比较两组差异有统计学意义（$P<0.05$）。观察两组儿童术后疼痛行为（FLACC）客观评估以及数字疼痛（NRS）评分主观评估，观察组患儿疼痛的客观评分与主观评分均低于对照组，差异有统计学意义（$P<0.05$）。
结论 术前模拟情景戴纱布眼罩游戏联合术后奥布卡因点眼能有效降低患儿术前紧张和恐惧，缓解患儿术前焦虑和苏醒期躁动情况，减轻患儿术后疼痛，对预防全麻斜视矫正患儿术后躁动有较好的效果。

PU-1029

动画视频联合小剂量丙泊酚在全麻斜视矫正术患儿麻醉诱导中的效果观察

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目的 探讨由于患儿的心理能力尚未发育成熟，在手术麻醉过程中和父母的短暂分离、麻醉、陌生环境及手术本身的创伤等因素容易引起术前焦虑、术后躁动甚至造成精神创伤等。如何缓解患儿负性情绪，提高患儿在麻醉诱导中合作度及手术治疗效果是临床医护人员关注的重点，因此术前采取积极有效的方法改善术前心理状态显得至关重要。本组研究采用播放动画视频联合小剂量丙泊酚静脉推注的应用，观察在麻醉诱导中对斜视患儿的影响。

方法 选取 2023 年 1 月-2023 年 12 月我院收治的 60 例斜视矫正患儿的临床资料，并按随机数字方法分为对照组和实验组，各 30 例。对照组术前访视后给予患儿放映喜欢的动画视频，采用亲密接触用温暖的话语安慰患儿，正确引导患儿观看其喜欢的动画视频；观察组在观看动画视频的基础上同时给予丙泊酚静脉推注，边观察患儿意识状态保护其安全，并温柔安抚患儿心理情绪。观察比较两组患儿术前访视（T1）、操作后 5min(T2）、麻醉诱导时（T3），3 个时间段的心理状况，采用中文版改良耶鲁术前焦虑量表（mYPAS)评分、诱导期合作度量表（ICC）评分、观察围手术期生命体征指标、儿童苏醒期躁动评分量表（PAED）、术后行为量表（PHBQ）。

结果 患儿麻醉诱导前后生命体征变化：诱导后观察组生命体征均明显低于对照组（P＜0.05）；两组患儿不同时间段 mYPAS 评分：组内比较，T2 和 T3 时刻的 mYPAS 评分显著低于 T1 时刻（P＜0.05),且 T3 时刻患儿 mYPAS 评分显著低于 T2 时刻（P＜0.05），组间比较，观察组的 mYPAS 评分显著低于对照组（P＜0.05）；观察组苏醒期躁动评分量表、诱导期合作度量表、术后行为量表评分均低于对照组（P＜0.05）。

结论 观看患儿喜爱的动画视频联合小剂量丙泊酚静脉推注具有较好的麻醉诱导作用，融入儿童喜爱的动画元素，能有效的缓解患儿心理应激反应，提高麻醉诱导配合度，减轻患儿术前焦虑、术后躁动及行为改变的发生，保证了手术的顺利，值得临床上推广应用。

PU-1030

基于人文关怀理念的舒适护理在麻醉恢复室留观患者中的应用

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目的 麻醉恢复室集中观察麻醉患者的康复情况，对患者的生命体征分析，若是在苏醒的过程中出现异常情况可以及时地护理，避免机体变化影响患者安全。基于人文关怀理念的舒适护理在麻醉恢复室留观患者中运用可以有效地改善患者生命体征，尽量地恢复患者的情况，这种护理方案整体有效，并且可更为尊重患者意愿，护理措施的有效性更强。

方法 以我院 2021 年 3 月到 2022 年 8 月收诊的 140 例麻醉恢复室留观患者为对象，将患者随机分为观察组与对照组，对人文关怀理念的舒适护理的价值分析。结果：观察组与对照组患者低氧血症、躁动、寒颤、苏醒延迟、合计 1.43（1/70）、2.86（2/70）、1.43（1/70）、0.00（0/70）、5.71（4/70）和 4.29（3/70）、5.71（4/70）、2.86（2/70）、2.86（2/70）、15.71（11/70），χ2=3.264、3.365、1.568、2.754、10.036，P=0.091、0.082、0.157、0.096、0.001，有差异，（P＜0.05）

结果 观察组与对照组患者低氧血症、躁动、寒颤、苏醒延迟、合计数据分别为 1.43（1/70）、2.86（2/70）、1.43（1/70）、0.00（0/70）、5.71（4/70）和 4.29（3/70）、5.71（4/70）、

2.86（2/70）、2.86（2/70）、15.71（11/70），χ2=3.264、3.365、1.568、2.754、10.036，P=0.091、0.082、0.157、0.096、0.001，有差异，（P＜0.05）。

结论 麻醉恢复室留观患者受到多种因素的影响，在苏醒期可能会出现并发症情况，这就需要积极的护理，加强对患者的管理。基于人文关怀理念的舒适护理实施可以有效地降低对患者的影响，对患者进行生命体征护理和基础护理措施改善患者病情，这样可以有效地降低对患者的影响，对患者手术后康复有较大的帮助。基于人文关怀理念的舒适护理是以患者为中心，观察患者的生命体征变化，对患者的心理更为关注，可以构建更为稳定的信任关系。

综上所述，麻醉恢复室留观患者在基于人文关怀理念的舒适护理实施可以有效降低患者发生并发症的概率，这种护理措施有推广的意义。

PU-1031

手术病人电灼伤一例反思

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目的 高频电刀是一种取代机械手术刀进行组织切割的医疗器械,它通过有效电极端产生的高频电压电流与机体接触时对组织进行加热,从而达到对机体组织进行分离的治疗目的。由于使用中会有高密度的电流通过人体,操作不当会导致机体灼伤。 总结本院在手术过程中发生的高频电刀意外电击损害的主要类型和原因,对存在的风险因素进行分析并持续改进,提高手术室护理管理质量。探讨高频电刀在手术中的正确应用,防止操作不当引起灼伤、烧伤及电击伤等不良事件。

方法 通过介绍我院一例应用高频电刀致皮肤灼伤病例，针对高频电刀使用不当发生灼伤的手术不良事件进行根因分析。

结果 临床存在不当使用情况，包括重复粘贴、裁剪后使用产品、任意改变高频设备输出功率、不考虑手术时长对产品的影响和患者体重和年龄特点等。 通过建立人员保护屏障、完善设备保护屏障、明确制度保护屏障多层屏障，避免此类事件的发生。

结论 正确规范地使用高频电刀,严格遵守高频电刀的操作规程,不断提高安全防范意识才能保证操作者和患者的安全,防止意外损害的发生。只要正确掌握高频电刀的操作规程和使用方法,就会发挥高频电刀的手术中的优势,减少不良事件的发生。手术安全无小事，手术室电刀灼伤事件虽然不多见，但是一旦发生，就会给患者及医院带来难以挽回的损失。我们只有在思想上高度重视，牢固树立人员、设备及制度三层保护屏障，避免此类事件的发生。

PU-1032

加速康复外科（ERAS）协议对麻醉恢复室护理实践和艾滋病患者结果的影响

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目的 本研究旨在评估加速康复外科（Enhanced Recovery After Surgery, ERAS）协议对麻醉恢复室（Post-Anesthesia Care Unit, PACU）护理实践和艾滋病（HIV/AIDS）患者术后恢复结果的影响。通过分析实施 ERAS 协议前后护理措施和患者恢复情况，探索其在提高护理质量和患者术后恢复中的作用。

方法 本研究采用前后对照研究设计，选取在我医院进行择期手术的艾滋病患者作为研究对象。受

试者分为两组：实施 ERAS 协议前的对照组（n=50）和实施 ERAS 协议后的实验组（n=50）。ERAS 协议包括术前患者教育、优化营养、术中麻醉管理、术后疼痛管理和早期活动等措施。

数据收集包括患者的术后恢复时间、并发症发生率、住院时间、疼痛评分和满意度等指标。同时，通过问卷调查和半结构化访谈，收集护理人员对 ERAS 协议实施前后护理实践变化的反馈。数据分析采用 SPSS 软件进行统计分析，通过 t 检验和卡方检验比较两组间的差异。

结果 1、恢复时间：实验组患者在麻醉恢复室的平均恢复时间显著短于对照组（P<0.01），实验组患者的恢复时间平均减少了 30%。

2、术后并发症：实验组患者的术后并发症发生率显著降低，特别是在术后感染和恶心呕吐方面，实验组的发生率明显低于对照组（P<0.05）。

3、住院时间：实验组患者的平均住院时间较对照组减少了 2 天（P<0.01），表明 ERAS 协议在促进患者快速康复方面具有显著效果。

4、疼痛评分：实验组患者的术后疼痛评分显著低于对照组（P<0.05），说明 ERAS 协议中的多模式镇痛措施有效减轻了术后疼痛。

5、患者满意度：实验组患者对护理服务的满意度显著提高，特别是在术后护理和疼痛管理方面，实验组患者给予了更高的评分（P<0.01）。

护理人员反馈表明，ERAS 协议的实施使护理流程更加系统化和规范化，提高了护理人员的工作效率和护理质量。

结论 本研究结果表明，加速康复外科（ERAS）协议在麻醉恢复室中的实施对艾滋病患者的术后恢复有显著的积极影响。ERAS 协议通过优化护理措施，显著缩短了恢复时间，降低了术后并发症发生率，提高了患者的满意度和舒适度。同时，护理人员的反馈显示，ERAS 协议有助于提高护理实践的系统性和规范性，提升了整体护理质量。建议在临床实践中广泛推广 ERAS 协议，以进一步改善艾滋病患者的术后护理和恢复效果。未来研究可以进一步探讨 ERAS 协议在不同类型手术和不同患者群体中的应用效果，优化和完善这一护理模式。

PU-1033

一例肺泡蛋白沉积症并呼吸衰竭患者全肺灌洗术麻醉护理配合

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目的 总结 1 例肺泡蛋白沉积症并呼吸衰竭患者全肺灌洗术麻醉护理配合经验。

方法 患者术前心理护理及宣教，减轻患者及家属焦虑与恐惧情绪；医护团队协作制定个性化麻醉方案，改进手术耗材，缩短手术时长，降低患者风险；术中麻醉护理配合，加强麻醉状态下的监测与护理；术后患者随访与指导，预防并发症的发生，保证护理过程的连贯性。

结果 患者心肺功能差，呼吸衰竭，肺部感染严重，增加了术中及术后相关并发症发生的风险。麻醉科医护人员通过术前认真讨论、精心准备，术中严密监护、密切配合，保证了手术的顺利进行，并将原本灌洗时间由 8 小时/次降低到 4 小时/次，大大缩短了灌洗时间，也降低了患者术中的风险，术后及时随访、多次指导，无相关手术并发症的发生。经 2 次全肺灌洗治疗后，患者皮肤黏膜紫绀症状基本消失、胸闷气急症状明显改善，复查胸部 CT，较前局部减轻，纵膈内淋巴结肿大，较前部分减少。患者在呼吸与危重症医学科住院三周，历经 2 次全肺灌洗治疗及术前、术中、术后精心的护理,病情好转出院。

结论 肺泡蛋白沉积症为发病原因未明的少见肺部疾病，多见于成人，全肺灌洗术是治疗肺泡蛋白沉积症的确切有效方法。

PU-1034

麻醉专科护士岗位管理现状调查

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目的 了解我国麻醉专科护士岗位管理现状，为麻醉专科护士规范化建设和发展提供参考依据。
方法 采用便利抽样法，运用自制问卷《麻醉专科护士岗位管理现况调查》对国内 25 个省份的 105 名麻醉科护士长或相关负责人进行问卷调查，采用“问卷星”小程序发放问卷。
结果 105 家医院共拥有 3554 名麻醉科护士，462 名麻醉专科护士，78%有麻醉科专职护士长；94%医院有专科护士岗位管理制度，58%医院的专科护士层级管理制度与护士核心能力（N0∽N4 级）对应；麻醉专科护士工作内容主要包括临床专科护理工作、科研工作、教育工作及参与质量改进与专业提升等。
结论 目前麻醉专科护士岗位管理已初具雏形，今后仍需国家、医院以及个人“三位一体”的共同努力，促进麻醉专科护士规范化建设与发展。

PU-1035

双元育人麻醉护理人才培养路径研究

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目的 德国最先提出“双元教育”的概念，我国近年来才开始引入和推行“双元教育”概念。“双元型”教学模式非常符合职业院校育人教学的需求，既能有效地解决目前应试教育制度中存在的问题，又能让学生有进行实践操作的时间与机会，使其将理论联系实际，从而更好地了解自己所学的东西，并能将其应用得更好
方法 双元育人思想的实施需要企业与企业的合作，企业对学校给予一定的支持，给他们需要的经费来对教育设施进行投入，同时也可以作为一个教育实践的场所，学校要帮助企业在发展中解决各种问题，同时也要为医疗单位储备人才，从而减少人才的引入与培养费用。这种培训方法有利于学生在职业生涯中实现自我身份与观念的转变，从而更快地融入到工作中去。麻醉护理顺应了当今社会大众对提升健康满意度的需求，缓解了患者疾病治疗期间所产生的疼痛，是医学发展的一大跨越。但针对麻醉护理人才的培养，需要学校与医疗机构共同协作基于双元育人机制下，制定教学系统及课程标准，并根据学院的具体需求，开展实训工作。另外，还需要在校企联合办学的指导下，高校在招生、专业设置等方面要方便用人单位，开展“有针对性”的招生和培训。而医疗机构则需要在为毕业生提供实习机会的同时，也要为毕业生的就业工作提供保障。由学院与医疗机构签约，在政府出台相关的相关法律和法规保障的基础下，允许合作学院毕业的学生可以直接进入到医院实习，并由医院为实习生提供最基础的生活保障。另外，医疗单位的高级专家也可以以业内专家老师的身份进入到学校，进行教学，将有关的实际经验和技巧传授给学生，学院的教授也可以进入到医院中来，成为医院和医疗单位之间的互惠双赢，促进国家的麻醉护理事业的快速发展
结果 双元育人思想和目前我国所提倡的“产教融合”的教学方法是一致的，两者都是为了提高学生在工作中的胜任能力，从而培养出适合于时代发展的复合型的技术和技能人才。
结论 目前，国内的麻醉护理学专业人才的培训还刚刚开始，无论是教学方法还是实习基地的构建，都存在着一定的不足。所以，本文试图就“双元教育”的麻醉护理专业人才的培养途径展开深入探索。

PU-1036

基于全过程管理的 PACU 护理干预措施对术后低体温老年患者的影响效应研究

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目的 分析全过程管理护理干预对食道癌老年患者术后低体温的影响效果。
方法 选取 2023 年 3 月至 2024 年 3 月在我院行食道癌手术后进入麻醉恢复室的 160 例老年患者作为研究对象，采用随机数字表法分为对照组(80 例)、处理组(80 例)，所有对象均给予麻醉后监测治疗室基础管理, 在此基础上将实施干预措施的患者列入处理组，进行对比分析。
结果 两组在一般资料的对比无显著性差异；观测组在苏醒时间、麻醉恢复时间低于对照组，舒适度高于观测组，术后低体温老年患者寒战、躁动发生率低于对照组，差异均具有统计学意义（P<0.05）；相较于控制组，处理组的复温时间最短，复温速度最快，差异均具有统计学意义（P<0.05）；在对措施的满意度和配合度中，高于对照组，差异均具有统计学意义（P<0.05）。
结论 基于全过程管理的护理干预措施对低体温老年患者，能有效缩短患者的苏醒时间、麻醉恢复时间，减少患者并发症发生率，提升患者的舒适度、满意度和配合度，对患者恢复有积极影作用。

PU-1037

阻塞性睡眠呼吸暂停低通气综合征在全麻下行扁桃体切除手术后患者麻醉恢复室的专项优质护理体会

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目的 总结阻塞性睡眠呼吸暂停低通气综合征在全麻下行扁桃体切除手术后患者麻醉恢复室的专项优质护理工作
方法 选取 2023 年 1 月 15 日——2024 年 4 月 29 日西京医院麻醉恢复室收治阻塞性睡眠呼吸暂停低通气综合征在全麻下行扁桃体切除手术患者为对象，在麻醉恢复室的给予专项优质护理，观察患者复苏情况
结果 患者临床指标均良好，其中有 2 例出现一过性低氧患者，均及时给予有效处理，其余均未出现呼吸抑制、上呼吸道梗阻、低氧血症等情况。所有患者均顺利度过麻醉苏醒期，安全转运至病房
结论 针对阻塞性睡眠呼吸暂停低通气综合征在全麻下行扁桃体切除手术后患者，通过麻醉恢复室的专项优质护理，可有效确保患者安全度过麻醉恢复期

PU-1038

急性疼痛管理小组围术期随访对胸外全麻患者满意度的影响

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目的 探讨急性疼痛管理小组（APS）围术期随访，对胸外全麻手术患者满意度的影响
方法 选取郑州大学第一附属医院接受胸外手术的 216 例患者为研究对象，采用随机数表法将入组病例分为两组，各 108 例。对照组患者接受麻醉医生和麻醉护士护士围术期常规随访，麻醉医生在手术前一天下午去病房随访患者，

了解患者基本情况，交代禁食水时间等，术中当天麻醉护士为患者讲解手术流程及手术室环境，术后第二天麻醉护士去病房随访患者基本生命体征以及是否出现恶心呕吐等不良反应。观察组由 APS 小组成员进行随访，术前评估患者基本情况及手术方式，讲解术后镇痛的必要性，为患者答疑解惑。术中根据手术情况制定镇痛泵的配方及剂量。术后随访患者镇痛泵使用的情况，根据患者的疼痛评分调节镇痛泵参数，及时解决使用镇痛泵的不良反应。

结果 观察组术前患者满意度高于对照组（P<0.05）见表 1

观察组术中患者满意度高于对照组（P<0.05）见表 2

观察组术后患者满意度明显高于对照组（P<0.05）见表 3

表 1 术前两组患者满意度比较[n(%)]

组别	例数	非常满意	满意	不满意	总满意
对照组	108	3	78	27	81
观察组	108	15	85	8	100
χ2	12.309	p<0.001			

表 2 术中两组患者满意度比较[n(%)]

组别	例数	非常满意	满意	不满意	总满意
对照组	108	7	85	16	92
观察组	108	12	90	6	102
χ2	5.061	p<0.024			

表 3 术后两组患者满意度比较[n(%)]

组别	例数	非常满意	满意	不满意	总满意
对照组	108	5	75	26	80
观察组	108	20	78	10	98
χ2	8.913	p<0.003			

结论 急性疼痛管理小组围术期随访可以有效帮助医护人员有效提高全麻术后患者满意度，值得推广。

PU-1039

多学科协作的镇痛管理模式在子宫肌瘤患者行子宫动脉栓塞的应用效果

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目的 探讨多学科协作的镇痛管理模式在子宫肌瘤患者行子宫动脉栓塞中的应用效果。

方法 选取我院 2023 年 2 月-2023 年 8 月收治的 50 例子宫肌瘤患者为对照组，选取 2023 年 9 月至 2024 年 3 月收治的 50 例子宫肌瘤患者为观察组，对照组采用病房常规镇痛进行护理，观察组采用多学科协作的镇痛泵管理模式。将两组患者各时点疼痛评分（术前 1h、栓塞即刻、栓塞后 5min、手术结束时及术后 6 小时、12 小时、24 小时、48 小时、72 小时 NRS 评分）、镇痛满意度进行比较。

结果 观察组患者在栓塞即刻、栓塞后 5min、手术结束时及术后 6 小时、12 小时、24 小时、48 小时 NRS 评分均显著低于对照组，差异具有统计学意义（P＜0.05）；观察组患者的镇痛效果满意度明显高于对照组，差异具有统计学意义（P＜0.05）。

结论 多学科协作的镇痛管理模式可以降低子宫肌瘤患者行子宫动脉栓塞的疼痛程度，可以提高患者的镇痛满意度，让患者无痛舒适化渡过围手术期，具有较高的临床价值。

PU-1040

老年髋部骨折患者术后麻醉恢复期认知功能障碍的预测因子：基于风险预测模型的 MATE 分析

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目的 系统评价老年髋部骨折术后认知功能障碍风险预测模型。
方法 计算机检索 PubMed、Embase、Web of Science、Cochrane Library、中国知网、万方、维普数据库关于老年髋部骨折术后认知功能障碍风险预测模型的研究。英文检索词为：hip fracture、Trochanteric Fractures、IntertrochantericFractures、Subtrochanteric Fractures、Fractures, Sub rochanteric、Postoperative delirium、prediction model、prognostic model、risk score、risk assessment、risk factor；中文检索词以 ：髋骨骨折、髋部骨折、术后谵妄、预测模型、风险评分、危险因素、影响因素、预测因子。 用主题词+自由词检索，检索时间限定为建库至 2023 年 6 月，语言限制为中文或英文。由 2 名研究者独立筛选文献和提取数据，采用 PROBAST 预测模型研究偏倚风险与适用性评估工具评价文献质量。采用 RevMan5.4 软件进行 Meta 分析。
结果 共纳入 13 个模型，13 个模型均报告 ROC 值，范围为 0.60~0.97。在模型验证方面，3 个模型进行了外部验证，3 个模型未进行模型验证，其余为内部验证。13 个模型中包含了 2~9 个预测因子，对 13 个风险预测模型包含的预测因子进行 mate 分析，进一步将其分为易感因子和促发因子两类。易感因子为年龄、ASA 分级和认知功能储备减少；促发因子为术前等待时间、输血、低蛋白血症。13 个模型的预测性能较好，但均存在一定的偏倚，主要为未报告数据缺失处理方法，大部分模型预测因子筛选未结合临床专业知识，且缺少模型外部验证，部分研究术后认知功能障碍评估工具、时间存在差异。
结论 年龄、ASA 分级和认知功能储备减少、术前等待时间、输血、低蛋白血症是老年髋部骨折患者术后麻醉恢复期认知功能障碍的预测因子。现有模型整体预测性能较好，适用性风险较低，但偏倚风险较高，仍需完善变量筛选、缺失数据处理及模型效能评价等统计分析细节，开展前瞻性研究，对现有模型进行外部验证。

PU-1041

基于 eCASH 理念的综合护理干预在全身麻醉老年患者围手术期的应用效果

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目的 探讨基于 eCASH 理念的综合护理干预在全身麻醉老年患者围手术期的应用效果。
方法 将 2023 年 1 月 1 日—2023 年 12 月 31 日期间于本院实施全身麻醉的老年手术患者 98 例作为研究对象，选取年龄≥65 岁，按照随机数字列表法，随机均分为对照组和干预组，对照组采用常规护理，干预组采用基于 eCASH 理念的综合护理干预。比较两组入院时和干预后①睡眠质量【采用匹兹堡睡眠质量指数量表（PSQI）】评估患者睡眠质量主要从入睡时间、睡眠效率等方面进行评估，最终得分与睡眠质量成反比；②疼痛程度【采用疼痛数字评分法（NRS）】评估患者疼痛程度，总分 0-10 分，得分越高表示患者疼痛越剧烈；③舒适度【采用 Koleaba 舒适状况表（GCQ)]，主要从患者心理、生理、社会和环境四个方面综合评估最终得分与舒适度成正比；④术后并发症发生情况包括谵妄、消化道反应、伤口感染等。
结果 经应用基于 eCASH 理念的综合护理干预后，两组【匹兹堡睡眠质量指数量表（PSQI）评分、

【采用疼痛数字评分法（NRS）】评分在手术后均高于同组入院时（P＜0.05）；干预 1 周后，两组 PSQI 评分、NRS 评分均低于同组手术后（P＜0.05），且手术后、干预 1 周后，干预组 PSQI 评分、NRS 评分均低于对照组（P＜0.05）；干预 1 周后,干预组【Koleaba 舒适状况表（GCQ)】各项评分均高于对照组（P＜0.01），干预组术后并发症发生率低于对照组，但两组比较差异无统计学意义（P＞0.05）。

结论 基于 eCASH 理念的综合护理干预可有效改善全麻老年患者围手术期的睡眠质量，减轻患者疼痛，增加患者舒适感，有效控制术后并发症发生率，具有应用和参考价值。

PU-1042

时效教学模式在麻醉恢复室实习护士带教中的应用

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目的 探讨时效教学模式在麻醉恢复室实习护士护理教育中的实践意义。

方法 选取 2021.07～2022.03 安徽医科大学第一附属医院高新院区麻醉科麻醉恢复室实习护士 42 名，将其随机分为常规组和时效组，每组各 21 人；其中常规组采用护士长-总带教-分带教一对一模式，时效组采用护士长-总带教-分带教交叉模式。麻醉恢复室（Postanesthesia care unit，PACU）实习结束后，两组实习护士分别按照出科考核、带教老师综合评价、实习生出科满意度三个方面进行比较，其中出科考核包括理论考核、操作考核（情景实境考核（ASA1～2 级患者转交接、PACU 记录单书写、患者满意度、患者健康宣教、伦理护理）。

结果 常规组实习护士在出科考核、带教老师综合评价及实习生出科满意度中的综合成绩明显低于时效组，且差异有统计学意义（P＜0.05）；

结论 时效教学模不仅提高临床实习护士的综合成绩与主观学习积极性，还提高带教老师教学时间利用率、情景教学能力及教学质量，统筹规划麻醉护理团队集体教学路径；同时也有利于实习护士情景学习能力、临床知识系统运用能力、整体护理思维能力及与患者的沟通能力和共情能力的提高。

PU-1043

基于认知负荷理论的思维导图联合快速循环刻意练习在麻醉恢复期呼吸系统并发症应急培训中的应用

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目的 探讨基于认知负荷理论的思维导图联合快速循环刻意练习在麻醉恢复期呼吸系统并发症应急培训中的应用效果。

方法 于 2024 年 1 月-3 月，运用思维导图联合快速循环刻意练习，对我院 26 名麻醉护士进行麻醉恢复期呼吸系统并发症应急处理培训，采用柯氏四级评估模式对麻醉护士的培训效果进行评价。比较培训前后麻醉护士理论及操作考核成绩、麻醉恢复期呼吸系统并发症应急处理能力、PACU 非计划建立人工气道发生率、麻醉医生对麻醉护士应急处理的满意度，以及麻醉护士对培训的满意度评价。

结果 培训后麻醉护士的理论及操作考核成绩、麻醉恢复期呼吸系统并发症应急处理能力、麻醉医生对麻醉护士应急处理的满意度与培训前相比，各项得分及总分均显著提高（P＜0.001）；麻醉护士对培训的满意度（4.43±0.34）和自信心（4.44±0.38）较高； PACU 非计划建立人工气道发生率

在培训前后分别为 0.47%和 0.22%，差异无统计学意义。
结论 在麻醉恢复期呼吸系统并发症应急培训中采用基于认知负荷理论的思维导图联合快速循环刻意练习，有助于提升麻醉护士的理论知识、专业技能和应急处理能力，增强培训效果，改善麻醉护士的自信心和培训满意度。

PU-1044
白噪声联合动画视频在小儿麻醉苏醒期躁动的应用

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目的 探讨白噪声疗法联合动画视频对减少小儿麻醉苏醒期躁动的可行性，减少小儿苏醒期躁动发生率，以及造成意外性拔管、创面出血等情况的发生，避免护理不良事件以及减少术后并发症的发生，从而提高患儿麻醉安全、缩短住院时间及家属的满意度。
方法 通过实验组小儿进行播放白噪声及动画视频让患儿在常规护理基础上接受舒适的听觉和视觉刺激，通过观察以下指标：
①躁动发生率；②躁动持续时间；③PACU 停留时间；④患儿家属对麻醉复苏室（PACU)护理服务满意度等来观察效果
结果 通过运用白噪声音源同时联合动画视频的方式，不仅能够减轻患儿术后紧张、焦虑及躁动发生，而且利于减少术后并发症、缩短住院时间、加快患者术后康复，提高患者家属满意度。
结论 白噪声联合动画视频是预防小儿麻醉苏醒期躁动优质的联合干预方案，值得应用。

PU-1045
基于证据多模式防治后术后恶心呕吐的现状调查及因素分析

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目的 了解基于证据多模式防治 PONV 管理后择期成年患者在麻醉恢复室内(post- anaesthesia care unit,PACU)术后恶心呕吐（postoperative nausea and vomiting， PONV）的发生率，分析发生 PONV 的影响因素，为规范麻醉科 PONV 管理及为麻醉护士的预见性护理提供参考。
方法 选取 2023 年 2 月至 2023 年 10 月于郑州大学附属郑州市中心医院择期手术后接受 PACU 照护患者共 13089 例，回顾性收集病历，根据纳排标准纳入了 10736 例患者，按患者术后 PONV 发生情况分为 PONV 组和非 PONV 组。统计分析 10736 例患者一般资料、PONV 史、晕动史、手术方式、手术开始时间、麻醉方式等。
结果 本研究结果显示，基于证据多模式防治 PONV 管理后择期成年患者在 PACU 内 PONV 的发生率为 5.03%。多因素 Logistics 回归分析结果发现其独立影响因素为：女性、BMI≥30kg/m2、PONV 史、晕动病史、麻醉方式、手术开始时间 10:01-14:00、腔镜手术、内镜手术、产科、代谢减重手术、神经外科手术、胃肠外科手术。
结论 基于证据多模式防治 PONV 管理降低了 PONV 发生率，但本研究发现 BMI≥30kg/m2、行内镜手术及手术开始时间在 10:01-14:00 期间的患者仍易发生 PONV。本研究探索患者在围术期全时段发生 PONV 的危险因素，优化围术期 PONV 管理方案，有利于实施预见性护理对患者 PONV 潜在危险因素进行针对性的预防性措施，有效减少 PONV 发生，防止相关并发症，实现舒适化、多元化护理对策，提升围术期患者安全舒适性和患者满意度。

PU-1046

基于预康复理念的多模式疼痛管理模式在老年膝关节置换术患者中的应用研究

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目的 探讨基于预康复理念的多模式疼痛管理模式在老年膝关节置换术患者中的应用效果。
方法 纳入我院老年膝关节置换术患者，将 2022 年 7 月-12 月患者作为对照组接受常规疼痛管理，2023 年 7 月-12 月患者作为观察组接受基于预康复理念的多模式疼痛管理模式，两组各 100 例。比较两组患者术后 6h、12h、24h、48h、72h 的疼痛情况、术后首次下床时间、首次排气时间、术后不良反应发生率及患者满意度。
结果 观察组术后 12h、24h、48h、72h 视觉模拟量表(VAS)评分分别为（4.17±0.39）分、（4.03±0.71）分、（2.45±0.62）分、（1.24±0.45）分均低于对照组术后 12h、24h、48h、72hVAS 评分分别为（5.93±0.92）分、（5.11±0.56）分、（4.23±0.75）分、（3.17±0.36）分，差异均具有统计学意义（P<0.05），但术后 6hVAS 评分两组无统计学差异（P>0.05）。观察组术后首次下床活动时间为（18.43±6.67）h 短于对照组（24.48±8.17）h，（P<0.05）。观察组术后首次排气时间为（15.78±4.90）h 短于对照组（23.66±5.38）h，（P<0.05）。术后不良反应中观察组患者头晕头痛发生率为 6.77%低于对照组 11.39%，（P<0.05），恶心呕吐、嗜睡及排尿困难等不良反应发生率差异无统计学意义（P>0.05）。观察组护理满意度为 98.33%高于对照组 90.67%，（P<0.05）。两组患者基线资料差异无统计学意义（P>0.05）。
结论 基于预康复理念的多模式疼痛管理模式应用于老年膝关节置换术患者中有助于减轻患者术后疼痛，缩短患者首次下床活动、排气时间，降低患者术后头晕头痛发生率的同时提高了护理满意度，为老年膝关节置换术患者提供了围手术期质量管理保障。

PU-1047

一例极度消瘦合并 VHL 综合征患者的胰腺肿瘤手术麻醉护理体会

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目的 总结 1 例极度消瘦（BMI:11.4）合并希佩尔-林道综合征（VHL 综合征）患者胰腺肿瘤手术的围麻醉期相关麻醉护理体会，为急危重且合并罕见病的患者围术期麻醉安全提供病例参照。
方法 重点阐述此患者围麻醉期不同阶段的麻醉护理评估及麻醉护理实施。麻醉前充分评估患者的消瘦程度、皮肤状况、疼痛、气道、心理等全身状况，以及 VHL 综合征导致的多个器官病变程度，对麻醉药物的代谢和排泄产生的影响；评估医护人员对 VHL 综合征的基本病理生理特点的了解程度，并组织相应医护人员进行学习和麻醉前讨论，制定相应的管理策略和应急预案。麻醉时采取慢诱导、深麻醉、轻插管的方案，维持诱导期循环稳定，避免生命体征波动较大。术中护理管理重点为患者的皮肤保护、体温保护、液体疗法，谨遵术前讨论的相应措施实施，并对症处理、随机应变。术后拔除气管导管护理时正确识别相关并发症并处理；术后疼痛制定个性化的治疗方案，选择适合的疼痛评估工具，根据疼痛评分灵活处理，予以静脉镇痛泵持续镇痛为主，间断给与镇痛药物为辅。
结果 该患者采取姑息性手术治疗，围麻醉期生命体征平稳，皮肤无破损，术后疼痛评分在“无痛-轻微疼痛”之间，安返病房后继续监护并顺利出院。
结论 麻醉前期患者的综合评估、用物及医护人员的准备，预先制定相应的管理策略和应急预案、

团队的协作、精细化的护理措施、个性化的疼痛方案，对于急危重且合并罕见病的患者围术期麻醉安全有积极的作用。

PU-1048

基于三维质量结构模型构建麻醉护理本科生临床教学质量评价指标体系

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目的 构建麻醉护理本科生临床教学质量评价指标体系。
方法 以三维质量结构模型为理论框架，通过检索 国内外文献、小组讨论以及德尔菲专家函询法，确定麻醉护理本科生临床教学质量评价体系指标，运用层次分析法确定各级指 标权重。
结果 两轮专家函询问卷有效回收率均为 100%，专家权威系数为 0.931；第 2 轮专家函询的二级指标和三级指标 的肯德尔和谐系数分别为 0.306、0.339（P<0.001）。最终形成的麻醉护理本科生临床教学质量评价指标包括 3 项一级指标、13 项二级指标，67 项三级指标。
结论 构建的麻醉护理本科生临床教学质量评价指标体系具有较高的可靠性和科学性，可为 护理高校评价麻醉护理本科实习生培训基地的临床教学质量提供依据。

PU-1049

一例前列腺恶性肿瘤患者术后复苏期出血及无尿的抢救及护理

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目的 前列腺癌目前是男性人群中发病率最高的恶性肿瘤，而前列腺癌根治已经成为治疗局限性前列腺癌的首选治疗方式。该类患者手术并发症的观察是衡量手手术安全性的重要指标，也是确保患者安全、舒适的重要举措。麻醉护士作为患者术后病情观察的第一接力棒，其工作职责是在复苏室对手术患者进行复苏期的生命体征的监护及病情观察。麻醉护士必须拥有敏锐的观察力和娴熟的专业技能和良好的沟通能力，以便在患者复苏期发现手术患者指标异常，同时积极配合麻醉医生、手术医生处理。
本文报道了一例前列腺恶性肿瘤患者接受根治性前列腺切除术后，在复苏期出现出血及无尿的紧急状况，以及随后进行的多学科合作抢救和精细且个性化的护理。通过本案例分析，以期为类似病例提供借鉴和参考。
方法 本文为一项个案报道。
患者，男性，79 岁，因前列腺癌Ⅲ期入住我院泌尿外科。经过全面评估（既往有高血压、糖尿病、心脏病）和术前准备，患者接受了腹腔镜下根治性前列腺切除术。术后，患者被送入复苏室进行密切观察。然而，在复苏期，麻醉护士发现患者引流袋引流量持续增多且无尿。应用护理程序模式和叙事护理方法对患者提供个性化的护理，同时多学科联合对患者进行积极治疗，在超声辅助下拟行膀胱造口术。
结果 患者术后病情稳定出手术室；术后回访时，患者及家属反馈良好，无投诉事故发生。
结论 在高龄危重患者复苏期，麻醉护士严密关注患者病情变化，同时对不同患者提供精细化且个性化的护理，可降低患者及家属投诉率，促进患者手术安全，改善患者预后，提高麻醉护士临床决策能力，提升优质护理质量，提高医院住院满意度。

PU-1050

环泊酚或丙泊酚在老年患者无痛胃镜检查中的麻醉效果比较

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目的 探讨环泊酚或丙泊酚在老年患者无痛胃镜检查中的麻醉效果比较。
方法 研究对象为 2023 年 6 月至 11 月在内镜中心接受无痛胃镜检查的老年患者，共计 177 例，年龄范围为 65 至 80 岁，性别不受限制，体质量指数（body mass index，BMI）18～28 kg/m2,美国麻醉医师协会（American Society of Anesthesiologists，ASA）分级 I-II 级。采用随机数字表法将患者分为丙泊酚组（P 组）和环泊酚组（C 组），其中 P 组患者 90 例，C 组患者 87 例。记录不良反应的发生率，包括低血压、低氧血症、呼吸抑制、心动过缓、注射痛、体动反应、头晕、恶心呕吐及总体不良反应发生率。记录诱导时间、检查时间、定向力恢复时间、离室时间。记录麻醉诱导前（T0）、置入胃镜时（T1）、胃镜检查 3 min 时（T2）、胃镜检查结束时（T3）以及苏醒时（T4）的心率、平均动脉压及血氧饱和度。记录操作医师满意度以及患者满意度。
结果 与P组相比，C组患者低血压、结果显示，环泊酚组相比丙泊酚组，在低氧血症、呼吸抑制、注射痛以及总体不良反应的发生率方面都较低，且这些差异具有统计学意义（P＜0.05）。在心动过缓、体动反应、头晕、恶心呕吐方面，两组患者的发生率差异均无统计学意义（P＞0.05）。而在 T1、T2 时，C 组患者的平均动脉压和血氧饱和度均显著高于 P 组，差异有统计学意义（P＜0.05）。在其余时间点，两组生命体征比较差异均无统计学意义（P＞0.05）。此外，在诱导时间、检查时间、定向力恢复时间、离室时间方面，两组患者之间的差异也无统计学意义（P＞0.05）。
结论 环泊酚能够在老年患者无痛胃镜检查中提供与丙泊酚相似的镇静效果，不影响患者苏醒质量，同时还降低了老年患者无痛胃镜检查中包括低血压、低氧血症、呼吸抑制以及注射痛等不良反应的发生率，内镜医师和患者满意度更高，值得在老年患者这一特殊群体中推广应用。

PU-1051

插管型喉罩与鼻咽通气道在静脉全麻经食道超声心动图术中的应用比较

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目的 观察使用插管型喉罩在经食道超声心动图（transesophageal echocardiography, TEE）的应用价值
方法 将 182 例拟实施择期 TEE 的患者（ASA 分级Ⅱ~Ⅲ级）随机分成鼻咽通气道组（N 组，n=141）和插管型喉罩通气组(G 组，n=141)，两组患者均静脉注射阿芬太尼 5ug/kg，环泊酚 0.5mg/kg,待患者意识及睫毛反射消失、下颌松弛，N 组即置入鼻咽通气道行辅助呼吸，G 组用插管型喉罩辅助呼吸。两组均根据手术时间和患者体动情况追加丙泊酚。记录两组麻醉前(T0)、插管型喉罩/鼻咽通气道置入时（T1）、手术开始时（T2）、手术开始后 5min(T3)、手术结束时（T4）、取出插管型喉罩/鼻咽通气道时（T5）6 个时点的平均动脉压（MAP）、心率（HR）和脉搏血氧饱和度（SPO2）、术中患者呛咳、体动和缺氧情况、术者满意度等
结果 两组患者性别、年龄、术前诊断等一般情况无统计学意义；在 T0、T1、T5 时点 MAP、HR、SpO2 无明显差异；在 T2、T3 时点，两组 MAP、HR 有显著差异；两组 Sp02 在 T2、T3、T4、T5 时点差异有统计学意义。内镜进入成功率 G 组为 100%，基础生命体征平稳、无体动呛咳；内镜进入成功率 N 组为 91.49%，基础生命体征波动较大、有体动呛咳；两组一次通气成功率为 100%，无移位发生。与 N 组相比，G 组患者术中术后生命体征更平稳、无体动呛咳，不良事件发生率更低，

且内镜较 N 组可一次性轻松进入食道、平均手术时间缩短、术者满意度更高
结论 插管型喉罩用于 TEE 可取得满意效果，且安全性更高。

PU-1052

瑞马唑仑在舒适内镜检查老年患者中的应用体会

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目的 探讨瑞马唑仑在老年无痛胃肠镜检查中的应用及对患者认知功能和血流动力学的影响。
方法 选取 2021 年 1 月~2022 年 12 月医院收治的 102 例老年无痛胃肠镜检查患者，依照随机数表法分为观察组和常规组，每组 51 例。观察组男/女：31/20，年龄（9.63±6.25）岁，常规组男/女：20/31，年龄（79.06±6.93）岁。符合正态分布的计量资料采用“”表示，用 t 检验；计数资料用“%”表示，用 χ2 检验。常规组采用丙泊酚+阿芬太尼麻醉， 观察组采用甲苯磺瑞马唑仑+阿芬太尼麻醉。①比较两组患者苏醒时间。②认知功能，分别于术前、术后 2d、术后 5d 用简易精神状态量表（Mini Mental State Scale，MMSE）评定，从记忆力、注意力、定向力、语言能力等方面进行评定，总分 30 分，分数越低表示认知损害越严重[8]。③不同时间点[给药前（T1），给药后 3min（T2），给药后 6min（T3），给药后 9min（T4）]血压、血氧饱和度，采用 mindrayT5 多功能生命体征监测仪监测患者不同时间点血压、血氧饱和度。
结果 观察组患者苏醒时间、离室时间均短于常规组（t 值=14.195，P 值=0.000，t 值=7.852，P 值=0.000），2 组患者 MMSE 评分组间、时间、交互比较，差异均有统计学意义（F=19.652，P=0.000，F=13.745，P=0.000），观察组术后 2d、术后 5d 的 MMSE 评分均高于常规组（F=17.358，P=0.000），观察组 T2 时刻血压、血氧饱和度均高于常规组（F=8.852，P=0.000，F=12.58，P=0.000，F=16.851，P=0.000），常规组患者 T3 时刻、T4 时刻收缩压、血氧饱和度、舒张压均高于 T2 时刻（F=9.452，P=0.000，F=13.541，P=0.000，F=19.584，P=0.000）。
结论 瑞马唑仑瑞马唑仑具有避免出现过深镇静和持续时间过长的优势，同时也不会在体内积累产生副作用，因此使用该药物相对较为安全。它的代谢和起效速度很快，且不依赖于肝肾功能，可以帮助维持患者的血流动力学稳定。用于老年无痛胃肠镜检查可以缩短苏醒时间，改善患者的患者认知功能，减轻对患者血液动力学的影响，值得在临床中推广应用。

PU-1053

阿芬太尼联合右美托咪定在 TEE 检查清醒镇静中的运用

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目的 经食道超声心动图通过将探头放置至食管中下段，从心脏后方探查心脏及大血管的内部结构，避免了胸壁、肋骨及肺的干扰，可以显示更佳的图像信息，为临床诊断提供更有效的诊断依据。但由于 TEE 是一种侵入性操作，探头对咽部刺激导致频繁恶心极大影响了 TEE 的检测效果，同时刺激引起的疼痛、紧张，血流动力学剧烈波动，增加了部分具有心脏基础疾病的高危患者检查的风险。对于在门诊检查的患者，局麻效果欠佳，全身麻醉及其相关并发症对门诊工作的安全性和效率也带来了不小的挑战，这些情况都大大限制了 TEE 的临床应用范围。因此寻找更好的清醒镇静方案，是门诊 TEE 检查急需解决的问题。本研究探讨了阿芬太尼联合右美托咪定在门诊患者 TEE 清醒镇静中的运用，为 TEE 检查提供有效安全的镇静方案。
方法 选择 2023.05-07 月在我院申请 TEE 检查的患者 80 名，患者被随机分为两组：研究组（n=40）

和对照组（n=40）。研究组使用阿芬太尼联合右美托咪定，对照组使用咪达唑仑联合右美托咪定，直到患者 RSS 达到 3 分停药开始检查。根据需要使用阿芬太尼对两组患者进行药物追加。评估患者咽喉反射的抑制情况，记录达到目标镇静水平的时间、手术持续时间和恢复时间。记录检查过程中患者的血流动力学参数、术中不良反应发生率以及患者和检查医生的满意度。
结果 研究组患者初次镇静成功率(85%)明显高于对照组（35%），P<0.05。对照组诱导时间短于研究组（P<0.05），但是恢复时间较研究组长（P<0.05）。对照组的补救剂量明显高于研究组（P<0.05）。两组患者并发症的比较中对照组患者低血压（<20%）的发生率(47.5%)大于研究组(25.0%)（P<0.05），研究组呼吸抑制的发生率(42.5%)要高于对照组(15.0%)（P<0.05）。在患者配合度方面，对照组出现两名患者无法进行配合的情况，其余并发症均无统计学差异（P>0.05）。关于检查的满意度调查，本研究中研究组医生和患者的满意度均高于对照组（P<0.05）。
结论 对于门诊行 TEE 检查的患者，阿芬太尼联合右美托咪定能有效抑制检查过程中患者的咽喉反射，并且检查过程中患者能配合检查医生行 Valsalva 动作，明显提高了 TEE 检查的效率，是临床值得推广的镇静技术。

PU-1054

环泊酚复合小剂量舒芬太尼用于胃镜检查镇静的有 90%有效剂量

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目的 本研究旨在确定环泊酚复合5 μg舒芬太尼抑制胃镜检查中呛咳反应的90%有效剂量（ED90）。
方法 首例患者给与环丙酚剂量 0.3 mg/kg，其余患者均根据之前患者使用环泊酚镇静是否成功，采用偏性掷币设计的规则分配环泊酚剂量。若前一例患者镇静失败，则下一例患者剂量增加 0.05 mg/kg；若前一例患者镇静成功，下一例患者的剂量有 0.11 的概率降低 0.05 mg/kg，0.89 的概率保持不变。概率单位回归和保序回归两种模型计算 ED90；其中保序回归采用合并相邻违法者算法对数据进行二次优化，u3 估计量计算 ED90 的点估计，自举法用于计算 95%置信区间。
结果 有偏抛币随机将 53 例患者分为 4 个环泊酚剂量的队列：A 组(0.30 mg/kg)、B 组(0.35 mg/kg)、C 组(0.40 mg/kg)和 D 组(0.45 mg/kg)。保序回归和概率单位回归的90%有效剂量分别为0.367 (95% CI: 0.344 ~ 0.416) mg/kg 和 0.368 (95% CI: 0.347 ~ 0.419) mg/kg。广义估计方程用于分析平均动脉压和心率的组内和组间差异。T0 数据作为协变量，采用 Bonferroni 校正对两两比较的 p 值进行校正。时间和组别对平均动脉压的交互效应无统计学意义，因此进行主效应分析(Wald 卡方=9.816,P=0.632)。矫正分组效应后，各时间点平均动脉压差异有统计学意义(Wald 卡方=362.842,P<0.001)。T0 与 T1、T2、T3、T4 的平均平均动脉压差异有统计学意义(校正后 P<0.001)，分别为 13.6 (Wald 95% CI: 11.1 ~ 16.0)、17.8 (Wald 95% CI: 16.0 ~ 19.7)、14.0 (Wald 95% CI: 11.6 ~ 16.5)、13.1 (Wald 95% CI: 10.6 ~ 15.6)mmHg。在校正时间的影响后，组间平均动脉压的差异无统计学意义(Wald 卡方=0.160,P=0.984)。由于时间和组别对心率的交互作用无统计学意义(Wald 卡方=9.813,P=0.632)，因此进行主效应分析。矫正分组效应后，各时间点心率的差异有统计学意义(Wald 卡方=97.723.15,P<0.001)。T0 与 T1、T2、T3 或 T4 的平均心率差异有统计学意义(校正后 P<0.001)，分别为 6.7 (Wald 95% CI: 4.8 ~ 8.7)、10.2 (Wald 95% CI: 7.9 ~ 12.4)、10.9 (Wald 95% CI: 8.6 ~ 13.1)和 8.7 (Wald 95% CI: 6.3 ~ 11.1)次/ min。在校正时间的影响后，组间心率差异无统计学意义(Wald 卡方=1.494,P=0.684)。采用 Spearman 相关分析评价麻醉后平均动脉压的下降值与剂量的相关性，两者无相关性(rs=0.074, P=0.599)。平均动脉压下降中位数为 13 mmHg， 四分位数间距为 11 mmHg。采用 Spearman 相关分析评价苏醒时间与剂量的相关性，两者无相关性(rs=0.085, P=0.543)。苏醒时间中位数为 5 min，四分位数间距为 6 min。A ~ D 组低血压发生率分别为 20.0%、25.0%、15.0%和 0%，Fisher 精确检验显示组间差异无统计学意义。53

例患者中有 3 例出现心动过缓，2 例出现严重呛咳。所有患者均未发生严重气道阻塞、低氧血症、术后恶心呕吐及注射部位疼痛。
结论 环泊酚复合 5 μg 舒芬太尼用于胃镜检查镇静的 ED90 为 0.367 mg/kg, 95% CI 为 0.344 ~ 0.416 mg/kg，这为患者提供了最佳剂量推荐。使用环泊酚麻醉后平均动脉压仍有下降，但下降幅度不超过 20 mmHg。在 0.3 ~ 0.45 mg/kg 范围内，平均动脉压的下降无剂量依赖性影响。

PU-1055

喉气管狭窄病人的再麻醉值得关注

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目的 一位微创喉癌术后 3 年的患者需要进行静脉麻醉下胃肠镜检查，气管造口已封闭，声音嘶哑。在充分吸氧后（指脉氧饱和度氧饱和度可达 100%）推注布托菲诺和丙泊酚，出现短暂呼吸暂停，予以剑突下摁压辅助呼吸，氧饱和度仍逐渐下降至 81%，并维持 2-3 分钟，随后缓慢回升。内镜拍摄到喉部结构发生明显改变：会厌肥大，气管入口狭小，瘢痕组织增生、扭结，声带不可见，目测 6.5 号导管无法通过，无法观察到声门下是否狭窄。
随着技术成熟，各种喉部手术增多，许多病人可以获得较好的预后和生活质量，然而，当病人因其它医疗需求而需要再次麻醉时，喉部的解剖改变使气道安全充满了不确定性。了解喉气管狭窄（Laryngotracheal stenosis，LTS）的成因、分类、麻醉相关顾虑的机制以及麻醉前评估与准备非常有必要。
方法 以“喉气管狭窄”为关键词查阅文献，搜寻相关信息。
结果 喉气管狭窄（LTS） 包含了一系列广泛的与上气道各部位（包括声门、声门上、声门下和气管）变窄相关的非同质性诊断，由于富含胶原蛋白的病理性瘢痕沉积导致不同程度的阻塞，可伴有严重且可能致命的呼吸损害或发音受损。长时间气管插管而导致的获得性 LTS 是医源性（iatrogenic laryngotracheal stenosis，iLTS）中最常见的一种，其它原因还有：既往气管切开术、颈部部外伤、化学吸入或热力损伤、炎症和自身免疫性疾病（如结节病或肉芽肿性多血管炎）等。此外，还有一些特发性喉气管狭窄的病例是在既往没有任何损伤或基础疾病的情况下发生的，这类病例往往有明显的喘鸣症状。
喉部手术创伤大小不一，全喉切除术后需要终生通过气切造口呼吸，丧失发音功能。部分切除或者微创的患者有可能保留发音功能，将来可以闭合气管造口，获得较高的生活质量。然而，实际上，微创手术术中使用的激光或等离子等热动力器械所带来的组织改变并不亚于传统冷器械。术后，由于组织重塑、粘连、瘢痕增生，喉部的解剖必然会发生不可逆的改变，气管入口狭窄、喉肌运动学改变等是不可避免的。这类患者但在以后的生活中如果遇到需要麻醉，尤其是全身麻醉的情况时，依然面临着较大的困难气道风险。尽管声门后部（即呼吸部）开放时的宽度只要 3-4 厘米就能满足呼吸功能，但却远远不能满足气管导管置入，容易造成未预料的困难气道。而静脉非插管麻醉后，喉部组织松弛，气管开口、声门以及声门下开放程度能否满足最小需要量的气体进入是重中之重。对于有此病史或手术史的病人，需要询问具体医疗过程，索要检查图像，了解日常睡眠有无打鼾或憋醒，听诊是否有喘鸣。如非急诊手术，建议先完善床旁光纤喉镜（如果有狭窄可以当即通过刚性或柔性支气管镜的任何一种技术来扩大）或喉-气管部 CT 检查。此类麻醉应参照按困难气道流程准备用品，考虑纤支镜引导或清醒插管，并做好再次气切的准备，或更改全麻为区域阻滞。参考既往静脉麻醉下喉气管手术的通气模式，如果狭窄与通气不足严重，也可以考虑高频射流通气。
结论 喉气管狭窄尤其是微创喉癌术后的病人并不一定会有严重的症状，但狭窄的上气道结构必然影响日后的麻醉，需要加强对该类病人的评估，做好备案，必要时更改麻醉方式。

PU-1056

Assessing the current status of pre-anesthetic evaluation for gastrointestinal endoscopy in China: a web-based questionnaire survey

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Background In China, the demand for sedation during gastrointestinal endoscopy (GIE) is increasing, while the availability of anesthesia staffing remains relatively insufficient. Despite this trend, there is a paucity of information regarding the pre-anesthetic evaluation (PAE) practice for GIE in the country.
Methods An online questionnaire focusing on PAE and sedation practices was disseminated among anesthetists across various healthcare facilities.
Results A total of 413 anesthetists from 282 hospitals across 31 provincial-level regions in mainland China participated in this survey. Findings revealed a lack of standardization in PAE practices, with significant variations observed among different hospitals and anesthetists. Regarding timings, 39.4% of hospitals conducted only one PAE on the day of the GIE, whereas 56.5% conducted two PAEs before and on the day of the procedure, which resulted in a lower incidence of sedation cancellations on the day of the GIE. The primary locations for PAE were identified as endoscopy centers (56.0%) and preoperative evaluation clinics (37.2%). Furthermore, there was considerable diversity in the selection and number of preoperative examinations conducted across hospitals. Electrocardiograms were the most frequently performed test (95.0%), followed by complete blood count (45.7%) and infectious disease testing (44.7%), with an average of 2.6 examinations administered per patient at each hospital.
Conclusions This survey represents the inaugural assessment of the existing landscape of PAE for GIE in China, underscoring wide disparities in PAE practices across the nation. It is our aspiration that this survey will draw greater attention to the PAE process for GIE and contribute to the enhancement of perioperative care in the future.

PU-1057

布托啡诺与舒芬太尼用于高原患者无痛诊疗麻醉中的应用效果比较

殷国江[1]、洛桑江村[2]、黎笔熙[1]、宋晓阳[1]
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2. 隆子县人民医院

目的 探讨布托啡诺与舒芬太尼复合依托咪酯-丙泊酚合剂（etomidate-propofol 合剂，EP 合剂）用于高原患者无痛诊疗麻醉中的应用效果。
方法 选择 2024 年 1 月至 2024 年 6 月西藏隆子县人民医院拟行无痛诊疗患者 82 例作为研究对象，性别不限，年龄 18~73 岁，BMI 18.5～34.9kg/m2，ASA Ⅰ～Ⅲ级，其中无痛人流患者 38 例、无痛刮宫患者 12 例、无痛利普刀手术患者 2 例、无痛胃镜患者 19 例、无痛肠镜患者 4 例、无痛胃肠镜患者 7 例，将所有患者按手术类型随机分为布托啡诺复合 EP 合剂组（B 组，n=41）和舒芬太尼复合 EP 合剂组（S 组，n=41）。所有患者入室后常规监测心电图（ECG）、无创血压（BP）、心率（HR）及脉搏血氧饱和度（SpO2），经鼻导管吸氧 5L/min，B 组给予布托啡诺 10μg/kg+EP 合剂 0.15ml/kg，S 组给予舒芬太尼 0.1μg/kg+EP 合剂 0.15ml/kg，所有患者当改良警觉/镇静评分（Modified Observer's Assessment of Alertness/Sedation Scale, MOAA/S）≤1 分后开始手术（操

作），根据手术时间及患者反应必要时追加 EP 合剂 0.05ml/kg/次。记录麻醉前 1min（T0）、麻醉后 1min（T1）、手术开始时（T2）、手术结束时（T3）和出室时（T4）MAP、HR 及 SpO2，记录 MOAA/S≤1 分时间、EP 合剂总用量、患者苏醒时间、出室时间，记录患者与医师满意度评分、不良事件发生情况。

结果 与 T0 比较，两组患者 T1~T4 时 MAP、HR 及 SpO2 均降低（P<0.05），但两组间 HR 比较差异无统计学意义（P>0.05），B 组患者 T1~T4 时 MAP 及 SpO2 显著高于 S 组（P<0.05）。两组患者 MOAA/S≤1 分时间差异无统计学意义（P>0.05）。与 S 组比较，B 组患者 EP 合剂总用量更少（P<0.05）、患者苏醒时间和出室时间更短（P<0.05），患者与医师满意度评分更高（P<0.05）。B 组患者低血压、低氧血症、体动反应、恶心呕吐等不良事件发生率低于 S 组（P<0.05）。

结论 布托啡诺复合 EP 合剂比舒芬太尼复合 EP 合剂更适合高原患者无痛诊疗麻醉，布托啡诺可减少无痛诊疗麻醉镇静药物总用量，降低低血压、低氧血症、体动反应、恶心呕吐等不良事件发生率，其低氧血症发生率更低对高原患者无痛诊疗麻醉更具优势。

PU-1058

基层医院如何开展无痛胃肠镜

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目的 向基层医院推广无痛胃肠镜，做到早诊早治，提高消化道早癌治愈率。

方法 我国为胃癌、结直肠癌高发地区。无痛胃肠镜可提高患者舒适度，提高阳性率和复诊率，有利于早诊早治，提高治愈率。

结果 我院为市级肿瘤专科医院，床位仅 1000 张，但无痛胃肠镜诊疗数量多年居甘肃第一，无痛占比 95%左右，手术室外麻醉占比 77%，居全国前列。

结论 基层医院开展无痛胃肠镜大有可为，未来必将占据麻醉科业务员的半壁江山。

PU-1059

环泊酚联合小剂量瑞苏太尼在无痛胃镜检查静脉麻醉的安全性的讨论

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目的 环泊酚联合小剂量瑞苏太尼在无痛胃镜检查静脉麻醉的安全性讨论

方法 选取我院 2024 年 1 月-2024 年 5 月内行无痛胃镜检查患者 400 例，采用随机数字表法分为“丙泊酚+舒芬太尼”组(PS 组，n=200)、“环泊酚+瑞芬太尼”组(CR 组，n=200)。PS 组静脉注射丙泊酚 2.0 mg/kg+舒芬太尼 0.1 μg/kg；CR 组静脉注射环泊酚 0.4 mg/kg +瑞芬太尼 0.3 μg/kg，术中根据患者体动、MAP、HR 追加丙泊酚 5 mg 或环泊酚 1.5 mg，必要时使用血管活性药物。记录两组镇静成功率、血流动力学变化、麻醉诱导时间、苏醒时间情况，同时记录低氧血症、低血压、注射痛、呛咳、呃逆、体动反应等不良事件发生。

结果 两组镇静成功率均为 100%。CR 组镇静起效时间[(49.12±3.27) s vs (61.97±7.6) s]、苏醒时间[(462.72±93.57) s vs (361.27±82.63) s]及离室时间[(321.25±54.32) s vs (221.65±45.26) s]均长于 PS 组（P＜0.05）。CR 组麻醉诱导后心率变化值[CR: (9.12±1.27) bpm vs PS: (19.97±7.6) bpm]与平均动脉压变化值[CR: (12.72±4.57) mmHg vs PS: (21.27±8.63) mmHg]均低于 PS 组，两者比

较有统计学意义（P＜0.05）。与 PS 组相比，CR 组总体不良事件发生率低：低氧血症(16% vs 44%)、低血压(36% vs 54%)、注射痛(0% vs 76%)发生率低于 PS 组，但呛咳(16% vs 6%)、呃逆(10% vs 8%)发生率高于 PS 组，两者体动反应(18% vs 18%)比较无统计学意义(P＞0.05)。

结论 环泊酚联合小剂量瑞苏太尼（环泊酚 0.4 mg/kg +瑞芬太尼 0.3 μg/kg）静脉麻醉可安全用于门诊无痛胃镜检查中，具有药物总用量少、呼吸循环抑制轻，不良反应更少，患者满意度高的特点。

PU-1060

双手托下颌角联合右肘部按压胸廓对无痛纤支镜顺利入声门及防治呼吸抑制探究

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目的 探讨双手托下颌角、右肘部按压胸廓、双手托下颌角联合右肘部按压胸廓对无痛纤支镜顺利入声门及防治呼吸抑制的效果。

方法 筛选长沙市第四医院内镜中心行无痛纤支镜检查的患者 120 例，随机分为 4 组，每组 30 例：C 组（对照 组）、B 组（双手托下颌角组）、T 组（右肘部按压胸廓组）及 BT 组（双手托下颌角联合右肘部按压胸廓组），待患者给药意识消失后、纤支镜检查实施前， B 组、T 组及 BT 组分别给予双手托下颌角或（和）右肘部按压胸廓：双手托起下颌角，下颌角前移 0.5-1cm;右肘部按压按压幅度（2~3）cm，频率 30 次/min，共 20 次。比较各组寻找声门并通过声门时间、出现血氧下降（SpO2＜基础值）、低氧状态（SpO2＜95%）以及低氧血症（SpO2＜90%）的发生率；各组退纤支镜行面罩通气率。

结果 寻找声门并通过声门时间：T 组与 C 组比较无统计学差异（P>0.05）, B 组及 BT 组的均明显短于 C 、T 组（P＜ 0.01）。四组间血氧下降、低氧血症的发生率均有统计学差异（P＜0.05）；与 C 组比较，B 组、 T 组及 BT 组血氧下降发生率明显降低（P＜0.01），其中 BT 组无需退纤支镜行改良面罩通气。

结论 双手托下颌角联合右肘部按压胸廓能缩短纤支镜寻找声门并通过声门时间，降低无痛纤支镜中麻醉药物引起呼吸抑制的发生率。

PU-1061

瑞马唑仑在肥胖患者无痛胃肠镜检查中的应用分析

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目的 探讨瑞马唑仑在肥胖患者无痛胃肠镜检查中的使用价值

方法 收集行无痛胃肠镜检查的肥胖患者 110 例，根据随机数字表法随机分为瑞马唑仑（R）组和丙泊酚（T）组各 55 例。两组首先静脉注射枸橼酸舒芬太尼注射液 0.1 μg/kg，1 min 后 R 组静推瑞马唑仑 0.2 mg/kg 进行静脉麻醉；T 组静脉注射丙泊酚 1.5 mg/kg 进行静脉麻醉。眼睑反射消失后开始胃镜检查，观察两组患者麻醉诱导前（T0 ）、置入胃镜时（T1 ）、入镜 3min（T2）、入镜 10min（T3）、退镜结束（T4 ）、苏 醒（T5）时的脉搏血氧饱和度（SPO2）、平均动脉血压（MAP）、心率（HR）、呼吸（RR）变化；观察并记录咽喉部软组织失张力塌陷率、鼻咽道通气道使用率、面罩加压给氧率；记录起效时间、苏醒时间、麻醉后监护室（PACU）监护时间、患者满意度、操作者满意度，以及不良反应的发生率。在胃镜检查期间，患者出现体动、呛咳、吞咽反射或改良警觉/镇静(MOAA/s)评分＞ 2 分时分别追加 0.04 mg/kg 甲苯磺酸瑞马唑仑和 0.4 mg/kg 丙

泊酚，必要时重复，直至满足操作要求。
结果 组内比较：与 T0 点比较，T 组在 T1、T2 时间点 SPO2、MAP、RR 明显降低(P＜0.05)，R 组在 T1、T2 时间点 SPO2、MAP、RR 降低不明显(P＞0.05)。组间比较 ：R 组在给药后 T1、T2、T3、T4 时间点的 SPO2、MAP、RR 等变化比 T 组波动小(P＜0.05)；呼吸抑制、低氧血症、低血压发生率远低于 T 组(P＜0.05)，发生咽喉部软组织失张力塌陷率、通气道使用率、面罩加压给氧率低于 T 组(P＜0.05)，起效时间略长于 T 组，苏醒时间和 PACU 监护时间短于 T 组，离室时头晕、恶心等不良反应发生率低于 T 组，R 组无注射痛，患者满意度、操作者满意度高于 T 组。
结论 瑞马唑仑静脉麻醉可以达到镇静、镇痛和对循环呼吸功能稳定的效果，可有效减少肥胖患者在无痛胃肠镜检查中因咽喉部软组织失张力塌陷而造成的气道梗阻，降低低氧血症发生率，减少临床干预，更有利于麻醉医生对气道的管理，提高了麻醉安全性。患者清醒质量高，满意度高，减少 PACU 滞留时间，提高周转率。

PU-1062

瑞马唑仑复合阿芬太尼抑制 ERCP 术患者十二指肠镜置入反应的 50%有效剂量

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目的 瑞马唑仑复合阿芬太尼抑制 ERCP 术患者十二指肠镜置入反应的 50%最低有效剂量（50% effective dose, ED_{50}）
方法 选取年龄为 18~85 岁行经内镜逆行胰胆管造影术的患者，所有患者术前均给予 10 μg/kg 阿芬太尼，首例患者瑞马唑仑初始剂量为 0.2 mg/kg，给药 3 min 后置入十二指肠镜，根据患者十二指肠镜置入的反应情况，
采用改良 Dixon 序贯试验法，每位患者术前 1 min 均给予 10 μg/kg 阿芬太尼，首例患者瑞马唑仑的初始剂量为 0.2 mg/kg，3 min 后置入十二指肠镜，当患者出现十二指肠镜置入失败时，下一位患者瑞马唑仑增加一个剂量梯度，否者降低一个剂量梯度，剂量梯度为 0.025 mg/kg，直到出现 6 次以上折返则停止研究。十二指肠镜置入失败的标准：十二指肠镜置入咽腔时或者置入 2 min 内患者出现呛咳、呕吐或体动反应；或注射瑞马唑仑 3 min 后 BIS 值>75 且 MOAA/S 评分>1 分也定义为失败，给予抢救性镇静。使用 R 统计软件，应用保序回归算法得出 ED_{50}(effective dose in 50% of subjects, ED_{50}),再通过自助算法得出结果的 95%置信区间。
结果 共纳入患者 36 例，其中男性 20 例，女性 16 例。成功置入的患者为 17 例，失败的患者为 19 例。
瑞马唑仑复合阿芬太尼抑制 ERCP 术患者十二指肠镜置入反应的 ED_{50} 为 0.159 mg/kg（95%CI 0.092~0.226）。
结论 瑞马唑仑复合阿芬太尼抑制 ERCP 术患者十二指肠镜置入反应的为 ED_{50} 0.159mg/kg（95%CI 0.092~0.226）。

PU-1063

亚麻醉剂量艾司氯胺酮联合丙泊酚应用于无痛胃肠镜安全性及有效性 Meta 分析

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目的 采用 Mate 分析的方法，分析亚麻醉剂量艾司氯胺酮联合丙泊酚应用于无痛胃肠镜的安全性和有效性。
方法 对考克兰图书馆(Cochrane Library)、中国知网(CNKI)、PubMed 文献数据库、Embase 数据库、万方数据知识服务平台(Wanfang Data)、维普中文期刊全文数据库(VIP)进行检索，检索日期为 2022 年 1 月至 2023 年 9 月。纳入比较亚麻醉剂量艾司氯胺酮联合丙泊酚与单纯丙泊酚应用于无痛胃肠镜的随机对照实验，并对符合纳入标准的文献进行质量评价和资料提取，后续采用 RevMan 5.3 软件对采集好的数据进行 Meta 分析。
结果 共计纳入 14 项随机对照试验，共 1230 例患者。Meta 分析结果显示，与单纯丙泊酚相比，亚麻醉剂量艾司氯胺酮联合丙泊酚应用于无痛胃肠镜能明显增加血流动力学的稳定性 MAP(MD = 6.06mmHg，95%CI：0.18~11.94mmHg，P=0.04）、HR(MD=2.93 次/分，95%CI：0.77~5.09 次/分，P=0.008)，降低了低血压的发生率(OR=0.24，95%CI：0.12~0.48，P＜0.001)、呼吸抑制的发生率(OR=0.47，95%CI：0.32~0.68，P＜0.0001)、体动的发生率(OR=0.34，95%CI：0.21~0.54，P<0.00001)、注射痛的发生率(OR=0.16，95%CI：0.06~0.42，P=0.0002)；但在头晕的发生率(OR=1.77，95%CI：1.17~2.68，P=0.007)和视觉障碍的发生率(OR=6.86，95%CI：2.29~20.55，P=0.0006)方面亚麻醉剂量艾司氯胺酮联合丙泊酚组明显增加。
结论 在无痛胃肠镜的麻醉中，亚麻醉剂量艾司氯胺酮联合丙泊酚组较单纯丙泊酚组术中的血流动力学更加稳定，术中低血压、呼吸抑制、体动和注射痛等不良反应发生率更低，但头晕、视觉障碍不良反应发生率更高。

PU-1064

靶控输注瑞芬太尼复合右美托咪定或丙泊酚抑制经会阴前列腺穿刺活检术应激的有效效应室浓度 — 一项前瞻性、单盲、随机对照试验

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目的 评价靶控输注瑞芬太尼复合右美托咪定或丙泊酚抑制经会阴前列腺穿刺活检术（transperineal prostate biopsy，TPB）应激反应的有效浓度和安全性。
方法 将 2020 年 6 月-2022 年 12 月就诊于我院拟行经会阴前列腺穿刺活检术患者随机分为两组，D 组（右美组）：给予右美托咪定 0.6μg/kg 的负荷量泵注 10min，之后以 0.6μg/kg/min 持续静脉泵注维持；P 组（丙泊酚组）：以 0.8μg/ml 靶控输注丙泊酚，两组同时靶控输注瑞芬太尼。在监测下麻醉管理（monitored anesthesia care，MAC）下采用 Dixon 序贯法滴定各组瑞芬太尼靶控输注的有效浓度，记录术中呼吸抑制的发生率、严重程度以及改善措施、麻醉时间、手术时间、苏醒时间、麻醉医生，患者和外科医生满意度评分、Ramsay 镇静评分、术中心率血压的变化和相关不良事件。

结果 右美组和丙泊酚组靶控输注瑞芬太尼抑制经会阴前列腺穿刺活检术的应激反应的半数有效浓度(EC50)分别为 3.1ng/ml（95%CI:2.8～3.4ng/ml）和 4.8ng/ml（95%CI:4.4～6.2ng/ml）。D 组呼吸抑制发生率（36.6%＆63.3%，P=0.039）和 Ramsay 镇静评分（2.53min＆3.43min，P＜0.001）均低于 P 组，术后苏醒时间较 P 组长(8.87min＆4.53min，P＜0.001)，麻醉诱导时间明显较 P 组长（14.83min＆6.80min，P＜0.001）。

结论 靶控输注丙泊酚 0.8μg/ml 时靶控输注瑞芬太尼抑制经会阴前列腺穿刺活检术应激反应靶浓度的 EC50 为 4.8ng/ml；泵注 0.6μg/kg 右美托咪定的负荷量 10min 后，以 0.6μg/kg/min 持续泵注时，靶控输注瑞芬太尼抑制经会阴前列腺穿刺活检术应激反应靶浓度的 EC50 为 3.1ng/ml。右美托咪定联合瑞芬太尼组呼吸抑制发生率和严重程度更低，但苏醒时间和麻醉诱导时间更长。

PU-1065

无痛麻醉、清醒镇静镇痛和普通方式下胃十二指肠镜检查后患者报告生命质量的对比研究

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目的 胃十二指肠镜检查是上消化系统疾病诊断的常用方式，检查过程给患者带来不同程度不适，良好镇静、镇痛或麻醉有助于患者安全、顺利度过检查过程，减少患者伤痛。本研究探讨了普通、清醒镇静镇痛和无痛麻醉三种条件下行胃十二肠镜检查后的患者报告结局。

方法 2023 年 4 月至 2023 年 10 月期间前瞻性纳入在遂宁市中心医院进行胃镜检查且符合纳入标准的患者，根据患者实际检查条件将病例分为普通、镇静镇痛和无痛麻醉三组。收集患者社会人口学、基础疾病和检查后不适症状等资料，在胃十二指肠镜检查前和检查后 5-7 天使用生活质量评定（SF-12）量表评估患者身体状态（PCS）、使用健康状况调查（SF-36）量表评估患者心理状态（MCS）。采用倾向性匹配得分法（PSM）匹配普通、清醒镇静镇痛和无痛麻醉三种下胃十二指肠镜检查患者的基线资料，三种条件下检查后患者的 PCS 和 MCS 评分比较采用方差分析、检查前后 PCS 和 MCS 评分对比采用配对样本 T 检验。

结果 前瞻性纳入 2361 例患者，其中普通检查 572 例（24.2%）、清醒镇静镇痛 307 例（13.0%）、无痛麻醉 1482 例（62.8%），三组患者间的年龄、糖尿病、高血压等基线特征的分布存在不均衡（均 P<0.05），经 PSM 匹配后普通、镇静镇痛和无痛麻醉三组均纳入 257 例患者，匹配后三组患者的基线特征分布均衡（均 P>0.05），普通、镇静镇痛和无痛麻醉患者的基线 PCS 评分分别为 52.2±3.2、51.9±3.4 和 52.3±3.0 分（P=0.146），MCS 评分分别为 50.3±2.7、51.4±2.9 和 51.1±2.4 分（P=0.152）。三种条件下胃十二指肠镜检查后 PCS 和 MCS 评分均存在不同程度下降，检查后 PCS 评分普通条件下降为 44.6±2.3 分（P<0.001）、清醒镇静镇痛条件下降为 47.3±2.6 分（P<0.001）、无痛麻醉条件下降为 48.5±2.5 分（P<0.001），检查后 MCS 评分普通条件下降为 42.6±2.1 分（P<0.001）、清醒镇静镇痛条件下降为 43.9±2.2 分（P<0.001）、无痛麻醉条件下降为 49.8±3.0 分（P<0.01）。三组间检查后 PCS 评分比较差异有统计学意义（P<0.001），两两比较显示清醒镇静镇痛和无痛麻醉 PCS 评分均高于普通麻醉（P<0.01）、清醒镇静镇痛和无痛麻醉间 PCS 评分无差异（P>0.05）。三组间检查后 MCS 评分比较差异有统计学意义（P<0.01），两两比较显示无痛胃镜 MCS 评分高于普通组和清醒镇静镇痛组（P>0.05），而清醒镇静镇痛患者的 MCS 评分高于普通组（P>0.05）。

结论 胃十二指肠镜检查对患者报告的生命质量有一定影响，不同条件下胃十二指肠镜检查后患者身体和心理健康评分变化存在差异。

PU-1066

胃镜引导下左侧卧位气管插管术在消化内镜治疗中的应用

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目的 探讨研究胃镜引导下左侧卧位气管插管术与常规仰卧位下可视喉镜插管术、左侧卧位下可视喉镜插管术在消化内镜手术中的应用。
方法 选择择期在全身麻醉下行消化内镜治疗的手术患者 90 例，随机分为三组，胃镜引导下左侧卧位气管插管组（G）30 例，常规仰卧位下可视喉镜插管组（S）30 例，左侧卧位下可视喉镜插管组（L）30 例。G 组患者在清醒状态下寻找最舒适的左侧卧位体位，随后行常规全身麻醉并在胃镜引导下行气管插管。内镜医师持胃镜置于声门前方，操作者左手托住患者左侧下颌角抬起舌根，充分暴露声门，右手将套于“J”形硬质管芯上的气管导管从口垫右侧孔进入口内，送入声门口附近，导管尖端进入声门后，左手即沿管芯送入气管导管，然后拔出管芯，固定气管导管。 L 组患者在清醒状态下寻找最舒适的左侧卧位体位，随后行常规全身麻醉并用可视喉镜进行气管插管。S 组患者仰卧位调整头颈部相对伸展，随后行常规全身麻醉并用可视喉镜进行气管插管，插管完毕由手术人员、护士、麻醉医生共同摆放左侧卧位体位。统计插管时间、插管次数、插管成功率、手术体位摆放准备时间。观察并记录插管前（T0）、插管时（T1）、插管后（T2）、摆动体位后（T3）的 MAP、SPO2、HR 的变化。记录术后与插管相关的不良反应和并发症，如咽喉痛、声音嘶哑、会厌谷及口腔黏膜损伤、牙齿损伤等。
结果 三组患者均插管成功，在插管次数、插管成功率上无差异(P>0.05)，S 组插管时间较 G 组和 L 组短，差异无统计学意义(P>0.05)；组间比较，G、L 组患者在 T0、T1、T2、T3 各个时间点的 MAP、SPO2、HR 无明显变化(P>0.05)，S 组患者 MAP、HR 在 T3 点与 T2 时比较波动较明显(P＜0.05)；S 组手术体位摆放准备时间较 G、L 组明显缩短(P＜0.05)。G 组患者会厌谷黏膜损伤出血率较 L、S 组明显减少，其余气管插管相关并发症无明显差异。
结论 我们观察到在胃镜引导下左侧卧位气管插管在操作可行性方面不劣于仰卧位可视喉镜下气管插管和左侧卧位下可视喉镜气管插管。并能维护血流动力学稳定，减少摆放体位人数，缩短手术体位摆放准备时间，降低会厌谷黏膜损伤率，其他安全性指标无明显差异，特别适合在消化内镜中心推广。

PU-1067

苯磺酸瑞马唑仑联合丙泊酚在日间宫腔镜手术中的效果观察

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目的 探索苯磺酸瑞马唑仑联合丙泊酚于日间宫腔镜手术的麻醉效果观察。
方法 方法 156 例行日间宫腔镜手术患者，随机分为三组（每组 52 例）：瑞马唑仑组（R 组）、瑞马唑仑+丙泊酚组（RP 组）和丙泊酚组（P 组）。其中 R 组和 RP 组应用瑞马唑仑进行麻醉诱导，R 组应用瑞马唑仑麻醉维持，RP 组应用丙泊酚麻醉维持。P 组应用丙泊酚诱导和维持。主要记录各种不良反应的发生率，包括低 SpO2、低血压、心动过缓、注射痛、体动、呃逆和 PONV。其次记录入室平静时（T0）、麻醉诱导后(T1)、喉罩置入后（T2）、宫颈扩张时(T3)、手术结束时(T4)、喉罩拔除后(T5)的平均动脉压(MAP)、心率(HR)、脉氧饱和度(SpO2)和改良警觉/镇静评分（MOAA/S）。另外记录患者苏醒、恢复以及术后首夜睡眠质量情况。
结果 结果 RP 组不良反应发生率明显低于 R 组和 P 组（P<0.001）。RP 组和 R 组低 SpO2 发生率显著低于 P 组(P<0.001)。RP 组低血压发生率显著低于 P 组(P<0.017)。然而，R 组的体动发生率

明显高于 RP 组和 P 组(P<0.001)。三组患者均未发生 PONV。RP 组和 R 组的血流动力学波动明显小于 P 组。T5 时，R 组和 RP 组的 MOAA/S 显著高于 P 组(P<0.017)，但 R 组的苏醒时间显著长于 P 组和 RP 组(P<0.001)。三组患者的恢复和睡眠质量情况比较，差异无统计学意义（P>0.05）。
结论 结论 联合应用苯磺酸瑞马唑仑和丙泊酚的患者各种不良反应的发生率最低，血流动力学相对稳定。

PU-1068

Clinical Effect of Target-Controlled Infusion of Sufentanil and Remifentanil for Internal Thoracoscopy

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Objective To analyze the anesthetic effect of internal thoracoscopic surgery with sufentanil and remifentanil target-controlled infusion intravenous anesthesia. Methods: Eighty patients who underwent internal thoracoscopic examination at the endoscopy center of our hospital were selected for analysis. The selected 80 patients were grouped by random number table. 40 patients received sufentanil target-controlled infusion vein. Anesthesia was used as the study group. The remaining 40 patients received remifentanil target-controlled infusion intravenous anesthesia as a control group, and the anesthetic effects of the two groups of patients after receiving different anesthetic target-controlled infusion measures were compared. Results: After the two groups of patients received different anesthetic drug target-controlled infusion measures, the circulation was stable during the operation. The difference of pain visual analog scores was not obvious 30 minutes after the end of the operation. There was a significant difference in the wake-up time between the two groups. There was no significant difference in the incidence of adverse reactions between the two groups after surgery. Conclusions: In patients with clinical thoracoscopic surgery, remifentanil and remifentanil can be used for target-controlled infusion intravenous anesthesia, but patients in the remifentanil group can wake up more quickly and can be promoted and applied.

PU-1069

鼻内阿片类药物及其拮抗剂在临床疼痛治疗中的应用潜力：回顾与更新自 2012

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目的 更新和综述最近 12 年来吗啡和芬太尼家族等阿片类药物经鼻给药的药理学、药代动力学和临床疗效，更新用于治疗阿片类药物引起的呼吸抑制的阿片类受体拮抗剂经鼻给药的药理学、药代动力学及临床效果，以期更好地扩展临床疼痛安全高效的管理方法，并探讨经鼻阿片类药物和阿片类药物拮抗剂的最新理念和未来方向。
方法 使用 PubMed 检索已发表的相关文献，选择 2012 年以来关于阿片类药物经鼻给药及关于阿片类药物拮抗剂和激动拮抗剂经鼻给药的文献，手动审查纳入部分所选文献的参考文献。筛选并选取了相关性较强的文献。检索式为：("Analgesics, Opioid"[Mesh] OR"Narcotic Antagonists"[Mesh] OR "morphine" OR "fentanyl" OR "opioids" OR “naloxone” OR “nalmefene” OR “naltrexone” OR “nalbuphine”) AND ((((((((((((Administration, Intranasal Drug[Title/Abstract]) OR (Administrations,

Intranasal Drug[Title/Abstract])) OR (Drug Administrations, Intranasal[Title/Abstract])) OR (Intranasal Drug Administrations[Title/Abstract])) OR (Administration, Nasal[Title/Abstract])) OR (Administrations, Nasal[Title/Abstract])) OR (Nasal Administration[Title/Abstract])) OR (Nasal Administrations[Title/Abstract])) OR (Drug Administration, Intranasal[Title/Abstract])) OR (Intranasal Administration[Title/Abstract])) OR (Administrations, Intranasal[Title/Abstract])) OR (Intranasal Administrations[Title/Abstract])) OR (Intranasal Drug Administration[Title/Abstract]) OR ("Administration, Intranasal"[Mesh]))

结果 从 388 条检索结果中筛选出相关性较强的文献综述和临床试验。文献显示：经鼻二氢吗啡的生物利用度为 52%；经鼻氢吗啡酮的生物利用度为 55%；经鼻奥施康定生物利用度为 75%左右；研究报道舒芬太尼鼻喷雾剂对 78%的手术镇痛有效；47ug/140ul 芬太尼一次鼻腔喷雾剂的生物利用度为 74.7%足以充分缓解术中疼痛；纳洛酮鼻内制剂的生物利用度为 50%，纳洛酮鼻内制剂的使用可增加使用阿片类药物过量患者康复的几率并减少急诊就诊的次数；在瑞芬太尼诱导的呼吸抑制模型中，经鼻纳美芬比纳洛酮起效更快；经鼻纳曲酮（含吸收促进剂和不含吸收促进剂）后其相对生物利用度为 76%和 48%；经鼻纳布啡生物利用度约为 50%，经鼻纳布啡后患者疼痛水平在统计学上显著下降；对于接受 H 型悬雍垂腭咽成形术的老年患者，先行鼻腔给药布托啡诺有效抑制了术后疼痛，减少了镇痛剂的用量，并减少了术后认知障碍的发生。

结论 与传统的给药方式相比，经鼻阿片类药物或阿片类药物拮抗剂、激动拮抗剂具有无创、迅速、给药方便、患者依从性好等优点，并且在文中提到的药物经鼻给药后普遍具有较高的生物利用度（有些是在辅助剂的帮助下），这些优点让经鼻阿片类药物或阿片类药物拮抗剂、激动拮抗剂在临床用于治疗急诊突发疼痛和慢性癌症爆发疼痛、急性镰状细胞闭塞性疼痛发作以及逆转由阿片类药物引起的呼吸抑制具有巨大的潜力，目前，芬太尼和纳洛酮的经鼻制剂已经获得批准应用于临床，未来或许有更多的阿片类药物及其拮抗剂的经鼻制剂批准上市成为临床疼痛治疗和管理的有力武器。

PU-1070

侧卧位气管插管在贲门失弛缓症患者内镜微创治疗中的应用

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目的 观察和比较侧卧位气管插管和仰卧位气管插管在贲门失弛缓症患者内镜微创治疗中的安全性和对患者术后恢复的影响。

方法 选择 2022 年 6 月到 2024 年 6 月期间中国人民解放军北部战区总医院内窥镜科择期行 POEM 手术的患者 80 例。ASA 分级 I-II 级，所有患者术前均禁食水 8 小时以上，且均行气管插管全麻，将所有患者随机分为两组，其中 40 例患者行侧卧位气管插管即让患者麻醉前自己摆好侧卧体位，然后行气管插管，选择舒适的体位进行手术（C 组）。剩余 40 例患者先为平卧体位待气管插管完成后被动侧卧体位（P 组）进行手术。所有患者术前均无严重心肺疾病，均无长期卧床病史，且麻醉时间均在 1.5 小时~2 小时之间，超过 2 小时予以排除。观察两组患者插管成功时间，一次性插管成功率，插管时返流误吸情况，插管成功即刻（T0）以及翻动体位即刻（T1 本研究为插管后 2 分钟）的循环波动情况（超过基础值 20%即为循环波动较大），术后即刻下侧肢体不适情况以及术后 1 天、3 天恢复情况。

结果 两组患者插管成功即刻（T0）和翻动体位即刻（T1）的血压波动情况 C 组明显小于 P 组，差异有统计学意义。C 组患者返流误吸情况明显低于 P 组（P<0.05）差异有统计学意义。C 组术后即刻下侧肢体出现不适情况明显少于 P 组，且术后恢复情况优于 P 组。

结论 侧卧位气管插管不仅能够安全的用于临床，而且有效的降低了插管时的返流误吸风险，同时避免了被动体位对患者肢体造成的不利影响，有利于患者的术后康复。

PU-1071

老年患者无痛胃肠镜诊疗后 PACU 低血压与其早期预后的相关性

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目的 应用倾向性评分匹配探讨老年患者无痛胃肠镜诊疗后 PACU 低 血压对其早期预后的影响。
方法 选择 2021 年 3 月 至 6 月于苏北人民医院内镜 中心行无痛胃肠镜诊疗老年患者的病历资料，性别不限，年龄≥60 岁，ASA 分 级Ⅰ~Ⅲ级。收集术前、术中和 PACU 各指标。根据是否为 PACU 低血压分为低 血压组和对照组，采用倾向性评分匹配法 1：1 匹配 2 组术前和术中临床资料。 主要结局指标为：PACU 内不良事件，包括：低血压、低氧血症、头昏、乏力、 疼痛、嗜睡；次要结局指标：PACU 滞留时间。采用 Logistic 回归分析 PACU 低 血压与 PACU 内不良事件的相关性。
结果 经过倾向性评分匹配后，共纳入 614 例老年患者，其中 PACU 低血压组 312 例，对照组 312 例。与对照组比较，PACU 低血压组术后头昏、嗜睡、乏力发生率比例明显升高，PACU 滞留时间明 显延长（P＜0.05）。Logistic 回归分析显示，PACU 低血压与 PACU 内头昏 （OR=1.932，95%CI 1.063~3.510 ）、嗜睡（OR=1.963，95%CI 1.374~2.805）、 乏力（OR=4.839，95%CI 1.377~17.009）的发生相关。
结论 老年患者无痛胃肠 镜诊疗后 PACU 低血压会增加 PACU 内头昏、嗜睡、乏力发生率，延长 PACU 滞留时间。

PU-1072

预防老年患者全麻术后苏醒延迟的最佳证据总结

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目的 苏醒延迟(delayed recovery,DR)是指全身麻醉停止给药后 2h，排除脑血管意外，患者仍意识不清且对外界刺激无明显反应。DR 是老年患者全麻术后最常见的并发症之一，发生率约为 23%。患者术后 DR 不仅干扰麻醉恢复室(post anesthesia care unit,PACU)正常工作秩序，而且增加各种并发症的发生风险，加重患者及其家属心理和经济负担。随着精准麻醉和快速康复理念的不断深入，麻醉后 PACU 转出延迟率被纳入国家麻醉医疗质控指标。目前，国内外关于 DR 研究以综述和影响因素分析为主，缺乏可靠的循证依据，未形成系统预防方案。鉴于此，本研究基于循证护理，总结围术期 DR 预防措施，为临床医护人员制定科学的老年患者全麻术后 DR 预防方案提供循证依据。
方法 根据 PIPOST 模式确立循证问题，包括目标人群（population,P）为择期全麻老年患者；干预方法（intervention,I）是涉及 DR 的预防措施；证据应用人员（professional,P）为麻醉科、手术室、PACU、外科病房的护士和医生；结局指标（outcome,O）为全麻术后 DR 发生率；证据应用场所（setting,S）为外科病房、手术室、PACU；证据类型（type of evidence,T）包括临床决策、指南、证据总结、系统评价以及专家共识。本项目已在复旦大学循证护理中心注册（ES20244588）。依据中英文检索词系统检索国内外数据库。中文检索词为：苏醒延迟；全麻术后，全身麻醉，麻醉苏醒期，麻醉恢复期。英文检索词为：delayed emergence、delayed awakening、delayed recovery、postoperative general anesthesia、general anesthesia、anesthesia recovery period、anesthesia convalescent period 等。检索的文献类型包括临床决策、指南、证据总结、系统评价、专家共识等，对所纳入的文献进行文献质量评价及证据的提取和汇总。
结果 初步检索获文献 1387 篇，经去重和筛选后，最终纳入 12 篇文献，其中 3 篇临床决策、4 篇

指南、2篇系统评价、3篇专家共识，从中共提取9个方面（术前评估、中医预防、麻醉深度监测、循环管理、通气管理、体温管理、内环境调控、肌松监测、苏醒评估）共 30 条最佳证据。
结论 临床医护人员可依据证据指导，开展临床的培训和实践，以减少全麻术后苏醒延迟的发生率，提高医护人员综合管理能力。

PU-1073

不同剂量氟马西尼对瑞马唑仑全麻下老年患者 ERCP 术后苏醒质量的影响

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目的 探讨不同剂量的氟马西尼对瑞马唑仑全麻下行经内镜逆行胰胆管造影术（ERCP）老年患者苏醒质量的影响。
方法 选择择期行 ERCP 患者 120 例，将患者随机分至 A、B、C、D 共 4 组。术前进行术后恢复质量评估量表（PQRS）和脑电双频指数（BIS）的基础测定，术中使用瑞马唑仑进行全麻诱导和维持，A、B、C、D 组患者在手术结束时分别静脉注射 0.2mg、0.5mg、1.0mg 氟马西尼以及生理盐水。观察并记录患者术后睁眼时间、指令运动恢复时间、清醒时间、达到离室标准的时间；记录术后 15min(T1)、术后 30min(T2)、术后 45min(T3)时间点的 BIS 值、PQRS 评分和苏醒期并发症。
结果 A、B、C 组较 D 组睁眼时间缩短（P<0.05），B、C 组较 A 组睁眼时间缩短（P<0.05），C 组较 B 组睁眼时间缩短（P<0.05）。T1 时间点 A 组呼吸抑制的发生率较 D 组降低（P<0.05），B 组低血压、呼吸抑制、头晕的发生率较 D 组降低（P<0.05），C 组出汗发生率较 A、B、D 组升高（P<0.05）。
结论 在瑞马唑仑全麻下老年患者 ERCP 术后使用 0.5mg 氟马西尼可缩短全麻恢复时间，在术后 15min 时满意恢复生理功能、伤害性刺激以及情绪并减少苏醒期并发症，在术后 30min 时满意恢复 BIS、日常生活活动能力以及认知功能，具有明显改善患者苏醒质量的作用。

PU-1074

环泊酚和丙泊酚对老年患者目标导向血流动力学管理策略食管 ESD 术后恢复质量影响的比较

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目的 比较环泊酚和丙泊酚对老年患者目标导向血流动力学管理策略食管 ESD 术后恢复质量的影响。
方法 择期行胃镜下食管 ESD 的老年患者 100 例，性别不限，年龄 65~80 岁，BMI 18~28 kg/m^2，ASA 分级Ⅰ或Ⅲ级，手术时间 30~60min。采用随机数字表法分为 2 组(n＝50)：环泊酚（C 组)和丙泊酚组(P 组)。术前：C 组和 P 组均实施有创桡动脉血压监测和脑电监测；麻醉诱导：C 组静脉输注环泊酚 0.3~0.4mg/kg，P 组静脉输注丙泊酚 2 mg/kg。麻醉维持：C 组静脉泵注环泊酚 1.0~2.5 $mg·kg^{-1}·h^{-1}$，P 组静脉泵注丙泊酚 4~12 $mg·kg^{-1}·h^{-1}$，术中维持 BIS 值 40~60。术中 2 组均采用目标导向血流动力学管理策略，根据每搏量变异度 4%~12%和心脏指数 2.5~4.0 $L·min^{-1}·m^{-2}$ 调整输液量和血管活性药（去甲肾上腺素）。采用 15 项恢复质量评分量表(QoR-15)评估患者的术后恢复质量，于术前 1 d、术后 30min、3 d 和 15d 时进行 QoR-15 评分。记录 2 组患者术中血管活性药用量、术中低血压和心动过缓的发生情况，术前、术毕时血气生化分析检测；记录意识恢复时间、气

管拔管时间、PACU 驻留时间和术后住院时间；记录术后不良反应的发生情况。
结果 与 P 组比较，C 组患者术中低血压和心动过缓发生率较低，去甲肾上腺素用量较少，血乳酸浓度较低，术后 30min、术后 3d 的 QoR-15 评分较高(P<0.05)。
结论 环泊酚改善老年患者目标导向血流动力学管理策略食管 ESD 术后恢复质量的效果优于丙泊酚。

PU-1075

鼻塞式麻醉鼻罩在无痛胃镜中的应用

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目的 评价鼻塞式麻醉鼻罩在肥胖患者无痛胃镜检查术中的效果
方法 选择行无痛胃镜检查术的患者 100 例,性别不限，年龄 18-64 岁，ASA 分级 I-II 级，BMI ≥30kg/m2,采用随机数字表法分为 2 组(n=50）：鼻导管吸氧组(C 组）和鼻塞式麻醉鼻罩组(T 组）。C 组经鼻导管吸纯氧 8L/min，T 组连接鼻塞式麻醉鼻罩通气装置吸纯氧 8 L/min。麻醉诱导予以静注舒芬太尼 0.1μg/kg 和丙泊酚 2mg/kg（10mg/s），如果心率保持在>100 次/min 或增加>20%，或出现肢体运动或咳嗽，则给予丙泊酚（0.2–0.4 mg/kg）。记录胃镜检查时间、丙泊酚总用量和苏醒时间;记录胃镜检查过程中与缺氧相关不良事件（亚临床呼吸抑制、缺氧和严重缺氧)发生情况和不良事件处理措施(增加通气氧流量、开放气道、面罩辅助通气和气管插管行机械通气）使用情况。记录患者、操作者和麻醉医生的主观满意度评分。记录胃镜检查过程中体动、呕吐、反流、支气管痉挛和呛咳等的不良反应发生情况。
结果 与C组比较，T组胃镜检查时间缩短，丙泊酚用量增加，亚临床呼吸抑制和缺氧发生率降低，开放气道使用率及面罩通气使用率降低，体动和呛咳发生率降低 (p<0.05)。
结论 鼻塞式麻醉鼻罩可安全、有效地用于肥胖患者无痛胃镜检查术。

PU-1076

无痛胃镜中睫毛反射消失与肌肉松弛作为最佳入镜点的比较

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目的 比较无痛胃镜中以睫毛反射消失和肌肉松弛作为胃镜入镜点的麻醉效果及安全性。
方法 选取本院门诊行无痛胃镜检查的患者 148 例，年龄 18-65 岁，ASA 分级Ⅰ～Ⅱ，随机分为睫毛反射消失组（A 组）和肌肉松弛组（B 组），每组 74 例患者。两组患者入室摆放左侧卧位后，嘱其左侧手臂放在胸前，采用静脉注射芬太尼 0.1μg / kg 联合丙泊酚 1～2 mg / kg 行麻醉诱导，A 组以患者入睡后睫毛消失为胃镜入镜点，B 组以患者肌肉松弛、左侧手臂自然垂下为胃镜入镜点，记录患者给药前（T0）、入镜前（T1）、胃镜置入时（T2）、苏醒时（T3）两组患者的心率（HR）和脉搏氧饱和度（SpO2），记录胃镜置入时和胃镜低位翻转时的麻醉效果，记录检查过程中呛咳、低氧、心动过缓、呃逆等反应、术毕清醒时间和丙泊酚总量。
结果 与 T0 时点比较,两组患者 HR 在 T1 时点上升，差异有统计学意义(P<0.05)，与 A 组比较，B 组上升幅度较小（P<0.05），在 T2 时点差异无统计学意义(P<0.05)，在 T3 时点下降，差异有统计学意义(P<0.05)，与 A 组比较，B 组下降幅度较小（P<0.05）。与 T0 时点比较，两组患者 SpO2 在 T1、T2、T3 时点下降,差异有统计学意义(P<0.05)， 与 A 组比较，B 组在 T1、T3 时点下降幅度较小，差异有统计学意义(P<0.05)。胃镜置入时 A 组麻醉效果为Ⅰ级（65.6%）、Ⅱ级（23.3%）、Ⅲ级（11.1%），胃镜置入时 B 组的麻醉效果为Ⅰ级（81.4%）、Ⅱ级（18.6%）、Ⅲ级（0%），

低位翻转时 A 组的麻醉效果为Ⅰ级（60%）、Ⅱ级（26.7%）、Ⅲ级（13.3%），B 组的麻醉效果为Ⅰ级（82.6%）、Ⅱ级（17.4%）、Ⅲ级（0%），B 组在胃镜置入时和低位翻转时两个时间点的麻醉效果明显好于 A 组，差异有统计学意义。两组患者在低氧、心动过缓、呃逆等不良反应的比较，差异无统计学意义(P>0.05)，A 组的呛咳比率（15.6%）明显高于 B 组（5.8%），差异有统计学意义(P<0.05)。B 组在丙泊酚用量和术毕苏醒时间上略大于 A 组，差异有统计学意义(P<0.05)。

结论 以肌肉松弛作为无痛胃镜的入镜点较睫毛反射消失麻醉效果好，呛咳反应低，生命体征较平稳，因此选择肌肉松弛为胃镜入镜点更体现优势。

PU-1077

比较瑞马唑仑与丙泊酚全凭静脉麻醉对老年纤支镜检查患者的有效性和安全性：一项随机对照研究

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目的 在纤支镜检查中，采用瑞马唑仑全凭静脉麻醉，相比于采用丙泊酚全凭静脉麻醉，老年患者术中血流动力学、氧合和苏醒时间的影响

方法 选取 2023 年 7 月的～2023 年 10 月，72 例在我院接受纤支镜检查的患者，年龄大于 65 岁。随机分为瑞马唑仑组（实验组）和丙泊酚组（对照组），每组 36 例。实验组采用瑞马唑仑 0.2mg/kg+瑞芬太尼 1μg/kg 麻醉诱导，对照组采用丙泊酚 2mg/kg+瑞芬太尼 1μg/kg 麻醉诱导，给药完成两分钟后置入喉罩，常规监测生命体征+脑电双频指数（BIS），纤支镜进入声门上下分别给予 1%利多卡因 2ml,加强表面麻醉，出现体动追加瑞芬太尼 0.5μg/kg，术中允许追加两次。记录麻醉诱导时、检查结束时和苏醒拔喉罩时血压（BP）、心率（HR）和 BIS，并记录低血压、心动过缓和低氧饱和度(SPO2<93%)的发生情况及苏醒时间。数据处理采用 SPSS20.0，其中对于所得出计数资料，分别以 n 和%表示，所使用的检验方法是卡方值和 x^2；而对于所得出的计量资料，则以（x±s）来表示，符合正态分布，检验所使用的方法为 t 值，经比较数据资料后，若显示 P＜0.05，证实有统计学意义存在。

结果 进入纤支镜检查室时，两组患者血压心率和氧饱无显著性差异（P > 0.05）。实验组与对照组患者苏醒时间及术中低血压,心动过缓,低氧饱和发生率的比较差异均有统计学意义[苏醒时间:(14.6 ± 2.2) min 比(11.6±2.4) min, t=11.102;低血压:13.5%比 20.4%,x^2=6.776;心动过缓:3.8%比 7.4%,x^2=5.628;低氧饱和度:7.7%比 13.0%,x^2=5.791,P＜0.05]。两组患者中无一例发生术中知晓及苏醒延迟。

结论 本试验结果显示，实验组和对照组在临床指标尚存在显著差异，实验组苏醒时间为 14.6±2.2min，略高于对照组，P＜0.05；而在不良事件率方面，观察组比对照组低，P＜0.05。可见以瑞马唑仑作为麻醉药物，虽然相对于丙泊酚在苏醒时间稍有延长，但其可减少术中不良反应的发生率，因此其仍可为纤支镜检查提供有效和安全的麻醉效果。以瑞马唑仑组作为麻醉药物，搭配阿片药物和局麻药物，在老年患者纤支镜检查中可得到理想麻醉效果，同时还能起到减少不良事件发生的作用。

PU-1078

瑞马唑仑在口腔舒适化诊疗的应用研究

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目的 目的：探讨瑞马唑仑在舒适化口腔治疗中的应用效果和安全性。
方法 选取 2023 年 5 月~2024 年 5 月在本院口腔门诊诊疗的 89 例患者作为研究对象，采用随机数字表法随机分为对照组（45 例）和研究组（44 例）。对照组在单纯局麻下进行口腔治疗，研究组在对照组基础上静脉注射瑞玛唑仑进行口腔治疗。比较两组静脉给药后（T0）、局麻时（T1）、治疗时（T2）、治疗结束后（T3）、治疗结束后 2 小时（T4）的生理指标[平均动脉压（MAP）、心率（HR）、血氧饱和度（SpO2）、呼吸频率（RR）、脑电双频指数（BIS）]、Ramsay 评分、牙科焦虑量表（DAS）评分、疼痛数字评分表（NRS）评分，另比较两组治疗 Kolcaba 舒适状况（GCQ）评分和不良反应发生率。
结果 研究组与对照组各时间点 SpO2 比较差异均无统计学意义（P＞0.05）；研究组 MAP、RR 在 T1、T2、T3 时均低于对照组（P＜0.05）；研究组 HR、BIS 在 T1、T2、T3、T4 时均低于对照组（P＜0.05）。研究组 Ramsay 评分在 T1、T2、T3 时均高于对照组（P＜0.05）；研究组 DAS 评分在 T1、T2、T3、T4 时均低于对照组（P＜0.05）；研究组 NRS 评分在 T1、T2、T3 时均低于对照组（P＜0.05）。治疗结束后 2 小时研究组 GCQ 评分高于对照组（P＜0.05）。研究组不良反应总发生率（4.55%）低于对照组（17.78），但差异无统计学意义（P＞0.05）。
结论 在口腔治疗局麻下应用苯磺酸瑞马唑仑镇静效果和安全性良好，能够减少患者焦虑、疼痛，提高治疗舒适度。

PU-1079

瑞芬太尼加利多卡因胶浆轻度镇静用于无痛胃镜检查术效果分析

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目的 分析瑞芬太尼静脉注射加利多卡因胶浆表面麻醉用于成人无痛胃镜麻醉相对于深度镇静的优势
方法 选取 2024 年 3 月～4 月间在我院就诊的 810 例无痛胃镜诊疗患者为对象，ASAⅠ～Ⅲ级，年龄 18～83 岁，男性 538 例，女性 272 例，体重指数 18～31 kg/m2，随机分为对照组和观察组，每组 405 例。对照组采用舒芬太尼 2.5～5μg，丙泊酚-依托咪酯合剂（150mg：10mg）2～3ml/kg 静脉注射加利多卡因胶浆表面麻醉；观察组采用瑞芬太尼（4 μg/ml）2.5～3ml/kg 静脉注射加利多卡因胶浆表面麻醉。需要追加药物时，对照组追加丙泊酚-依托咪酯合剂 2～5ml，观察组追加瑞芬太尼（4μg/ml）1.5～2.5ml。记录两组患者术中生命体征变化趋势；呼吸道梗阻、躁动、血氧饱和度降低等并发症发生率；术后恶心、呕吐、顺行性遗忘发生率；离床时间；患者满意度、胃镜诊疗医师满意度，组间进行比较。
结果 两组患者男女比例，ASA 分级，平均年龄，体重指数，合并困难气道患者占比，检查时长差异无统计学意义（P >0.05）。观察组患者 389 例（96%）在胃镜置入后，血压、心率呈上升趋势，其中 7 例患者使用了尼卡地平降低血压，其余 16 例（4%）心率、血压较术前持平或者略有降低；12 例（3%）术中有血氧饱和度降低，但不低于 90%，需要指导患者做深呼吸，未发生其他并发症；20 例（5%）有顺行性遗忘，都为 70 岁以上患者；24 例（6%）术后恶心，其中 3 例（0.7%）呕吐；离床时间 1～42min，平均（10±2.8）min；患者满意度 98%，胃镜诊疗医师满意度 100%。另外 22 例（5.4%）需要在胃镜至食管开口处时做 1～2 次吞咽动作，方能顺利通过。对照组患者有 1

例在注射丙泊酚-依托咪酯合剂后在病床上不停翻动，追加药物不能改善，待其清醒后，采用观察组用药方案，顺利完成诊疗，未计入实验数据。对照组患者有 391 例（97%）在胃镜置入后血压、心率呈下降趋势，其余 13 例（3%）心率、血压较术前持平或者略有上升；181 例（44.8%）术中有血氧饱和度降低，需要采取托下颌（171 例），放置鼻咽通气道（5 例），中断诊疗，面罩加压给氧（2 例），气道痉挛，静脉推注地塞米松（3 例）等处置措施；85 例（21%）患者术中打嗝；12 例（3%）患者有注射痛；9 例（2%）有肌肉抽搐；总并发症发生率 65%（P<0.01）；11 例（2.7%）术后恶心（P<0.01），无呕吐；离床时间 15～39min，平均（21±3.6）min（P<0.01）；患者满意度 100%，胃镜诊疗医师满意度 99%。

结论 瑞芬太尼静脉注射加利多卡因胶浆表面麻醉轻度镇静用于成人无痛胃镜，可有效抑制和消除胃镜诊疗的不适，较使用丙泊酚为主的深度镇静，总并发症发生率低，安全性高，但恶心发生率较高，需对症处理。

PU-1080

不同剂量环泊酚用于老年患者无痛肠镜诊疗的效果

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目的 目的 观察三种剂量环泊酚用于老年患者无痛胃镜诊疗的临床效果

方法 方法 选择择期行无痛肠镜诊疗的老年患者 80 例，男 38 例，女 42 例，年龄（65 岁～75 岁），BMI 18～30 kg/m2, ASAⅡ或Ⅲ级。采用随机数字法将患者分为四组：丙泊酚组(P 组，n=20)、环泊酚 0.4 mg/kg 组(H2 组，n=20)、环泊酚 0.3 mg/kg 组(H3 组，n=40)和环泊酚 0.2mg/kg 组(H4 组，n=20)。R2 组、R3 组、R4 组分别静脉注射环泊酚 0.4、0.3 和 0.2 mg/kg, P 组静脉注射丙泊酚 1.5 mg/kg,肠镜诊疗中根据实际情况追加环泊酚 0.2mg/kg 或丙泊酚 0.5 mg/kg。患者在行肠镜诊疗前均静脉滴注舒芬太尼 5μg 进行镇痛处理。记录患者入睡时间、苏醒时间、离开麻醉恢复室时间和低血压、呼吸抑制、注射痛等不良反应的发生情况。

结果 结果 与 P 组比较，R2 组、R3 组、R4 组入睡时间明显延长(P<0.05),R3 组、R4 组离开恢复室时间明显缩短(P<0.05)。与 R2 组比较，R4 组入睡时间明显延长(P<0.05),R3 组苏醒时间和离开恢复室时间明显缩短(P<0.05)。与 P 组比较，R2 组、R3 组、R4 组低血压、呼吸抑制、注射痛的发生率明显降低(P<0.05)。

结论 结论 环泊酚用于老年患者无痛肠镜诊疗较丙泊酚在稳定血流动力学指标方面更具优势，其中环泊酚 0.3 mg/kg 能更好地提高患者苏醒质量、加快恢复室病床周转率及降低不良反应发生率。

PU-1081

不同剂量环泊酚复合阿芬太尼在无痛胃镜检查术中的有效性和安全性： 一项单中心、随机、双盲、对照试验

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目的 探讨不同剂量环泊酚复合小剂量阿芬太尼在无痛胃镜检查术中的有效性和安全性。

方法 择期行无痛胃镜检查术的患者 120 例，性别不限，年龄 18-65 岁，BMI18.5-27kg/m^2 ,ASA 分级Ⅰ级或Ⅱ级,无麻醉药物过敏史和神经精神疾病史。采用随机数字表法分为环泊酚 0.3 mg/kg 组(C1 组)、环泊酚 0.4 mg/kg 组(C2 组)以及环泊酚 0.5 mg/kg 组(C3 组)，每组 40 例。所有患者术前予以规禁食、禁饮，入室后入室后建立外周静脉通路，输注钠钾镁钙葡萄糖注射液。鼻导管吸氧 5

L/min，常规监测血压、心率和 SpO_2。缓慢注射阿芬太尼 5ug/kg，30s 后按照分组缓慢注射相应剂量的环泊酚。待 MOAA/S 评分≤1 分时开始胃镜操作。给药后 2min，若患者 MOAA/S 评分仍＞1 分或胃镜进镜操作失败，则追加环泊酚初始剂量的 50% ,再次评估、进镜。监测并记录三组患者入室后（T0）、进镜时（T1）、进镜后 3min（T2）、检查结束时（T3）、入 PACU 时（T4）、出 PACU 时（T5）的心率（HR）、平均动脉压（MAP）及脉搏血氧饱和度（SpO_2）；记录麻醉诱导后进镜成功率（诱导给药后成功进镜例数/总例数*100%）、镇静成功率（不使用替代麻醉药物或给予环泊酚的补充剂量不超过 5 次）；记录麻醉诱导时间、苏醒时间、药物追加剂量及总用量、术中与术后不良事件发生情况及患者与医师满意度。

结果 三组患者的镇静成功率均为 100%，但 C1 组的诱导后进镜成功率显著低于 C2 和 C3 组（P＜0.05）。三组患者在各时间点的心率、平均动脉压及脉搏血氧饱和度无显著差异（P＞0.05）。与 C1 组相比，C2 和 C3 组麻醉诱导时间和环泊酚追加剂量显著减少（P＜0.05），麻醉医师和内镜医师满意度显著提高（P＜0.05）。与 C3 组相比，C1 和 C2 组麻醉苏醒时间和环泊酚用药总量显著减少（P＜0.05）。C1 组术中呼吸抑制、辅助通气的发生率低于 C2 和 C3 组（P＜0.05）术中体动的发生率高于 C2 和 C3 组（P＜0.05）。三组恢复期不良反应发生率无显著差异（P＞0.05）。

结论 环泊酚复合阿芬太尼可安全有效用于门诊无痛胃镜检查术的患者，环泊酚的最佳剂量为 0.4 mg/kg，具有呼吸循环稳定、不良反应发生率低、患者满意度高等优势。

PU-1082

瑞马唑仑用于无痛胃镜检查术镇静对患者术后第一天睡眠质量的影响

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目的 探讨使用瑞马唑仑或丙泊酚镇静对行无痛胃镜检查术的患者术后第一天睡眠质量的影响。

方法 选取拟在静脉麻醉下行胃镜检查的患者共 448 例，性别不限，ASA 分级 I / II 级，年龄 18-75 岁，BMI:18-30kg/m2，采用随机数字表法分为 2 组（n = 224）：瑞马唑仑组（R 组）与丙泊酚组（P 组）。胃镜检查前 20 分钟在受试者签署知情同意书后由同一名麻醉医生记录患者的人口学资料，包括姓名、ASA 分级、身高、体重、性别以及年龄等；病史，包括合并的基础疾病、用药史、手术史及麻醉史等；术前睡眠质量使用 PSQI 和 RCSQ 进行量表评估。进镜前 R 组给予 0.2-0.3mg/kg 瑞马唑仑，P 组给予 1-2mg/kg 丙泊酚，睫毛反射消失后开始进镜操作，检查过程中记录患者睫毛反射消失时间、入室、诱导后和苏醒后的血流动力学指标以及胃镜检查过程中不良事件的发生率。记录患者的睫毛反射消失时间、检查过程中 BIS 的最高值及最低值、入室、诱导后、苏醒时的心率、平均动脉压、血氧饱和度以及术中不良事件的发生情况，包括低血压、高血压、咳嗽、呃逆等。术后患者进入恢复室，Aldrete 评分>9 分可以离院。两组患者均于检查后 24h 使用 RCSQ 以及恢复质量 15 项量表(QOR-15)评估其睡眠情况和恢复质量，并记录患者术后头晕、腹痛、乏力以及恶心呕吐的发生情况。

结果 与术前相比，R 组患者术后第一天 RCSQ 评分更高，与 P 组相比，R 组 RCSQ 评分也更高，差异具有统计学意义(P=0.031)，且主要体现在睡眠深度与觉醒两个条目的得分更高。两组的恢复质量评分、检查后头晕、腹痛、乏力以及恶心呕吐的发生率无明显差异。检查过程中 R 组低血压、注射痛的发生率以及血管活性药物的使用率均低于 P 组，差异有统计学意义(P<0.001)，而呃逆的发生率高于 P 组，差异有统计学意义(P<0.001)，高血压、心动过缓、低氧血症、咳嗽的发生率以及阿托品的使用率方面两组均无明显差别，两组中均没有发生过敏的患者。

结论 与丙泊酚相比，瑞马唑仑可提高行无痛胃镜检查术患者术后第一天的睡眠质量，主要体现在自我报告的更深的睡眠深度与更少的觉醒次数。

PU-1083

Comparison of 95% effective dose of remimazolam besylate and propofol for gastroscopy sedation on elderly patients: A single-centre randomized controlled trial

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Aims: Advanced age is an important risk factor for adverse events during procedural sedation. Remimazolam is safe and effective in gastroscopic sedation. However, the ideal dose and methods of application for elderly patients remain unknown. We aim to investigate its 95% effective dose (ED95) for elderly patients undergoing gastroscopy and to assess its safety and efficacy, with propofol as the comparison.

Methods The trial consists of 2 parts: patients aged >65 years and scheduled for outpatient painless gastroscopy were enrolled. In the first part, Dixon's up-and-down methodology was used to determine the ED95 for each drug during gastroscopic insertion, in combination with an adminstered dose of 0.2 μg/kg remifentanil. In the second part, patients in each group received 0.2 μg/kg remifentanil and ED95 dose of the study drugs for sedation induction, supplemental doses were added to maintain sedation depth when necessary. The primary outcome was the incidence of adverse events. The secondary outcome was the recovery time.

Results The ED95 of remimazolam besylate and propofol induction was 0.2039 (95% confidence interval 0.1753–0.3896) mg/kg and 1.9733 (95% confidence interval 1.7346–3.7021) mg/kg respectively. Adverse events were reported in 26 (40.6%) patients in the remimazolam group and 54 (83.1%) in the propofol group (P <0.0001), whereas the remimazolam group presented a higher incidence of hiccups (P=0.0169).

Besides, the median time to awake was approximately 1 min shorter with remimazolam than with propofol (P<0.05).

Conclusion For elderly patients undergoing gastroscopy, the ED95 dose of remimazolam is a safer alternative than propofol when inducing the same sedation depth.

PU-1084

复合丙泊酚时奥赛利定抑制肥胖患者胃镜置入反应的半数有效剂量

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目的 评价复合丙泊酚时奥赛利定抑制肥胖患者胃镜置入反应的半数有效剂量。

方法 选择拟行无痛胃镜检查术患者，性别不限，ASA 分级Ⅰ或Ⅱ级，BMI≥28 kg/m2。静脉注射奥赛利定 2min 后缓慢静脉注射丙泊酚 1.5mg/kg，待患者睫毛反射消失、下颌松弛后开始胃镜检查。采用改良 Dixon 序贯法进行试验，根据预实验结果设定奥赛利定起始剂量为 0.015mg/kg，相邻药物剂量比值为 1:1.2，若进镜时及检查开始 2min 内患者出现吞咽、呛咳、体动等影响检查操作的反应为阳性，下一例患者增加 1 个剂量梯度，否则视为阴性下一例患者降低 1 个剂量梯度，重复此过程直至出现 7 个转折。采用 Probit 法计算奥赛利定的半数有效剂量（ED50）、95%有效剂量（ED95）及其 95%置信区间（95%CI）。

结果 复合丙泊酚 1.5mg/kg 时奥赛利定抑制肥胖患者胃镜置入反应的 ED50（95%CI）为 0.015

（0.010-0.023）mg/kg，ED95（95%CI）为 0.028（0.021-0.083）mg/kg；所有患者均未出现低血压、心率减慢、术后恶心、呕吐等症状。其中 1 例患者出现术中低氧血症，行抬下颌、增加氧流量及放置鼻咽通气管处理后，氧合恢复。

结论 复合丙泊酚 1.5mg/kg 麻醉诱导时，奥赛利定抑制肥胖患者胃镜置入反应的 ED50 和 ED95 分别为 0.015mg/kg 和 0.028mg/kg。奥赛利定复合丙泊酚静脉麻醉可安全用于无痛胃镜检查。

PU-1085

环泊酚或丙泊酚复合瑞芬太尼用于支气管镜检查的安全性和有效性的比较

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目的 比较环泊酚复合瑞芬太尼和丙泊酚复合瑞芬太尼在支气管镜检查中的安全性和有效性。

方法 本研究为前瞻性、对照、双盲、随机临床试验，共纳入 152 例拟行支气管镜检查的患者，采用数字随机法随机分配到泊酚联合瑞芬太尼组（A 组）和环泊酚联合瑞芬太尼组（B 组）。

结果 B 组在诱导即刻低氧血症的发生例数高于 A 组（P<0.05），A 组意识消失时间（秒）较 B 组长（P<0.05），B 组在诱导即刻平均动脉压（80.01±10.12）、较 A 组低（P<0.05）；B 组患者发生注射痛例数、纤支镜进入声门发生呛咳例数、术中使用麻黄碱的例数均较 A 组多（P<0.05），B 组检查总时长高于 A 组（P<0.05），A 组在医生满意度较 B 组高（P<0.05）。

结论 环泊酚复合瑞芬太尼在无痛支气管镜检查时低氧血症发生率更低，在循环方面较丙泊酚复合瑞芬太尼更优，不良反应发生率更低，医生满意度方面更高。

PU-1086

无痛胃肠镜检查静脉麻醉中的连接意识和记忆的研究分析

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目的 全身麻醉过程中，患者可能会出现意识状态的波动，促使连接意识的产生，引发较为严重的后果。有研究表明，在气管插管全身麻醉的手术过程中存在连接意识，但在无痛胃肠镜检查静脉麻醉中，对连接意识发生情况的研究还很欠缺。随着医疗水平提高和对舒适化医疗的追求，无痛胃肠镜检查数量逐步攀升，连接意识的发生率和其原因必须得到重视。本课题组选取采用丙泊酚、依托咪酯联合舒芬太尼行无痛胃肠镜检查的患者为研究对象，通过在无痛胃肠镜静脉麻醉中对患者进行听觉刺激，研究连接意识的发生率及相关影响因素，以及听觉刺激对患者外显记忆和内隐记忆的影响。

方法 收集温州医科大学附属第一医院 2023 年 1 月-2023 年 6 月择期行无痛胃肠镜检查的患者 315 例(编号 A001-A315)。在静脉诱导后，将术中 BIS 值控制在 40-60 区间内，在胃镜通过食道入口后，重复播放指令 3 分钟，观察患者是否有指令动作。根据患者指令动作响应情况，将患者分为有连接意识组和无连接意识组。指令播放结束，反复播放学习表的词语对患者进行听觉刺激。待患者入 PACU 后进行记忆测试、改良的 Brice 调查问卷、谵妄筛查量表、疼痛评分等测试。记录患者一般临床资料(年龄、BMI、性别、职业、学历、焦虑情况)，记录入手术室时(T1)、胃镜通过食管入口后(T2)、检查 10 分钟时(T3)、检查结束时(T4)、入 PACU 时(T5)、入 PACU5 分钟(T6)、入 PACU10 分钟(T7)的无创血压 BP 、心率 HR、经皮脉搏氧饱和度 SpO2、手术持续时间、麻醉持续时间、麻

醉医生职称、术中用药情况、术中血流动力学参数、术中严重并发症、围术期合并用药情况等相关数据。根据指令动作响应情况计算连接意识的发生率，并根据记忆测试结果计算外显记忆、内隐记忆成绩。

结果 试验共筛选来自温州医科大学附属第一医院消化内科择期行无痛胃肠镜检查患者 315 例，脱落 3 例，最终纳入 312 例进行研究分析。

1. 纳入有效病例 312 例，纳入有连接意识组共 33 例，纳入无连接意识组共 279 例，连接意识的发生率为 10.6%。

2. 比较有连接意识组和无连接意识组患者的年龄、BMI、性别、职业、学历、焦虑情况等数据，两组间未见统计学差异(p>0.05)，故两组患者基线水平存在可比性。

3. 两组术中丙泊酚、依托咪酯用量、手术和麻醉持续时间、麻醉医生级别对连接意识的发生率无明显差异(p＞0.05)。

4. 与无连接意识组相比，有连接意识组患者的术中平均动脉压在胃镜通过食管入口后(T2)、检查 10 分钟时(T3)、检查结束时(T4)明显增高，差异具有统计学意义(p＜0.05)。

5. 与无连接意识组相比，有连接意识组术中做梦的发生率较高，差异具有统计学意义(p＜0.05)。两组患者术后躁动、寒颤、恶心、呕吐、谵妄、改良的 Brice 调查问卷、疼痛评分比较无统计学差异。

6. 两组患者中无痛胃肠镜连接意识的发生对外显、内隐记忆的形成无统计学差异(p＞0.05)。整体分析发现，患者进行听觉刺激后，内隐记忆成绩与 0(常数)相比，差异有统计学意义(p＜0.05)；外显记忆成绩与 0(常数)相比，差异无统计学意义(p＞0.05)。

结论 1、无痛胃肠镜检查静脉麻醉中的连接意识，发生率约为 10.6％，可能与术中平均动脉压高相关。

2、无痛胃肠镜检查静脉麻醉中存在内隐记忆。

PU-1087

95% effective dose of remifentanil for conscious sedation in obese patients undergoing gastroscopy: A biased coin design up-and-down sequential trial

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Background Airway management in obese patients undergoing gastroscopy is challenging. The estimated incidence of hypoxemia in obese patients under deep sedation during gastroscopy is 20%. Conscious sedation could be a good option for the anesthesia in obese patients undergoing gastroscopy.

Objective To examine the feasibility of using intravenous remifentanil for conscious sedation in obese patients undergoing gastroscopy and to determine the 95% effective dose (ED95).

Design: This was a clinical trial. Remifentanil dosage was titrated using a biased coin design up-and-down sequential method.

Setting: The tertiary care hospital.

Patients: Adult patients (18-65 years of age) with body mass index (BMI) ≥ 30 kg/m² undergoing gastroscopy were eligible.

Intervention: The starting dose of remifentanil was 0.5 μg/kg. Upon sedation failure, defined as either Ramsay score ＜2 or VAS pain score ≥4, the dose of of remifentanil was increased by 0.1 μg/kg in the next patient. Upon successful sedation, the next patient had a 95% chance of using the same dose and a 5% chance of dose reduction by 0.1 μg/kg.

Main outcome measures: Ramsay score of patients at each dose was the main outcome measures.

Results A total of 42 patients were enrolled (43.9±13.5 years of age; 31 men). The average BMI was 32.2±2.5 kg/m². Sedation was successful in 35 patients (83.33%). The ED95 of remifentanil was 0.915 μg/kg [95% CI, 0.790-0.989 μg/kg]. The procedural time was 5.9 (2.9-10.5) minutes. No serious adverse events occurred during the procedure.
Conclusions The ED95 of remifentanil for conscious sedation in obese patients undergoing the gastroscopy was 0.915 μg/kg.

PU-1088

大肠癌筛查患者无痛肠镜麻醉方案

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目的 研究布托啡诺复合依托咪酯和丙泊酚用于无痛肠镜的麻醉作用和安全性。
方法 选取 2022 年 8 月～2023 年 5 月在我院行大肠癌筛查，接受无痛肠镜检查的患者 120 例进行研究，随机分为试验组（T 组）对照组（C 组），每组 60 人， T 组在肛诊前 5 分钟先给予布托啡诺 5ug/kg，再予以依托咪酯 0.05～0.08mg/kg，后静注丙泊酚，C 组在肛诊前 5 分钟给予布托啡诺 0.01mg/kg，后静注丙泊酚，均于肛诊无反应后开始结肠镜检查，并进行对比考察。
结果 两组患者一般资料及肠镜检查时长，术中发生体动、肌阵挛，和术后意识恢复时间以及不良事件比较，均无统计学差异（P>0.05）；T 组的血压、心率、血氧饱和度在静注丙泊酚后 2min 和 5min，与 C 组比较有明显统计学差异（P<0.05）；其中血压：C 组 16 例注药后血压下降 20 %～35%，血压与注药前比较有显著性差异（P<0.05）；T 组血压注药后有不同程度的下降，但降幅未超过 10%，注药前后血压比较无显著性差异（P>0.05）；组间比较，给药前和静注丙泊酚 10 分钟后均无统计学差异（P>0.05），静注丙泊酚后 2 分钟和 5 分钟，C 组明显低于 T 组，有统计学意义（P<0.05）；心率：C 组注药后 2min 心率明显下降，与麻醉前和 T 组比较均具有显著差异（P<0.05），T 组给药前后心率变化无统计学差异（P>0.05）；SpO2：C 组给药静注丙泊酚后 2min 内有 12 例患者下降至 95%以下，经予以辅助呼吸后缓解，T 组均在 97%以上，C 组明显低于 T 组，有统计学意义（P<0.05），给药前和静注丙泊酚 10 分钟后两组均无统计学差异（P>0.05）；两组术中发生肌阵挛例数，及术中体动病例数，和术后意识恢复时间以及不良事件发生率，两组无统计学差异（P>0.05）。
结论 无痛结肠镜检查是目前筛查大肠肿瘤的主要检查手段，但由于疾病本身影响，和术前肠道准备丢失体液较多，往往在镜检过程中发生低血压等情况，所以麻醉方案的选择尤其重要，本研究应用布托啡诺复合依托咪酯和丙泊酚用于无痛肠镜的麻醉，血流动力学监测指标平稳，SpO2 监测无明显降低，围麻醉期过程更平稳，术中肌阵挛及术后不良反应事件发生无特殊，临床效果良好，推荐临床应用。

PU-1089

全麻患者拔除气管导管后不同流量吸氧对氧合和 PETCO2 的影响

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目的 探讨择期开腹手术的胃肠肿瘤患者在 PACU 内拔除气管导管后经鼻导管不同流量吸氧对氧合和 PETCO2 的影响
方法 选择择期全麻下开腹手术患者 180 例，性别不限，年龄 18~64 岁，BMI<28kg/㎡，ASA Ⅱ或

Ⅲ级。采取随机数字表法分为 3 组，每组 60 例。患者拔除气管导管后经鼻导管不同流量氧疗： L 组（2L/min O2）、M 组（4L/min O2）、H 组（6L/min O2）。分别在术前（T0）、拔除气管导管后 30min（T1）记录 SpO2、MAP、HR 及由微旁流呼气末二氧化碳监测设备测得 PETCO2，同时行动脉血气分析，计算氧合指数（OI）。记录各组患者拔管后低氧血症和高氧血症发生情况。
结果 三组患者低氧血症发生率差异无统计学意义。在 T1 时，L 组 PaO2 和高氧血症的发生率明显低于 M 组和 H 组（P<0.05），而 OI 明显高于 M 组和 H 组（P<0.05）。L、M 和 H 组 PETCO2 与 PaCO2 相关系数分别为 0.836、0.453、0.283。
结论 在本研究条件下胃肠肿瘤开腹手术患者在 PACU 内拔除气管导管后经鼻导管 2L/minO2 吸氧不会增加低氧血症发生率且氧合指数高，可显著降低高氧血症的发生率，同时 PETCO2 更能准确反映 PaCO2。

PU-1090

丙泊酚-瑞芬太尼静脉靶控输注浓度变化预测麻醉苏醒期意识恢复的价值

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目的 观察行日间妇科宫腔镜手术时，丙泊酚联合瑞芬太尼静脉靶控输注下血流动力学指标变化和血药浓度(Cp)、效应室浓度(Ce)的变化，研究 Cp、Ce 变化特征对短小日间手术苏醒时安全拔出喉罩的应用价值。
方法 选择 100 例 ASAI-II 级择期行妇科日间宫腔镜手术患者。患者进入手术室后建立静脉通道，监测平均动脉压(MAP) 、呼吸（RR）、心率(HR) 、心电图（ECG）、末梢脉搏氧饱和度（ SpO2）和脑电监测（BIS）。所有病例均采用静脉靶控输注诱导，丙泊酚效应室靶控浓度（Ce）从 6ug / ml 开始，瑞芬太尼的 Ce 从 5ng/ml 开始，每间隔 20 秒进行改良 OAA / S 评分直到 0，BIS 小于 60，患者睫毛反射消失后，置入喉罩。机械通气的参数指标：潮气量（VT）8ml～10ml/kg，呼吸频率(RR)12 次/分，吸呼比 1：2。呼末二氧化碳 （PetCO2）维持在 30mmHg～40mmHg 之间。术中根据患者手术刺激及血流变化调整丙泊酚及瑞芬太尼靶控血药浓度，效应室靶浓度（Ce）分别设置为 2.5ug / ml 和 2.5ng / ml，维持血压平稳，镇静镇痛满足手术需求，如患者有体动，可给予提高丙泊酚靶控浓度 0.5ug/L，直至达到足够的麻醉深度以保证手术顺利进行。术者停止操作，即停止泵注药物。停药后由麻醉医生每间隔 20 秒进行改良 OAA / S 评分直到 5 为止，且自主呼吸频率 <20 次 分， 潮气量> 6ml/kg ，Sp02>95%，且可睁眼，BIS 大于 60，对刺激有反应后拔除喉罩。记录患者苏醒阶段不同时间段（T0、T1、T2）的平均动脉压（MAP）及心率（HR），丙泊酚及瑞芬太尼的 Cp 和 Ce，分析计算 MAP、HR、Cp、Ce，对安全拔出喉罩的预测概率 PK 值，并比较各 Pk 值之间的差异。分析丙泊酚和瑞芬太尼药物总量与苏醒时间的相关性，并计算拔除喉罩时丙泊酚、瑞芬太尼的 Cp、Ce 变化特征。
结果 日间短小手术清醒安全拔出喉罩时，丙泊酚 Cp 的 95%CI 为 1.14 ug/ml ~1.20ug/ml，Ce 的 95%CI 为 1.65 ug/ml ~1.74ug/ml，瑞芬太尼 Cp 的 95%CI 为 0.75ng/ml ~0.79ng/ml，Ce 的 95%CI 为 0.94 ng/ml ~1.01ng/ml；丙泊酚 Cp、Ce 预测安全拔出喉罩的 Pk 值分别 0.999、0.993；瑞芬太尼预测安全拔出喉罩 Cp、Ce 的 Pk 值分别 1.00、1.00；MAP 和 HR 预测安全拔出喉罩的 Pk 值分别为 0.654 和 0.714 ；丙泊酚和瑞芬太尼的 Cp、Ce 的 Pk 值与 MAP、HR 的 Pk 值相比，有显著差异(P<0．05)。药物总量、手术时间长短与苏醒时间无相关性(P>0．05),术毕血药浓度下降差值与苏醒时间显著相关(P<0．05)。
结论 丙泊酚联合瑞芬太尼静脉靶控输注下的短小手术时，丙泊酚和瑞芬太尼的 Cp、Ce 的变化可预测患者清醒且安全拔出喉罩的时机。

PU-1091

瑞马唑仑联合阿芬太尼用于老年患者无痛胃肠镜检查的麻醉效果研究

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目的 老年患者行无痛胃肠镜检查，由于存在心肺功能不全等基础疾病，对麻醉的耐受度较低，因此选择合适的麻醉药物是临床研究的重点。目前常用的镇静方案为丙泊酚复合短效阿片类药物，但丙泊酚注射痛较为强烈；且该药物对循环、呼吸系统的抑制作用较强，不良反应大，对于老年患者安全性差[1]。瑞马唑仑为新型苯二氮䓬类短效麻醉药，可快速发挥肌松、镇静作用，且不损伤患者肝肾功能，适合于手术时间短但机体反应剧烈的胃肠镜检查。但由于瑞马唑仑上市时间短，其对患者术中血流动力学、安全性的影响仍需进一步研究[2]。因此，本研究旨在分析行无痛胃肠镜检查中使用瑞马唑仑联合短效阿片类药物阿芬太尼进行麻醉的可行性，现报道如下：

方法 1.1 一般资料

选取 2022 年 7 月至 2023 年 12 月于**医院行无痛胃肠镜检查的 92 例老年患者为研究对象，通过随机数字表法分为观察组和对照组各 46 例。观察组予以瑞马唑仑联合阿芬太尼静脉麻醉诱导，对照组予以丙泊酚联合阿芬太尼静脉麻醉诱导。

1.2 麻醉方法

患者行无痛胃肠镜检查前须常规禁食 8h、禁饮 4h。入室后患者取平卧位，开放上肢静脉通路，术前采用达克罗宁胶浆 10 mL 行口腔表面麻醉，连接监护装置予以生命体征连续监测，后行鼻导管吸氧。两组均静脉注射阿芬太尼 7μg/kg；观察组患者静脉注射甲苯磺酸瑞马唑仑 0.2 mg/kg，术中发生体动反应单次追加瑞马唑仑 0.04mg/（kg·次）；对照组患者静脉注射丙泊酚中/长链脂肪乳注射液 1.5mg/kg，术中发生体动反应单次追加丙泊酚 0.5mg/（kg·次）。待患者肌肉松弛，意识、睫毛反射、眼球凝视消失后行无痛胃肠镜检查。若检查过程中患者出现呼吸频率（RR）<8 次/min 且血氧饱和度（SpO2）<90%，给予患者面罩加压给氧或者托下颌处理；若心率（HR）<50 次/min、平均动脉压（MAP）<60mmHg，静脉注射硫酸阿托品注射液 1 mg，盐酸麻黄碱注射 10mg/次；若出现低血压（收缩压降低超过基础值的 30％或收缩压< 90 mmHg）时，静脉注射甲氧明 2 mg/次。无痛胃肠镜检查结束后，将患者送至观察室，于患者意识清醒 30min 后引导患者出观察室。

1.3 观察指标和评价标准

①记录两组患者的麻醉诱导时间（由清醒状态转为睡眠状态的时间）、内镜检查时间（胃镜入镜至肠镜出镜的时间）、苏醒时间（内镜检查结束至呼之睁眼的时间）、定向力恢复时间（内镜检查结束到能够准确回答自己基本信息的时间）；②记录两组患者麻醉诱导前（T0）、睫毛反射消失时（T1）、进胃镜时（T2）、退出胃镜时（T3）、进肠镜时（T4）、退出肠镜时（T5）、麻醉苏醒时（T6）的心率（HR）、呼吸频率（RR）、平均动脉压（MAP）、脉搏血氧饱和度（SpO2）水平。③统计两组患者低血压、恶心呕吐、心动过缓、、呼吸抑制、注射痛的发生情况

结果 二、结果

2.1 一般情况

本研究共纳入行无痛胃肠镜麻醉患者 92 例。观察组 46 例中男、女性分别为 25、21 例；两组的年龄、性别、BMI、ASA 分级及检查时间等一般资料基线均衡可比，差异无统计学意义（p>0.05）。

2.2 两组患者麻醉相关指标结果比较

与对照组相比，观察组患者麻醉诱导时间、苏醒时间、定向力恢复时间均有缩短，差异有统计学意义（P<0.05），内镜检查时间组间无差异。

给药后两组患者的 HR、RR、MAP、SpO2 水平均呈先降低后升高的趋势，且观察组患者 T1 的 HR，T2、T3 和 T4 的 HR、RR、MAP 及 T5 的 MAP 水平均高于对照组（P<0.05），SpO2 水平均无统计学差异。

2.2 两组患者麻醉不良反应结果比较

两组患者低血压、恶心呕吐、心动过缓、呼吸抑制、注射痛等不良反应发生率及总发生率（观察组 17.39%，对照组 26.09%）比较，差异均无统计学意义（P>0.05）

结论 本次研究结果显示，观察组患者麻醉诱导时间、苏醒时间、定向力恢复时间较对照组均有所缩短（P<0.05）；与给药前比，给药后两组患者的 HR、RR、MAP、SpO2 水平均呈先降低后升高的趋势，且观察组患者 T1 的 HR，T2、T3 和 T4 的 HR、RR、MAP 及 T5 的 MAP 水平均高于对照组，观察组患者 HR、RR、MAP 的波动幅度小于对照组（P<0.05），但 SpO2 水平均无明显差异；两组患者不良反应发生率比较，差异均无统计学意义（P>0.05）。表明采用瑞马唑仑复合阿芬太尼对老年患者行无痛胃肠镜检查可缩短其麻醉诱导时间、苏醒时间、定向力恢复时间，提示瑞马唑仑在维持血流动力学稳定方面优于丙泊酚，且不增加不良反应的发生，安全性好，基本无注射痛。与其他研究结果基本一致。

PU-1092

大五人格特征——可能成为全麻下前列腺手术术后躁动新的预测因子 （一项前瞻性、观察性临床研究）

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目的 全麻苏醒期躁动（后称术后躁动）是一种全麻苏醒期的常见不良现象，可能造成严重的不良后果，提高了医疗及护理成本、增加了患者痛苦。研究表明，精神问题尤其是术前的精神状态可能是术后躁动的诱发因素之一。精神问题的影响因素较多，最为主要的是患者自身的性格因素。本研究旨在证实性格特征与全麻术后躁动发生之间可能存在的相关性。

方法 自 2021 年 5 月 12 日至 2023 年 12 月 25 日，我们针对于上海市第一人民医院（北院）择期行全麻下前列腺手术的患者进行了一项前瞻性的观察性临床试验。通过量表评估的形式，评估患者术前的快速大五人格特征分数（BFI-10），并于术后 1h 内采用评估者盲的方法评估术后躁动的发生。

结果 本研究共筛选 196 例病例，其中 10 例患者在术前谈话时由于符合剔除标准被排除。研究过程中无退出和失访病例，最后 186 例受试者符合 ITT 集。受试者的平均年龄是 69.7 岁，总体躁动发生率为 30.1%。结果提示，外向型、神经质型两个人格维度评分升高、开放型维度评分降低是躁动发生的独立危险因素。（图 1）

图 1：受试者大五人格维度与躁动发生之间的回归分析森林图，采用相关度（95%可信区间）[OR(95%CI)]表示。

根据以上结果，针对上述三个人格维度（Extraversion、Neuroticism、Openness）的指标，进行简单计算，从而获得每个患者特有的 ENO 评分。进一步采用 ROC 曲线对该全新的评分模型进行验证，结果提示曲线下面积（AUC）为 0.828，敏感度 0.714，特异性 0.823（图 2）。

图 2，ENO 评分模型与术后躁动发生间的 ROC 曲线图

为便捷今后开展全麻下前列腺手术的医务人员，我们将 ENO 评分分为三个等级：≤4 分为低分值，4~7 为中分值，≥7 分为高分值。当患者术前 ENO 评分不超过 4 时，其术后躁动的发生率仅为 3.75%，为低风险；当患者术前 ENO 评分在 4-7 之间时，其术后躁动发生率为 34.0%，需要医务人员提高监管，做好干预的准备；当患者术前 ENO 评分达到 7 时，其术后躁动的发生率高达 63.5%，需要医务人员引起重视，并建议尽早采取一定的措施，如术前宣教、给予一定的预防药物、术后加强护理等（图 3）。

图 3. 根据 ENO 评分对全麻下前列腺手术患者术后躁动发生的危险等级评定。

结论 基于快速大五人格量表（BFI-10）的 ENO 评分模型作为一个新的快速自测评估模型，可以用于预测全麻下成人前列腺手术术后躁动的发生及危险程度的分级，具有一定的临床指导意义。

PU-1093

The influence of piriform recess instillation with lidocaine before bronchoscopy on post-general anesthesia cough: a randomized controlled trial

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Abstract
Background and importance: Postoperative cough is a common complication of general anesthesia after bronchoscopy. The aim of the present study was to determine the safety profile and efficacy of piriform recess instillation with lidocaine in reducing the incidence of coughing.
Objective To what extent could piriform recess instillation with lidocaine decrease the incidence of cough at 10min after extubation?
Outcome measures and analysis: 88 consecutive patients were equally randomized to a lidocaine group receiving piriform recess instillation with 2ml 2% lidocaine, and a normal saline group receiving piriform recess instillation with 2ml saline. The primary outcome was the incidence of cough after extubation, and the secondary outcomes were throat score at 10 min and 6 h after extubation assessed by the numerical rating scale, cough severity at 10 min and 6 h after extubation assessed by the Visual Analog Scale (VAS), 24 h 40-item Quality of Recovery Score (QoR-40), and subject-rated satisfaction score on a VAS.
Main Results: Compared with saline group, the incidence of cough in lidocaine group was significantly lower (63.6% vs 86.4%, P=0.014). The sore throat score at 10 min after extubation was significantly lower (0[0,0] vs 1[0,2], P<0.001). The subject-rated overall anesthesia satisfaction score was significantly higher (84.8[±6.2] vs 76.6[±8.6], P<0.001). The severity of cough at 10 min after extubation was significantly lower (Mild: 36.4% vs 11.4%, P=0.006; Severe: 9.1% vs 43.2%, P<0.001). There was no significant difference in the sore throat score at 6 h after extubation, severity of cough at 6 h after extubation, or QoR-40 at 24 h after extubation between the two groups.
Conclusion Piriform recess instillation with lidocaine before bronchoscopy is a simple and effective method for reducing early cough intensity and alleviating early sore throat. At 6 hours, there were no differences observed between the two groups.

PU-1094

瑞马唑仑复合舒芬太尼抑制老年患者纤维支气管镜置入反应的半数有效剂量

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目的 测定瑞马唑仑联合舒芬太尼抑制老年患者纤维支气管镜置入反应的半数有效剂量(ED50),为临床合理用药提供参考。
方法 择期在全麻下进行纤维支气管镜检查老年患者 26 例,美国麻醉医师协会(ASA)麻醉分级Ⅰ或Ⅱ级,年龄 60-80 岁。患者检查前先给与雾化吸入利多卡因 2mg/kg 行局部麻醉，雾化结束后给与鼻导管 2-4L/min 吸氧。依据改良 Dixon 序贯试验法,静脉注射舒芬太尼 0.1μg·kg-1 后,再给予瑞马唑仑,瑞马唑仑初始剂量为 0.1 mg·kg-1,2 min 后置入纤维支气管镜,出现内镜置入反应时,下一位患者增加瑞马唑仑用药剂量到高一级,否则使用低一级,剂量梯度为 0.01 mg·kg-1,直到出现 6 次折返停止试验。插管反应参照 Batra 硬支气管镜置入评分标准进行评分(表 1) : 总分 5 分为最佳条件， 即患者无呛咳、无体动、下颌完全松弛， 喉镜容易置入和声门处于开放状态， 评分达到 5～9 分者定义为无插

管反应， ≥10 分者为有插管反应， 追加丙泊酚 1 ～ 2 mg /kg。如果首次进镜插管不成功、进镜时出现严重呛咳或 SpO2 ＜90%需要紧急处理， 予以剔除。计算复合舒芬太尼时瑞马唑仑抑制老年患者纤维支气管镜置入反应 ED50 及 95%可信区间(CI)。

结果 复合 0.1μg·kg -1 舒芬太尼时单次静脉滴注瑞马唑仑抑制老年患者纤维支气管镜置入反应的 ED50 为 0.16 mg·kg-1,95%CI 0.16～0.17 mg·kg-1。与基础值(T0)比较,静脉注射瑞马唑仑 2 min 后(T2)心率(HR)、脉搏氧饱和度(SpO2)无明显变化(P>0.05);T2 时平均动脉压(MAP)、呼吸频率(RR)较 T0 降低(P<0.01),但下降在 20%以内;T2 时镇静深度指标 BIS 值、临床镇静评分(MOAA/S)比 T0 明显下降(P<0.01)。

结论 联合舒芬太尼时瑞马唑仑抑制患者上消化道内镜置入反应的 ED50 为 0.16 mg·kg -1,呼吸循环稳定,镇静效果确切

PU-1095

丙泊酚与瑞马唑仑对房颤射频消融术老年患者的临床研究

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目的 射频消融术是微创治疗心房颤动的重要方法,已广泛运用于临床,因消融时的热刺激及体外电复律可使患者感到明显不适和疼痛;同时术中为了实现精准的心脏测绘与消融,要求患者长时间制动。因此为避免患者的不适与体动,该手术常需术全身麻醉。观察丙泊酚与瑞马唑仑全身麻醉用于房颤射频消融术的临床效果。

方法 选择我院择期行全麻房颤射频消融术的老年病人 60 例,美国麻醉医师协会(ASA)麻醉分级Ⅰ或Ⅱ级,年龄 60-80 岁。采用随机数字表法分为瑞马唑仑组(R 组)、丙泊酚组(P 组),每组 40 例。2 组病人均常规麻醉诱导,P 组用 2.5mg·kg-1 丙泊酚、0.5μg·kg-1 舒芬太尼、0.15 mg·kg-1 顺式阿曲库铵进行麻醉诱导，并以 4～6 mg·kg-1·h-1 丙泊酚进行麻醉维持。R 组用 0.25 mg·kg-1 瑞马唑仑、0.5μg·kg-1 芬太尼、0.15 mg·kg-1 顺式阿曲库铵进行麻醉诱导，并以 0.2～0.4 mg·kg-1·h-1 瑞马唑仑进行麻醉维持。两组都持续输注瑞芬太尼 0.12mg·kg-1·h-1 麻醉维持。术中血压高于或低于术前基础值 30%并持续 10 分钟为高血压或低血压，当出现高血压给予乌拉地尔；低血压时去给予去甲肾上腺素；心率低于 55 次/分，给予阿托品，心率高于 120 次/分，给予艾司洛尔。术毕患者恢复自主呼吸后给予新斯的明 0.05mg/kg、阿托品 0.02 ～0.03 mg/kg。记录 2 组麻醉诱导前(T0)、气管插管前(T1)、气管插管即刻(T2)以及气管插管后(T3)气管插管后 60 min(T4)，手术结束时(T5)的平均动脉压(MAP)、心率(HR);记录 2 组手术时间、消融时间、血管活性药使用、拔管时间、出室时间,以及围拔管期相应并发症的发生率；

结果 2 组病人一般情况比较,差异均无统计学意义(P＞0.05); P 组 T2、T3、T4、T5 时刻 MAP 与 HR 均较 T0、T1 时刻高,且明显高于 R 组(P<0.05);手术时间、消融时间、拔管时间及出室时间差异均无统计学意义(P＞0.05);P 组血管活性药使用量和围拔管期不良反应的发生率也明显低于 R 组(P<0.05)。

结论 瑞马唑仑麻醉够维持血流动力学稳定，可以安全有效地应用于老年房颤病人射频消融术中麻醉。

PU-1096

CONCERT-CLE 闭环输注系统用于胃镜诊疗镇静的随机对照临床试验

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目的 探究 CONCERT-CLE 闭环输注系统用于胃镜诊疗镇静的安全性与有效性，为该系统在胃镜诊疗镇静中的应用提供依据。
方法 本研究为单中心随机对照临床试验，纳入 2023 年 7 月至 2024 年 2 月在长海医院消化内镜中心，接受镇静下胃镜诊疗的 692 例门诊患者，随机分配至试验组或对照组，每组 346 例。两组均使用丙泊酚镇静，试验组使用 CONCERT-CLE 闭环输注系统，对照组采用手动注射。记录患者的基础资料，胃镜诊疗镇静期间的脉搏氧饱和度、无创血压、心率等生命体征及试验组的 CSI 值，同时记录术中苏醒、呛咳、喉痉挛、体动等不良事件，以及丙泊酚用量、内镜医师满意度与离室时改良 Aldrete 评分。主要结局为低氧血症、低血压、心动过缓的复合事件发生率。通过对比不良事件的发生率、丙泊酚用量、内镜医师满意度等，评估试验组的 CSI 值，探索 CONCERT-CLE 输注系统的安全性与有效性。
结果 共 692 例患者入组并被随机分配至试验组与对照组，剔除不符合要求及数据记录不全的病例后，共 669 例纳入分析，其中试验组 334 例，对照组 335 例。两组间患者基线资料无统计学差异，试验组的主要结局复合事件发生率低于对照组（29.0% vs 52.2%, p＜0.001），但两组间心动过缓发生率无统计学差异（0.3% vs 0.3%, p=0.998）。试验组苏醒用时略长（10.0±3.0minutes vs 9.5±2.8minutes, p=0.036）。两组间其他不良事件发生率无差异。试验组 CSI 值在胃镜进入胃腔时为 56.5±8.3，退出胃腔时为 56.5±8.0，在诊疗期间总体保持稳定。
结论 使用 CONCERT-CLE 闭环系统输注丙泊酚，为接受择期胃镜诊疗的患者提供镇静，低氧血症、低血压、心动过缓复合事件的发生率较手动注射低，并能够在胃镜诊疗期间保持镇静深度稳定。该系统用于胃镜诊疗镇静时，表现出良好的安全性与有效性。

PU-1097

瑞马唑仑复合阿芬太尼抑制纤维支气管镜置入时心血管反应的有效剂量

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目的 探讨瑞马唑仑复合阿芬太尼抑制纤维支气管镜置入时心血管反应的有效剂量。
方法 选择行无痛纤维支气管镜检查的患者 40 例，年龄 18-65 岁，瑞马唑仑初始剂量为 0.2mg/kg, 所有患者在诱导剂量瑞马唑仑给药结束后 30s 内给予 10ug/kg 阿芬太尼，麻醉医生评估 MOAA/S＜1 后开始纤支镜检查。瑞马唑仑剂量按偏倚 95％硬币的序贯设计。心血管反应阳性定义为纤支镜开始进镜至过隆突后 2 分钟内的血压和心率变化幅度≥基础值的 20%，且持续时间大于 1 分钟。95%有效剂量(ED95)及 95％CI 使用 Probit 回归分析和自举法(Bootstrap)得出。
结果 瑞马唑仑复合 10ug/kg 阿芬太尼抑制纤维支气管镜置入时心血管反应的 ED95 为 0.393mg/kg(95% CI：0.381–0.432mg/kg)，所有的患者在给予首次瑞马唑仑剂量后都能达到 MOAA/S＜1 并开始纤支镜检查，33 例(82.5%)患者检查过程顺利，未出现心血管反应。7 例(17.5%)患者在检查中出现缺氧，经过提高氧流量和托下颌处理后迅速恢复。
结论 瑞马唑仑复合 10ug/kg 阿芬太尼抑制纤维支气管镜置入时心血管反应的 ED95 为

0.393mg/kg(95% CI：0.381–0.432mg/kg)。

PU-1098

闭塞性细支气管炎患儿行电子支气管检查治疗麻醉管理一例

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目的 探索闭塞性细支气管炎患儿行电子支气管镜检查治疗的围术期管理方法
方法 患儿，男，8 岁，123cm，体重 22.5kg，因“间断咽部红肿伴咽痛 7 年，间断入睡打鼾 7 年”入院，经检查诊断为“扁桃体腺样体肥大、慢性扁桃体炎”，行扁桃体腺样体切除术后行电子支气管镜检查治疗，既往 2019 年患有手足口病、重症渗出性多形红斑已治愈，2020 年诊断患有闭塞性细支气管炎，后因反复喘息咳痰，至今每日行布地奈德雾化治疗。查体：意识清楚，发育尚可，胸廓隆起，听诊双肺喘鸣音，爬楼 1 层喘息气促明显。高分辨率 CT（HRCT）：肺内改变，考虑 BO，左支气管内稍高密度影，考虑分泌物（2020-6-5）；左肺磨玻璃影较前显著，左上叶闭塞性细支气管炎内支气管张力减低，右侧闭塞性细支气管炎，较前显著（2021-4-11）；两肺透光度较前增高，左上叶闭塞性细支气管炎内支气管充气较前著明，右侧闭塞性细支气管炎，支扩较前明显（2022-4-14）。肺功能试验：混合性通气功能障碍（重度阻塞伴轻度限制）。支气管舒张试验阴性。心脏超声心脏结构和功能未见明显异常。全外显子基因检测未发现变异。
麻醉门诊评估：ASAⅢ级，爬楼 1 层喘息气促明显，肺功能严重下降，安静吸空气状态下状态下血气分析（PH7.36，PaCO240.1，PaO267，Lac2.2），肝肾功能未见明显异常。
患儿术前 1 日增加雾化吸入频率至 2 次/日，术前 30min 给予口服咪达唑仑 0.5mg/kg，入室后监测生命体征 HR116 次/min、SpO298%、NIBP102/60mmHg，充分吸氧去氮后开放外周静脉，先行通气试验检测患儿呼吸道通畅度，吸入七氟烷 6%待患儿潮气量降至 3ml/kg 时行面罩手控辅助通气，潮气量可升至 8ml/kg 且 SpO2 未见下降提示呼吸道尚通畅。静脉诱导给予丙泊酚 3mg/kg，盐酸戊乙奎醚 0.02mg/kg，舒芬太尼 0.4ug/kg，罗库溴铵 0.5mg/kg，利多卡因 2mg/kg，甲泼尼松龙 2mg/kg，置入喉罩顺利接呼吸机行机械通气，通气选择压力控制容量保证模式（PCV-VG）采用小潮气量 6～8ml/kg，PEEP4～6mmHg，使 PETCO2≤55mmHg，麻醉维持采用七氟烷 2～4%吸入，瑞芬太尼 0.35ug·kg-1·min-1，治疗时长 35min，术中 SpO2≥96%，HR 波动于 90～105 次/min，血气结果（PH7.35，PaCO244.6，PaO2121，Lac0.8）术毕前 5min 停七氟烷，将瑞芬太尼调至 0.2ug·kg-1·min-1 持续泵入至出室，以减轻苏醒期躁动引发的氧耗增加，术毕即刻行口咽部吸引，拔除喉罩时不再吸引，恢复期采用头高位≥30°，术毕 15min 清醒后无呛咳拔管，生命体征平稳，HR 最高 115 次/min。
结果 次日访视患儿除略有咽痛外余未见明显异常。出院随访既往咽部症状消失，雾化吸入由既往每日 1 次降为术日 1 次，患儿爬楼试验 2 层，提示活动耐力增强，目前可规律上学。但未再行 HRCT 评估。
结论 BO 患儿的麻醉管理需要根据病情进展实施个体化麻醉方案，本例患儿的麻醉管理取得了理想结果，可供借鉴。但由于本病发病率较低，合并手术需要麻醉管理的病例尚无报道，因此仍需进一步探索。

PU-1099

由于冠状动脉空气栓塞导致肺移植期间的一过性右心衰(RAF):一个儿科病例报告

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目的 Lung transplantation (LT) is an effective intervention for treating end-stage pulmonary diseases, particularly in children. Perioperative right heart failure may manifest, with its causes and mechanisms potentially differing.
方法 This case report details the experience of a pediatric patient who underwent pulmonary transplantation and subsequently experienced transient right heart failure by Transesophageal echocardiography (TEE).
结果 The clinical presentation, diagnostic evaluation, management strategy, and pediatric patient outcome are comprehensively discussed.
结论 The case underscores the significance of early identification and timely intervention in addressing right heart dysfunction during lung transplantation, along with a review of the literature.

PU-1100

儿童肝移植围术期凝血功能监测对术后短期血栓并发症的影响

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目的 分析儿童肝移植围术期凝血功能变化情况及术后血栓形成情况，探讨儿童亲体肝移植缺血再灌注后凝血功能对术后早期血栓形成的影响。
方法 收集我院择期行亲体肝移植患儿 200 例临床资料，术后 1 周由床旁超声多普勒检查术后血栓形成情况，分析缺血再灌注后 1h Sonoclot 监测凝血功能对术后早期血栓形成的影响。
结果 200 例儿童亲体肝移植手术术后 1 周发生血栓并发症一共 38 例（19%），其中术后肝动脉血栓发生 23 例（11.5%），门静脉及肝静脉血栓发生 15 例（7.5%）。Sonoclot 凝血参数无血栓组 & 血栓组激活全血凝固时间 ACT：178.5±33.2 & 280.4±58.6（p<0.05）, 凝结速率 CR:12.4±5.4 & 11.5±5.7(p>0.05), 血小板功能 PF：3.0±1.4 & 2.6±1.1 (p>0.05)。单因素分析两组体重、身高、无肝期时间、PELD 评分、移植物冷缺血时间、血浆输注量、ICU 时间、ACT 差异有统计学意义（p<0.05），多因素分析 PELD、冷缺血时间、ACT 是影响术后早期血栓形成的独立危险因素（p<0.05）。ROC 曲线分析影响术后早期血栓形成的 ACT 最佳临界值为 228.5s (AUG:0.9, 95%CI:0.934 - 0.983)。
结论 缺血再灌注后 1h Sonoclot 参数 ACT 是影响术后早期血栓形成的危险因素，建议 ACT 维持在 228.5s 以上以减少术后血栓发生。

PU-1101
肾移植术中输注羟乙基淀粉 130/0.4 对移植肾功能的影响

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目的 第三代羟乙基淀粉（HES 130/0.4）是否会损害肾移植受体的移植肾功能尚不清楚。本研究的目的是评估与平衡盐溶液相比，术中输注 HES 130/0.4 是否会损害心脏死亡器官捐献（DCD）肾移植患者的移植肾功能。

方法 本研究为回顾性队列研究，分析了于 2016 年 1 月至 2022 年 12 月在苏州大学附属第一医院行 DCD 肾移植患者的临床资料。分为两组：一组为 HES（H）组，一组为乳酸林格（R）组。主要研究指标：移植肾功能延迟恢复（DGF）的发生率。次要研究指标：肾动脉开放后多巴胺的使用率；住院期间急性排斥反应（AR）、移植肾血管和输尿管并发症的发生率；术后 1 天、7 天、1 月、3 月、6 月、12 月时患者的血肌酐（SCr）、估算肾小球滤过率（eGFR）、尿素氮（BUN）及胱抑素 C（Cys C）水平；术后 1 年的移植肾存活率。

运用倾向性评分匹配（PSM）、逆概率治疗加权（IPTW）、重叠加权（Overlap）来消除分组不均带来的混杂因素。使用单因素 Logistic 回归或广义线性回归对主要及次要结局进行分析。Kaplan-Meier 法绘制两组术后一年的移植肾存活曲线，Logrank 法检验两组差异。采用限制性立方样条（RCS）分析 HES 剂量与 DGF 发生之间的非线性关系。并对可能影响到主要结局的协变量进行了亚组分析。

结果 经排除后，共纳入 526 例患者，H 组 189 例，R 组 337 例。经过 PSM、IPTW、Overlap 调整后，标准化平均差（SMD）＜0.1，基线资料均衡可比。

PSM 前后两组 DGF 发生率之间无显著差异。PSM 前（33.4% VS 32.9%，OR=1.12, 95% CI 0.77~1.63， P=0.559 ）； PSM 后（ 35.0% VS 33.8%， OR=1.06, 95% CI 0.66~1.69，P=0.812）。次要结局中，PSM 前后 H 组肾动脉开放后多巴胺的使用率均低于 R 组（P＜0.001），住院期间 AR、移植肾血管和输尿管并发症的发生率无显著差异。术后 1 天、7 天、1 月、3 月、6 月、12 月时患者的 SCr、eGFR、BUN 及 Cys C 水平也无显著差异。

PSM 前后两组术后 1 年时的移植肾存活率无显著差异。PSM 前（89.4% VS 88.7%，HR=1.11, 95% CI 0.64~1.92，Logrank P=0.719）；PSM 后（89.2% VS 90.4%，HR=0.87, 95% CI 0.43~1.74，Logrank P=0.692）。

PSM 前后的 RCS 曲线均未发现 HES 的剂量与 DGF 发生之间的非线性关系。匹配前（P for nonlinear=0.542）；匹配后（P for nonlinear=0.675）。随着 HES 剂量的增加，DGF 的发生风险并未呈现明显的上升或下降趋势。

亚组分析的结果显示 H 组与 R 组在年龄、性别、BMI、术前透析情况、血型、热缺血和冷缺血时间的亚组中无统计学差异（P＞0.05）。

在 IPTW 与 Overlap 调整后的队列中得到了与上述一样的结果。

结论 羟乙基淀粉 130/0.4 对 DCD 肾移植患者的移植肾功能无明显影响，能更好地维持移植肾灌注，显著降低了肾动脉开放后多巴胺的使用。

PU-1102
miRNA-146a-5p 预测儿童活体肝移植术后谵妄中的临床研究

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目的 拟评价血清 miRNA-146a-5p 在儿童活体肝移植术后谵妄中的预测价值。

方法 收集胆道闭锁行活体肝移植术的患儿 80 例，年龄 5～12 个月，体重 4～12kg，ASA 分级Ⅱ～Ⅲ级，分别于麻醉前（T0）、麻醉后切皮即刻（T1）、无肝期 30min（T2）、新肝期 5min（T3）、新肝期 24h（T4）时记录各时间点心率（HR）、平均动脉压（MAP）、中心静脉压（CVP）。术前 1d、术后 1d、术后 3d 和术后 7d 采用简易精神状态评价量表(MMSE)和改良版蒙特利尔认知评估量表(MoCA)评价患儿认知功能情况。根据术后 7d 内是否发生 POD，将患儿为 POD 组和非 POD 组。将组间比较差异有统计学意义的因素进行多元 logistic 回归分析，以 ROC 曲线来预测临床效能。于术前一天采集静脉血提取 RNA 检测 miRNA-146a-5p 的含量。

结果 共纳入患者 80 例，其中 POD 组 30 例，非 POD 组 50 例。术前 2 组患儿的 MMSE、MoCA 评分比较差异无统计学意义(P>0.05)；术后 1d、3d、7d 后 POD 组患儿 MMSE、MoCA 评分较手术前均降低,且术后 1d、3d 后非 POD 组 MMSE、MoCA 评分高于 POD 组，差异有统计学意义（P<0.05）。血清学检测，POD 组术前 1d 的 miRNA-146a-5p 水平明显低于非 POD 组，差异有统计学意义(P<0.05)；相关性分析发现 POD 发生率与 miRNA-146a-5p 表达水平两者成负相关，相关系数为-0.6387，并且通过 ROC 曲线进行预测，曲线下面积（AUC）为 0.870，具有较高预测价值。

结论 小儿肝移植术前血清 miRNA-146-5p 水平非 POD 组较 POD 组升高，POD 的发生和 miRNA-146a-5p 表达水平呈负相关；可作为小儿肝移植术的潜在分子生物标志物，可能为该病的预防和治疗提供新的见解。

PU-1103

肺移植麻醉管理现状：一项中国的单中心调查研究

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目的 尽管越来越多的证据表明，肺移植术中的麻醉管理可能会影响手术结局，但当前缺乏严格的循证学证据，通常是基于各医疗机构的经验和偏好。无锡市人民医院作为中国最大的肺移植中心，承担着在全国范围内培训肺移植麻醉医生的责任。本研究旨在评估目前中国肺移植术中麻醉管理的现状。

方法 本研究对中国 22 个不同省份 52 家医院共 70 名在无锡市人民医院培训过肺移植麻醉的麻醉医生进行了匿名调查。调查内容包括其所在机构中普遍的肺移植术中麻醉管理实践。根据临床经验和专业技术职称，参与者被分为中级组和高级组，并比较了这两组的回复内容。

结果 依托咪酯（95.7%）是肺移植麻醉最常用的诱导药物，其次是丙泊酚（58.6%）。舒芬太尼（100%）是主要的术中镇痛药物，其次是瑞芬太尼（71.4%）和羟考酮（24.3%）。顺式阿曲库铵（82.9%）和罗库溴铵（74.3%）是最常用的肌松药物。如果使用吸入麻醉，最常用的是七氟烷（80.0%）。多数人认为，肺移植期间动脉氧饱和度（SpO2）达到 85-90%是可接受的最低水平（52.9%），而血红蛋白浓度（Hb）能接受的下限为 80-90g/L（52.9%）。如果需要循环支持，体外膜肺（ECMO）是首选模式（98.6%）。晶体液是液体治疗的首选方法（100%），其中醋酸钠林格氏液更受青睐（71.4%）。如果需要用到胶体液，白蛋白是首选（98.6%），其次是血浆（82.9%）和人工胶体（35.7%）。多数麻醉医生认为术中应该维持-500~+500ml 的出入量平衡（64.3%）。活化凝血时间（ACT）（74.3%）和血栓体力图（57.1%）是凝血功能监测的主要手段。压力控制模式为术中通气管理的首选方法（95.7%）。去甲肾上腺素是首选的血管活性药物（95.7%），其次是去氧肾上腺素（67.1%）、肾上腺素（62.9%）等。术中肺动脉高压主要通过静脉使用米力农（64.3%）和前列腺素（60.0%）来处理。血流动力学监测技术主要包括 Swan-Ganz 导管（92.9%）、血流动力学监护仪（80.0%）和经食道超声心动图（TEE）（67.1%）。术后镇痛主要依靠患者自控静脉镇痛（PCIA）（91.4%），辅以区域神经阻滞（81.4%）。

结论 关于肺移植麻醉的管理，中国麻醉医生的偏好与欧美同行在某些方面存在一定差异。比如中国医生在诱导药物中更多选择依托咪酯，而欧美更多选择丙泊酚；中国主要静脉使用药物来处理术中肺动脉高压，而欧美主要选择术中吸入一氧化氮。我们需要进一步的研究来验证不同药物和方法

对肺移植术后结局的影响，为优化肺移植麻醉的管理提供中国的循证学依据。

PU-1104

Abdominal wall blocks combined with patient-controlled intravenous analgesia versus epidural analgesia for kidney transplantation: A randomized, non-inferiority clinical trial.

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Abstract
Background Epidural analgesia improves early postoperative recovery following renal transplantation. Abdominal wall blocks (transversus abdominis plane[TAP] and rectus sheath[RS]) combined with patient-controlled intravenous analgesia (PCIA) have also been shown to enhance postoperative recovery. However, it remains unclear whether these techniques are as effective as epidural analgesia.
Methods In this single-centre, randomised, non-inferiority clinical trial, participants undergoing renal transplantation were randomly assigned to receive either a TAP+RS block (combined with PCIA) or epidural analgesia alone (EP group). The primary outcome was Quality of Recovery-15 (QoR-15) scale scores on postoperative day 1 (POD1). Secondary outcomes included haemodynamics, postoperative renal function indices, time to interventions and postoperative pain scores.
Results Ninety participants were included in the analysis. The TAP+RS group demonstrated non-inferiority to the EP group in terms of total QoR-15 score on POD1 (90.6 [5.0] vs. 92.4 [6.4]; mean difference, −1.8; 95% CI, −4.2 to 0.6; P < 0.001 for non-inferiority). QoR-15 scores on POD3 and POD7 and postoperative renal function indices were comparable between the groups, with no group–time interactions. The EP group exhibited significantly lower mean arterial pressure, intraoperative opioid consumption and time to eye opening and extubation than the TAP+RS group (all P < 0.05). However, intervention time was longer in the EP group (P<0.001).
Conclusions The TAP+RS block combined with PCIA demonstrated non-inferiority to epidural analgesia for postoperative QoR following renal transplantation. This approach offers a potentially more convenient and favourable alternative to epidural analgesia, helping maintain haemodynamic stability, postoperative renal function and a low complication profile.

PU-1105

儿童肝移植术后急性肾损伤对慢性肾功能不全和死亡的影响

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目的 分析儿童肝移植手术后急性肾损伤（Acute Kidney Injury, AKI）对术后一年慢性肾脏疾病（Chronic Kidney Disease, CKD）的发生和死亡率的影响。
方法 回顾性分析 2017 年 1 月至 2021 年 12 月于广西医科大学第一附属行肝移植手术的 132 例患儿的临床资料，年龄 3 个月～12 岁，并对其随访一年。根据改善全球肾脏病预后组织（KDIGO）的 AKI 和 CKD 诊断与分期标准对患儿进行术后 AKI 分期和一年 CKD 评估。主要结局事件为患儿术

后一年 CKD 的发生，次要结局为术后一年的全因死亡率。

结果 132 例患儿有 13 例在术后一年内死亡，在 119 例存活患儿中，术后第 1、2、3、4、5、7 天的 AKI 发生率分别为 24.4%、16.8%、22.7%、19.3%、10.1%、16.8%，7 天内发生 AKI 共有 54 例（45.4%），其中轻度占 40.4%，中度占 37.4%，重度占 22.2%；近一半患儿（44.4%）的 AKI 只持续 1 天，持续 2、3、4、5、6 天的发生率分别为 18.5%、9.3%、11.1%、11.1%、5.6%。AKI 患儿中有 25 例（46.3%）在术后一年内发展为 CKD，而 65 例无 AKI 的患儿中亦有 13 例（10.9%）进展成为 CKD；CKD 患儿中在术后第 1 个月开始出现肾小球滤过率（estimated Glomerular Filtration Rate, eGFR）下降的发生率高达 60.5%，在术后第 2、3、4、5、6 个月新出现 eGFR 下降的发生率分别为 15.8%、5.3%、13.2%、2.6%、2.6%，术后第 7、8、9、10 个月均没有患儿被诊断为 CKD。进一步行单因素分析，结果显示肝移植患儿术前肝功能 Child-pugh C 级、术后在 ICU 停留时间、中度和重度 AKI 可能是影响患儿术后一年 CKD 的因素。经调整患儿术前状态（ICU、住院时间≥5 天、住院时间＜5 天）、腹水情况、ICU 停留时间、肝功能 Child-pugh 分级、术中冷缺血和热缺血时间、术中使用人血白蛋白量以及术后免疫抑制剂包含他克莫司共 8 个因素后，多因素 Logistic 回归分析显示中度和重度 AKI 是患儿术后一年 CKD 的独立危险因素（中度 AKI，OR = 3.8，95% CI = 1.2～12.3；重度 AKI，OR = 7.4，95% CI = 1.4～38.3）。儿童肝移植术后一年的总死亡率为 9.8%，13 例患儿的死亡原因中有 4 例为移植肝失功能（术后第 9、13、16 和 67 天），1 例出现了急性肾功能衰竭（术后第 8 天），5 例为多器官功能障碍（术后第 18、88、194、329 和 355 天），1 例为低血容量性休克（术后第 133 天），1 例为急性呼吸窘迫综合征（术后第 83 天），1 例为败血症（术后第 161 天）。术后无 AKI 患儿的一年死亡率为 9.2%，重度 AKI 患儿一年死亡率（41.6%）明显高于无 AKI 患儿（HR = 5.3，95% CI = 1.5～18.4），轻度和中度 AKI 患儿的死亡率与无 AKI 患儿比较，差异无统计学意义（P＞0.05）。

结论 儿童肝移植手术后 AKI 的发生较常见，中度和重度 AKI 均是术后一年 CKD 的独立危险因素，重度 AKI 患儿的术后一年死亡率明显增加。

PU-1106

肝移植患者术后发生急性肾损伤的危险因素分析及预测模型建立

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目的 通过收集和分析收据，找到影响肝移植手术术后发生急性肾损伤的危险因素，并建立预测模型。

方法 回顾性分析 2015 年 1 月至 2023 年 12 月于大连医科大学附属第二医院首次行原位肝移植手术的 227 例患者的临床资料，基于改善全球预后组织（KDIGO）对术后急性肾损伤（AKI）的定义，将患者术后 7 天内是否发生 AKI 作为分组标准，分为 AKI 组和非 AKI 组。收集患者的术前、术中及术后资料。对采集到的数据进行处理：若单个变量的缺失比例≥30%，则剔除该变量，其余缺失值采用链式方程多重插补。正态分布计量资料以均数±标准差（x±s）表示，非正态分布计量资料以中位数（M）和四分位数间距（IQR）表示，组间比较采用 Mann-Whitney U 检验。计数资料以例（%）表示，组间比较采用 χ2 检验。采用单因素分析及二元 Logistic 回归分析肝移植术后 AKI 的危险因素并建立 logistic 预测模型，绘制受试者工作特征（ROC）曲线并计算曲线下面积（AUC），并利用 Hosmer-Lemeshow 检验评价模型的预测能力。最后通过限制性立方样条分析找到独立危险因素与 AKI 的关系。

结果 患者年龄（OR=1.06，95%CI 1.02-1.11，P=0.004）、术前纤维蛋白原含量（OR=0.55，95%CI 0.37-0.82，P=0.003）、术中尿量（OR=0.65，95%CI 0.52-0.82，P<0.001）以及术中乳酸升高值（OR=1.49，95%CI 1.28-1.73，P<0.001）为接受原位肝移植手术患者术后发生急性肾损伤的独立危险因素。基于独立危险因素建立的 logistic 预测模型，AUC 为 0.869，根据 youden 准则，模型的预测阈值为 0.294，特异性为 0.794，敏感性为 0.821，预测准确率为 80%，Hosmer-

Lemeshow 检验结果 P>0.05，表明模型的拟合效果良好，能够有效预测术后急性肾损伤的发生。限制性立方样条分析结果显示，患者年龄在 57 岁、术前纤维蛋白原含量 2.12 g/L、术中尿量 2.34 ml/kg/h 和 6.09 ml/kg/h，以及术中乳酸升高值 1.7 mmol/L 为 OR 值转变的关键点。

结论 患者年龄、术前纤维蛋白原含量、术中尿量以及术中乳酸升高值是肝移植患者发生急性肾损伤的独立风险因素，可以作为术后急性肾损伤的预测因子，他们与术后急性肾损伤存在非线性关系。以独立危险因素建立的 Logistic 预测模型具有良好的预测能力，可用于临床进行指导工作。

PU-1107

右旋氯胺酮对幼鼠肝缺血再灌注相关心肌损伤保护作用初步探讨

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目的 初步探讨右旋氯胺酮对幼鼠肝缺血再灌注相关心肌损伤保护作用机制

方法 清洁级 SD 雄性幼鼠 9 只，周龄 3 周，体重 50～80g，随机数字表法将幼鼠分为 3 组：假手术组（Sham 组）、肝缺血再灌注组（I/R 组）和右旋氯胺酮组（Esk 组），每组 3 只。Sham 组仅行开腹、游离腹腔脏器、暴露第一肝门以及关腹等操作，不进行血管夹闭。I/R 组和 Esk 组使用清洁血管夹夹闭门静脉、肝左动脉的共支，使肝脏缺血面积达到 70%。Esk 组阻断门静脉前经尾静脉注射右旋氯胺酮 10 mg/kg 。于再灌注后 6h 后，取血清和心肌组织。HE 染色观察心肌组织病理学改变情况；ELISA 法检测血清炎性因子含量（IL-1β、TNF-α、IL-6）及心肌损伤标记物（cTnI，CK-MB）浓度；Western blot 法测定心肌组织内细胞焦亡标志蛋白（ASC、Caspase-1 和 NLRP3）表达水平。

结果 与假手术组（Sham 组）相比，肝缺血再灌注组（I/R 组）幼鼠在再灌注 6h 后血清 IL-1β、TNF-α 和 IL-6 的浓度均升高（P < 0.05）；与 I/R 组相比，右旋氯胺酮组（Esk 组）血清 IL-1β、TNF-α 和 IL-6 的浓度均下降（P <0.05）。与 Sham 组相比，I/R 组血清 CK-MB、cTnI 浓度水平升高（P < 0.05），心肌病理损伤加重；与 I/R 组比较，Esk 组血清 CK-MB 和 cTnI 浓度水平下降（P <0.05），心肌病理损伤减轻。与 Sham 组比较，I/R 组心肌组织焦亡标志蛋白 ASC、Caspase-1 和 NLRP3 表达均上调（P < 0.05）；与 I/R 组比较，Esk 组心肌组织 ASC、Caspase-1 和 NLRP3 表达均下调（P < 0.05）。

结论 右旋氯胺酮可减轻幼鼠肝缺血再灌注相关心肌损伤，其机制可能与抑制心肌细胞焦亡及炎性因子释放有关。

PU-1108

肝移植术后急性肾损伤及慢性肾病的危险因素：一项随访 1 年的回顾性研究

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目的 肝移植术后急性肾损伤和慢性肾病的发生率较高。本研究的目的为探讨肝移植术后急性肾损伤（Acute Kidney Injury, AKI）以及术后 1 年慢性肾病（Chronic Kidney Disease, CKD）的危险因素。

方法 回顾分析青岛大学附属医院 2018 年 1 月 1 日到 2022 年 12 月 31 日成人肝移植手术的病历资料。排除年龄≤18 岁，术前、术后缺少肌酐数据的患者。AKI 定义为术后 7 天内肌酐水平升高大于基础值的 50%。CKD 定义为至少有两个单独间隔至少 90 天的估计肾小球滤过率(eGFR) ≤ 60ml-

1min-11.73m-2。Cox 比例风险模型用于分析肝脏移植手术后 CKD 的危险因素。Logistics 回归分析肝移植术后 AKI 的危险因素。
结果 在此期间本院共 678 例肝移植手术患者，排除 60 例未成年，10 例术前肌酐数据不全，4 例术后肌酐数据不全，共 604 例患者纳入本研究。平均年龄 51.09±9.51 岁，男性 476 例（78.8%），经典原位肝移植 520 例（86.1%），背驮式 33 例（5.5%），肝肾移植 5 例（0.83%）。AKI 共 288 例，发生率为 47.7%，30 天内总死亡率为 4.97%。Logistics 回归显示，BMI（OR 1.182, 95% CI 1.014-1.377, P=0.033），术前肌酐（OR 0.988, 95% CI 0.982-0.994, P＜0.001），术中最大乳酸水平（OR 1.172, 95% CI 1.060-1.297, P=0.002）是术后 AKI 的危险因素。排除 286 例术后 12 月内缺失两次间隔 90 天以上的肌酐数据患者。共 318 例患者纳入 Cox 比例风险模型，CKD 的发生率为 48.1%。结果显示术前糖尿病（HR 1.796, 95% CI 1.075-3.001, P=0.025），术前肌酐（HR 1.003, 95% CI 1.001-1.005 P=0.001）是肝移植术后 CKD 的危险因素。
结论 肝移植患者术后 AKI 和 CKD 发生率较高。BMI 高、术前肌酐水平高、术中最大乳酸水平是术后 AKI 的危险因素。术前糖尿病、术前肌酐水平高是肝移植术后 CKD 的危险因素。

PU-1109

肺移植手术的麻醉管理——基于两例复杂百草枯中毒肺移植的分析与思考

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目的 本论文旨在探讨肺移植手术的麻醉管理策略，并结合我中心近期的百草枯中毒后进行肺移植手术的麻醉管理案例，对两例特殊病例围术期的特殊情况进行剖丝剥茧地复盘分析，提出对现有麻醉管理方法的优化建议，提高手术安全性和成功率。通过整理和分享这些特殊的肺移植麻醉案例，我们希望能够为麻醉医师及相关医疗人员提供宝贵的学习和培训资源，帮助他们在遇到类似挑战时能够做出更好的临床决策。
方法 回顾性分析我院近期完成的两例复杂肺移植病例的患者资料。两例肺移植病例均为百草枯中毒导致的严重肺纤维化，从而接受肺移植手术，病情复杂，在围术期均出现了严重的并发症，生命体征剧烈变化。我们详细记录 ECMO 方式，麻醉前评估、麻醉诱导、维持及术后镇痛的策略，围术期生命体征和检验结果。通过复盘总结两例患者的围术期变化、麻醉管理过程和术后恢复情况，总结经验教训。
结果 两例患者均顺利度过术中阶段，但在术毕以及围术期均出现严重的血流动力学波动，甚至多次手术，但在精心的麻醉管理下均顺利完成手术，术后恢复良好，康复出院。第一例患者为 17 岁男性，因服用百草枯 1 月严重肺纤维化，VV-ECMO 辅助下行双肺肺移植术。术毕入 ICU 后，凝血功能较差，引流量很大，血压波动较大。在多学科会诊后，通过调整 ECMO 策略、改善凝血功能等，病情得以控制，顺利康复出院；第二例患者为 26 岁女性，因服用百草枯 27 天严重肺纤维化，VV-ECMO 辅助下行双肺肺移植术。术毕不明原因出现持续低血压、长时间反复室颤、瞳孔散大，多学科会诊后，经积极治疗后奇迹般康复出院。
结论 肺移植手术的麻醉管理是一个复杂且具有挑战性的过程，这类患者由于原有的病理条件以及术中可能出现的严重并发症，对麻醉团队提出了更高的要求。我们认为加强术中血流动力学监测、优化围术期管理流程、围术期多学科协作机制以及持续教育和培训是提高手术成功率的关键。

PU-1110

肝移植患者移植后糖尿病与术后肾功能及预后的关系研究——一项回顾性观察结合 Meta 分析研究

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目的 移植后糖尿病(Post-transplantation Diabetes Mellitus, PTDM)的发生是否会影响肝移植患者的肾功能和生存仍存在争议。因此，本研究采用回顾性分析结合 Meta 分析的研究方法，旨在探讨肝移植患者移植后糖尿病是否增加术后急性肾损伤（Acute Kidney Injury, AKI）及慢性肾功能不全（Chronic Kidney Dysfunction，CKD）的发生率，是否降低肝移植患者短期及长期的生存率。
方法 本研究回顾性收集了 2015 年 1 月至 2021 年 1 月中山大学附属第三医院收治的 476 例行同种异体肝移植患者的临床资料。根据肝移植术后 1 年内是否发生 PTDM 将患者分为两组，N-PTDM 组 366 例，PTDM 组 110 例。分析比较两组术前、术后 1-7 天、术后 2 周、术后 3 周、术后 1 月的肾功能及血糖等变化趋势，分析 PTDM 与术后 1 月内 AKI 发生的相关性，探索 PTDM 对肝移植患者 3 个月、1 年生存率等预后的影响。此外，检索 PubMed、Embase、Cochrane Library 数据库，检索时间从建库至 2024 年 01 月，收集有关肝移植与 PTDM 的研究进行荟萃分析。采用比值比(OR)作为效应量，计算 95%可信区间(CI)。$P < 0.05$ 代表差异有统计学意义。
结果 回顾性分析结果显示肝移植术后 1 年内 PTDM 的发生率为 23.1%。PTDM 组与 N-PTDM 组两组间 sCr 水平变化趋势差异有统计学意义($P < 0.01$)，PTDM 组 sCr 水平在术后 2 天内明显高于 N-PTDM 组($P < 0.05$)。PTDM 组患者术前及术后 1 个月内各时间点血糖水平均明显高于 N-PTDM 组($P < 0.05$)。血糖水平与患者术后 1、2 周的 sCr 水平相关($P < 0.05$)。PTDM 与术后 1 个月内 AKI 发生无相关性($P > 0.05$)，且对术后 3 个月和 1 年的生存率无明显影响($P > 0.05$)。
我们纳入 29 项观察性研究进行 Meta 分析 (PTDM 组 9070 例，N-PTDM 组 59438 例)，结果显示，PTDM 增加了肝移植患者术后肾功能不全的风险[OR=1.37, 95%CI(1.25,1.50), Z=6.86, P<0.001]，尤其是慢性肾脏病(CKD)的风险[OR=1.75, 95%CI(1.42, 2.16), Z=5.23, P<0.001]，且增加了患者术后 2 年和 5 年的死亡率。
结论 虽然 PTDM 并不增加术后 1 月内 AKI 的发生率，不影响肝移植患者 3 个月、1 年等短期生存率，但 PTDM 增加了肝移植患者术后后期肾功能不全尤其是 CKD 发生的风险，影响肝移植患者的长期生存率；因此术后早期 sCr 及 Glu 同时增高的患者需尽早加强血糖监控且及时给予早期的肾功能保护，降低该类患者后期发生肾功能不全及影响长期预后的风险。

PU-1111

丙泊酚对小鼠原位移植胶质瘤生长的影响及 GAS5 在其中的作用

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目的 丙泊酚常用于胶质瘤切除手术的麻醉诱导、麻醉维持全程，是胶质瘤患者围手术期用药的重要组成部分，因此丙泊酚对在体胶质瘤的作用亟须明确，以避免临床药物选择不当对胶质瘤患者预后产生潜在不利影响。本研究拟评价丙泊酚对小鼠原位移植胶质瘤生长的影响以及 GAS5（growth arrest-specific transcription factor 5, GAS5）在其中的作用，为临床用药决策提供理论依据。
方法 使用慢病毒 GAS5-shRNA 或阴性 shRNA 干扰载体转染小鼠胶质瘤细胞系 GL261 细胞，敲低 GL261 细胞内 GAS5 的表达水平。在小鼠右侧脑室种植不同 GAS5 表达水平的 GL261 细胞，建立小鼠胶质瘤原位移植模型。按照种植细胞和药物处理的不同将小鼠分为 5 组（n=18）：C 组为正常

GL261 细胞小鼠脑室种植，不使用药物干预；L 组为正常 GL261 细胞小鼠脑室种植成瘤后，使用 20%脂肪乳进行干预；P 组为正常 GL261 细胞小鼠移植成瘤后进行丙泊酚药物干预；GP 组和 NP 组分别使用经 GAS5-shRNA 和阴性 shRNA 转染的 GL261 细胞小鼠脑室移植，然后进行丙泊酚药物干预。GL261 细胞注射 10 天后，使用丙泊酚注射液对 P 组、GP 组和 NP 组小鼠腹腔注射给药，给药剂量为 35 mg/kg，给药时间为每三天 1 次，C 组注射等量生理盐水，L 组注射等量 20%脂肪乳。观察并记录小鼠生存情况，进行生存分析。观察期后取出小鼠脑组织制作石蜡切片，使用 TUNEL 法检测瘤组织的凋亡情况，使用荧光免疫法检测瘤组织内 Ki67、c-Myc、谷胱甘肽-S-转移酶 Mu3（glutathione-S-transferase Mu 3, GSTM3）蛋白表达水平，并使用 qRT-PCR 测定移植瘤细胞内 GAS5 的表达。

结果 与 C 组相比，L 组各项实验结果无显著差异，P 组和 NP 组生存率升高，中位生存时间延长（P＜0.05），凋亡指数升高（P＜0.05），瘤组织内 GAS5 表达水平升高（P＜0.05），Ki67、c-Myc、GSTM3 表达减少（P＜0.05）。与 P 组相比，GP 组生存率降低，中位生存时间缩短（P＜0.05），凋亡指数减低（P＜0.05），瘤组织内 GAS5 表达水平降低（P＜0.05），Ki67、c-Myc、GSTM3 表达增多（P＜0.05）。

结论 丙泊酚能够抑制小鼠原位移植胶质瘤的生长，GAS5 参与了这一过程。丙泊酚可安全用于胶质瘤患者手术麻醉过程。

PU-1112

瑞马唑仑联合瑞芬太尼或右美托咪定在颈后路手术患者慢诱导气管插管中的效果

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目的 观察并探讨瑞马唑仑联合瑞芬太尼或右美托咪定对颈后路手术患者慢诱导气管插管期间的患者应激反应及舒适度等效果比较。

方法 将择期行遗忘镇静镇痛慢诱导气管插管且符合纳排标准的颈椎后入路手术的患者 64 例，随机分为两组：瑞马唑仑联合瑞芬太尼慢诱导气管插管组（RR 组）和瑞马唑仑联合右美托咪定气管插管组（RD 组）。两组患者入室后均静脉给予瑞马唑仑 0.1mg/kg 及口咽气道表面麻醉。RR 组给予瑞芬太尼 0.75μg/kg，负荷剂量给药 1min，后持续泵注 0.075μg/kg/min；RD 组给予右美托咪定 0.5μg/kg，负荷剂量给药 10min，后持续泵注 0.5μg/kg/h，当患者 BIS 值至 70~80、Ramsay 评分为 2-4 分时，进行可视喉镜气管插管操作。两组药物负荷剂量给药结束后，每隔 1min，判断患者 Ramsay 评分，决定是否追加瑞马唑仑，2.5mg/次，每 15min 段内追加不超过 5 次。记录两组患者入手术室后 5 min 给药前时刻（T0），插管前时刻（T1），气管导管进入气管时刻（T2），气管插管完成 1min 时刻（T3），气管插管完成 3min 时刻（T4），气管插管完成 5min 时刻（T5）时患者的 HR、MAP、SPO2；收集记录两组的一次插管成功率、插管期间呛咳反应评分、耐管评分、口咽损伤评分、不良事件；随访记录两组患者术后 2 小时在麻醉恢复室（PACU）内出现的口腔不适，术后 1d 对麻醉诱导的回忆评分及满意度。

结果 1.两组患者的一般资料差异无统计学意义。2.经重复测量方差分析显示两组 MAP、HR 和 SpO2 时间差异均有显著性（均 P=0.000），两组 MAP、HR 在给予负荷量药物后均下降，插管后升高；两组 MAP、HR 组间与时间的交互作用差异均有显著性（P＜0.05）；MAP 不同时间点组间比较，T2 时 RD 组 MAP 高于 RR 组（P＜0.05），其余时间点两组间比较无显著性差异（P＞0.05）；HR 不同时间点组间比较，T1 时 RD 组 HR 低于 RR 组（P＜0.05），其余时间点两组间比较无显著性差异（P＞0.05）；SpO2 不同时间点组间比较均无显著差异（P＞0.05）；3. RR 组一次插管成功率明显高于 RD 组（P＜0.05）；两组在泵注负荷剂量结束后瑞马唑仑额外给药次数，插管过程中插管损伤情况、不良事件之间无明显差异；4. 两组患者插管期间的呛咳评分有显著性差

异（P＜0.01），RR 组的呛咳评分明显低于 RD 组。两组患者插管期间耐管评分、患者满意度、术后 2 小时 PACU 内患者咽喉不适以及术后回忆评分之间无明显差异（P＞0.05）。

结论

1. 瑞马唑仑联合瑞芬太尼慢诱导气管插管在降低插管应激反应，减轻插管呛咳方面的效果更好，且一次插管成功率更高。

2. 瑞马唑仑联合右美托咪定慢诱导气管插管在患者的插管耐受性、满意度等方面也可达到较好的麻醉诱导效果，但对于术前合并心率较低的病人需谨慎选择。

PU-1113

不同剂量瑞马唑仑对缺血性脑血管病介入治疗患者术后苏醒和神经认知功能恢复的影响

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目的 探讨不同剂量瑞马唑仑与丙泊酚联合应用于全身麻醉诱导和维持对缺血性脑血管病介入治疗患者术后苏醒和神经认知功能恢复的影响。

方法 选择择期在全身麻醉下行颅内动脉狭窄血管内介入治疗患者 105 例，采用简单随机化方法分为三组，丙泊酚组（P 组）、瑞马唑仑 0.1 mg·kg-1·h-1（R1 组）和瑞马唑仑 0.2 mg·kg-1·h-1（R2 组），每组 35 例。麻醉诱导：以改良警觉 / 镇静（modified observer's assessment of alertness / sedation scale，MOAA / S）评分 0 分和 BIS 40~60 为镇静目标，P 组静脉靶控输注丙泊酚，R1 和 R2 组静脉注射瑞马唑仑 0.06 mg/kg 后分别按 0.1 mg·kg-1·h-1 和 0.2 mg·kg-1·h-1 静脉泵注瑞马唑仑联合静脉靶控输注丙泊酚；麻醉维持：以 BIS 40~60 为镇静目标，P 组静脉靶控输注丙泊酚，R1 组和 R2 组分别按 0.1 mg·kg-1·h-1 和 0.2 mg·kg-1·h-1 静脉泵注瑞马唑仑联合静脉靶控输注丙泊酚。用 MOAA / S 评分评估患者苏醒情况，记录患者苏醒时间、拔管时间、麻醉复苏室（PACU）停留时间和术后住院时间。术前 1d、术后 1d、术后 3d 和术后 7d 采用 3D-CAM 量表和 CAM-CR 量表评估谵妄情况，术前 1d、术后 1d、术后 3d、术后 7d、术后 30 天、术后 90 天和术后 180 天采用 MMSE 量表评估认知功能，采用标准差法计算围术期神经认知功能障碍（PND）发生率，并采用改良的 Rankin 残疾量表在术后 3 个月评估神经功能结局。记录术中低血压、心动过缓、术后恶心呕吐、术中知晓、苏醒延迟和围术期脑卒中等不良反应和不良事件的发生情况。

结果 三组苏醒时间分别为 33.00 min(27.00, 57.50)、31.00 min (27.00, 54.00)和 23.00 min (14.50, 33.00)，拔管时间分别为 48.00 min (35.00, 63.00)、38.00 min (30.00, 59.00)和 30.50 min (24.50, 49.50)，R2 组苏醒时间和拔管时间较 P 组和 R1 组缩短（P =0.0015 和 P =0.0183），术后第 1 天 R1 组 CAM-CR 评分较 P 组和 R2 组降低（P＜0.05），术后第 7 天 R1 组 CAM-CR 评分较 P 组降低（P＜0.05），三组患者术后谵妄发生率差异无统计学意义（P＞0.05），三组患者术前 1d、术后第 1 天、术后第 3 天、术后第 7 天、术后 30 天、术后 90 天和术后 180 天 PND 发生率和 MMSE 评分比较无明显差异（P>0.05），三组患者术后3个月神经功能结局比较无明显差异（P>0.05）。R1 组术中低血压发生率较 P 组和 R2 组明显降低(P＜0. 05)，三组患者术中心动过缓、术后恶心呕吐、术中知晓、苏醒延迟和围术期脑卒中等不良反应和不良事件发生率差异无统计学意义（P＞0.05）。

结论 0.2 mg·kg-1·h-1 瑞马唑仑联合丙泊酚麻醉用于缺血性脑血管病介入治疗可缩短患者麻醉苏醒和拔管时间，两种剂量瑞马唑仑均不影响患者术后神经认知功能恢复，但应警惕剂量相关性低血压。

PU-1114

脑膜瘤手术后脑出血麻醉一例

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目的 患者，女，60 岁，身高 152cm，体重 67kg，因“头晕 4 年，加重 2 月”以“颅内占位性病变”收入院。入院后完善相关检查，诊断为右侧桥小脑角区脑膜瘤，剖宫产术后。患者既往合并高血压、冠心病。入院后于全麻下行大脑病损切除术，术后返回神外监护室。术后第 1 天患者神志清楚、言语流畅、饮水呛咳，行头颅 CT 示右侧小脑蛛网膜下腔出血，脑室受压，予脱水降颅压治疗，并密切监护生命体征，术后第 2 天患者意识较前下降，GCS 评分 8 分，头颅 CT 示小脑水肿，脑积水，急诊行右侧脑室外穿刺引流，随后患者意识障碍进展加重，为浅昏迷状态，考虑脑水肿进行性加重，脑疝趋势，急诊行右侧小脑病损切除+去骨瓣减压术。
方法 患者入室时为昏迷状态，病情危重，血气分析提示患者乳酸升高，提示患者可能处于灌注不足状态。术前化验检查示丙氨酸氨基转移酶 65IU/L，天冬氨酸氨基转移酶 43IU/L，应注意维护患者肝功能，避免使用对肝功能有损害的药物。患者既往合并高血压及冠心病，术中应尽量维持患者血压在基线水平的±20%，如术中血压波动较大，易发生再发脑出血或心脑梗死，导致患者病情恶化，应保证脏器灌注，防止发生心脑血管意外，注意观察尿量，定期测血气监测患者电解质及乳酸水平，监测凝血功能，根据结果及时调整用药。
结果 患者带气管插管入室，无创袖带血压 135/78mmHg，脉氧饱和度 97%，有自主呼吸，呼吸频率 20 次/分，心率 82 次/分。血气示血红蛋白 12.6g/L，乳酸 2.33mmol/L。患者入室后，立刻将气管插管连接至呼吸机吸氧，建立外周静脉输液通路，监测有创动脉血压、心率、脉氧饱和度、BIS、PPV。诱导前予甲强龙 80mg 抗应激、抗炎、防过敏以及乌司他丁 60 万单位抗炎，随后在静脉予依托咪酯 4mg、舒芬太尼 20ug、罗库溴铵 60mg 进行全身麻醉诱导后，改呼吸机模式为机控呼吸模式。麻醉维持使用丙泊酚 2mg/kg/h、瑞芬太尼 0.3ug/kg/min。术中持续泵注去甲肾上腺素 0.05-0.9ug/kg/min，去氧肾上腺素 0.02-0.08ug/kg/min 维持患者循环稳定。术中间断监测血气，并根据血气分析结果调节电解质及酸碱平衡。该患者尿量较多，由于术前使用甘露醇脱水，因此术中处于液体负平衡状态，循环波动较大，术中采用 PPV 导向的液体治疗，有创动脉血压维持在 90-140/50-70mmHg，心率维持 80-130 次/分，术中自体血回收 325ml，出血 600ml，尿量 4400ml，输液 4500ml，输悬浮红细胞 2U，新鲜冰冻血浆 400ml。术毕查血气乳酸 2.56mmol/L，电解质水平正常。术毕带气管插管回监护室。
结论 术后 3 月，患者神志清，精神可，无特殊不适，进食可，准予出院。

PU-1115

丙泊酚与环泊酚全身麻醉对神经外科手术中视觉诱发电位影响的研究

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目的 神经外科手术后并发症较多，术后发生视觉功能损害是其严重的并发症之一，直接影响患者的生命质量。特别是垂体腺瘤、颅咽管瘤、鞍结节脑膜瘤及其他位于视交叉附近的肿瘤切除术。患者在全身麻醉下的手术过程中是无意识的，因此视觉诱发电位(VEP)是患者在全身麻醉状态下对其进行视觉功能评估的重要手段，通过观察 VEP 的波幅变化，可影响术者的手术决策，从而避免或减少术后视觉功能损伤的发生。VEP 幅度的下降及潜伏期的延长可预测患者术后视力下降及视野缺陷发生的概率。然而，由于以前对其对环泊酚的敏感性的看法是有限的。本研究是为了比较环泊酚

与丙泊酚全身麻醉对神经外科手术中视觉诱发电位监测的影响。
方法 该方案设计为一项试点、单中心、前瞻性、随机研究。选择 2023 年 9 月至 2024 年 2 月在南昌大学第一附属医院择期行神经外科手术患者 24 例。受试者被随机分配接受丙泊酚为基础(A 组）或环泊酚为基础(B 组）的全身麻醉。对于麻醉诱导，静脉输注丙泊酚（1.5-2.5mg/kg）或环泊酚（0.4-0.6mg/kg）约 1 分钟，通过持续输注丙泊酚（4-6 mg/kg/h）或环泊酚(0.8mg/kg/h)，术中调节麻醉药物浓度，旨在将脑电双频指数（BIS）维持在 40-60 范围内。诱导和插管后，皮下放置电极以收集 VEP 记录。波形稳定后每 30 分钟记录一次 VEP 波形，并在整个手术过程中由神经生理学家进行评估。主要观察指标是麻醉诱导后 120 分种 VEP 的 P75-N100 振幅（VEP 振幅）及 P100 潜伏期（VEP 潜伏期）。次要结局包括人口统计学特征、血流动力学和不良事件的发生。
结果 共评估 20 名受试者，成功采集 VEP 波形。与丙泊酚组麻醉相比，环泊酚组 VEP 波形中Ｎ75-P100 峰值差和 P100 潜伏期并无统计学意义。两组人口统计学特征、血流动力学和不良事件的发生无统计学意义。
结论 我们的数据表明，丙泊酚组和环泊酚组全身麻醉对 VEP 振幅和潜伏期无明显影响；两组术中生命体征及不良反应无明显差异，因此，对于影响视觉通路的神经外科手术中两种麻醉都可作为 VEP 监测的麻醉方案。

PU-1116

颅底肿瘤切除术的唤醒麻醉管理 1 例

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目的 颅底肿瘤切除的唤醒麻醉管理报道较少，做探索性研究
方法 术前给予患者静脉注射盐酸戊乙奎醚 0.5ｍｇ、地塞米松５ｍｇ。患者入手术室后常规心电监护，ＢＰ140／85ｍｍＨｇ，ＨＲ80 次／分，ＳｐＯ２98％，吸氧，并再次沟通唤醒麻醉配合要点。患者鼓腮后或吹气可诱发右下颌疼痛，立即泵入瑞芬太尼，血浆靶控浓度达到 2.0ng/ml 时右下颌疼痛不能诱发。诱导用药：丙泊酚血浆靶控浓度 3μg/ml，瑞芬太尼血浆靶控浓度 3ng/ml，顺阿曲库铵 10mg 静推。诱导后插入双腔喉罩，机控呼吸。超声引导下行右颈内静脉穿刺及桡动脉穿刺置管测压。0.5%罗哌卡因共 22ml 行术侧头皮神经阻滞及头钉位置局部浸润。摆好体位，上头架，消毒铺巾，0.5%罗哌卡因 8ml 切口位置浸润麻醉后手术开始。术中维持用药：丙泊酚血浆靶控浓度 3μg/ml，瑞芬太尼血浆靶控浓度 3ng/ml，顺阿曲库铵 1mg/h 静脉泵入。卸下颅骨后硬膜表面贴覆棉片并喷洒 2%利多卡因 10ml，15min 后剪开硬膜继续手术。术中可见肿瘤位于右侧桥小脑角区及桥前池并侵及对侧桥小脑角区，肿瘤组织与周围血管神经粘连紧密。手术顺利，生命体征平稳，电生理监测下肿瘤切除后，可见三叉神经受压扭曲变形，正常解剖结构消失。止血期间停止肌松药泵入。止血完成后瘤腔内填充适量止血海绵，停止丙泊酚泵入，静脉滴注昂丹司琼 8mg，并调整瑞芬太尼血浆靶控浓度为 1ng/ml，芬太尼 0.1mg 稀释备用并清理呼吸道。丙泊酚停止泵入后约 15min 自主呼吸恢复正常，停止瑞芬太尼泵入后拔出喉罩。未刺激及呼唤患者，继续等待约 10min 后患者意识清醒。评估后，鼓腮、吹气等未能诱发右下颌疼痛。与患者继续交流约 20min，期间多次诱发右下颌疼痛均未引出。与术者沟通后结束唤醒，重复诱导及维持麻醉方案，开始关颅。
结果 术毕，麻醉苏醒完全，清醒状态下再次诱发右下颌疼痛未能引出，安返病房。后期患者恢复良好，顺利出院，随访半年未见复发。
结论 颅底肿瘤的全麻唤醒手术国内外文献罕有报道，这类手术对唤醒麻醉的平稳性要求更高。合理的手术麻醉方案及相应预案是手术成功的保障。此类手术的临床麻醉经验较少，需要进一步探索总结经验。

PU-1117

气道表面麻醉型气管导管减轻高血压患者全麻拔管反应的临床研究

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目的 观察气道表面麻醉型气管导管外喷洒利多卡因对高血压患者全身麻醉苏醒期拔管反应的影响
方法 选择 70 例拟行腹腔镜下胆囊切除术合并高血压患者进行研究。将患者分为研究组（表面麻醉型气管导管组 A 组）和对照组（普通气管导管组 B 组），每组各 35 例。在手术完成之前 5min，A 组经导管注药囊注射 2%利多卡因 3ml，B 组不处理。依次记录患者入室 T0、拔管时 T1、拔管后 1 minT2、拔管后 2 min T3、拔管后 5minT4 每个时间点收缩压（SBP）和心率（HR）的数值；记录两组患者手术时间（切皮开始至缝皮结束的时间）、苏醒时间（缝皮结束至呼唤姓名后睁眼的时间）、拔管时间（麻醉苏醒至拔除气管导管的时间）以及麻醉苏醒期运用活血管药、发生呛咳、躁动、术后咽痛例数等拔管不良反应发生例数
结果 A 组患者在拔管期不同时间点收缩压及心率变化幅度明显优于 B 组，具有统计学意义(P＜0. 05) 。A 组运用活血药物、发生呛咳、躁动、术后咽痛例数都明显低于 B 组，两组比较差异具有统计学意义(P＜0. 05) ；两组手术时间、苏醒时间及拔管时间无统计学差异（p>0.05）。
结论 术毕前通过表面麻醉型气管导管外喷洒利多卡因对高血压患者全身麻醉苏醒期不仅能降低患者全身麻醉拔管期心血管反应，而且对减轻拔管后不适有良好的预防作用，且不延长苏醒及拔管时间，值得临床推广

PU-1118

围术期血压变异度与心脏手术后重要脏器不良预后的相关性

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目的 围术期血流动力学稳定性与器官灌注密切相关，然而，围术期血压变异度对手术后重要脏器不良预后影响仍然不明确，特别是小儿领域。且在心脏手术中血压控制和管理比非心脏手术更加严格。因此，本文对围术期血压变异度与心脏手术后重要脏器不良预后相关研究进行系统综述，旨在通过对围术期血压变异度与心脏手术后重要脏器不良预后的相关性分析，为临床围术期血压变异度管理提供相关理论依据，从而改善心脏手术后近、远期不良预后。
方法 系统在 PubMed, Medical Subject Headings, Embase, Web of Science, SCOPUS, clinicaltrials.gov, and Cochrane Library 进行了检索， 共计检索出 4747 篇文献，最终纳入心脏手术相关分析 20 篇。
结果 这些研究在血压变异度的分析上有所不同，包括标准差（standard deviation, SD）、变异系数（coefficients of variation, CVs）、平均真实变异度（average real variability, ARV）和曲线下面积（area under the curve, AUC），最常使用的是 SD 和 CVs。研究中明确指出：成人领域，血压变异度已经成为超越血压水平的重要预测指标，可预测心血管结局(心肌梗死、急性冠脉综合征、中风、急性失代偿性心力衰竭和心血管其他相关不良并发症）和低灌注相关不良事件（AKI 和晕厥等）；较大收缩压变异度与舒张压变异度与心脏手术后急性肾损伤具有相关性，增加术后 30 天死亡率和肾衰竭发生;小儿领域，相关研究甚少，研究指出较大的血压变异度可能与婴儿心脏手术后急性肾损伤相关。
结论 围术期较大血压变异度与心脏手术后重要脏器不良预后相关，血压变异度是心脏手术后不良

预后并发症发生的潜在危险因素，但是仍需要大型前瞻性临床研究加以验证，并进一步分析不同年龄段小儿围术期血压变异度与心脏手术后重要脏器不良预后的相关性。

PU-1119

基于机器学习个体化血压管理对非心脏手术患者术后并发症的应用研究

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目的 评价基于机器学习个体化血压管理对非心脏手术患者术后并发症的影响。
方法 择期非心脏手术患者 302 例，性别不限，年龄 18~80 岁，BMI19~28kg/m2,ASAⅡ或Ⅲ级，采用随机数字表法分为 2 组（n=151）,标准化血压管理组（S 组）和个体化血压管理组（Ⅰ组）。2 组麻醉方法依据患者手术综合要求而定。S 组维持术中 SBP>90mmHg 且降低幅度小于基线血压的 20%，Ⅰ组通过机器学习方法提前预警患者低血压信息，提前根据患者术中心功能状态及血管阻力大小个体化管理血压。记录术中麻醉药物输注量、手术时长、输液量、出血量和尿量，是否输血以及血管活性药物使用情况；记录 PACU 血压波动趋势、脑氧饱和度、Ramsay 镇静评分、VAS 评分及不良反应发生率（寒颤；恶心呕吐；呼吸抑制等）；记录术后一周 QoR-15 恢复质量量表评分；记录术后一周内并发症的发生率（术后出血；术后急性心肌损伤；术后急性肺损伤；术后急性肾损伤；术后脑认知功能障碍等）。
结果 与 S 组相比，Ⅰ组术后一周内并发症发生率降低。
结论 基于机器学习个体化血压管理可降低非心脏手术患者术后并发症的发生。

PU-1120

反比通气对腹腔镜下胃减容术肥胖患者呼吸力学及肺损伤的影响

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目的 探讨反比通气对接受腹腔镜下胃减容术的肥胖患者术中呼吸力学、氧合及 CO_2 排出情况及肺损伤的影响。
方法 选取 2021 年 12 月至 2022 年 9 月期间于内蒙古自治区人民医院接受腹腔镜下胃减容术的肥胖患者 62 例，年龄 18～50 岁，ASA II～III 级，BMI＞30kg/m^2，采用随机数字表法分为试验组(n=31)和对照组(n=31)，依据剔除标准剔除后，最终完成本研究肥胖患者 60 例，其中试验组 30 例，对照组 30 例。两组患者应用压力控制容量保证通气模式(pressure-controlled volume-guaranteed ventilation, PCV-VG)，呼吸参数设置：潮气量 7ml/kg，呼气末正压 7cmH_2O，吸入氧浓度 60%，吸呼比(inspiration/expiration ratio，I：E) 1:2，初始呼吸频率（respiratory rate，RR）12 次/分，并依据呼气末二氧化碳分压(end-tidal carbon dioxide, $P_{ET}CO_2$) 进行调整，使 $P_{ET}CO_2$ 在 35 至 45mmHg。气腹建立后，试验组 I:E 为 2:1，对照组 I:E 保持不变，至机械通气结束。于气管插管后 5mim（T1）、气腹后 5min（T2）、气腹后 30min (T3)、气腹后 60min（T4）、气腹后 90min（T5）记录呼吸力学参数，包括气道峰压(Ppeak)、平均气道压(Pmean)、肺动态顺应性（Cdyn)，计算驱动压；记录呼气末二氧化碳分压($P_{ET}CO_2$)和呼吸频率（RR）；于麻醉诱导前(T0)、T5 时间点取动脉血检测血气指标：动脉血氧分压（PaO_2）、动脉血二氧化碳分压（$PaCO_2$），计算氧合指数（OI）；于 T0、 拔管后 30min(T6) 取静脉血采用酶联免疫吸附法检测两组患者克拉拉细胞蛋白 16（Clara cell protein 16，CC16）和肺表面活性物质相关蛋白 A(pulmonary surfactant-

associated protein A, SP-A)的浓度。
结果 两组肥胖患者在性别、年龄、ASA 分级、BMI、手术时间、气腹时间、输液量及尿量等方面的基线比较差异无统计学意义（P＞0.05）。 T2、T3、T4、T5 时两组患者的 Ppeak、Pmean、驱动压高于 T1 时，而 Cdyn 低于 T1 时；试验组的 Ppeak、驱动压显著低于对照组，而试验组的 Pmean、Cdyn 显著高于对照组，差异均有统计学意义（P＜0.05）。两组患者 T2、T3、T4、T5 时的 $P_{ET}CO_2$、RR 高于 T1 时；试验组的 RR 显著低于对照组，差异均有统计学意义（P＜0.05）。两组患者 T5 时的 PaO_2、$PaCO_2$ 均显著高于 T0 时；试验组 T5 时的 OI 显著高于 T0 时；T5 时，试验组 PaO_2 和 OI 显著高于对照组，而 $PaCO_2$ 显著低于对照组，差异均有统计学意义（P＜0.05）。两组患者 T6 时的 CC16、SP-A 表达水平均显著高于 T0 时；T6 时，试验组的 CC16、SP-A 表达水平较对照组显著降低，差异有统计学意义（P＜0.05）。
结论 反比通气应用于腹腔镜下胃减容术的肥胖患者，可降低术中 Ppeak、驱动压，增加 Pmean、Cdyn，减少 RR 的设定值，改善术中通气；降低 $PaCO_2$，增加 PaO_2 和 OI，改善术中氧合；减少 CC16 和 SP-A 的表达，减少肺损伤的程度，且并未观察到对肥胖患者血流动力学的不利影响。在 PCV-VG 通气模式下应用反比通气对行腹腔镜下胃减容术的肥胖患者而言是一种安全可行的通气策略。

PU-1121

Global Research and Scientific Publications on PND between 1969 and 2022: A Bibliometric Analysis

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Abstract: Objectives: We hope to offer a comprehensive understanding of the advancements and patterns in research on PND.Methods:We performed a thorough search on the Web of Science Core Collection to locate relevant studies published from 1969 to 2022 and utilized four distinct tools, namely VOSviewer [1]–[4], CiteSpace [5], Scimago Graphica, and R-bibliometrix which allowed us to examine various aspects.Results:we included a total of 6787 articles and reviews for analysis which described PND research,the sources, and the subfields;highlighted the significant developments in this field;identified three main directions in PND.Conclusion:This study highlights the rapid growth of research on PND in recent years and provided an overview of previous studies in the field of PND, thereby establishing the overall landscape of PND research and identifying potential avenues for future investigations.
Methods We performed a thorough search on the Web of Science Core Collection to locate relevant studies published from 1969 to 2022. To perform bibliometric analysis and network visualization, we utilized four distinct tools, namely VOSviewer [1]–[4], CiteSpace [5], Scimago Graphica, and R-bibliometrix. These tools allowed us to examine various aspects, including the yearly publication output, the contribution of different countries or regions, the involvement of active journals, co-citation analysis, publication status, keywords and terms, as well as scientific categories. We hope to offer a comprehensive understanding of the advancements and patterns in research on PND. The insights gained from this study can assist researchers and clinicians in enhancing the management and implementation of their work in this field.
Results In this study, we included a total of 6787 articles and reviews for analysis. First, publication trends andcontribution by country analysis described PND research. Second, a historical analysis described PND research, the sources, and the subfields. Third, an analysis of keywords highlighted the significant developments in this field. Fourth, an analysis of research themes identified three main directions in PND.
Conclusion In summary, the research volume exhibits exponential growth over time. Furthermore, the majority

of contributions originate from Western countries and China. The interdisciplinary nature of the field is evident, with its roots in biology and medicine and further branching into psychology and social sciences. POCD, delirium-predominant associated clinical management were major research themes about PND.

PU-1122

Driving pressure on postoperative pulmonary complications in obese patients undergoing laparoscopic sleeve gastrectomy: a randomized controlled trial

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Background Postoperative pulmonary complications (PPCs) are common in patients under general anesthesia, with an incidence rate of 2%-59% depending on the type of surgery. Obese patients have approximately doubled the incidence of PPCs compared with normal-weight patients due to the unique characteristics associated with obesity. The benefit of lung protective strategies has been well demonstrated in the intensive care units and the operating room. With the advances in lung protective strategies, airway driving pressure, measured as plateau pressure minus PEEP, is clearly in the leading position and has become the better substitute indicator of lung injury. It has been established that driving pressure is associated with mortality in patients with acute respiratory distress syndrome (ARDS). However, the effect of driving pressure on outcomes in the operating room varies across different types of surgeries (such as thoracic, abdominal, spinal, and cardiac) and study designs (retrospective or prospective). The efficacy of driving pressure in obese patients remains poorly understood, with only limited studies indirectly exploring the effect of driving pressure in obese patients and concluding that reducing driving pressure did not result in improved clinical outcomes. Therefore, we conducted a single-center, randomized controlled trial in patients undergoing laparoscopic sleeve gastrectomy to investigate the association between driving pressure and the incidence of PPCs, as well as identify a safe threshold of driving pressure specifically for obese patients.

Methods This study was a single-center, randomized controlled trial to investigate the effect of driving pressures on the PPCs in patients undergoing laparoscopic sleeve gastrectomy. We included adult patients (ages between 18-65 years) with a body mass index (BMI) of at least 30 kg/m^2 who were scheduled for laparoscopic sleeve gastrectomy among patients with American Society of Anesthesiologists (ASA) physical status classification I to III. Patients were excluded if they had severe pulmonary complications, continuous hemodynamic instability, had severe cardiac, renal, and hepatic dysfunction, were pregnant, were involved in the other clinical trials, and refused to participate in the trial. Patients undergoing laparoscopic sleeve gastrectomy were randomized to either a high level of driving pressure group (HDP group) (>15 cmH_2O) or a low level of driving pressure group (LDP group) (≤15 cmH_2O). PEEP and tidal volume were adjusted to meet the requirements of the assigned group. All patients received volume-controlled ventilation. A recruitment maneuver was conducted before titration of driving pressure. The primary outcome was the incidence of postoperative pulmonary complications in the post-anesthesia care unit (PACU) and 3 days after surgery. Secondary outcomes included mechanical power of ventilation, administration of vasopressor drugs, length of hospital stay, rescue strategy for desaturation, and postoperative lung function.

Results A total of 208 patients were randomized into the HDP group (n=104) and the LDP group (n=104). The mean driving pressure was 13.7 cmH_2O in the HDP group vs 10.8 cmH2O in the LDP group (mean difference 2.89 cmH2O [95% confidence interval, CI: 2.01-3.77, P<0.001]) before establishing pneumoperitoneum, and they were 19.6 cmH_2O vs 14.1 cmH_2O (mean difference: 4.07 cmH_2O, 95%CI:3.47-4.68, P<0.001) after establishing pneumoperitoneum. The incidence of

PPCs was not significantly different between the two groups (18/104,[17.3%] in the LDP group vs 14/104[13.5%] in the HDP group [risk ratio; 1.15, 95% CI:0.82-1.62]). Mechanical power, rescue strategy for desaturation and the administration of vasopressor drugs had no significant difference between the two groups. The effect of driving pressure level on the occurrence of PPCs was not significant across subgroups, including sex, body mass index less than 40 vs 40 and greater, and ARISCAT score. Spline models adjusted for age, sex, and BMI were performed to analyze the association of PPCs with driving pressure, and mechanical power with and without pneumoperitoneum (Fig. 1). The results showed a positive association between driving pressure and PPCs after pneumoperitoneum (P<0.001).

Conclusions In obese patients undergoing laparoscopic sleeve gastrectomy, a low level of driving pressure, compared with a high level of driving pressure did not reduce the incidence of PPCs. The safe threshold of driving pressure may not be 15 cmH_2O in obese patients before pneumoperitoneum, and may be greater than 15 cmH_2O in obese patients after pneumoperitoneum. However, further studies of driving pressure-guided ventilation for high-risk obese patients are warranted. Driving pressures provide an easily measured correlate of global lung strain. The benefit of driving pressure has been demonstrated in ARDS patients and surgery. Driving pressure was not independently associated with 90-day mortality in obese ARDS patients. However, there is minimal evidence on the impact of driving pressure in obese patients during surgery. In our study, we first aimed to assess the relationship between driving pressure and PPCs in obese patients and find a safe threshold of driving pressure in obese patients, and directly compared the effect of driving pressure on the PPCs. Previous studies pointed out that the safe threshold was 17 cmH_2O in the ARDS patients and 15 cmH_2O in the obese patients, respectively. Based on this result, and considering the alternation of respiratory function in obese patients and the transmission of pneumoperitoneum pressure, we chose 15 cmH_2O as the threshold in our study. However, we did not observe a statistically significant difference between the two groups in terms of the incidence of PPCs due to the lower incidence of PPCs. There are some limitations to our study. First, it was conducted in a single center, limiting the generalizability of the findings. Second, we did not perform blood gas analysis due to the invasive nature of the procedure, opting instead to assess oxygenation through SpO_2/FiO_2, this may underestimate the incidence of PPCs. Finally, considering the setting of airway plateau pressure, the level of PEEP chosen in our study (15 cmH_2O) may not have provided sufficient alveolar recruitment for obese patients.

PU-1123

脓毒症急性肺损伤在细胞水平的研究进展

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目的 脓毒症是宿主对各种感染反应失调而引起的危及生命的器官功能障碍。肺脏是众多受累器官中最易受损的靶器官，早期即可出现肺组织线粒体功能和结构的变化,发生细胞能量代谢障碍,导致急性肺损伤(ALI)。虽然现代医疗技术和医疗设备飞速发展，但是脓毒症致 ALI 的病因及发病机制错综复杂，且诊断缺乏特异性，其发病率和病死率仍居高不下。有文献报道，ALI 的病死率高达 30%~40%，其中脓毒症所致 ALI 的病死率明显高于非脓毒症所致的 ALI，可达 50%~60%。本文从细胞水平对脓毒症肺损伤加以综述。

方法 从细胞水平探讨脓毒症肺损伤的发病机制。

结果 细胞水平的研究不仅有助于了解脓毒症肺损伤的发病机制，也为临床治疗提供方向和参考，为靶向治疗提供新思路

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PU-1124

Effect of driving pressure-guided individualized positive end-expiratory pressure ventilation strategy on postoperative atelectasis in patients undergoing laparoscopic surgery as assessed by ultrasonography

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Background Ventilator-induced lung injury caused by mechanical ventilation under general anesthesia as well as CO_2 pneumoperitoneum and special positions for laparoscopy may lead to perioperative atelectasis. Untreated severe atelectasis may increase the risk of postoperative pulmonary complications (PPCs), prolong hospital stay, and even increase perioperative mortality. To reduce the risk of PPCs in surgical patients, the guidelines recommend lung protective ventilation during general anesthesia, including small tidal volume, appropriate positive end-expiratory pressure (PEEP), and recruitment. However, there is considerable debate about the optimal level of PEEP and how to set the individualize PEEP. Driving pressure reflects the overall respiratory stress and can be adjusted by setting PEEP. High driving pressure is an independent risk factor for PPCs. Lung ultrasound (LUS), as a safe and portable new auxiliary diagnostic tool with the advantages of real-time monitoring and repeated measurements, can semi-quantitatively assess the lung ventilation loss, and has been widely used in the diagnosis and evaluation of clinical lung diseases. The purpose of this study is to explore whether driving pressure-guided individualized PEEP ventilation can improve intraoperative respiratory mechanics, reduce postoperative LUS score, and reduce the incidence of postoperative atelectasis and PPCs in laparoscopic surgery compared with the traditional fixed PEEP ventilation strategy.
Methods The study was a single-center, prospective, randomized controlled clinical study that included moderate-to-high-risk adult patients with PPCs undergoing laparoscopic surgery for more than 2 hours according to the inclusion and exclusion criteria. Patients were randomly assigned in a 1:1 ratio to receive an individualized PEEP guided by minimum drive pressure (group D) or a fixed PEEP of 5cm H_2O (group C). The protocol of anesthesia, intraoperative management, postoperative analgesia, and ventilation methods other than PEEP setting were consistent in both two groups. Patients in group C maintained a PEEP of 5 cmH_2O throughout the whole process, and patients in group D was administered individualized PEEP after the start of pneumoperitoneum to achieve minimum driving pressure until the end of the operation (Figure 1). The primary outcome was the LUS score at 24 hours postoperatively. The secondary outcomes were the LUS scores at other time points, incidence and specific types of PPCs at 7 days postoperatively, intraoperative respiratory mechanics and oxygenation index. Baseline characteristics of all patients were recorded.
Results A total of 102 patients, 51 patients in each of the two groups were included in the final statistical analysis. There were no significant differences in baseline characteristics and preoperative incidence of pulmonary complications between the two groups. The individualized PEEP in group D was significantly higher than that in group C (7(1)cm H_2O vs 5(0)cm H_2O, U=102.000, P＜0.001). The LUS score at 24 hours postoperatively of group D was significantly lower than that of group C (4(3) points vs 6(3) points, U=728.500, P＜0.001). Except for the preoperative LUS score, which was not significantly different between the two groups, the LUS scores at all other postoperative time points were lower in group D than in group C, including in PACU, at 48h postoperatively, and 72h postoperatively (P<0.05, Table 1). The incidence of PPCs (9.8% vs 25.5%, χ^2=4.317, P=0.038) and postoperative atelectasis (13.7% vs 31.4%, χ^2=4.547, P=0.033) in group D was significantly lower than those in group C, while the incidence of pulmonary infection, pleural effusion, respiratory failure and pulmonary embolism were not significantly different between the two groups (P>0.05). During the operation, from the completion of PEEP titration to the end of the operation, the driving pressure of group D was decreased, the compliance

was increased, and the oxygenation index was increased compared with group C (P<0.05, Table 2).
Conclusions In laparoscopic surgery, compared with the fixed PEEP lung protective ventilation strategy, the driving pressure-guided individualized PEEP protective ventilation strategy can improve the intraoperative respiratory mechanics, reduce the postoperative LUS score, and reduce the incidence of postoperative atelectasis and pulmonary complications.

PU-1125

驱动压指导 PEEP 滴定用于术中机械通气的 Meta 分析

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目的 系统评价驱动压指导 PEEP 滴定用于术中机械通气的有效性、安全性，及其最佳设置方法。
方法 计算机检索 PubMed、Web of Science、the Cochrane Library、Embase、中国期刊全文数据库（CNKI）、万方和维普数据库，检索驱动压用于术中机械通气的随机对照研究（RCT），检索时间为建库至 2023 年 11 月 8 日。由 2 名研究者独立筛选文献、提取资料并评价纳入研究的偏倚风险后，采用 Revman 5.4 和 Stata15.1 软件进行 meta 分析。
结果 共纳入 19 篇文献，共计患者 2 906 例，驱动压指导 PEEP 滴定组 1 440 例，传统肺保护通气组 1 466 例。与对照组比较，驱动压指导 PEEP 滴定组在非胸科手术中有更低的术后肺部并发症（PPCs）发生率（RR=0.53，95%CI：0.43～0.65，P<0.001），而在胸科手术中差异无统计学意义（RR=0.89，95%CI：0.78～1.02，P=0.09）。另外还能提高术中肺顺应性（MD=6.90，95%CI 5.80～7.99，P<0.001），缩短住院时间（MD=-0.27 天，95%CI:-0.43～-0.12，P<0.001），而术中平均动脉压(MAP)差异无统计学意义（MD=0.36 mmHg，95%CI：-1.30~2.01，P=0.67）。网状 meta 分析显示，与对照组比较，采用 PEEP 递增法的 PPCs 发生率更低(OR=0.41，95%CI 0.27～0.60)，采用 PEEP 递减法与递增法均有更低的术中驱动压(MD=-2.96cmH2O，95%CI -4.04～-1.88；MD=-1.91 cmH2O，95%CI -2.50～-1.31)、更高的肺顺应性(MD=7.20ml/cmH2O，95%CI 4.70～9.71；MD=6.54ml/cmH2O，95%CI 4.71～8.36)与氧合指数(MD=25.05mmHg，95%CI 1.37～48.72；MD=22.89mmHg，95%CI 10.94～34.84)。
结论 驱动压指导 PEEP 滴定用于术中通气能够提高患者肺顺应性、改善氧合，降低术毕 LUS 和 PPCs 发生率，缩短术后住院时间，但不影响 MAP。其中，采用驱动压指导的 PEEP 递减法或者递增法均能改善术中驱动压、肺顺应性与氧合指数，但只有 PEEP 递增法可以降低 PPCs 的发生率。

PU-1126

Immune-Mediated Molecular Mechanisms Linking Subarachnoid Hemorrhage to Acute Respiratory Distress Syndrome

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Background
Subarachnoid hemorrhage (SAH) is a brain injury condition with high mortality, predominantly induced by ruptured aneurysms. Studies have demonstrated that brain injury frequently precipitates extracranial organ and systemic injuries, with the lungs being notably vulnerable in the context of brain injuries. It has been observed that patients with SAH are more susceptible to acute respiratory

distress syndrome (ARDS) during their hospitalization. Although there is a certain association between these two diseases, the precise molecular mechanisms underlying this link remain unclear.
Methods
Bioinformatics methods were employed to analyze gene expression datasets related to SAH and ARDS in the GEO database, identifying common differentially expressed genes (DEGs). The biological functions and signaling pathways of these DEGs were investigated through GO and KEGG enrichment analyses. Immune-related gene data were sourced from the ImmPort database. PPI network analysis and machine learning techniques (LASSO) were utilized to identify immune-related hub genes and the optimal shared diagnostic genes (OSDGs) in both diseases. Disease diagnostic models were established. Furthermore, the CIBERSORT algorithm was applied to analyze immune cell infiltration.
Results
The study successfully identified 349 DEGs between SAH and ARDS, which primarily involve immune responses and inflammation processes. Further analysis recognized CD4, TLR3, TLR4, IL7R, MMP9, and CCR7 as key genes related to immune response, with TLR2, CCR7, and CD74 serving as shared biomarkers with significant diagnostic value for both diseases. Analysis of immune cell infiltration revealed changes in specific immune cells and underscored the importance of the immune microenvironment in both conditions.
Conclusions
6 immune-related hub genes and 3 candidate biomarkers that predict SAH combined with ARDS were identified. The findings provide a foundation for further understanding the molecular mechanisms between SAH and ARDS.

PU-1127

两种不同方法滴定个体化 PEEP 对肥胖患者术后肺不张的影响

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目的 通过术中采用最佳肺静态顺应性（Cstat）的方法滴定 iPEEP，与电阻抗肺断层扫描（EIT）滴定的 iPEEP 相对比，研究其对肥胖患者在腹腔镜手术术中氧合和术后肺不张的影响，证实最佳 Cstat 的方法滴定的 iPEEP 简便易行且同样有效；通过卫生学指标（住院时间、住院花费等）进一步证实个体化 PEEP 对减少肥胖患者术后肺部并发症以及加速术后康复的意义，进而为制定适宜的肥胖患者围术期保护性肺通气策略，并引入到 ERAS 的环节中来，提供有效的临床证据。
方法 本研究为前瞻性、单盲、随机对照研究。选择择期在腹腔镜下行胃减容手术的肥胖患者（BMI≥ 32.5kg/m2）140 例，随机纳入两组： Cstat-iPEEP 组（最佳静态肺顺应性法滴定个体化 PEEP 组）和 EIT-iPEEP 组（电阻抗肺断层扫描成像法滴定个体化 PEEP 组）。两组患者术中机械通气过程中均采用小潮气量（7ml/kg），尽可能低的吸入氧浓度（FiO2 = 0.5），且均接受肺复张。同时采用不同方法滴定 iPEEP 后，进行机械通气。本研究的主要结局指标是拔管后 15min 及拔管后 2h 的肺塌陷面积比例，次要结局指标包括呼吸参数、PPCs 的发生率、围术期的氧和指数、血气分析参数、麻醉相关参数以及卫生经济学指标。
结果 EIT 机器测定的肺塌陷面积，在拔管后 15min， Cstat-iPEEP 组为 6.0±3.9%，EIT-iPEEP 组为 5.7±2.7%，（P=0.005）；在拔管后 2h 时，Cstat-iPEEP 组对比 EIT-iPEEP 组，为 2.7±1.2% vs 2.5±1.3%，（P=0.045）；即 Cstat-iPEEP 组拔管后 15min 及 2h 的肺不张程度（与肺塌陷面积比例相对应）不劣于 EIT-iPEEP 组。 Cstat-iPEEP 组的 iPEEP 为 10.0±2.3 cmH2O，低于 EIT-iPEEP 组的 iPEEP（14.0±2.0 cmH2O），（P<0.001）。与 Cstat-iPEEP 组相比，EIT-iPEEP 组在 iPEEP 维持 60 分钟时气道峰压略高（27.65±4.16 vs 30.00±2.78），（P= 0.039），其余时间点两组的气道峰压无显著差异，两组间各时间点的驱动压和静态肺顺应性无显著差异，（P>0.05）。两组间术后肺部并发症（PPCs）发生率、术中氧合指数（PaO2/FiO2）、血流动力

学参数、卫生经济学指标均无明显差异（P > 0.05）.
结论 与 EIT 法滴定个体化 PEEP 相比，最佳 Cstat 法滴定的个体化 PEEP 略低，且降低了气道峰压和驱动压，并没有增加肺塌陷面积的比例。证明，Cstat 法滴定的 iPEEP 结合肺复张和低潮气量的肺保护性通气策略简便易行，在预防术后肺不张，改善呼吸参数和术中氧合方面，与 EIT 法滴定个体化 PEEP 同样有效，是肥胖患者实施腹腔镜手术的理想肺保护措施。

PU-1128

Individualized blood pressure regulation and acute kidney injury in older patients having major abdominal surgery: a pilot randomized trial

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Objective Acute kidney injury (AKI) is among the most common and serious complications in hospitalized patients, especially in older people, and the incidence remains high despite other health-care advances in recent years. AKI is multifactorial, vascular volume and blood pressure are among the few modifiable risk factors for AKI. Observational studies report strong associations between intraoperative hypotension and AKI, but it remains unclear whether the relationship is causal and thus amenable to intervention. Baseline blood pressures differ considerably among surgical patients suggesting that individually tailored blood pressure management may be beneficial. We therefore tested the primary hypothesis that individualized intraoperative blood pressure regulation reduces postoperative AKI in older surgical patients.
Methods We enrolled patients ≥60 years old scheduled for elective major abdominal surgery with invasive arterial pressure monitoring. All had goal-directed fluid management based on stroke volume variation and cardiac output, and administration of a starch. Participants were randomly assigned to: 1) individualized blood pressure management targeting a systolic blood pressure (SBP) within -20% and +10% if baseline SBP ≥ 130 mmHg or diastolic blood pressure ≥ 80 mmHg, otherwise, to keep SBP within ±10% of the baseline value; 2) maintenance of SBP ≥ 90 mmHg and MAP ≥ 65 mmHg. Metaraminol was used to achieve the blood pressure target. The primary outcome was AKI incidence which was assessed by Kidney Disease Improving Global Outcomes criteria during the initial 7 postoperative days. Intraoperative secondary outcomes included the incidence of hypotension, area under MAP 65 mmHg, cumulative duration of MAP less than 75 mmHg, 65 mmHg, and 60 mmHg, hypertension, bradycardia, dose of vasoactive medications, total fluid volume, blood transfusion, and urine output. Postoperative secondary outcomes included the number of patients who needed renal replacement therapy, unplanned transfer to the intensive care unit, duration of postoperative mechanical ventilation, time to first flatus, postoperative nausea and vomiting, postoperative delirium, duration of hospitalization, postoperative complication within 30 days, hospital readmission within 30 days, mortality within 30 and 90 days.
Results From March 2022 to June 2023, a total of 247 patients scheduled for elective abdominal surgery was screened for eligibility, and 192 patients were included and randomized either to individualized (n = 96) or routine (n = 96) management. 179 patients were included in the intention-to-treat analysis. Age averaged 68 ± 5 (SD) yr and 64% were male, and baseline characteristics were well balanced between the study groups. Mean (SD) intraoperative mean arterial blood pressure (MAP) in the individualized group was 86 (10) mmHg, which was higher than that in the control group 76 (12) mmHg throughout surgery. Randomization to the individualized management reduced the area under MAP <65 mmHg [median difference: -37（-47 to -25) mmHg-min, P < 0.001]. Additionally, the cumulative duration of intraoperative MAP <75, <65, and <60 mmHg was

also less in patients assigned to individualized management. In contrast, intraoperative hypertension was more in patients assigned to individualized management (51%) than in the control group (24%, P < 0.001). The number of intraoperative hypertension events was also significantly higher in the individualized group [1 (0 to 1) vs. 0 (0 to 0); P < 0.01]. Other adverse events such as bradycardia and hemorrhage, did not differ significantly between groups. The incidence of the AKI was 11% in patients assigned to individualized management versus 16 % in those assigned to routine management: relative risk 0.72 [95% CI 0.34 to 1.54], P=0.396. The severity of AKI was also similar between groups and none of the patients who developed AKI required renal replacement therapy postoperatively. There were no significant differences in the changes in eGFR from baseline in patients randomized to individualized versus routine pressure management. No differences were observed between groups in unplanned ICU administration, the incidence of PONV, duration of hospitalization, the incidence of postoperative complication within 30 days postoperatively, readmission to hospital within 30 days, and patients who died within 30 days and 90 days postoperatively. Patients assigned to individualized pressure management had more urine output, a shorter postoperative mechanical ventilation duration, and faster recovery of bowel function.

Conclusion Our pilot trial shows that individualized intraoperative blood pressure management is feasible in older patients who have major abdominal surgery. Individualized blood pressure management markedly reduced hypotension. As expected in a pilot trial, the 28% reduction in AKI was not statistically significant. However, the reduction was clinically meaningful and suggests that a full trial is warranted.

PU-1129

Perioperative administration of Hydrocobutin was associated with postoperative pulmonary complications in elderly patients undergoing hip fracture surgery

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目的 The study aims to determine whether perioperative administration of hydrocobutin is associated with PPCs in elderly patients during hip fracture surgery.

方法 In this retrospective cohort study, records of 584 patients (≥ 65 years) who underwent hip fracture surgery between January 2013 and October 2020 were extracted. Univariate and multivariate regression analysis were performed to identify the risk factors for PPCs. To further explore the association between administration of hydrocobutin and PPCs, 53 patients received hydrocobutin and 53 patients without hydrocobutin were matched for the confounding factors using propensity score matching (PSM) analysis.

结果 The odds ratios (OR) and 95% confidence intervals (CI) for the above variables were analyzed. Results The incidence of PPCs during postoperative hospitalization was 6.83% (38/556) among the elderly patients following hip fracture surgery. Patients with PPCs had higher postoperative mortality rate, longer hospital stay, more hospitalization cost, and higher incidence of cardiac arrest (all P < 0.05). Multivariate logistic regression analysis showed that age, hypertension, hypoglycemia, hypoproteinemia and perioperative hydrocobutin were independent risk factors for PPCs. Moreover, administration of hydrocobutin was significantly correlated with PPCs both before PSM adjustment (OR = 3.25; 95% CI, 1.67 to 6.33; P = 0.001) and after PSM adjustment (OR = 6.68; 95% CI, 1.40 to 31.82; P = 0.017).

结论 Perioperative administration of hydrocobutin is a risk factor for PPCs in elderly patients undergoing hip fracture surgery.

PU-1130

Neuroprotective Effects of Testosterone on Sevoflurane-Induced Neurotoxicity in Testosterone-Deprived Male Mice

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Abstract
Background Sevoflurane induces cognitive impairment in neonatal male mice, but not in young male mice. The potential neurotoxicity of sevoflurane in young male mice that have lost the neuroprotective effects of testosterone remains unclear. Furthermore, it is unknown whether testosterone supplementation can reverse the effects of sevoflurane.
Methods Young male mice were subjected to orchiectomy (ORC) to induce testosterone deprivation. The effects of sevoflurane on long-term (ORC 10 weeks) and short-term (ORC 2 weeks) testosterone deprivation were assessed. Various techniques, including western blotting, immunofluorescence, the Morris water maze, TUNEL staining, ELISA, Golgi staining, and neuronal signal measurement, were employed to investigate these effects and the potential reversal by testosterone treatment.
Results Sevoflurane increased tau phosphorylation, cognitive impairment, neuronal apoptosis, inflammatory cytokine levels, and decreased the amplitude of Ca2+ signals and dendritic spine density in dorsal hippocampal CA1 (dCA1) neurons in testosterone-deprived mice. Testosterone treatment reversed the effects of sevoflurane in short-term testosterone-deprived male mice, but not in long-term testosterone-deprived male mice.
Conclusions We have discovered for the first time that testosterone can mitigate the sevoflurane-induced neurotoxicity in testosterone-deprived male mice and that there exists a therapeutic time window. This may provide new insights into the neuroprotective role of sex hormones.

PU-1131

Lung stress index during one-lung ventilation is associated with postoperative hypoxemia in patients undergoing lobectomy

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Objective To investigate the association of lung stress index (SI) during one-lung ventilation with postoperative hypoxemia in patients undergoing lobectomy. Methods The prospective cohort study was conducted from July 1, 2022, to December 31, 2022, at the Affiliated Hospital of Southwest Medical University, involving patients undergoing video-assisted thoracoscopic surgery for pulmonary lobectomy. All patients received double-lumen endotracheal tube intubation, lung-protective ventilation strategy, PEEP incremental lung recruitment maneuver, and synchronized intermittent mandatory ventilation during anesthetic emergency. Total intravenous anesthesia was adopted for maintenance. Patients were grouped into low SI, medium SI, and high SI groups according to the mean values of SI recorded within the first 5 minutes during one-lung ventilation (<0.9, 0.9 to 1.1, >1.1, respectively). The primary outcome was the occurrence of hypoxemia from postoperative day 1 to day 5 or at discharge, while the secondary outcome was the proportion of lung aeration compartments on the non-operative side. Results A total of 72 patients were finally entered into the analysis. The incidence of postoperative hypoxemia was 66.7%

(24/36) in the low SI group, 38.1% (8/21) in the medium SI group, and 26.7% (4/15) in the high SI group, with a significantly higher incidence in the low SI group (P=0.029). The risk of postoperative hypoxemia was associated with age, preoperative oxygen saturation, duration of one-lung ventilation, lung compliance, inspiratory resistance, airway pressure, mechanical power, and SI, with a 30% decrease in risk for every 0.1 increase in SI. The proportion of hyper-aerated lung compartments was greater in patients with high SI, both preoperatively and postoperatively, while the proportion of atelectasis compartment was higher in patients who suffered postoperative hypoxemia. Conclusion Lower SI during one-lung ventilation was associated with a higher incidence of postoperative hypoxemia. Ventilation strategies aimed at maintaining SI at a medium level may reduce the risk of postoperative hypoxemia in patients undergoing thoracic surgery.

PU-1132

A bidirectional Mendelian randomization study investigating the relationship between gut microbiota and sleep disorders

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Background The number of people experiencing sleep disorders is rising. Research indicates that there is a mutual interaction between the gut microbiota and sleep quality; however, the causal relationship between the gut microbiome and sleep disorders remains unclear.
Methods The gut microbiome(GM) data were sourced from the MiBioGen platforms, and Sleep disorder summary statistics were obtained from public GWAS platform. Than selecte the Instrumental variables(IVs) from GM, and employing Inverse-Variance Weighted (IVW), MR-Egger, weighted median, weighted mode, and simple mode methods to conduct a Mendelian Randomization (MR) analysis. Subsequently, heterogeneity and horizontal pleiotropy among significant findings. Sensitivity analyses to evaluate the robustness of the results. Finally, reverse Mendelian randomization was performed to infer potential causal relationships in the opposite direction.
Results From 196 known gut microbiota, 15 kinds of GM showed associations with sleep disorders. Among these, four significant gut microbial were found: Genus Dorea (OR: 0.997, 95% CI: 0.995 - 0.100, Pval: 0.024); Genus Parasutterella (OR: 0.998, 95% CI: 0.997 - 0.100, Pval: 0.045); Genus Slackia (OR: 0.998, 95% CI: 0.997 - 0.100, Pval: 0.037); and Order Bacillales (OR: 0.999, 95% CI: 0.998 - 0.100,Pval: 0.043). No heterogeneity or horizontal pleiotropy was found among the instrumental variables. Reverse Mendelian randomization analysis did not find a significant causal relationship between sleep disorders and the gut microbiota.
Conclusion Through a two-sample MR study at the genetic level, we have identified specific microbial populations with a causal relationship to sleep disorders, providing new theoretical basis for the application of probiotics in the treatment of sleep disorders.

PU-1133

PGC-1α 缺失在 APAP 肝损伤中介导 LDHB-乳酸轴促进线粒体蛋白乳酸化

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目的 APAP 是一种广泛使用的解热镇痛药，但其肝毒性问题在 COVID-19 疫情期间显得尤为突出。后续“长新冠”的反复感染导致 APAP 药物频繁使用而增加了肝损伤的风险，但现有的治疗手段如 N-乙酰半胱氨酸（NAC）仅在病程早期中有效。线粒体在 APAP 诱导的肝毒性中起关键作用，但其具体机制尚不清楚。本研究旨在探讨过氧化物酶体增殖物激活受体-γ 辅激活因子-1α（PGC-1α）在对乙酰氨基酚（APAP）诱导的肝损伤中的作用机制，特别是通过乳酸脱氢酶 B（LDHB）介导乳酸代谢重编程调节线粒体质量控制的机制。
方法 为了研究 APAP 诱导的肝损伤机制，研究团队利用 AML12 细胞和 C57/BL6 小鼠建立了急性肝损伤模型。通过慢病毒转染技术在体外过表达 SIRT1 和 PGC-1α，以建立稳定的细胞系。此外，使用基因表达汇编数据集分析 APAP 诱导肝损伤患者的基因表达谱。生物信息学和 ChIP-seq 分析用于确定 PGC-1α 与 LDHB 启动子区域的相互作用。通过这些方法，研究了 APAP 处理对 SIRT1/PGC-1α/LDHB 轴及线粒体功能的影响。
结果 APAP 处理降低了 SIRT1/PGC-1α/LDHB 的表达，增加了线粒体乳酸水平和蛋白乳酸化，促进了肝脏线粒体的病理损伤。PGC-1α 的过表达或激活减轻了 APAP 诱导的细胞和肝脏损伤。此外，PGC-1α 的过表达增加了 LDHB 的合成，促进了从乳酸到丙酮酸的转换，并减少了乳酸化水平。
结论 本研究表明，PGC-1α 在 APAP 诱导的肝损伤中发挥了保护作用，主要通过上调 LDHB 表达和调节线粒体质量控制及乳酸代谢重编程。这些发现揭示了 PGC-1α/LDHB 轴作为 APAP 诱导肝损伤的潜在治疗靶点的重要性，为治疗急性肝损伤提供了新的思路。

PU-1134

不同麻醉方法对糖尿病足患者围术期血流动力学及预后影响

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目的 比较全身麻醉和神经阻滞麻醉对糖尿病足患者下肢手术围术期血流动力学变化及预后的影响。
方法 选择 2020 年 5 月至 2022 年 1 月期间在广西医科大学第一附属医院行糖尿病足下肢手术患者共 149 例，年龄 18~65 岁，性别不限，ASA 分级 Ⅱ ~ Ⅳ 级，术前无瘫痪及下肢神经损伤。采用随机双盲对照法，按照麻醉方法随机分成两组：全身麻醉组（GA 组，n=62）和神经阻滞组（PNB 组，n=87）。PNB 组患者行股神经联合坐骨神经阻滞麻醉。GA 组患者均采用气管插管下全凭静脉麻醉，靶控输注丙泊酚和瑞芬太尼使 BIS 维持在 40~60 水平，并维持生命征平稳。记录入室时（T0）、诱导插管或神经阻滞操作时（T1）、切皮时（T2）、转孔时（T3）、手术结束时（T4）等各时点收缩压（SBP）、舒张压（DBP）和平均动脉压（MAP）。记录术中低血压发生情况及血管活性药的使用。记录术后补救性镇痛药使用情况、首次进食、首次下床时间、不良并发症发生以及住院天数。收集患者术前一般资料、虚弱量表（Frailscale）评分、简明疼痛量表（BPI）评分、密歇根神经病变筛查工具（MNSI）评分、阿姆斯特丹术前焦虑信息量表（APAIS）评分，收集患者术前 1 天及术后连续 3 天的 ED-5Q 生活质量评估量表评分和简易智力状态评估表（Mini-Cog）评分。应用华为（HUAWEI）4e 标准版运动智能手环监测患者术前 1 天及术后第 1、2 天的睡眠质量，包括总睡眠时间、浅睡眠时间、深睡眠时间及夜间清醒次数。
结果 两组患者一般资料、Frailscale 评分、BPI 评估、APAIS 评分、MNSI 评分及 Mini-Cog 评分比

较差异无统计学意义（P>0.05）。GA 组患者在 T1、T2、T3 时间点的 SBP、DBP 及 MAP 均低于 PNB 组，术中低血压发生率及术后补救性镇痛药使用率较 PNB 组升高（P<0.05）。与 GA 组相比，PNB 组术后首次下床患者例数比率高，术后首次进食时间明显缩短，术后咽痛发生率低（P＜0.05）。在术后第 1、2 天，PNB 组患者总睡眠时长及深睡眠时长均高于 GA 组（P＜0.05）。

结论 超声引导下股神经联合坐骨神经阻滞用于糖尿病足患者下肢手术优于全身麻醉，具有术中循环稳定、升压药使用量少、术后疼痛及不良反应发生率低和补救性镇痛药物使用量少等优点，患者睡眠质量及住院满意度较高。但两组患者预后如死亡率及 ICU 入住率等结果无统计学差异。

PU-1135

VGSC 抑制剂 QX-314 对 GERC 豚鼠的影响

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目的 通过建立胃食管反流性咳嗽（GERC）豚鼠模型，探索 VGSC 抑制剂 QX-314 对 GERC 豚鼠的影响。

方法 雄性白化豚鼠 30 只，300-500g，分为空白对照组（n=6）、模型组（n=6）、QX-314 组（n=6）、布比卡因组（n=6）、QX-314 与布比卡因复合物组（n=6）。实验开始前进行豚鼠咳嗽敏感性评估，记录豚鼠吸入柠檬酸 10min 内和吸入后 10min 的咳嗽次数、咀嚼次数和咀嚼总时间。豚鼠麻醉后将四肢固定在豚鼠固定板上，呈头高臀低位，经口将聚乙烯软管(6 F，直径 2mm)插入食管远端管腔，模型组、QX-314 组、布比卡因组和 QX-314 与布比卡因复合物组豚鼠采用 0.1mol/L 稀盐酸（含 0.5%胃蛋白酶）食管中下段灌注，灌注速度为 26ml/h，灌注时间为 20min，每天一次，持续 14 天；其中 QX-314 组、布比卡因组、QX-314 与布比卡因复合物组于第 8 天开始分别予 QX-314、布比卡因和 QX-314 与布比卡因复合物颈部皮下注射，连续 7 天，至最后一次灌注结束。空白对照组采用纯净水灌注，方法同模型组。灌注结束后 24h 进行咳嗽敏感性评估，评估结束后取材（肺、气管、食管），行 HE 染色进行病理分析，行 Elisa 实验检测肺、气管组织中 SP、CGRP、VIP、TNF-α、IL-8 的表达。

结果 与空白对照组比较，模型组豚鼠：①咳嗽次数、咀嚼次数、咀嚼总时间明显增多（P＜0.05)；②肺、气管、食管组织病理评分明显增高（P＜0.05)。

与模型组比较，①QX-314 组、布比卡因组、QX-314 与布比卡因复合物组咳嗽次数均明显减少（P＜0.05)，其中 QX-314 与布比卡因复合物组效果更显著；②QX-314 与布比卡因复合物组咀嚼时间明显减少（P＜0.05)；③QX-314 与布比卡因复合物组、布比卡因组气管组织病理评分减少（P＜0.05)；④肺组织内 CGRP、IL-8 在 QX-314 与布比卡因复合物组明显降低（P＜0.05)；⑤气管组织内 CGRP、SP、VIP、IL-8 在 QX-314 组、布比卡因组、QX-314 与布比卡因复合物组均明显降低（P＜0.05)；⑥气管组织内 TNF-α 在 QX-314 与布比卡因复合物组明显降低（P＜0.05)。

结论 ①连续 14 天对豚鼠进行食管中下段稀盐酸灌注，可成功建立 GERC 豚鼠模型；②VGSC 抑制剂 QX-314、布比卡因、QX-314 与布比卡因复合物均可减轻 GERC 豚鼠咳嗽敏感性，其中 QX-314 与布比卡因复合物效果更显著；③VGSC 抑制剂可抑制 GERC 豚鼠气道神经肽及炎症因子的表达，减轻慢性炎症反应。

PU-1136

老年腹膜后肿瘤患者术后 7 天内 AKI 的发生率、危险因素和对术后 60 天生存影响分析：一项回顾性队列研究

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目的 目的:探讨老年患者在经历腹膜后肿瘤切除术后发生急性肾损伤（Acute kidney injury，AKI）的比例、危险因素及其是否影响预后。
方法 方法:纳入并回顾性分析 2014 年 10 月至 2022 年 12 月于北京大学国际医院择期进行先腹膜后肿瘤切除术的老年患者，根据 KDIGO 指南中急性肾损伤（AKI）定义患者术后是否发生 AKI，并将入组患者分为 AKI 组与非 AKI 组。收集所有患者人口学资料（性别、年龄、BMI）、术前临床资料（心功能分级、ASA 分级、术前合并症、手术史、术前是否单肾状态、肿瘤影像学特征、术前实验室检查）、麻醉与手术资料（手术时长、术中液体平衡量、血制品使用、术中用药、术中实验室检查、术中肾脏切除）、术后资料（术后实验室指标、术后 60 天生存资料）等。通过单因素及 Logistic 多因素相关分析确定与术后 AKI 相关的独立危险因素，并通过 Log-rank 检验分析不同肾损伤状态与术后 60 天生存资料间的关系。
结果 2014 年 10 月至 2022 年 12 月 1689 例次在我院接受腹膜后肿瘤切除术患者中共有 248 例次老年患者被纳入分析。本研究 248 例次手术患者中，女性患者 112 例次（45.2%），所有患者中位年龄 69（66-72）岁，多次手术患者 129 例次（52%），44 例次（17.7%）患者在术后发生 AKI，术后 7 天内 AKI 患者与非 AKI 患者基线水平未见统计学差异。被纳入多因素分析的单因素结果包括手术时长（每小时）P＜0.001，失血量 P＜0.001，术中肾脏切除 P＜0.001，术中红细胞输注量 P＜0.001，术中血浆输注量 P＜0.001，术中使用凝血酶原复合物 P=0.03，术中液体平衡量 P＜0.001，术毕血色素水平 P=0.043，术毕乳酸水平 P＜0.001，术毕血糖水平 P=0.014。向前向后逐步多因素 Logistics 分析显示，手术时长（每小时）[OR=1.26,95% CI 1.04-1.53,P=0.021]，术中肾脏切除 [OR=7.29,95% CI 2.84-18.72,P ＜ 0.001]，和术毕乳酸水平 [OR=1.38,95% CI 1.01-1.9,P=0.045]与术后发生 AKI 正相关。Log-rank 检验显示术后 7 日内发生的 AKI 与患者术后 60 天生存率负相关。
结论 17.7%老年腹膜后肿瘤患者在术后 7 天内会发生 AKI，对于手术时间长、术中进行肾脏切除以及术后乳酸水平升高的患者，应密切关注其肾功能，并预防可能发生的 AKI。

PU-1137

机器人辅助妇科肿瘤手术等比通气联合个体化 PEEP 对肺功能的影响

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目的 探究等比通气联合个体化呼气末正压（PEEP）的通气模式对机器人辅助妇科肿瘤手术患者肺功能的影响。
方法 选取我院 2021 年 9 月至 2022 年 9 月拟在全身麻醉下行机器人辅助腹腔镜宫颈癌根治术患者 40 例，年龄 45-65 岁，BMI 18-28 kg/m2，ASA 分级 I-III 级。随机分为两组：对照组（C 组）和等比通气联合个体化 PEEP 组（EP 组），每组 20 例。全麻诱导后设置呼吸参数：潮气量 8 ml/kg，呼吸频率 12 次/分，吸入氧浓度 60%，吸呼比 1:2。CO2 气腹合并 Trendelenburg 体位建立后 EP 组调整吸呼比为 1:1，并以 Cdyn 滴定最适 PEEP，C 组不调整吸呼比及设置 PEEP。使用肺超声评

估患者麻醉诱导前（T0）及拔管后 10 min（T8）肺不张情况；记录 T0、插管后（T1）、气腹头低位后 10 min（T2）、30 min（T3）、60 min（T4）、120 min（T5）、180 min（T6）、气腹放气后 10 min（T7）、T8 的平均动脉压（MAP）及心率（HR），记录 T1、T2、T3、T4、T5、T6、T7 的气道平台压（Pplat）、峰压（Ppeak）、驱动压（DP）及肺动态顺应性（Cdyn）；记录 T1、T3、T5、T6、T7 的血气指标（PaO2、PaCO2），计算氧合指数（OI）、肺泡氧分压（PAO2）、肺泡-动脉氧分压差（A-aDO2）及呼吸指数（RI）；记录术中失血量、补液量及尿量。

结果 与 C 组比较，EP 组拔管后肺不张发生率及肺超声评分降低，EP 组 Ppeak 在 T5、T6、T7 时降低，DP、Cdyn 在 T3 至 T6 时升高（P＜0.05），EP 组在 T3、T5、T6 时 PaO2、OI 升高，A-aDO2、RI 降低，但差异无统计学意义。两组各时间点 MAP、HR、Pplat、PAO2、PaCO2、术中失血量、补液量及尿量比较差异无统计学意义。

结论 在机器人辅助妇科肿瘤手术中应用等比通气联合个体化呼气末正压，血流动力学平稳，可显著降低 CO2 气腹和 Trendelenburg 体位下的 Ppeak 及 DP，提高 Cdyn，减少拔管后的肺不张发生率。

PU-1138

Is overweight a risk of Acute kidney injury after cardiac surgery among Adults?: A population-based cohort study

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Background Cardiac surgery-associated acute kidney injury (CS-AKI) is a common postoperative complication affecting patient prognosis. With the increasing incidence of CS-AKI, the role of abnormal body mass index (BMI) in CS-AKI has attracted more and more attention, and many studies have shown that there is an "obesity paradox" in body mass index, i.e., slight overweight can reduce the incidence of acute kidney injury. Nevertheless, some studies have shown that abnormal BMI is an independent risk factor for developing CS-AKI. This study focuses on the association between overweight and the occurrence of CS-AKI.

Methods This retrospective cohort study was based on the Medical Intensive Care Center (MIMIC) IV database, and the study population was patients who had completed cardiac surgery. Exposure of interest was the BMI measured in an intensive care unit admission. We classified the patients within 24 hours of admission into 6 groups according to BMI (underweight BMI <or=18.5], normal [18.5 <BMI <25], overweight [25 <BMI <or=30], obese I [30 <BMI <or=35], obesity II [35 <BMI <or=40] and obesity III [BMI> 40]). The study outcome was a cardiac surgery-related AKI occurring during hospitalization. We explored the relationship between BMI and CS-AKI using a multivariable logistic regression model to control for known confounders, using curve fitting to determine the relationship between BMI and AKI; interaction and stratified analysis to verify the influence of age, sex and surgery type on the relationship between BMI and CS-AKI.

Results Excluding patients with preoperative renal disease, 5817 patients undergoing open heart surgery, of whom 4348 (74.7%) had AKI and 1469 (28.3%) did not, had an increased risk of AKI in overweight and obese class I and class II III compared with normal weight patients (adjusted OR=1.33; 95% CI, 1.12- 1.57; OR=2.76; 95% CI, 2.26-3.36; OR=4.44; 95% CI, 3.32-5.95; OR=12.04; 95% CI, 6.94-20.88). Curve fitting results showed a "U"-shaped relationship between BMI and mortality in patients undergoing cardiac surgery and a "J"-shaped relationship with the risk of AKI. The risk of Moderate to severe acute kidney injury increased with BMI levels up to the inflection point of 23.33. Below a BMI of 23.33, the estimated dose-response curve appeared as a horizontal line, indicating a non-significant relationship between BMI and the risk of acute kidney injury (P>0.05). Conversely, above the inflection point, the risk of Moderate to severe acute kidney injury increased with higher BMI levels.Furthermore, the subgroup analysis showed no evidence of effect modification or interaction based on common risk factors for Acute Kidney Injury (all P values

for interaction were >0.05).
Conclusions In contrast to their results, overweight patients have an increased risk of postoperative kidney injury. This may influence the cardiac surgeon's recommendation of the range of body mass index to maintain in the perioperative period for patients undergoing elective surgery; is it to maintain the overweight range or to recommend weight loss to normal weight? However, Both overweight and obese patients are at increased risk for postoperative AKI in the heart. More studies are necessary to elucidate the reasons for this relationship.

PU-1139

Validation of a Nomogram Model for Predicting Acute Kidney Injury in Laparoscopic Partial Nephrectomy Patients

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Background Laparoscopic partial nephrectomy (LPN) performed under general anesthesia is typically the preferred treatment option for renal cell carcinoma. However, postoperative acute kidney injury (AKI) is a frequently observed complication following nephrectomy. Research indicates that the occurrence of AKI following LPN ranges from 16.5% to 42%. Patients who develop AKI postoperatively are at an increased risk of developing chronic kidney disease (CKD) and experiencing higher mortality rates compared to those without AKI. The mortality of AKI in hospitalized adult patients were 23.9%, which was characterized by decreased glomerular filtration rate (GFR) and urine output, increased creatinine and urea nitrogen. Thus, early identification and intervention of postoperative AKI patients can enhance perioperative safety and patient recovery. The nomogram model, a prognostic tool developed through regression factor analysis incorporating biological and clinical variables, presents each predictive variable individually with an assigned score. By summing the scores of all variables and aligning them with a predetermined result scale, the model calculates the probability of clinical events for an individual. Thus, the objective of this study is to retrospectively investigate the risk of AKI in patients undergoing LPN under general anesthesia, aiming to more effectively, accurately, and promptly identify high-risk patients.
Methods This retrospective analysis includes LPN patients from November 2021 to December 2023. A total of 380 LPN patients were randomly allocated into training and verification datasets at a ratio of 7:3. Demographic and clinical variables including patient age, sex, ASA classification, BMI, preoperative comorbidities (hypertension, diabetes, and cardiovascular disease), and intraoperative conditions (such as Crystalloid solution，Succinyl gelatin injection，Hydroxyethyl starch, blood volume, urine output, duration of renal artery block and surgery time) were recorded. Data analysis was conducted using univariate and multivariate logistic regression, univariate logistic regression analysis was initially performed, and risk factors with a significance level of P<0.1 in the univariate analysis were further analyzed using multivariate logistic regression and P<0.05 was considered a statistically significant difference, and analyze the independent variables in the model with multiple covariance, a nomogram model was constructed based on the findings of the multivariate logistic regression analysis and the Akaike information criterion (AIC) minimum. The performance of the nomogram model was assessed through the Hosmer-Lemeshow test, calibration curve, receiver operating characteristic curve (ROC), and decision curve analysis (DCA).
Results This study included 380 patients diagnosed with LPN, who were then randomly assigned to either a training dataset (n=266) or a validation dataset (n=114) in a 7:3 ratio. Baseline characteristics were found to be comparable between the two datasets (P>0.05). According to the

KDIGO criteria, AKI was identified in 69 (25.9%) and 40 (35.1%) patients in the training and validation datasets, respectively. Univariate regression analysis revealed significant associations between AKI and gender, BMI, hypertension, duration of renal artery blockade, and surgery time. Multivariate regression analysis and AIC minimum showed that gender, BMI, hypertension, duration of renal artery blockade and surgery time were independent risk factors of AKI. Multiple covariance analyses were conducted on the developed multivariate logistic regression models, with variance inflation factor (VIF) values consistently below 10, suggesting no significant covariance among the predictor variables. A nomogram model was constructed based on the findings of the multivariate logistic regression analysis and AIC minimum. The model presented allows for the prediction of the probability of AKI in LPN patients. Each indicator was used to draw a vertical line on the scoring axis, with the corresponding downward vertical line indicating the probability of AKI development. Validation of the model was conducted using data from line 11 (male, BMI: 28.41, hypertension, duration of renal artery blockade: 29 minutes, surgery time: 210 minutes), resulting in a total score of 249 and a 77.7% risk of AKI. The predictive model had an AUC of 0.783 (95% CI: 0.73-0.84), sensitivity of 0.617, and specificity of 0.808 in the training dataset. In the validation dataset, the model had a similar predictive effect on AKI (AUC=0.752, 95%CI:0.66~0.85), sensitivity of 0.627, and specificity of 0.806. The Hosmer-Lemeshow test, including a calibration curve, demonstrated a P-value greater than 0.05 ($\chi 2$=8.25, P=0.41) in the training dataset, suggesting that the model exhibited good calibration. The calibration curves of the nomogram model demonstrated that both the training and validation dataset calibration curves closely approximated the ideal diagonal, suggesting a strong alignment between predicted and actual probabilities. The DCA illustrated the favorable clinical utility of the nomogram model in predicting the risk of AKI in patients with LPN.

Conclusion The nomogram model, incorporating risk factors such as gender, BMI, hypertension, duration of renal artery block, and surgery time, offers valuable predictive insights for postoperative AKI in LPN patients, aiding clinicians in enhancing postoperative outcomes.

PU-1140

中性粒细胞反向跨内皮迁移促进脓毒症肺损伤

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目的 脓毒症易引发急性肺损伤（acute lung injury，ALI），临床上没有特异性治疗方法，其死亡率较高。脓毒症时在原发损伤部位激活的中性粒细胞反向跨内皮迁移（reverse transendothelial migration, rTEM）再次进入血液循环中，可到达其他器官导致炎症扩散。本研究旨在探讨中性粒细胞反向迁移在 ALI 中的作用机制。

方法 本研究采用腹腔注射脂多糖（Lipopolysaccharide，LPS）诱导小鼠 ALI 实验模型。小鼠腹腔注射生理盐水作为对照组。注射 LPS24 小时后，分析肺组织病理学特征、肺水肿、髓过氧化物酶（MPO）的表达、中性粒细胞浸润、反向迁移相关分子（肺组织连接粘附分子-C（junction adhesion molecule-C, JAM-C）和中性粒细胞弹性蛋白酶（neutrophil elastase, NE））的表达，流式检测外周血中 rTEM 中性粒细胞（ICAM-1highCXCR1low）的数量。为探究中性粒细胞 rTEM 机制，采用 CXCR4 抑制剂 AMD3100 干预中性粒细胞 rTEM 并从小鼠骨髓中分离培养原代中性粒细胞。

结果 通过分析肺组织苏木素-伊红（HE）切片，发现对照组小鼠肺泡结构完整，肺泡间隙和肺泡间隔厚度正常，未见明显肺泡出血和中性粒细胞浸润；LPS 组小鼠肺泡结构破坏严重，肺泡间隔增厚，肺组织有明显红细胞和中性粒细胞浸润。LPS 组肺组织湿干比的比值最高。取小鼠肺组织检测 MPO 活性，发现 LPS 组 MPO 活性最强。通过分析肺组织中性粒细胞免疫荧光，发现 LPS 组肺组织中性粒细胞浸润显著增加。此外，LPS 组小鼠全血中 rTEM 中性粒细胞的数量显著增加。通过 Western blot 分析，LPS 组小鼠肺组织 JAM-C 表达降低，NE 表达增加，进一步证实了中性粒细胞

反向迁移的增加。小鼠腹腔注射 AMD3100 后，发现 LPS 组小鼠血液中 rTEM 中性粒细胞数量显著增加，而 LPS+AMD3100 组小鼠血液中 rTEM 中性粒细胞数量比 LPS 组低，证实 CXCR4 参与中性粒细胞反向迁移。此外，通过提取小鼠骨髓原代中性粒细胞，用于免疫荧光实验，发现 LPS 组 GRK2 的表达降低以及 CXCR4 的表达增加。

结论 在 ALI 小鼠模型中，我们的结果表明，中性粒细胞 rTEM 通过 CXCR4 介导的机制，促进脓毒症引发的肺损伤。这一发现为脓毒症相关 ALI 的治疗提供了潜在的新靶点。

PU-1141

帕瑞昔布治疗接受结直肠癌根治术的高脂血症病人术后谵妄：一项随机 对照试验

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目的 高脂血症可通过加剧神经炎症促进术后谵妄(Postoperative delirium, POD)的发生。前列腺素氧化环化酶 2(Prostaglandin endoperoxide synthase 2, PTGS2/COX-2)介导神经炎症参与 POD 的发生。本研究旨在探讨术前应用 PTGS2 特异性抑制剂帕瑞昔布对高脂血症病人 POD 发生率的影响。

方法 本研究于 2023 年 8 月至 2024 年 1 月在西南医科大学附属医院进行，通过随机、双盲、对照试验，将接受择期全麻下结直肠癌根治术的高脂血症病人以 1：1 的比例被随机分为帕瑞昔布组或安慰剂组。帕瑞昔布组在麻醉诱导前 15min 静脉注射帕瑞昔布 40mg，安慰剂组在同时间静脉注射等剂量生理盐水。术后 3 天是否发生 POD 为主要结局指标(意向性治疗分析)。次要结局是苏醒期谵妄发生率、苏醒延迟发生率、术后第一天 PTGS2 水平、淋巴细胞计数、中性粒细胞计数、白细胞计数、视觉模拟评分法疼痛(Visual analogue scale, VAS)评分、术后住院时间、术后住院死亡率、术后并发症发生率、术后 3 月累积死亡率和累积痴呆发病率。

结果 共 434 例高脂血症病人完成研究，其中帕瑞昔布组 219 例，安慰剂组 215 例。帕瑞昔布组 POD 发生率明显低于对照组(14.16% VS 27.44%, odds ratio, 0.507; 95% confidence interval: 0.336-0.767; P<0.001)。帕瑞昔布组苏醒期谵妄发生率、术后第一天 PTGS2 水平、中性粒细胞计数、白细胞计数、VAS 评分更低(P < 0.05)。两组病人苏醒延迟发生率、术后第一天淋巴细胞计数、术后住院时间、术后并发症发生率、远期死亡率和痴呆率无明显差异。中介分析表明术后第一天 PTGS2 表达水平、VAS 评分和白细胞计数在帕瑞昔布降低 POD 发生率中具有中介作用。限制性立方样条回归发现帕瑞昔布可显著降低炎症诱发的 POD 风险。

结论 麻醉诱导前静脉注射帕瑞昔布可显著降低高脂血症病人 POD 的发生率，降低术后第一天 PTGS2 和炎症细胞计数水平，缓解术后疼痛程度。帕瑞昔布对炎症和疼痛的控制在其降低 POD 发生率中起到中介作用，并且术前炎症水平越高，帕瑞昔布的 POD 预防作用越显著。

PU-1142

不同剂量艾司氯胺酮对全麻患者脑电双频指数的影响

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目的 脑电双频指数（bispectral index, BIS）常在临床中用于监测镇静深度。研究表明，静注 0.25 mg/kg、0.5 mg/kg 和 1 mg/kg 氯胺酮可明显升高全身麻醉患者的 BIS 值。临床工作中需重视这种变

化，忽略会导致麻醉加深和镇静催眠药的过量使用。艾司氯胺酮为氯胺酮的右旋异构体，其药物清除及苏醒更快、副作用更少。艾司氯胺酮 0.25 mg/kg 和 0.5 mg/kg 的临床应用可降低患者的术后疼痛评分和阿片类药物消耗量，改善术后情绪，预防瑞芬太尼引起的痛觉过敏。但其对全麻患者 BIS 的影响研究较少。本研究的目的为观察静脉注射不同剂量的艾司氯胺酮对全麻患者 BIS 的影响。

方法 选择行择期腹腔镜子宫内膜癌、宫颈癌或结直肠癌根治手术患者 57 例，随机分为 0.25 mg/kg 艾司氯胺酮组（E1 组）、0.5 mg/kg 艾司氯胺酮组（E2 组）和对照组（C 组）。当稳定的麻醉和手术条件维持至少 10 min，静脉注射 10 ml 生理盐水（C 组）、0.25 mg/kg 艾司氯胺酮 10 ml（E1 组）或 0.5 mg/kg 艾司氯胺酮 10 ml（E2 组）。分别记录给药前（T0）和给药后 5 min（T1）、10 min（T2）、15 min（T3）、20 min（T4）、30 min（T5）、60 min（T6）、90 min（T7）、120 min（T8）时的 BIS 值、频谱边缘频率（spectral edge frequency, SEF）、EMG 值、HR、MAP 和脑氧饱和度（regional cerebral oxygen saturation, rSO2），记录患者苏醒时间，并于术前一天、术后第一天和术后第二天评估记录患者健康问卷-9（patient health questionnaire-9, PHQ-9）、简易智能状态检查量表（mini-mental state examination, MMSE）和视觉模拟评分（visual analogue score, VAS）。

结果 与 T0 时相比，E1 组 T1-T5 各时点 BIS 值增高（P<0.05），E2 组 T1-T8 各时点 BIS 值增高（P<0.05）；E1 组和 E2 组 T6-T8 各时点 BIS 值较 T1 时下降（P<0.05）；E1 组 T1-T5 各时点和 E2 组 T1-T8 各时点 BIS 值较 C 组高（P<0.05）；E2 组 T1-T8 各时点 BIS 值较 E1 组高（P<0.05）。与 T0 时相比，E1 组 T1-T5 各时点 SEF 值增高（P<0.05），E2 组 T1-T8 各时点 SEF 值增高（P<0.05）；E1 组和 E2 组 T6-T8 各时点 SEF 值较 T1 时下降（P<0.05）；E1 组 T1-T5 各时点和 E2 组 T1-T8 各时点 SEF 值较 C 组高（P<0.05）；E2 组 T1-T8 各时点 SEF 值较 E1 组高（P<0.05）。与 T0 时相比，三组 T1-T8 各时点 EMG 值和 rSO2 值差异无统计学意义（P>0.05）；三组间各时点 EMG 值和 rSO2 值差异无统计学意义（P>0.05）。与 T0 时相比，E2 组 T4 与 T5 时 HR 增高、T2 与 T3 时 MAP 下降（P<0.05）；三组间各时点 HR、MAP 差异无统计学意义（P>0.05）。三组间苏醒时间及术后各时点 PHQ-9、MMSE 和 VAS 评分差异无统计学意义（P>0.05）。

结论 0.25 mg/kg 和 0.5 mg/kg 艾司氯胺酮使全麻患者 BIS 值增高，其 BIS 值增高持续时间不同，SEF 值的变化与 BIS 值相似。

PU-1143

基于蛋白质组学分析脓毒症大鼠急性肾损伤线粒体相关蛋白

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目的 脓毒症急性肾损伤发生机制涉及到多种线粒体蛋白质。本研究利用蛋白质组学分析脓毒症肾损伤中线粒体相关蛋白，评价线粒体相关蛋白在脓毒症大鼠急性肾损伤中的变化情况，为明确脓毒症急性肾损伤的机制提供参考。

方法 健康清洁级 SD 雄性大鼠 12 只，6 ~ 8 周龄，质量 162 ~ 179 g，采用随机数字表法将大鼠分为 2 组（n = 6）：空白组（C 组）和模型组（LPS 组）。采用腹腔注射脂多糖（LPS）10 mg/kg 的方法制备脓毒症大鼠模型。取两组大鼠肾标本组织通过 TMT 定量蛋白质组学分析差异蛋白表达。根据得到的差异蛋白总结出对应的差异表达基因（DEGs），与线粒体数据库（MitoCarta 3.0 数据库）中大鼠的线粒体基因取交集，得到线粒体相关的差异表达基因。筛选线粒体相关的差异蛋白进行基因本体（GO）富集分析、京都基因与基因组百科（KEGG）通路分析和蛋白质-蛋白质相互作用(PPI)网络分析寻找重要枢纽蛋白。

结果 经过 TMT 定量蛋白质组学分析，并进行了差异表达蛋白的筛选，鉴定出空白组与 LPS 组 530 个差异蛋白，其中 280 个上调蛋白，250 个下调蛋白。根据得到的差异蛋白总结出对应的差异表达基因（DEGs），与线粒体数据库中大鼠的线粒体基因取交集，将得到的 50 个线粒体相关差异基因进行 GO 分析结果显示，差异蛋白生物过程（BP）的变化显著富集于翻译、大脑发育、脂肪酸 β-

氧化等；差异蛋白分子功能（MF）的变化主要富集于核糖体的结构成分和磷酸吡哆醛结合；差异蛋白细胞成分（CC）变化主要富集于线粒体及线粒体基质。KEGG 分析结果显示，差异蛋白参与的通路有代谢途径；核糖体；缬氨酸、亮氨酸和异亮氨酸降解；脂肪酸代谢等。构建 PPI 网络，分析蛋白互作连接度，最终确定了 Mrpl39、Mrpl33、Mrpl2、Mrpl4、Mrpl15、Mrpl30、Mrpl45、Mrpl35、Gadd45gip1 等枢纽蛋白。

结论 本研究通过蛋白质组学分析脓毒症大鼠的急性肾损伤机制，筛选相关线粒体蛋白，通过现有的数据库查找可能存在的信号通路，但最终通路有待于进一步实验验证。综上，线粒体核糖体相关蛋白 Mrpl39、Mrpl33、Mrpl2、Mrpl4、Mrpl15、Mrpl30、Mrpl45、Mrpl35 和 Gadd45gip1 等 9 种蛋白的下调与脓毒症 AKI 相关，因此可以作为脓毒症 AKI 新的研究思路。

PU-1144

Effects of parecoxib sodium on early cognitive impairment and inflammation levels in burned rats

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Background While burns can cause pain, large wounds can increase the risk of infection and inflammation. As a selective cyclooxygenase inhibitor, parecoxib sodium can relieve inflammation and thus play an analgesic effect on the one hand, and reduce peripheral and central nervous sensitization on the other hand, affecting cognitive function.
Aim: To study the effect of parecoxib sodium in alleviating inflammation in burned rats and restoring cognitive function in burned rats.
Materials and Methods: SPF grade SD rats (6-8 weeks age, 180-220 g), a total of 30 male and female. They were randomly divided into 6 groups, each group of 5 animals: (1) Blank control group (Group C). (2) Sham surgery group (Group Sham). (3) Second-degree burn model (Group B). (4) Low-dose (1 mg/kg/d) parecoxib sodium (Group L+B). (5) Medium-dose (10 mg/kg/d) parecoxib sodium (Group M+B). (6) High-dose (20 mg/kg/d) parecoxib sodium (Group H+B). ELISA measures inflammatory factor IL-2, IL-6, TNF-α and IFN-γ, cognitive function factor NSE, cortisol and S-100β. Combined with water maze and dark avoidance experiments to further verify the recovery of cognitive function in rats.
Results The contents of IL-2, TNF-α and IL-6 in Group M+B were significantly lower than those in Group Sham ($P<0.05$), and the content of IFN-γ was significantly lower than that in Group Sham ($P<0.05$). The cognitive markers NSE, S-100β and cortisol levels in Group M+B were significantly higher than those in Group Sham at 2h, 1d, 5d and 10d after operation ($P<0.05$). In the Group M+B dark-avoidance experiment, the number of probes and errors were not significantly different than those in Group Sham and Group C ($P>0.05$), and the number of times Group M+B found a platform in the water maze experiment and crossed the platform was second only to Group B and Group C.
Conclusions Parecoxib sodium can effectively reduce inflammation in burn rats and promote cognitive recovery in burn rats, and the optimal dose of parecoxib sodium for burn rats is 10 mg/kg.

PU-1145

Sodium butyrate inhibits ferroptosis and ameliorates intestinal ischemia-reperfusion injury by modulating the NRF2/SLC7A11/GPX4 pathway

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Purpose: Sodium butyrate, a short-chain fatty acid produced by the metabolism of intestinal flora, has been shown to have a protective effect against intestinal ischemia reperfusion injury (IRI), but its effect on intestinal IRI-associated ferroptosis has not yet been demonstrated.This experiment was conducted to investigate whether sodium butyrate could affect intestinal ischemia-reperfusion injury by inhibiting ferroptosis.

Methods This experiment used the superior mesenteric artery occlusion model of SPF grade male C57BL mice to explore the effect and principle of sodium butyrate on intestinal IRI-related ferroptosis. We assessed the role of sodium butyrate by constructing mice intestinal IRI models and determining the extent of intestinal tissue damage and changes in ferroptosis-related factors. In this experiment, 36 healthy male C57BL/6 mice of SPF grade with body mass of 20-23 g were selected and divided into 6 groups (n=6) by randomized numerical table method: sham surgery group (SHAM group), intestinal ischemia reperfusion group (IR group), intestinal ischemia reperfusion+sodium butyrate group (IN group), intestinal ischemia reperfusion+sodium butyrate+FER-1 group(INF group), intestinal ischemia reperfusion+sodium butyrate+erastin group (INE group), and intestinal ischemia reperfusion+sodium butyrate+ML385 group (INM group). In the SHAM group, only the SMA was isolated, while the remaining five groups underwent intestinal ischemia-reperfusion modeling. The IN, INF, INE and INM groups were gavage with sodium butyrate 500 mg/kg daily for 7 days prior to modeling. On the other hand, the SHAM and IR groups were injected with equal amounts of saline 7 days prior to modeling. Additionally, FER-1, erastin, and ML385 were intraperitoneally injected into the INF, INE, and INM groups at doses of 5 mg/kg, 10 mg/kg, and 30 mg/kg in the three groups, respectively, 1 h before modeling. HE staining was used to observe tissue damage and calculate the score, WB was used to detect the expression of Nrf2, GPX4, SLC7A11 and FTH1, and ELISA was used to detect the levels of Fe2+, MDA, GSH, and GSH/GSSG.

Results Results showed that intestinal IRI mice exhibited increased tissue damage, massive infiltration of inflammatory cells, severe disruption of villous structure and elevated MDA compared to the sham group. The corresponding tissue damage score was also elevated. In addition, GSH and GSH/GSSG were decreased and Fe2+ was increased in the IR group compared to the SHAM group. At the same time, the protein levels of the ferroptosis negative regulators GPX4, FTH1 and SLC7A11 were downregulated, whereas sodium butyrate reversed the changes in the above factors. Fe2+ declined in the INF group, and GSH and SLC7A11 did not change significantly compared with the IN group, although the changes in the IN group were reversed by the addition of erastin, an inducer of ferroptosis. Compared with the IN group, GSH, GSH/GSSG, GPX4, FTH1 and SLC7A11 decreased in the INM group, and Fe2+ increased in the INM group. The results of HE staining and HE score also showed that tissue damage was more severe in the INM group than in the IN group. Although there was a decrease in MDA in the INM group compared to the IN group, it was not statistically significant. In addition, NRF2 rose in the IN group compared to the IR group and decreased after the addition of an NRF2 inhibitor.

Conclusion This experiment demonstrates that sodium butyrate regulates the SLC7A11/GPX4 pathway by up-regulating NRF2, thereby inhibiting ferroptosis and attenuating intestinal IRI.

PU-1146

Perioperative Management of Severe Pulmonary Hypertension: A Case Report

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Perioperative management of pulmonary hypertension (PH) is challenging. The most common causes of mortality are respiratory failure and heart failure . Patients with severe PH have an even higher mortality, as high as 25%. Furthermore, if a patient has severe PH and concurrent left failure, the optimal regimen for such a patient remains to be defined.

This case report discusses the complex perioperative management of a 71-year-old female with PH, systemic hypertension, atrial fibrillation, diabetes mellitus, chronic kidney disease stage III, sleep apnea syndrome, and T4a squamous cell carcinoma of the mandibular gingiva was admitted for elective oral cancer composite resection (OCCR), pectoralisflap, tracheostomy, and percutaneous placement of gastrostomy tube. Five months prior to this admission she was hospitalized with acute on chronic hypoxic, hypercarbic respiratory failure and acute on chronic diastolic right heart failure. Right heart catheterization was performed at that time showing right atrial pressure of 20 mmHg, pulmonary arterial pressure of 93/33/53 mmHg, pulmonary wedge pressure of 21/33/24 mmHg, and pulmonary arterial O2 saturation of 45.9% in the setting of a femoral arterial O2 saturation of 89%. Transthoracic echocardiography (TTE) showed an estimated right ventricular systolic pressure greater than 100 mmHg, severe tricuspid regurgitation, mildly dilated left atrium, mildly dilated right atrium, normal right ventricular size and function, and normal left ventricular ejection fraction. Her current medications included carvedilol, furosemide, and losartan. She was 162 cm tall and weighed 87 kg (body mass index [BMI] = 33.15 kg/m2). Her airway examination revealed oropharyngeal class III and reduced oral opening (large tongue). Her hemoglobin was 10.3 g/dl and other laboratory test values were within normal range. Chest CT showed an enlarged pulmonary artery, enlarged right atrium and right ventricle, and dilated inferior vena cava consistent with chronic pulmonary hypertension. Severe tricuspid regurgitation where intraoperative trans-esophageal echocardiography was not feasible. Routine monitoring consisting of a blood pressure cuff, pulse oximeter and 5 lead ECG, was applied prior to induction. After adequate pre-oxygenation, induction was achieved with ketamine 100 mg IV, propofol 30 mg IV, and succinylcholine 100 mg IV. A 7 mm oral endotracheal tube (ETT) was inserted uneventfully with direct laryngoscopy. Brachial arterial line and femoral central venous line were placed after intubation. Her baseline of arterial blood pressure was 170/62 mmHg and CVP was 21 cmH2O. Intraoperative anesthesia was maintained with ketamine (5-10 mcg/kg/min) and isoflurane 1% throughout the surgery with intermittent administration of cisatracurium. Inhalation of epoprostenol 50 ng/kg/min was initiated immediately after intubation via an in-line nebulization device placed in the inspiratory arm of the anesthetic circuit. Approximately 1 hour after surgical incision the peak inspiratory pressure (PIP) gradually increased from 30 to 50 cmH2O and the tidal volume decreased to less than 200 ml. This occurred around the time when the oral ETT was removed and 7.0 reinforced tracheal tube was placed into the newly created tracheostomy. Inappropriate placement of ETT was suspected, but correct placement of ETT was confirmed with bronchoscopy and auscultation of the breath sounds. In addition, the A-a gradient increased in association with the PIP increase. This pattern suggested pulmonary edema as a cause of decreased lung compliance. A pulmonary process was suspected as possible improvement of right heart output relative to the left heart might occur because of using inhaled epoprostenol resulting in pulmonary edema. Based on this presentation, the epoprostenol therapy was terminated. A 60mg furosemide IV bolus was administered and infusion of epinephrine 5 mcg/min began. Peak inspiratory pressure gradually decreased to 38 cmH2O and tidal volume increased to 400 ml per breath after 15 minutes. Hemodynamics remained stable afterward. Blood gas values were as follows: pH 7.49, pCO2 35 mmHg, pO2 238 mmHg, HCO3- 27 mmol/L, BE 3.3, Lactate 0.6 mmol/L, arterial O2 saturation 99%. Her airway pressure gradually returned to the baseline and maintained relatively stable in the rest

of her surgery time. The surgery lasted about 7.5 hours with estimated blood loss 440 mL, urine output 2155 ml, and Plasmalyte 1900 ml IV infusion. The patient was breathing spontaneously via a #6 tracheostomy tube and transported to the ICU. She was later ventilated in the ICU with SIMV and a tidal volume of 480ml, PEEP of 8cm H2O, and FiO2 of 40%. She was also managed with a fentanyl infusion and epinephrine infusion. She underwent further diuresis with resolution of her pulmonary edema on post operation serial chest x-rays. She was discharged to a nursing facility on post operation day #9.

We can not be sure what produced the reduction of her PIP and A-a gradient after termination of inhaled epoprostenol and starting the epinephrine infusion. Recognition of possible pulmonary edema and alteration of intraoperative management improved these derangements and allowed the case to be completed. In the ICU, we followed the same approach to manage her severe PH and diastolic heart failure. She responded well to further diuresis and maintenance of normoxia without additional pulmonary vasodilator therapy.

The case underscores the challenges in managing patients with severe PH, emphasizing the need for close monitoring of cardiac function and cautious use of pulmonary vasodilators. The patient's favorable response to diuresis and normoxia without additional pulmonary vasodilator therapy highlights the importance of individualized perioperative management strategies in such complex cases.

PU-1147

不同剂量地氟烷对高血压老年患者髋关节置换术后谵妄的影响

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目的 探讨不同剂量的地氟烷对高血压老年患者髋关节置换术后谵妄的影响，为临床术中地氟烷应用剂量提供新思路。

方法 将 135 名拟进行髋关节置换术的老年患者，按区组随机分组法分为标准剂量组（C 组）、小剂量组（D2 组）、大剂量组（D1 组），术中分别采用相应剂量地氟烷及静脉药物进行麻醉维持至手术结束，对患者手术后谵妄以及苏醒时间进行观察。记录患者术中心率（HR）、平均动脉压（MAP）和 BIS 值，记录比较 3 组患者的苏醒时间和患者苏醒状态；分别于术前 2h、术后 2h、4h、24h、48h、72h 时，应用谵妄评分量表（CAM）评估比较 3 组患者术后谵妄的发生情况。

结果 与大剂量组相比，标准剂量组和小剂量组患者术后谵妄发生率较高剂量组患者谵妄发生率低，差异均有统计学意义(P<0.01) ；大剂量组、小剂量组和标准剂量组术后谵妄患者术中发生低血压，且此类患者术后苏醒时间延长，患者术后谵妄的发生可能与术中低血压的发生有关。

结论 本研究基于地氟烷的药理作用研究地氟烷的剂量对高血压老年患者髋关节置换术后谵妄的影响,发现剂量较大时患者术后谵妄的概率较高,其作用可能与患者术中低血压的发生有关。

PU-1148

艾司氯胺酮对老龄大鼠术后认知功能障碍的改善作用与 STING/TBK1 信号通路的关系

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目的 探讨艾司氯胺酮对老龄大鼠术后认知功能障碍（POCD）的作用及相关机制。

方法 实验 I 清洁级健康雄性 24 月龄 Sprague-Dawley（SD）大鼠 72 只，按随机数字表法分为四组（n =18）：对照组（Sham）、剖腹探查组（POCD）、剖腹探查+生理盐水组（POCD+S）、剖腹探查+艾司氯胺酮组（POCD+ES）。POCD 组大鼠用剖腹探查术构建模型，Sham 组大鼠只进行麻醉和消毒。POCD+ES 组大鼠手术结束后立即腹腔注射艾司氯胺酮（10 mg/kg）。实验Ⅱ 36 只大鼠随机分为三组（n =12）：POCD + ES + S（PES 组）、POCD + ES + C-176（PEC 组）、POCD + ES + ADU-S100（PEA 组），于手术结束后即刻腹腔内注射艾司氯胺酮和 C-176（STING 抑制剂，15 mg/kg）/ADU-S100（STING 激活剂，20 mg/kg）。术后 30 天旷场实验检测大鼠的运动能力和探索行为，通过新物体识别实验、Morris 水迷宫实验检测大鼠的认知功能；免疫荧光检测大鼠海马和 vmPFC 区 β 淀粉样蛋白（Aβ-42）阳性神经元细胞百分比，星形胶质细胞的活化情况，以及 γ-氨基丁酸（GABA）阳性星形胶质细胞百分比；通过蛋白质印迹法（Western blot）检测大鼠海马和 vmPFC 区 STING、TBK1（t-TBK1）、磷酸化 TBK1（p-TBK1）的表达水平。
结果 实验 I 旷场实验结果显示，四组大鼠的运动总路程没有显著差异（P >0.05）。与 Sham 组对比，POCD 和 POCD+S 组大鼠新物体指数（DR）明显降低，水迷宫逃避潜伏期明显延长，穿越平台次数和在目标象限运动距离百分比明显减少，Aβ-42 阳性神经元比例增多，星形胶质细胞激活增多，GABA 阳性星胶比例明显增多，STING、p-TBK1 的表达明显增多（均 P <0.05）；与 POCD 组相比，POCD + ES 组大鼠应用艾司氯胺酮后 DR 明显升高，逃避潜伏期缩短，穿台次数增多，目标象限运动距离百分比增加，Aβ-42 阳性神经元比例减少，星形胶质细胞激活减少，GABA 阳性星胶比例明显降低，STING、p-TBK1 的表达明显降低（均 P <0.05）。实验Ⅱ PES、PEC、PEA 三组之间的运动总路程没有显著差异（P >0.05）。与 PEC 和 PES 组对比，PEA 组大鼠 DR 减小，逃避潜伏期延长，穿越平台次数减少，在目标象限运动距离百分比减小，p-TBK1 的表达上调（均 P <0.05）。与 PES 和 PEA 组相比较，PEC 组 DR 增大，逃避潜伏期缩短，穿越平台次数增多，目标象限运动距离比例增加，p-TBK1 的表达下降（P <0.05）。
结论 艾司氯胺酮对老龄大鼠术后认知功能障碍的保护作用可能与抑制 STING/TBK1 信号通路激活有关

PU-1149

机械通气引发肺部菌群失调:预防和治疗机械通气肺损伤的新靶点

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目的 本文章通过梳理近几年关于机械通气及肺部菌群的文献作一综述，认为机械通气引发肺部菌群失调将会是预防和治疗机械通气肺损伤的新靶点，为围术期肺损伤提供新的保护思路！
方法 梳理近几年肺部菌群在机械通气的相关文献，查找肺部菌群与机械通气肺损伤中的联系。
结果 机械通气作为全麻术中呼吸支持的手段，可能从以下几个方面影响呼吸道菌群的变化:1.机械通气的持续时间，2.体位的影响，3.高氧环境，4.呼吸道清理能力的损伤等
结论 呼吸机相关肺损伤（VILI）对肺部微生物群落多样性及其相关生物（生理、细胞和分子）和非生物（物理、化学）机制的影响的相关研究可以帮助我们在单细胞转录组水平上理解 VILI 如何影响肺细胞功能，如何改变肺部的局部免疫微环境，以及如何最终导致局部肺部微生物群落的多样性变化。预防 VILI 可减轻多器官功能衰竭，提高生存率，随着对相关的细胞和分子机制有了更深入的了解，可以在 VILI 的治疗过程中补充新的临床方法（例如益生菌，药物），从而在维持肺部微生物群落多样性的同时进一步探索如何调节肺部微生物群落多样性，以及调节微生物群落的最佳时机，以实现的机会病原性疾病治疗过程的更科学和高效的临床管理。

PU-1150

探究颈上交感神经节阻滞对大鼠心肌 I/R 损伤的作用及其与铁死亡关系。

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目的 探讨颈上交感神经节阻滞对大鼠心肌 I/R 损伤的作用及其与铁死亡关系。
方法 30 只 SPF 级成年雄性 SD 大鼠，体重 250-300g，依照随机数字表法分为三组(n=10):对照组(C 组)、缺血再灌注组(R 组)、颈上交感神经节阻滞组(S 组)。制备大鼠心梗模型，当出现心尖部及左心室壁颜色由红变白伴心室壁运动减弱 ST 段弓背向上抬高时提示缺血成功。缺血成功 30min 后，B 组行左侧颈上交感干离断术,松开结扎线可见心尖及左心室颜色逐渐恢复红润且 ST 段恢复提示再灌注成功并持续 120min。对照组(C 组)丝线仅穿过左冠状动脉前降支，但不结扎;S 组左冠状动脉前降支结扎 30min，使用罗哌卡因行星状神经节阻滞后恢复血供 120min。记载手术前(T o)，结扎 30min(T1)，再灌注后 30min(T2)、再灌注后 60min (T3)、再灌注后 120min(T4)时刻的心率(HR)以及平均动脉压(MAP);再灌注结束颈动脉取血后处死大鼠，采用 ELISA 法测定 3 组大鼠血清中肌钙蛋白 I(cTnl)浓度、心肌组织中 MDA、Fe^{2+}含量及 SOD 活性，HE 染色法检测心肌 I/ R 损伤表型，Western blot 法检测核因子 E2 相关因子 2(NRF2)、谷胱甘肽过氧化物酶 4(GPX4)、长链脂酰辅酶 A 合成酶家族成员 4(ACSL4)来揭示铁死亡水平。
结果 三组大鼠 To 时刻血压无统计学差异，T1 时刻，R 组、S 组与 C 组比较血压明显下降(P<0.05)，T2-T4 时刻，R 组、S 组与 C 组比较血压仍明显下降，但 S 组血压高于 R 组的血压(P<0.05)。随着时间的推移，C 组大鼠血压变化不大，R 组血压逐渐下降，S 组血压于再灌注后趋于平稳。与 C 组比较，R 组和 S 组心肌损伤加重、血清 cTnl 浓度、心肌 MDA、Fe2+含量升高，SO D 活性降低，心肌 ACSL4 表达上调，NRF2、GPX4、表达下调(P<0.05);与 R 组比较，S 组心肌损伤减轻、血清 cTnl 浓度、心肌 MDA、Fe2+含量下降，SOD 活性升高，心肌 ACSL4 表达下调，NRF2、GPX4、表达上调(P<0.05)。
结论 本研究揭示了 SGB 通过调节 NRF2/System xc-/GPX4 轴抑制铁死亡发挥心脏保护作用。我们的研究提示 NRF2/System xc -/GPX4 轴介导的铁死亡是治疗心肌 I/R 损伤的一个有前景的靶点。

PU-1151

USP24 经泛素-蛋白酶体途径稳定 SLC7A11 降解抑制急性肺损伤的铁死亡

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目的 1.探究急性肺损伤患者肺泡灌洗液中 SLC7A11 的表达及是否参与急性肺损伤发病;2.阐明 SLC7A11 在肺泡上皮细胞铁死亡中的作用;3.探究 USP24 经泛素-蛋白酶体途径参与 SLC7A11 抑制的肺泡上皮细胞铁死亡的具体分子生物学机制。
方法 1.观察 SLC7A11 的蛋白表达:使用 ELISA 检测急性肺损伤患者支气管肺泡灌洗液中 SLC7A11 的表达情况。
2.研究 SLC7A11 基因敲除对肺泡上皮细胞的影响:构建沉默 SLC7A11 的稳转肺泡上皮细胞系,分析细胞氧化应激和铁死亡水平。WB 检测 Nrf2、NQO1 和 HO-1 以及抗铁死亡分子 GPx4 的表达水平。RT-q PCR 检测 GPx4 和 SLC7A11 的 m RNA 水平。检测细胞中 SOD 活力和 MDA 及 ROS 水平。
3.研究 USP24 干预对 SLC7A11 诱导的肺泡上皮细胞铁死亡的影响:敲低 USP24 后检测细胞

SLC7A11 的表达,分析细胞氧化应激和铁死亡水平。WB 检测抗氧化因子 Nrf2、NQO1 和 HO-1 的表达水平。SOD、MDA 和 ROS 检测试剂盒检测细胞中 SOD 活力和 MDA 及 ROS 水平。
4.研究 USP24 去泛素化 SLC7A11 进而稳定其蛋白表达:用蛋白质合成抑制剂 CHX 或蛋白酶体抑制剂 MG132 干预细胞后采用 WB 检测不同时间点 SLC7A11 蛋白水平。通过质粒转染构建 USP24 过表达细胞及沉默 USP24 的细胞。用 CHX 干预对照组细胞和过表达/沉默 USP24 的细胞后在不同时间点采用 WB 检测 SLC7A11 蛋白表达分析 SLC7A11 的稳定性。免疫沉淀(Immunoprecipitation,IP)探讨 USP24 和 SLC7A11 的蛋白互作。利用过表达或沉默 USP24 的细胞进行内源性多聚泛素化 SLC7A11 蛋白的 IP 反应,使用抗 Ub 抗体检测 SLC7A11 蛋白的泛素化水平探讨 USP24 是否直接通过去泛素化调节 SLC7A11。
结果 1. SLC7A11 参与急性肺损伤发生发展:ELISA 结果显示, SLC7A11 在急性肺损伤患者支气管肺泡灌洗液中表达显著降低。
2.沉默 SLC7A11 诱导肺泡上皮细胞铁死亡:WB 和 RT-qPCR 检测显示,沉默 SLC7A11 均可导致抗氧化因子 Nrf2、NQO1 和 HO-1 蛋白表达减少。肺泡上皮细胞中 SOD 的活力,诱导脂质过氧化产物 MDA 和活性氧 ROS 水平升高。
3.USP24 去泛素化 SLC7A11 进而稳定蛋白表达: SLC7A11 可被蛋白酶体降解:在 BEAS-2B 细胞中,CHX 随时间逐渐下调 SLC7A11 的蛋白表达。使用蛋白酶体抑制剂 MG132 随时间抑制 SLC7A11 的降解。细胞中转染不同浓度的 USP24 过表达质粒,发现 SLC7A11 的蛋白表达水平随转染的 USP24 过表达质粒浓度升高而升高。
4.USP24 维持 SLC7A11 蛋白的稳定性并存在蛋白互作: IP 结果显示, SLC7A11 蛋白和 USP24 蛋白易于同彼此发生免疫共沉淀,在抗 USP24 免疫沉淀物中检测到了 SLC7A11 蛋白,反过来,在抗 SLC7A11 免疫沉淀物中检测到了 USP24 蛋白。
5.USP24 稳定 SLC7A11 抑制肺泡上皮细胞铁死亡:ALI 诱导 USP24 表达下调促进了 SLC7A11 的蛋白水平降低进而调节铁死亡。
结论 1. SLC7A11 缺失加重急性肺损伤发病;2. SLC7A11 显著抑制肺泡上皮细胞铁死亡;3. USP24 表达下调促进了 SLC7A11 经泛素-蛋白酶体途径降解最终导致肺泡上皮细胞铁死亡。

PU-1152

3MA administration alleviates ADHD-like behavior of offspring mice induced by S-ketamine exposure by inhibiting astrocyte pyroptosis in amygdala

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ABSTRACT
Background Attention deficit hyperactivity disorder (ADHD) is a chronic developmental nervous system dysfunction characterized by inattention, hyperactivity and impulsivity. 3-methyladenine (3MA) as a novel autophagy inhibitor, reduces programmed necrosis by inhibiting the combination and nuclear translocation of RIP3 and AIF. Herein, we aimed to investigate whether 3MA mitigates ADHD-like behavior in offspring mice after S-ketamine exposure.
Methods SPF healthy C57BL/6 wild-type pregnant mice were injected with S-ketamine intraperitoneal injection to establish an ADHD model of offspring mice. Twelve offspring of pregnant mice exposed to S-ketamine were divided into 2 groups (n=6) by a random number table method at 14 days after birth: ADHD + normal saline group (AN group) and ADHD + 3MA group (AM group). Twelve offspring of pregnant mice exposed to normal saline were divided into 2 groups (n=6) by a random number table method at 14 days after birth: control + normal saline group (CN group) and

control + 3MA group (CM group). CM group and AM group were intraperitoneally injected with 3MA 15 mg/kg once a day for 7 consecutive days; CN group and AN group were replaced with equal volume normal saline. After intraperitoneal administration, open field test (OFT), elevated plus-maze test (EPM), new object recognition test (NOR) and fear conditioning (FC) were used to evaluate the behavious. Whole brain electrodes were implanted in mice 21 days after birth, and local field potential (LFP) was recorded in FC 7 days after recovery for subsequent electrophysiological signal analysis. After the behavioral experiment, the mRNA of related autophagy factor was detected in the amygdala of mice. The number of positive cells in the amygdala region of NLRP3, IL-18, IL-1β, cleaved caspase-1, and GABA were detected by immunofluorescence. Western blotting detected the expression of autophagy and pyroptosis related proteins.

Results Compared with the CN group, the cross-cell times and the percentage of central area residence time of mice in group AN increased in the OFT, the number of mice entering the open arm and the proportion of open arm residence time increased in the EPM, the percentage of new object exploration and the RI in the NOR decreased, and the percentage of freezing time in the FC decreased. Compared with the AN group, the cross-cell number and central area residence time percentage of mice in the AM group decreased in the OFT, the number of mice entering the open arm and the proportion of open arm residence time decreased in the EPM, the percentage of new object exploration and the RI in the NOR increased, and the percentage of freezing time in the FC increased. Compared with the AN group, the AM group increased the power of θ oscillation in the amygdala region. We detected cytokines and chemokines related to autophagy in the amygdala, and found that compared with the CN group, PI3K mRNA level in the amygdala of AN group was increased, while compared with AN group, PI3K mRNA level in AM group was decreased. The results of immunofluorescence showed that 3MA reversed the increase of pyroptosis related factors in the amygdala of ADHD mice and alleviated neuronal damage. WB results showed that 3MA down-regulated NLRP3, IL-18, IL-1β, cleaved caspase-1, PI3K, LC3-II/I ratio in the amygdala of ADHD mice.

Conclusions：Autophagy inhibitor 3MA alleviates ADHD-like behavior of offspring mice after S-ketamine exposure, and its mechanism may be related to inhibiting autophagy dependent pyroptosis of astrocytes in amygdala region.

PU-1153

Unveiling the Link: Obesity's Role in Acute Respiratory Distress Syndrome (ARDS) - A Mendelian Randomization Study

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Abstract

Background Evidence from observational and clinical trials suggests a potential causal relationship between obesity and lung injury, but this remains to be confirmed. Therefore, we aimed to demonstrate the causal relationship between obesity and ARDS through MR analysis.

Methods We conducted a two-sample Mendelian randomization (MR) study using large-scale genome-wide association summary data with sample sizes ranging from 454,137 to 462,166. We primarily used Inverse Variance Weighted (IVW) method to assess the causal relationship between circulating CRP levels and ARDS risk. MR-Egger regression and MR-PRESSO global tests were employed to determine pleiotropy. Cochran's Q test was utilized to test for heterogeneity. Leave-one-out analysis validated the robustness of the results. Additionally, multi-omics integrative analysis and enrichment analysis were performed to speculate on potential molecular mechanisms.

Results IVs extracted from exposure indicators BMI (OR=1.78, 95%CI=1.05-3.04, P=0.033), WC

(OR=2.46, 95%CI=1.23-4.92, P=0.011), WFM (OR=1.88, 95%CI=1.07-3.29, P=0.027) showed no significant level of pleiotropy, heterogeneity, or bias. MR analysis revealed a causal relationship between elevated circulating obesity levels and increased ARDS risk. Furthermore, potential genes and pathways were identified through multi-omics integrative analysis.
Conclusion Current research indicates that higher levels of obesity may increase the risk of ARDS in individuals of European ancestry.

PU-1154

小剂量艾司氯胺酮复合星状神经节阻滞对老年全髋关节置换患者术后早期认知功能的影响

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目的 探讨小剂量艾司氯胺酮复合星状神经节阻滞（SGB）对老年全髋关节置换患者早期术后认知功能障碍（POCD）的影响。
方法 选取 2024 年 7-12 月，年龄 65-90 岁、ASA 分级 I～III 级、拟于椎管内麻醉下行全髋关节置换术患者 128 例，按照随机数字表法分为试验组（0.25mg/kg 艾司氯胺酮+星状神经节阻滞）64 例与对照组（等量的生理盐水+星状神经节阻滞）64 例。两组均行椎管内麻醉后，试验组给予 0.25mg/kg 艾司氯胺酮处理，对照组予以等量的生理盐水处理。记录两组患者在入手术室时（T0）、给药+神经阻滞后即刻（T1）、给药+神经阻滞后 30min（T2）、手术切皮时（T3）、手术开始后 1h（T4）、手术结束时（T5）、术后 24h（T6）心率（HR）和平均动脉压（MAP）。于术前 1d 和术后 1 天（T7）、术后 2d（T8）、术后 3d（T9）采用简易智能状态检查量表（MMSE）进行评分，同时测定神经特异性烯醇化酶（NSE）和 S100β 蛋白浓度，并记录术后认知功能障碍（POCD）发生情况。此外，记录患者术后 3h、24h、48h 疼痛评分及发生恶心、呕吐、低血压、头痛等不良反应情况。
结果 在 T1、T2、T3、T4、T5、T6 点，试验组患者的平均动脉压（mean arterial pressure）、心率（heart rate，HR）均低于对照组（P<0.05）。与术前相比，两组术后 MMSE 评分均显著下降（P<0.05），试验组在 T7、T8、T9 时 MMSE 评分均显著高于对照组，（P<0.05）。术后 2、3d 试验组 POCD 发生率显著低于对照组（P<0.05）。试验组术后 3h、24 h、48h 疼痛评分均低于对照组（P<0.05）。两组恶心、呕吐、低血压、头痛等不良反应发生率比较无统计学意义（P>0.05）。两组术后 S100β 蛋白水平均较术前显著上升（P<0.05），术后 1、2、3d 试验组 S100β 蛋白水平显著低于对照组（P<0.05）。
结论 小剂量艾司氯胺酮复合星状神经节阻滞能够稳定老年全髋关节置换患者血流动力学，减少术后疼痛感及不良反应，提高患者术后早期认知功能，降低早期 POCD 的发生率,安全性高，值得临床推广。

PU-1155

超声引导下星状神经节阻滞对单肺通气老年患者肺内分流及脑氧代谢的影响

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目的 观察超声引导下的星状神经节阻滞（SGB）对单肺通气的老年患者肺内分流和脑氧代谢的影

响

方法 96 例计划接受全麻胸外科手术的患者，年龄范围在 60-80 岁之间，随机分配到两个组别：SGB 组和对照组（对照组），每组各 48 人。在全麻诱导之前，SGB 组行超声引导下通气侧 SGB，注入 0.25%的罗哌卡因和 1%的利多卡因混合液 4 mL。两组患者在全麻诱导插管后均行右侧锁骨下颈内静脉置管术，术中静吸复合维持麻醉。在手术开始即刻（T0），单肺通气前（T1），单肺通气 15 min 后（T2）、30 min 后（T3）、60 min（T4），以及恢复双肺通气 15 min 后（T5），监测并记录患者在手术过程中不同时间点的生理指标，包括平均动脉压（MAP）和心率，并进行桡动脉血和颈内静脉球部血的血气分析，计算肺内分流量和氧合指数（OI）。同时，记录颈静脉血氧饱和度（SvO2）和阻滞侧脑氧饱和度（rSO2）数值，通过公式计算脑氧耗量（Ca-vO2）、脑氧摄取率（CERO2）。记录与 SGB 相关的并发症，以及术后 72 h 内肺部并发症的发生情况。

结果 SGB 组患者在手术过程中的心率较对照组低，MAP 也比对照组更稳定（P <0.05）。单肺通气后，两组患者的肺内分流量增加，动脉氧分压（PaO2）下降，对照组区域 rSO2 呈下降趋势（P<0.05）。在 T2-T5 时间点上，SGB 组的 OI 高于 CN（P<0.05），而肺左右分流比（Qs/Qt）低于对照组（P<0.05）。在 T2~T4 时间点，对照组 SvO2、rSO2 较术前明显下降（均 P＜0.05），同时伴随 Ca-vO2、CERO2 升高（均 P＜0.05），而 SGB 组 SvO2、rSO2 及 Ca-vO2、CERO2 较术前的变化差异无统计学意义（均 P>0.05）。组间比较显示，在 T2、T3 时点，SGB 组 SvO2、rSO2 比对照组高（均 P＜0.05），而 Ca-vO2、CERO2 比对照组低（均 P＜0.05）。SGB 组有 2 例出现单侧喉返神经阻滞症状和 1 例出现臂丛神经阻滞，均未予特殊处理，于术后 24h 内好转。两组均未出现严重肺部并发症。

结论 超声引导下 SGB 有助于减少单肺通气期间的肺内分流，改善术中氧合和脑氧代谢，具有一定的脑保护作用。

PU-1156

The effect of intranasal insulin pretreatment on postoperative delirium and NLRP3/Caspase-1/IL-1 β pathway in elderly patients with esophageal cancer undergoing radical surgery

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Background To investigate the effect of intranasal insulin pretreatment on postoperative delirium and NLRP3/Caspase-1/IL-1 β pathway in elderly patients undergoing esophageal cancer radical surgery. Material/Methods Sixty elderly patients who planned to undergo elective esophageal cancer radical surgery were randomly divided into a control group (Group C) and an insulin group (Group I) using a random number table method, with 30 cases in each group. Group I started administering rapid acting insulin via nasal route 2 days before surgery (30U/dose, 2 times/day) until the last dose was administered 10 minutes before anesthesia on the day of surgery. Group C was given an equal volume of physiological saline using the same method. The incidence of postoperative delirium was assessed by CAM-ICU on the first day (T1), the second day (T2) and the third day (T3) after surgery. Before the first intervention (T0), T1, T2, T3, ELISA was used to detect the concentration of peripheral blood inflammatory factor IL-1β, and qRT-PCR was used to detect the expression of NLRP3 mRNA and Caspase-1 mRNA in peripheral blood mononuclear cells. Results Compared with group C, the incidence of delirium three days after operation in group I was decreased (P<0.05)；the concentration of IL-1β in peripheral blood decreased at T1-3 (P<0.05); the mRNA expressions of NLRP3 and Caspase-1 were down-regulated at T1-3 (P<0.05). Conclusions Nasal insulin pretreatment before operation can reduce the incidence of

delirium 1-3 days after radical resection of esophageal cancer in elderly patients. The mechanism may be related to the down-regulation of NLRP3/Caspase-1 signaling pathway by intranasal insulin. Trial registration The trial is registered with the Chinese Clinical Trials Registry (Date: 22/02/2022 Number: ChiCTR2200056906)

PU-1157

地氟醚通过 let-7b-5p/HOXA9 轴减轻 LPS 诱导的急性肺损伤

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目的 探索地氟醚在对急性肺损伤的保护作用的机制，为肺保护寻求新的可能靶点。
方法 用脂多糖（LPS）孵育 BEAS-2B 细胞，建立 ALI 细胞模型。用流式细胞技术观察地氟醚对 LPS 诱导细胞凋亡的抑制作用，并用酶联免疫吸附试验（ELISA）检测炎症细胞因子水平。双荧光素酶活性、染色质免疫沉淀（ChIP）和 RNA 下拉分析验证了 let-7b-5p、同源盒 A9（HOXA9）和细胞因子信号抑制因子 2（SOCS2）之间的相互作用。
结果 地氟醚可以缓解 LPS 诱导的 BEAS-2B 细胞活力下降、炎症反应和细胞凋亡。地氟醚抑了 LPS 诱导的 BEAS-2B 细胞上 let-7b-5p 的表达，从而改善了 LPS 诱导的细胞损伤。进一步探究机制发现，let-7b-5p 靶向结合 HOXA9 并抑制其表达，而 HOXA9 通过增强 SOCS2 转录抑制 NF-κB 通路。HOXA9 过表达减弱了 let-7b-5p 模拟物对 LPS 诱导的细胞损伤的促进作用。结论：Des 通过降低 let-7b-5p 的表达来升高 HOXA9 的表达，从而通过转录升高 SOCS2 的表达来抑制 NF-κB 通路的激活，从而减轻 LPS 诱导的 ALI。
结论 地氟醚可能通过 let-7b-5p/HOXA9/SOCS2 轴抑制 ALI 中的炎症反应和肺泡上皮细胞损伤，从而产生肺保护作用。该研究为 ALI 提供了潜在的分子靶点。

PU-1158

基于肺超声指导个体化肺保护通气对老年患者围术期膈肺功能的影响

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目的 探讨基于肺超声指导个体化肺保护性通气策略对老年结肠癌根治患者围术期膈肺功能的影响。
方法 选择择期全麻腹腔镜结肠癌根治手术老年患者 71 例，男 36 例，女 35 例，年龄 66～85 岁，ASAⅡ级或Ⅲ级，BMI 18.5～27.9 kg/m2。采用数表法随机分为两组：T-LP 组（36 例），采用传统肺保护性通气策略，设置为低潮气量（tidal volume，VT）为 6ml/kg、持续固定呼气末正压（positive end-expiratory pressure，PEEP）为 5cm H2O 和固定肺复张（lung recruitment maneuver，RM）气道峰压（airway peak pressure，Ppeak）30cmH2O；U-LP 组（35 例），基于肺超声实施个体化肺保护性通气组，设置为低 VT 为 6ml/kg，在肺超声扫查下滴定个体化 PEEP 和个体化 Ppeak-RM。记录麻醉诱导前、麻醉后气腹前、气腹后 30min、1h、2h 及拔管后 30min 的氧合指数（oxygenation index，OI）和呼吸指数（respiratory index，RI）；记录麻醉诱导前与拔管后 30min 平静呼吸（quiet breathing，QB）和深呼吸（deep breathing，DB）期间膈肌偏移（diaphragm excursion，DE）[平静呼吸膈肌偏移（DEQ）、深呼吸膈肌偏移（DED）]，及膈肌增厚分数（diaphragmatic thickening fraction，DTF）[平静呼吸膈肌增厚分数（DTFQ）、深呼吸

膈肌增厚分数（DTFD）]等膈肌超声监测指标；记录麻醉后气腹前至气腹后 2h 的呼吸末二氧化碳分压（end-tidal carbon dioxide pressure，PETCO2）、驱动压（driving pressure，ΔP）、PEEP、Ppeak-RM 和肺动态顺应性（pulmonary dynamic compliance，Cdyn）；记录拔管后 30min 疼痛数字等级评定量表评分（numerical rating scale,NRS）；及记录所有患者术前血红蛋白浓度、术前屏气时间、手术时间、气腹累计时间、术中出血量、输液量、术中 VT、术后拔管时间、术后住院时间及术后 7 天新增肺部并发症情况等。

结果

1.两组患者术前、术中一般资料比较，差异无统计学意义（P>0.05），NRS 评分比较，差异无统计学意义（P>0.05）。

2.与麻醉诱导前比较，U-LP 组拔管后 30minOI、DEQ、DTFQ 变化不明显，差异无统计学意义（P>0.05），两组拔管后 30minRI 明显升高（P<0.05），DED 明显减少（P<0.05），DTFD 明显降低（P<0.05）；T-LP 组拔管后 30minOI 明显降低（P<0.05），DEQ 明显减少（P<0.05），DTFQ 明显降低（P<0.05）。

3.与 T-LP 组比较，气腹后 30min、1h、2h、拔管后 30minU-LP 组 OI 明显升高，RI 明显降低（P<0.05）；气腹后 30min、1h、2hU-LP 组 PETCO2、ΔP 明显降低，Cdyn 明显升高（P<0.05）；麻醉后气腹前、气腹后 30min、1hU-LP 组 PEEP 明显降低（P<0.05），气腹后 2hU-LP 组 PEEP 明显升高（P<0.05）；麻醉后气腹前、气腹后 30min、1h、2hU-LP 组 Ppeak-RM 明显降低（P<0.05）；拔管后 30minU-LP 组 DEQ、DED、DTFQ、DTFD 明显升高（P<0.05）。

4.与 T-LP 组比较，U-LP 组术后拔管时间、住院天数明显减少（P<0.05），术后 7 天内新增肺部并发症发生率明显降低（P<0.05）。

结论 与传统肺保护性通气策略比较，基于肺超声指导个体化肺保护性通气用于老年腹腔镜结肠癌根治术患者术中，在保留围术期膈肺功能相关指标方面更具优势，更利于围术期膈肺功能保护，可有效缩短术后早期拔管时间和住院天数，降低术后肺部并发症的发生。但与麻醉诱导前比较，基于肺超声指导个体化肺保护性通气难以有效保护呼吸指数和深呼吸下的膈肌功能，因此，需进一步研究优化个体化通气参数设置，以获取基于肺超声指导个体化肺保护性通气的最大价值。

PU-1159

后腹腔镜手术肥胖患者应用肺保护性通气策略对其肺功能的影响研究

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目的 本研究旨在探索小潮气量、合理呼气末正压和间断规律肺泡复张在肥胖患者在侧卧位行后腹腔镜手术中肺保护作用的安全性和有效性

方法 通过随机化原则将南昌大学第一附属医院 2023 年 9 月—2024 年 3 月接收的 88 例后腹腔镜手术患者分为两组，两组患者术前均常规禁食 12 h 及禁饮 8 h，待入室后再将静脉通道开放，将监护仪连接好，对呼吸、血压、心率、氧饱和度、二氧化碳分压和氧合指数等进行监测。通过静脉注射 6.0 mg/kg/h 注射用甲苯磺酸瑞马唑仑、0.3～0.5 ug/kg 枸橼酸舒芬太尼、0.4 mg/kg 环泊酚以及 0.15 mg/kg 苯磺顺阿曲库铵进行麻醉诱导，在此基础上参照组（ n =44）给予常规通气，即全程通气模式：呼吸频率为 12 次/min，潮气量为 8ml/kg，呼吸比维持在 2∶1。观察组（ n =44）给予保护性通气。观察组采取保护性肺通气模式，给予潮气量 8 ml/kg+呼气末正压 7 cmH2O+每 30 分钟一次规律手法肺复张，术中调整呼吸频率以保证呼气末 CO2 分压在正常范围内波动。两组麻醉维持均持续静脉泵注瑞芬太尼 0.1～0.2μg·kg-1·min-1，丙泊酚 100μg·kg-1·min-1，顺式阿曲库铵 2～3μg·kg-1·min-1 维持脑电双频指数 40～60 维持麻醉，同时根据情况调整保证术中生命体征平稳。术中气腹机 CO2 流量设为 20 L/min，气腹压设定为 12～13 mmHg。术中输入加温液体、采用变温

毯等措施保温，比较两组患者气腹前(T1)、气腹后 1 h(T2)、气腹后 2 h(T3)、气腹停止 5 min 时(T4)的气道峰压(Ppeak)、平台压(Pplat)、肺动态顺应性(Cdyn)及血清白介素-8(IL-8)、血清人克拉拉细胞蛋白 16(CC16)、肺泡表面活性物质-D(SP-D)浓度,以及术后 5 d 内肺部并发症的发生情况。

结果 观察组患者在 T2～T4 时 Ppeak、Pplat 低于对照组,Cdyn 高于对照组,差异均有统计学意义(t 分别=5.84、6.02、7.3、8.36、9.35、8.73、6.98、6.35、7.38,P 均<0.05)。观察组患者在 T2～T4 时 IL-8、CC16 和 SP-D 均低于对照组,差异均有统计学意义(t 分别=5.84、7.21、6.34、7.01、8.36、7.87、6.39、5.81、6.20,P 均<0.05)。观察组患者的术后 5 d 内肺部并发症发生率低于对照组,差异有统计学意义(χ2=4.28,P<0.05)

结论 LPVS 明显改善后腹腔镜手术肥胖患者术中呼吸功能，降低术后早期肺部并发症发生率，可安全有效地应用于全麻下行后腹腔镜手术的肥胖患者

PU-1160

碳酸氢钠林格氏液与乳酸林格氏液在长时间腹部开放手术患者中的疗效比较：一项多中心前瞻性随机对照研究

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目的 探索碳酸氢钠林格氏液与乳酸林格氏液对长时间腹部开放手术患者乳酸代谢、酸碱平衡及临床结局的影响；碳酸氢钠林格氏液是不依赖肝肾代谢的 HCO_3^-缓冲系统，有抗酸作用，假设其在长时间腹部开放手术中，维持酸碱平衡方面更有效。

方法 采用多中心、前瞻性随机对照研究，筛选 188 例预计手术时长大于 3 小时的腹部开放手术患者，共纳入 112 例，碳酸氢钠林格氏液 A 组（n=55）和乳酸林格氏液 B 组（n=57），他们接受以 6～15 ml·kg·h-1 的速率给予静脉输液，使 CVP 维持在 5～12 mmHg。主要结局是术毕高乳酸血症发生率；次要结局包括碱剩余（BE）、酸碱度（pH 值）、碳酸氢盐（HCO3-）、血糖（Glu）、术后 24h 肝功能（白蛋白、谷草转氨酶 AST、谷丙转氨酶 ALT、总胆红素 TBIL）和术后并发症。采用线性回归法筛选影响乳酸浓度的因素。在患者液体治疗前（T0）、手术 1h（T1）、术毕（T2），术后 1h（T3）各时间点采集动脉血行血气分析；记录术中输液量、出血量及尿量，术后 24h 肝功能（白蛋白、AST、ALT、TBIL），术中输血、泵注降压药、泵注升压药比例。术后苏醒延迟及术后送至 ICU 发生率；记录术后 3 天、7 天随访：术后低血压、心律失常、肺部感染、心肌梗死、脑梗死发生率。

结果 液体治疗后，术毕（T2）A 组发生高乳酸血症的概率低于 B 组（9.1% vs. 19.3%，P=0.177）。两组间各时点乳酸值 $F_{时间}$=30.945，$P_{时间}$<0.001，$F_{组别}$=0.598，$P_{组别}$=0.441，$F_{时间*组别}$=1.036，$P_{时间*组别}$=0.342；两组间各时点 BE、pH 值、HCO_3^-、Glu $P_{时间}$<0.001，$P_{组别}$>0.05，$P_{时间*组别}$>0.05；两组术后 24h 白蛋白、ALT、AST 及总胆红素差异无统计学意义（P >0.05）。两组术中输血、泵注降压药、泵注升压药，术后苏醒延迟及术后送至 ICU 发生率差异无统计学意义（P >0.05）；术后 3 天、7 天随访两组患者低血压、心律失常、肺部感染、心肌梗死及脑梗死发生率无统计学差异（P >0.05）。

结论 碳酸氢钠林格氏液和乳酸林格氏液用于长时间腹部开放手术，在围术期乳酸水平，酸碱平衡及临床术后结局方面没有差别，均是安全的补液选择。

PU-1161

认知储备与老年非心脏手术患者术后谵妄的关系研究：认知储备与衰弱的交互作用分析

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目的 认知储备降低与老年认知衰退风险增加有关，较高的认知储备可能会降低术后谵妄（POD）的发生率，但认知储备与年龄相关的身体健康丧失（例如衰弱）之间的相互作用在 POD 中仍不清楚。因此，本文拟探究认知储备与 POD 的关联，以及这些关联中认知储备与衰弱的相互作用。
方法 选择 2023 年 02 月至 2023 年 10 月择期行非心脏手术老年患者 213 例，男 131 例，女 82 例，年龄≥65 岁，BMI 18~28 kg/m2，ASAⅡ-Ⅲ级。术前应用认知储备调查问卷（CRIq）评估患者术前认知储备水平，根据得分情况将患者分为高认知储备（≥ 85）组与低认知储备（< 85）组；使用埃德蒙衰弱量表（EFS）评估术前衰弱存在情况。术后 3d 内采用中文版意识模糊评估法（CAM）评估患者 POD 的发生情况。根据是否发生 POD 将患者分为两组：POD 组与非 POD（N-POD）组。记录患者人口学资料（年龄、身高、体重、BMI、性别、居住地等）、术前合并疾病（高血压、冠心病、糖尿病、脑梗死、慢阻肺、术前疼痛等）、术前实验室检查、麻醉方法、手术时间及术中失血量等。采用单因素和多因素 Logistic 回归分析 POD 的危险因素。应用 R 中的 interactionR 包对认知储备和衰弱进行交互作用分析。
结果 本研究共纳入 213 例患者，其中 62 例（29.1%）患者发生 POD，111 例（52.1%）患者术前认知储备降低，39 例（18.3%）患者术前被诊断为衰弱。低认知储备组患者 POD 发生率为 37.8%（42/111），高认知储备组患者 POD 发生率为 19.6%（20/102）。Logistic 多因素回归分析显示：低认知储备（OR = 2.154, 95% CI: 1.090-4.259, P = 0.027）、衰弱（OR = 2.855, 95% CI: 1.260-6.469, P = 0.012）和 ASA 分级（OR = 1.974, 95% CI: 1.007-3.869, P = 0.048）是 POD 发生的独立危险因素。交互作用分析结果提示认知储备与衰弱之间存在交互作用（RERI = 18.98, 95% CI: 5.35-65.56）。逐层分析结果显示，在同时对协变量和衰弱进行校正时，较高的认知储备与较低的 POD 风险相关（OR = 0.464, 95% CI: 0.235-0.918, P = 0.027）。当纳入认知储备与衰弱的相互作用项（P = 0.003）时，较高的认知储备与 POD 风险之间的关联更加显著（OR = 0.043, 95% CI: 0.007-0.254, P = 0.001）。这些结果表明衰弱可显著调节认知储备对 POD 的作用。
结论 在非心脏手术的老年患者中，低认知储备是 POD 发生的独立危险因素，且认知储备与衰弱之间存在交互作用，认知储备在不同的衰弱状态人群中对 POD 的作用不同。

PU-1162

葛根素通过 AMPK 调控的铁死亡信号通路保护脓毒症心肌损伤的作用研究

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目的 研究显示，葛根素可有效改善脓毒症引起的心肌损伤，目前认为主要与抑制炎症反应及氧化应激等机制有关。已证实铁死亡在多种原因引起的心肌损伤中起着关键作用，如糖尿病心肌病、缺血性心肌病以及脓毒症心肌损伤等。目前认为，多种信号通路均可调控铁死亡的发生，其中 AMPK 信号通路是其调控通路之一，激活该通路可抑制铁死亡的发生发展。而研究显示，葛根素可通过激活 AMPK 信号通路进而改善多种心肌疾病，包括病理性心肌肥厚和心肌缺血损伤等。因此，我们推测葛根素可以通过活化 AMPK 信号通路进而抑制炎症反应、氧化应激以及铁死亡的发生从而减轻

LPS 诱导的心肌损伤。
方法 根据处理方法不同，将 H9c2 细胞分成 5 组：对照组、脓毒症组（LPS 组）、脓毒症+葛根素组（LPS+Pue 组）、脓毒症+葛根素组+铁死亡促进剂（LPS+Pue+Era 组）以及脓毒症+葛根素组+AMPK 抑制剂 Compound C（LPS+Pue+CC 组）。测定上清液中乳酸脱氢酶（LDH）、肿瘤坏死因子 α（TNF-α）的水平以及铁离子含量；观察细胞活力以及细胞凋亡情况；测定心肌细胞中谷胱甘肽过氧化酶 4（GPX4）以及磷酸化 AMPK（P-AMPK）的表达水平。将 12 只健康雄性 SD 大鼠随机分为四组：对照组、脓毒症组（LPS 组）、脓毒症+葛根素组（LPS+Pue 组）和脓毒症+葛根素组+AMPK 抑制剂 Compound C（LPS+Pue+CC 组）。分别使用 Pue 以及 Pue 联合 AMPK 抑制剂 Compound C（CC）对脓毒症大鼠进行处理。测定心肌组织中铁蛋白（Ferritin）、酰基辅酶 A 合成酶长链家族成员 4（ACSL4）、谷胱甘肽过氧化酶 4（GPX4）、转铁蛋白受体（TFR）、磷酸化 AMPK（P-AMPK）的表达水平以及铁离子含量。
结果 1.葛根素可以改善 LPS 诱导的 H9c2 细胞损伤，降低 LDH 及 TNF-α 的水平，减少细胞凋亡，上调 GPX4 的表达水平并降低铁离子含量。2.葛根素的脓毒症心肌保护作用可被铁死亡促进剂 Era 以及 AMPK 抑制剂 CC 废除。3.葛根素提高了脓毒症大鼠心肌组织中 AMPK 磷酸化水平。4.AMPK 抑制剂 CC 促进了脓毒症心肌组织中铁死亡的发生，且其可废除葛根素对铁死亡的抑制作用。
结论 葛根素可以通过抑制 LPS 诱导的心肌细胞铁死亡的发生，进而对脓毒症心肌损伤产生保护作用并改善心脏功能。并且葛根素可通过调控 AMPK 调控的铁死亡信号通路对脓毒症心肌损伤进行保护，而铁死亡促进剂 Era 和 AMPK 抑制剂 CC 均可有效废除葛根素对脓毒症心肌损伤的保护作用。

PU-1163

肺保护性通气相关研究进展与趋势——基于文献计量学分析

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目的 采用文献计量学分析方法，系统分析近 20 年来肺保护性通气领域的研究进展、研究趋势和热点变化。
方法 从 Web of Science（WoS）核心数据库中检索 2003 年 1 月 1 日至 2022 年 11 月 1 日发表的肺保护性通气相关文献，采用文献计量学在线分析平台(http://biblimetric.com)、R 语言文献计量学分析（Biblioshiny）及 Citespace 软件分析纳入文献的总量、国家合作关系、年发文量、国家年累计发文量、h 指数、被引频次、发文国家、发文机构、发文作者、被引期刊、参考文献共被引以及关键词变化趋势等基本情况，并从中挖掘该领域研究趋势和热点变化。
结果 共检索到 2820 篇肺保护性通气相关文献，1944 篇符合条件的文献被纳入最终分析。2003-2022 年期间肺保护性通气研究领域相关文献发文量总体呈上升趋势，并在 2021 年达到高峰。美国是该领域研究的领先国家，其发文量（703 篇）、国家 h 指数（93）和被引频次（42260）均排首位。我国在该领域研究的发文量位列第三（283 篇），但国家 h 指数（31）和被引频次（6283）分别排第 8 位和第 7 位。加拿大的多伦多大学、美国的麻省综合医院、哈佛大学为该领域研究的核心机构。急性肺损伤、呼吸机相关性肺损伤、肺炎、小潮气量、呼气末正压、肺复张、肺保护性通气等是该领域研究的经典热点；术后肺部并发症、驱动压、COVID-19、联合、膈肌损伤等是该领域新兴热点。未来，肺保护性通气领域的相关研究的目标仍然是探索出更加完善的、个体化的保护性通气策略，更好地指导临床实践。
结论 2003—2022 年期间肺保护性通气相关研究发展迅速，美国是该研究领域的领先国家，我国在论文质量和影响力方面应加以提升。肺保护联合膈肌保护的通气策略将是未来保护性通气领域研究的新方向，如何有效应对肺损伤、肺炎、肺部并发症以及膈肌损伤带来的危害，仍然是未来该领域研究的焦点。

PU-1164

红景天苷对小鼠肝部分切除术后肝再生及 NLRP3/ASC/Caspase-1 通路的影响

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目的 本研究旨在探究红景天苷对小鼠肝部分切除术（partial hepatectomy, PH）后的肝再生效果及对 NLRP3/ASC/Caspase-1 通路的影响。
方法 18 只 SPF 级健康雄性 C57BL/6 小鼠，6 ~ 8 周龄，体质量 18 ~ 23 g，采用随机数字表法随机分为 3 组（n = 6）：假手术+生理盐水组（S 组）、肝部分切除术+生理盐水组（PH 组）与肝部分切除术+红景天苷组（SAL 组）。在 3%异氟烷麻醉下，采用切除小鼠 70 %肝脏的方法构建肝部分切除术模型，切除小鼠肝脏左外叶、中叶及胆囊。S 组仅腹部切皮后缝合未实施手术。SAL 组于手术前 4 d 灌胃红景天苷 0.3 g·kg-1·d-1，1 次/d，S 组及 PH 组代以等量生理盐水。第 5 d 在给药或生理盐水 2 h 后进行手术或假手术，术后 SAL 组继续灌胃红景天苷，S 组及 PH 组继续灌胃生理盐水，直至小鼠被处死。所有小鼠于术后第 2 d 在 2%异氟烷麻醉下首先称取小鼠体质量，然后摘眼球取血，随后颈椎脱臼法处死小鼠并收集肝脏组织，使用全自动生化仪检测血清 ALT、AST 浓度，采用 HE 染色观察肝组织病理变化，计算小鼠再生后的残肝质量与小鼠被处死时体质量的比值即肝质量/体质量比（%），采用免疫组织化学染色法检测 Ki67 的表达，Western blot 法检测各组 CCND1、PCNA、NLRP3、ASC、pro-Caspase-1、GSDMD 蛋白的表达， 实时荧光定量 PCR 法检测 NLRP3、ASC、Caspase-1 的 mRNA 表达， ELISA 法检测血清 IL-1β 及 IL-18 的浓度。
结果 与 S 组比较，PH 组肝组织病理学损伤明显，表现为肝细胞排列紊乱，核固缩明显，肝脏中出现大量肝细胞脂肪变性，胞质中可见大小不一的空泡，胞核被推向一侧，血清 ALT、AST、 IL-1β 及 IL-18 浓度升高（P＜0.01），肝组织 Ki67、CCND1、PCNA、NLRP3、ASC、pro-Caspase-1、GSDMD 的蛋白表达及 NLRP3、ASC、Caspase-1 的 mRNA 表达上调（P＜0.05 或 0.01）；与 PH 组比较，SAL 组肝脏组织病理学损伤得到明显缓解，肝细胞排列整齐，未见明显脂滴，ALT、AST 、IL-1β 及 IL-18 浓度降低（P＜0.01），肝质量/体质量比升高（P＜0.01），Ki67、CCND1、PCNA 的表达上调，NLRP3、ASC、pro-Caspase-1、GSDMD 的蛋白表达及 NLRP3、ASC、Caspase-1 的 mRNA 表达下调（P＜0.05 或 0.01）。
结论 红景天苷可缓解小鼠肝部分切除术后急性肝损伤，促进肝脏再生，其作用机制可能与抑制 NLRP3/ASC/Caspase-1 通路有关。

PU-1165

流速优化的压力控制容量保证通气模式（PCV-VG）对单肺通气患者术后肺部并发症的影响研究

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目的 在 PCV-VG 模式下，优化吸气流速的通气方式对单肺通气下胸科患者术后呼吸功能和全身炎症因子的影响，我们假设调整吸呼比、吸气压力上升时间等呼吸机输入参数与术后肺部并发症（PPCs）发生率降低有关。
方法 采用前瞻性随机对照研究。选取 108 例择期行胸科手术的患者，将其随机分成 2 组，分别为对照组（固定吸呼比 1:2）（53 例）、试验组（流速优化组）（55 例）。于插管后即刻（T0）、单肺通气后即刻（T1）、单肺通气 30 min（T2）、双肺通气 10 分钟（出手术室前）（T4）记录气

道峰压（Ppeak）、气道平台压（Pplat）、PETCO2 并计算肺动态顺应性（Cdyn）、呼吸频率、吸氧浓度；分别于单肺通气 30min（T2）、单肺通气结束即刻（T3）行血气分析记录氧合指数（PaO2/FiO2）。入麻醉复苏室后（T5）行肺部超声评分（LUS）进行评估并记录术后肺部并发症（PPCs）的发生率。

结果 与其他组相比，试验组 PPCs 的总发生率明显降低(3.64% vs. 16.98%， P=0.022)。在插管后即刻（T0）时两组气道压力峰值、气道平台压力、动态肺顺应性、PETCO2、呼吸频率、吸氧浓度差异均无统计学意义(P>0.05)。而在 T1、T2、T4 时，试验组（流速优化组）组的动态肺顺应性显著升高(P<0.05)，并且在单肺通气结束时(T3)的氧合指数显著增加(P<0.05)。术前两组炎症细胞及 CRP 的水平无显著差异。与对照组相比，试验组（流速优化组）在术后 1 天的白细胞、CRP 水平显著降低(P<0.05)。

结论 在接受单肺通气的肺切除手术的患者中，优化吸气流速，使用容量保证的压力支持通气（PCV-VG）模式，通过调整吸气压力上升时间及吸气时间，能够促进肺泡气体交换，减轻患者的术后肺部并发症，改善肺的动态顺应性。

PU-1166

臭氧预处理通过激活 Nrf2/Slc7a11/Gpx4 通路抑制铁死亡减轻脑缺血再灌注损伤

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目的 脑卒中后的脑缺血再灌注损伤由一系列复杂的病理生理改变引起，包括以铁依赖性的脂质过氧化积累和线粒体萎缩为特征的铁死亡。臭氧作为一种天 然的生物活性分子，具有抗氧化的特性，已有的研究表明，臭氧可以减轻脑缺 血再灌注损伤。然而，臭氧发挥脑保护作用的机制与抑制铁死亡是否相关尚不明确。本研究旨在确定臭氧预处理是否通过抑制神经元铁死亡以改善缺血再灌注后的脑组织损伤。

方法 本研究对 SD 大鼠脑缺血再灌注损伤模型进行了臭氧预处理干预，通过神经行为学评分、TTC 染色及尼氏染色明确臭氧对脑缺血再灌注损伤具有改善作用。为了进一步探讨臭氧的脑保护作用与铁死亡是否相关，我们通过透射电镜观察线粒体形态；通过检测脂质过氧化物（LPO）水平和丙二醛（MDA）含量来 反映每组大鼠脑组织的脂质过氧化水平；通过铁离子试剂盒检测脑组织中亚铁离子水平；通过 qPCR 和 Western blot 检测铁死亡负调控因子 FTH1、GPX4 和正调控因子 ACSL4 的 mRNA 和蛋白水平。为了进一步明确核转录因子 NRF2、溶质载体家族成员 SLC7A11 以及谷胱甘肽过氧化物酶 4（GPX4）在臭氧发挥脑保护作用 中的扮演的角色，我们在建立脑缺血再灌注模型前 1 小时腹腔注射 NRF2 抑制剂 ML385、SLC7A11 抑制剂 Erastin 和 GPX4 抑制剂 RSL3，通过免疫荧光检测 NRF2 的核转位情况；通过 qPCR 和 Western blot 检测 NRF2、SLC7A11 以及 GPX4 的 mRNA 和蛋白表达。

结果 我们的体内实验证明了臭氧预处理能明显减轻脑缺血再灌注所致的神经元损伤，降低脑梗死体积，而且这种保护作用可能与减轻神经元线粒体形态学损伤，改善脂质过氧化水平相关。研究结果表明，臭氧能够促进 Nrf2 的核转位， 同时促进铁死亡负调控因子 FTH1、GPX4 的表达，降低铁死亡正调控因子 ACSL4 的表达。然而 NRF2 抑制剂 ML385、SLC7A11 抑制剂 Erastin 和 GPX4 抑制剂 RSL3 的处理显著逆转了臭氧预处理对脑的保护作用，增加了脑组织梗死体积、增强了脂质过氧化水平和神经元内亚铁离子聚集、降低了铁死亡负调节因子的表达。

结论 综上所述，我们的研究结果表明，臭氧预处理通过 NRF2/SLC7A11/GPX4 信号通路减轻神经元铁死亡改善大鼠脑缺血再灌注损伤，为臭氧预处理作为一 种新的缺血性脑卒中的治疗方法提供了理论基础。

PU-1167

家庭环境因素与学龄前儿童术后苏醒期谵妄的关联性分析

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目的 苏醒期谵妄(ED)是一种感知障碍和精神运动性躁动的结合，常见于全麻后的儿科患者，尤其是学龄前儿童。本研究的主要目的为探讨家庭环境因素与学龄前儿童扁桃体切除术后 ED 的关系，次要目的为分析 ED 的独立危险因素，以期为临床医生提供更精准的预后评估和个体化护理策略，同时为预防和管理这一术后并发症提供科学依据。

方法 本研究是一项单中心、前瞻性、观察性队列研究，纳入 2023 年 12 月至 2024 年 6 月，于宁夏医科大学总医院在全身麻醉下行扁桃体切除术的患儿 163 例。纳入标准为年龄 3～7 岁，美国麻醉医师协会(ASA)分级 I～Ⅱ级。于手术前一天访视患者时使用家庭环境量表中文版(FES-CV) 和自行设计的一般情况问卷分别评定儿童的家庭环境因素以及家庭一般情况。在麻醉后恢复室（PACU）由训练有素的研究人员使用面部、腿部、活动、哭泣和安慰(FLACC)行为量表对患儿的疼痛程度进行评分并采用儿科麻醉苏醒期谵妄(PAED)量表评估 ED 的发生。以任意时间 PAED 评分等于或大于 10 分为发生 ED。根据患儿术后是否发生 ED 分为 ED 组和非 ED 组，采用 T 检验分析家庭环境因素与 ED 的相关性，随后对两组患者的相关观察指标进行单因素分析，将单因素分析中 P<0.05 因素纳入多因素 Logistic 回归分析模型，分析 ED 独立危险因素。

结果 163 名患儿中 59 例（36.2%）发生 ED。其中男性 37 例，女性 22 例，分别占总例数的 62.7% 和 37.2%。单因素分析结果显示在家庭环境量表评分中, ED 组情感表达、矛盾性、独立性、知识性、娱乐性、组织性、控制性评分略高于非 ED 组，而亲密度、成功性、道德观略低于高于非 ED 组，差异无统计学意义(P＞0.05)。单因素分析结果显示，ED 组和非 ED 组患儿的年龄、FLACC 评分、患儿的文化程度和距术日病程持续时间比较差异有显著性(t=－3.273，8.078，c2=6.157，7.945， P<0.05)；多因素 Logistic 回归分析的结果显示,FLACC 评分(OR=0.564，95%CI=0.468~0.679)和距术日病程持续时间(OR=0.141，95%CI=0.025～0.794)是 ED 发生的独立危险因素。

结论 本研究发现患儿距术日病程持续时间、在 PACU 的 FLACC 评分是患儿扁桃体切除术术后发生 ED 的独立危险因素。并且可以通过患儿距术日病程持续时间对术后 ED 的发生进行预测，及早采取干预措施以减少 ED 的发生。

PU-1168

单肺通气对肺部微生物的影响

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目的 研究背景及目的：近年来，随着非生物依赖性分子技术的发展，研究肺部微生物与肺部常见疾病之间的关联已成为目前肺损伤的研究热点之一；机械通气是全身麻醉手术必备的呼吸支持手段之一，也是造成围术期肺损伤的主要原因，其侵袭性的通气形式、高氧环境、气道粘膜清理能力的损害等均被认为会引起肺部微生物的变化。单肺通气是胸外科手术常用的通气方式，该通气方式会对肺部造成缺血再灌注损伤。目前关于单肺通气后造成的肺缺血再灌注损伤与肺部微生物变化之间的研究仍比较缺乏。本研究旨在确定全身麻醉下肺部缺血再灌注对肺部微生物多样性的改变，探讨肺部微生物的改变与单肺通气后肺损伤的关系；对于围术期单肺通气患者的肺损伤与肺保护提供新思路与帮助。

方法 我们选取南昌大学第一附属医院 2024 年 3 月到 2024 年 5 月拟行胸腔镜下肺叶切除术的患者

49 例，分为对照组（Control 组，C 组）与缺血再灌注组（Ischemia reperfusion 组，IR 组），单肺通气前的术侧肺为 C 组，单肺通气后恢复行双肺通气 10 分钟的术侧肺为 IR 组，病人单肺通气前后形成自身前后对照。抽取单肺通气前及双肺通气 10 分钟后术侧肺的肺泡灌洗液，用 16s rRNA 测序技术检测肺泡灌洗液中肺部微生物群的变化，酶联免疫吸附（ELISA）技术检测肺泡灌洗液中细胞因子白介素 1β（interleukin 1β，IL-1β）、肿瘤坏死因子 α（tumor necrosis factor-α，TNF-α）的变化评估肺损伤的程度。数据分析采用 SPSS21.0 进行统计学分析，计量资料两组间的比较采用独立样本 t 检验。非正态分布计量资料两组之间的比较采用带有两个独立样本的非参数 Mann-WhitneyU 检验。

结果 我们收集了共 49 名患者的肺缺血再灌注前后的肺泡灌洗液共 98 份，发现 IR 组肺部微生物较 C 组 α 多样性降低（P＜0.05），β 多样性无明显变化。IR 组肺泡灌洗液中 IL-1β、TNF-α 显著增高（P＜0.05）。

结论 胸科手术中的单肺通气会造成肺缺血再灌注损伤，减少肺部微生物的 α 多样性，我们的研究认为肺缺血再灌注损伤与肺部微生物多样性变化有关，这将可能为围术期肺保护提供新思路

PU-1169

The association between triglyceride-glucose index and acute kidney injury after cardiac surgery: a retrospective cohort study

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Background Acute kidney injury (AKI) is a life-threatening complication after cardiac surgery and the incidence varies from 5% to 42%. AKI impairs the function of the heart, lungs, brain, and gut; and is associated with an increased risk of chronic kidney disease, in-hospital or long-term mortality, especially with AKI status. Although researchers emphasized that avoidance of nephrotoxins, optimization of systemic hemodynamics, and avoidance of both fluid depletion and fluid overload could prevent the development of AKI, the incidence of cardiac surgery associated-acute kidney surgery(CSA-AKI) has not been decreased. The pathophysiology of AKI is multifactorial and remains incompletely understood. Previous researchers have identified some risk factors for AKI, but the relationship between insulin resistance and postoperative AKI is less defined. IR may play an important role in the development of AKI. Oxidative stress and endothelial dysfunction may cause glomerulosclerosis or atherosclerosis-related kidney damage.

Triglyceride-glucose (TyG) index, the product of triglyceride and fasting glucose, is a surrogate marker for insulin resistance. It was first proposed in 2008 and has reported its high sensitivity and specificity in detecting insulin resistance. Growing evidence has revealed that a high TyG index is markedly and independently associated with the incidence of contrast-induced nephropathy, and has better diagnostic and predictive value than other single metabolic indicators. Although it is believed that IR plays a crucial role in the development of AKI, evidence about the relationship between the TyG index and AKI after cardiac surgery is limited. Therefore, the purpose of our study was to investigate the relationship between TyG index and the occurrence of AKI following cardiac surgery, to provide novel perspectives for preventing and treating AKI after cardiac surgery.

Methods This retrospective cohort study enrolled 1025 adult patients who underwent cardiac surgery from March 2019 to September 2022 in Nanfang Hospital, Southern Medical University. The Institutional Ethics Committee of Nanfang Hospital, Southern Medical University approved the study and waived the informed consent (NFEC-2022-181). The protocol was registered in the Chinese Clinical Trial Register (ChiCTR2200062111). The correlation between TyG index and the incidence of postoperative AKI and its severity was compared. Logistic regression was used to investigate the association between TyG levels and postoperative AKI. TyG levels were assessed

both as a continuous variable and as quartiles, with the lowest quartile serving as the reference group. Generalized additive model (GAM), subgroup analysis, and interaction test were used to verify the robustness of the results. Finally, the diagnostic value of the TyG index and metabolic indices (HbA1c, FPG, TG, LDL-c) for postoperative AKI after cardiac surgery was compared using ROC analysis.

Results In this cohort study, 33.3%（341 of 1025）of patients developed AKI after cardiac surgery. The median TyG index was 8.6 (IQR, 8.2-9.0). Participants were categorized into subgroups based on TyG quartiles (<8.20, ≥8.20 to < 8.56, ≥ 8.56 to < 9.02, and ≥9.02). Compared with the lowest quartile of TyG index, patients with a higher TyG index tended to be heavier, have a higher proportion of males, have a history of hypertension, diabetes and coronary heart disease, take ACEI or ARB and lipid-lowering agents, use insulin, have higher levels of FPG, HbA1c, TG, LDL-c and have lower levels of eGFR. The incidence of postoperative AKI was higher and more severe with an increasing TyG index. Similarly, patients who developed AKI had a higher level of preoperative TyG index distribution than those without postoperative AKI.

After adjusting for clinical risk factors, logistic regression analysis showed that a higher preoperative TyG index was a risk factor for the development of AKI after cardiac surgery (OR=1.34, 95% CI 1.05-1.71, p=0.017); compared with the lowest quartile of TyG index, the risk of AKI was 1.56 times higher in the highest quartile.

To validate the robustness of the results, we additionally used a GAM to insert the continuity covariates into the equation as a curve, which was consistent with the previous results. The association between TyG index and AKI following cardiac surgery did not differ between subgroups. Particularly, the risk of postoperative AKI after cardiac surgery was significantly higher with increasing TyG index in those older than 65 years (OR=2.22, 95% CI 1.30-3.78).

In addition, ROC curve analysis showed that the areas under the curve (AUCs) of the TyG index, HbA1c, FPG, TG and LDL-c levels for diagnosing AKI was 0.564(95% CI 0.526-0.601, P=0.001), 0.557(95% CI 0.519-0.594, P=0.003), 0.557(95% CI 0.519-0.596, P=0.003), 0.547(95% CI 0.509-0.584, P=0.015), 0.509(95% CI 0.471-0.547, P=0.652), respectively. This suggested that TyG index, HbA1c, FPG and TG had diagnostic value for AKI, except for LDL-c (all $p < 0.05$). However, the diagnostic value of TyG for AKI was not significantly superior to other metabolic indexes.

Conclusion The present study showed that a higher TyG index is significantly associated with a higher risk of AKI in patients following cardiac surgery, representing an independent risk factor for AKI. Future research is required to validate our findings and elucidate the exact mechanisms underlying the association between TyG index and AKI after cardiac surgery.

PU-1170

Mechanism of Tetrahydropalmatine alleviates Hepatic Ischemia-Reperfusion Injury by regulating spermidine metabolic reprogramming in macrophages through AMD1

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Hepatic Ischemia Reperfusion Injury (IRI) is a significant influence factor of liver transplantation. It is a hot topic in clinical liver transplantation to study the mechanism of liver IRI and the new strategies to alleviate hepatic IRI. In previous studies, we found that Tetrahydropalmatine could effectively alleviate hepatic IRI by regulating macrophage polarization. It was further found that Tetrahydropalmatine could mediate metabolic reprogramming of spermine and spermidine in macrophages by regulating the expression of AMD1, and inhibit the M1-type polarization of macrophages. Therefore, this study innovatively proposed for the first time that Tetrahydropalmatine directly up regulates M2 type gene expression by activating JAK1/STAT6 signaling pathway, promotes macrophage polarization towards M2 type, and increases the release

of anti-inflammatory factors. In addition, STAT6 can also promote the expression of AMD1, thereby increasing the content of spermine and spermidine, inhibiting the M1-type polarization of macrophages, reducing the release of inflammatory factors, and finally alleviating hepatic IRI. This study aims to clarify the effect of Tetrahydropalmatine on hepatic IRI from clinical samples, animal, cell levels and molecular mechanisms. And further clarify the mechanism of Tetrahydropalmatine regulate macrophage polarization. To provide a new theoretical basis and strategy for clinical alleviates IRI.

PU-1171

利多卡因股动脉注射改善股外侧皮瓣血运一例

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目的 59 岁男性患者在全身麻醉下行股外侧皮瓣移植术时，出现皮瓣明显缺血，局部多种方法处理后改善不明显。拟观察动脉注射利多卡因能否改善游离的股外侧皮瓣血运不佳情况。

方法 患者男，59 岁，身高 160cm，体重 49kg，BMI 19.14 kg/m²，心功能 II 级，ASAII 级，患者自诉于 1 年前左手部皮肤开始溃烂，未做特殊处理，伤口至今（2024 年 4 月 15 日）未愈合。既往幼时左手烧伤，于当地医院住院手术治疗后左手背疤痕挛缩伴各指畸形，手部活动障碍。既往 2 型糖尿病病史 2 年余。专科体查：左手背可见大小约 5cm*4cm 的疤痕组织，局部皮肤溃烂，周围皮肤发白，未见明显渗液，左手各指畸形，周围皮肤疤痕增生伴挛缩，各手指缺如，活动障碍，感觉正常。左手正斜位 X 线片：左手向尺侧弯曲、挛缩畸形，腕掌关节及掌指关节 90°弯曲，各指骨均部分缺如，周围软组织密度均匀。

入院 2 日后（2024 年 4 月 17 日），患者在全身麻醉联合臂丛神经阻滞下行左侧股外侧皮瓣左手皮瓣转移术，术中应用加温毯维持患者体温。术中首先清理左手部坏死组织及肉芽组织后，分离出桡动脉及头静脉，用辅料加压包扎后，再于左大腿前外侧，按创面大小设计皮瓣，切开皮瓣的一侧皮肤与皮下组织后，分离股外侧穿支到旋股外侧动脉降支主干，保护股神经肌支，继续向近端分离一段主干，充分结扎各血管分支后台上医生发现皮瓣颜色苍白，皮瓣动脉无法触及，提示血运不佳，此时液体总入量已达 3000ml，出血不超过 100ml，监护仪显示医生查看患者有创动脉血压维持在 110/70mmHg 左右，脉压变异率（PPV）在 8%-9%波动。手术台上的外科医生采取旋股外侧动脉降支主干根部局部注射 2%利多卡因，或局部使用硝酸甘油以及及罂粟碱等一系列常规措施后，经历将近 2h 努力，未能收获满意效果。经过慎重考虑之后，我们猜测股动脉注射利多卡因可能能作为本案例的一个解决方案。暴露患者左侧腹股沟区域，手指探及股动脉，股动脉波动有力，脉率与心率一致。确定穿刺部位后，皮肤规范消毒，以无菌 5ml 注射器抽取 2%利多卡因 5ml(50mg),充分排气后，找到波动最强点，垂直进针，有突破感后，回抽见红色血液后，确认在股动脉穿刺成功，再次确认注射器无气体后，将利多卡因注射入股动脉，同时严密观察患者生命体征变化。利多卡因注射后的 5min 内，患者心率几乎无明显改变，收缩压下降约 5-6mmHg。然而下肢的血运改善却非常显著，大约 3min 后，游离的皮瓣周围可见渗血，动脉搏动恢复，5min 后颜色逐渐变红；而游离皮瓣后的大腿的肌肉创面开始出现渗血。手术医生着手开始对创面进行止血。20min 后，检查发现皮瓣颜色正常，动脉搏动良好，决定实施断蒂后移植。将离断的皮瓣动脉与左手桡动脉近端缝合，将伴行静脉与头静脉的近端缝合，放松止血带。约 1min 左右，发现移植的皮瓣就开始出现了红润，红润速度明显快于平常。按常规流程缝合皮瓣，放入引流条，外敷料包扎。

结果 术后第一天左拇指植皮处皮片存活可，左手背游离皮瓣创缘渗血渗液较多，皮瓣表面可见少许细小水泡，皮瓣毛细血管反应尚可，皮温正常，伤口周围皮肤稍红肿，周围皮肤感觉减退。左大腿手术切口可见少许渗血渗液，局部植皮皮片颜色淡紫，伤口周围皮肤无红肿，皮温正常。患者于 2024 年 5 月 6 日康复出院，出院时左手部皮瓣无明显渗血渗液，皮瓣毛细血管反应良好，伤口周围皮肤颜色正常，皮瓣顺利存活。

结论 本案例提示，利多卡因股动脉注射可以显著改善股外侧游离皮瓣血运，为提高皮瓣移植成功率提供了一个有效的临床参考，特别是在常规方法处理无效的情况下，应用本方法，或许可以提供额外的帮助。

PU-1172

高血糖与细菌性肺炎的因果关系：一项两样本孟德尔随机化研究

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目的 术后肺炎是患者术后并发症之一，其中以细菌性肺炎感染为主。术后肺炎感染延缓患者术后康复，加重其医疗负担，因此寻找并解决术后肺炎相关患病因素成为目前临床工作重点。越来越多的证据表明围术期患者血糖控制水平与患者肺炎发生率相关，然而患者血糖水平与细菌性肺炎因果关系并不明确。因此本研究将使用孟德尔随机化方法来探究高血糖水平与细菌性肺炎的因果关联。
方法 我们从公开的全基因组关联研究（GWAS）以及芬兰数据库（R10 版本）提取数据，对高血糖水平（N = 200622）以及细菌性肺炎（N = 361521）进行两样本孟德尔随机化分析。以 P < 5×10-8 为阈值从 GWAS 数据库中筛选与高血糖强关联的单核苷酸多态性（SNP）作为工具变量。以 r2 ＝ 0.001 和 Clump distance > 10 000 kb 为阈值筛选不受连锁不平衡影响的相互独立的 SNPs，采用逆方差加权法(inverse-variance weighted，IVW)、MR-Egger、加权中位法(weighted median)和加权模式（Weighted mode）等四种方法，以选定的 SNPs 作为工具变量评估高血糖水平与细菌性肺炎间的因果关联。使用 MR-Egger 回归、MR-PRESSO 和 Cochran 的 Q 检验评估水平多效性、异质性。
结果 我们在分析中鉴定出 62 个 SNP，结果显示高血糖水平是细菌性肺炎的危险因素。IVW 方法计算出 OR 值为 1.208（95%CI = 0.030-0.349），MR-Egger 计算出 OR 值为 1.372（95%CI = 0.030 - 0.602），Weighted median 计算出 OR 值为 1.305（95%CI = 0.057 - 0.476），Weighted mode 计算出 OR 值为 1.344（95%CI = 0.096 - 0.495），均为 P ＜ 0.05。其中 IVW 分析结果表明高血糖每增加 1 个单位，细菌性肺炎感染风险将升高 20.8%。其次，根据 MR-Egger 回归、MR-PRESSO 和 Cochran 的 Q 检验，我们没有发现水平多效性、异质性的显著证据。
结论：本研究结果表明高血糖水平与细菌性肺炎感染风险增加存在因果关系，血糖水平越高，细菌性肺炎感染风险增加。
结论 本研究结果表明高血糖水平与细菌性肺炎感染风险增加存在因果关系，血糖水平越高，细菌性肺炎感染风险增加。

PU-1173

肠道菌群和昼夜节律振荡在糖尿病小鼠肝缺血再灌注损伤中的作用

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目的 昼夜节律在哺乳动物的行为和代谢过程中起着至关重要的作用，是哺乳动物代谢的一个决定性特征。肠道菌群遵循内源性昼夜节律，昼夜节律紊乱会显著影响肠道微生物群的组成。相反，微生物代谢物的变化也可以调节宿主昼夜节律基因的转录表达。这表明肠道微生物群与宿主代谢的昼夜节律之间存在复杂的关系。肝缺血再灌注损伤(HIRI)发生在肝切除术、肝移植和其他肝脏手术中，是不可避免的，并且正在成为术后肝功能障碍的主要原因之一。由于糖尿病相关的微循环疾病和炎

症反应的损伤作用，肝脏通常更容易发生缺血再灌注损伤，随着糖尿病发病率的迅速增加及其影响，对糖尿病患者 HIRI 的关注日益增加。在本研究中，我们旨在阐明糖尿病性肝缺血再灌注损伤(HIRI)的昼夜节律特征以及肠道微生物群在糖尿病小鼠 HIRI 中的作用。
方法 通过高脂饮食+小剂量 Streptozotocin 诱导小鼠糖尿病模型，肝缺血再灌注损伤手术于 ZT0 或 ZT12 进行。分析肝脏病理评分及血清谷丙转氨酶(ALT)、天冬氨酸转氨酶(AST)水平，评价各组小鼠肝损伤程度。进行 16S rRNA 基因测序，研究了正常血糖小鼠和糖尿病小鼠肝脏缺血再灌注损伤时肠道微生物群的变化和昼夜节律振荡导致的菌群差异。对小鼠进行甲硝唑-新霉素-万古霉素-氨苄西林(ABX)预处理制备伪无菌小鼠，对糖尿病伪无菌小鼠进行 HIRI 实验，结果表明伪无菌肝损伤较正常小鼠加重，说明肠道菌群参与了糖尿病小鼠 HIRI 的调节。之后，为了验证糖尿病小鼠的肠道菌群在对 HIRI 的潜在作用，进行了菌群移植实验。
结果 (1)高血糖加重糖尿病小鼠 HIRI，但糖尿病小鼠 HIRI 无昼夜节律变化。(2)糖尿病小鼠的肠道菌群组成与对照组有显著差异。(3)糖尿病小鼠的肠道菌群经菌群移植验证，对 HIRI 存在明显的有害作用。但是，差异菌群中特定的肠道微生物代谢物及相关的分子机制还有待进一步研究。
结论 糖尿病小鼠和正常小鼠在不同时间点的菌群组成差异，高血糖加重了糖尿病小鼠的 HIRI，特别是肠道微生物参与了 HIRI 的调节，肠道菌群可能是 HIRI 治疗的一个靶点。

PU-1174

系统炎症指数与老年患者非心脏手术后心肌损伤的关系：一项回顾性队列研究

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目的 炎症与心血管疾病相关，临床上已存在中性粒细胞与淋巴细胞比率（neutrophil-to-lymphocyte ratio，NLR）预测 MINS 的研究，但其他系统炎症指数如血小板与淋巴细胞比率（platelet-to-lymphocyte ratio，PLR）及系统免疫炎症指数（systemic-immune-inflammation index，SII）尚未被应用于预测 MINS。因此，本研究拟探讨系统炎症指数与 MINS 的关系，同时比较三个系统炎症指数对 MINS 的临床预测价值。
方法 本研究纳入 2017 年 1 月至 2019 年 8 月期间于解放军总医院第一医学中心接受非心脏手术的老年患者（年龄≥65 岁）。通过受试者工作特征曲线(receiver operating characteristic curve, ROC)生成三个系统炎症指数截断值，并通过单多因素 logistic 回归分析炎症指数与 MINS 之间的关系。ROC 曲线下面积(receiver operating characteristic curve, AUC)来评价三个系统炎症指数的预测价值，并用 DeLong 的统计学显著性检验 AUC 曲线之间的差异。通过单多因素 logistic 回归分析建立一个新的预测模型，并将三个炎症指数分别加入到新模型中。
结果 在 12,464 例患者中，共有 965 例发生了 MINS。结果显示 NLR>2.59 与老年患者 MINS 显著相关（OR: 1.54, 95%CI: 1.27-2.20, p<0.001），但 PLR 和 SII 仅在单因素 logistic 回归分析中与 MINS 相关。AUC 结果显示，NLR (AUC: 0.671, 95% CI: 0.652~0.689) 比 PLR (AUC: 0.635, 95% CI: 0.616~0.655)和 SII (AUC: 0.648, 95% CI: 0.628~0.667)有更高的预测价值。单多因素 logistic 分析筛选出预测指标年龄、脑血管疾病史、心脏疾病史、心律失常、心衰、手术失常、术中平均动脉压<65 时长及术中输血量 8 个指标构建一个新的预测模型。在训练集和验证集中，纳入 NLR 的预测模型表现最好，AUC 分别为 0.797（95% CI, 0.779~0.814）和 0.771（95% CI, 0.774~0.798），而 PLR 的 AUC 分别为 0.790（95% CI, 0.772~0.807）和 0.764（95% CI, 0.730~0.791），SII 分别为 0.791（95% CI, 0.774~0.809）和 0.765（95% CI, 0.730~0.792）。与预测模型相比，加入 NLR、PLR 及 SII 后 NRI 和 IDI 均有提高。
结论 对于老年非心脏手术患者，术前应关注患者的炎症状态，以降低术后 MINS 的发生风险。且 NLR 在临床易获得且具有一定的预测价值，为 MINS 的早期预测和风险评估提供了帮助。

PU-1175

系统炎症指数与老年患者非心脏手术后心肌损伤的关系

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PU-1176

Individualized Lung-Protective Ventilation Strategy Guided by Pulmonary Ultrasonography and Lung Dynamic Compliance in Patients Undergoing Laparoscopic Rectal Cancer Radical Surgery: A Prospective Study

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Objective:This study aimed to observe the effects of an individualized lung-protective ventilation strategy guided by pulmonary ultrasonography and lung dynamic compliance (Cdyn) on intraoperative lung atelectasis and oxygenation function in patients undergoing laparoscopic rectal cancer radical surgery.Methods: From January 2023 to December 2023, 120 patients who underwent laparoscopic radical resection of rectal cancer were randomly divided into two groups: the Standard Positive End-Expiratory Pressure Group (SP group) and the Individualized Ventilation Protection Group (IP group), each comprising 60 patients. The inclusion criteria included patients

over 18 years old, with a body mass index of 18-30 kg/m^2, and ASA classification of I-III. During surgery, both groups of patients were ventilated using volume-controlled ventilation: The tidal volume VT for patients in the SP group and the IP group was set at 6ml/kg × ideal body weight (IBW). By adjusting the ventilation frequency between 10 and 15 times per minute, $PetCO_2$ was maintained at 35-45 mmHg, and an air-oxygen mixture with FiO_2 of 50% was inhaled at a rate of 2L/min. Immediately after tracheal intubation, lung recruitment was performed in both groups, and intermittent lung recruitment was performed every 30 minutes thereafter. In the SP group, after the first lung recruitment, PEEP was set at 5cmH_2O and maintained at this level throughout the surgery until the end of the operation. In the IP group, after the first lung recruitment, PEEP was set at 5cmH_2O. After the establishment of CO_2 pneumoperitoneum and Trendlenburg position, the individualized optimal PEEP level for the patient was measured using the Cdyn-guided PEEP titration method, and ventilation was maintained at this PEEP level until the end of the surgery. The specific PEEP titration method is as follows: Every 2 minutes, PEEP was gradually increased by 2cmH_2O, and the corresponding Cdyn for each PEEP was calculated using the formula Cdyn=VT/(Ppeak-PEEP). When Cdyn began to decrease, indicating the disappearance of the maximum dynamic compliance, the PEEP level before the inflection point was considered the optimal positive end-expiratory pressure，and this PEEP value is used for ventilation until the end of pneumoperitoneum.Record the arterial blood gas index, hemodynamic index, and ventilation index of the two groups of patients at the following time points: before anesthesia induction (T), 30 minutes after the establishment of pneumoperitoneum-Trendelenburg position (T_1), 1 minute after the release of pneumoperitoneum (T_2), 1 minute after the closure of the abdominal cavity (T_3), and 15 minutes after the removal of the tracheal tube (T_4). Specifically including: lung ultrasound score (LUS), heart rate (HR), mean arterial pressure (MAP), plateau pressure (Pplat), arterial oxygen partial pressure (PaO_2), and arterial carbon dioxide partial pressure ($PaCO_2$). Calculate the oxygenation index (OI), alveolar-arterial oxygen partial pressure difference (A-aDO_2), and lung driving pressure (DP) at T_{1-3}， using the following formulas: OI=PaO_2/FiO_2, aDO_2=(PiO_2 — $PaCO_2$/R)-PaO_2, DP=Pplat-PEEP. The specific method for lung ultrasound examination is: using a portable ultrasound (MicroMax, Bothell, WA) with a 6-12 MHz linear probe. We divide both sides of the chest into 12 areas based on three longitudinal lines (parasternal line, anterior axillary line, and posterior axillary line) and two transverse lines (one above the diaphragm and the other at nipple level). Each area is scored from 0 to 3 according to the ultrasound images: 0 points, normal lung sliding sign, no more than 2 single B-lines.1 point, more than 2 single B-lines. 2 points, fused B-lines appear. 3 points, lung consolidation sign. Results: There was no statistical difference in the relevant indicators of preoperative general conditions (gender, age, BMI, ASA classification, etc.) and intraoperative conditions (blood loss, anesthesia time, mechanical ventilation time, pneumoperitoneum time, and operation time) between the two groups (P>0.05).After titration, the median value of individualized PEEP in the IP group was 9.2±1.6cmH_2O, which was higher than 5cmH_2O in the SP group, and the difference was statistically significant (P<0.05).The LUS score and the incidence of atelectasis in the IP group were significantly lower than those in the SP group at T_{1-3} (P<0.05). The OI in the IP group was significantly higher than that in the SP group at T_{1-3} (P<0.05), while A-aDO_2 was significantly lower than that in the SP group (P<0.05). The driving pressure in the IP group was significantly lower than that in the SP group at T_{1-2} (P<0.05), and there was no statistical significance between the two groups at T_3. There was no significant statistical difference in $PaCO_2$ between the two groups at each time point (P>0.05).There was no significant difference in MAP and HR between the two groups at each time point. Conclusion: An individualized lung-protective ventilation strategy guided by pulmonary dynamic compliance improves oxygenation in patients undergoing laparoscopic rectal cancer radical surgery. Early detection of intraoperative lung atelectasis can be achieved through pulmonary ultrasound assessment.

PU-1177

米力农控制性低中心静脉压对腹腔镜肝切除术患者术中脑血流的影响

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目的 探讨在腹腔镜肝切除术患者中应用米力农实施低 CVP 技术对术中脑血流的影响，为临床应用提供参考。

方法 本研究为单中心双盲随机对照临床试验，纳入在我院行全身麻醉下腹腔镜肝脏切除术择期手术患者 80 例，性别不限，BMI:18~30kg/m2，年龄:18~60 岁，ASA 分级 I~Ⅲ级，采用随机数字表法将患者分为 2 组(n=40)：硝酸甘油组(X 组)和米力农组(M 组)。所有患者都需要在手术前按规定禁食禁饮 8 小时，术前不会进行输液来弥补液体损失。患者进入手术室后，常规建立外周静脉通路，并持续监测心电图、指脉氧饱和度、有创动脉压和脑电双频指数。血流动力学参数如心输出量(CO)、心指数(CI)等由 vigileo 监护仪监测。所有患者均采用统一麻醉方案，手术开始后 M 组持续静脉泵注米力农 0.5μg·kg^{-1}·min^{-1}，X 组泵注硝酸甘油 0.5~1.5μg·kg^{-1}·min^{-1}，维持 CVP0-5cmH_2O。于入室(T0)、气管插管后 10min(T1)、气腹建立后(T2)、CVP 达到目标值后 5min(T3)、CVP 达到目标值后 30min(T4)时、CVP 恢复正常值后 5min(T5)、术毕(T6)记录心率(HR)、平均动脉压，并于 T1~6 时记录颈内动脉平均血流速度(IBVm)、平均血流量(IBF)、CO、CI、呼末二氧化碳分压、气道压。记录术野评分、术中血管活性药物用量、液体出入量、术后 7d 并发症发生情况。

结果 与 X 组比较，M 组 T3-5 时 CO、CI、IBVm 和 IBF 升高，术中去甲肾上腺素用量减少，术野评分升高（P<0.05）；2 组各时点术中液体出入量和术后并发症发生率差异无统计学意义（P>0.05）。

结论 腹腔镜肝切除术中米力农较硝酸甘油诱导 CVP 技术相比，可在一定程度改善脑血流，其机制可能与米力农可增加心输出量有关。

PU-1178

右美托咪定对机器人辅助腹腔镜根治性前列腺切除术患者视神经鞘直径的影响

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目的 选择择期行机器人辅助腹腔镜根治性前列腺切除术患者 60 例，随机分成试 验组与对照组。试验组从麻醉诱导开始持续静脉泵注右美托咪定 0.5ug/kg/h；对 照组以相同速率泵注生理盐水。记录患者麻醉诱导前(T0)，气管插管后 10min(T1)， 头低位结合 CO2 气腹 30min(T2)，头低位结合 CO2 气腹 90min(T3)，头低位结合 CO2 气腹 150min(T4)，关闭 CO2 气腹恢复仰卧位(T5)时点 MAP、HR、SpO2、BIS、 CVP、ETCO2、双侧 ONSD 的变化情况。

方法 选择择期行机器人辅助腹腔镜根治性前列腺切除术患者 60 例，随机分成试 验组与对照组。试验组从麻醉诱导开始持续静脉泵注右美托咪定 0.5ug/kg/h；对 照组以相同速率泵注生理盐水。记录患者麻醉诱导前(T0)，气管插管后 10min(T1)， 头低位结合 CO2 气腹 30min(T2)，头低位结合 CO2 气腹 90min(T3)，头低位结合 CO2 气腹 150min(T4)，关闭 CO2 气腹恢复仰卧位(T5)时点 MAP、HR、SpO2、BIS、 CVP、ETCO2、双侧 ONSD 的变化情况。

结果 选择择期行机器人辅助腹腔镜根治性前列腺切除术患者 60 例，随机分成试 验组与对照组。试验组从麻醉诱导开始持续静脉泵注右美托咪定 0.5ug/kg/h；对 照组以相同速率泵注生理盐水。记录

患者麻醉诱导前(T0)，气管插管后 10min(T1)， 头低位结合 CO2 气腹 30min(T2)，头低位结合 CO2 气腹 90min(T3)，头低位结合 CO2 气腹 150min(T4)，关闭 CO2 气腹恢复仰卧位(T5)时点 MAP、HR、SpO2、BIS、 CVP、ETCO2、双侧 ONSD 的变化情况。
结论 1.术中持续泵注右美托咪定可一定程度缓解 RALP 手术中颅内压的增加。
2.通过超声测量 ONSD，可无创性评估术中颅内压变化。
3.监测和管理颅内压，有利于防止 RALP 期间颅内压持续升高，减少相关并发症的发生。

PU-1179

麻醉诱导期间芬太尼与丙泊酚给药时间增加的血流动力学影响

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目的 麻醉诱导可产生严重的丙泊酚剂量依赖性低血压。芬太尼联合用药可降低经口气管插管时的儿茶酚胺反应，从而降低丙泊酚的剂量。本研究旨在探讨在不增加达到最佳催眠时间的情况下，增加芬太尼与丙泊酚的给药间隔时间并减少丙泊酚的用量能否改善血流动力学反应。
方法 经研究伦理委员会批准，拟行气管插管非心脏手术的患者通过计算机生成表随机分为 6 个时间剂量组(1、2 min /1、1.5、2 mg)。丙泊酚 Kg-1)。支气管吸入风险高、气道困难、血流动力学不稳定或麻醉过敏的患者被排除。静脉注射芬太尼(2g.kg-1)后，各组分别在 1 min 和 2 min 后给予不同剂量的丙泊酚。分别于诱导前、插管前、插管后测定患者的无创血压(BP)和心率(HR)。记录入睡时间(bis < 60)。
结果 205 例患者中 198 例完成了研究(1 min 组 101 例;2 min 组 97 例)。我们观察到所有组的心率和血压在给予丙泊酚后降低，在插管后升高($p < 0.0001$)。55 岁以上的患者，2 分钟- 2 毫克。在插管前，kg-1 组的收缩压下降幅度最大(36±12%)，而 1 min - 1.5 mg 组的收缩压下降幅度最大。Kg-1 组插管前后血流动力学变化最小(-4±13%)。6 组间低龄患者及达到催眠所需时间差异均无统计学意义。虽然没有记录到严重心动过缓的病例，但 5,4%的样本需要使用血管加压药。
结论 结论:对于年龄> 55 岁的患者，延长芬太尼和丙泊酚给药的间隔时间最多 2 min 会导致更严重的低血压。

PU-1180

术前血清肌酐与胱抑素 C 预测非心脏手术后急性肾损伤：一项回顾性队列研究

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目的 急性肾损伤（Acute kidney injury，AKI）是非心脏手术后的重要并发症，术前风险预测对于早期预防 AKI 至关重要。尽管已有多个 AKI 预测模型发表，但没有一个模型在独立外部验证中表现良好。既往 AKI 预测模型都纳入了血清肌酐及基于 Cr 的估算肾小球滤过率（estimated Glomerular Filtration Rate based on creatinine，eGFRcr）。然而，血清肌酐水平受骨骼肌含量等非肾脏因素的影响，使得仅包含这一类肾脏指标的预测模型表现不佳。胱抑素 C 受非肾脏因素的影响较小，被视为更精准的肾功能评估指标。在许多研究中，胱抑素 C 对不良结局的预测能力强于肌酐。然而，肌酐与胱抑素 C 联合应用时对术后 AKI 的预测价值尚不清楚。本研究的目的是通过在基线模型中加入肌酐和胱抑素 C 以评估其对术后 AKI 的预测价值。
方法 本研究是一项单中心回顾性队列研究，纳入了中国广东省某大型三甲医院 2012 年至 2022

年期间接受非心脏手术，并在术前 30 天内同时进行了肌酐和胱抑素 C 测量的成年患者。通过建立 Logistic 回归模型来评估肌酐和胱抑素 C 与术后 AKI 的相关性，并主要通过受试工作者曲线下面积（Area under the receiver operating characteristic curve，AUC）和新增预测信息比（Fraction of new predictive information）以及临床效益（决策曲线分析）来评估加入肌酐和胱抑素 C 后模型的预测性能。

结果 根据改善全球肾脏病预后组织（Kidney Disease Improving Global Outcomes，KDIGO）的定义，一共 1135 名患者（4.9%）在术后 7 天内诊断为术后 AKI。在基线模型中分别加入肌酐和胱抑素 C 后，较高的肌酐水平和较高的胱抑素 C 水平，均与 AKI 发生率增加相关。在结合肌酐和胱抑素 C 的模型中，较低的肌酐水平和较高的胱抑素 C 水平与 AKI 发生率增加相关。在模型中分别或同时加入肌酐和胱抑素 C 均能提高模型的预测能力。在模型中加入肌酐， AUC 增加 0.008，新增预测信息比为 0.072；在模型中加入胱抑素 C，AUC 增加 0.006，新增预测信息比为 0.116。同时加入肌酐和胱抑素 C 的预测能力最佳，AUC 增加 0.024，新增预测信息比为 0.211。结合肌酐和胱抑素两种标志物的模型在临床决策曲线分析中有更高的净收益。

结论 术前肌酐和胱抑素 C 对预测非心脏手术后急性肾损伤比仅使用基线模型更为有效，它们的联合应用提供了最大的预测信息。未来的研究将致力于进一步验证结合肌酐和胱抑素 C 两种标志物的模型性能，以便更好地支持临床决策和围术期患者管理。

PU-1181

基于未校准的动脉压波形分析的目标导向血流动力学治疗对非心胸外科手术患者术后结局的影响

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目的 目标导向血流动力学治疗（goal-directed hemodynamic therapy, GDHT）的概念已在临床麻醉中存在多年，但实际应用却各有不同。临床中常用未校准的动脉压波形分析（uncalibrated arterial pressure waveform analysis）来指导 GDHT，研究者们也对其开展了一些随机对照试验（randomized controlled trials, RCTs），但其对患者术后结局的影响并不一致。本研究将对基于未校准的动脉压波形分析进行 GDHT 的 RCTs 进行 Meta 分析，以探究 GDHT 与常规血流动力学治疗相比，是否能够改善非心胸外科手术患者的术后结局

方法 在 PubMed、Embase 等数据库和国际临床试验注册平台检索相关研究，检索时间范围设定为 2005 年 1 月至 2024 年 5 月。纳入研究为非心胸外科手术相关的 RCTs，且在全身麻醉期间接受 uncalibrated arterial pressure waveform analysis 指导的 GDHT。主要结局是术后并发症以及按照系统进行分类的并发症，次要结局包括住院时间、死亡率、术毕动脉血乳酸水平。使用 Stata/SE 12.0 及 RevMan 5.4.1 进行统计学分析。

结果 本研究最终纳入了 19 项符合条件的随机对照试验，涉及 1931 名患者。结果显示，GDHT 组与对照组相比：术后并发症发生率明显降低，OR 为 0.58 [95% CI (0.40, 0.84)]。循环系统并发症、呼吸系统并发症的发生率明显降低，OR 分别为 0.56 [95% CI (0.38, 0.85)]和 0.65 [95% CI (0.48, 0.89)]，而神经系统并发症、肾脏并发症的差异无统计学意义。住院时间明显缩短，WMD 为-1.41 天[95% CI (-2.45, -0.37)]。死亡率的差异无统计学意义。术毕动脉血乳酸水平明显降低，SMD 为-0.61 [95% CI (-0.99, -0.22)]

结论 Meta 分析研究表明，基于未校准的动脉压波形分析的 GDHT 可以改善非心胸外科手术患者的术后结局，包括减少术后并发症、缩短住院时间，尤其是在减少心肺并发症及减少高危患者群体并发症方面。

PU-1182

基于转录组测序探索并验证乌司他丁治疗脓毒症脑病的作用机制

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目的 脓毒症是由炎症和广泛感染引起的严重疾病，可能引发脓毒症相关性脑病(Sepsis -associated encephalopathy, SAE)。目前，SAE 的发病机制仍不完全清楚，寻找有效的生物标志物对 SAE 的早期诊断、预防和探讨其致病机制至关重要。。乌司他丁(UTI)具有重要的抗炎作用。本研究旨在探索 UTI 治疗后 SAE 模型小鼠的关键基因及其分子机制。
方法 收集 SHAM 组(Ctrl 组，n=5)、Sepsis 组(CLP 组，n=5)和 UTI+Sepsis 组(UTI +Sepsis 组，n=5)海马组织进行 RNA 测序。通过差异表达分析，确定引起 UTI 处理后基因表达变化的关键差异表达基因(DEGs)。通过将关键 DEGs 与免疫相关基因(IRGs)重叠，获得差异表达的 IRGs。随后，应用 Cytoscape 软件中的 Cytohubba 插件的 6 种算法获得蛋白质-蛋白质相互作用(PPI)网络中的枢纽基因。采用基因集富集分析(GSEA)进一步分析关键基因的功能。分析比较 3 组小鼠的免疫微环境。通过在线数据库预测与关键基因相关的潜在药物。最后通过 qRT-PCR 验证关键基因在 CLP 小鼠海马组织中的表达。
结果 RNA 测序共鉴定出 864 个 DEGs (CLP vs. Ctrl)和 279 个 DEGs (UTI vs. CLP)。随后将表达趋势相反的两组 DEGs 进行交叉，得到 165 个关键 DEGs。通过 6 种算法筛选，51 个 DE-IRGs 中 ICAM-1、IRF7、IL-1β、CCL2、IL-6 和 SOCS3 被确定为枢纽基因。其中，6 个枢纽基因共富集于自然杀伤(NK)细胞介导的细胞毒性、JAK/STAT 信号通路、toll 样受体信号通路等。有趣的是，只有 Treg 细胞减少(CLP vs. Ctrl)， UTI 治疗后又增加(UTI vs. CLP)。预测出 106 种枢纽基因相关药物，产生 116 对药物-基因对。其中 BIN-DARIT-Ccl2 和 LIFITEGRAST-Icam1 具有较高的亲和力。此外，qRT-PCR 验证了核心基因 ICAM-1、IRF7、IL-1β、CCL2、IL-6 和 SOCS3 的表达，结果与我们的预测一致。
结论 ICAM-1, IRF7, IL-1β， CCL2, IL-6 和 SOCS3 是 UTI 治疗脓毒症小鼠的潜在靶点。本研究为脓毒症合并 UTI 的治疗提供了理论支持。

PU-1183

经皮电刺激内关穴对降低全麻下眼科手术患者眼心反射发生率的研究

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目的 在进行一些眼科手术及操作时，因加压眼球或牵拉眼组织而导致患者出现心率减慢、心律失常，并伴胸闷不适等症状，这一现象称眼心反射（oculocardiac reflex，OCR），目前，使用丁卡因眼液局麻、静脉注射阿托品以及球后神经阻滞用于预防眼科手术中 OCR 的发生。但研究发现，以上方式极易引起全身性副作用，经皮穴位电刺激(Transcutaneous acupoint electrical stimulation，，TEAS)内关穴具有调节心率的作用，认为心包经对心率具有良性双向调整作用。因此，我们推测在术前对内关穴实施电刺激可以降低眼心反射的发生率，提高手术的安全性，加快患者恢复时间并减少术后并发症的发生。
方法 选取 2023 年 8 月-2024 年 5 月择期行全麻眼科手术患者 50 例，年龄 8~65 岁，ASA 分级Ⅰ-Ⅱ；NYHA 分级Ⅰ-Ⅲ,BMI<28 kg/cm2，使用 SPSS23.0 生成随机序列，每个人按 1:1 比例随机分为电针组（T 组）和非针非穴组（C 组）。术前 30 min，对 T 组患者的双侧内关穴进行电针预刺激，

采用疏密波（疏波 2Hz，密波 30Hz）2-100HZ，电流强度以患者能耐受最大电流为适宜，在 3~6mA 之间调节，刺激持续 30min 后进行麻醉,直至手术结束；C 组患者于非经非穴点对手臂处理及电极片粘贴方式、处理时长和电刺激与 T 组无异。记录眼心反射发生次数（分级）,记录入室（T0）、麻醉后 2 min（T1）、手术开始（T2）、手术开始后 30min（T3）、手术开始后 60min（T4）、术毕（T5）的 SBP、DBP、MAP、HR、CO、皮质醇，血糖值,心率变异性，术后 PONV 发生率。术后 24 h，48 h 视觉模拟评分（VAS）值。

结果 T 组眼心反射发生次数为 1.59±1.11 次，C 组眼心反射发生次数为 3.67±1.99 次，两组相比差异有统计学意义（P=0.03）

结论 TEAS 内关穴可降低眼科手术眼心反射发生次数，证实 TAES 能有效降低眼科患者术中眼心反射发生率，改善患者预后，并且为进一步解释 TAES 调节自主神经平衡理论提供新的科学证据

PU-1184

口服 RDP58 以肠道菌群依赖的方式改善 dss 诱导的结肠炎

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目的 Although the pathogenesis of inflammatory bowel disease (IBD), including ulcerative colitis (UC) and Crohn's disease (CD), has not been fully elucidated, accumulating researches suggest that intestinal microbiota imbalance contributes to the development of IBD in patients and animal models. RDP58, a peptide-based computer-assisted rational design, has been demonstrated to be effective in protecting against a wide range of autoimmune and inflammatory diseases. However, the underlying mechanism by which RDP58 protects against IBD mediated by intestinal microbiota has yet to be elucidated.

方法 Although the pathogenesis of inflammatory bowel disease (IBD), including ulcerative colitis (UC) and Crohn's disease (CD), has not been fully elucidated, accumulating researches suggest that intestinal microbiota imbalance contributes to the development of IBD in patients and animal models. RDP58, a peptide-based computer-assisted rational design, has been demonstrated to be effective in protecting against a wide range of autoimmune and inflammatory diseases. However, the underlying mechanism by which RDP58 protects against IBD mediated by intestinal microbiota has yet to be elucidated.

结果 Although the pathogenesis of inflammatory bowel disease (IBD), including ulcerative colitis (UC) and Crohn's disease (CD), has not been fully elucidated, accumulating researches suggest that intestinal microbiota imbalance contributes to the development of IBD in patients and animal models. RDP58, a peptide-based computer-assisted rational design, has been demonstrated to be effective in protecting against a wide range of autoimmune and inflammatory diseases. However, the underlying mechanism by which RDP58 protects against IBD mediated by intestinal microbiota has yet to be elucidated.

结论 RDP58 ameliorated DSS-induced colitis through altering intestinal microbiota and enhancing SCFAs and Tregs production in intestinal microbiota dependent manner, potentially provide a novel therapy for IBD.

PU-1185

血浆纤维蛋白原/白蛋白比值(FAR)预测非心脏手术患者围术期脑卒中：一项多中心回顾性队列研究

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目的 纤维蛋白原是一种肝细胞合成的糖蛋白，是人体中最丰富的凝血蛋白，同时也是全身炎症反应中的急性期蛋白，在炎症期间迅速增加，转变为纤维蛋白后积极参与凝血过程。血浆白蛋白水平则通常反应人体营养状况。因此血浆纤维蛋白原/白蛋白比值(FAR)可以作为反应患者炎症、凝血以及营养状态的综合指标。在这项研究中我们评价了血浆纤维蛋白原/白蛋白比值(FAR)对于围术期脑卒中的预测价值。

方法 回顾性纳入来自三家医疗中心（中国人民解放军总医院、河南省人民医院、南方医科大学南方医院）的 301457 名非心脏手术患者，通过单因素以及多因素 Logistic 回归探讨术前血浆纤维蛋白原/白蛋白比值(FAR)与围术期脑卒中发病的相关关系，使用限制性立方样条(RCS)回归分析评估了围术期脑卒中发病风险伴随术前血浆纤维蛋白原/白蛋白比值(FAR)的变化趋势。使用倾向性评分以及逆概率加权分析调整了基线特征差异。亚组分析与敏感性分析比较了术前血浆纤维蛋白原/白蛋白比值(FAR)在不同人群中的对围术期脑卒中发病的预测能力。

结果 采用受试者工作特征曲线 (ROC) 分析确定 FAR 的最佳截断值为 0.079。在单因素回归模型中，FAR > 0.079 预测围术期脑卒中发病的 OR 为 2.668（95% CI：1.210-5.324，P＜ 0.001）。在调整了术前协变量、术中协变量以及所有纳入协变量的多因素回归模型中，OR 分别为 2.390（95% CI：1.133-3.952，P=0.008）、2.661（95%CI：1.109-4.325，P=0.006）和 1.678（95% CI：1.467-2.283， P= 0.003）。亚组分析表明，FAR 在女性患者、 神经外科手术患者、糖尿病患者以及老年患者中预测效果更好。

结论 血浆纤维蛋白原/白蛋白比值(FAR)升高与非心脏手术患者围术期脑卒中发病相关，FAR 有望成为非心脏手术患者围术期脑卒中发病预测的新型标志物。

PU-1186

肠道菌群代谢产物丁酸上调 GPX4 抑制铁死亡减轻小鼠肠缺血再灌注损伤

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北京大学第一医院

目的 探究肠道菌群通过代谢产物丁酸调控谷胱甘肽过氧化物酶 4（GPX4）表达在肠缺血再灌注（I/R）损伤中的作用及其与铁死亡的关系。

方法 方法 SPF 级健康雄性 C57BL/6 小鼠 30 只，8-10 周龄，体重 18-22g，采用随机数字表法分为 5 组（n =6）：假手术组（S 组）、肠 I/R 组（IR 组）、肠 I/R+丁酸钠组（IRB 组）、GPX4 抑制剂 RSL3 组（IRR 组）、肠 I/R+丁酸钠+GPX4 抑制剂 RSL3 组（IRBR 组）。采用夹闭肠系膜上动脉 45 min 后恢复灌注 120 min 的方法构建小鼠肠 I/R 损伤模型。IRB 组和 IRBR 组小鼠于缺血再灌注前 3 h 予丁酸钠灌胃（20mg/kg）；IRR 组和 IRBR 组小鼠于缺血再灌注前 1 h 腹腔注射 RSL3（50mg/kg）。再灌注 120 min 后处死小鼠，收集小鼠小肠内容物行 16 S rRNA 基因扩增序列检测、非靶向代谢组学和靶向代谢组学分析；取肠组织行 HE 染色并于光镜下观察肠组织病理学变化并行 Chiu’s 评分；于电子透射显微镜下观察肠粘膜上皮细胞线粒体形态变化；采用荧光染色法检测 ROS 含量，比色法检测肠组织 Fe2+及 MDA 含量，Elisa 法检测谷胱甘肽（GSH）含量；采用免疫荧光

法和 Westernblot 法检测 GPX4、长链脂酰辅酶 A 合成酶 4（ACSL4）和非糖基化的 xCT（SLC7A11）的表达。
结果 结果 与 S 组相比，IR 组小鼠肠道菌群 chao1 指数、Shannon 指数和 Simpson 指数下降，肠道丁酸含量降低，肠组织 Chiu's 评分升高，ROS、Fe2+及 MDA 含量增加，GSH 含量降低，GPX4、SLC7A11 表达下调，ACSL4 表达上调（P ＜0.05）；与 IR 组相比，IRB 组小鼠肠组织 Chiu's 评分降低，ROS、Fe2+及 MDA 含量下降， GSH 含量升高，GPX4、SLC7A11 表达上调，ACSL4 表达下调（P ＜0.05）；与 IRB 组相比，IRBR 组小鼠肠组织 Chiu's 评分升高，ROS、Fe2+及 MDA 含量增加，GSH 含量降低，GPX4、SLC7A11 表达下调，ACSL4 表达上调（P ＜0.05）。
结论 结论 小鼠肠 I/R 导致肠道菌群失调及其代谢产物丁酸含量减少，丁酸钠可以减轻小鼠肠 I/R 损伤，其机制可能与上调 GPX4 表达，抑制铁死亡有关。

PU-1187

右美托咪定联合舒芬太尼用于剖宫产术后镇痛对疼痛程度及免疫功能的影响

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目的 观察右美托咪定联合舒芬太尼用于剖宫产术后镇痛对疼痛程度及免疫功能的影响。
方法 方法 收集 2022 年 6 月-2023 年 4 月于本院行择期剖宫产术的 100 例足月孕妇作为研究对象，随机将患者分为观察组和对照组，每组 50 例。两组患者术后均给予静脉自控镇痛泵（PCIA）镇痛。观察组 PCIA 方案：右美托咪定 0.1μg·kg-1＋舒芬太尼 2μg·kg-1＋托烷司琼 15mg＋生理盐水至 150mL；对照组 PCIA 方案：舒芬太尼 3μg·kg-1＋托烷司琼 15mg＋生理盐水至 150mL。比较两组患者术后 6、12、24、48h 的布氏舒适评分（BCS）评分和 Ramsay 镇静评分。比较两组患者术前 24h 及术后各时点 CD4+、CD8+、NK 细胞免疫功能指标，比较两组患者术后药物不良反应发生率。
结果 结果 与对照组比较，观察组在术后 6，12，24，48h 的 BCS 评分升高，差异有统计学意义（P＜0. 05），Ramsay 镇静评分差异无统计学意义（P＞0.05）。两组患者术前 24h CD4+、CD8+、NK 细胞水平比较，差异无统计学意义（P＞0.05）。观察组术后 6，12，24，48hCD4+细胞水平、NK 细胞水平均高于对照组，差异均有统计学意义（P＜0. 05）；CD8+细胞水平均低于对照组，差异有统计学意义（P＜0.05）。两组药物不良反应发生率比较，观察组和对照组分别为 8.00％和 34.00％，差异有统计学意义（P＜0.05）。
结论 结论 右美托咪定联合舒芬太尼用于剖宫产术后 PCIA，不仅可产生良好的镇痛效果，还能改善术后免疫抑制，不良反应发生率低，安全性高，值得临床应用推广。

PU-1188

盐酸右美托咪定联合舒芬太尼用于剖宫产术后镇痛对疼痛程度及免疫功能的影响

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目的 观察右美托咪定联合舒芬太尼用于剖宫产术后镇痛对疼痛程度及免疫功能的影响。
方法 方法 收集 2022 年 6 月-2023 年 4 月于本院行择期剖宫产术的 100 例足月孕妇作为研究对象，随机将患者分为观察组和对照组，每组 50 例。两组患者术后均给予静脉自控镇痛泵（PCIA）镇痛。

观察组 PCIA 方案：右美托咪定 0.1μg·kg-1＋舒芬太尼 2μg·kg-1＋托烷司琼 15mg＋生理盐水至 150mL；对照组 PCIA 方案：舒芬太尼 3μg·kg-1＋托烷司琼 15mg＋生理盐水至 150mL。比较两组患者术后 6、12、24、48h 的布氏舒适评分（BCS）评分和 Ramsay 镇静评分。比较两组患者术前 24h 及术后各时点 CD4+、CD8+、NK 细胞免疫功能指标，比较两组患者术后药物不良反应发生率。

结果 结果 与对照组比较，观察组在术后 6，12，24，48h 的 BCS 评分升高，差异有统计学意义（P＜0. 05），Ramsay 镇静评分差异无统计学意义（P＞0.05）。两组患者术前 24h CD4+、CD8+、NK 细胞水平比较，差异无统计学意义（P＞0.05）。观察组术后 6，12，24，48hCD4+细胞水平、NK 细胞水平均高于对照组，差异均有统计学意义（P＜0. 05）；CD8+细胞水平均低于对照组，差异有统计学意义（P＜0.05）。两组药物不良反应发生率比较，观察组和对照组分别为 8.00％和 34.00％，差异有统计学意义（P＜0.05）。

结论 结论 右美托咪定联合舒芬太尼用于剖宫产术后 PCIA，不仅可产生良好的镇痛效果，还能改善术后免疫抑制，不良反应发生率低，安全性高，值得临床应用推广。

PU-1189

基于 cAMP-PKA 通路调控慢波睡眠探讨星状神经节阻滞改善老年小鼠术后认知功能障碍的作用机制

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目的 探讨星状神经节阻滞是否通过 cAMP-PKA 通路调控慢波睡眠改善老年小鼠术后谵妄

方法 18 个月龄 C57BL/6 小鼠在异氟烷麻醉下行胫骨骨折+内固定手术建立老年小鼠手术麻醉模型，将实验小鼠分为 6 组, ①Con 组：不进行麻醉手术，向海马注射等量溶剂；②Con+Rp-cAMPS 组：不进行麻醉手术，向海马注射 PKA 特异性抑制剂 Rp-cAMPS（10μM）；③Sur 组：进行麻醉手术，向海马注射等量溶剂；④Sur+Rp-cAMPS 组：进行麻醉手术，向海马注射 Rp-cAMPS（10μM）；⑤SGB 组：在麻醉手术前行星状神经节阻滞,向海马注射等量溶剂；⑥SGB +Rp-cAMPS 组: 在麻醉手术前行星状神经节阻滞，向海马注射 Rp-cAMPS（10μM）。术后第三天行 Morris 水迷宫试验、矿场试验和新奇物品识别试验评估认知功能变化；采用 EEG/EMG 生物监测系统监测睡眠情况；Western blot 及免疫荧光标记法检测术后 3 天海马神经突触可塑性相关蛋白 SYN、PSD-95 蛋白表达，cAMP-PKA 通路相关蛋白 5-HTlAR、Gi/o、cAMP 和 PKA 蛋白表达情况；Elisa 法检测海马区 BDNF，NfL、S100β 蛋白表达情况；高尔基法染色观察海马神经元形态及树突棘密度变化；透射电镜观察海马突触显微结构改变。

结果 ①手术麻醉引起老年小鼠认知功能损害，表现为与 Con 组相比，Sur 组在麻醉手术后第 1、3、7 天水迷宫行为学逃避潜伏期延长，平台象限穿越次数及目标象限的停留时间减少；而星状神经节阻滞能够有效改善神经认知功能损害；

②手术麻醉引起老年小鼠海马区突触可塑性损伤，表现为突触相关蛋白表达减少，树突棘数量减少和密度降低，cAMP-PKA 信号通路蛋白表达减少，伴有术后睡眠时间缩短，该不良反应在星状神经节阻滞处理后得到明显改善；

③PKA 特异性抑制剂 Rp-cAMPS 逆转星状神经节阻滞对手术麻醉后突触可塑性、睡眠质量和认知功能的保护作用。

结论 星状经节阻滞通过促进慢波睡眠改善老年小鼠手术麻醉后认知功能障碍，该作用与调控 cAMP-PKA 信号通路有关。

PU-1190

艾司氯胺酮对单肺通气患者肺功能的影响

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目的 本研究旨在探讨艾司氯胺酮对单肺通气患者肺损伤影响
方法 拟选择我院择期全麻患者 80 例，入选患者对本研究知情同意并签署知情同意书，将患者随机分为 2 组：艾司氯胺酮组（E 组）和对照组（等量生理盐水，C 组）。入选标准：(1) 年龄在 18-65 岁之间，心功能 I-II 的患者；(2)ASA 分级Ⅱ到Ⅲ级；(3)拟全麻下行经胸腔镜肺癌根治术的患者；（4）同意参与并签署知情同意书（5）BMI 指数<30kg/m2。排除标准：(1)拒绝接受此实验；(2) 严重心、肺、肝、肾功能不全患者；(3) 术前呼吸道和肺部感染的患者(4)麻醉期间 SPO2 难以维持在 95%以上者； (5)术中气道压力 > 40cmH2O 的患者。（6）术中单肺通气时间小于 1 小时；（7）术中出现严重并发症如大出血、过敏性休克等；（8）中转开胸手术者；（9）有滥用麻醉性镇静镇痛药史；存在对试验药物及其他麻醉药物的禁忌症或者过敏者。
2.研究所需药品及仪器
药品：艾司氯胺酮，罗库溴铵，丙泊酚，瑞芬太尼，舒芬太尼；主要仪器：多功能监护仪，麻醉机。
3.研究方案
3.1 麻醉诱导
患者术前常规禁食水，所有患者随机分为 2 组（n=30），常规面罩吸氧 3L/min，E 组麻醉诱导前 5min 静脉注射艾司氯胺酮（0.2mg/kg），C 组静脉注射等量生理盐水。2 组患者麻醉诱导均以舒芬太尼 0.5ug/kg，罗库溴胺 0.6mg/kg，丙泊酚 0.3mg/kg 进行，待患者意识、呼吸消失，面罩加压给氧，在可视喉镜明视下快速气管插管。术中监测心电图(ECG)、心率(HR)、有创动脉血压(IBP)、血氧饱和度(SpO2)、PETCO2。
3.2 麻醉维持
气管插管后进行机械通气，术中维持 SpO2 95%～100%，术中麻醉维持经静脉泵注瑞芬太尼（10-15μg/kg/h）及丙泊酚（4-8mg/kg/h），按需追加罗库溴铵用量。术中根据血压及心率调整丙泊酚泵入速度。
3.3 主要观察指标
记录两组患者在麻醉诱导前(T0)、气管插管后即刻(T1)、单肺通气后 1h (T2)和手术结束前 10min (T3)的氧合指数（PaO2/FiO2）。
结果 艾司氯胺酮组对单肺通气患者肺功能的影响小于对照组
结论 艾司氯胺酮可以降低单肺通气患者肺功能的影响

PU-1191

STING 依赖性内质网应激参与麻醉和手术后神经认知功能障碍

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目的 探究 STING 的激活对小鼠围术期神经认知功能障碍（PND）的影响。
方法 健康雄性 C57BL/6 老年小鼠 40 只，18 月龄，采用随机数字表法将小鼠随机分为四组，每组（n=10），对照（Control）组：考虑到麻醉和手术同时进行，Control 组未经任何处理；模型（PND）组：在吸入七氟醚麻醉下行左胫骨骨折+髓内针固定术建立 PND 模型；cGAS 抑制剂（RU.521）组：术前半小时给予腹腔注射 RU.521（5mg/kg）治疗，然后在吸入七氟醚麻醉下行左胫骨骨折+髓内针固定术；STING 激动剂（2′3′-cGAMP）组：在 RU.521 组小鼠的基础上，在术后

2h，12h，24h，48h 通过鼻内给药的方式给予 STING 激动剂 2′3′-cGAMP。通过新物体识别（NOR），Y 迷宫测定小鼠的学习记忆及空间探索能力；通过 Western-blot 检测小鼠海马 STING、GRP78、BAX、BCL-2 蛋白表达变化；采用 qPCR 技术检测小鼠海马炎症因子 TNF-α 、IL-6 和 IL-1β mRNA 的表达变化；采用透射电镜观察小鼠海马内质网形态变化；采用 TUNEL 染色评估小鼠海马凋亡情况。

结果 （1）行为学测试结果显示：与 Control 组相比，PND 组与 2′3′-cGAMP 组辨别指数和自发交替率均下降（p<0.05），RU.521 组上述指标差异无统计学意义（p>0.05）；与 PND 组比较，RU.521 组辨别指数和自发交替率升高（p<0.05），2′3′-cGAMP 组上述指标差异无统计学意义（p>0.05）；与 RU.521 组比较，2′3′-cGAMP 组辨别指数和自发交替率均下降（p<0.05）；（2）Western-blot 结果显示：与 Control 组相比，PND 组与 2′3′-cGAMP 组 STING、GRP78、BAX、BCL-2 蛋白表达升高（p<0.05），RU.521 组上述指标差异无统计学意义（p>0.05）；与 PND 组比较，RU.521 组 STING、GRP78、 BAX、BCL-2 蛋白表达下降（p<0.05），2′3′-cGAMP 组上述指标差异无统计学意义（p>0.05）；与 RU.521 组比较，2′3′-cGAMP 组 STING、GRP78、 BAX、BCL-2 蛋白表达升高（p<0.05）；（3）qPCR 结果显示：与 Control 组相比，PND 组与 2′3′-cGAMP 组 TNF-α 、IL-6 和 IL-1β 表达升高（p<0.05），RU.521 组上述指标差异无统计学意义（p>0.05）；与 PND 组相比，RU.521 组 TNF-α 、IL-6 和 IL-1β 表达下降（p<0.05），2′3′-cGAMP 组上述指标差异无统计学意义（p>0.05）；与 RU.521 组比较，2′3′-cGAMP 组 TNF-α 、IL-6 和 IL-1β 表达升高（p<0.05）；（4）透射电镜结果显示：与 Control 组相比，PND 组内质网肿胀，管腔扩张，RU.521 治疗后可以逆转内质网的改变，而给予 2′3′-cGAMP 干预后则加重了内质网的肿胀及管腔扩张；（5）TUNEL 染色结果显示：PND 组与 2′3′-cGAMP 组小鼠海马组织内红色荧光信号增强，表明细胞凋亡增强；与 PND 组小鼠相比，RU.521 组小鼠海马组织内红色荧光信号减弱，说明 RU.521 预处理可以减轻麻醉和手术导致的细胞凋亡。

结论 麻醉和手术后，STING 表达增加，进一步激活内质网应激，加剧神经炎症和细胞凋亡，最终导致小鼠神经认知障碍。

PU-1192

胰岛素抵抗指数 TyG 与非心脏手术后心肺肾损伤的相关性分析

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目的 甘油三酯葡萄糖(TyG)指数来源于空腹血甘油三酯和葡萄糖水平，已成为胰岛素抵抗的一种简单且容易获得的生物标志物。然而，关于 TyG 指数与术后并发症之间关系的数据有限。大多数现有的研究都集中在心脏手术或心血管结果上，TyG 指数在非心脏手术中的临床意义仍然存在空白。
本研究是一个单中心回顾性队列研究，主要目的是验证术前较高的 TyG 指数与非心脏手术患者术后心肌损伤、急性肾损伤和肺损伤风险增加相关的假设。此外，考虑到术后高血糖是胰岛素抵抗的直接影响之一，并导致各种术后并发症，我们进一步研究了术后高血糖在术前 TyG 指数与术后器官损伤之间的潜在中介作用。

方法 本回顾性研究分析了 2019 年 1 月至 2022 年 10 月在中国广东省南方医科大学南方医院接受非心脏手术的成年患者。该研究的主要终点为术后器官损伤，包括非心脏手术术后心肌损伤、急性肾损伤、肺损伤。进行了多因素 logistic 回归模型、限制性立方样条图和亚组分析，以评估术前 TyG 指数与术后器官损伤的关联。通过 R 4.2.2 中的中介包评估了术后随机血糖的中介作用，以研究 TyG 指数与器官损伤之间关联的潜在机制。

结果 该队列人群的术前 TyG 指数平均值为 8.6± 0.6，年龄中位数为 53 (41, 64)岁，术后随机血糖中位数为 8.1(6.4,10.9)mmol/L。在多变量调整模型中，TyG 指数与非心脏手术术后心肌损伤、急性肾损伤、肺损伤呈正相关（心肌损伤：OR=1.21，95% CI=1.05-1.38；急性肾损伤：OR=1.28，95%

CI=1.11-1.47；肺损伤：OR=1.25，95% CI=1.11-1.40）。中介分析表明，术后高血糖分别介导了 TyG 指数与非心脏手术术后心肌损伤、急性肾损伤、肺损伤关联的 18% 、27%和 15%。
结论 术前 TyG 指数(胰岛素抵抗指标)较高的非心脏手术患者术后发生心肌损伤、肾损伤和肺损伤的风险显著增加。这些关联部分由术后高血糖介导，强调了胰岛素抵抗和糖代谢失调在这些并发症发生中的重要性。我们的研究结果强调了 TyG 指数作为术前风险评估工具的临床价值，并支持有针对性的干预措施以减轻高危患者的胰岛素抵抗和优化围手术期血糖控制的必要性。

PU-1193

rSO2 为导向小剂量去甲肾上腺素对全麻沙滩椅位手术患者术后谵妄的影响

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目的 探讨局部脑氧饱和度（rSO2）为导向小剂量去甲肾上腺素（NE）对全麻沙滩椅位（Beach Chair Position，BCP）手术患者术后谵妄的影响。
方法 选取 2023 年 3 月至 2024 年 03 月于本院行沙滩椅位手术的老年患者 60 例，采用计算机生成随机数字表的方式分为对照组（30 例）、观察组（30 例）。对照组按照常规方法进行麻醉管理，维持平均动脉压（MAP）波动幅度不超过基础值 20%，不以 rSO2 变化率为调节指标；观察组根据 rSO2 变化率外周静脉泵注 NE，使 rSO2 变化率≤20%，按需给予其他血管活性药物维持 MAP 波动幅度不超过基础值 20%。比较两组 T0（麻醉诱导前）、T1（麻醉诱导后 3 min）、T2（BCP 开始时）、T3（BCP 后 5 min）、T4（BCP 后 30 min）、T5（BCP 后 60 min）、T6（手术结束平卧位时）时 MAP、心率（HR）、rSO2；比较两组术中情况、术后恢复情况、不良反应、谵妄发生情况及认知功能。
结果 T3 时，与对照组比较，观察组在 T3 时 MAP 升高（P＜0.05）；T2、T3 时，与对照组比较，观察组 T2、T3 时 rSO2 均升高（P＜0.05）；与对照组比较，观察组麻黄碱使用率降低（P＜0.05），自主呼吸恢复时间、睁眼时间、拔管时间、麻醉后恢复室（PACU）滞留时间、住院时间缩短（P＜0.05）；两组恶心呕吐、呼吸抑制、心率降低、躁动发生率比较，差异无统计学意义（P＞0.05）；与对照组比较，观察组术后 1 d 谵妄发生率降低（P＜0.05）；术后 1、3、5 d，与对照组比较，观察组术后 1、3、5 d 简易智力状态检查量表（MMSE）评分均升高（P＜0.05）。
结论 以 rSO2 为导向应用小剂量 NE 可减少术中血流动力学波动，促进老年患者术后恢复，改善术后认知功能，减少谵妄发生，且安全性高。

PU-1194

Crosstalk between neuroinflammation and brain iron metabolism after intracerebral hemorrhage

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Intracerebral hemorrhage (ICH), defined as bleeding caused by nontraumatic vascular rupturewithin the brain parenchyma, is a serious neurological disorder that results in approximately 2.8 milliondeaths worldwide each year. The primary pathophysiological features of ICH include extensivehemorrhage, neuronal death, and neuroimmune system impairment, all of which significantly affectpatientprognosis.
NeuroinflammationfollowingICHinvolvestheearlyactivationofresidentmicroglia,the release of

proinflammatory mediators, and the influx of peripheral leukocytes, which plays a crucialrole in the pathophysiology of secondary brain injury. Iron, an essential trace element, is critical formaintaining normal nervous system function. After ICH, disruptions in brain iron metabolism are one ofmajor contributors to neuroinflammation and negatively impact patient outcomes. In this review, weendeavour to explore the complex relationship between neuroinflammation and cerebral iron metabolismdisorders following ICH, with the goal of improving clinical management strategies.

PU-1195

术中 SedLine 脑电参数与老年腔镜胃肠道肿瘤切除术后谵妄相关性分析

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目的 分析术中 SedLine 脑电参数与老年腔镜胃肠道肿瘤切除术后谵妄的相关性。
方法 方法: 纳入 2023 年 1 月至 8 月于中国人民解放军联勤保障部队第九〇〇医院在全身麻醉下行择期腔镜胃肠道肿瘤切除术的患者，年龄≥60 岁，ASA 分级 II-III 级，术前简易精神状态量表（Mini-Mental State Examination，MMSE）评分≥18 分，术中采用丙泊酚联合瑞芬太尼行全凭静脉全身麻醉，联合神经阻滞麻醉。术中采用 SedLine 多参数脑电监测仪监测并收集术中患者脑电信息。术后依据谵妄分级评分 98 修订版（Delirium Rating Scale-Revised-98，DRS-R-98）评分或意识模糊评估方法 CAM/CAM-ICU（Confusion Assessment Method- Intensive Care Unit，CAM-ICU）结果，将患者分为谵妄组（POD，N=55)与非谵妄组（NPOD，N=80）。患者入室后（T0），麻醉诱导后（T1），手术切皮（T2），手术 1h（T3），气管拔管时（T4），拔管后 30 分钟（T5）为观测点。主要的观测指标为脑电图（Electroencephaography）（包括 α 波、β 波、θ 波和 δ 波），α 波脑电功率，患者状态指数（Patient State Index，PSI），频谱边缘频率（Spectral Edge Frequency，SEF），脑电爆发抑制（Burst Suppression，BS）总时长，爆发抑制率（Burst Suppression Ratio，BSR），大脑密度谱阵列（Density Spectral Array，DSA）。术前记录患者的一般资料情况包括 MMSE 评分等，观测围手术期血流动力学指标，术中及术后镇痛麻醉药物使用情况 。
结果 1. 本研究共随访了 150 例患者，其中发生 POD 的患者共 58 例，发生率为 38.67%；共有 55 例 POD 例患者、80 例 NPOD 患者纳 入数据分析。
2. BSRmax[16(8, 22) vs 4(0, 9.5), 差值 10, 95%CI: 6-12, P＜0.05]、BST [71.95(30.51, 308.06) vs 4.49(0, 34.96) , 差值 50.68, 95%CI:34.83-77.16, P＜0.05]、αmin 波脑电低功率 [(-7.90±5.95) vs (-3.26±4.17), 差值 4.64，95%CI: 2.92-6.37, P＜0.05]、αmax 波脑电功率 [(4.03±4.66) vs (7.482±2.90)，差值 3.45, 95%CI: 2.17-4.74, P＜0.05]的差异有统计学意义。
3.纳入二元 Logistic 回归分析，术前危险因素包括: 年龄（OR: 1.075, 95%CI: 1.006 -1.150, P<0.05）、ASA 分级（OR: 4.856, 95%CI: 1.786-13.205, P<0.05）、接受教育年限（OR: 0.820, 95%CI: 0.653 - 0.913, P<0.05）、性别（OR: 2.309, 95%CI: 1.085-4.914, P < 0.05)、 MMSE（OR: 0.554, 95%CI: 0.406-0.847, P < 0.05）。
4. POD 的术中危险因素包括：BSRmax（OR: 1.100, 95%CI:1.022-1.184, P < 0.05)、BST （OR: 1.006 , 95%CI: 1.019-1.098, P < 0.05 ）、αmax 波 脑电功率（OR: 0.833, 95%CI: 0.757-0.917, P<0.05）和 αmin 波脑电功率（OR: 0.849, 95% CI: 0.788-0.914, P<0.05) 。
5. 绘制 ROC 曲线，多个危险因素中 ROC 曲线下 AUC 面积分别为：BST（0.807）、BSR max（0.793）、αmin 波脑电功率（0.721）、αmax 波脑电功率（0.682）、MMSE（0.649）、接受教育年限（0.643）、年龄（0.641）、ASA（0.629）、性别（0.595）。
结论 1. 接受腔镜胃肠道肿瘤切除的老年患者 POD 发生率为 38.67%（58/150）。

2. 接受腔镜胃肠道肿瘤切除的老年患者 POD 的术前危险因素包括年龄、MMSE 评分、ASA 分级、性别和接受教育年限；术中危险因素包括 BSRmax、BST、αmax 波脑电功率和 αmin 波脑电功率。3.术中脑电参数 （AUC＞0.7） ：BST（0.807）、BSRmax（0.793）、αmin 波脑电功率（0.721）对预测 POD 发生价值较好。

PU-1196

不同预处理方式对肝脏缺血再灌注损伤保护作用的研究进展

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目的 肝脏缺血再灌注损伤（Hepatic ischemia reperfusion injury，HIRI）是肝切除术后常见并发症之一，是指肝脏短暂缺血引起的原发性损伤和血供恢复后加重的继发性损伤过程。HIRI 可造成肝切除患者肝脏功能受损，影响术后恢复质量，导致手术失败甚至患者死亡，仍是亟待解决的临床问题。本文拟通过检索国内外数据库，就近年来文献报道的相关预处理方式的治疗策略和临床应用现状作以综述，旨在为预防 HIRI 提供新的策略和思路，为患者提供更大的临床获益加速术后康复。
方法 通过检索中国知网、万方中文数据库，以及 PubMed、Web of Science 等外文数据库以“肝切除术”、“肝脏缺血再灌注损伤”、“hepatectomy”、“hepatic ischemia reperfusion injury” 等为主题词，检索不同预处理干预措施在肝脏缺血再灌注损伤方面的作用机制、临床应用等相关研究文献。
结果 缺血预处理
缺血预处理是指在长时间的缺血之前进行一段短时间的缺血再灌注过程，使脏器对较长的缺血期和随后的再灌注损伤有更强的耐受性。1986 年由 Murry 等人在犬心肌缺血模型中提出，随后 Clavien 等人分别在半肝切除和大范围肝切除的前瞻性随机研究中证明其对肝脏缺血的有效性。虽其效果确切，但由于对靶器官的直接压力和对主要血管结构的机械损伤，使得临床应用受限。
远程缺血预处理
远程缺血预处理指机体部分器官在受到短暂的、可逆性缺血缺氧刺激后，通过诱导缺血器官以外的其他远隔脏器对随后发生的严重或致命的缺血缺氧产生保护作用。远程缺血预处理通过神经系统、体液信号和全身通路之间的相互作用实现其保护作用，因其安全无创，操作简便，在临床上作为 HIRI 常规的保护策略值得推广。
药物预处理
药物预处理是针对 HIRI 的病理生理学及多个靶点和机制进行调节，减轻肝脏细胞组织损伤，主要有抗炎药物、抗氧化剂、调节细胞凋亡与自噬的药物等，联合用药可能具有更大潜在价值，但仍需更多临床证据支持。
结论 肝切除术是肝脏良恶性疾病患者获得长期生存的重要治疗手段，如何预防手术患者围术期并发症和不良预后是当前临床面临的只要挑战之一。HIRI 机制的多样性导致通过靶向单一的介质或机制来减少 IRI 很难实现有效的保护，将作用机制不同的预处理方式联合使用不仅能弥补单一用药的不足，且能提供多种机制保护肝细胞，在临床应用之前仍需进一步的前瞻性临床研究。

PU-1197

乌贼墨黑色素纳米粒对缺血再灌注诱导急性肾损伤的保护作用及机制研究

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目的 急性肾损伤（Acute kidney injury，AKI）是临床多见的急、危、重症。主要发生在约 10-15%的住院患者以及超过 50%的重症患者中，是住院患者死亡的独立危险因素。临床针对 AKI 主要以支持疗法和肾脏替代治疗为主，目前仍缺乏特异性治疗药物。研制有效的药物预防和治疗 AKI，很大程度上可降低患者死亡率，从而改善其预后。由于肾脏是高代谢和高需氧量器官，缺血再灌注（Ischemia/reperfusion，I/R）会导致肾脏组织内产生过多的活性氧（Reactive oxygen species，ROS），使大量细胞死亡并出现炎性细胞浸润。因此，缺血再灌注诱导 AKI（Ischemia/reperfusion induced AKI，IRI-AKI）的治疗目标主要是抑制氧化应激、缓解炎症级联反应、减少细胞死亡等。乌贼墨是一种由乌贼身体内部色素细胞产生并通过特殊器官释放的黑色墨汁，具有伪装逃避和防御的作用。黑色素是乌贼墨墨汁中的主要成分，通过在生物体内自然生成可以制备出由黑色素组成的纳米粒子，不仅副作用小，而且具有抗氧化和抗炎特性。因此，本研究设想从乌贼墨墨汁中提取黑色素制备黑色素纳米粒（Cuttlefish ink-derived melanin nanoparticles，CIMNP）治疗 IRI-AKI。本研究通过制备 CIMNP 和了解其理化性质，明确 CIMNP 在体内外的抗炎、抗氧化和抗凋亡作用，进一步探究 CIMNP 在体内发挥作用的可能机制和潜在的治疗靶点。

方法 （1）从乌贼墨墨囊中提取天然成分黑色素，利用差速离心法制备乌贼墨来源黑色素纳米粒。通过透射电子显微镜、马尔文粒子分析仪和傅里叶变换红外光谱仪等检测和鉴定其理化性质。

（2）通过电子自旋共振波谱仪，过氧化氢、抑制和产生超氧阴离子自由基试剂盒等测定 CIMNP 清除 ROS 自由基和抗氧化能力。

（3）以肾小管上皮细胞为模型细胞。通过 CCK-8 试剂盒检测 CIMNP 细胞毒性；通过与 20%的小鼠红细胞溶液混合，观察 CIMNP 的体外生物相容性。以过氧化氢诱导氧化应激损伤细胞模型，通过使用 CCK-8 试剂盒、ROS 荧光探针、JC-1 荧光探针，测定 IL-6、IL-1β 和 TNF-α 等炎症因子水平，并使用异硫氰酸荧光素标记磷脂结合蛋白凋亡试剂评估 CIMNP 在体外对损伤细胞是否具有保护作用。

（4）通过血常规、肝肾功能检测和 H&E 染色观察 CIMNP 在小鼠体内的生物相容性和安全性。以 C57BL/6 小鼠作为模型动物，连续 5 天腹腔注射 CIMNP 后，夹闭双侧肾蒂 38 min 构建 IRI-AKI 动物模型。通过检测小鼠肾功能和肾损伤分子-1（Kidney injury molecule 1，Kim-1）水平，使用组织 H&E 染色、TUNEL 染色、超氧化物歧化酶和丙二醛试剂盒、透射电子显微镜、实时荧光定量 PCR 和免疫组化法观察肾脏组织中炎症因子水平，评估 CIMNP 是否能改善肾功能、缓解肾组织损伤和具有抗炎、抗氧化和抗凋亡能力。

（5）对肾脏组织进行转录测序，通过实时荧光定量 PCR 和蛋白质印迹分析验证 CIMNP 在体内治疗作用的可能机制。

结果 （1）透射电子显微镜观察到 CIMNP 是分散性良好的球形黑色素纳米粒，马尔文粒子分析仪测得 CIMNP 在水中稳定性好，水合粒径大约为 198.1±6.16 nm、Zeta 电位为-20.6 mV。CIMNP 主要由黑色素、氨基酸、单糖和多种金属元素等组成，表面有丰富的蛋白，并且在 300-900 nm 范围有单一、宽幅吸收光谱。

（2）CIMNP 对三种代表性 ROS 自由基（·OH、H_2O_2 和 O2·-）以及 DPPH 自由基具有强大的清除和抗氧化能力。

（3）体外实验发现，CIMNP 具有低细胞毒性。CIMNP 可提高氧化应激损伤的肾小管上皮细胞活力，降低细胞内 ROS 含量和维持线粒体膜电位，并且能抑制炎症反应，降低细胞死亡数量。

（4）体内实验发现，CIMNP 在小鼠体内具有良好的生物相容性和安全性。CIMNP 可改善 IRI-AKI

小鼠肾功能和肾脏组织病理结构，降低肾小管损伤标志物 Kim-1 水平，改善线粒体结构，减少炎症因子浸润和细胞凋亡。
（5）转录测序结果表明，假手术组、AKI 组和 CIMNP 组之间基因表达差异明显，主要与氧化应激、炎症反应和细胞凋亡等通路有关。CIMNP 可通过抑制 ATM-PLK3-P53 信号通路，减少因氧化应激损伤引起的炎症和细胞凋亡级联反应。
结论 CIMNP 具有良好的稳定性和体内外生物相容性，具备清除 ROS 自由基和抗氧化能力；对过氧化氢诱导肾小管上皮细胞具有保护作用；可减轻 IRI-AKI 小鼠肾脏损伤、炎性细胞浸润和细胞凋亡，具体机制可能与 ATM-PLK3-P53 通路相关，这为治疗 AKI 提供新思路，且具有临床转化潜力。

PU-1198

Intermittent occlusion of the ascending aorta successfully rescues aortic rupture during mediastinal tumor resection

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During resection of mediastinal tumours, the large size of the tumour and its involvement of the major thoracic blood vessels pose a significant challenge to both the anaesthetist and the surgeon. The most frightening aspect of perioperative management is sudden aortic dissection, which requires rapid assessment and timely resuscitation by both surgeons and anaesthetists. However, it is often difficult to locate the site of bleeding when the bleeding is rapid. We report for the first time a case of sudden aortic rupture and bleeding during mediastinal surgery in which the ascending aorta was successfully saved by emergency ascending aortic clamping without backup extracorporeal circulatory support. During clamping, a split-clamp release was used to maintain cardiac rhythm and provide timely supplementation of cerebral blood flow and oxygenation, allowing time for surgical control of massive bleeding and arrival of extracorporeal circulatory support. Surprisingly, the patient recovered well post-operatively with no adverse outcomes such as neurological complications and ischaemia of vital organs.

PU-1199

右美托咪定对胃肠道肿瘤手术患者炎性反应所致血管内皮糖萼损伤的作用

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目的 观察术中静脉注射右美托咪定对胃肠道肿瘤手术患者炎性反应和糖萼的影响
方法 择期行胃肠道肿瘤手术患者 110 例，按计算机随机数字表法随机分为 2 组（n=55）：CON 组（对照组，等容量的生理盐水）、DEX 组（右美托咪定组）所有患者依照相同麻醉诱导方案，随后持续静脉输注右美托咪定，麻醉深度监测下至手术结束时停止输注，后持续镇痛泵静脉输注。 术中在无创血流动力学指导下，目标导向液体管理联合 CVP、MAP 作为液体管理的参数指标。检测术前（T0）、关腹前（T1）、术后 24h（T2）以及术后 7 天（T3）患者 TNF-α、IL-6 水平以及多配体聚糖 (Syndecan-1)浓度、硫酸乙酰肝素(heparin sulfate, HS)浓度的变化、P(v-a)CO2 值及乳酸值；观察患者围术期输液量、阿片类药物用量、尿量、失血量以及术后呼吸系统、心血管系统等相关并发症；住院时间以及 30 天全因死亡率
结果 胃肠道肿瘤手术患者围术期炎性反应显著上升（ P<0.05），多配体聚糖 (Syndecan-1)、硫酸

乙酰肝素(heparin sulfate, HS)发生大量降解（ P<0.01），同时电镜亦发现肠微血管内皮糖萼层发生破坏变薄，右美托咪定的干预不仅缓解了糖萼的破坏，同时减轻了炎性反应。且 DEX 组 VAS 评分、术后相关并发症及住院时间均低于 CON 组（均 P<0.05）。
结论 术中静注右美托咪定减少了胃肠道肿瘤手术患者的炎性反应，同时从保护血管内皮糖萼破坏的药物途径上提供了实验依据。

PU-1200

机器人辅助腹腔镜根治性前列腺切除术对患者颅内压的影响

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目的 评估机器人辅助腹腔镜根治性前列腺切除术（robot-assisted laparoscopic radical prostatectomy, RALRP）中的气腹和 Trendelenburg 体位对患者颅内压（intracranial pressure, ICP）的影响。
方法 本研究选择了 60 例择期全麻下行手术的患者，分为两组：RALRP 组和普通外科胃肠手术组，各 30 例。RALRP 组患者在六个时间点进行视神经鞘直径（optic nerve sheath diameter, ONSD）测量：麻醉诱导前 5 分钟（T1）、气腹后 5 分钟（T2）、气腹合并 Trendelenburg 体位 5 分钟（T3）、气腹合并Trendelenburg体位30分钟（T4）、气腹合并Trendelenburg体位1小时（T5）、放气后平卧位 5 分钟（T6）。作为对照，胃肠手术组进行开放性手术，术中体位始终保持平卧位，测量时间点与 RALRP 组相同，分别为麻醉诱导前 5 分钟（T1）、切皮后 5 分钟（T2）、切皮后 15 分钟（T3）、切皮后 30 分钟（T4）、切皮后 1 小时（T5）、腹膜关闭后 5 分钟（T6）。
结果 两组患者在年龄、身高、体重和体重指数（BMI）等一般人口学特征上无显著差异（P＞0.05）。在 T1 时，两组间的 ONSD 无统计学差异（P＞0.05）。然而，在 T2 到 T6 时间点，RALRP 组的 ONSD 显著高于胃肠手术组（P＜0.05）。胃肠手术组在 T1 到 T6 各时间点之间的 ONSD 均未见显著差异。而在 RALRP 组中，除 T3 与 T4 之间以及 T4 与 T5 之间的 ONSD 无显著差异外，其他各时间点均存在显著差异（P＜0.001）。特别是，在建立气腹后的T2到T5时间点，ONSD 显著高于 T1 和 T6 时间点（P＜0.05）。在气腹合并 Trendelenburg 体位的 T3 到 T5 时间点，ONSD 显著高于单纯气腹的 T2 时间点（P＜0.05）。此外，RALRP 组术后头晕发生率（30.0%）显著高于胃肠手术组（6.9%）（P＜0.05），而两组在术后头痛和恶心呕吐的发生率上无显著差异。
结论 本研究结果显示机器人辅助腹腔镜根治性前列腺切除术中，气腹可导致颅内压显著升高。当体位变更为 Trendelenburg 体位时，颅内压升高进一步加剧。这种颅内压的变化可能与患者术后头晕发生率的升高相关，但与术后头痛和恶心呕吐的发生率无关。在气腹和 Trendelenburg 体位消失后，ONSD 显著下降，但在 5 分钟内尚未恢复至基线水平。这些发现表明，临床医生在进行 RALRP 的围术期麻醉管理时应关注气腹和 Trendelenburg 体位对颅内压的负面影响，并采取相应措施预防和管理术后头晕等并发症，以提高手术的安全性和患者的舒适度。

PU-1201

前列腺素 E1 雾化对单肺通气时氧合的影响

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目的 在 40% 吸入氧浓度（FiO2）下，单肺通气（OLV）前通过改造的呼吸回路对非手术侧肺进行

不同剂量前列腺素 E1（PGE1）雾化，探讨其对 OLV 期间肺内分流率（Qs/Qt）、氧合和术后肺部并发症（PPCs）的影响。
方法 选择拟在全凭静脉麻醉下行左剖胸食管癌根治术患者 156 例，男 121 例，女 35 例，年龄 18~64 岁，美国麻醉医师协会（ASA）Ⅱ或 Ⅲ 级，体质量指数（BMI）18~30 kg/m2。采用随机数字表法将患者分为四组：L 组（0.1 μg/kg PGE1，n = 39）、M 组（0.2 μg/kg PGE1，n = 38）、H 组（0.3 μg/kg PGE1，n = 39）和 C 组（生理盐水对照组，n = 40）。在麻醉诱导完成后，将患者摆成右侧卧位，通过改造的呼吸回路，分别予以 L 组、M 组、H 组和 C 组右肺（OLV 期间的非手术侧肺）0.1 μg/kg PGE1、0.2 μg/kg PGE1、0.3 μg/kg PGE1 和生理盐水雾化。雾化时气体流量设置为 2 L/min，药物均稀释至 10 ml，雾化时间为 10 min。分别于麻醉诱导前（T0）、雾化前（T1）、OLV 10 min（T2）、OLV 15 min（T3）、OLV 30 min（T4）、OLV 60 min（T5）和 OLV 120 min（T6）时采集桡动脉和颈内静脉血行血气分析，并记录各时间点的平均动脉压（MAP）、心率（HR）、动脉血氧分压（PaO2）、氧合指数（OI）、肺内分流率（Qs/Qt）、动脉血二氧化碳分压（PaCO2）和气道峰压（Peak）。记录术中低血压和低氧血症的发生情况，术后第 2 天临床肺部感染评分（CPIS）和 7 天内术后肺部并发症（PPCs）发生情况。
结果 与 C 组比较，L 组、M 组和 H 组术中低氧血症发生率明显降低（P<0.05），T2、T3 时 H 组 MAP 明显降低（P<0.05），T2~T4 时 L 组、M 组和 H 组 Qs/Qt 明显降低、PaO2 和 OI 明显升高（P<0.05），H 组术后第 2 天 CPIS 明显降低（P<0.05）。与 L 组比较，T2~T4 时 H 组 Qs/Qt 明显降低（P<0.05），T3、T4 时 H 组 PaO2 和 OI 明显升高（P<0.05）。四组低血压发生率、不同时点 HR、PaCO2、Ppeak 和术后 7 天内 PPCs 发生率差异无统计学意义。
结论 在 40% FiO2 下，OLV 前 0.1 μg/kg、0.2 μg/kg 和 0.3 μg/kg PGE1 雾化吸入均能降低肺内分流、改善氧合，降低低氧血症的发生率，且不增加低血压的发生率。0.3 μg/kg PGE1 降低肺内分流、改善氧合的效果最好，但对术中 MAP 造成了影响，对于高龄、血流动力学不稳定等特殊患者应用时，剂量应当更为慎重。尽管 0.1 μg/kg、0.2 μg/kg 和 0.3 μg/kg PGE1 雾化吸入均未对 PPCs 产生影响，但 0.3 μg/kg PGE1 雾化吸入可显著降低术后第二天 CPIS，具有一定的肺保护作用。

PU-1202

基于 citespace 软件对近二十年机械通气相关肺损伤的热点可视化分析

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目的 本研究使用 CiteSpace 6.1.R6 信息可视化分析软件对收录在中国知网的中文文献进行了可视化分析，以对国内在机械通气肺损伤领域的研究展开深入分析，希望能够从文献发表趋势、机构合作、研究热点及前沿趋势有所把握，为开展相关研究提供理论基础。
方法 数据源：检索中国知网数据库 CNKI，期刊检索词为“机械通气”并含“肺损伤”，检索方式为主题检索，将时间跨度设置为 1992 年 1 月～2023 年 8 月，语言限定为中文，时间分区 Years Per Slice 设置为 1 年，聚类节点属性 Node Phrases 根据分析需要进行选择，阈值调节属性 Top N 设置为 50，其他属性值采用软件默认参数。共检出 1016 篇，剔除会议论文等无作者的文献后剩余 1010 篇。格式：中国知网纳入的文献以 Refworks 格式导出。利用 CiteSpace 6.1.R6 软件对 CNKI 数据进行格式转换后，将数据库的数据导入 CiteSpace 并分析作者、机构和关键词。
结果 最终纳入文献 1010 篇，最早始于 1992 年，于 2010 年达到发文量的最高峰；核心作者有姚尚龙、张新日、冯丹、邱海波、俞森洋等；研究热点涉及机械通气、肺损伤、呼吸、人工等，近年来突现的研究热点有甲泼尼龙、炎症等。
结论 通过对机械通气肺损伤相关的研究文献进行 CiteSpace 可视化分析，发现国内对机械通气肺

损伤的研究越来越清晰，为疾病的诊断及防治都带来了新的希望，对于疾病发生的分子机制的研究及防治的方法也一直是研究者的研究重点，但其发生的分子机制尚未完全阐明，目前仍然是研究者的研究热点，近几年对于该疾病发生分子机制的研究，如对发生机制中参与的炎症因子的研究及疾病预后效果等也备受研究者的关注。

PU-1203

脓毒症相关急性肺损伤：通过 CiteSpace 软件进行的近 20 年文献计量学研究和可视化分析

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目的 脓毒症相关急性肺损是一种严重的急性呼吸窘迫综合征，由感染引发的全身性炎症反应所致，具有高发病率和高死亡率。尽管已有大量研究，但其复杂的病理生理机制和多变的临床表现使得研究挑战依然存在。为了更好地理解和把握该领域的研究动态，本文通过文献计量方法，定量和定性地预测脓毒症相关急性肺损伤研究的前沿热点和趋势，为临床和基础研究提供科学借鉴和指导。
方法 本研究从 Web of Science 核心合集数据库中检索 2004 年 1 月至 2023 年 12 月期间发表的脓毒症相关急性肺损伤的文献。为了确保数据的全面性和准确性，我们设定了明确的检索策略，涵盖了主题词、摘要和关键词等多个维度。通过使用 CiteSpace 软件进行文献分析，绘制了各类可视化图谱，包括年发文量、国家地区、机构、关键词等，以系统地展示研究领域的演变和发展。
结果 研究共检索到 4058 篇相关文献。从 2004 年至 2022 年，脓毒症相关急性肺损伤的研究数量总体上呈现逐年增加的趋势。这表明该领域的关注度和研究热情持续高涨。然而，2023 年的文献数量出现了下降，这可能与新型冠状病毒肺炎防疫政策普遍放开后研究资源分配的变化有关。从国家分布来看，美国在脓毒症相关急性肺损伤研究中占据主导地位，是发表文献数量最多的国家。但研究发现，各研究团队之间的合作并不紧密，呈现出较为分散的研究格局。这提示在未来的研究中，加强国际间的合作与交流，可能有助于推动该领域的进一步发展。通过 CiteSpace 软件的关键词共现分析，研究发现发病机制和临床并发症是该领域的主要研究热点。具体而言，研究者们对脓毒症相关急性肺损伤的研究主要集中在发病机制、治疗及预后。此外，信号通路、细菌清除率、小鼠模型是此研究领域的新兴趋势，也给未来研究者们提供了新思路、新方向。
结论 本研究通过文献计量方法，系统地分析了脓毒症相关急性肺损伤的研究现状和发展趋势。结果表明，该领域的研究热度依然很高，尤其是在新冠肺炎疫情流行期间，相关研究受到了更大的关注。未来，发病机制、治疗手段及预后管理仍将是研究的重点和难点。同时，国际间和机构间的合作有待加强，通过多中心研究和资源共享，可以更好地推进脓毒症相关急性肺损伤的科学研究，最终改善患者的预后。总之，本研究不仅为脓毒症相关急性肺损伤的研究提供了全面的文献计量分析，也为未来的研究方向和策略提供了有益的参考。希望通过进一步的科学研究，能够早日揭示脓毒症相关急性肺损伤的病理机制，并开发出更有效的治疗方法，以减轻患者的痛苦，提升治疗效果。

PU-1204

动脉血气 O2 和 CO2 异常的麻醉选择和管理

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目的 老年手术患者增加，老年低 O2 血症和高 CO2 血症手术病人也随之增多，该类患者是否可以

择期手术，围术期处理能力亟待提高。

方法 病例 1 低 O2 血症患者，男性，79 岁，身高 165cm，体重约 48kg，右髋外伤后疼痛、活动受限 7 天。动脉血气 PH:7.461; O2 52.0mmHg;CO2 35.0mmHg;Lac0.5mmol/L，腰麻。病例 2 高 CO2 血症患者，女 86 岁，瘦弱（＜40Kg），骨折 3 天，人工股骨颈头置换术。偶有气急，无呼衰史，呼吸音粗。动脉血气 PH:7.34; O2109.0mmHg（氧合指数 330）;CO249.3mmHg;Lac0.8mmol/L，神经阻滞；病例 3：低 O2 血症伴高 CO2 血症患者，女，78 岁，47 Kg，人工股骨头置换术，呼吸音粗，体质弱，CT 肺纹理增粗；动脉血气 PH:7.433; O2 53.0mmHg;CO2 73.9mmHg;Lac0.66mmol/L，插管全麻。

结果 这三例患者均择期手术，合理麻醉选择，术中处理得当，病例 3 入监护室，均安全度过围术期。

结论 单纯性低 O2 血症患者：如果患者通气能力完好（呼吸平稳，CO2 基本正常），仅氧弥撒功能下降（PaO2 低），而乳酸不增高（已低氧适应），此时，CO2 是常规维持呼吸的刺激因子。如手术不存在导致通气能力下降；创伤不大；不存在弥撒显著下降可能，选择能完好保护通气能力的麻醉方法即可。术后若氧弥撒下降，可吸氧。单纯高 CO2 血症患者：判断高 CO2 是否稳定（没进展）主要是看是否已被肾完全代偿（PH 值）。急性 PaCO2 升高（急性呼酸）：自主呼吸下，PaCO2 升高时，如果 BE 不增高或 SB 正常表明呼酸未被肾代偿，此时 PH 常＜7.35，表明该患者是急性高 CO2 血症，手术、麻醉导致通气能力下降至低氧的刺激不能刺激产生足够通气时 PaCO2 进展性升高，术中和必须通气支持。稳定的高 PaCO2 血症（即肾脏代偿）： PaCO2 每升高 10mmHg, [H2CO3-] p 升高 3.5mmol/ L， PH 正常，此时要看患者的通气能力储备，如果体能尚可，一般能耐受不影响通气的麻醉方式；升高明显小于 3.5 mmol/L 或 PH＜7.35，说明未完全代偿，属于介于急性呼酸和稳定的高 PaCO2 血症之间，低氧可能参与 O2 呼吸刺激（Lac 往往偏高）。这类病人呼吸通气代偿差，需密切观察，往往术后容易 CO2 蓄积而呼衰。低 O2 血症伴严重高 CO2 血症患者：如上分析，即使稳定期【低氧适应（Lac 正常），高 CO2 血症肾脏完全代偿（PH 正常）】更需谨慎选择麻醉方式，一般需要麻醉中和术后呼吸支持。

PU-1205

Effects of neostigmine on postoperative pulmonary complications in elderly patients undergoing robot-assisted pancreaticoduodenectomy: a single-center retrospective analysis

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Background Postoperative residual neuromuscular block (PRNB) can cause postoperative pulmonary complications (PPCs). This investigation aimed to evaluate the effects of neostigmine on PPCs in elderly patients undergoing robot-assisted pancreaticoduodenectomy (RPD) to identify possible interventions for PRNB.

Methods Data from patients treated between January 2019 and December 2022 were analyzed retrospectively. PNRB was evaluated using clinical subjective criteria. Perioperative medical data, anesthetic procedures and management, surgery and anesthesia related events, patients' physiological data, body temperature, neuromuscular reversal details, time from last non-depolarizing neuromuscular blocking drug (NDNMBD) dose to reversal and length of stay in the postoperative anesthesia care unit (PACU) were recorded.

Results A total of 202 patients were included. There were 83 patients using neostigmine for reversal (NEO group) and 119 patients with no reversal (NONE group). We found no statistical difference between the two groups in the incidence of PPCs [27.71% vs 37.82%, p = 0.135], however, the incidence of pleural effusion was reduced in the NEO group (34.94% vs 50.42%, p =

0.029). Compared to NONE group, NEO group had a reduction in the time to extubation (23.37 ± 13.66 min vs 30.29 ± 20.78 min, p = 0.005) and length of stay in the PACU (56.99 ± 16.87 min vs 68.55 ± 27.63 min, p < 0.001). In addition, PaCO2 at 2 hours after extubation was lower in the NEO group (39.29 ± 3.59 mmHg vs 40.88 ± 3.93 mmHg, p = 0.004). Post hoc analysis revealed that PPCs were associated with elevated preoperative lactate level (p = 0.005), increased intraoperative NDNMBD use (p = 0.032) and fluid volumes (p = 0.002), more sodium bicarbonate requirements (p = 0.016), higher postoperative PaCO2 (p = 0.01), decreased postoperative PaO2 (p = 0.001) and OI (p = <0.001).
Conclusions Neostigmine reversal did not reduce the incidence of PPCs within the first 7 days after surgery, but reduced the incidence of pleural effusion, shortened the time to extubation, length of stay in the PACU and slightly lowered the PaCO2 at 2 hours after extubation in elderly patients undergoing elective RPD. Based on these data, we recommend neostigmine reversal as standard practice for RPD if extubation is intended.

PU-1206

PRMT6/STAT1/ACSL1 通路在糖尿病肾病中促进细胞铁死亡

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目的 高血糖诱导的铁死亡是糖尿病肾病（DN）患者肾功能障碍的重要原因。此外，针对铁死亡的治疗对 DN 的治疗具有临床意义。然而，目前尚未确定有效的铁死亡治疗靶点。在本研究中，我们旨在探讨蛋白精氨酸甲基转移酶 6（PRMT6）在调节 DN 中铁死亡的精确作用。
方法 在本研究中，我们使用了包括野生型和 PRMT6 敲除（PRMT6-/-）小鼠在内的小鼠 DN 模型。通过转录组和脂质组分析，以及各种分子生物学方法，确定了 PRMT6 在 DN 中调节铁死亡的潜在机制。
结果 我们的结果表明，PRMT6 下调通过调节 DN 中的铁死亡参与肾功能障碍和肾细胞死亡。此外，PRMT6 减少通过上调长链脂酰辅酶 A 合成酶家族成员 1（ACSL1）表达引起脂质过氧化，最终导致铁死亡。此外，我们研究了 PRMT6 与信号转导和转录激活因子 1（STAT1）共同调节 ACSL1 转录的分子机制。我们还发现，使用 STAT1 特异性抑制剂氟达拉滨治疗可以延缓 DN 进展。此外，我们观察到 PRMT6 和 STAT1 协同调节 ACSL1 转录，以在高血糖细胞中介导铁死亡。我们的研究表明，PRMT6 和 STAT1 共同调控 ACSL1 转录，以诱导磷脂-多不饱和脂肪酸（PL-PUFAs）的产生，从而参与 DN 中的铁死亡。
结论 这些发现表明，PRMT6/STAT1/ACSL1 轴是预防和治疗 DN 的新治疗靶点。

PU-1207

Effect of adjusting the positive end-expiratory pressure levels based on the driving pressure in elderly patients undergoing laparoscopic colorectal cancer surgery: a randomized controlled trial

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Background A high incidence of postoperative pulmonary complications (PPCs) occurs in elderly patients due to general anesthesia. Studies show lower ventilation driving pressures may result in

fewer PPCs. Appropriate levels of positive end-expiratory pressure (PEEP) may also help prevent developing PPCs in patients undergoing general anesthesia. This study aimed to test the hypothesis that driving pressure-guided PEEP titration ventilation could effectively reduce the incidence of PPCs, optimize respiratory mechanics, and improve lung oxygenation during mechanical ventilation in elderly patients undergoing laparoscopic colorectal cancer surgery.
Methods This randomized, parallel group, patient- and outcome assessor-blinded, single-center trial included a total of 70 elderly patients scheduled for laparoscopic colorectal cancer surgery. Patients were randomly divided into two groups: the titration group (receiving driving pressure-guided PEEP titration ventilation) and the control group (receiving a fixed PEEP of 5 cmH2O). The primary endpoint was the incidence of PPCs ≥moderate severity within 7 days after surgery. The secondary endpoints included pulmonary oxygenation and respiratory mechanics values during surgery, PACU discharge times, and length of hospital stay.
Results The incidence of PPCs ≥moderate severity within 7 days after surgery was significantly lower in the titration group (17.1%) than in the control group (45.7%) (RR, 0.375; 95% CI, 0.166 to 0.845; p = 0.010). The titration group demonstrated higher dynamic lung compliance and oxygenation during mechanical ventilation than the control group. PACU discharge times and length of hospital stay were similar in both groups (p > 0.05).
Conclusion In elderly patients undergoing laparoscopic colorectal cancer surgery, driving pressure-guided PEEP titration ventilation significantly reduced the incidence of PPCs and increased dynamic lung compliance and oxygenation.

PU-1208

Effects of propofol postconditioning on cognitive function in septic mice and its relationship with Nrf2 pathway

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Abstract Objective To investigate the effect of propofol postconditioning on cognitive functions in sepsis mice and its relationship with the antioxidant pathway mediated by nuclear factor E2 related factor 2 (Nrf2). Methods Eighty male C57BL/6 Mice were randomly divided into 4 groups: control group (Con), sepsis model (LPS), propofol treatment group (PF) and propofol+Nrf2 inhibitor group (PF+ML385). LPS group mice were intraperitoneally injected with 10 mg/kg lipopolysaccharide to establish the sepsis model. 30 minutes after LPS injection, PF group mice was intraperitoneally injected with 50 mg/kg propofol, and the other groups were given the same volume of drugs. The drug was given again 12 hours later. The reflex test and Morris water maze were used to evaluate the mice behavioral changes 24 h after LPS injection; HE staining was used to observe the pathological damage of hippocampal CA1 region in mice; The permeability of BBB was measured by Evans blue (EB) method; brain tissue water content was measured; the serum contents of tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6) were detected by ELISA test; the activity of superoxide dismutase (SOD) and malondialdehyde (MDA) in hippocampus tissue were tested by assay kits; the expression of Nrf2, HO-1 and NQO1 proteins were detected by RT-PCR and Western blot. Results Compared with Con group, the pathological damage in hippocampus CA1 region, the contents of pro-inflammatory factors TNF-α, IL-6 and MDA were significantly increased (P＜0.05),while cognitive functions, activity of SOD were significantly decreased (P＜0.05), the protein and mRNA expression levels of Nrf2, HO-1 and NQO1 were increased (P ＜0.05). Compared with LPS group, the cognitive deficits, pathological damage, contents of TNF-α, IL-6 and MDA were decreased (P＜0.05), the activity of SOD was markedly increased (P＜0.05)，the protein and mRNA expression levels of Nrf2, HO-1 and NQO1 were significantly increased (P＜0.05) in PF group. Compared with PF group, Nrf2 inhibitor ML385 inhibited the protective effect of propofol on cognitive dysfunction in septic mice. Conclusion Propofol postconditioning may

ameliorate cognitive impairment in septic mice by activating Nrf2 mediated antioxidant signaling pathway.

PU-1209

脉压变异率在肝癌手术中目标导向液体治疗的应用效果研究

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目的 探讨肝癌手术中目标导向液体治疗中应用脉压变异率的效果。
方法 在 2021 年 2 月至 2022 年 2 月时段我院收治的肝癌手术患者中选取 82 例参与研究，根据随机数字表法分为 3 组，分别为 PPV1 组 26 例、PPV2 组 26 例，对照组 30 例。对照组采取控制性降低中心静脉压技术指导液体管理干预，PPV1 组（脉压变异率＜10%水平）、PPV2 组（脉压变异率介于 10%~20%水平）采取目标导向液体治疗。比对三组血流动力学指标、晶体液和胶体液输入量、出血量、胃肠功能恢复时间以及不良反应发生率等指标。
结果 与对照组比，PPV1 组、PPV2 组 MAP 水平较高（PPV2 组＞PPV1 组），心率水平较低（PPV2 组＞PPV1 组），结果比较有显著差异性（P＜0.05）；与对照组比，PPV1 组、PPV2 组晶体液和胶体液输入量、出血量较高（PPV2 组＜PPV1 组），结果比较有显著差异性（P＜0.05）；与对照组比，PPV1 组胃肠功能恢复时间较长，PPV2 组胃肠功能恢复时间较短（P＜0.05）；与对照组比，PPV1 组不良反应发生率较高，PPV2 组不良反应发生率较低（P＜0.05）。
结论 对肝癌手术患者给予基于脉压变异率的目标导向液体治疗，PPV 维持在 10~15%之间治疗效果更优，晶体、胶体输入量以及出血量减少，使血流动力学指标维持稳定状态，胃肠道功能可在短时间内恢复，控制不良反应发生，临床上有一定应用价值。

PU-1210

暴发性心肌炎患者行环杓关节复位术麻醉一例

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目的 我们报道一例暴发性心肌炎恢复期患者全身麻醉下行环杓关节复位术的围术期麻醉方法及管理。通过 BIS 监测麻醉深度，术中非插管期间应用 THRIVE 保障患者氧合，术中精准用药，最大限度地避免手术及麻醉相关应激对患者循环的影响，旨在为暴发性心肌炎恢复期患者行环杓关节脱位手术的麻醉管理提供参考
方法 患者入室后无创血压 120/75mmHg。连接 BIS 监测麻醉深度，行桡动脉穿刺置管并监测有创动脉压，采集吸氧前（T0）动脉血气分析示 pH 7.405、PaO2 91.7 mmHg、PaCO2 40.7 mmHg 。麻醉诱导：静脉注射地塞米松 5mg，依托咪酯 100mg，阿芬太尼 0.6mg，意识消失后，静脉推注琥珀胆碱 2mg/kg，呼吸暂停后予以机械辅助通气 3 分钟，患者血氧 SpO2100%，心率 75 次/分，血压 102/60mmHg，BIS 值 52，动脉血气分析（T1）pH 7.388、PaO2 406 mmHg、PaCO2 41.6 mmHg。脱离面罩，行 THRIVE，调节氧流量 50L/min，支撑喉镜置入前给予 30mg 依托咪酯和 20ug 瑞芬太尼加深麻醉，麻醉维持：泵注瑞马唑仑（50mg/h）+瑞芬太尼（400ug/h）。外科医师经口置入支撑喉镜，挑起会厌，暴露声门，以支撑架固定。使用复位钳夹持左侧杓状软骨，顺杓状软骨方向向前内拨动环杓关节，使关节复位。手术开始一分钟时测血气分析（T2）：pH 值 7.34、PaO2 418 mmHg 和 PaCO247.1 mmHg。手术顺利，撤镜术毕。停麻醉药，术毕时（T3）血气分析值：pH 值 7.26、PaO2 262 mmHg 和 PaCO261.3 mmHg，生命体征 SpO2 100%，心率

70 次/分，血压 120/72mmHg。予以面罩通气，2 分钟后患者恢复自主呼吸及意识。给予氟马西尼 0.5mg 静注拮抗残余瑞马唑仑作用，患者肌力、呼吸均恢复。术中循环稳定未使用血管活性药物，BIS 值 42-58，术后安返病房。手术历时 12 分钟，术中输注醋酸钠林格 500ml，无出血。

结果 此例患者非插管全麻下应用经鼻湿化高流量通气技术 THRIVE 行环杓关节复位术。患者术中生命体征平稳，未应用血管活性药物，术后恢复良好。THRIVE 得应用可以增加患者的安全窒息时间，保障患者术中的氧合的同时，也降低了 PaCO2 的上升速率，该例手术中 THRIVE 的应用是可行且安全的。

结论 THRIVE 的应用可以增加患者的安全窒息时间，保障患者术中的氧合的同时，也降低了 PaCO2 的上升速率，该例手术中 THRIVE 的应用是可行且安全的，支撑喉镜检查可确保气道通畅，保障了高流量氧气输送，进而保障心肌的氧供，维持了患者良好的氧合状态。该项技术的应用为外科医生提供了一个扩大且安全无障碍的喉部视野，改善了手术操作环境，可能会加快手术速度，对患者的预后产生积极的影响。

PU-1211

Intraoperative opioid-free anesthesia for patients undergoing temporomandibular joint surgery: a randomized controlled trial

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Background and purpose: The intensity of pain after temporomandibular joint (TMJ) surgery is often underestimated, and inadequate pain control may be associated with poor quality of recovery, increased opioid requirement and increased hospital stay postoperatively. It was hypothesized that opioid-free anesthesia could provide a promising option for pain management in patients undergoing TMJ surgery.

Methods Sixty patients undergoing TMJ surgery were randomly assigned to the control group and the opioid-free groupin a 1:1 fashion using permuted block randomization. The primary outcome was the worst documented pain score while in the post-anesthesia care unit (PACU). The secondary outcomes included perioperative opioid use; the use, dosage and time to use of rescue analgesia in the PACU; the incidence of postoperative nausea and vomiting in PACU and at home after surgery; pain satisfaction; the incidence of opioid-related adverse effects; length of PACU and hospital stay, and total dose of oxycodone-acetaminophen tablets used at 24 and 48 hours after surgery.

Results There were no significant differences in demographic data and baseline medical comorbidities of patients ($P>0.05$, $n=30$). No significant differences were observed in the worst documented pain scores, postoperative opioid or oxycodone-acetaminophen consumption, pain satisfaction, PACU discharge and hospital discharge. Moreover, astatistically significant difference was observed in time to rescue analgesia ($P<0.05$, $n=30$).

Conclusion Opioid-free anesthesia using lidocaine, dexmedetomidine, and ketamine infusion therapy for pain management showed a similar postoperative analgesia effect, compared to opioid-based anesthesia, in patients undergoing arthroscopic TMJ surgery. However, opioid-free anesthesia did not reduce the incidence of post-operative side effects typically associated with opioids.

PU-1212

Comparison of postoperative analgesia in children following ropivacaine and lidocaine surgical field infiltration with epinephrine for cleft palate repair: A double-blinded, randomized controlled trial

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Study objective: The study aimed to evaluate the efficacy of ropivacaine in providing postoperative analgesia for children undergoing cleft palate repair.
Methods A double-blinded, randomized controlled trial was conducted on sixty-four children scheduled for cleft palate repair. The patients received either local infiltration with 1% lidocaine or 0.2% ropivacaine before incision. The primary outcome was the postoperative average pain score, and secondary outcomes included pain scores at various time points, consumption of flurbiprofen and hydromorphone, the effectiveness of nurse-controlled analgesia pumps, and incidence of bradycardia, vomiting, and respiratory depression.
Main results: The results showed that the postoperative average pain score was significantly lower in the ropivacaine group compared to the lidocaine group (1.27±0.28 vs. 1.75±0.29, P<0.001). Pain scores at multiple postoperative time points were also lower in the ropivacaine group. Additionally, consumption of flurbiprofen and hydromorphone was lower, and ineffective compressions of the nurse-controlled analgesia pump were reduced in the ropivacaine group. The incidence of vomiting, bradycardia, and respiratory depression did not show significant differences between the two groups.
Conclusion Local infiltration with ropivacaine effectively provided postoperative analgesia for children undergoing cleft palate repair without major side effects. It was found to be superior to lidocaine in reducing the need for additional rescue analgesia

PU-1213

低剂量右美托咪啶复合球后神经阻麻醉 在玻璃体切除术 中的应用效果分析

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目的 探讨低剂量右美托咪啶复合球后神经阻麻醉在玻璃体切除手术中的应用效果分析
方法 1、选择 2022 年-2023 年本院择期行玻璃体切除术患者 80 例，男性 42 例，女性 38 例，年龄 45~70 岁，美国麻醉医师协会 ASAⅠ ~ Ⅱ级，体重 40~80 kg 。
2、根据随机化数字表，随机分为 0.4ug/kg 右美托咪啶 A（组）和 0.5ug/kg 右美托咪啶 B（组)以及 0.6ug/kg 右美托咪啶 C（组)。排除标准：不能正确理解及表达镇静及镇痛评分， 窦性心动过缓(<55 次/min）或Ⅱ度及以上房室传导阻滞者，左室功能受损（射血分数＜55％），严重肝肾功能障碍，严重呼吸系统疾病，有镇痛、镇静药物长期使用史，有酒精或药物滥用史，对本药物过敏者。3、患者均未术前用药，术前正常饮食。入手术室后常规鼻导管吸氧 2（L/min），连续监测手术前后心电图 ECG、血氧饱和度 SpO2、无创血压。三组均泵注盐酸右美托咪啶注射液。A 组以 0.4 μg/kg 负荷量匀速泵注 10 min ，B 组以 0.5 μg/kg 负荷量匀速泵注 10 min ，C 组以 0.6 μg/kg 负荷量匀速泵注 10 min 。术中根据 MOAA/S 镇静分级，观察患者镇静深度，当患者 MOAA/S 评分达到 3 分，停止泵注药液。3 组均在药液泵注停止后开始手术。患者术后 MOAA/S 评分大于 3 分，送回

病房。记录患者入手术室时（T0）、手术开始时（T1）、切吸玻璃体时（T2）、手术结束时（T3）的 4 个时 间 点 的心率（HR）、平均动脉压（MAP）、SpO2 和 MOAA/S 镇静评分、NRS 镇痛评分变化及不良反应情况。
4 应用 SPSS 23．0 统计软件进行数据处理， 计量资料以 x±s 表示，组内比较用重复测量的方差分析,组间比较用独立样本 t 检验。计数资料组间比较采用 χ2 检验。 P＜0.05 为差异有统计学意义。
结果 1、循环波动程度：B、C 两组在 T1、T2、T3 不同时间点，心率及平均动脉压均明显低于 A 组，差异有统计学意义（P<0.05）。
2、镇静程度：三组患者不同时间点 MOAA/S 评分进行比较。与 T0 相比:组内比较，三组患者在 T2、T3 时间点，评分均有所下降,差异有统计学意义（P<0.05）。组间比较，B、C 两组在 T2、T3、T4 不同时间点 MOAA/S 评分均明显低于 A 组,差异有统计学意义（P<0.05）。
3、疼痛程度：三组患者术后不同时间点疼痛评分进行比较。与 T0 相比:组内比较,A 组患者在 T1、T2、T3 不同时间点，疼痛评分的差异无统计学意义（P>0.05）；B、C 两组患者在 T1、T2、T3 不同时间点，疼痛评分的比较差异有统计学意义（P<0.05）。组间进行比较，B、C 两组在 T2、T3 不同时间点，与 A 组患者疼痛评分的比较差异有统计学意义（P<0.05）意义。
4、术后不良反应：A 组患者与 B 组患者相比，BP 与 HR 相关不良反应发生率无统计学意义（P>0.05）。C 组患者出现心率下降情况与 A 组相比差异有统计学意义（P<0.05）。
结论 1、低剂量右美托咪定泵注提高了球后神经阻滞麻醉下的玻璃体切除手术患者耐受性及安全性。
2、应用 0.4-0.5ug/kg 右美托咪啶进行泵注，可以维持患者相对平稳的循环，保证手术安全。
3、应用 0.6ug/kg 右美托咪啶进行泵注，其对心率的影响已经体现，在临床应用过程中需要注意。

PU-1214

比较右美托咪定和右美托咪定联合布托啡诺用于清醒纤支镜引导气管插管的有效性和安全性

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目的 比较单纯右美托美定（dexmedetomidine，DEX）和右美托咪定联合布托啡诺（Butorphanol，B）用于清醒镇静纤支镜（fiberoptic scope，FOS）引导气管内插管的有效性和安全性。
方法 纳入 ASAⅠ-Ⅲ级、接受择期手术，因困难气道需行清醒纤支镜引导气管插管的患者 64 例，随机分为两组，DEX 组：单纯给予右美托咪定，DEX+B 组：给予右美托咪定+布托啡诺。主要观察指标是：患者在预给氧、置入纤支镜及气管插管过程中患者的舒适度和反应。次要观察指标：达到目标镇静深度所需时间，一次成功率，在预给氧、纤支镜进入及气管插管过程中血流动力学改变，术后 24h 评估患者对气管插管的满意度，术后 24h 评估头晕、恶性、呕吐等药物副反应。
结果 与 DEX 组相比，DEX+B 组患者更安静和合作；DEX+B 组患者的满意度更高，并且达到目标镇静深度所需要的时间更短。两组之间血流动力学改变没有统计学差异，两组一次插管的成功率均为 100%。
结论 右美托咪定联合布托啡诺与单纯用右美托咪定均可安全地用于清醒纤支镜引导气管插管，但是右美托咪定联合布托啡诺舒适度更高，耗时更短，值得临床应用推广。

PU-1215

磷丙泊酚用于支撑喉镜下声带息肉切除术全麻诱导的安全性和有效性

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目的 探讨磷丙泊酚和丙泊酚诱导在支撑喉镜下声带息肉切除术的安全性和有效性以及迷走神经反射发生情况的比较

方法 选择 100 例 18 岁及以上 ASAⅠ～Ⅱ级择期行支撑喉镜下声带息肉切除术患者，随机分为 2 组，每组各 40 例，分别为磷泊酚组（F 组）和丙泊酚组（P 组），诱导前 5 分钟均静注 40 mg 帕瑞昔布钠超前镇痛，F 组麻醉诱导：磷丙泊酚 6.5 mg/kg，顺苯磺酸阿曲库铵 0.15 mg/kg，舒芬太尼 0.4μg/kg 实施麻醉诱导。P 组麻醉诱导：丙泊酚 2.5 mg/kg，顺苯磺酸阿曲库铵 0.15 mg/kg，舒芬太尼 0.4 μg/kg 实施麻醉诱导。2 组均使用 6~10 μg/kg/h 瑞芬太尼和 4~8 mg/kg/h 丙泊酚麻醉维持。主要结局指标为手术过程中低血压、注射痛、迷走神经反射等不良事件的发生情况。次要结局指标：（1）麻醉诱导的成功率；（2）记录两组患者诱导前（T0）、麻醉诱导后（T1）,气管插管后喉镜置入前（T2），支撑喉镜置入时（T3），入 PACU 时（T4）和拔除气管插管后（T5）各时间点的平均动脉压（MAP）和心率（HR）；（3）记录诱导期改良警觉/镇静评分（MOAA/S）≤1 所需时间、手术时长、苏醒期自主呼吸恢复时间、睁眼时间、拔管时间和 PACU 滞留时间；（4）通过视觉模拟量表（VAS）、躁动（RS）评分及 Ramsay 评分评估拔管后疼痛与镇静情况以及不良事件的发生情况。（5）记录术中丙泊酚、瑞芬太尼维持用量及阿托品用量。

结果 不良反应：F 组注射痛发生率明显低于 P 组（P < 0.05），两组诱导期低血压及肌阵挛发生率无统计学差异（P > 0.05）；术中迷走神经反射的发生率及严重程度上无统计学差异（P > 0.05）；苏醒期过度镇静、头晕及恶心呕吐发生率无统计学差异（P > 0.05）。

血流动力学：组内比较：两组患者 T1 时 MAP 和 HR 较 T0 时明显降低（P < 0.05）。组间比较：T0 时两组患者的 MAP、HR 相比无统计学差异（P > 0.05）； T2、T3 时 F 组的 MAP 明显高于 P 组（P < 0.05），其余时间点两组间 MAP 无统计学差异（P > 0.05），F 组 MAP 整体变化趋势较 P 组平缓。T1-T5 两组 HR 无统计学差异（P > 0.05）。

麻醉诱导成功率及 MOAA/S≤1 时间：两组麻醉诱导成功率均为 100%（P > 0.05），F 组 MOAA/S≤1 长于 P 组（P < 0.05）。

麻醉恢复时间：与 P 组相比，F 组自主呼吸恢复时间及睁眼时间、拔管时间明显缩短（P < 0.05），PACU 停留时间无统计学差异（P > 0.05）。

苏醒期评分：F、P 两组患者苏醒期 RS 躁动评分、Ramsay 镇静评分、Steward 苏醒评分及疼痛 VAS 评分均无统计学差异（P > 0.05）。

药物用量：F、P 两组在丙泊酚和瑞芬太尼用量、阿托品用量上均无统计学差异（P > 0.05）。

结论 磷丙泊酚诱导用于支撑喉镜下声带息肉切除术安全有效，与丙泊酚相比，血流动力学更平稳，且能缩短支撑喉镜下声带息肉切除术患者麻醉恢复时间，但不能降低咽喉迷走神经反射的发生。

PU-1216

术中液体管理对口腔癌游离皮瓣修复术后血管危象的影响

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目的 皮瓣血管危象是口腔癌根治同期游离皮瓣修复术后最常见的并发症，分析术中液体管理与之发生的相关性研究较少。本研究旨在通过搜集即有的临床资料，采用回顾性分析的方法，评估术中

液体管理对口腔癌根治同期游离皮瓣修复术后发生血管危象的影响，寻求更优的输液速率，并分析术后发生血管危象的独立危险因素

方法 收集 2022 年 1 月至 2022 年 12 月于中南大学湘雅二医院择期行口腔癌根治性手术同期行游离皮瓣修复术的患者。根据纳入排除标准，最终纳入 314 例患者。收集患者一般资料、生化指标、术中及术后相关资料。主要暴露因素是术中输液速率，即患者在手术室期间单位时间单位体重的输液量[ml/（kgh）]，总输液量包括晶体液、胶体液和血制品的输注量。根据术中输液速率的三分位数分为三组：低输液组，L 组(输液速率≤8 ml/（kgh）)；中输液组，M 组（8 ml/（kgh）＜输液速率≤11 ml/（kgh））；高输液组，H 组（输液速率＞11 ml/（kgh）），主要观察目标为皮瓣血管危象（血栓形成相关；非血栓形成相关）；次要观察目标：其他术后并发症（术后出血、皮下血肿、伤口感染、肺部感染、急性心衰、肝功能受损）、术后输血、转入 ICU、术后住院时间。应用单因素分析和多因素回归分析发生术后皮瓣血管危象的风险因素，将单因素分析中 P≤0.1 的变量纳入多因素分析，以确定因变量与各协变量之间的关系，在多因素分析中 P＜0.05 的变量被认为是发生皮瓣血管危象的独立风险因素。

结果 共有 314 例患者纳入分析，L 组 83 例；M 组 146 例；H 组 85 例。三组间患者的基本情况及术前生化指标差异无统计学意义（P＞0.05）；L 组患者血管危象发生率明显高于 M 组和 H 组（P=0.001,P＜0.05），M 组和 H 组之间无显著性差异（P＞0.05）；L 组血栓形成原因的血管危象发生率亦明显高于 M 组和 H 组（P=0.01,P＜0.05），M 组和 H 组之间无显著性差异（P＞0.05）；而非血栓形成原因的血管危象在三组间无明显差异（P=0.196，P＞0.05）；三组间的总体术后并发症无统计学上差异（P=0.192，P＞0.05）;H 组的急性心衰发生率高于 M 组和 L 组（P=0.039，P＜0.05），M 组和 L 组之间无显著性差异（P＞0.05）。L 组的术后住院时间长于 M 组和 H 组（P=0.033,P＜0.05），M 组和 H 组的术后住院时间无明显差异（P＞0.05）；三组伤口感染、术后出血、皮下血肿、术后输血、肺部感染、转入 ICU 差异无统计学意义（P＞0.05）；患者合并高血压、合并糖尿病、术中输液速率≤8 ml/（kgh）是接受口腔癌根治同期游离皮瓣修复术的血管危象的独立危险因素（P＜0.05）。

结论 （1）本研究显示，在口腔癌游离皮瓣修复手术中，术中平均输液速率≤8 ml/（kgh）显著增加术后血栓形成相关血管危象的发生率和术后住院时间；术中平均输液速率＞11 ml/（kgh）可能与术后发生急性心衰有关。（2）患者合并高血压、合并糖尿病、术中输液速率≤8 ml/（kgh）是术后发生皮瓣血管危象的独立危险因素。

PU-1217

阻塞性睡眠呼吸暂停（OSA）患者上气道手术围术期管理的研究进展

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目的 由于接受上气道手术患者本身存在上气道解剖结构改变、多合并全身性病变，给围术期管理带来很大的挑战，本文根据已发表的文献、专家管理经验，对上气道手术术前准备及术中术后管理等相关进展进行汇总，重点关注上气道手术围术期管理的关键环节，以期提高围术期安全、促进患者康复。

方法 OSA 患者拟行上气道手术根据手术平面可分为：鼻咽部手术、软腭-舌根部手术（软腭和舌根部微创手术、悬雍垂腭咽成形术）、下咽部手术（如经口机器人手术、颏舌肌前徙术、舌骨悬吊术等）、双颌前徙术。本文根据查询不同平面手术的术前管理、术中管理及术后相关文献，以证据级别对文献证据进行分类、总结

结果 对于上气道手术，术前继续维持气道正压通气（PAP）治疗，可降低术后气道并发症的风险；术前行药物诱导睡眠内镜检查术（drug-induced sedation endoscopy，DISE），有助于判断阻塞

部位（平面）和多平面手术的个体化实施，目前推荐使用丙泊酚和咪达唑仑用于 DISE；术前不常规给予镇静药物。上气道手术目前几乎均在全身麻醉下完成，具体麻醉方式选择根据所在医疗机构条件、病人一般情况、麻醉医师经验等综合考虑。接受上气道手术患者增加面罩通气和气管插管困难风险，加强气道评估，诱导前做好困难气道处理预案。OSA 和上气道手术都是拔管困难的危险因素，拔管前应充分评估，拔管后进行严密监测。术中合理使用阿片或非阿片镇痛方案；若使用阿片类药物，则严密监测患者生命体征。建议在上气道手术中，使用非去极化肌肉松弛药并行监测神经肌肉阻滞程度监测；如无禁忌，建议术毕常规行肌松阻滞拮抗。若无禁忌，围术期静脉注射类固醇激素有助于减轻上气道手术后气道水肿。术后管理要考虑患者 OSA 严重程度、PAP 使用的依从性、手术类型及合并症等情况。术后避免平卧位，建议头高位。在麻醉后恢复室除了标准监测项目外，还应监测呼吸状况。在术后住院期间，推荐 OSA 患者行便携式睡眠呼吸监测。对于无禁忌的上气道手术患者，术后应尽早恢复应用 PAP，以减轻呼吸系统相关并发症。建议术后镇痛采用多模式的镇痛方案，尽量减少阿片类使用。

结论 OSA 患者临床管理存在较大的挑战，本文虽然根据已有文献进行了总结，但上气道手术围术期管理的文献数量偏少，已有文献更多关注了 OSA 患者非上气道手术的管理，部分已发表的 Meta 分析没有区别 OSA 患者是否接受上气道手术；此外，部分已发表关于上气道手术围术期管理的临床试验多为观察性研究或病例报道，样本量较小，证据级别整体较低。因此，未来需要开展更多上气道手术相关的高质量临床研究，为上气道手术的围术期管理提供高质量的证据。

PU-1218

瑞马唑仑预防成人全身麻醉下鼻外科手术后苏醒期躁动的效果：一项随机对照研究

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目的 The purpose of this study was to evaluate the effectiveness of postoperative use of remimazolam in preventing emergence agitation (EA) in adult following nasal surgery.

方法 In total, 86 patients undergoing nasal surgery were randomly divided into two groups. Propofol, sufentanil and cis-atracurium were used for induction of anaesthesia, then the 1.5 to 3.5% sevoflurane concentration was used for maintenance of anaesthesia. At the end of the surgery, patients were randomly assigned to receive either remimazolam 0.1 mg/kg (Group R, n = 43) or 0.9% normal saline (Group C, n = 43). The primary outcome was the incidence of EA. The secondary outcomes included the incidence of severe EA, extubation time, length of PACU stay and Maximum NRS score in PACU. In addition, adverse events, MAP and HR (at different time points) during the observation period were recorded.

结果 A total of 86 adult patients completed the study. The incidence of EA was lower in Group R than in Group C (21% vs 49%, P = 0.007). The incidence of severe EA was also lower in Group R than in Group C (2% vs 19%, P = 0.035). The maximal RSAS score during emergence was lower in Group R (4 [4–4]) than in Group C (5 [4–6]) (P < 0.001). In addition, the incidence of hypertension and grade of cough in Group R were significantly lower than Group C (P = 0.024). During the emergence period, the MAP and HR of group R showed more stable changes than group C.

结论 Postoperative injection of remimazolam 0.1 mg/kg into adult patients undergoing nasal surgery can significantly reduce the incidence of EA and severe EA, and provide smooth and haemodynamically stable emergence.

PU-1219

Visuable Kit and Dual Bronchial Blockers: A Sustainable Try for Thoracic Surgery of A Patient With Variant Tracheal Bronchus

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Abnormal bronchus originating from the trachea or main bronchus are rare. Major bronchial abnormalities include accessory cardiac bronchus (ACB) and tracheal bronchus(TB)[1]. Variant TB brings difficulty and confusion when this patient undergoing thoracic surgery. Double-lumen tube(DLT) is the preferred method for lung isolation in right lung surgery, but it is an challenge to provide satisfactory lung collapse and lung recruitment with DLT in the process of surgery. Bronchial blocker(BB) is another commonly method for lung isolation during thoracic surgery, but the abnormal bronchus might not be occluded, Therefore, We tried a new unconventional way of dual BB for a patient with variant TB and anesthesia effect was satisfying. Dual BB could be recommended as a backup or even preferred lung isolation strategy in patients with TB.

PU-1220

The Effect of α2-AR Agonists on Cerebral Oxygen Metabolism in Children with Congenital Heart Disease During the Perioperative Period

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Objective To explore the effects of α2- adrenergic receptor (AR) agonist on creatine kinase isoenzyme (CK-MB), heart-type fatty acid binding protein (H-FABP) and arterial internal jugular vein bulbar oxygen difference (Ca-jvO2) in children with congenital heart disease (CHD) during perioperative period. Methods: A total of 90 children with CHD undergoing elective atrioventricular septal defect repair under general anesthesia and cardiopulmonary bypass were enrolled. According to random number table method, they were divided into control group (n=30), low-dose Dexmedetomidine (Dex) group (D1 group, n=30) and high-dose Dex group (D2 group, n=30). The surgical data, perioperative myocardial injury markers [CK-MB, cardiac troponin I (cTnI), H-FABP], brain injury markers [S-100β protein, neuron-specific enolase (NSE)] and blood gas analysis indexes [arterial oxygen concentration (CaO2), arterial partial pressure of oxygen (PaO2), oxygen saturation of intemal jugular vein (Sjv02), Ca-jvO2] in different groups were compared. Results: There was no significant difference in surgical data among the three groups (P>0.05). After surgery, myocardial injury indexes and brain injury indexes were increased first and then decreased in the three groups. At T2, T3 and T4, myocardial injury indexes were gradually increased in D2 group, D1 group and control group, the above differences were statistically significant (P<0.05). At T5 under low temperature, CaO2, PaO2 and Sjv02 were increased, while Ca-jvO2 was decreased in the three groups. CaO2, PaO2 Sjv02 and Ca-jvO2 were gradually increased in D2 group, D1 group and control group, the above differences were statistically significant (P<0.05). At T6 under normal temperature, CaO2, PaO2 and Sjv02 were decreased, while Ca-jvO2 was increased in the three groups. CaO2, PaO2 and Sjv02 were gradually decreased in D2 group, D1 group and control group, while Ca-jvO2 was gradually increased, the above differences were statistically significant (P<0.05). Conclusion: Dex can reduce the incidence of postoperative myocardial injury and brain injury in CHD children, which is more beneficial to

maintain postoperative stability of cerebral blood flow.

PU-1221

瑞马唑仑用于先天性心脏病患儿意识消失的半数有效量

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目的 研究瑞马唑仑用于先天性心脏病患儿意识消失的半数有效量（ED50）
方法 选择择期拟行先天性心脏病手术的患儿，根据年龄分为 2 组：婴儿组（1 月～1 岁）和幼儿组（1 岁～3 岁），ASA 分级Ⅱ或Ⅲ级。2 组采用 Dixon 上下序贯法进行试验，两组瑞马唑仑静脉注射初始剂量为 0.3 mg/kg。若患儿意识消失则下一例患儿增加 0.025 mg/kg，否则降低 0.025 mg/kg。采用改良警觉镇静（MOAA/S）评分评估镇静程度。意识消失标准：静脉注射后 5 min 内 MOAA/S 评分≤3 分。采用 Probit 法计算瑞马唑仑用于先天性心脏病婴儿和幼儿意识消失的半数有效量（ED50）及其 95%可信区间（CI）。记录患儿心率（HR）、脉搏氧饱和度（SpO2）及其不良反应。
结果 瑞马唑仑用于先天性心脏病婴儿和幼儿意识消失的 ED50 和 95% CI 分别为 0.188（0.091-0.249）mg/kg 和 0.243（0.176-0.303）mg/kg。静脉注射瑞马唑仑未出现严重不良反应。
结论 瑞马唑仑用于先天性心脏病婴儿和幼儿的 ED50（95% CI）分别为 0.188（0.091-0.249）mg/kg 和 0.243（0.176-0.303）mg/kg

PU-1222

胸横肌平面阻滞对心肺转流下瓣膜置换术患者应激反应和术后镇痛的影响

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目的 探讨胸横肌平面阻滞（TTP）对心肺转流下瓣膜置换术患者应激反应和术后镇痛的影响。
方法 选择 2022 年 9—11 月择期行瓣膜置换术的患者 40 例，男 29 例，女 11 例， 年龄 35～ 65 岁，BMI 18 ～ 25 kg /m2 ，ASA Ⅱ或Ⅲ级，心功能Ⅱ或Ⅲ级。采用随机数字表法分为两组: 双侧 TTP 阻滞联合全麻组(A 组) 和单纯全麻组(B 组) ，每组 20 例。A 组麻醉诱导前在超声引导下 经胸骨旁 4、5 肋间隙行双侧 TTP 阻滞，B 组不做处理，两组麻醉方法相同，术后均采用舒芬太尼静脉自控镇痛。记录术中舒芬太尼、瑞芬太尼、右美托咪定、丙泊酚用量。于麻醉诱导前、心肺流转前、术毕、 术后 12 h 及术后 24 h 抽取静脉血，测定血浆血管紧张素Ⅱ(Ang Ⅱ) 和 β 内啡肽(β-EP) 浓度。记录 术后 6、12、24 h 静息和咳嗽时 VAS 疼痛评分。记录术毕至术后 12 h、术后 12～ 24 h 镇痛泵有效按压次数。记录术后机械通气时间、ICU 停留时间、肺部并发症及心力衰竭发生例数。
结果 A 组术中舒 芬太尼、右美托咪定、丙泊酚用量明显少于 B 组(P＜0. 05) 。两组术中瑞芬太尼用量差异无统计学意 义。与麻醉诱导前比较，CPB 前、术毕、术后 12、24 h 两组 Ang Ⅱ浓度明显升高(P＜0. 05) ，术毕、术后 12、24 h 两组 β-EP 浓度明显升高(P＜0. 05) 。术毕、术后 12、24 h A 组 Ang Ⅱ和 β-EP 浓度明显低于 B 组(P＜0. 05) 。A 组术后 6、12 h 静息和咳嗽时 VAS 疼痛评分明显低于 B 组，术毕至术后 12 h 镇痛 泵有效按压次数明显少于 B 组，术后机械通气时间明显短于 B 组(P＜0. 05) 。两组术后肺部并发症 及心力衰竭发生率差异无统计学意义。
结论 双侧 TTP 阻滞可减少 CPB 下瓣膜置换术患者术中麻醉药物用量，减轻应激反应，并提供良好

的术后镇痛。

PU-1223

术前升主动脉内径对成人心脏术后急性肾损伤的预测作用：一项回顾性分析

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目的 升主动脉内径 (Ascending Aortic Diameter, AAD) 是心脏手术患者术前超声检查重要组成部分，其对心脏手术患者预后至关重要。升主动脉是大动脉重要组成部分之一，其形态功能将影响中动脉和脏器灌注。因而，升主动脉内径的改变可能影响患者肾脏灌注，从而影响心脏手术患者术后肾脏功能。AAD 对心脏手术患者术后 AKI 的影响仍有待于进一步探究，因此，本研究拟通过一项回顾性研究探讨 AAD 对心脏手术患者术后 AKI 的预测作用

方法 通过纳入 2023 年 4 月至 2023 年 7 月在中国医学科学院阜外医院行择期心脏手术成年患者，将其按术后研究结局分为 AKI 组和非 AKI 组。收集患者术前人口学资料（性别、身高和体重等）、术前资料（术前白蛋白等检查指标）、手术资料（诊断、手术方式、手术时间和体外循环时间等）和研究结局（AKI 发生率等）等。将收集的患者资料分别进行单因素和多因素分析，探究心脏手术患者术后 AKI 的危险因素。通过 ROC 曲线评价模型性能，通过加入和去除 AAD 的 ROC 面积探究 AAD 对心脏手术患者术后 AKI 的预测作用。

结果 本研究最终纳入 442 名受试者，平均年龄为 58.51±11.65 岁。其中，46 名患者发生术后 AKI，AKI 发生率为 10.41%。校正多因素分析结果显示，女性，低白蛋白血症、CPB 时间长、术前升主动脉内径增宽、术前左房前后径增大、术前左肺动脉直径增宽和术前右肺动脉直径降低与心脏手术术后 AKI 发生率显著相关。在加入和去除升主动脉内径、左房前后径、左肺动脉直径和右肺动脉直径后，模型 ROC 曲线下面积差异无显著统计学意义。单因素和多因素分析结果显示，AAD 是成人心脏手术患者术后 AKI 发生的独立危险因素（P<0.05）。体外循环亚组分析结果显示，成人择期体外循环患者中，高龄、术前低白蛋白血症、术前升主动脉内径增宽和左肺动脉内径增宽患者术后 AKI 发生率较高，是成人择期体外循环下心脏手术术后 AKI 的独立危险因素。ROC 分析结果显示，加入 AAD 变量，ROC 模型面积从 0.67 增加至 0.72，差异具有统计学意义（P<0.05）。

结论 AAD 对成人心脏手术术后 AKI 具有重要预测价值。术前 AAD 值更高的心脏手术患者术后 AKI 发生率更高。AAD 对成人心脏手术患者术后 AKI 预测价值在体外循环患者中更高。

PU-1224

Prognostic value of preoperative ascending aortic diameter on postoperative acute kidney injury in adult cardiac surgery

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Abstract Background The ascending aortic diameter (AAD) is common in ultrasound examinations of cardiac surgery patients, and it is important for the prognosis of cardiac patients. The ascending aortic diameter has effect on renal perfusion. However, the impact of AAD on the incidence of postoperative acute kidney injury (AKI) in cardiac surgery patients is still unknown. This study aims

to explore the prognostic value of ascending aortic diameter on the incidence of postoperative AKI in cardiac adult patients.
Method This retrospective study included patients aged ≥18 years who underwent cardiac operations between April 2023 to July 2023 in Fuwai Hospital, China. Patients were divided into two groups: AKI group and non-AKI group. The values of cardiac ultrasound the day before surgery were collected. The end point was the rate of acute kidney injury. Univariable and multivariable logistic regression analyses were performed to identify the independent risk factors for postoperative AKI. The receiver operating characteristic curve was used to assess model performance. Using another model without AAD, the effect of the addition of AAD was assessed.
Result 442 patients were included in this study. The average age was 58.51 ± 11.65 years. 46 patients with AKI and 396 patients with non-AKI. The incidence of acute kidney injury in adult cardiac surgery was 10.41%. The results showed that after adjusting for potential risk factors, female, lower albumin, longer CPB time, higher ascending aorta diameter, higher left atrial anteroposterior diameter, higher left pulmonary artery diameter, and lower right pulmonary artery diameter were significantly associated with the accidence of AKI. There was no significant difference in the area under the curve (AUC) of the 5 different models with or without 4 ultrasound testing values (ascending aorta diameter, left atrial anteroposterior diameter, left pulmonary artery diameter, and right pulmonary artery diameter). Univariable and multivariable results suggested that AAD was an independent factor of postoperative AKI for both on-pump and off-pump cardiac patients ($P<0.05$). To avoid CPB time confounding factor, we went subgroup analysis of the area under the curve of CPB time further. The results of analysis of on-pump subgroup analysis showed that patients with older age, lower serum albumin, higher ascending aorta diameter, and higher left pulmonary artery diameter were significantly associated with the incidence of AKI. The addition of AAD improved the area under the curve from 0.67 to 0.72 ($P<0.05$) in on-pump patients.
Conclusion AAD represents a prognostic value of postoperative AKI in adult cardiac surgery. Patients with higher preoperative AAD values are more likely to have postoperative AKI. AAD has a prognostic value of postoperative AKI for adult cardiac surgery patients, and the prognostic value of AAD is higher in on-pump patients.

PU-1225

非体外循环冠状动脉搭桥术中交替脉一例

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目的 探讨交替脉的发病机制
方法 非体外循环冠状动脉搭桥术中交替脉一例
结果 本例患者出现交替脉的原因可能与心脏手术中麻醉药物的用量不当、心脏固定器的压迫以及手术操作对心脏的损伤有关。这些因素可能导致心脏功能受到抑制，进而出现交替脉现象
结论
对于冠心病三支病变的患者，非体外循环冠状动脉搭桥术是一种有效的治疗手段。然而，手术过程中，由于心脏搬动、心肌损伤以及血容量不足等因素，可能导致心肌收缩力下降，进而出现交替脉。对于这种情况，可以观察心电图、血氧饱和度和有创动脉压，通过经食道超声（TEE）来监测血容量及心功能。在发生交替脉时，经食管中段左心室长轴切面可以观察心功能和测量左心室射血，帮助诊断和指导治疗。因此，在临床实践中，对于此类患者应密切关注病情变化，及时采取有效措施，以保障患者的生命安全。

PU-1226

超前镇痛对于老年冠心病患者胸腔镜下纵隔肿物切除术 ERAS 的影响

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目的 观察氟比洛芬酯注射液超前镇痛在老年冠心病患者胸腔镜下纵隔肿物切除术中对 ERAS 的影响

方法 选择术前影像学显示需行胸腔镜下纵隔肿物切除术的老年冠心病患者 40 例（65 岁-80 岁），ASAI-II 级，随机双盲分为两组。I 组 20 例患者单纯采用全麻下行胸腔镜下纵隔肿物切除术；II 组 20 例患者在全麻诱导前 15min 静脉注射氟比洛芬酯 1.0 mg/kg 超前镇痛再行胸腔镜下纵隔肿物切除术。观察并记录手术结束时（T1）、术后 4h（T2）、术后 8h（T3）及术后 12h（T4）各时间点两组患者疼痛视觉模拟评分（VAS）及不良反应的发生率；两组患者术后 ST-T 的下移情况。

结果 ① 两组患者年龄、体重、身高、ASA 状态及手术时间等指标差异均无统计学意义（P＞0.05）；② I 组与 II 组镇痛效果在 T1 时间点比较，差异无统计学意义（P＞0.05）；T2、T3、T4 时间点 VAS 评分 I 组患者高于同时点 II 组,镇痛效果比较差异有统计学意义（P＜0.05）；③ 不良反应发生率：两组患者均无明显呼吸抑制及循环抑制，无头晕、恶心呕吐及嗜睡的发生，差异无统计学意义（P＞0.05）；④ 两组患者术后各时点 ST-T 的下移 I 组患者高于同时点 II 组，差异有统计学意义（P＜0.05）。

结论 氟比洛芬酯（凯纷）超前镇痛应用于老年冠心病患者胸腔镜下纵隔肿物切除术中，能够对 ERAS 产生较大的影响，尤其能够明显减轻患者术后疼痛，并不增加术后不良反应的发生率，同时能够明显控制术中及术后炎症反应从而促进术后老年患者的快速康复（ERAS），因此对老年患者更为安全可靠。

PU-1227

中国人群开胸术后慢性疼痛发生风险预测模型的开发与验证：基于系统性回顾和荟萃分析的纵向队列研究

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目的 本项目基于系统性回顾和荟萃分析，开发和验证一个风险预测模型，用于预测中国人群 CPTP 的发生，以提供更早干预机会，改善患者生活质量，减少医疗经济负担。

方法 该研究严格遵守赫尔辛基宣言的原则，在正式研究开始前取得患者及其授权人的知情同意。本研究招募从 2021 年 10 月至 2023 年 5 月于河南省胸科医院择期接受胸外科手术的 2988 名的患者，收集相关的临床资料，进行前瞻性分析，并分别进行术后 3、6 和 12 个月的随访。使用衍生队列对三种模型进行分析。采用 Meta 分析和 logistic 回归分析筛选 CPTP 发生的危险因素，采用多重插补法对遗漏变量进行插补。内部验证采用自举法(bootstrap)，外部验证采用验证队列。在判别受试者工作特征曲线(ROC)下面积评估模型的性能。校准和判别方法用于验证队列。根据临床和统计学重要性选择变量以构建列线图。

结果 本研究开发并并验证了 3 个模型。模型 1 包括性别、糖尿病病程、既往疼痛史、受教育程度、吸烟史、既往手术史和焦虑抑郁病史等 7 个临床指标。模型 2 在模型 1 的基础上增加了 4 个指标，分别为镇痛药物使用情况、围术期输血情况、手术时长和体重指数。模型 3 在模型 2 的基础上增加

了 C 反应蛋白(CRP)、中性粒细胞-淋巴细胞比值(NLR)、神经元特异性烯醇化酶(NSE)、血沉(ESR)、肿瘤坏死因子(TNF-α)、白细胞介素(IL)-6 和 IL-1β 等实验室检查指标。与验证队列 CPTP 发生率 33.8 % (297/879)相比，在衍生队列中，19.1 % (387/2027)的患者发生 CPTP。模型 1~3 的 ROC 曲线下面积分别为 0.792 (0.749~0.821)、0.845 (0.821~0.880)和 0.896 (0.872~0.920)。模型 1 ~模型 3 的 Youden 指数分别为 0.433、0.561 和 0.651。模型 3 显示出最高的敏感性和特异性。所有模型的区分度和校准度均较好。

结论 模型 1 和模型 2 均为无创性，在 CPTP 高危患者的一般筛查中具有一定的作用。然而，在三种模型中，模型 3 在预测 CPTP 发生风险方面的性能最佳，提供了更有针对性的筛选方法。

PU-1228

多模式无阿片药物麻醉对胸腔镜手术患者应激反应及血流动力学的影响

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目的 通过在胸腔镜手术中将艾司氯胺酮替代阿片类药物进行全麻，并联合胸椎旁间隙阻滞，与传统的阿片类药物全麻联合胸椎旁间隙阻滞进行对比，观察两种方法对患者血流动力学及应激反应的影响，来探究多模式无阿片药物麻醉是否能有效控制手术伤害性刺激，安全用于胸腔镜手术。

方法 选择阜阳市人民医院 2023 年 1 月-10 月拟全麻下行胸腔镜肺大疱或肺叶切除手术的患者，使用随机数字表法随机分为阿片类药物组（OA 组）和无阿片类药物组（OFA 组）两组，OA 组术中使用常规阿片类药物（舒芬太尼、瑞芬太尼）全身麻醉联合胸椎旁间隙阻滞进行麻醉，OFA 组使用艾司氯胺酮代替阿片类药物进行全身麻醉并联合胸椎旁间隙阻滞，观察两组患者术中不同时间点的血流动力学指标（MAP、HR），应激反应指标（Clu、Cor、8-iso）和术中丙泊酚用量，术后复苏时间（拔管时间、苏醒时间）、静息和咳嗽时 VAS 疼痛评分和不良反应（恶心呕吐、皮肤瘙痒、精神症状）发生情况。

结果 研究最终纳入患者 106 例，其中 OA 组 53 例，OFA 组 53 例。两组患者基线指标（年龄、性别、BMI、术式、手术时间）对比，差异无统计学意义（P>0.05）；两组患者各时点血流动力学指标对比，OFA 组在诱导、插管、切皮时 MAP 和 HR 均高于 OA 组（P<0.05），在拔管时，MAP 及 HR 均低于 OA 组（P<0.05），其 MAP 波动范围均在基础血压 20%范围内；术中丙泊酚用量对比，OFA 组低于 OA 组（P<0.05）；两组患者各时点 Glu、Cor、8-iso 对比，差异无统计学意义（P>0.05）；两组患者拔管时间、苏醒时间对比，差异无统计学意义（P>0.05）；不良反应对比，OFA 组 48h 内恶心呕吐发生率低于 OA 组（P<0.05），两组皮肤瘙痒及精神症状发生率相当（P>0.05）；两组患者在 48h 内各时点静息、咳嗽时 VAS 评分对比，差异无统计学意义（P>0.05）。

结论 以艾司氯胺酮代替阿片类药物联合胸椎旁间隙阻滞的多模式 OFA 方案用于胸腔镜手术麻醉可以有效控制手术应激反应，减少术中丙泊酚用量，有利于维持患者麻醉期间循环稳定，且可降低术后不良反应发生，不增加术后急性疼痛发生率，值得临床推广

PU-1229

神经阻滞联合保留自主呼吸麻醉在老年患者胸腔镜手术中的应用

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目的 随着人口老龄化，接受胸腔镜手术的老年患者逐渐增多。由于老年患者合并症较多，肺功能脆弱。常规麻醉行双腔支气管插管行单肺通气带来的气道损伤和机械通气相关肺损伤应引起重视。本研究拟探讨神经阻滞联合保留自主呼吸麻醉在老年患者胸腔镜肺叶切除术中的应用的安全性和可行性。
方法 前瞻性随机对照研究，纳入 2022 年 1 月~2023 年 1 月胜利油田中心医院行胸腔镜肺叶切除术老年患者 57 例，随机数字表法分为观察组（28 例）和对照组（29 例），两组患者均于麻醉诱导前行超声引导下竖脊肌平面阻滞并置管行术后低浓度罗哌卡因连续镇痛。观察组实施保留自主呼吸喉罩全身麻醉，对照组实施常规全麻。记录两组患者术中阿片药物和丙泊酚使用量，术后苏醒时间、首次主动下床时间、住院时间；记录术后苏醒即刻、4、8、12、24、48 h 静息和活动 VAS 评分；记录镇痛泵按压次数、补救镇痛药物用量和不良事件发生率。
结果 两组患者一般临床资料、术中维持药物使用量，组间比较差异没有统计学意义（P＞0.05）；观察组术后 24h 内各时间点静息和咳嗽 VAS 评分降低、镇痛泵按压次数减少，补救镇痛次数更少、术后主动下床时间、住院天数明显缩短（P＜0.05）。
结论 术前超声引导置管竖脊肌平面阻滞联合保留自主呼吸喉罩全身麻醉应用于胸腔镜肺叶切除手术老年患者安全有效，不仅减少了术中阿片类药物用量，有利于患者术后快速康复。

PU-1230

肺移植术后非插管保留自主呼吸全麻急症胸腔镜探查术一例

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目的 提供一例肺移植术后非插管保留自主呼吸全麻急症胸腔镜探查术，此前未见相关报导，旨在为临床麻醉工作，尤其是胸外科手术的围术期麻醉管理和前沿麻醉方式提供借鉴。
方法 患者，男，40 岁，身高 172cm，体重 65kg。因双肺间质性肺病于 12 天前在气管插管全身麻醉、VV-ECMO 下行“全肺切除术、双侧肺移植术”。但在 2 天前，患者的胸腔引流量开始增多，复查胸部 CT 示右侧胸腔积液量较前增多（如图所示），血常规检查血红蛋白较前 1 日下降约 10%，同时，患者表现出明显的胸闷症状。患者当日纤维支气管镜检查：气管通畅，隆突锐利，左、右主支气管吻合口处见部分黏膜暗灰色改变，无渗血、开裂，双肺各叶开口通畅。综合以上情况，考虑患者可能存在胸腔内活动性出血，于是决定急诊全身麻醉下行右侧胸腔镜探查术。
患者进入手术室后接受常规监护，面罩吸氧 5L/min，测动脉血气。使用舒芬太尼 5ug、瑞马唑仑 9mg 及血浆靶控输注丙泊酚 2ug/ml、瑞芬太尼 0.05ug/kg/min、右美托咪定 0.3ug/kg/h 进行麻醉诱导，充分诱导后插入 4 号喉罩，以 0.375%布比卡因行前锯肌阻滞。术中无需行迷走神经阻滞及肺表面喷洒局麻药。当壁层胸膜被打开后，停止机械通气并诱导患者的自主呼吸。术中氧流量 2L/min。术中肺塌陷良好，外科大夫清理血凝块，充分止血并行胸腔冲洗。术毕 15min 前测动脉血气。
结果 术毕，患者苏醒平稳，氧合良好，未诉明显疼痛，安返病房。
术后患者恢复良好，于第 3 天拔除右侧胸腔引流管，第 4 天顺利出院，并继续康复治疗。
结论 该患者处于肺移植术后第 12 天，容易发生气道吻合口并发症，且移植肺的功能弱。若对该患者使用双腔气管导管或支气管封堵器，既易因导管套囊压迫右主支气管吻合口（该患者右主支气管吻合口距隆突约 2cm）而造成局部缺血、增加吻合口并发症风险，又易因机械正压通气造成肺损伤、

增加肺部感染风险。因此我们选择使用 non-intubated 保留自主呼吸的全身麻醉。此前未见类似病例报导。non-intubated 保留自主呼吸的全身麻醉避免了对支气管吻合口造成损伤和机械通气相关的肺损伤。另外，由于移植肺缺少了迷走神经的支配，不需要在肺表面喷洒局麻药和迷走神经阻滞，这让麻醉过程更加容易，进行肺部探查时病人更加耐受。

PU-1231

犬马尿酸代谢通路对心肺转流大鼠术后认知功能障碍的影响

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目的 Postoperative cognitive dysfunction (POCD) has become the popular critical post-operative consequences, especially cardiopulmonary bypass surgery, leading to an increased risk of mortality. However, no therapeutic effect about POCD. Probiotics are beneficial bacteria living in the gut and help to reduce the risk of POCD. However, the detailed mechanism is still not entirely known. Therefore, our research aims to uncover the effect and mechanism of probiotics in relieving POCD and to figure out the possible relationship between kynurenine metabolic pathway.
方法 Thirty-two rats were grouped into three groups: sham operated group (S group, n=12), Cardiopulmonary bypass group (CPB group, n=12), and Probiotics+CPB (P group). After CPB model preparation, water maze test and Garcia score scale was performed to identify the neurological function. Immunofluorescence and Hematoxylin and eosin staining has been used for hippocampal neurons detection. Brain injury related proteins, oxidative stress factors, and inflammatory factors were detected using ELISA. Neuronal apoptosis was detected by TUNEL staining and western blot. HPLC/MS was performed to detect the key factors of the kynurenine metabolic pathway.
结果 Our results demonstrated that Probiotics improved neurological function of post-CPB rats. The administration of Probiotics ameliorated memory and learning in spatial terms CPB rats ($P<0.05$). H&E staining data, S‐100β and NSE data convinced that Probiotics agonists reduced brain damage in CPB rats ($P<0.05$). Moreover, Probiotics regulated inflammatory factors, meanwhile attenuated hippocampal neuronal apoptosis.
结论 Probiotics alleviated POCD in rats with CPB through regulation of kynurenine metabolic signaling pathway.

PU-1232

肾动脉阻力指数对心脏术后急性肾损伤的早期预测

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目的 探讨心肺转流心脏手术中肾动脉阻力指数（RI）与术后急性肾损伤（AKI）的相关性。
方法 选择择期行 CPB 心脏手术患者 44 例，男 21 例，女 23 例，年龄 18~80 岁，BMI 18.5~23.9 kg/m2，ASA Ⅰ—Ⅲ级。于麻醉诱导后 20 min（T1）、CPB 结束后 30 min（T2）经食管超声心动图（TEE）测量左肾动脉收缩期峰值流速（PSV）及舒张末期流速（EDV），计算得出左肾动脉 RI=(PSV-EDV)/PSV。根据 KDIGO 诊断标准判断 AKI 发生情况。根据是否发生 AKI 将患者分为两组：AKI 组和非 AKI 组。采用 Logistic 多因素回归分析预测心脏术后 AKI 的危险因素。
结果 16 例（36%）发生 AKI。与非 AKI 组比较，AKI 组 CPB 时间及主动脉阻断时间明显延长（$P<0.05$），T1、T2 时 RI 明显升高（$P<0.05$）。多因素分析显示，T2 时 RI 是 AKI 发生的独立危

险因素。T2 时 RI 预测心脏术后 AKI 的 AUC 为 0.893（95%CI 0.794~0.991，P<0.01），敏感性为 84.5%，特异性为 78.6%，临界值为 0.720。
结论 CPB 心脏手术中肾动脉 RI 是心脏术后 AKI 的独立危险因素，CPB 结束后 30 min 肾动脉 RI 大于 0.720 可作为心脏术后 AKI 的早期预测指标。

PU-1233

Effect of oxycodone combined with ultrasound-guided thoracic paravertebral nerve block on postoperative analgesia in patients undergoing thoracoscopic surgery for lung cancer: A prospective, randomised, blinded study

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Purpose: To determine the optimal dose of oxycodone for patient-controlled intravenous analgesia when combined with a paravertebral nerve block to achieve effective multimodal analgesia management in patients undergoing thoracoscopic lung cancer lobectomy.
Patients and methods: This prospective, single-centre, single-blind, randomised controlled trial enrolled 160 patients aged ≥ 60 years who underwent elective thoracoscopic lobectomy for lung cancer at the First Affiliated Hospital of Shandong First Medical University, Jinan City, Shandong Province, a tertiary university hospital in China, from April 7 to December 31, 2023. The study was registered with ClinicalTrials.gov (NCT05742256). Using a computer-generated table of random numbers, patients were randomly assigned into four groups based on the interventions used for postsurgical patient-controlled intravenous analgesia: the OCA group (oxycodone: 0.5 mg/kg), OCB group (oxycodone: 1.0 mg/kg), OCC group (oxycodone: 1.5 mg/kg), and control group (SF group; sufentanil: 2 μg/kg). Flurbiprofen (50 mg) and ondansetron (16 mg) were administered to all groups. The primary outcome was the pain score using a numeric rating scale (NRS) at rest and when coughing, 24 h after surgery.
Results When comparing the OCA group with the OCB, OCC, and SF groups, the NRS scores at rest were reduced, although the reduction was not statistically significant at 2, 4, 12, and 48 h. However, at 24 h, the NRS scores at rest in the SF group were significantly lower than those in the OCA group (P<0.05). The NRS scores when coughing were significantly lower in the OCB, OCC, and SF groups than in the OCA group (P<0.05). Furthermore, the scores at 24 h were significantly increased in the SF group compared with those in the OCB group.
Conclusion These findings suggest that 1.0 mg/kg of oxycodone was more effective than 2 μg/kg of sufentanil for postoperative analgesia.

PU-1234

Effect of thoracic paravertebral nerve block on the quality of recovery after throracoscopic lobectomy - a prospective double blind study

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Objective：Thoracoscopic lobectomy is a common surgical procedure and the most effective treatment for early and middle stage of lung cancer. Paravertebral nerve block (TPVB) has been

shown to have beneficial postoperative analgesic effects when used as a part of multimodal analgesia. The aim of this study was to determine whether TPVB improves postoperative recovery quality in patients undergoing thoracoscopic lobectomy. Evaluation of the effects of TPVB on postoperative pain, opioid consumption, and nausea and vomiting was the secondary objective.
Methods In this prospective double-blind study, 83 patients undergoing thoracoscopic lobectomy were randomised into one of two groups: a standard multimodal analgesic regimen in Group N (control) or an TPVB was performed in Group T. Preoperative and postoperative recovery quality was measured using the 40-item quality of recovery (QoR-40) questionnaire; postoperative pain was evaluated using the numerical rating scale scores.
Results Postoperative mean (standard deviation) QoR-40 scores were higher in Group T than in Group N， p<0.01.Compared with group N, the dosage of propofol and remifentanil intraoperatively, the incidence of postoperative nausea and vomiting were decreased (P < 0.05）. The total amount of tramadol consumed in the first 24 h was lower in Group T(P < 0.05）.
Conclusions TPVB improved postoperative quality of recovery in patients undergoing thoracoscopic lobectomy. Moreover, TPVB reduced pain scores and cumulative opioid consumption.

PU-1235

不同途径给予亚麻醉剂量艾司氯胺酮对胸腔镜下肺癌根治术患者 POFS 的影响

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目的 研究不同方式予以亚麻醉剂量艾司氯胺酮对胸腔镜肺癌根治术患者术后疲劳程度的影响。观察患者术后免疫炎症反应，不良反应发生情况，为改善胸腔镜术后恢复质量提供一定临床参考。
方法 选择 99 例择期行单孔胸腔镜下肺癌根治术的患者作为研究对象，随机数字法将其分为静脉注射组（SV 组）、神经阻滞组（SN 组）及对照组（N 组），各 33 例。SV 组以 0.25%罗哌卡因 20ml（2mg/kg）行改良肋间神经阻滞，阻滞完成后以 0.25mg/kg 艾司氯胺酮静脉注射；SN 组以 0.25%罗哌卡因和艾司氯胺酮（0.25mg/kg）配制成的混合溶液行改良肋间神经阻滞，静脉予以同等容量的生理盐水；N 组以 0.25%罗哌卡因 20ml 行改良肋间神经阻滞，静脉予以同等容量生理盐水。所有患者接受相同麻醉诱导方案：静脉注射依托咪酯 0.3mg/kg、舒芬太尼 0.5μg/kg、罗库溴铵 0.9mg/kg，BIS 值<60 后行双腔支气管插管，纤维支气管镜联合听诊器定位。机械通气控制呼吸，频率 10～16 次/分，吸呼比为 1:2，潮气量 8～10ml/kg,维持呼气末二氧化碳分压 30～45mmHg，术中气道压力≤2.94kPa（30cmH2O）。麻醉维持：使 1%七氟烷联合 2～3mg/（kg▪h）丙泊酚、4～6ug/（kg▪h）瑞芬太尼。诱导前 10 分钟开始泵注右美托咪定 0.5ug/kg，随后以 0.4ug/(kg▪h)泵注至手术结束前 30 分钟。期间 30～40 min 按 0.3 mg /kg 追加罗库溴铵，根据患者体质量、禁食禁饮时间及出血量常规进行补液，维持 BIS 值 40～60，必要时给予血管活性药维持生命体征稳定，血压、心率波动于基础值±20%以内。根据术中 PETCO2 调整呼吸参数，根据血气分析结果调整内环境。手术结束前 15 分钟停止吸入麻醉药，随后根据 BIS 值调整丙泊酚用量，手术结束前 5 分钟停止丙泊酚和瑞芬太尼。术后镇痛方案：舒芬太尼 1.0ug/kg+地佐辛 0.4mg/kg+托烷司琼 0.2mg/kg+右美托咪定 2ug/kg 至 100ml，输注速率为 2ml/h，单次给药 2ml/次，锁定时间为 15min。记录术中一般情况，包括手术时间、术中出血量及术中补液量。进行疲劳程度评估：术前 1 天（T1），术后 0h(T2)、12h（T3）、24h（T4）、48h（T5）进行视觉疲劳模拟评分（VAS）、疲劳量表（FS-14）、恢复质量量表（QoR-15）评估患者疲劳程度。以患者 T1 疲劳评估为基线、对比术毕苏醒后 T2、T3、T4、T5 疲劳程度差异；同时检测免疫炎症指标（CD4+、CD8+、IL1、IL6、IgG、C 反应蛋白，白细胞）；48h 内镇痛泵使用情况：补救镇痛总次数及第一次补救镇痛时间；记录麻醉不良反应：恶心、头晕、呕吐、嗜睡、视物模糊发生情况及患者术后住院时间。若术后 VAS 评分大

于 5 分，予以 1mg/kg 曲马多。
结果 ① EN 组手术后疲劳程度评分较 EV 组、N 组降低（P<0.05）；②与 EV 组、N 组相比，EN 组患者 IL-1、IL-6、C 反应蛋白、白细胞均下降（P<0.05），CD4+、CD8+升高（P<0.05）；③ EN 组术后 24h 补救镇痛次数较 EV 组、N 组明显降低（P<0.05）,首次补救发生时间明显延长（P<0.05）；④EN 组、EV 组术后不良反应发生情况和 N 组相当。
结论 艾司氯胺酮混合罗哌卡因辅助改良肋间肋间神经阻滞可缓解术后疲劳，提高患者术后恢复质量，且改善免疫炎症指标，不增加不良反应发生。

PU-1236

艾司氯氨酮联合竖脊肌平面阻滞在胸腔镜肺切除术后多模式镇痛的效果观察

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目的 探究艾司氯胺酮联合竖脊肌平面阻滞（erector spinae plane block，ESPB）用于胸腔镜肺切除术患者术后多模式镇痛的效果。
方法 选取 2022 年 12 月～2023 年 6 月到我院接受胸腔镜下单侧肺切除术的患者共 97 例，年龄 18～65 岁，BMI 18.5～28.0 kg/m2，ASA 分级Ⅱ或Ⅲ级。使用随机数字表法将患者随机分为艾司氯胺酮联合 ESPB 组（试验组，n=49)、ESPB 组（对照组，n=48）。两组患者均于麻醉诱导前行患侧竖脊肌平面阻滞。试验组患者在手术切皮前 5min 予以缓慢静脉注射艾司氯胺酮 0.2mg/kg，术中予以静脉泵注艾司氯胺酮 0.2mg·kg-1·h-1 直至缝合皮肤，对照组予以等容量生理盐水缓慢静脉注射、术中静脉泵注。两组患者均采用丙泊酚中/长链脂肪乳注射液 1.5～2.5mg/kg、枸橼酸舒芬太尼注射液 0.3μg/kg、罗库溴铵注射液 0.9mg/kg 静脉麻醉诱导，术中麻醉维持药物:七氟醚吸入调节其浓度，持续静脉泵注 0.1～0.3μg·kg-1·h-1 注射用瑞芬太尼。手术期间将血压和心率维持在基线 20%范围波动，维持 BIS 值在 40～60。所有患者均采用患者自控静脉镇痛（patient controlled intravenous analgesia，PCIA）进行术后镇痛。记录术中注射用瑞芬太尼用量，术后 24h(T5)患者 PCIA 按压次数和药物使用剂量、补救镇痛次数。记录患者转入麻醉后恢复室时(T1)、术后 2h(T2)、术后 6h(T3)、术后 12h(T4)、术后 24h(T5)、术后 48h(T6)静息和咳嗽时的疼痛数字评分（numerical rating scale，NRS）。记录患者术后镇痛满意度、不良事件发生情况。记录患者术前(T0)和术后 24h (T5) NK 细胞、CD4+T 细胞、CD8+T 细胞水平。术后 3 月、6 月电话随访并记录患者慢性术后疼痛发生情况、以及慢性疼痛对日常生活影响评级和处理措施评级情况。
结果 研究共纳入患者 97 例，试验组 49 例，对照组 48 例。两组患者一般资料比较差异无统计学意义（P＞0.05）。与对照组相比，试验组患者术中瑞芬太尼用量、术后 PCIA 按压次数和镇痛药物用量、补救镇痛次数明显降低（P＜0.05）。与对照组相比，两组患者在 T1、T2、T3 的静息和咳嗽 NRS 评分比较差异无统计学意义（P＞0.05），T4、T5、T6 静息和咳嗽 NRS 评分试验组较对照组明显降低（P＜0.05）。与对照组比较，试验组患者镇痛满意度明显高于对照组（P＜0.05）。两组患者苏醒期躁动、术后恶心呕吐发生率差异无统计学意义（P＞0.05）。两组患者均无严重不良事件发生。两组患者 T0 时刻 NK 细胞、CD4+T 细胞和 CD8+T 细胞水平比较差异无统计学意义（P＞0.05）。T5 时刻 NK 细胞、CD4+T 细胞、CD8+T 细胞水平试验组显著高于对照组，差异有统计学意义（P＜0.05）。试验组患者术后 3 月、6 月 NRS 评分均低于对照组（P＜0.05）。两组患者术后慢性疼痛发生率无明显差异（37.0% VS. 39.6%）（P＞0.05）；试验组患者术后慢性疼痛对日常生活影响评级和疼痛处理措施评级明显低于对照组（P＜0.05）。
结论 1.静脉应用艾司氯胺酮联合竖脊肌平面阻滞可提供良好的镇痛效果，且不增加术后不良反应，提高患者术后镇痛满意度。2.静脉应用艾司氯胺酮联合竖脊肌平面阻滞可调节患者术后细胞免疫功能。3.静脉应用艾司氯胺酮联合竖脊肌平面阻滞应用于胸腔镜肺切除术能有效改善患者术后慢性疼

痛程度，但并未降低术后慢性疼痛的发生率。

PU-1237

布比卡因脂质体超声引导下竖脊肌平面阻滞用于胸腔镜手术患者的临床观察

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目的 比较布比卡因脂质体和罗哌卡因行竖脊肌平面阻滞，应用于胸腔镜手术后的镇痛效果及镇痛时间

方法 选取胸腔镜下肺叶切除术的患者 60 例，ASAⅠ~Ⅲ级；年龄 18~75 岁，BMI 小于 30kg/m2，随机分为布比卡因脂质体组（LB 组）和罗哌卡因组（LP 组），每组 30 例。两组患者均在侧卧位下行超声引导下竖脊肌平面阻滞，LB 组采用布比卡因脂质体 266mg 配伍生理盐水共 30ml，LP 组则采用 0.4%罗哌卡因 30ml，单次阻滞不置管。两组术后均采用 PCIA 标准体重配制舒芬太尼镇痛，不设置背景剂量，记录术后疼痛评分变化，最早 PCA 时间，按压次数及补救镇痛次数；记录有无相关并发症发生。

结果 LB 组与 LP 组相比，在早期的镇痛评分相似，与 LP 组相比，LB 组的最早 PCA 时间要明显晚于 LP 组，LB 组 6 小时后 PCA 按压次数及其他镇痛药物补救次数明显低于 LP 组；LB 组术后 72h 内并发症发生率明显低于 LP 组。

结论 布比卡因脂质体行超声引导下竖脊肌平面阻滞，可安全有效的应用于胸科手术术后镇痛，相较于临床常用的罗哌卡因，可提供更长时间的镇痛效果。

PU-1238

远隔缺血预处理对全主动脉弓置换术后 90 天患者肾脏预后的影响

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目的 本课题组前期的随机对照试验中，评估了远隔缺血预处理（remoteischemicpreconditioning，RIPC）对 130 例（每组 65 例）接受全主动脉弓置换术的患者术后 7 天内发生急性肾损伤（acutekidneyinjury，AKI）的影响。RIPC 组发生术后 AKI 的患者明显少于对照组，并且 RIPC 显著降低了严重 AKI（II-III 级）的发生率。然而，尚不清楚 RIPC 对行全主动脉弓置换术患者长期预后的影响。

方法 本研究为先前临床试验的事后分析。评估 RIPC 对接受全主动脉弓置换术的 患者术后 90 天内发生主要肾脏不良事件（major adverse kidney events，MAKE）的影响，该终点定义为持续肾功能不全，接受肾脏替代治疗和死亡的复合终点。在术后 90 天的随访中，130 例患者的数据均可用。

结果 结果显示，RIPC 未改善接受全主动脉弓置换术的患者术后 90 天 MAKE 的发生率（RIPC 组：10.8%，对照组：23.1%:P=0.061）。但是对于两组术后发生 AKI 的患者，在术后 90 天内 MAKE 发生 率有所不同（RIPC:11.2%，对照组：29.2%:P=0.046）。

结论 随访接受全主动脉弓置换术后 90 天的患者，本研究发现，与对照组相比，RIPC 对患者的肾脏保护作用无显著差异。

而 RIPC 对全主动脉弓置换术后 AKI 的影响尚需大型随机对照试验进一步研究。

PU-1239

Global burden of ischemic heart disease in COVID-19 pandemic years: a systematic analysis for the Global Burden of Disease Study 2021

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Abstract

Background Ischemic heart disease (IHD) is a leading cause of death worldwide, however, adequate estimates in COVID-19 pandemic years are scarce. To address this gap, we examined the global, regional, and national changes in the burden of IHD and their associated risks from 1990 to 2019, and 2019 to 2021.

Methods In this systematic analysis based on the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021, we report the age-standardized rate of prevalence (ASRP), incidence (ASRI), mortality (ASRM) and age-standardized disability-adjusted life-years (ASRD) of IHD, as well as the corresponding estimated annual percentage changes (EAPCs), and risk factors for IHD in 204 countries and territories. We further analysed the trends according to age, sex, and sociodemographic index (SDI).

Results A total of 254,276,268 cases (145,307,703 male [57.15%]) were included in the analysis. In 2021, there were 31,872,778 incident cases of IHD worldwide. Cases of IHD increased by 101.55% (95% uncertainty interval [UI], 98.87%-104.39%) from 1990 to 2021, and increased 4.61% (95% uncertainty interval [UI], 0.88%-8.37%) from 2019 to 2021. Over 3 decades, significant decreases in ASRP, ASRI, ASRM and ASRD were observed for IHD globally. However, the ASRP of IHD showed an increased trend from 2019 to 2021, raising from 2905.86 to 2946.38 per 100,000 population (EAPCs, 0.70; 95% CI, 0.70-4.13). Meanwhile, the EAPCs of ASRI increased from -0.46 to -0.15, the EAPCs of ASRM expanded from -1.30 to -0.99, and the EAPCs of ASRD of raised from -1.20 to -0.87. Regionally, North Africa and Middle East had the highest ASRP and ASRI for IHD in 2021, and Central Asia had the highest ASRM and ASRD, while the low-middle SDI countries had the largest increase in ASRP, ASRI, ASRM and ASRD of IHD. Among 204 countries, Kuwait and United Arab Emirates had the highest national ASRP of IHD in 2021; Uzbekistan and Syrian Arab Republic had the highest national ASRI; Nauru and Ukraine had the highest ASRM; Vanuatu and Egypt had the highest ASRD. Males accounted for 56.35% of the incidence IHD cases in 2021. The proportional of disability-adjusted life-years contribution to the risk factors varied across regions, with higher proportions of High systolic blood pressure in countries with a higher SDI and higher proportions of Dietary risks in countries with a low SDI.

Conclusions Global IHD pose an increasing global health challenge in COVID-19 pandemic years. Results of this study suggest that the ASRP, ASRI, ASRM and ASRD of IHD were decreased slower from 2019 to 2021, especially in 65-69 age group and low-middle SDI regions. These findings provide helpful insights into the global distribution and discrepancies in the disease burden, as well as support for IHD control planning efforts and appropriate steps by global health authorities.

PU-1240

心脏瓣膜置换术后认知功能障碍的血清蛋白质组学研究:一项前瞻性观察研究

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目的 围手术期神经认知障碍（Perioperative Neurocognitive Disorders，PND）的发生率相当高，特别是在心脏手术后，但其潜在机制仍不明确。本研究旨在通过前瞻性观察研究，探讨心脏瓣膜置换术后 PND 患者血清蛋白质组学的差异。
方法 本研究纳入了 226 名接受心脏瓣膜手术的患者。根据评分，将他们分为非 PND 组（non-P 组）和 PND 组（P'组）。我们分析了与 PND 相关的危险因素，并通过倾向性评分匹配（Propensity Score Matching，PSM）方法将这些患者进一步分为 C 组和 P 组，以利用血清蛋白质组学研究方法探讨与 PND 相关的血清蛋白质。
结果 术后 6 周内 PND 的发生率为 16.8%。本研究中 PND 的危险因素：年龄、慢性疾病、舒芬太尼剂量和心肺转流时长。通过蛋白质组学分析，我们发现了 31 种下调蛋白质和 6 种上调蛋白质，最终确定 GSTO1、IDH1、CAT 和 PFN1 与 PND 相关。
结论 PND 的发生可能会影响某些氧化应激蛋白。本研究为未来关于全身麻醉和手术相关的 PND 研究提供了数据支持。

PU-1241

Cardioprotection effect with sevoflurane only provides limited clinical value during off-pump coronary artery Surgery:A retrospective study

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目的 Effects of sevoflurane and propofol anesthesia on cardioprotectiveand postoperative recovery were compared in patients with off-pump coronary bypass surgery
方法 Preoperative and postoperative myocardial enzymes,other blood biochemical indexes and clinical outcome were retrospectively analyzed.
结果 Compared with the propofol group,paek serum concentration of troponin I(1.19±2.68ng/mL vs 0.24±0.52ng/mL,p=0.018) and brain natri-retic peptide(713.19±849.31pg/dL vs 403.78±237.23pg/dL,p=0.017) were significantly lower in sevoflurane group,postoperative clinical outcome
was not significantly different between the two groups.
结论 Sevoflurane was used for anesthesia maintenance can reduce the serum level of cTnI and BNP after off-pump coronary bypass surgery,values of clinical outcome are limited.

PU-1242

Soluble Transferrin Receptor Is Associated with Red Blood Cell Transfusion in Infant Cardiac Surgery

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Abstract
Background Iron deficiency (ID) is linked to an increased need for perioperative red blood cell (RBC) transfusion in cardiac surgery. However, the relationship between sTfR level and the need for a high volume of RBC transfusion in pediatric cardiac surgery patients has not been explored.
Methods From August 2021 to July 2022, 236 low-weight infants (≤10 kg) who underwent cardiac surgery were included in this study. Preoperative sTfR levels and the volume of RBCs perioperatively transfused were recorded. Receiver operating characteristic (ROC) curve analysis and a multivariable logistic model were used to explore the association between sTfR levels and the need for a high-volume of RBC transfusion in this study.
Results In our study, 29 (12.2%) patients received more than 2 units during the perioperative period. sTfR level was the most accurate marker for predicting the need for RBC transfusion (AUC=0.643, 95% CI = 0.53-0.76). Moreover, in both the continuous and categorical variable-adjusted models, a high sTfR level was associated with a greater need for RBC transfusion (P=0.006; P<0.001).
Conclusions RBC transfusion is common for low-weight infants undergoing cardiac surgery. Furthermore, a high preoperative sTfR level is associated with the need for a high-volume perioperative RBC transfusion.

PU-1243

盐酸戊乙奎醚对胸腔镜下肺叶部分切除术患者的影响

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目的 通过收集 18～70 岁拟行胸腔镜下肺叶部分切除术患者 80 例进行分析观察盐酸戊乙奎醚对单肺通气肺损伤的影响。
方法 选择我院 18～70 岁拟行胸腔镜肺部手术患者 80 例。按照纳入排除标准严格筛选病例，记录相关病例信息。分别于术前和术后第一日留取患者血液样本，进行离心，提取血清，-80℃深低温保存以备后期分析，统计两组白细胞介素-6（IL-6）和中性粒细胞细胞弹性蛋白酶（NE）的含量。并记录患者术后不良反应及平均住院日
结果 1、两组患者术前 IL-6 及 NE 水平没有差异，不具有统计学意义；术后不良事件发生率差别无统计学意（P>0.05）。
2、试验组给与盐酸戊乙奎醚（1mg）处理后较对照组相比，IL-6 的水平及 NE 的水平低于对照组，差异有统计学意义（P <0.05）。
3、给予盐酸戊乙奎醚处理后可有效缩短患者的住院时间，其差异具有统计学意义（P<0.05）。
结论 盐酸戊乙奎醚可有效降低胸腔镜下肺叶部分切除术患者体内炎性因子水平，缩短患者平均住院时间且无明显毒副作用，利于患者预后，盐酸戊乙奎醚可安全用于此类患者的肺保护。

PU-1244

Small bowel necrosis leading to short bowel syndrome in a patient post-heart transplant

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SUMMARYP atients undergoing heart transplant may experience gastrointestinal infections, which can, in severe cases, lead to rare complications such as bowel obstruction. If not treated promptly, these infections can progress to bowel necrosis. Extensive necrosis of the small bowel, complicated with septic shock, requiring extensive resection, can result in short bowel syndrome, impairing nutrient absorption, leading to unstable hemodynamics and potentially threatening the patient's life. This case highlighted the importance of early recognition of symptoms and signs of bowel obstruction and septic shock; and comprehensive laboratory testing, strict assessment of surgical indications, elimination of precipitating factors, infection control, and maintenance of hemodynamic stability (such as monitoring cardiac output and peripheral vascular resistance) were crucial.
BACKGROUND Monitoring and managing hemodynamics are essential during general anesthesia to ensure adequate tissue and organ perfusion in patients after heart transplant (HT), especially in those with septic shock. Maintaining blood pressure (BP) and heart rate (HR) within ± 20% of the baseline level is generally recommended. However, this may be challenging in serious situations. Critically ill patients require advanced hemodynamic monitoring. We selected PulsioFlex to dynamically monitor the hemodynamic status since the Swan-Ganz catheter had been removed before the patient returned to the general ward. Short bowel syndrome (SBS) involves loss of the small intestine from congenital disabilities, surgical resection, or other situations. Intestinal obstruction, septic shock, and poor hemodynamics might put patients in life-threatening situations. Therefore, prompt surgical intervention and anesthesia management were challenging. This article reports a case of small intestine necrosis and septic shock in a patient who underwent an emergency small intestine resection after HT and was then diagnosed with SBS.OUTCOME AND **FOLLOW-UP** He survived after HT, returning to daily life accompanied with SBS and jejunostomy, during which he witnessed his son's marriage and the birth of his grandchildren. His last visit to our institution occurred on March, 2023, during which a cardiac ultrasound showed a LVEF of 56%. We conducted a telephone follow-up, and he survived for 19 months until passed away due to multiple organ failure caused by COVID-19.
CONCLUSION When encountering similar patients, limited resources and methods should be used to monitor and maintain the hemodynamic parameters within a proper range. This indicates that a high cardiac output (12.3 L/min) and low systemic vascular resistance (240 Dyn·s·cm^{-5}) can ensure adequate blood oxygen supply for the vital organs.

PU-1245

可视软镜引导硅胶型双腔管在肥胖患者双腔管插管中的应用

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目的 观察可视软镜引导预热 PVC 型和硅胶型双腔管在肥胖患者双腔管插管中的效果。
方法 选取我院择期胸外科单肺通气手术患者 79 例，BMI >24 kg/m2，男 36 例女 43 例，年龄 25~64 岁，ASA I-III 级。采用随机数字表法将患者分为 PVC 型组（PH 组，n=39）和硅胶型组（SD 组，n=40）。PH 组采用 PVC 型双腔管，使用前将双腔管放置于 50°恒温箱中预热 20min；SD 组采用硅胶型双腔管，放置于常温中，两组均选择左侧型双腔管。记录可视软镜显露声门时间、气管插管

时间，双腔管置管次数、置管阻力分级、支气管错位率、可视喉镜使用率；记录气道损伤、术后咽喉疼痛、声音嘶哑等并发症情况。
结果 SD 组气管插管时间明显短于 PH 组，双腔管置管次数明显少于 PH 组，置管阻力明显小于 PH 组，可视喉镜使用率明显低于 PH 组。SD 组术后咽喉部疼痛和疼痛评分、声音嘶哑、气道损伤、总并发症发生率均明显优于 PH 组。
结论 肥胖患者采用可视软镜引导预热 PVC 型双腔管和硅胶型双腔管均是安全、有效的双腔管插管方法；使用硅胶型双腔管气管插管时间更短、置管次数更少、阻力更小，气道损伤和术后并发症发生率更低。

PU-1246

经导管主动脉瓣置入术的全身麻醉管理进展

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目的 经导管主动脉瓣置入术（Transcatheter Aortic Valve Implantation，TAVI）已成为不耐受开胸手术患者，严重主动脉瓣狭窄或返流的替代治疗方法。接受 TAVI 手术的患者，常由于高龄、心功能差、合并症较多，其麻醉方案的制定、术中管理、并发症的处理以及与外科医生的配合尤为关键。本文通过搜集相关文献，并结合本中心临床经验，对实施 TAVI 手术的患者术前评估、麻醉管理以及行 TAVI 术中和术后监测和管理作一综述，以期对 TAVI 的麻醉管理提供参考。
方法 本文对以下数据库的中英文文献进行了系统检索，包括:万方数据、CNKI、PubMed、Embase、Cochrane Library、Web of Science。英文检索词包括："Transcatheter aortic valve replacement"、"TAVR"、"Transcatheter aortic valve implantation"、"TAVI"、"Anesthetic Advances"、"Anesthetic management"、"General Anesthesia"、"Anesthesia Techniques"、"complication"；中文检索词包括："经导管主动脉瓣置换/植入术"、"麻醉进展"、"麻醉管理"、"全身麻醉"、"麻醉技术"、"并发症"。本文通过总结以往的文献，结合本中心的经验，对实施 TAVI 手术的患者术前评估、麻醉管理、并发症的预防和处理进行综述。
结果 接受 TAVI 手术的患者常合并有其他器官、系统性疾病，这些合并症会明显增加手术和麻醉的风险。因此，术前须对患者的全身情况进行全面评估。术中严密监护，对突发情况及时处理。与其他麻醉方式相比，全身麻醉并不增加 TAVI 患者的远期死亡率。且 TAVI 患者施行全身麻醉能适应各种手术需求，便于使用高级监测设备如 TEE，快速应对术中紧急情况，提供稳定的血流动力学控制，降低特定患者并发症风险；减少患者的记忆负担，确保患者在整个手术过程中的舒适与稳定；以及便于术后管理，从而提高手术效率和患者安全。
结论 TAVI 已成为治疗严重症状性主动脉瓣狭窄及单纯主动脉瓣反流的有效方法，全身麻醉可以安全应用于 TAVI 患者。参与 TAVI 的麻醉医师应该充分了解瓣膜性心脏病的病理生理学、超声心动图诊断、血流动力学管理、TAVI 的并发症和处理方法，以及手术程序和围手术期管理，为患者的生命安全保驾护航。

PU-1247

急性左心衰肺水肿的研究进展

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目的 从临床、麻醉、手术和重症监护进行多角度讨论急性心源性肺水肿患者的综合管理策略。

方法 对目前国内外关于急性左心衰的流行病学特征、分类以及诊断治疗进展进行综合概述，对最新的诊断措施及治疗方法进行研究并结合各国心力衰竭指南
结果 更好的指导临床实践，为急性左心衰及急性肺水肿的临床管理提供更好的临床视角
结论 形成急性心源性肺水肿患者的综合管理策略

PU-1248

超声引导下竖脊肌平面阻滞可以提高视频辅助胸外科患者术后恢复质量:一项随机对照试验

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目的 视频胸腔镜手术是目前世界范围内进行胸外科手术最常用的微创手术技术之一，在大多数医疗机构中被认为是肺癌的首选切除方法。与传统开胸手术相比，视频胸腔镜手术创伤更小，住院时间更短，身体功能恢复更好。然而，中度至重度急性疼痛在视频胸腔镜手术患者中更为常见，同时术后慢性疼痛的发生率也很高。本研究的目的是探讨超声引导下竖脊肌平面阻滞和胸椎旁神经阻滞对视频辅助胸外科手术患者术后恢复质量的影响。
方法 我们招募了福建省肿瘤医院在视频胸腔镜下行肺切除手术的 129 例患者，随机分为 3 组:竖脊肌平面阻滞组和胸椎旁神经阻滞组采用超声引导下的神经阻滞，对照组仅采用多模式镇痛方案。主要结局指标为术后 24 小时恢复质量-15 评分。次要结局指标包括静息和咳嗽时的视觉模拟评分、术中瑞芬太尼剂量、术后患者自控静脉自控按压次数、不良反应发生率和视频胸腔镜手术后一年内的术后慢性疼痛。
结果 竖脊肌平面阻滞组和胸椎旁神经阻滞组术后 24 h 恢复质量-15 评分明显高于对照组。竖脊肌平面阻滞组和胸椎旁神经阻滞组术后 7 h 内静态(静止)和动态(咳嗽)视觉模拟评分评分、术中瑞芬太尼用量、术后 PCI 自控按压次数均显著低于对照组(P<0.001)。竖脊肌平面阻滞组和胸椎旁神经阻滞组恶心、呕吐、头晕发生率低于对照组(P<0.05)，其他不良反应及术后慢性疼痛三组间差异无统计学意义。
结论 超声引导下的竖脊肌平面阻滞可能是一种很有前途的区域麻醉形式，有助于视频胸腔镜手术后患者的恢复，类似于胸椎旁神经阻滞。

PU-1249

Dexmedetomidine and dexamethasone as adjuvants to local anesthetic mixture in rhomboid intercostal and sub-serratus block for video-assisted thoracoscopic surgery: a randomized, double-blind, controlled trial

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Background The utilization of adjuvants such as dexamethasone and dexmedetomidine in combination with local anesthetics has proven effective in extending analgesia duration. We aimed to investigate the potential efficacy of combining dexmedetomidine and dexamethasone in rhomboid intercostal and sub-serratus (RISS) block for prolonging postoperative analgesia in patients undergoing video-assisted thoracoscopic surgery (VATS).

Methods We did this randomized, double-blind, controlled trial in two tertiary-care hospitals. A total of eighty patients undergoing VATS under general anesthesia were enrolled in this study. They were randomly assigned into four groups: ropivacaine (R) group, ropivacaine + dexmedetomidine (RM) group, ropivacaine + dexamethasone (RS) group, or ropivacaine + dexmedetomidine + dexamethasone (RSM) group. The primary outcome measure was the duration of analgesia. Secondary outcomes included Numeric Rating Scale (NRS) scores, cumulative oxycodone consumption and adverse effects.
Results The RSM group exhibited a significantly prolonged duration of analgesia at 1073.5 min (932.0-1283.3) compared to the R group with a duration of 154.5 min (80.5-199.3) and the RS group with a duration of 282.0 min (195.3-350.0, $P < 0.001$). The cumulative oxycodone consumption during the 0-12 hours and 0-24-hours period was significantly reduced in the RSM group compared to the R group ($P < 0.05$). There was also a lower incidence of nausea at 48 hours postoperatively in the RSM group compared to the RM group. However, there were no significant differences between the four groups regarding NRS pain scores.
Conclusion The combination of ropivacaine, dexmedetomidine, and dexamethasone in RISS block significantly prolongs the duration of postoperative analgesia following VATS.

PU-1250

Factors Impacting High-Sensitivity Cardiac Troponin T Excessive Elevation After Open-Heart Surgery: A Retrospective Analysis

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Background:：High sensitivity cardiac troponin T (Hs-cTnT) testing has been recommended as a central part of clinical decision algorithms and used to assess prognosis by most contemporary consensus statements. However, in the context of cardiac surgery, postoperative cardiac troponin T levels are considerably higher than the criteria for perioperative myocardial infarction (type 5 MI). In addition, the value of postoperative hs-cTnT predicting perioperative adverse cardiovascular events or the short- and long-term prognosis remains controversial. It's necessary to investigate the risk factors associated with excessive elevation of hs-cTnT after cardiac surgery to understand the significance of cardiac troponin release for perioperative myocardial injury or infarction and predicting prognosis, as well as the potential cardiac troponin release mechanisms.
The aim of this study was to identify the independent risk factors for significantly elevated hs-cTnT on the first day after open-heart surgery.
Methods：We reviewed clinical data from 523 patients who underwent open-heart surgery between May 2018 and February 2021, all performed by a group of tertiary cardiac surgeons.
The variables to be analyzed was based on domestic and international literatures on myocardial damage and cardiac troponin. Patient characteristics were age, gender, body mass index (BMI), history of hypertension and diabetes mellitus, preoperative serum levels of N-terminal pro-brain natriuretic peptide (NT-proBNP), and preoperative echocardiography measurements including left ventricular ejection fraction (LVEF) and left ventricular end-diastolic diameter (LVEDD). Postinduction hypotension was defined as systolic blood pressure <90 mm Hg or mean arterial blood pressure <55 mm Hg with a duration of ≥5 minutes within the first 20 minutes of anesthesia. Anesthesia regimen included total intravenous anesthesia, combined intravenous/inhalation anesthesia, and inhalation anesthesia. Operation-related factors included the frequency and total volume of cardioplegia solution, the duration of ascending aorta cross-clamp, CPB, and the operation. The types of surgeries were categorized as follows: ventricular septal defect repair, atrial septal defect repair, aortic valve replacement (AVR), ascending aortic replacement, mitral valve replacement (MVR), mitral valvuloplasty (MVP), ventriculostomy including left ventricular outflow

tract dredging, right ventricular outflow tract dredging or ventricular aneurysm resection, concurrent CABG, and concurrent atrial RF ablation.
Univariate and multivariate analysis were performed to identify the factors influencing high-sensitivity cardiac troponin T ≥1500 ng/L on the first postoperative day.
Results： According to the inclusion exclusion criteria, We retrospectively analyzed the data of 206 patients from May 2018 to January 2021.
All operations were performed under endotracheal intubation, general anesthesia, and mild or moderate hypothermia cardiopulmonary bypass (CPB). The anesthesia plan was carried out at the discretion of the anesthesiologist and perfusionist. Anesthesia was maintained by continuous infusion of propofol (total intravenous anesthesia) or a continuous infusion of propofol in conjunction with sevoflurane inhalation (concomitant intravenous/inhalation anesthesia) or inhalation of sevoflurane throughout the procedure, including CPB (inhalation anesthesia). CPB was established through ascending aorta cannulation, superior and inferior vena cava cannulation or right auricular insertion. After ascending aorta cross-clamp, modified St. Thomas (every 30 minutes) or del Nido cardioplegia solution (every 90 minutes) was intermittently anterogradely infused through the aortic root or coronary artery ostia. Patients with atrial fibrillation (AF) received radiofrequency (RF) ablation, and the ablation route was based on the maze III procedure. Hs-cTnT concentrations were routinely tested in the CSICU about 16-24 hours after surgery using the fourth generation hs-cTnT assay.
The hs-cTnT levels in all patients was above 14ng/L on the first postoperative day. The distribution of postoperative hs-cTnT level ranged from 135 to 10000 ng/L with a median of 617 ng/L (interquartile range, 388-1,548 ng/L). In addition, 205 (99.5%) patients had the Hs-cTnT levels over 140ng/L (>10 URL), 75 (36.4%) were over 980ng/L (>70 URL), and 58 (28.2%) were over 1400ng/L (≥100 URL).
High preoperative N-terminal pro-brain natriuretic peptide (odds ratio = 1.330, 95% confidence interval: 1.012 - 1.747), total intravenous anesthesia (odds ratio = 12.232, 95% confidence interval: 2.046 - 73.12), prolonged cardiopulmonary bypass time (odds ratio = 2.008, 95% confidence interval: 1.460 - 2.762]), and concomitant atrial radiofrequency ablation (odds ratio = 72.566, 95% confidence interval: 21.498 - 244.945) were identified as independent risk factors for postoperative cardiac troponin T ≥1500 ng/L. The effect of each identified factor on hs-cTnT≥1500 ng/L can be obtained by constructing a nomogram and the area under curve of predicting model was 0.943 (0.903, 0.984). In this nomogram , Preoperative NT-proBNP and total intravenous anesthesia contributed up to 15 points and 30 points respectively. Moreover, CPB duration exceeding 3 hours could accumulate up to 50 points as did the concurrent atrial RF ablation procedure.
Conclusion We determined high preoperative N-terminal pro-brain natriuretic peptide, total intravenous anesthesia (compared with volatile anesthesia), prolonged cardiopulmonary bypass, and concomitant atrial radiofrequency ablation as the independent risk factors for excessive elevation of cardiac troponin T after open-heart surgery. Importantly, concurrent atrial RF ablation and CPB duration longer than 3 hours are the two primary risk factors for excessive release of hs-cTnT on the first day after open-heart surgery.

PU-1251

右美托咪定对糖尿病心肌缺血再灌注损伤的保护作用：一项回顾性研究

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目的 探讨右美托咪定对糖尿病患者在体外循环下行冠状动脉搭桥手术的心肌缺血再灌注损伤的保护作用。

方法 本研究纳入 2018 年 3 月 1 日至 2023 年 12 月 31 日于吉林大学第一医院行体外循环下冠脉搭桥手术的 634 名糖尿病患者。本研究是一篇回顾性队列研究，通过医院海泰系统和电子麻醉记录单收集记录所需要的患者信息和数据。根据术中是否使用右美托咪定将糖尿病患者分为两组，DEX 组为使用右美托咪定，非 DEX 组为未使用右美托咪定。记录术前（T0）、术后第一天（T1）、第二天（T2）和第三天（T3）的 cTnI、住院病死率、术后 30 天病死率及术后 30 天再住院率。回顾对比两组患者的基线特征和临床结局。使用倾向性评分匹配法平衡两组间的基线差异，采用 Kaplan-Meier 绘制生存曲线，用来评估 30 天病死率。使用 COX 比例风险模型评估不同变量对预后的影响，以风险函数值比值，即风险比及其 95%置信区间表示。

结果 DEX 组在 T1、T3 时间点的肌钙蛋白高于非 DEX 组（P<0.05）。两组在 T0、T2 时间点肌钙蛋白无显著差异（P>0.05）。两组 T1-T3 时间点肌钙蛋白较 T0 时间点明显升高（P<0.05）。与 T1 时间点比较，DEX 组和非 DEX 组 T2 时间点肌钙蛋白明显升高（P<0.05），T3 时间点肌钙蛋白差异无统计学意义（P>0.05）。两组 T3 时间点肌钙蛋白显著低于 T2 时间点（P<0.05）。本研究共纳入 634 例患者，其中 DEX 组 346 例，非 DEX 组 288 例。倾向性评分匹配后纳入 123 对患者。在使用倾向性评分匹配法调整基线危险因素的差异后，两组在住院病死率（2.44% vs.4.07%，P=0.719）、30 天病死率（3.25% vs.4.07%，P=1.000）和 30 天再住院率（0.81% vs.4.07%，P=0.213）之间无统计学差异。与非 DEX 组相比，DEX 组住院时间更长（P<0.05），差异具有统计学意义。两组 ICU 住院时间和术后并发症无统计学差异。Kaplan-Meier 生存图显示 DEX 组对术后 30 天生存率没有显著影响（P>0.05）。DEX 是降低术后 30 天病死率的保护因素。术前低 EF、高肌酐水平和体外循环时间被证实与 30 天病死率增加相关。

结论 DEX 是降低术后 30 天病死率的保护因素。但 DEX 不能降低行 CABG 的糖尿病患者住院病死率和 30 天病死率。DEX 组患者的住院时间更长。此外，术前低 EF、高肌酐水平和体外循环时间可能与 30 天病死率增加相关。

PU-1252

经股动脉导管主动脉瓣植入术操作过程中的脑氧饱和度可作为有潜在恢复风险的高危患者的筛查工具

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背景 脑氧饱和度（Cerebral oxygen saturation ,ScO_2）可通过近红外光谱（Near-infrared spectroscopy ,NIRS）无创测量，反映大脑灌注。ScO_2 下降与脑缺血相关，增加围术期并发症。在经股动脉导管主动脉瓣植入术（transfemoral transcatheter aortic valve implantation ,TAVI）期间需要快速心室起搏，心室率可达 180 次/分，对血流动力学影响巨大。

目的 在该单中心观察性研究中，我们描述了机械通气患者 TAVI 过程中 ScO_2 的动力学波动及其对患者预后的影响。

方法 在经股动脉 TAVI 期间，对 60 例全身麻醉机械通气的患者通过 NIRS 连续测量 ScO_2。其中男性占比 52.6%，平均年龄为 75 岁。在整个手术过程中我们将 ScO_2 分为 6 个部分，分别为：不吸氧状态下 ScO_2 基础值[T0，59.296%(55.825%, 61.177%)]、麻醉诱导后 ScO_2 均值[T1，60.962%(3.7)]、TAVI 操作前 ScO_2 均值[T2，57.973%(4.578)]、TAVI 操作过程中 ScO2 最小值[T3，52.077%(49.485,7.077)]、TAVI 瓣膜释放平稳后 ScO_2 均值[T4，59.256%(4.886)]、气管导管拔出前 ScO2 均值[T5，59.021%(5.45)]。

结果 我们观察发现在快速心室起搏过程中，ScO_2 下降显著（T2，57.973% vs T3，52.077%，p＜0.001）。在瓣膜释放平稳后 ScO_2 能恢复至术前水平（59.256% vs 57.973%，p＞0.05）。术后所有患者都返回重症监护室（Intensive Care Unit,ICU），57.8%的患者在 ICU 观察一天即可转入普通病房。我们将患者按照 ICU 住院时间是否超过 1 天分为两组，研究发现 ICU 住院时间超过 1 天的

患者 TAVI 操作过程中 ScO_2 下降程度更大（56.316% vs 50.554%，p＜0.001）。除此之外，我们还发现 TAVI 瓣膜释放平稳后 ScO_2 水平在 ICU≤1 天的患者中更高（61.116vs57.928，p=0.012）。**结论** TAVI 操作过程 ScO_2 下降水平越低患者 ICU 住院时间越长。TAVI 瓣膜释放平稳后患者 ScO2 水平较低者应在 ICU 观察时间更长，有利于术后并发症的及早发现治疗。ScO_2 监测是一种易于实施的监测工具，有利于筛查 TAVI 术后有潜在恢复风险的高危患者。

PU-1253

Relationship between myostatin and complications and cognition in patients with lung cancer and sarcopenia

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Background The risk of surgery and postoperative complications increases greatly in frail elderly patients with sarcopenia. The purpose of this study is to explore the correlation between myostatin (MSTN) levels and cognitive function and postoperative pulmonary complications (PPCs) in elderly patients undergoing thoracoscopic lobectomy and to determine whether MSTN could be used to predict the risk of postoperative complications and cognitive impairment.
Methods A prospective observational study was conducted at the First Affiliated Hospital of Bengbu Medical University, China, between January 2023 and June 2023. The risk factors of PPCs and postoperative cognitive impairment were studied using backward stepwise logistic regression analysis. The independent factors were formed into a linear regression equation to construct a risk score model for each patient. The 122 patients who participated in the study were divided into two groups, a low-level group and a high-level group, based on an MSTN level cutoff; the preoperative MSTN cutoff values was 25.55 ng/mL for cognitive dysfunction and 22.29 ng/mL for PPCs. The PPCs and cognitive function of the groups were compared.
Results Preoperative MSTN was confirmed as a risk factor for postoperative cognitive dysfunction and PPCs. After surgery, the proportion of patients with cognitive impairment in the high-level group was significantly higher than in the low-level group ($P < 0.001$). In the high-level group, the incidence of respiratory tract infections was 17.9% higher ($P = 0.021$), hypoxaemia was 20.5% higher ($P = 0.001$) and respiratory failure was 14.4% higher ($P = 0.012$) than in the low-level group. In addition, a high-level of MSTN increased the length of hospital stay ($P < 0.001$) and decreased the Barthel Index score ($P < 0.001$).
Conclusions The study findings suggest that MSTN could be used as an index to predict complications and cognitive impairment after thoracoscopic lobectomy in elderly patients with sarcopenia and to provide evidence for reducing postoperative cognitive impairment and PPCs.

PU-1254

围手术期输注利多卡因对接受非心脏开胸手术患者心肌损伤的影响:一项随机、双盲、安慰剂对照试验

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目的 Myocardial injury after noncardiac surgery (MINS) is a leading cause of postoperative 30-day

mortality. Lidocaine has a cardioprotective effect that may reduce the incidence of MINS.
方法 This was a randomized, double-blind, placebo-controlled trial conducted at Shanghai Pulmonary Hospital. The participants were randomized into lidocaine and placebo groups in a 1:1 ratio. The primary outcome was myocardial injury, defined as serum high-sensitivity troponin T (hsTnT) concentration ≥ 14 ng/L within 2 days after surgery. Secondary outcomes included (1) the concentrations of hs-TnT, NT-proBNP, CK-MB, and myoglobin on the first and second days after surgery; (2) the concentration of hs-CRP and inflammatory factors on the first and second days after surgery; (3) total consumption of opioids during surgery; and (4) intraoperative hemodynamic parameters.
结果 Between June 29, 2021, and December 3, 2021, we enrolled 119 patients who underwent noncardiac thoracic surgery (mean age 59.41 years [SD 11.085], 58 [48.7%] male). MINS occurred in 14 (23.3%) of 60 paitients assigned to lidocaine, and 14 (23.7%) of 59 patients assigned to placebo (P=0.96). The level of IL-6 on the second day after operation was significantly reduced in the lidocaine group (46.51±33.60 pg/ml vs. 306.96±312.23 pg/ml; P=0.04). Univariate analysis identified a decreased risk of myocardial injury in patients aged < 65 years (OR 0.259; 95% CI 0.107-0.627; P=0.003).
结论 In patients undergoing noncardiac thoracic surgery, intravenous lidocaine did not significantly reduce the incidence of MINS but partially alleviated the inflammatory reaction.

PU-1255

罗哌卡因联合羟考酮用于椎旁神经阻滞的临床效果研究

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目的 探索罗哌卡因联合羟考酮用于椎旁神经阻滞的临床效果
方法 选择 2022 年 9 月至 2023 年 12 月在南昌大学第一附属医院接受胸腔镜下肺叶切除手术治疗的患者 112 例，使用随机数字表法把研究对象分为 4 组：空白对照组（C 组）、单纯罗哌卡因组（R 组）、单纯羟考酮组（O 组）、罗哌卡因联合羟考酮组（R+O 组）。比较四组患者术后 2H（T1)、6H(T2)、12H(T3)、24H(T4)、48H(T5)的 Ramsay 镇静评分、心率（HR）、平均动脉压（MAP）以及静息时和咳嗽时的 NRS 评分。记录麻醉诱导前(t0)、切皮前即刻(t1)、切皮后 5min(t2)、10min(t3)、15min(t4)、30min(t5)、60min(t6)时的 HR 和 MAP，记录术中麻醉药品的使用情况。比较四组患者术后 48 小时内氢吗啡酮的消耗量。
结果 1.R 组、R+O 组在 t2、t3、t4、t5、t6 的 HR 和 MAP 均低于 C 组（P＜0.05），O 组在 t5 和 t6 的 MAP 低于 C 组而高于 R 组、R+O 组（P＜0.05）。与 t1 时间点相比，C 组在 t2、t3、t4、t5、t6 时的 HR 和 MAP 均升高（P＜0.05），O 组在 t6 的 MAP 升高（P＜0.05）。R 组、R+O 组术中各时间点的 HR、MAP 与 t1 相比无统计学差异（P＞0.05）。
2.在 T1，T2 时，R 组、O 组、R+O 组的静息时及咳嗽时的 NRS 评分均低于 C 组（P＜0.05）；在 T3 时，R+O 组的静息时及咳嗽时的 NRS 评分均低于 C 组（P＜0.05）；在 T4 时，R+O 组咳嗽时的 NRS 评分低于 C 组、R 组和 O 组（P＜0.05）。
3. R 组、O 组、R+O 组术中的瑞芬太尼消耗量均低于 C 组（P＜0.05）；与 C 组相比，其余 3 组术后 48 小时内氢吗啡酮消耗量更少（P＜0.05），R+O 组氢吗啡酮消耗量少于 R 组、O 组（P＜0.05）；与 C 组相比，R 组、O 组、R+O 组术后 48 小时内补救镇痛次数更少（P＜0.05）。
结论 罗哌卡因联合羟考酮用于椎旁神经阻滞有利于维持术中血流动力学稳定，使镇痛持续时间延长，减少围手术期阿片类药物的消耗。

PU-1256

超声引导下肋间神经阻滞镇痛与静脉自控镇痛在胸腔镜肺叶切除术后镇痛效果比较

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目的 比较单一肋间神经阻滞镇痛、静脉自控镇痛以及肋间神经阻滞镇痛联合静脉自控镇痛方案对于胸腔镜肺叶切除手术后的镇痛效果
方法 选自 2024 年 1 月 1 日至 2024 年 5 月 1 日于南昌大学第一附属医院在双腔气管插管全身麻醉下行胸腔镜肺叶切除手术的患者 90 例作为研究对象。采用 随机数表法将患者分为 A 组、 B 组和 C 组三组，每组 30 例。A 组患者于手术关胸前予肋间神经阻滞镇痛，B 组患者于手术结束后予静脉自控镇痛，C 组患者于关胸前予肋间神经阻滞镇痛，术后予静脉自控镇痛。采用视觉模拟评分法（VAS）观察并记 录三组患者术后 6h、12h、24h、48h、72h 静息状态下 VAS 评分、术后住院天数及 不良反应（如恶心呕吐、皮肤瘙痒、呼吸抑制、尿潴留等）发生情况。
结果 术后不同时间点 VAS 评分差异显著（P＜0.05），不同分组不同时间点 VAS 评分差异显著（P＜0.05）。术后 6h、12h、24h、48h、72h，A 组患者的静息 VAS 评分与 B 组患者的静息 VAS 评分比较均无统计学意义（P＞0.05）。术后 6h、12h、 24h A 组患者的静息 VAS 评分与 C 组患者的静息 VAS 评分比较无统计学意义（P＞ 0.05）。术后 48h、72h，A 组患者的静息 VAS 评分均显著高于 C 组患者的静息 VAS 评分，差异有统计学意义（P＜0.05）。术后 6h、12h、24h B 组患者的静息 VAS 评分与 C 组患者的静息 VAS 评分比较无统计学意义（P＞0.05）。术后 48h、72h， B 组患者的静息 VAS 评分显著高于 C 组患者的静息 VAS 评分，差异有统计学意义 （P＜0.05）。三组患者术后住院时间组间比较 P＞0.05，差异无统计学意义。以 患者术后 VATS 评分≤3 分判定为镇痛效果满意，术后 24h A 组的满意度显著低于 B 组、C 组（P=0.000＜0.05)，余组别在不同时间点满意度比较未见明显差异（P ＞0.05）。三组患者术后恶心呕吐发生率 A 组 8.1%、B 组 12.9%、C 组 9.7%，差 异无统计学意义（P＞0.05），余未见皮肤瘙痒、呼吸抑制、尿潴留等不良反应发生
结论 胸腔镜肺叶切除手术患者术后联合使用肋间神经阻镇痛与静脉自控镇痛较单用肋间神经阻滞镇痛或静脉自控镇痛有更好的镇痛效果，患者满意度好，能够减少阿片类药物使用量，有利于加速患者胸腔镜肺部手术后的快速康复 , 更利于在临床实践中应用。

PU-1257

Development of a Predictive Risk Model for Intraoperative Acquired Pressure Injury

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Aims: Intraoperative acquired pressure injury (IAPI) is related to surgical operation, which has a significant impact on patients' physical health and postoperative rehabilitation. Not only does it cause pain and discomfort to patients, it can also lead to serious complications, prolong hospital stays, increase medical costs, and affect patients' quality of life. The survey showed that the

incidence of intraoperative pressure in patients with cardiovascular surgery was as high as 29.1%, and such patients should be taken as the key population for prevention. The aims of this study are to understand the influencing factors of intraoperative acquired pressure injury and establish a reliable risk prediction model for promoting the implementation of preventive measures.

Methods：This study employed electronic medical records from a tertiary hospital in Jiangsu Province, encompassing comprehensive information of patients from admission to discharge, including demographic characteristics, surgical information, anesthesia records, intraoperative vital signs, laboratory examinations, and diagnoses. Data preprocessing included addressing missing values using multiple imputation with predictive mean matching via the R 'mice' package, identifying outliers through the interquartile range (IQR) method and handling them by nearest replacement, and standardizing numerical data using Z-score normalization. Selection criteria included age >18, general anesthesia, surgery duration ≥2 hours, clear consciousness, and voluntary participation. Exclusion criteria included pre-existing pressure injuries and relevant skin diseases. Feature selection was performed using machine learning techniques. Six machine learning algorithms—logistic regression, naive Bayes, random forest (RF), support vector machine (SVM), Extreme Gradient Boosting (XGBoost), and Gradient Boosting Decision Tree (GBDT) were employed to develop independent intraoperative acquired pressure injury (IAPI) risk prediction models. The stacking method was used to integrate these models, enhancing predictive performance. The SHAP (SHapley Additive exPlanations) framework and Shapley values were applied to analyze the interpretability of significant decision factors in the prediction models.

Results：In this study, we analyzed 594 patients who underwent cardiovascular surgery to evaluate the risk factors and predictive models for intraoperative acquired pressure injury (IAPI). Out of these patients, 58 developed IAPI. Detailed demographic and clinical data were collected and analyzed to determine significant differences between those who developed IAPI and those who did not.

The median age of patients in the IAPI group was 67.5 years, whereas the median age in the non-IAPI group was 64 years. This age difference was statistically significant ($p=0.004$), indicating that older patients were more likely to develop IAPI. The gender distribution showed no significant difference between the groups ($p=0.366$); 74.1% of patients in the IAPI group were male compared to 67.4% in the non-IAPI group.

We observed significant differences in the duration of surgery, with the IAPI group having a median surgery time of 5.17 hours compared to 4.75 hours in the non-IAPI group ($p=0.014$). Similarly, the duration of anesthesia was longer in the IAPI group, with a median of 5.88 hours versus 5.33 hours in the non-IAPI group ($p=0.010$). Additionally, patients who developed IAPI had a significantly longer ICU stay, with a median of 71.71 hours compared to 45.21 hours in the non-IAPI group ($p<0.001$).

To predict the risk of IAPI, we employed six different machine learning models: logistic regression, naive Bayes, random forest, support vector machine (SVM), XGBoost, and gradient boosting decision tree (GBDT). The performance of these models was evaluated using five-fold cross-validation and assessed based on accuracy, precision, recall, F1 score, and area under the curve (AUC).

Among the single models, the SVM demonstrated the highest performance on the test set, achieving an accuracy of 0.953, recall rate of 0.955, F1 score of 0.952, and AUC of 0.992. The GBDT model exhibited the highest precision on the test set at 0.958. In the validation set, the SVM model maintained the highest accuracy (0.833), recall (0.907), and F1 score (0.907), while the GBDT model had the highest AUC (0.747). The naive Bayes model showed the highest precision in the validation set at 0.936.

To improve predictive performance and robustness, we utilized the Super Learner algorithm to integrate these models. The integrated model outperformed individual models, with the test set results showing an accuracy of 0.955, precision of 0.962, recall of 0.945, F1 score of 0.953, and AUC of 0.994. The validation set results were also promising, with an accuracy of 0.833, precision of 0.907, recall of 0.907, F1 score of 0.907, and AUC of 0.725.

The interpretability of the prediction model was analyzed using the SHAP (SHapley Additive exPlanations) framework. SHAP analysis revealed that the duration of anesthesia, estimated

glomerular filtration rate, and white blood cell count were key factors influencing the risk of developing IAPI. These factors were identified as significant contributors to the model's predictions, providing insights into the underlying mechanisms and risk factors for IAPI. For instance, longer anesthesia duration and higher white blood cell counts were associated with increased IAPI risk, highlighting their importance in clinical decision-making and patient management.
Conclusions：Our study demonstrates that machine learning models, particularly the support vector machine and Super Learner integrated models, can effectively predict the risk of intraoperative acquired pressure injury in cardiovascular surgery patients. The findings underscore the significance of clinical variables such as anesthesia duration, estimated glomerular filtration rate, and white blood cell count in assessing IAPI risk, which can aid in developing preventive strategies and improving patient outcomes.

PU-1258

使用程序间歇推注双侧导管浅表胸骨旁肋间平面阻滞在开胸心脏手术中术后镇痛的功效

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目的 本研究调查了使用布比卡因脂质体程序间歇推注 (programmed intermittent bolus，PIB) 进行导管浅表胸骨旁肋间平面 (superficial parasternal intercostal plane，SPIP) 阻滞是否可以减少阿片类药物的消耗，同时在涉及胸骨切开术的心脏手术后超过 72 小时提供增强的镇痛效果。
方法 设计：一项双盲、前瞻性、随机、安慰剂对照试验。
患者： 40 名 18 岁或以上的患者，计划通过胸骨切开术进行心脏手术。
干预措施：患者以 1:1 的比例随机分配到布比卡因脂质体组或生理盐水组。 手术后，患者接受双侧 SPIP 阻滞 48h，使用 0.53%布比卡因脂质体（每侧 10mL）进行诱导，然后使用 PIB 和 0.26%布比卡因脂质体（5mL/侧，间隔 2h）或双侧 SPIP 导管进行诱导。0.9%生理盐水遵循相同的给药方案。所有患者均接受舒芬太尼自控镇痛。
测量：术后疼痛根据非语言疼痛量表或数字评分量表进行评分。主要结果是术后最初 48 小时内累积的吗啡当量消耗量和患者术后前 72 小时内的疼痛评分。次要结果比较了重症监护病房住院时间、住院时间、拔管时间、肠道功能恢复时间以及恢复工作或日常活动的时间。
结果 与生理盐水组相比，布比卡因脂质体组 48 小时内累积吗啡消耗量显着下降（分别为 29.56±29.77 mg vs 70.2±73.16 mg；95% CI，-71.9 至-22.3，P = 0.005）。 与生理盐水组相比，布比卡因脂质体组在大多记录时间点的疼痛评分均较低（P<0.05），恶心和呕吐发生率较低（分别为 2/20 vs 8/20；P<0.05）。此外，与生理盐水组相比，布比卡因脂质体组在拔管时间（P<0.05）、步行（P<0.05）和自我报告的镇痛满意度方面表现出显着改善（P=<0.05）。
结论 使用布比卡因脂质体 PIB 进行的双侧导管 SPIP 阻滞可在 48 小时内减少阿片类药物的消耗，同时在在涉及胸骨切开术的心脏手术后提供较为满意的术后镇痛效果。

PU-1259

可视喉镜与普通喉镜用于胸科手术患者左双腔支气管插管反向错位率的对比研究

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目的 使用两种可视喉镜（Glidescope ，Airtraq）对胸科手术患者进行左双腔气管插管，并以普通 Macintosh 喉镜为对照，比较麻醉科低年资住院医师使用不同喉镜的插管错位反向率。
方法 纳入拟行择期胸科手术的患者，1:1:1 随机分为试验组一（G 组，采用 Glidescope 喉镜进行双腔气管插管），试验组二（A 组，采用 Airtraq 喉镜进行插管），对照组（M 组，采用普通 Macintosh 喉镜进行插管）。三组均采用相同的麻醉方式，进行插管的人员为麻醉科低年资（一、二年级）住院医师。记录术前气道评估情况，主要结局指标为插管反向错位率，次要结局指标为首次插管成功率，插管后心率血压变化，插管时的声门暴露百分比（POGO 评分），插管时间。
结果 共入组 219 例患者。三组之间插管错位率有统计学差异，G 组的反向率明显高于 M 组[P=0.002，OR=3.242，95%CI(1.541，6.943)]， A 组的反向率明显高于 M 组[P＜0.001，OR=4.665，95%CI(2.191，9.932)]；而 G 组与 A 组的反向率无显著差异。三组之间插管前后心率及平均动脉压变化、POGO 评分差异有统计学意义：G 组插管后平均动脉压变化显著大于 M 组（P＜0.001， 效应值 d=0.679）和 A 组（P=0.003，效应值 d=0.527），心率变化显著大于 M 组（P=0.001，效应值 d=0.589）；A 组的 POGO 评分高于 M 组（P＜0.001）。三组的首次插管成功率及插管时间无显著差异。
结论 气道评估正常的患者中，麻醉科低年资住院医师使用不同喉镜进行左双腔管插管时，Glidescope 喉镜、Airtraq 喉镜相较 Macintosh 喉镜插管错位率较高；Glidescope 喉镜引起插管后循环波动更大，Airtraq 喉镜的声门暴露较好。三种喉镜首次插管成功率无明显差异，且插管时间相近。临床上麻醉医生可以根据个人习惯及手术需求选择相应的插管工具。

PU-1260

偏币随机序贯设计探索罗哌卡因用于胸大肌肋间肌平面阻滞 EC90 的研究

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目的 通过偏币随机序贯法测定罗哌卡因用于胸大肌肋间肌平面阻滞的 90%有 效浓度(EC90)。
方法 选择 2022 年 8 月至 2023 年 1 月拟行正中开胸心脏外科手术的患者，男 女不限，年龄 18-65 岁，BMI 为 18.5-24kg/m2。患者在术前行超声引导下胸大 肌肋间肌平面阻滞，分别在胸骨旁两侧第 2-3、4-5 肋间隙 4 个点各注射 10mL 罗哌卡因溶液，共计 40mL。采用偏币随机序贯法调整罗哌卡因浓度，初始浓 度为 1.0mg/mL，间隔浓度梯度为 0.3mg/mL，最大浓度设定为 5.0mg/mL。后一患者的浓度由前一患者的阻滞效果确定，若前一患者阻滞效果被判定为无效， 则后一患者浓度增加一档(0.3mg/mL)；若前一患者阻滞效果被判定为有效，则 进行偏币随机，后一位患者所使用的罗哌卡因浓度有 11%的概率降低一档 (0.3mg/mL)，有 89%的概率保持不变。采集受试者的一般资料、手术切口长度； 每间隔 5min 测量并记录受试者的生命体征、阻滞范围；同时观察受试者是否有局麻药中毒的征兆，例如头晕目眩、耳鸣、口周麻木等；记录切皮前后以及 锯胸骨前后平均动脉压；记录术后 12H 和 24H 的疼痛数字评定量表(Numeric Rating Scale,NRS)评分。使用概率单位回归计算罗哌卡因的 EC90 及其 95%有效区间。

结果 1 例患者因二次手术被排除，59 例受试者数据使用概率单位回归计算得 出的罗哌卡因 EC90 为 3.057 mg/mL，其 95%可信区间为(2.891-3.410) mg/mL； 阻滞有效组在术中切皮和锯胸骨的循环波动、术后疼痛评分均要优于阻滞无效 组；在试验过程中未观察到局麻药中毒事件。
结论 在胸骨左右 2-3、4-5 肋间隙 4 点注射的方法行 PIFB 时，阻滞范围能够 覆盖 T2-T6 平面，为正中开胸心脏手术患者提供良好的镇痛。在使用 40mL 罗哌 卡因溶液进行 PIFB 操作时，我们推荐使用罗哌卡因的浓度为 3.057mg/mL，使 用此浓度进行 PIFB 是相对安全的，目前没有观察到局麻药中毒事件。

PU-1261

Quantitative lung CT indicators have good predictive ability for hypoxemia during one-lung ventilation in radical resection for lung cancer

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ABSTRACT

Objective Hypoxemia is the most common complication during one-lung ventilation (OLV). Preoperative identification of patients who may experience hypoxemia during OLV can help anesthesiologists to develop intraoperative management strategies. This study aimed to identify the preoperative risk factors for hypoxemia during OLV in patients who underwent thoracoscopic radical resection for lung cancer and to establish a prediction model.
Methods This retrospective study included 268 patients who underwent video-assisted thoracoscopic surgery (VATS) radical resection for lung cancer at Yunnan Cancer Hospital from October 2021 to June 2022. Logistic regression analysis was performed to identify independent preoperative risk factors for hypoxemia during OLV by using a double-lumen tube. A prediction model was established, and its predictive efficacy was evaluated with the consistency index (C-index) and the area under the receiver operating characteristic curve (AUC).
Results The multivariate analysis demonstrated that the ratio of dependent lung FLV to total lung FLV (odds ratio [OR], 0.8434; 95% confidence interval [CI], 0.7281-0.9623), dependent lung HU value (OR, 0.9676; 95% CI, 0.9419-0.9895), dependent lung LAV% (OR, 1.1838; 95% CI, 1.0856-1.3138), and DLCO% pred (OR, 0.9632; 95% CI, 0.9353-0.9864) were independent preoperative risk factors affecting OLV hypoxemia. The prediction model that was constructed by this indicator was internally validated, with a C-index of 0.963, an AUC of 0.96 (95% CI, 0.94-0.99) for the training set, and an AUC of 0.92 (95% CI, 0.83-1) for the test set.
Conclusions CT-based quantitative indicators of the dependent lung during OLV are strong predictors of hypoxemia during VATS radical resection for lung cancer patients. This prediction model helps anesthesiologists to intuitively and accurately identify lung cancer surgery patients who may experience hypoxemia during OLV before surgery and develop individualized management strategies.

PU-1262

半定量 CT 严重程度评分系统在术前评估肺结核患者行择期全肺切除术后肺部感染发生率中的应用：一项回顾性对照研究

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目的 本研究旨在通过回顾性对照研究，评估半定量 CT 严重程度评分系统在术前评估肺结核患者行择期全肺切除术后肺部感染发生率中的应用价值。
方法 本研究纳入了 120 例行择期全肺切除术的肺结核患者。利用半定量 CT 严重程度评分系统对胸部 CT 进行评估，由两名经验丰富的麻醉科医师独立判读，并采用重评制度以确保评分结果的一致性。根据 CT 评分结果，将患者分为轻度组（60 例）和重度组（60 例）。通过医院信息系统（HIS）收集患者的术前 CT 影像资料、术中手术记录及术后随访数据。主要结局指标为术后肺部感染发生率，次要结局指标包括术后住院时间、术后 30 天内死亡率及术后并发症发生率。
结果 两组患者在性别、年龄、BMI、ASA 分级、基础合并症等方面无明显差异。手术情况也没有显著差异，包括手术时长、输液量、血红蛋白输注情况和出血量。然而，轻度组患者肺部感染的发生率为 29.3%，重度组患者的肺部感染发生率为 38.3%（$p<0.05$）。轻度组患者的住院时长（26.9±8.2 天）显著短于重度组（33.2±11.9 天），且轻度组的住院费用（75641.0 元，95% CI：70245.8～80892.0）显著低于重度组（87599.5 元，95% CI：79563.9～110921.5）。此外，CT 评分估值与住院时长及住院费用均呈显著正相关（Pearson 系数分别为 0.442 和 0.601，$p<0.05$）。
结论 本研究揭示了半定量 CT 严重程度评分系统在术前评估肺结核患者行择期全肺切除术后肺部感染发生率中的潜在应用价值。CT 评分估值与术后住院时长和住院费用的显著正相关关系，提示该评分系统可为临床医生在术前评估和术后管理中提供重要参考。

PU-1263

Intraoperative blood glucose and acute kidney injury after on-pump cardiac surgery: a retrospective cohort study

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Introduction: Acute kidney injury (AKI) is a common complication after on-pump cardiac surgery, and previous studies have suggested that blood glucose is associated with postoperative AKI. However, limited evidence is available regarding intraoperative glycemic thresholds in cardiac surgery. The aim of this study was to explore the association between peak intraoperative blood glucose and postoperative AKI, and determine the cut-off values for intraoperative glucose concentration associated with an increased risk of AKI.
Methods The study was retrospective and single-centered. Adult patients in West China Hospital of Sichuan University who underwent on-pump cardiac surgery (n = 3375) were included. The primary outcome was the incidence of AKI. Multivariable logistic analysis using restricted cubic spline was performed to explore the association between intraoperative blood glucose and postoperative AKI.
Results The incidence of AKI in the study population was 18.0% (607 of 3375). Patients who developed AKI had a significantly higher peak intraoperative glucose during the surgery compared to those without AKI. After adjustment for confounders, the incidence of AKI increased with peak intraoperative blood glucose (adjusted odds ratio, 1.08, 95% confidence interval 1.03, 1.12). Furthermore, it was demonstrated that the possibility of AKI was relatively flat till 127.8 mg/dL (7.1

mmol/L) glucose levels which started to rapidly increase afterward.
Conclusions Increased intraoperative blood glucose was associated with an increased risk of AKI. Among patients undergoing on-pump cardiac surgery, avoiding a high glucose peak (i.e., below 127.8 mg/dL [7.1 mmol/L]) may reduce the risk of postoperative AKI.

PU-1264

主动脉全弓置换手术患者术后院内死亡危险因素分析

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目的 探讨急性 A 型主动脉夹层患者主动脉全弓置换术后住院期间死亡危险因素
方法 收集 2016 年 1 月至 2023 年 10 月在河北医科大学第二医院行主动脉全弓置换的急性主动脉夹层患者，根据术后院内是否死亡分为死亡组（n=33）和存活组（n=179）。对两组患者术前、术中及术后资料进行统计分析，将差异性分析有统计学意义的指标（P<0.05）纳入二元 Logisti 回归进行多因素分析,确定影响患者术后死亡的独立危险因素，并采用受试者工作特征曲线（ROC）对独立危险因素进行效能检测。
结果 本研究最终纳入 TAR 患者 212 例，其中术中死亡 3 例，术后住院期间死亡患者 30 例。多因素 Logistic 回归结果显示：冠状动脉累及、心脏复跳后功能障碍、术后低氧血症、术后脑卒中和术后肾功能衰竭是术后死亡的独立危险因素。各危险因素对应 ROC 曲线下面积分别为 0.69（95%CI 0.57,0.80）、0.68（95%CI 0.56,0.80）、0.78（95%CI 0.69,0.88）、0.84（95%CI 0.76,0.92）、0.75C（95%CI 0.70,0.86）（P<0.002）。模型系数的 Omnibus 检验 P=0.00,对该模型进行 Hosmer-Lemeshow 拟合优度检验，P=0.96，预测结果和实际结果差异无统计学意义。
结论 术前冠状动脉累及、心脏复跳后功能障碍、术后脑卒中、术后低氧血症、术后肾功能衰竭是行主动脉全弓置换手术患者术后院内死亡的危险因素。

PU-1265

心尖入路经导管主动脉瓣置换术（TA-TAVR）神经阻滞和围术期麻醉管理经验

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目的 主动脉瓣狭窄（aortic stenosis，AS）和主动脉瓣关闭不全（aortic incompetence，AI）在我国，是常见的心脏瓣膜病。虽然心脏外科经胸主动脉瓣置换术（(surgical aortic valve replacement, SAVR）可以拯救大部分患者生命，但由于 AS 病变机制为机械性梗阻， 虽然外科经胸主动脉瓣置换术 (sur-gical aortic valve replacement , SAVR) 拯救了 大部分患者的生命,但由于 AS 病变机制为机械性梗阻， 既往对重度 AS 患者无任何有效的药物治疗手段， 一旦出现心脏症状，其生存期一般少于 5 年。常见的 TAVR 手术入路包括股动脉入路、心尖入路、升主动脉入路、锁骨下动脉入路、颈动脉入路和下腔静脉入路等。术前影像学评估对于合适入路的选择有一定指导意义。对于股动脉狭窄较重、严重扭曲或重度钙化的主动脉瓣病变的患者， 多采用经心尖入路行主动脉瓣置换。经心尖 TAVR 属于微创手术，所以针对此类患者应充分结合加速康复外科(enhanced recovery af[1]ter surgery, ERAS)理念加以管理。充分的镇痛有助于维持血流动力学稳定，静脉给予镇痛药物、局部浸润麻醉、肋间神经阻滞或局部切口阻滞均能达到良好的镇痛效果。回顾性总结了心尖入路经导管主动脉瓣置换术（TA-TAVR）神经阻滞和围术期麻醉管理经验。

方法 纳入 2017 年 9 月至 2024 年 5 月共 118 例在我院行心尖入路经导管主动脉瓣置换术（TA-TAVR）的患者，记录了围术期术前、术中及术后的临床资料，对于术前神经阻滞及围术期并发症的预防和管理进行分析总结。
结果 共纳入 118 例患者，平均年龄（75.54±5.26）岁，TA-TAVR 手术均在全麻下完成，应用血管活性药物 95 例（81.19%）术后平均机械通气时间 16（8:40）h，术后监护室停留时间 2（1:4）d，术后住院时间（13.25±8.47）d；术后紧急开胸 2 例（1.69%）术后死亡 1 例（0.84%）院内死亡 3 例（2.54%），主要并发症包括急性肾损伤、急性心梗、中风卒中、III°房室传导阻滞及主动脉夹层。
结论 TA-TAVR 手术由于创伤大、围术期风险高，需要在全身麻醉下进行，术中要求维持血流动力学的平稳并及时识别和处理并发症。

PU-1266

超声引导下椎旁神经阻滞联合胸内迷走神经阻滞用于胸腔镜手术快速康复的研究

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目的 探讨超声引导下椎旁神经阻滞（TPVB）联合胸内迷走神经阻滞用于胸腔镜手术快速康复的效果
方法 以我院 2022 年 2 月至 2023 年 1 月期间于我院接受胸腔镜手术的 66 例肺癌患者为研究对象，按照随机数字表法将所有的患者分为 A 组和 B 组，每组 33 例。A 组和 B 组均接受电视辅助胸腔镜（VATS）肺癌手术，B 组麻醉方式为双腔支气管插管全麻，A 组的麻醉方式为超声引导下 TPVB 联合胸内迷走神经阻滞。观察 A 组和 B 组患者术后恢复情况：术后统计 A 组和 B 组患者手术时间、复苏室停留时间、术后首次进食时间、胸管引流量、以及住院时间;不同时间节点平均动脉压及心率：于麻醉诱导前、手术开始 30min、术毕即刻记录 A 组和 B 组患者的心率以及平均动脉压;疼痛程度：记录术前 30 分钟、术后 1、6、12、24 以及 48h 疼痛程度。疼痛程度采用视觉模拟评分（VAS）量表评分进行评价，分值越高疼痛越明显；及并发症发生率：住院期间统计 A 组和 B 组患者术后恶心呕吐、呛咳等并发症的发生率。
结果 A 组胸管引流量、手术时间、复苏室停留时间以及住院时间同 B 组组间对比差异无显著性（P>0.05），A 组术后首次进食时间和住院时间短于 B 组，PaCO2 高于 B 组（P<0.05）；麻醉诱导前 A 组和 B 组患者心率以及平均动脉压组间对比差异无统计学意义（P>0.05），手术开始以及术毕即刻 A 组和 B 组心率和平均动脉压均发生波动，但是 A 组的波动显著低于 B 组（P<0.05）；术前 30 分钟 A 组和 B 组患者 VAS 评分组间对比差异无显著性（P>0.05），术后不同时间节点 A 组和 B 组 VAS 评分均降低，且 A 组 VAS 评分显著低于 B 组（P<0.05）；A 组并发症发生率显著低于 B 组（3.03%vs24.24%）（P<0.05）。
结论 相比较于双腔支气管插管全麻方式，对于接受电视辅助胸腔镜肺叶切除术的患者予以超声引导下 TPVB 联合胸内迷走神经阻滞可避免血压和心率的波动，减轻术后疼痛，加快术后恢复且不影响术中相关指标，降低术后并发症的发生率

PU-1267

盐酸羟考酮和昂丹司琼用于胸外科术前定位镇痛的临床安全性的回顾性研究

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目的 探讨盐酸羟考酮和昂丹司琼用于胸外科术前定位镇痛的临床有效性和安全性。
方法 检索中国人民解放军北部战区总医院麻醉科关于胸外科术前定位的麻醉记录单，选择手术日期在 2023 年 3 月 1 日至 9 月 30 日期间的胸外科术前 CT 定位的患者，根据患者是否在定位穿刺前给予羟考酮和昂丹司琼分为局麻组（J 组）和局麻+羟考酮+昂丹司琼组（Q 组）。收集患者入室后(T0)、给镇痛药后且未定位穿刺前(T1)、穿刺成功后 3min 内（T2）和出室前（T3）的无创平均动脉血压（MAP）、心率(HR)、脉搏血氧饱和度(SpO2)，收集患者穿刺时的数字模拟法评分（Numerical Rating Scale,NRS）记录，收集整个定位穿刺过程中发生的不良反应记录，包括呼吸抑制（呼吸抑制的标准:RR＜10 次·min-1 或 SpO2≤92%，观察过程中符合上述两个标准单独或同时出现皆判为出现呼吸抑制），头晕，恶心呕吐，胸膜反应，严重的血气胸等，以及是否给予了其他药物。
结果 两组患者在性别、年龄、BMI、ASA 分级和定位时间方面差异均无统计学意义(P>0.05)。两组患者 T0 时刻的 MAP、HR 和 SpO2 没有统计学差异(P>0.05)，J 组 T2 时刻的 MAP、HR、SpO2 显著高于 T0、T1、T3 时刻(P<0.001)；Q 组 T0、T1、T2、T3 时刻的 MAP 逐渐降低（P<0.05），Q 组 T1、T2 时刻的 SpO2 低于 T0 时刻（P<0.05）。Q 组患者的 NRS 评分明显低于 J 组（P<0.001）。Q 组患者头晕的比例明显高于 J 组（P<0.001）。两组患者发生头晕和恶心的比例无统计学差异(P>0.05)。两组患者均未出现呼吸抑制的病例。
结论 盐酸羟考酮和昂丹司琼用于胸外科术前定位，可以提供更加良好的镇痛效果，并且不会发生呼吸抑制，可以被临床广泛应用。

PU-1268

左侧椎旁神经阻滞抑制脾脏交感神经减轻肺叶切除术患者术后炎症反应

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目的 通过对胸腔镜肺叶切除手术患者实施 T7 椎旁神经阻滞，观察其对 α7nAChR 依赖胆碱能抗炎通路的影响。
方法 南昌大学第一附属医院 2023 年 8 月-9 月择期行胸腔镜肺部手术患者，分为试验组 T7 椎旁神经阻滞（TPVB 组），对照组 T7 竖脊肌阻滞（ESPB 组）。收集相关临床资料，记录患者术前（T1），手术开始后 30min(T2)、手术结束时(T3)、术后 12h(T4)，术后 24h(T5)的血压、心率，并采集各时间点静脉血 2ml。通过酶联免疫吸附测定法（ELISA）测炎症因子 IL-1β、IL-6、TNF-a 以及 α7nAChR 水平，超声多普勒检测 TPVB 组阻滞前后脾动脉阻力指数(RI)。
结果 TPVB 组和 ESPB 组患者的年龄、性别、ASA 分级、身高、体重无明显差异（p>0.05），术后恶心呕吐发生率，VAS 评分无明显差异（p>0.05），两组之间，各时间点血压、心率均无明显差异（p>0.05）。随着时间推移各个时期的 IL-1β、IL-6、TNF-a 指标逐渐升高，TPVB 组较 ESPB 组各炎性指标在 T4 和 T5 时间点明显降低（p<0.05），α7nAChR 水平则明显升高（p<0.05）。脾脏多普勒超声显示与阻滞前相比较，左侧 TPVB 组脾动脉 RI 明显降低（P<0.05）。左侧 TPVB 比

右侧 TPVB 组 IL-1β、IL-6、TNF-a 在 T4 和 T5 时间点明显降低（p<0.05）。α7nAChR 水平明显升高（p<0.05）。
结论 左侧 T7 椎旁神经阻滞通过激活 α7nAChR 依赖的胆碱能抗炎通路减轻肺叶切除术患者术后炎症反应，其机制可能与脾脏交感神经阻滞有关。

PU-1269

Association of preoperative diuretic use with postoperative acute kidney injury in pediatric cardiac surgery

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Background Diuretics are used preoperatively to manage congestive heart failure in children with congenital heart disease. Studies in adults indicate that preoperative diuretic use contributes to the risk of cardiac surgery-associated acute kidney injury(CS-AKI), while its effect on children remains unknown. So we conducted this study to explore the association between preoperative diuretics and postoperative acute kidney injury in pediatric cardiac surgery patients.
Methods This is a single-center retrospective observational study of children (28 days -18 years) who had CS requiring cardiopulmonary bypass between 2022.4 and 2023.12. AKI was defined according to the Kidney Disease Improving Global Outcomes guidelines.
Results A total of 5242 children were included. The incidence of AKI was 15.6%(816/4426) (stage 1: 11.8%; stage 2: 2.5%; stage 3: 1.1%). Multivariate logistic regression analysis showed that preoperative diuretics were significantly associated with CS-AKI (Adjusted odds ratio[aOR],1.311; 95%CI, 1.016-1.692; P=0.037). Preoperative diuretics correlated with postoperative mechanical ventilation time(β, 35.74; 95%CI, 29.24-42.25; P<0.001), ICU(β, 2.48; 95%CI, 2.09-2.86) and hospital stay (β, 2.12; 95%CI, 1.62-2.63; P<0.001) in linear regression analysis after adjusted for confounding factors.
Conclusions Preoperative diuretics contribute to the risk of CS-AKI in pediatric patients after congenital cardiac surgery. Those who had preoperative diuretic use were more likely to suffer worse clinical outcomes including longer postoperative mechanical ventilation time, ICU and hospital stay.

PU-1270

Anesthesia management of a patient with unilateral absence of left pulmonary artery undergoing right lung cancer surgery: A Case Report and Review of Literature

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Unilateral absence of the pulmonary artery (UAPA) is a rare congenital cardiac malformation. The occurrence of lung cancer associated with UAPA is extremely rare, limiting opportunities for clinical experience. The purpose of this report was to describe a case of a 72-year-old female patient and surgical treatment of contralateral primary lung cancer combined with unilateral absence of the left pulmonary artery. These patients are prone to intolerable hypoxemia during surgery and postoperative pulmonary arterial hypertension. The surgery and anesthesia were extremely difficult, but after a comprehensive preoperative anesthesia evaluation, airway management, and

anesthesia plan formulation, the patient successfully completed the surgery and was discharged 5 days after surgery. Given its extremely rare occurrence, reporting such cases may improve the safety of surgical treatment for such patients.

PU-1271

新生儿室间隔完整型肺动脉闭锁经导管肺动脉瓣打孔术麻醉管理

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目的 总结新生儿室间隔完整型肺动脉闭锁经导管肺动脉瓣打孔术麻醉管理经验。
方法 2018 年 10 月至 2022 年 10 月于青岛大学附属妇女儿童医院接受经导管肺动脉瓣打孔术 25 例 PA-IVS 患儿，患儿诊断明确后，术前结合经皮血氧饱和度（SpO2），根据情况静脉泵入前列腺素 E1［1~5 ng/（kg·min）］以维持动脉导管开放。使用 Bair Hugger 升温系统预热手术床，手术床保暖至 38.0 ℃。所有患儿均在全身麻醉和气管插管下进行手术。入室后行 ECG、SpO2、PETCO2 及无创压监测。咪唑安定 0.1mg/kg，丙泊酚 1mg/kg，芬太尼 2-3ug/kg、顺阿曲库铵 0.2 mg/kg 诱导完成气管插管，呼吸机控制通气，超声引导下桡动脉穿刺测压，颈内静脉置双腔导管监测中心静脉压。诱导后持续泵注去甲肾上腺素 0.02-0.05ug/kg/min，维持循环稳定。静脉泵入前列腺素 E1 保持动脉导管开放。术中七氟烷吸入维持麻醉。建立轨道过程中密切关注 ECG、SpO2、血压改变，尤其打孔成功导丝进入动脉导管会引起痉挛，导致氧饱和度下降，需要加大前列腺素 E1。扩张时也容易影响血压。
结果 所有患儿均成功完成手术，4 例患儿中转外科行直视下肺动脉瓣切开术，循环维持稳定，麻醉效果满意
结论 新生儿室间隔完整型肺动脉闭锁经导管肺动脉瓣打孔术麻醉需要精细管理，密切关注可能导致氧合循环改变情况，及时处理。

PU-1272

超快通道麻醉在小儿法洛氏四联症根治术快速康复的应用

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目的 观察超快通道麻醉应用于小儿小儿法洛氏四联症根治术的安全性。
方法 2023 年 3 月—2024 年 3 月间，择期体外循环下法洛氏四联症根治术患儿 19 例，其中男 10 例，女 9 例，年龄 3 月-2 岁，体重 5-13kg，术前心功能Ⅱ～Ⅲ级，ASA Ⅱ～Ⅲ级。入室后行 ECG、SpO2、PETCO2 及无创压监测。咪唑安定 0.1mg/kg，丙泊酚 1-2mg/kg，舒芬太尼 0.5ug/kg、顺阿曲库铵 0.2 mg/kg 诱导完成气管插管，呼吸机控制通气，桡动脉穿刺测压，颈内静脉置双腔导管监测中心静脉压，行双侧竖脊肌阻滞;监测 BIS,NMT.麻醉维持以七氟醚 MAC 0.5-0.7，右美托咪定 1ug.kg-1.h-1，瑞芬太尼 0.2-3ug kg-1.min-1 维持麻醉，转机后丙泊酚 4-5 mg kg-1.min-1 持续泵注，开放上下腔静脉后恢复机械通气，吸入七氟醚 MAC 0.5-0.7 维持麻醉，体外循环结束不再追加肌松药物，超滤滤出多余水分，血气指标满意。缝合胸骨后停七氟醚及丙泊酚和瑞芬太尼，并以 0.25% 罗哌卡因行手术部位及引流管切口局部浸润。缝合胸骨后手动通气诱导自主呼吸，待 VT 5ml/kg 以上，循环稳定，经胸肺超声评估肺功能无异常后拔除气管插管。新斯的明拮抗肌松，BIS75 左右。术后采用静脉持续输注舒芬太尼 0.04-0.06 ug.kg-1.min-1 复合右美托咪定 0.1ug.kg-1.h-1 维持镇痛。观察指标为心率、平均动脉压、CVP、术后拔管时间、CICU 停留时间、再插管率、术后并发症等

结果 19 例患儿中有 17 例在手术室内成功拔管,2 例患儿在 CICU 内拔管，但均在 6 小时内； 3 例需术后 CPAP 支持，时间 4h-7h；再插管率 0%；手术室内拔管时间（10 ± 4.5）min，CICU 停留时间（40 ± 3.2）h。
结论 超快通道麻醉应用于小儿法洛氏四联症根治术能缩短患儿恢复时间，需要多学科紧密协作，是一种安全、有效的麻醉管理方法。

PU-1273

Perioperative renal resistive index as a predictor of cardiac surgery-associated acute kidney injury: a prospective observational study

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Rationale & Objective: Prompt diagnosis is essential to advance cardiac surgery-associated acute kidney injury (CS-AKI) therapeutic interventions. In pre- or postoperative settings, an elevated renal resistive index (RRI) measured by transparietal echo-Doppler ultrasound (TP-EDus) has been demonstrated promise as an early CS-AKI biomarker. However, the evolution of RRI and the ability of RRI at different time points as a predictor of CS-AKI have been rarely explored. This study aimed to evaluate the correlation between RRI and CS-AKI measured by TP-EDus combined with transesophageal echo-Doppler ultrasound (TE-EDus) in perioperative course, as well as testing changes in RRI and their relation to CS-AKI.
Study Design: A prospective observational study.
Setting & Participants: Between November 2022 and June 2023, 206 adult cardiac surgical patients were admitted.
Predictors: RRI was measured at five time points by TP-EDus and TE-EDus, and changes in RRI were calculated.
Outcomes: The main outcome is CS-AKI, which was defined according to Kidney Disease: Improving Global Outcomes (KIDGO) criteria.
Analytical Approach: Mixed-effect models were used to assess RRI and hemodynamics repeated measures among different CS-AKI groups. The relationship between changes in RRI and CS-AKI were examined by Kruskal-Wallis test.
Results RRI at preoperative (T1), post-CPB (T3), end of surgery (T4) and 24h postoperative (T5) were significantly associated with CS-AKI. RRIT5 has the highest sensitivity and specificity for predicting persistent CS-AKI (cut-off value, 0.71). Pre-to post-ICU RRI was also associated with CS-AKI. However, pre-to post-anesthetic induction, pre-to post-CPB and pre-to post-surgery RRI were not associated with CS-AKI.
Limitations: RRI can not be obtained due to non-pulsatile perfusion during CPB.
Conclusions RRIT5＞0.71 and pre-to post-ICU changes in RRI were related to persistent CS-AKI. But preoperative and intraoperative RRI is insufficient as an early predictor of CS-AKI. The changes in RRI obtained intraoperatively also need to be further dynamically evaluated.

PU-1274

食管癌根治术中肾脏氧饱和度与术后肾功能 异常的相关性

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目的 探讨食管癌根治术中肾脏区域组织氧饱和度（ｒＳＯ２ ）与术后肾功能异常的相关 性。
方法 选择拟行食管癌根治术的患者 １１６ 例，男 ９３ 例，女 ２３ 例，年龄 １８～ ６４ 岁，ＢＭＩ＜２４ ｋｇ ／ ｍ2， ＡＳＡ Ⅱ或Ⅲ级。 术中连续监测左侧肾脏 ｒＳＯ２ 。 设定麻醉诱导后肾脏 ｒＳＯ２ 为基础值，当术中肾脏ｒＳＯ２ 绝对值≤５０％或低于基础值的 ７５％时，定义为肾脏 ｒＳＯ２ 异常下降。 记录术前及术后 ２４ ｈ 尿素 氮（ＢＵＮ）、血清肌酐（ ＳＣｒ），术后肾功能异常定义为术后 ２４ ｈ 血浆 ＳＣｒ＞ １３０ μｍｏｌ ／ Ｌ 或 ＢＵＮ＞ ７． ５ ｍｍｏｌ／ Ｌ。 根据术后是否出现肾功能异常将患者分为两组：肾功能正常组和肾功能异常组。 采用列联 系数分析术中肾脏 ｒＳＯ２ 异常下降与术后肾功能异常的相关性。
结果 有 ４０ 例（３４． ５％）患者术中出 现肾脏 ｒＳＯ２ 异常下降，有 ４５ 例（３８． ８％）患者术后出现肾功能异常。 二元 Ｌｏｇｉｓｔｉｃ 回归分析显示男性 是术后肾功能异常的危险因素（ＯＲ ＝ ５． ４９０，９５％ＣＩ １． ５２６ ～ １９． ７５４，Ｐ ＝ ０． ００９）。食管癌根治术中肾 脏 ｒＳＯ２ 的异常下降与术后肾脏功能异常呈正相关（ ｒｓ＝ ０． ５８７，Ｐ ＝ ０． ００９）。
结论 食管癌根治术中 肾脏 ｒＳＯ２ 异常下降与术后肾功能异常呈正相关。

PU-1275

超声引导下喉上神经阻滞对老年患者胸科双腔管麻醉效果的研究

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目的 探讨超声引导下喉上神经(superior laryngeal nerve,SLN)阻滞麻醉用于老年患者胸科手术全麻双腔管插管的麻醉效果，为减轻插管和拔管时对舌根和咽喉部结构及对气管的刺激，减少呛咳、血流动力学波动及心脑血管并发症，减轻术后咽喉痛，提高围术期安全性和舒适度提供临床方案和参考依据。
方法 选择 2022 年 4 月至 2023 年 5 月期间在我院择期行胸科手术全麻双腔管插管的老年患者 66 例,年龄 60～70 岁,随机分为实验组和对照组两组：实验组为喉上神经阻滞组，全麻诱导前行超声引导下双侧喉上神经阻滞 (S 组,n=33): 超声引导双侧 SLN 阻滞(每侧 0.2%利多卡因 2mL)后行全麻诱导气管插管；对照组(C 组,n=33):常规给予静脉全麻诱导药物后行气管插管。分别记录两组患者插管前 1min (T0)、插管即时（T1）、插管后 1min (T2)、插管后 5min (T3)、插管后 10min（T4）；拔管前 1min(T5)、拔管即时(T6)、拔管后 1min(T7）、拔管后 5min(T8）、拔管后 10min(T9)各个时间点患者的血压（BP）、心率(HR)、血氧(SPO2)等循环指标情况，并记录患者术后苏醒时间(包括肌松恢复时间、气管拔管时间)以及呛咳等不良反应发生率；记录拔管后 30min(T11)、1h(T12)、2h（T13）各个时间点咽喉痛的视觉模拟评分(visual analogue score,VAS)。
结果 两组年龄、性别、体重等一般情况均无统计学差异，与 T0 时间点相比，S 组与 C 组 T1～T4 各时间点 HR、MAP 均有上升，S 组上升差异无统计学意义(P>0.05），C 组上升差异有统计学意义(P<0.05）。与 C 组相比，S 组插管期间 T1～T4 各时间点以及拔管期间 T6～T9 各时间点 HR、MAP 均降低，差异有统计学意义(P<0.05）。两组患者肌松恢复时间分别为 7(7,8)、8(8,10)min,气管拔管时间分别为 11(11,12)、12(11,13)min，差异均无统计学意义(P>0.05)。S 组患者术后 T11～T13 各个时间点咽喉痛的 VAS 评分明显低于 C 组（P<0.05）。两组患者均未发生呛咳等不良反应。

结论 超声引导下喉上神经阻滞麻醉可以有效地维持老年患者胸科手术全麻双腔管插管及拔管期间血流动力学稳定,与空白对照组比较并不影响患者苏醒时间,两组均无不良反应的发生，但 SLN 阻滞组术后咽部疼痛改善效果更佳。

PU-1276

艾司氯胺酮局部用于胸椎旁阻滞对胸腔镜手术镇痛的影响

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目的 评价艾司氯胺酮作为局麻药佐剂联合罗哌卡因行胸椎旁阻滞用于单孔胸腔镜手术对患者围术期镇痛的影响。
方法 选择择期行单孔胸腔镜手术患者 70 例，年龄 18-65 岁，BMI≤30kg/m2，ASA 分级Ⅰ-Ⅲ级，采用电脑分配随机数字方法，将患者分为 2 组（n=35）：单纯罗哌卡因组（R 组）和艾司氯胺酮联合罗哌卡因组（KR 组）。均采用超声引导下胸椎旁神经阻滞，R 组于椎旁间隙注射 0.375%罗哌卡因 0.3ml/kg，KR 组于椎旁间隙注射含艾司氯胺酮 0.5mg/kg 的 0.375%罗哌卡因 0.3ml/kg。采用疼痛数字评分（Numerical Rating Scale,NRS）评分评估疼痛程度，于拔管后 0min（T1），30min（T2），1h（T3），2h（T4），4h（T5），8h（T6），24h（T7），48h（T8）时，记录静态和动态 NRS 评分，记录镇痛有效（NRS≤3 分）的情况，记录镇痛泵使用情况、首次补救性镇痛时间和补救性药物用量。随访患者术后 3 月、6 月切口慢性疼痛情况。记录围术期心血管不良事件，恶心呕吐，局麻药中毒反应，穿刺部位出血或血肿的发生情况。
结果 最终有 64 名患者（R 组 32 例，KR 组 32 例）纳入分析。两组患者术中丙泊酚和瑞芬太尼的用量无统计学意义，P＞0.05。KR 组患者的拔管时间较 R 组患者长，P＜0.001。KR 组患者术后 4h、8h、24h、48h 的静态 NRS 评分低于 R 组，P＜0.05；KR 组患者术后 1h、2h、4h、8h、24h 的动态 NRS 评分低于 R 组患者，P＜0.05，KR 组在各时间点的 NRS 评分均低于 R 组。两组患者术后各时间点的动态 NRS 评分和静态 NRS 评分的变化趋势一致，上述各时间点中，术后 8 小时处于术后急性疼痛的高峰值。KR 组患者各时间点处于中度以上疼痛的患者人数在 4h 和 8h 时明显少于 R 组。两组患者术后镇痛泵药物用量无统计学意义。两组患者围术期恶心呕吐、心血管不良事件等副作用无明显统计学差异。
结论 本研究表明艾司氯胺酮联合罗哌卡因较单纯罗哌卡因行超声引导下椎旁神经阻滞可延长单孔胸腔镜患者术后的镇痛时间，加强镇痛效果且未增加明显的副作用。

PU-1277

The fast-track anesthesia protocol in patients undergoing thoracoscopic radiofrequency ablation of atrial fibrillation: a real-world data research

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Objectives To investigate the safety and effectiveness of fast-track anesthesia (FTA) compared with non-FTA in adult patients undergoing thoracoscopic atrial fibrillation (AF) radiofrequency ablation surgery and to preliminarily evaluate the risk factors for FTA failure.
Methods Thirty-three patients undergoing elective thoracoscopic AF radiofrequency ablation

surgery were included in this retrospective observational study, and they were divided into FTA and non-FTA group based on the real anesthetic protocol. The perioperative information of the two groups was compared, with postoperative hospital stay as the primary endpoint. Univariate logistic regression analysis was used to analyze the risk factors associated with the performance of the FTA protocol.

Results Of the 33 patients, 25 successfully completed the FTA protocol and returned to the ward after surgery, while 8 patients underwent the non-FTA protocol and continued recovery in the intensive care unit. In the non-FTA group, there were significantly more females and patients with New York Heart Association (NYHA) class III, chronic AF with slow ventricular rate, and high CHA2DS2VASc score than those in the FTA group. Furthermore, opioid consumption was lower, nerve block implementation rate was higher, postoperative extubation was earlier, gastrointestinal function and mobility were recovered earlier, postoperative hospital stay and total hospital stay were shorter, and medical costs were lower in the FTA group. According to the results of the univariate logistic regression analysis, the risk factors for the implementation of the FTA protocol were female sex, chronic AF with slow ventricular rate, and high CHA2DS2VASc score.

Conclusion The FTA protocol is safe and beneficial in patients undergoing thoracoscopic AF radiofrequency ablation surgery. Female sex, chronic AF with slow ventricular rate, and high CHA2DS2VASc score may be the contributing factors for FTA failure.

PU-1278

红细胞分布宽度与体外循环心脏和主动脉瘤手术后肝损伤之间的关系

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Objective This study aimed to investigate the association between preoperative red blood cell distribution width (RDW) levels and liver injury (LI) after cardiac surgery and aortic aneurysm surgery with cardiopulmonary bypass, to highlight RDW's utility in early identification and intervention for patients at high risk of LI.

Methods Postoperative LI was defined by increased liver enzyme levels and/or hyperbilirubinemia, noted from the time of surgery to discharge. Logistic regression analyses were conducted to examine the RDW-LI relationship, with stratified analyses based on age, gender, and anemia. Survival within 30 days was assessed using the Kaplan-Meier method, with survival curve differences analyzed via the log-rank test. The study included three sets of sensitivity analyses.

Results Postoperative LI was observed in 75 patients (10%). Multivariate regression analysis showed a significant association between high RDW levels and postoperative LI (adjusted Odds Ratio=3.25, p=0.033, 95% CI:1.1–9.63), even after adjusting for all covariates. This association remained consistent across three sets of sensitivity analyses. Subgroup analysis showed men had a higher correlation with LI (p for interaction=0.041). Kaplan-Meier analysis indicated a significantly lower survival rate in the LI group (76%) compared to the non-LI group (99.6%, P<0.001).

Conclusion This study is the first to identify a significant association between preoperative RDW and postoperative LI following cardiac surgery. RDW could serve as a significant useful marker for early detection and intervention in patients at high risk of LI, thereby potentially improving patient outcomes.

PU-1279

磁导航与纤支镜引导下支气管封堵器肺隔离效果的比较

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目的 胸腔镜手术的麻醉中需要进行单肺通气，支气管封堵器（BBs）作为实施肺隔离技术的一种重要工具能够封堵主支气管，在保证一侧肺通气的前提下，使术侧肺充分萎陷并防止术侧肺肿瘤坏死组织、血液及分泌物进入健侧肺，从而在胸外科手术中实现可靠的肺隔离。电磁导航支气管镜系统（ENB）是将电磁定位技术、虚拟支气管镜和三维 CT 成像技术三者相结合的新一代支气管镜检查及治疗手段，是一种是安全且有效的肺部病灶定位方式。鉴于 ENB 拥有定位准确度高及安全性高的特点，ENB 可能是提高支气管封堵器肺隔离可靠性的有效方法，利用 ENB 可以实时跟踪定位传感器气管内位置的原理，精准引导 BB 定位至气管树的合适位置以实现封堵目标肺叶使其萎陷的目的。本研究比较分别采用电磁导航支气管镜系统（ENB）和纤维支气管镜（FOB）引导下定位支气管封堵器的肺隔离效果，以期为胸科麻醉的气道管理提供一种新的支气管封堵器定位方法。
方法 选择 106 例择期接受胸腔镜下需单肺通气手术的患者，根据 BB 定位的方式随机分为试验组（ENB 组）和对照组（FOB 组），分别用 ENB 和 FOB 引导定位支气管封堵器。比较两组肺隔离效果评分、定位时间、定位尝试次数、支气管封堵器移位率以及术中 FOB 的使用次数，记录两组患者插管前（T0）、支气管封堵器定位前（T1）和定位成功即刻（T2）的心率（HR）和平均动脉压（MAP），记录两组患者单肺通气前、单肺通气 10min 和 30min 的动脉血氧分压和二氧化碳分压以及血常规、CRP、术后肺部并发症等术后随访指标，并进行比较。
结果 ENB 组定位支气管封堵器的肺隔离效果评分高于 FOB 组($p=0.012$)，且 ENB 组的定位时间较 FOB 组更短($p<0.001$)。两组定位尝试次数、封堵器移位率、术中 FOB 的使用次数、血流动力学参数、机械通气参数、单肺通气的氧合指标以及术后随访指标比较，差异无统计学意义($p>0.05$)。
结论 磁导航引导的 BB 定位是一种有效的肺隔离方法，磁导航定位支气管封堵器的肺隔离效果优于传统纤支镜引导的 BB 定位，且磁导航可缩短支气管封堵器的定位时间。

PU-1280

新辅助化疗后心脏毒性患者的非心脏手术麻醉管理

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目的 大量实性肿瘤患者在手术切除肿瘤前必须接受包括化疗、放疗和免疫治疗（单独或联合）的新辅助治疗。这些治疗方法不仅针对快速分裂的癌细胞，而且也针对非恶性细胞，从而导致毒性。新辅助化疗（neoadjuvant chemotherapy，NAC）是在应用局部治疗方法（手术或放疗）前，为使肿块缩小、尽早杀灭肿瘤细胞所实施的全身化疗。但 NAC 药物可以对心脏产生不同程度的损伤，主要表现为心肌缺血、心律失常、动脉高压、心肌功能障碍，甚至心力衰竭，现已成为后续肿瘤手术围术期重要的危险因素，可能会影响手术进行以及患者的生命安全。麻醉医生在围术期对肿瘤心脏病患者进行相关的评估、积极的预防及处理尤为重要。
方法 本病例报告报到了一名 54 岁的男性患者，诊断“右肺上叶腺癌”，因考虑肿瘤瘤体较大，手术风险较高，决定先行二期肺癌术前新辅助化疗(顺铂+紫杉醇)。患者在化疗后出现心脏不适症状，经由心内科专科会诊确诊为扩张性心肌病，考虑与患者接受新辅助化疗后导致的心脏毒性有关。拟限期全麻下行“右肺癌根治术（右肺中上叶切除术+胸膜粘连烙断术+区域淋巴结清扫）”。
结果 患者入室后建立常规监护，监测有创血压（ABP），麻醉诱导缓慢分次给药，双腔气管插管顺利平稳，对位良好，右侧颈内静脉穿刺置管测压（CVP）。静吸复合全麻维持心肌氧供需平衡、

通气及麻醉深度适度，术中实施肺保护性通气策略，术后多模式镇痛给与充分镇痛。手术时间 90 分钟，出血量约 150 ml，尿量 750 ml，共补晶体液 1500 ml。术后即刻苏醒，肌力恢复后拔除气管内导管，患者术后积极康复锻炼，于术后第 12 天顺利出院。

结论 肿瘤患者新辅助化疗后的麻醉管理需要建立一个多学科的管理团队，对患者围术期可能发生的心血管并发症进行预测和预防，实现全程、有效、科学的管理和治疗。术前充分评估并努力改善心功能，术中注意密切监护，维持合理的心脏负荷，在麻醉诱导和苏醒阶段仔细调控循环，实施精准麻醉联合心脏保护措施，术后继续进行有效的循环支持，保障手术的顺利进行，并有利于提高患者的远期生存率。

PU-1281

Effect of anesthetic technique on serum VEGF-C and TGF-βlevels after video-assisted thoracic surgery for non-small-cell lung cancer: a prospective, randomized and controlled trial

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Background Surgery causes immunosuppression and promotes high levels of angiogenesis. Certain anesthetics or anesthesia techniques may affect the immunologic function to potentially influence cancer recurrence and metastasis. Vascular endothelial growth factor C (VEGF-C) and transforming growth factor-β (TGF-β) were essential for tumor angiogenesis. Therefore, this study was applied to compare the effects of propofol/remifentanil-based total intravenous anesthesia (TIVA) and sevoflurane-based inhalational anesthesia on the release of VEGF-C and TGF-β, as well as inflammatory mediators in the patients with non-small-cell lung cancer undergoing thoracoscopic lung cancer surgery.

Methods Forty patients were randomized to receive either sevoflurane-based inhalational anesthesia (SEV group) or propofol/remifentanil-based TIVA (TIVA group). Blood samples were taken before anesthesia and at 24 hours after surgery for measuring serum VEGF-C, TGF-β and inflammatory mediators, which were analyzed by using enzyme-linked immunosorbent assays.

Results There were 20 patients assigned to each of the SEV group and TIVA group. VEGF-C serum concentrations increased after surgery from 844 (772–922) pg/ml to 864 (787–946) pg/ml in the SEV group, but decreased in the TIVA group from 903 (837–950) pg/ml to 834(805–876) pg/ml. The change of pre- and postoperative VEGF-C concentrations was significantly lower in the TIVA group than in the SEV group (P=0.013). There were no significant differences in the preoperative and postoperative TGF-β concentrations between the two groups. The changes of pre- and postoperative IFN-γ, IL-6 and IL-10 concentrations were significantly lower in the TIVA group than in the SEV group. **Conclusion** Propofol/remifentanil-based TIVA can effectively reduce the increases of VEGF-C concentrations after surgery in comparison to sevoflurane-based inhalational anesthesia in patients undergoing thoracoscopic lung cancer surgery. Whereas the release of TGF-β was not affected by the two anesthetic methods.

PU-1282

Midazolam exerts anti-tumor effects via the lncRNA XLOC_010706/ miR-520d-5p/STAT3/autophagy pathway in non-small cell lung cancer

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Background Anesthesia and perioperative management contribute to long-term outcomes of patients with cancer. Midazolam is a widely used anesthetic of the benzodiazepine, the present study aimed to investigate the anti-tumor effects of midazolam in non-small cell lung cancer (NSCLC).
Methods The anti-tumor effects of midazolam on A549 and H1650 cells were analyzed by CCK-8, colony-forming assay, Annexin V-fluorescein isothiocyanate Apoptosis Detection Kit I, Transwell assay, and subcutaneous cancer models in nude mice which were established to evaluate its anti-tumor effects in vivo. Dual-luciferase reporter assay, RT-qPCR, and Western-Blot (WB) assay were employed to confirm the interaction in lncRNA XLOC_010706/miR-520d-5p/STAT3 axis.
Results Midazolam could inhibit both cell proliferation and invasion, and it induce apoptosis in A549 and H1650 cells in vitro and in vivo by promoting autophagy ($P<0.05$). Midazolam in the microenvironment can down-regulate the expression of lncRNA XLOC_010706 ($P<0.05$). Regarding the signaling pathway, lncRNA XLOC_010706 could act as a competing endogenous RNA (ceRNA) to target miR-520d-5p, and Signal transducer and activator of transcription 3 (STAT3) identified as a functional target gene for miR-520d-5p in NSCLC. Subsequently, lncRNA XLOC_010706 acts as an oncogene to promote both cell proliferation and invasion, and inhibit apoptosis via miR-520d-5p/STAT3 axis in NSCLC.
Conclusions Midazolam can down-regulate lncRNA XLOC_010706 expression, and lncRNA XLOC_010706 acts as an oncogene in NSCLC. Midazolam can exert anti-tumor effects via the lncRNA XLOC_010706/miR-520d-5p/STAT3 pathway by promoting autophagy in NSCLC, and lncRNA XLOC_010706 may serve as a novel diagnostic biomarker and therapeutic target for patients with NSCLC.

PU-1283

脑电监测下联合使用右美托咪定和瑞芬太尼对冠心病患者行胸腔镜手术的临床研究

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吉林省肿瘤医院

目的 本研究旨在探讨在脑电双频指数监测下联合使用右美托咪定和瑞芬太尼对冠心病患者行胸腔镜手术的安全性及临床效果。
方法 选择 2023 年 1 月-2024 年 3 月期间在本院做胸腔镜手术的冠心病患者 60 例，术前经过药物治疗后心电图均无 ST-T 改变且无心律失常发生，ASAI-II 级，随机双盲分为对照组（I 组）30 例，右美托咪定组（II 组）30 例。全麻诱导方案相同，术中麻醉维持均采用静吸复合麻醉方案：I 组 30 例患者术中麻醉采用血浆靶控泵注瑞芬太尼(速度为 1-2ng/ml)，同时复合吸入七氟烷；II 组 30 例患者则采用右美托咪定(速度为 1mg/ml)联合瑞芬太尼血浆靶控(速度为 1-2ng/ml)泵注，同时复合吸入七氟烷，通过脑电双频指数监测（BIS）、肌松监测等手段按需追加舒芬太尼和苯磺酸顺阿曲库铵。观察并记录两组患者在进入手术室时（T1）、CO2 气腹开始时（T2）、CO2 气腹结束时（T3）、

出手术室时（T4）各时间点两组患者的血压、心率等生命体征的变化；T1～T4 各时间点心电图 ST-T 的下移情况；T1～T4 各时间点脑电双频指数（BIS）的数值；手术结束和术后 1h 时间点患者的疼痛评分（VAS 评分）。

结果 ①两组患者年龄、身高、体重、ASA 状态及手术时间等指标差异均无统计学意义（P＞0.05）。②两组患者在 T1、T2、T3、T4 各时间点血压的比较，I 组明显高于 II 组，差异有统计学意义（P＜0.05）。③两组患者在两组患者在 T1、T2、T3、T4 各时间点心率的比较，I 组明显高于 II 组，差异有统计学意义（P＜0.05）。④两组患者在 T1、T2、T3、T4 各时间点心电图 ST-T 的下移情况：I 组高于同时点 II 组，差异有统计学意义（P＜0.05）。⑤两组患者在 T1～T4 各时间点脑电双频指数（BIS）的数值比较：I 组明显高于 II 组，差异有统计学意义（P＜0.05）。⑥两组患者在手术结束时疼痛评分（VAS 评分）无明显差异，（P＞0.05）；在术后 1h 时间点患者的疼痛评分：I 组患者高于同时点 II 组,镇痛效果比较差异有统计学意义（P＜0.05）。

结论 老年冠心病患者行胸腔镜手术，术中应用右美托咪定联合瑞芬太尼麻醉，能够稳定循环，减少术中心肌缺血的发生，明显减轻患者术后疼痛，并不增加术后不良反应的发生率，同时还能够明显抑制术中及术后应激反应，促进术后的快速康复（ERAS），临床效果比较满意，是安全可靠的。

PU-1284

罗哌卡因联合索拉非尼通过抑制 miR-224/HOXD10 轴抑制肝细胞癌细胞增殖和转移

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目的 肝细胞癌（HCC）细胞耐药性的发展限制了索拉非尼（Sor）的疗效。然而，Sor 和罗哌卡因（Rop）联合作用对 HCC 细胞的调节机制尚不清楚。本研究为发现 Rop+Sor 诱导肝癌细胞凋亡以及 Rop 非麻醉作用的新突破。

方法 应用 qRT-PCR 技术检测肝癌细胞中 miR-224 和 HOXD10 mRNA 的表达。CCK-8、Transwell 测定和裸鼠肿瘤形成实验用于评估 HCC 细胞的增殖、迁移和侵袭。还使用细胞划痕测定法分析 HCC 细胞的迁移。starBase 3.0 软件预测和双荧光素酶报告基因测定 miR-224 的靶基因，苏木精-伊红染色检测肿瘤面积。

结果 CCK-8 结果显示 Rop 和 Sor 以浓度依赖的方式显著降低 HepG2 和 Huh7 细胞的活力。选择 IC50 进行后续研究，CCK-8 结果显示 Rop、Sor、尤其是 Rop+Sor 联合使用降低 HepG2 和 Huh7 细胞的活力。qRT-PCR 分析显示 miR-224 在 HepG2 和 Huh7 细胞中的表达显著增加，Rop 或 Sor 治疗降低了 miR-244 的表达，尤其是 Rop+Sor 联合治疗。与阴性对照组相比，miR-224 mimic 的转染增加了裸鼠中 HCC 细胞的增殖和肿瘤大小，以及 Rop 和 Sor 存在下的体外迁移和侵袭。双荧光素酶报告基因测定显示 HOXD10 被 miR-224 靶向 HOXD10 蛋白表达，并且在 HepG2 和 Huh7 细胞中显著降低。Rop 或 Sor 处理增加了 HOXD10 蛋白的表达，特别是联合处理。miR-224 在用 Rop 和 Sor 处理的 HCC 细胞中负调控 HOXD10 的表达。与阴性对照转染相比，在 Rop 和 Sor 存在的情况下，转染介导的 HOXD10 沉默增加了 HCC 细胞的增殖、迁移和侵袭。

结论 Rop 和 Sor 的联合作用通过 miR-224/HOXD10 轴减弱 HCC 细胞的增殖和转移。

PU-1285

经皮耳穴迷走神经刺激对胃癌术后胃肠功能的影响

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目的 我随着我国老年人人口增多，老年患者由于机体耐受性降低，胃肠功能紊乱带来的严重心脑血管意外风险进一步增加。因此, 如何在围术期预防胃肠功能紊乱是目前医学面临的重要问题。目前临床上多采用药物和加强围术期管理防治胃肠道功能障碍。但同时增加了药物的副作用的风险，存在严重影响患者预后的风险。近年来关于穴位刺激对自主神经功能调节作用越来越受到重视。穴位刺激具有良性双向调整作用，可协调交感神经与迷走神经的平衡性，这种方法越来越成为调节自主神经功能的重要方法之一，从而为围手术期降低 POGD 发生率提供了新思路。本文探讨经皮耳穴迷走神经刺激对胃癌术后胃肠功能的影响。
方法 选择择期全麻下行腹腔镜胃切除手术的患者 70 例。采用随机数字表法分为 taVNS 组和对照组各 35 例。taVNS 组在麻醉前 30 分开始予以经皮耳穴迷走神经刺激，直至手术结束时停止。对照组同样在麻醉前 30 分开始时把电子针疗仪上的导电硅固定在 taVNS 组同样穴位位置，而不进行电刺激，直至手术结束时停止。观察胃肠功能恢复指标（首次肛门排气时间、术后首次肛门排便时间、术后首次经口进饮食时间、首次下床活动时间及住院时间），术后并发症（术后肺部感染、切口感染、下肢深静脉血栓、吻合口瘘和胃瘫综合征），术后第 24h、48h、72h 腹痛 VAS 评分，术后第 24h、48h、72h 恶心呕吐评分，术后第 24h、48h、72h 腹胀评分。
结果 通过观察两组患者的相关数据，taVNS 组患者术后首次肛门排气时间、术后首次肛门排便时间、术后首次经口进饮食时间及住院时间均短于对照组，组间比较差异有统计学意义（P<0.05）；两组患者术后首次下床活动时间比较差异无统计学意义（P>0.05）。两组患者的术后肺部感染率、切口感染率、下肢深静脉血栓率、吻合口瘘率和胃瘫综合征率比较差异均无统计学意义（P>0.05）。taVNS 组患者术后第 24h、48h、72h 腹痛 VAS 评分均显著低于对照组，差异有统计学意义（P＜0.05）。taVNS 组患者术后第 24h、48h 恶心呕吐评分显著低于对照组，差异有统计学意义（P＜0.05），两组术后第 72h 比较差异无统计学意义（P>0.05）。taVNS 组患者术后第 24h 腹胀评分显著低于对照组，差异有统计学意义（P＜0.05），两组术后第 48h、72h 比较差异无统计学意义（P>0.05）。
结论 全麻诱导期实施经皮耳穴位迷走神经刺激疗法可以缩短术后首次肛门排气时间、术后首次肛门排便时间、术后首次经口进饮食时间及住院时间，有效降低胃癌根治术后患者腹痛、恶心、呕吐及腹胀的胃肠道不良反应发生率，为术后胃肠道功能紊乱的防治提供新的思路，更好地保障患者围手术期安全。

PU-1286

Current Situation and Research Hotspots of Pheochromocytoma in Pregnancy: A Bibliometric Analysis（1990-2024）

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Objective Pheochromocytoma concurrent with pregnancy is a rare cause of hypertension during pregnancy, with an incidence rate of 0.007%. While perioperative guidelines for pheochromocytoma have been published internationally, there are currently no guidelines specifically addressing pheochromocytoma during pregnancy. This paper aims to perform a

bibliometric analysis of the literature on pheochromocytoma concurrent with pregnancy, summarizing the current status, research achievements, hotspots, and trends in the field.
Methods A comprehensive search was conducted in the Web of Science Core Collection and PubMed databases for articles related to pheochromocytoma concurrent with pregnancy from 1990 to 2024. Excel 2022 was used to analyze the publication volume and types, summarizing the current research status. A total of 203 articles from the Web of Science Core Collection were subjected to bibliometric statistical analysis, with metrics including country, institution, author, journal, references, and author keywords. Tools used for analysis included Excel 2022, VOSviewer, and CiteSpace.
Results From 1990 to 2024, a total of 273 articles related to pheochromocytoma concurrent with pregnancy were identified in WoSCC and PubMed. Case reports were the most common type of publication (n=203, 74%), followed by review articles, with the highest number of publications occurring in 2010. The bibliometric analysis included 203 articles from the WoSCC database. The United States was the leading country in publication, with significant contributions from Radboud University Nijmegen in the Netherlands. "Gynecological Endocrinology" was the most popular journal in this field. Jacques W.M. Lenders was the most prolific author and also had the highest co-citation count. Research by Bancos and others on factors influencing maternal and infant outcomes was the most cited reference from 2022 to 2024. The most frequently occurring keywords were "pregnancy," "pheochromocytoma," "hypertension," and "paraganglioma." Keyword cluster analysis indicated "Multiple Endocrine Neoplasia; surgery" as a popular topic, while emerging keyword analysis highlighted "adrenal tumor; mutations; tumor; catecholamine; management" as recent hot topics.
Conclusion This is the first comprehensive bibliometric study summarizing the state of research and hotspots concerning pheochromocytoma concurrent with pregnancy. It highlights influential research and outlines major findings, providing guidance for the diagnosis and treatment of pheochromocytoma during pregnancy. Current research hotspots focus on mechanisms and treatments related to pheochromocytoma during pregnancy, such as genetic mutations, catecholamines, and patient management, offering a reference for researchers needing insight into the dynamics and hot topics in the field.

PU-1287

环泊酚通过抑制 MAPK/ERK 信号通路在肝细胞癌中发挥抗肿瘤作用

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目的 探究环泊酚（Ciprofol）对肝细胞癌（HCC）生物学行为的抑制作用及相关机制。
方法 使用不同浓度的环泊酚处理 Hep3B 和 HCCLM3 两种肝癌细胞系，于不同时间点使用细胞计数试剂盒 8（CCK8）检测细胞数量，确定环泊酚对于肝癌的作用以及最佳浓度。通过克隆形成实验和 EdU 实验评估肝癌细胞的增殖能力，通过 Transwell 和 wound healing 实验分别评估细胞侵袭和迁移能力。使用 Hep3B 建立皮下异种移植及肝脏原位移植模型，确定环泊酚对体内 HCC 肿瘤发生发展的影响。建立肝癌肺转移模型来确定环泊酚对 HCC 转移能力的影响。通过 RNA 测序（RNA-seq）确定环泊酚处理后 Hep3B 细胞转录组水平的变化，差异基因显著富集的通路。随后通过 western blot 及免疫荧光检测对 RNA 测序分析预测的信号通路进行验证。
结果 环泊酚以时间及浓度依赖的方式抑制 Hep3B 及 HCCLM3 细胞的活力，且在 5μM 和 10μM 的环泊酚显示出显著的抗肿瘤活性。使用 0,5 和 10μM 浓度的环泊酚处理肝癌细胞，CCK8、EdU、Transwell 和创面愈合实验结果显示，环泊酚以时间及浓度依赖的方式抑制 Hep3B 及 HCCLM3 细胞的增殖，迁移和侵袭能力。体内实验发现环泊酚可抑制小鼠皮下瘤、肝脏原位癌的生长，及肝癌的肺转移能力。RNA-seq 显示，环泊酚处理 Hep3B 细胞，差异基因显著富集于 MAPK/ERK 通路。

Western blot 及免疫荧光结果显示，环泊酚降低了 Raf，MEK 及 ERK 的磷酸化水平及其在细胞核内的表达水平，但不改变其总蛋白的表达量。
结论 环泊酚通过抑制 Raf，MEK 及 ERK 的磷酸化，从而抑制 HCC 细胞中的 MAPK/ERK 信号通路，发挥其对 HCC 生物学行为的抑制作用。在临床实践中，我们的研究将为 HCC 手术患者的麻醉用药提供参考。

PU-1288

Effect of different intraoperative blood pressure regulation levels on postoperative myocardial injury in patients undergoing radical mastectomy for breast cancer after receiving neoadjuvant chemotherapy: a study protocol for a randomized controlled trial

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Introduction: For breast cancer patients receiving preoperative neoadjuvant chemotherapy, there is an increased risk of postoperative myocardial injury due to the cardiotoxicity of the chemotherapeutic agents. The optimal intraoperative blood pressure regulation regimen for these patients is unclear. This study is being conducted to determine whether targeting mean arterial pressure (MAP) to 100%-120% of the patient's baseline blood pressure reduces the incidence of MINS compared to targeting MAP to 80%-100%.
Methods and analysis: The study is a single-center, single-blind, prospective randomized controlled trial. It is expected to enroll 166 subjects between the ages of 40-75 years, scheduled for radical mastectomy. Participants will be randomized 1:1 to a lower-level group: intraoperative MAP control at 80-100% of baseline values or a higher-level group: intraoperative MAP control at 100-120% of baseline values. The primary outcome is defined by the incidence of MINS at 6-8h,24h, and 48h postoperatively. The secondary outcomes are HFABP values at 1-2h, 6-8h, and 24h postoperatively; the incidence of AKI within 48h postoperatively; QoR-15 scores at 24h,48h postoperatively; PAÇU length of stay; other postoperative cardiovascular complications; the number of times rescue analgesia and antiemetics are required; the time to first ambulation; length of postoperative hospitalization.

PU-1289

Progress of research on the role and mechanism of lidocaine in tumors

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Lidocaine, a local anesthetic, has been reported to mediate the development of a wide range of tumor cells, and it inhibits tumor cell proliferation by negatively affecting cancer cell signaling and gene modification. Cellular pyroptosis is a recently discovered novel mode of cell death, which can be promoted by inducing calcium overload in tumor cells or activating signaling pathways.The role of lidocaine in cellular pyroptosis in tumor therapy is a promising direction of research, so this paper

aims to explore the mechanism of antitumor resistance of lidocaine by triggering cellular pyroptosis, with the aim of providing useful references to the research in the related fields.

PU-1290

艾司氯胺酮对腹腔及盆腔肿瘤切除术患者术后焦虑的影响

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目的 背景：长期临床观察发现，围术期患者经普遍容易出现焦虑的心理状态,这种焦虑是继发于疾病、住院治疗、计划进行麻醉和手术时而表现出的紧张不安的不愉快状态，尤其是肿瘤患者，焦虑程度更为严重。近年来的研究表明，术前焦虑的患病率从 60%-70%不等，给患者带来许多不良的影响，如情绪激动、躁动不安等。焦虑也会影响患者对手术的耐受能力，对术后疼痛感知和康复都有不利的影响，甚至会出现焦虑型认知功能障碍。进而不利于患者术后的康复，延长住院时间，增加医疗费用和社会负担。艾司氯胺酮为氯胺酮的右旋拆分体，可用于治疗难治性抑郁症，目前国内多用于麻醉操作、围术期疼痛控制、有创操作时的镇痛，较少应用于抗焦虑治疗，因此，我们将探索一种新的治疗方法，来缓解患者的围术期焦虑状态。
目的：旨在探讨术中泵注艾司氯胺酮对腹腔镜下行腹腔及盆腔肿瘤切除术患者的术后焦虑的影响。
方法 收集本院择期行腹腔或盆腔肿瘤切除术的患者 80 例，年龄 18-75 岁，ASAⅠ-Ⅱ级，根据随机数表法分为两组，实验组术中泵注艾司氯胺酮（0.125mg/kg/h），对照组泵注等体积的生理盐水。两组均在手术开始前 30min 泵注。观察指标：1.两组诱导时（T1）、插管后 1h（T2）、拔管时（T3）三个时间段的心率（heart rate，HR）和平均动脉压（mean arterial pressure, MAP）；2.两组术后 1d，2d，5d 的医院焦虑抑郁量表（HADS）和汉密尔顿焦虑量表（HAM）；3.同时记录患者术后恶心呕吐、头晕、头痛、伤口疼痛、呼吸抑制、谵妄等不良反应。
结果 艾司氯胺酮组术后 1d、2d 的 HADS 和 HAM-A 评分均低于 N 组，差异有统计学意义（P＜0.05），两组 5d 的 HADS 和 HAM-A 均无统计学差异（P＞0.05），艾司氯胺酮组 T1 的 MAP 和 HR 较对照组高（P＜0.05），艾司氯胺酮组和对照组在 T2 的 MAP 和 HR 比较，无统计学差异（P＞0.05）； T3 的 MAP 和 HR 均较对照组低（P＜0.05），（P＜0.05）；与对照组相比，艾司氯胺酮组出现术后恶心呕吐、呼吸抑制的比例明显降低（P＜0.05）。
结论 术中泵注 0.125mg/kg/h 艾司氯胺酮能够短暂缓解患者术后焦虑情况，患者术后的不良反应也相对减少。

PU-1291

持续静脉泵注右美托咪定麻醉用于直肠癌手术麻醉苏醒期的价值

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目的 分析在直肠癌手术麻醉苏醒期中右美托咪定持续静脉泵注麻醉的价值。
方法 于 2018 年 1 月--2020 年 2 月，选取直肠癌手术 60 例，根据其就诊单双号分组，单号 30 例为控制组，双号 30 例为试验组。控制组给予静脉全麻，基于此试验组给予右美托咪定持续静脉泵注麻醉。比较两组对象 TNF-α 水平变化、并发症率及苏醒情况。
结果 两组对象术后 1d、7d TNF-α 水平、并发症率、苏醒延迟率、苏醒时间对比发现试验组均明显优于控制组（P<0.05），有统计学价值。
结论 在直肠癌手术麻醉苏醒期中右美托咪定持续静脉泵注麻醉的效果显著，即可抑制炎症反应

，减少并发症和苏醒延迟，可缩短麻醉苏醒时间，值得推广研究。

PU-1292

两例腹腔巨大肿瘤手术的麻醉策略思考

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目的 通过回顾 2 例来源不明腹腔巨大肿瘤患者手术的麻醉，总结与探讨此类手术麻醉平稳与安全的处置策略

方法 1、麻醉手术前充分的 MDT 和术中病情变化处理预案：从腹腔巨大肿瘤的活动度、周围脏器粘连与血管侵犯情况、神经分泌性特点等多维度进行评估。对于术中瘤体离体前后可能的大出血、大血管压迫解除时回心血量迅速冲击心脏所造成短时循环剧烈波动、由巨大肿瘤引起的限制性通气障碍转变为复张性肺水肿等，提前做好风险处置预案。

２、详尽的围麻醉期准备：两例患者术前均行呼吸功能锻炼，充足备血，有创动脉血压监测，体温、尿量、BIS 监测，开放深静脉通路，备血管活性药物。术中随时做好大量输血准备，避免大出血死亡三角形成，保证重要脏器的血供氧供，维持循环稳定，防止心脑血管意外发生。

３、麻醉中及时判断处置，维持循环功能稳定：麻醉诱导均采用快速顺序诱导，全凭静脉麻醉维持。手术开始前后，在心功能允许情况下迅速晶、胶体扩容，保证基本容量，增加血管反应性。两例患者瘤体离体时循环波动均剧烈，一例迅速大量出血，血压血氧一度测不出，心脏空搏状态，立即改变体位促进静脉回流，快速输血补液复合血管活性药物，瘤体离体后及时彻底止血，10min 内循环重新建立；另一例瘤体离体时血压骤升，常规处理改善不理想，转换思路考虑瘤体有分泌性改用酚妥拉明乌拉地尔立即见效，离体后泵注去甲肾上腺素，循环逐渐趋于稳定，血管活性药物逐渐停药。

４、持续关注麻醉恢复期生命体征稳定：术后及时心肺一体化超声评估心肺功能，循环容量，避免急性心衰肺水肿，下肢超声筛查，预防 VTE,采用多模式镇痛，静脉自控镇痛泵复合神经阻滞完善镇痛

结果 两例患者均带管送 ICU，术后当日拔管，恢复良好出院，术后病理结果支持副神经节瘤

结论 对两例瘤体巨大、来源不明、周围有压迫、疑似儿茶酚胺分泌性的手术麻醉，充分研判术中瘤体挤压造成的循环骤升骤降心脑血管意外，以及大出血引起的凝血功能紊乱、低体温、酸中毒、再灌注损伤和血栓形成的麻醉风险，预置中心静脉通路，合理的扩容血液稀释，避免低体温，维持改善凝血功能，提前备血防止了循环休克时血液输注不及时引起来的脏器功能损伤，瘤体搬动引起来的循环波动一般处理无效时积极转变思路

PU-1293

MFG-E8 和 GNA14 在子宫内膜异位症中的表达及其临床意义

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目的 探讨分析乳脂球表皮生长因子 8（milk fat globule epidermal growth factor-8，MFG-E8）和 GNA14 在子宫内膜异位症中的表达及其临床意义。

方法 方法 选取我院 2015 年 5 月至 2017 年 5 月收治的 82 例卵巢型子宫内膜异位症患者和 63 例子宫内膜异位症非典型增生患者以及 51 例子宫内膜异位症相关性卵巢上皮性癌（卵巢型子宫内膜异位症恶性病变）患者。采用免疫组化法检测 3 组患者病变组织中 MFG-E8、GNA14 表达情况，比较 3 组病变组织中 MFG-E8、GNA14 表达情况及其与临床病理特征的关系，并随访 5 年后患者

生存情况，分析其表达水平与子宫内膜异位症内异癌变的关系。
结果 结果 免疫组化法结果显示，子宫内膜异位症恶性病变组患者病变组织中 MFG-E8 阳性率 82.35%、GNA14 阳性率 70.59%均高于子宫内膜异位症非典型增生组的 41.27%、44.44%和子宫内膜异位症组的 25.61%、23.17%，组间差异具有统计学意义（P＜0.05）。MFG-E8 高表达与肿瘤直径、肿瘤级别、淋巴转移有关（P＜0.05），GNA14 高表达与淋巴转移有关（P＜0.05）。多因素分析结果显示，FIGO 分期Ⅱ期、淋巴转移、MFG-E8 高表达、GNA14 高表达是影响子宫内膜异位症恶性病变患者预后的独立危险因素（P＜0.05）。随访截止至 2022 年 5 月 31 日，术后 5 年内 51 例子宫内膜异位症恶性病变患者无进展生存期 23～46 个月，平均（37.46±4.23）个月 。MFG-E8 高表达患者无进展生存期低于低表达者（P＜0.01）；GNA14 高表达患者无进展生存期低于低表达者（P＜0.05）。
结论 结论 MFG-E8、GNA14 在子宫内膜异位症病变组织中呈高表达，与子宫内膜异位症癌变患者预后不良密切相关。

PU-1294

右美托咪啶对胸腔镜下肺癌手术患者围术期全身免疫炎症指数及术后康复的影响

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目的 肺癌是世界上最常见的恶性肿瘤之一，胸腔镜手术是肺癌患者常用的治疗方法，但大量研究证实，手术创伤与麻醉相关药物对机体围术期免疫功能有抑制作用，可影响肿瘤的转移与远期疗效，而肺癌的复发及转移是导致肺癌患者的主要死因。全身免疫炎症指数（systemic immune-inflammation index，SII）是一项新定义的指标，其公式是 SII=（P×N）/ L，其中 P、N、L 分别是血常规中的血小板计数、中性粒细胞计数和淋巴细胞计数，其可反映肿瘤患者免疫系统的整体状态和肿瘤微环境高度的炎性反应，大量研究显示 SII 与多种肿瘤患者的远期预后及化疗效果相关，因而可作为一项免疫指标评估机体免疫功能及肿瘤患者预后。有研究表示，右美托咪定作为麻醉辅助剂可减轻围手术期应激和炎症，保护免疫功能，具有多方面的保护作用，提示右美托咪定可能使手术患者在围手术期受益，并可能改善手术患者的临床结局。本实验通过记录围术期不同时期 SII 值，分析右美托咪定与 SII 变化水平的相关性，探索右美托咪定对肺癌手术患者围术期免疫功能及术后康复是否有助益，从而为优化围术期麻醉管理方法提供一种新思路，促进患者术后快速康复及改善远期预后。
方法 本研究选取南昌大学第二附属医院胸外科住院治疗、择期行胸腔镜手术的肺癌患者 60 例作为研究对象，年龄 18~65 岁，ASA 分级 I~Ⅱ级；采用随机对照研究，按照随机数表法分为 2 组，右美托咪啶（D 组）30 例，空白对照组（P 组）30 例。所有患者由同一名麻醉医师实施麻醉，手术操作和术后管理由同一组外科医生完成，患者对分组情况不知情。麻醉诱导前 15min,D 组静脉输注右美托咪啶，负荷量为 1ug/kg(10 min 内泵完），再恒速静脉泵注 0.5ug/(kg•h）至术毕关腹。C 组采用同样方法静脉泵注等容量生理盐水。麻醉诱导两组均给予丙泊酚 2mg/kg,舒芬太尼 0.3ug/kg，顺阿曲库铵 0.2mg/kg，麻醉维持两组患者均静脉泵注丙泊酚 4-10mg/kg/h、瑞芬太尼 0.1-0.2ug/kg/h、七氟醚 1%-3%，每隔 40min 间断给顺阿曲库铵 3mg，维持术中血压波动幅度在基线值的 20%以内，BIS 值在 40-60 之间的良好的麻醉深度。术毕入 PACU，两组患者术后镇痛均采用 PCIA，镇痛药物配方为舒芬太尼 50ug+地佐辛 15mg+托烷司琼 10mg。分别抽取两组患者麻醉诱导前（T0）、术后 1 天（T1）、术后 3 天（T2）、术后 5 天（T3）、术后 7 天（T4）外周静脉血，做血常规检验，根据检验结果，通过公式分别计算并记录 D 组和 P 组 T0、T1、T2、T3、T4 时的 SII 值。观察并记录两组患者术后住院日以及不良反应。
结果 与空白对照组（P 组）相比，右美托咪定（D 组）可减轻胸腔镜下肺癌手术患者围术期 SII 变

化水平，差异具有统计学意义(P <0.05）；D 组术后住院日较 P 组短，差异具有统计学意义(P <0.05），D 组术后不良反应较 P 组少，差异具有统计学意义(P <0.05）。
结论 右美托咪定可以减轻手术创伤与麻醉相关药物对机体的免疫抑制作用，同时可减少术后不良反应发生率，因而可促进肺癌患者术后快速康复及改善远期预后。

PU-1295

依托咪酯通过调控 JAK2/STAT3/PD-L1 轴抑制肝细胞癌免疫逃逸及其机制研究

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目的 近年来，越来越多的研究表明，围术期麻醉药物的选择与肿瘤患者的远期预后密切相关。大量的临床前和临床研究试图进一步明确麻醉药物对肿瘤微环境的影响，以进一步优化临床肿瘤患者的手术预后。在我们前期研究中发现，依托咪酯作为临床上广泛使用的一线静脉麻醉药物，可以与 ATP 竞争性结合 JAK2 的 ATP 结合口袋，从而抑制 JAK2 的磷酸化以及 JAK2/STAT3 信号通路的激活，进而显著抑制肝细胞癌细胞的恶性生物学行为，抑制肝细胞癌细胞的进一步发展。同时依托咪酯已被报道可以参与调节机体多种免疫反应，但依托咪酯是否在肿瘤免疫中发挥作用尚不明确。本研究旨在进一步阐明静脉麻醉药物依托咪酯对肝细胞癌免疫微环境的影响及其潜在的调节机制。
方法 为了明确依托咪酯对肝细胞癌免疫微环境的作用及其潜在机制，我们建立了肝细胞癌患者来源的类器官（PDO）模型、肝细胞癌患者来源的异种移植（PDX）模型、3D 共培养模型和原位肝细胞癌模型等多种体内外模型，并且采用了单细胞质谱流式、多光谱多色免疫组化、western blotting 和流式细胞学等多种实验技术对其进行探索。
结果 前期实验结果显示，依托咪酯可以显著降低肝细胞癌细胞中 PD-L1 的表达水平，并且促进 CD8+ T 细胞的浸润和活化。在机制研究上，我们发现依托咪酯可以以时间和剂量依赖的方式抑制 JAK2/STAT3 信号通路的激活，从而降低了肝细胞癌细胞中 PD-L1 的表达水平，进而促进 CD8+ T 细胞的浸润和活化。因此，我们认为依托咪酯可以通过调控 JAK2/STAT3
从而抑制了 PD-L1 的转录激活，进而促进了 CD8+ T 细胞的浸润和激活，从而抑制肝细胞癌的免疫逃逸。
结论 综上所述，本研究运用多种技术（单细胞质谱流式、3D 共培养、多光谱多色免疫组化）从多个层面（包括 PDO、PDX、小鼠、细胞）揭示了静脉麻醉药物依托咪酯通过 JAK2/STAT3/PD-L1 轴调控肝细胞癌免疫抑制微环境的分子机制。此外，我们的研究结果表明依托咪酯可以提高肝细胞癌对 PD-L1 相关抗体药物的免疫治疗疗效。总的来说，我们的发现突显了依托咪酯在肝细胞癌治疗中的巨大潜力，并为肝细胞癌临床治疗中个体化用药和改善肿瘤患者免疫功能的新药研发提供了理论基础及关键思路。

PU-1296

阿片类药物与肺癌之间潜在因果关系： 一项孟德尔随机化研究

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目的 全球范围内，处方药和非法阿片类药物的大范围滥用导致阿片成瘾，药物过量致死人数不断

增加，多国正面临严重的“阿片危机”。阿片类药物不仅增加了呼吸和心血管疾病的死亡风险，还会促进肿瘤发展和转移。有研究报道阿片类药物与肺癌风险增加相关，但是否阿片药物会直接导致肺癌仍未可知。众所周知，吸烟不仅阿片类药物使用密切相关还是导致肺癌的主要风险因素。因此，在研究阿片类药物与肺癌的因果关系时，吸烟的影响应被慎重考虑。本研究旨在利用孟德尔随机化（Mendelian randomization，MR）方法，评估阿片类药物与肺癌之间的因果关系，并探讨吸烟在其中的重要作用。

方法 本研究采用了多种孟德尔随机化方法，以遗传变异作为工具变量，研究阿片类药物暴露与不同类型肺癌的因果关联。阿片类药物、吸烟表型、肺癌的遗传工具变量分别来自 GWAS 荟萃分析数据库英国生物数据库（UK Biobank）和跨学科肺癌研究（Transdisciplinary Research in Cancer of the Lung，TRICL)。使用了单变量 MR 和多变量 MR，估计阿片药物对肺癌的直接因果效应并排除多效性。我们创新的利用三个工具变量之间的交互效应，讨论了吸烟分别在暴露和结果中对因果关系的意义。研究利用了双向 MR 分析，首次评估了阿片使用与吸烟表型间的因果效应。除此之外，应用 IVW 和 MR-Egger 回归等敏感性分析方法提高结果的稳定性。

结果 吸烟可能是阿片类药物引起肺癌的重要混杂因素。单变量 MR 分析显示，阿片类药物使用与总体肺癌发生率显著正相关（OR=1.07，95%CI=1.03-1.11，P＜0.001）。其中，阿片类药物使用对吸烟合并肺癌患者有明显的因果效应（OR=1.05, 95%CI=1.00-1.09, P =0.037），而在未吸烟者肺癌患者中未观察到类似的因果（OR=0.998，95%CI=0.896-1.11, P =0.978）。进一步分析发现，阿片类药物对肺鳞状细胞癌具有显著的因果效应(OR=1.12，95%CI=1.06-1.19，P＜0.001)，对肺腺癌和小细胞肺癌无显著影响。多变量 MR 分析同样显示，阿片类药物能直接导致肺鳞状细胞癌(OR=1.81，95% CI=1.18-2.78，P =0.007)。

结论 我们的研究揭示了阿片类药物使用、吸烟行为与肺癌风险之间复杂的相互作用：吸烟可能是阿片类药物引起肺癌的重要混杂因素；阿片类药物对肺癌具有显著的因果效应；阿片药物尤其是对肺鳞状细胞癌有直接的因果作用，并且这种因果独立于吸烟的影响。这些结果强调了在肺癌预防策略中考虑阿片类药物使用的重要性，并提示在未来应关注阿片类药物使用与吸烟的对肺癌的联合影响。

PU-1297

Semiquantitative 131I-MIBG Scintigraphy Predicts Intraoperative Blood Pressure Fluctuation in Patients Undergoing Surgery for Pheochromocytoma and Paraganglioma

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Severe BP fluctuation may happen during surgery for pheochromocytoma and paraganglioma (PPGL) due to release of catecholamines. 131I-MIBG scintigraphy indicates capacity of PPGL to retake and reserve catecholamines and may predict intraoperative BP fluctuation. This study aims to investigate whether 131I-MIBG scintigraphy and other risk factors predict blood pressure (BP) fluctuation in patients receiving PPGL surgery.

Methods This is a retrospective observational cohort study. Patients with suspected PPGLs who received 131I-MIBG scintigraphy from January 2020 to April 2023 and were treated by surgery afterward were considered to be included in this study. Semiquantitative 131I-MIBG scintigraphy score, normetanephrine, metanephrine, hematocrit, maximum preoperative blood pressure, tumor size, preoperative blood pressure in the operating room, and preoperative heart rate in the operating room were recorded. Short-term BP fluctuation, which is indicated by systolic blood pressure average real variability (SBP ARV) and mean arterial pressure average real variability (MAP ARV), was calculated based on intraoperative BP recorded in a 5-minute interval.

Results 159 consecutive PPGL patients confirmed by pathology were included in this study. Patients in the high 131I-MIBG scintigraphy score group had a higher SBP ARV (14.4±6.9 mmHg vs. 10.7±4.4 mmHg, p<0.001) and MAP ARV (9.6±4.2 mmHg vs. 7.6±2.9 mmHg, p=0.010) than patients in the low score group. In multiple linear regression analyses, semiquantitative 131I-MIBG scintigraphy score (p=0.010), metanephrine (p=0.014), and maximum preoperative blood pressure (p=0.021) were significantly correlated with SBP ARV. 131I-MIBG scintigraphy score (p=0.044), metanephrine (p=0.012), and maximum preoperative blood pressure (p=0.038) were also significantly correlated with MAP ARV.
Conclusions 131I-MIBG scintigraphy, as well as metanephrine and maximum preoperative blood pressure, can predict intraoperative BP fluctuation. These factors may be used to identify patients with a high risk of BP fluctuation and contribute to the management and prognosis improvement of PPGL patients.

PU-1298

通过心电监护仪提供的信息提示识别肺切除术后的发生心脏疝-病例报告

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目的 Purpose The cardiac herniation is an emergency of hemodynamic disturbance.The mortality rate is as high as 100% without timely diagnosis and treatment. The purpose of this case report is to emphasize the importance of the etiological factor being confirmed timely.
方法 Clinical features A 56-year-old man with no previous history of comorbidity presented for total left pneumonectomy resection. Cardiac arrest occurred during surgery. The actual reason: cardiac herniation was foud out and nullified in time, resulted in successful cardiopulmonary resuscitation (CPR).
结果 Conclusion The cardiac herniation is an emergency of hemodynamic disturbance. It is important to find out the actual reason by the information retrieved by ECG monitor and nullify it in time. Instantaneous exploratory thoracotomy may help find the cause of sudden cardiac arrest. Finally, the information retrieved by ECG monitor for cardiac arrest shows promising prospects warranting further investigation.
结论 Conclusion The cardiac herniation is an emergency of hemodynamic disturbance. It is important to find out the actual reason by the information retrieved by ECG monitor and nullify it in time. Instantaneous exploratory thoracotomy may help find the cause of sudden cardiac arrest. Finally, the information retrieved by ECG monitor for cardiac arrest shows promising prospects warranting further investigation.

PU-1299

Identification of the cardiac hernia after pneumonectomy by the information retrieved by electrocardiogram (ECG) monitor

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Purpose The cardiac herniation is an emergency of hemodynamic disturbance.The mortality rate is

as high as 100% without timely diagnosis and treatment. The purpose of this case report is to emphasize the importance of the etiological factor being confirmed timely.
Clinical features A 56-year-old man with no previous history of comorbidity presented for total left pneumonectomy resection. Cardiac arrest occurred during surgery. The actual reason: cardiac herniation was foud out and nullified in time, resulted in successful cardiopulmonary resuscitation (CPR).
Conclusion The cardiac herniation is an emergency of hemodynamic disturbance. It is important to find out the actual reason by the information retrieved by ECG monitor and nullify it in time. Instantaneous exploratory thoracotomy may help find the cause of sudden cardiac arrest. Finally, the information retrieved by ECG monitor for cardiac arrest shows promising prospects warranting further investigation.

PU-1300

The Impact of Lung-Protective Ventilation Strategies on Tumor Microenvironment-Related Hematological Indices in Patients Undergoing Colorectal Cancer Surgery: A Randomized Controlled Trial

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Background Debates exist on the effects of lung protective ventilation strategies (LPVS) on Tumor Microenvironment-Related Hematological Indices in colorectal cancer (CRC) surgery patients.
Objective To examine the impact of a lung-protective ventilation strategy on the tumor microenvironment (TME).
DESIGN, SETTING, AND PARTICIPANTS: The study was a single-center, double-blind, randomized clinical trial conducted at the Affiliated Hospital of Nantong University from February to March 2024. Sixty elective colorectal cancer surgeries were included in the study. Data analysis was completed in April 2024.
INTERVENTIONS: Patients were randomly assigned to receive either conventional mechanical ventilation or a lung-protective ventilation strategy.
MAIN OUTCOMES AND MEASURES: The main focus of the study was to assess variations in various comprehensive blood indices, including the commixed index of inflammation, immune responses, hemostasis, and nutrition (NLDA), PDM, the systemic immune-inflammation index (SII), and the prognostic nutritional index (PNI). Secondary outcomes included levels of neutrophils, lymphocytes, platelets, albumin, and D-dimers.
RESULTS：
Due to perioperative blood transfusions, one patient from each of the C and T groups was excluded (Figure 1), leaving 29 patients in each group for statistical analysis. There were no statistically significant differences in the general and perioperative characteristics between the two groups ($P>0.05$).
The levels of neutrophils and D-dimers at T1 were higher than those at T0 of both groups ($P<0.05$), while the levels of lymphocytes, platelets, and albumin at T1 were lower than those at T0 ($P<0.05$). Between-group comparisons showed that the D-dimer levels of Group T were lower than that of Group C at T1 ($P<0.05$). (See Table 3)
The values of NLDA, SII, and PDM at T1 were higher than those at T0 of both groups ($P<0.05$), while the PNI value at T1 was lower than those at T0 ($P<0.05$). Between-group comparisons showed that the values of NLDA, SII, and PDM of Group T were lower than those of Group C at T1, while the PNI value of Group T was higher than those of Group C ($P<0.05$). .
CONCLUSIONS AND RELEVANCE: In summary, lung-protective ventilation strategies (LPVS)

exert a positive impact on comprehensive blood indices (NLDA, PDM, SII, PNI) related to the tumor microenvironment in patients undergoing colorectal cancer surgery. They attenuate the adverse effects of surgical anesthesia and mechanical ventilation on the inflammation, immune response, hemostasis, and nutritional status of the CRC patient's tumor microenvironment, which may hold potential value for improving prognosis and long-term outcomes in CRC surgery patients.

PU-1301

PLZF promotes compensatory lung growth by increasing HUVEC proliferation and angiogenesis

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Objective Angiogenic signaling pathway activation has been shown to accelerate compensatory lung growth (CLG) after unilateral pneumonectomy (PNX). Therefore, it is a novel strategy to study specific genes regulating angiogenic signaling pathways for the promotion of CLG.
Methods CCK-8, EdU, flow cytometry and tube formation experiments were served to test the metabolism of Human umbilical vein endothelial cell (HUVEC). Western blot was analyzed for the levels of Promyelocytic leukemia zinc finger protein (PLZF), kelch-like ECH-associated protein 1 (Keap1), hypoxia-inducible factor-1α (HIF-1α), hemooxygenase-1 (HO1), quinone oxidoreductase (NQO1) and nuclear factor E2-related factor 2 (Nrf2). The proliferation of pulmonary endothelial cells was detected by Ki67 double staining. A unilateral PNX mouse model was constructed and the changes of lung volume and weight were detected.
Results Our current findings suggest that PLZF showed a clear downward trend after unilateral PNX by bioinformatics analysis. PLZF overexpression significantly promoted HUVEC proliferation and angiogenesis and inhibited its apoptosis. Further studies showed that Keap1 overexpression, HIF-1α and Nrf2 silencing all altered the effects of PLZF overexpression on HUVEC and the inhibition of its apoptosis. Notably, HIF-1α silencing only reversed the effect of PLZF overexpression on HUVEC angiogenesis, but not on proliferation and apoptosis. Nrf2 signaling pathway can activate HIF-1α/VEGF signaling pathway through nuclear metastasis and then affect angiogenesis. In vivo study confirmed that PLZF overexpression promote that increase of residual lung volume and lung weight in mice after unilateral PNX, and significantly promoted the proliferation of lung endothelial cells.
Conclusion In conclusion, our study shows that PLZF promotes HUVEC proliferation and angiogenesis and accelerates CLG by inhibiting Keap1 activation of Nrf2 and HIF-1α/VEGF signaling pathways.

PU-1302

星状神经节阻滞联合 PCSA 对难治性癌痛患者镇痛及抑郁影响

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目的 探究星状神经节阻滞联合皮下艾司氯胺酮和氢吗啡酮自控镇静泵对难治性癌痛患者镇痛及抑郁影响。
方法 选取唐山市人民医院 2023 年 01 月至 2024 年 01 月间就诊的 126 例晚期难治性癌痛患者作为研究对象，采用随机数字表法，将研究对象分为 S1 组、S2 组和对照组，每组各 42 例。对照组受盐酸氢吗啡酮皮下自控镇痛治疗，S1 组受盐酸氢吗啡酮与艾司氯胺酮皮下自控镇痛治疗，S2 组在 S1 组基础上加入星状神经节阻滞治疗。比较三组患者的疼痛缓解情况、干预前后氢吗啡酮日均用

量、日均暴发痛发作次数、睡眠质量及抑郁情况和药物不良反应发生情况。
结果 治疗前对照组、S2 组和 S1 组的疼痛数字分级评分法(numerical rating scale,NRS)评分、日均爆发痛次数、日均氢吗啡酮用量、匹兹堡睡眠质量指数量表(Pittsburgh Sleep Quality Index,PSQI)评分和医院焦虑和抑郁量表(Hospital Anxiety and Depression Scale,HADS)评分比较，差异均无统计学意义（P>0.05）。治疗后第 2 天和第 3 天 S2 组患者的 NRS 评分显著低于对照组和 S1 组(P<0.001)。三组病人治疗后 7 天，S2 组日均爆发痛次数低于对照组和 S1 组（P<0.05）。S2 组和 S1 组氢吗啡酮治疗 3、7 天日均用量低于对照组（P<0.001）。治疗后第 3 天，S2 组患者的 PSQI 评分显著低于对照组和 S1 组(P<0.001)。治疗后第 7 天，S2 组和 S1 组比对照组抑郁程度有显著性差异（P<0.001）；三组总不良反应发生率比较差异无统计学意义（P>0.05）。
结论 难治性癌痛患者应用星状神经节阻滞联合盐酸氢吗啡酮与艾司氯胺酮皮下自控镇痛有比较好的止痛效果，可减少患者暴发痛发作次数，改善患者的睡眠质量和抑郁状态。

PU-1303

鞘内镇痛在癌性疼痛治疗中的应用进展

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目的 疼痛是肿瘤患者最常见的症状之一，严重影响生活质量。随着治疗肿瘤方法的不断进步，肿瘤患者的生存时间显著延长，但对于癌性疼痛的治疗仍不充分。本文就鞘内镇痛在癌性疼痛治疗中的最新应用进展做一综述，为癌性疼痛治疗提供新的治疗思路及方案。
方法 通过数据库检索鞘内镇痛在癌性疼痛中的治疗相关文献，进行综述。自 1979 年 Wang 等首次将吗啡注射到蛛网膜下腔控制癌性疼痛以来，鞘内镇痛用于治疗各类慢性顽固性疼痛在全世界范围内得到广泛认可。国内多家医疗中心的研究发现，鞘内镇痛可明显改善癌性疼痛患者日常生活、情绪和睡眠的生活质量评分，提高镇痛满意度。同时，鞘内输注使用的阿片类药物剂量远低于常规途径镇痛的药物剂量，降低药物相关毒性，并带来更好的生存获益优势。有两类癌症患者能够从鞘内镇痛中获益最大：对标准治疗无效的顽固性疼痛患者，以及使用常规治疗剂量就出现不能耐受的不良反应的患者。随着鞘内镇痛技术的不断发展，多学科鞘内镇痛专家小组多次修订和更新了专家共识。共识认为除了预期寿命为数天的晚期癌痛患者，其余均可考虑鞘内镇痛，但也需综合考虑外科手术风险、感染风险和鞘内镇痛管理风险等因素。而对于终末期癌性疼痛患者，在被充分良好告知的情况下，可应用更大的药物剂量、更高的浓度和合用一些超指南范围的药物，以取得最佳的治疗效果。也有临床试验显示，持续小剂量鞘内注射右美托咪定可以安全应用于阿片耐受的癌性疼痛患者的鞘内镇痛，并且可以降低鞘内吗啡的用量，可能降低鞘内吗啡用量过大导致的严重不良反应。
结果 鞘内镇痛广泛用于癌痛患者的镇痛，镇痛效果显著，不良反应少。
结论 鞘内镇痛可有效控制癌痛患者的疼痛，同时减少阿片药物的不良反应，提高患者的镇痛满意度

PU-1304

围术期基于多模态监测以评价蒽环类药物所致心肌损伤的临床研究

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目的 围术期应用二维斑点追踪超声心动图(2DSTE)联合改良二尖瓣瓣环高度比(HR)，再结合心肌

酶谱，多模态的检测接受蒽环类药物(ATC)治疗的患者左心室亚临床功能的变化。
方法 选取我院围术期需行手术治疗的 ATC 化疗患者，分别于化疗前、化疗 1 周期后、2 周期后、4 周期后行超声心动图及心肌酶谱检查。分析获得左心室整体长轴应变 (GLS)、双平面 Simpson 法（EF）、左室心肌性能指数（MPI）、改良二尖瓣瓣环高度比(HR)，并进行统计学分析。结果 与化疗前比较，接受蒽环类药物治疗的患者左心室心肌收缩功能在化疗 2 周期后、4 周期后均显著下降。改良二尖瓣瓣环高度比与已有指标具有明显的相关性。
结果 与化疗前比较，接受蒽环类药物治疗的患者左心室心肌收缩功能在化疗 2 周期后、4 周期后均显著下降。改良二尖瓣瓣环高度比与已有指标具有明显的相关性。
结论 应用二维斑点追踪超声心动图(2DSTE)联合改良二尖瓣瓣环高度比(HR)，再结合心肌酶谱，这种多模态监测方法能在早期检测出左心室亚临床功能的变化，并且更敏感，显示低剂量 ATC 即对心肌造成的隐匿性损伤。

PU-1305

右美托咪定对嗜铬细胞瘤切除术的作用研究

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目的 本研究旨在探讨右美托咪定在嗜铬细胞瘤切除术中的作用。
方法 本文回顾性研究了嗜铬细胞瘤切除术患者 50 例，分为研究组及对照组，各 25 例。研究组于麻醉诱导前 30 min 靶控输注 4 μg/ml 右美托咪定 0.5 μg/kg，对照组泵注等容量 0.9%氯化钠注射液。观察及对比两组术中血压及心率波动情况，术中出血量、手术时间、术后引流量及引流时间、住院时间及术后并发症发生率。
结果 两组血压、心率、术中出血量、手术时间、术后引流量及引流时间及住院时间差异均有统计学意义（均 P＜0.05）；两组并发症发生率差异无统计学意义（P＞0.05）。
结论 右美托咪定应用于嗜铬细胞瘤切除术可使血流动力学更加稳定，同时具有手术时间短、出血量少、及住院时间短等优点，具有广阔前景，值得临床进一步推广应用。

PU-1306

硬膜外复合全麻在嗜铬细胞瘤手术中的应用

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目的 嗜铬细胞瘤是一种罕见的内分泌肿瘤，手术是其主要的治疗方法。然而，嗜铬细胞瘤手术对麻醉技术有很高的要求，因为该手术涉及到激素分泌的调节、血压的控制以及术中的血流动力学监测等，因此选择合适的麻醉技术对手术的成功与否具有重要影响。
方法 本研究选择了 30 例接受嗜铬细胞瘤手术的患者，其中 15 例采用了硬膜外复合全麻，另外 15 例采用了全身麻醉。比较两组患者的手术时间、术中出血量、住院时间、术后并发症等指标，评估硬膜外复合全麻在嗜铬细胞瘤手术中的应用效果。
结果 硬膜外复合全麻组与全身麻醉组相比，手术时间明显缩短（P<0.05），术中出血量明显减少（P<0.05），住院时间明显缩短（P<0.05）。术后并发症方面，硬膜外复合全麻组发生率明显低于全身麻醉组（P<0.05）。
结论 硬膜外复合全麻是一种安全有效的麻醉技术，在嗜铬细胞瘤手术中应用能够明显改善手术效果，减少术中出血量，缩短手术时间和住院时间，降低术后并发症的发生率。因此，硬膜外复合全

麻在嗜铬细胞瘤手术中具有广泛的应用前景。

PU-1307

Impact of perioperative risk factors for postoperative sleep disturbance in patients undergoing mastectomy: a prospective cohort study

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IMPORTANCE Patients' satisfaction and the intraoperative infusion of esketamine and sufentanil affect the incidence of postoperative sleep disturbance (PSD).
OBJECTIVE The aim of this study was to indentify perioperative risk factors associated with PSD in patients after mastectomy.
DESIGN, SETTING, AND PARTICIPANTS The prospective cohort study was conducted from April 2022 to October 2023 at Beijing Cancer Hospital in China. Data was collected for 335 consecutive patients who underwent elective mastectomy. Demographic, clinical, and sleep-related variables were collected. Univariate and multivariable logistic regression analyses were used to identify risk factors associated with PSD.
INTERVENTIONS PSD were assessed before and after surgery. All patients underwent mastectomy received either total intravenous or inhalation-based general anesthesia. Baseline data were stratified by categorizing the study population into two groups, PSD and non-PSD, according to whether the patients developed PSD after surgery.
MAIN OUTCOMES AND MEASURES The primary outcome was the incidence of PSD on the first night after surgery. Postoperative sleep disturbance was defined as having a Richards-Campbell Sleep Questionnaire (RCSQ) score of less than 40. Risk factors associated with PSD were evaluated as the secondary outcomes.
RESULTS PSD was found in 106 of 335 patients (31.6%) on the first night after surgery. The perioperative risk factors associated with PSD were Satisfaction with ward environment at baseline (OR: 0.983; 95% CI: 0.969–0.997; P=0.019), intraoperative sufentanil consumption (OR: 1.063; 95% CI: 1.016–1.113; P=0.009), while the intraoperative infusion of esketamine (OR: 0.251; 95% CI: 0.134–0.470; P<0.001) were identified as protective factors against PSD.
CONCLUSIONS AND RELEVANCE These results suggested that a good sleep quality after mastectomy is associated with higher level of satisfaction with ward environment before surgery and lower dosage of sufentanil during surgery. Intraoperative infusion of esketamine also exerted a protective effect against PSD.

PU-1308

Optimal time of Valsalva Maneuver in High-intensity Focused Ultrasound Hepatocellular Carcinoma Ablation: An Observational Clinical Study

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Objective Valsalva maneuver (VM) is required for a variety of procedures. However, VM may affect postoperative cognitive function. In this prospective observational study, we examined the

relationship between VM duration and burst suppression (an EEG phenomenon known to be associated with postoperative delirium) as well CAM score.
Methods Patients undergoing HIFU ablation for hepatocellular carcinoma were eligible. EEG was continuously monitored using Masimo SedLine. Burst suppression describes an EEG pattern characterized by continuous alternation between high-voltage slow waves, occasionally accompanied by sharp waves, and low-voltage or suppressed EEG activity. CAM score was determined at 24 hours postoperatively.
Results A total of 43 patients were enrolled. Three patients were excluded from the final analysis due to poor EEG recording. Burst suppression was observed in 26 among the 40 patients. Postoperative delirium (CAM score >20 within 24 hours) was not observed in any patients. In comparison to the patients without burst suppression, those with burst suppression had longer mean VM time (6.58±1.50 versus 4.62±1.27; P<0.001), higher CAM score (12.09±1.51 versus 14.28±2.20, P=0.064), higher beta frequency band (-31.37±7.02vs -24.66±7.36, P=0.007), higher gamma frequency band (-53.54±4.65vs -49.31±5.14, P=0.012), lower ApEn (0.64±0.05 versus 0.68±0.04, P=0.017), and lower SaEn of EEG (0.61±0.06 versus 0.66±0.05, P=0.015). In ROC analysis, the area under the curve (AUC) using >5.2 min mean VM time as the cutoff was 0.867. The sensitivity and specificity were 92.6% and 71.4%, respectively. Patients with >5.2 min VM time had higher rate of burst suppression (9% vs 79%; P< 0.001).
Conclusion VM time at >5.2 minutes was associated with burst suppression.
Significance: VM time should be controlled to <5.2 minutes if possible in patients undergoing HIFU ablation of HCC.

PU-1309

不同水平呼气末正压通气联合 60%吸入氧浓度对单肺通气患者氧合及术后肺部并发症的影响

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目的 探讨单肺通气（one-lung ventilation，OLV）期间不同水平呼气末正压（positive end-positive pressure，PEEP）联合 60%吸入氧浓度（inspired oxygen fraction，FiO2）对 OLV 患者氧合及术后肺部并发症（postoperative pulmonary complication，PPCs）的影响。
方法 择期行经左胸食管癌根治术患者，采用随机数字表法分为四组，共入组 120 例，每组 30 例，设置 FiO2=0.6，OLV 时 A、B、C、D 组使用相同的 FiO2，通气侧分别采用不同水平 PEEP，分别为 0、5、8、10 cmH2O。于 OLV 前即刻（T1）、OLV 10 min（T2）、OLV 15 min（T3）、OLV 30 min（T4）、OLV 60 min（T5）、OLV 120 min（T6）时分别经桡动脉与右颈内静脉中抽取动静脉血行血气分析，计算肺内分流率；记录各时间点的血流动力学与呼吸力学等指标；记录术后第 2 天的临床肺部感染评分（clinical pulmonary infection score ,CPIS）和 PPCs 的发生情况。
结果 A 组 2 例患者 OLV 中发生低氧血症而退出本研究，共 118 例患者完成试验。T2~T6 时 D 组 PaO2 明显高于 A 组、肺内分流率明显低于 A 组(P<0.05)；T3~T4 时 C 组 PaO2 明显高于 A 组、肺内分流率明显低于 A 组(P<0.05)。T4 时 B 组 PaO2 明显高于 A 组、肺内分流率明显低于 A 组(P<0.05)。T2~T5 时 D 组 PaO2 明显高于 B 组(P<0.05)；T2~T4 时 D 组肺内分流率明显低于 B 组(P<0.05)。T5 时 D 组 PaO2 明显高于 C 组 (P<0.05)。T2~T6 时 B、C、D 组驱动压明显低于 A 组（P<0.05）。T2~T5 时 C、D 组驱动压明显低于 B 组（P<0.05）。T4~T6 时 C、D 组肺动态顺应性（dynamic compliance ,Cdyn)明显高于 A、B 组（P<0.05）。术后第 2 天 B、C、D 组 CPIS 明显低于 A 组。
结论 OLV 时 FiO2 为 60%条件下，联合 5、8 和 10 cmH2O PEEP 均可改善氧合、降低肺内分流、增加肺动态顺应性，降低驱动压及 CPIS，从而具有一定的肺保护作用，其中 10 cmH2O PEEP 改善氧合的效应出现得更早，效果更佳。

PU-1310

新辅助治疗联合食管癌切除术中低血压的危险因素分析

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目的 探讨新辅助治疗联合手术切除食管癌患者发生术中低血压（IOH）的危险因素。
方法 本研究为回顾性病例对照研究，收集 2020 年 1 月至 2023 年 12 月接受术前新辅助治疗联合手术治疗的 749 例患者临床资料，男 620 例，女 129 例，年龄 18～90 岁，ASAⅡ-Ⅳ级。IOH 定义为 SBP＜90mmHg 持续时间超过 5 分钟,或术中间断推注或静脉泵注血管活性药物。根据术中是否发生 IOH 将患者分为两组：低血压组和非低血压组。收集临床相关指标，通过单因素分析及多因素分析各临床指标与 IOH 的相关性。
结果 352 例（46.99%）患者发生 IOH。单因素分析显示，年龄，ASA 分级，有无高血压病史，手术时间，术中液体输注速率，术中失血量，化疗史，免疫治疗史与 IOH 的发生有关（P＜0.05）。Logistic 回归分析显示，年龄≥65 岁（OR=2.275,95%CI 1.213～4.269），高血压病史（OR=2.629,95%CI 1.187～5.823），化疗史（OR=3.017, 95%CI 1.052～8.647），免疫治疗史(OR=1.465,95%CI 1. 033～2.077)为 IOH 的独立危险因素。
结论 高龄，高血压病史，化疗史，免疫治疗史是新辅助治疗联合食管癌切除术患者发生 IOH 的独立危险因素。

PU-1311

艾司氯胺酮复合静脉全身麻醉在乳腺癌切除术中的应用效果观察

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目的 探讨艾司氯胺酮复合静脉全身麻醉对乳腺癌患者术后睡眠质量的影响
方法 选取 2023 年 4 月至 2023 年 9 月在北京大学肿瘤医院择期行乳腺癌手术患者 90 例，随机分为对照组（静脉全身麻醉）和试验组（艾司氯胺酮复合静脉全身麻醉），各组 45 例。采用理查兹-坎贝尔睡眠量表（RCSQ）评估患者睡眠质量，视觉模拟疼痛评分表（VAS）评估患者疼痛情况，医院焦虑抑郁量表（HADS）评价焦虑、抑郁情绪水平，并记录手术时间，麻醉维持用量及不良反应。
结果 与对照组相比，试验组患者术后第 1、2 天 RCSQ 评分明显升高（P<0.05），术后第 1 天 VAS 评分和 HADS-A、HADS-D 评分均降低，差异具有统计学意义（均 P<0.05）；术后第 5 天 RCSQ 评分、术后第 2 天 VAS 评分以及术后第 2、5 天 HADS-A、HADS-D 评分比较均无统计学差异（P>0.05）。另外，两组患者手术时间、麻醉维持用量以及不良反应发生率比较均无统计学差异（P>0.05）。
结论 艾司氯胺酮复合静脉全身麻醉可显著改善乳腺癌患者术后睡眠质量，减轻术后疼痛和焦虑抑郁情况，且不增加不良风险。

PU-1312

睡眠障碍通过激活延髓 5-HT 能神经元 促进肺癌进展

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目的 肺癌是全世界癌症死亡最常见的原因，其中最常见的组织学亚型为非小细胞肺 癌，每年约有 160 万人死于该种亚型。促进肺癌发生的因素有很多，分为内部因素和外部因 素两个方面。内因主要为基因突变导致的肺癌。外部因素包括吸烟、污染、致癌物接触等。 有研究表明睡眠障碍可以促进小鼠肺癌的进展并增加了肺癌小鼠的死亡率。中枢神经系统 通过脑-肠轴或脑-肺轴调控外周脏器是近年来的研究热点。最新的研究表明脑干核团的活 动可以显著影响周围肿瘤的进展;然而，睡眠障碍促进肺癌进展的内在神经机制仍然了解 不足。因此，探究睡眠障碍促进肺癌进展的神经机制尤为重要，可为肺癌的神经免疫治疗提 供新的靶点。
方法 首先，我们通过临床横断面研究确定睡眠与肺癌进展之间的相关性。我们应用匹 兹堡睡眠质量指数量表(Pittsburgh Sleep Quality Index, PSQI)评估 290 例肺癌患者的睡眠质 量，并记录肿瘤良恶性。其次，我们通过建立小鼠昼夜节律紊乱及原位肺癌模型验证睡眠障 碍对小鼠肺癌生长的影响。然后，我们使用伪狂犬病毒逆行示踪技术来定位与肺之间存在 直接联系的神经核团，并采用 c-Fos 免疫荧光染色定位肺癌荷瘤小鼠激活的神经核团。确定 与肺存在直接神经联系并在肺癌荷瘤时激活的神经核团后，我们通过 c-Fos 与 5-HT 免疫荧光 技术检测肺癌与睡眠障碍时相关核团 5-HT 能神经元的激活状态。最后采用脑立体定位注射 和化学遗传技术调控肺癌相关神经核团活性，观察其对肺癌生长的影响。
结果 通过分析 PSQI 临床睡眠质量问卷，我们发现睡眠质量越差的肺肿瘤患者其肿瘤 的恶性比例占比越高;并且在昼夜节律紊乱的荷瘤小鼠模型中，昼夜节律紊乱组小鼠的肺 癌体积较对照组明显增大。在伪狂犬病毒逆行示踪实验中，我们在整个大脑中定位到 16 个 以上直接或间接支配肺的神经核团。通过 c-Fos 免疫荧光染色实验，我们发现小鼠发生原位 肺癌时延髓腹内、外侧核(Rostral ventromedial reticular nucleus/Rostral ventrolateral reticular nucleus, RVM/RVL)的神经元活性发生了显著变化。我们结合逆行示踪的结果确定 RVM、 RVL 核团为肺癌进展时激活的神经核团。通过实验我们发现睡眠障碍时 RVM 区 5-HT 能神经 元激活较对照组增多;而肺癌时 RVM 区 5-HT 能神经元激活较对照组减少。经过进一步脑立体定位注射和化学遗传调控发现，特异性激活 RVM 区 5-HT 能神经元可以促进肺癌的生长，而特异性抑制 RVM 区 5-HT 能神经元可以减缓肺癌的生长。
结论 睡眠障碍的患者肺恶性肿瘤比例显著高于睡眠正常患者;延髓 RVM 核团与肺之间存在直接神经调控作用;睡眠障碍时可通过激活延髓 RVM 核团 5-HT 能神经元促进肺癌进 展。通过化学遗传技术特异性激活 RVM 核团区 5-HT 能神经元可以促进肺癌生长，而特异性 抑制该区 5-HT 能神经元则可以缓解肺癌的生长。这些结果证明睡眠障碍可通过激活延髓 RVM 核团 5-HT 能神经元促进肺癌的进展。

PU-1313

麻醉药物对肺癌的生长和转移的影响

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肺癌是全球范围内最常见的癌症之一，其治疗面临诸多挑战。麻醉药物在肺癌治疗中的应用不仅限于手术过程中的麻醉管理，近年来越来越多的研究表明，麻醉药物可能对肺癌的生物学行为产生影响。本文综述了临床常见的麻醉药物对肺癌发展及治疗效果的潜在影响。研究显示，这些麻醉药物

可能通过调节肿瘤细胞的凋亡、细胞周期、转移和免疫逃逸等途径，影响肺癌的生长和转移。此外，麻醉药物还可能通过调节肺癌相关信号通路如 PI3K/Akt、MAPK 等，进一步影响肿瘤的生物学特性。然而，现有的研究结果并不一致，对于每种麻醉药物在肺癌治疗中具体作用机制和临床应用的影响，仍需进一步深入的研究和临床实验验证。总结而言，理解麻醉药物对肺癌影响的机制，有助于优化肺癌治疗策略并探索新的治疗方向。

PU-1314

Identification of HTR1D as a therapeutic target and prognostic indicator for colorectal cancer

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Background Colorectal cancer (CRC) causes heavy burden on human health and difference in gene expressions promotes the evolution of CRC. Screening genes bestowed with diagnostic and prognostic value for CRC are meaningful for CRC prevention and treatment.
Methods Identification of DEGs between colorectal cancer and adjacent normal tissues by GEO data set. To establish a protein-protein interaction network and identify key genes related to colorectal cancer. Colorectal cancer and adjacent tissues were collected for immunohistochemistry, and different colorectal cancer cell lines were subjected to Western blot to verify the differences of HTR1D. The potential mechanism of HTR1D was discussed by GO and KEGG enrichment analysis. Using TCGA database to analyze the prognostic value of pivotal genes in patients with colorectal cancer. Clinicopathological analysis, Kaplan-Meier survival analysis and multivariate Cox regression analysis were used to verify the correlation between HTR1D expression and clinicopathological features and prognosis of patients with colorectal cancer.
Results Our results demonstrated that the expression of HTR1D was considerably upregulated in CRC tissue, and it was principally expressed in the cytoplasm of tumor cells. Western blot assay was performed to detect HTR1D expression in CRC cell lines: HTR1D was highly expressed in poorly differentiated cell lines but not in highly differentiated cell lines. From clinical aspects, HTR1D expression was significantly correlated with tumor size and hypertension in CRC. Kaplan-Meier survival analysis and multivariate Cox regression analysis denoted that the expression of HTR1D were closely associated with the prognosis of patients.
Conclusion The results of this study prove that HTR1D may serve as a promising therapeutic target and prognostic marker for CRC.

PU-1315

围术期输注亚甲蓝对胰腺肿瘤患者术后谵妄的有效性和安全性研究

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目的 主要目的：
确认围术期输注 3mg/kg 亚甲蓝能否降低胰腺肿瘤患者 POD 的发生率。
次要目的：
寻找亚甲蓝预防 POD 发生的血液指标，从而为其改善术后认知损害提供有价值的评价指标；
评价围术期输注亚甲蓝对胰腺肿瘤患者不良事件的发生率。

方法 1.研究设计
本试验为单中心、前瞻性、随机单盲的临床研究，观察围术期输注 3mg/kg MB 能否降低行胰腺肿瘤手术患者 POD 的发生率，并探讨其降低 POD 发生率的可能机制。314 名择期下行胰腺肿瘤手术的受试者按 1:1 比例随机分为对照组和亚甲蓝组，每组 157 例，亚甲蓝组麻醉诱导后输注 2mg/kg 亚甲蓝稀释液（0.9%生理盐水稀释）50ml，持续时间 1 小时，手术结束前 30 分钟，输注 1mg/kg MB 稀释液 50ml。对照组则以同样的方式输注相同容积的生理盐水。观察两组患者术后谵妄的发生率以及术后不良事件的发生率，并采集受试者术前和术后的血液标本检测炎症标志物的变化，探索亚甲蓝降低术后谵妄发生的可能机制。
2.盲法
准备一套按顺序编号的密封不透明信封，内装处理分配。在受试者签署知情同意书前，没有人知道他们将参加哪一组。由于使用亚甲蓝后患者的尿液呈蓝绿色，实施干预的研究员（当台手术的麻醉医生）在输注亚甲蓝后难以避免的知晓患者的入组情况，但是经过我们前期的研究发现，可以通过在患者的尿袋中注入亚甲蓝（由当台手术的麻醉医生执行），使患者的尿袋内尿液呈蓝绿色，从而避免患者术后知晓入组情况，以达到对受试者设盲的目的。
3.谵妄评估
前一天访视受试者，完成日常生活能力量表(activities of daily living scale, ADLs)的评估，访视时用 CAM(Confusion Assessment Method, CAM)量表评估患者，筛除 CAM 量表评估阳性的患者，以确保患者术前无谵妄。本研究采用 CAM 量表评估受试者是否发生谵妄，患者在术前访问时完成 CAM 量表评估作为基线。术后 1-7 天或出院前，每天 2 次（上午和下午）进行 CAM 量表评估，要求两次评估间隔时间不少于 6 小时。POD 定义为术后 1-7 天或出院前每天两次的 CAM 评估中只要有一次评估阳性，则认为发生了 POD。每次 CAM 量表评估前均用 RASS 量表评估患者躁动和镇静程度，只有 RASS 评分 ≥-3 分时，才启动 CAM 量表评估。
4.血液标志物样本采集
分别于术前 3 天内(pre-op)、术后当天(PD0)、术后第 1 天(PD1)、术后第 3 天(PD3)采集中性粒细胞(N)、淋巴细胞(L)、单核细胞(M)、血小板(P)计数。NLR(neutrophil to lymphocyte ratio，NLR)为中性粒细胞/淋巴细胞比值，LMR(lymphocyte to monocyte ratio，LMR)为淋巴细胞/单核细胞比值，PLR(platelet to lymphocyte ratio， PLR) 为血小板/淋巴细胞比值， SII(systemic immune inflammation index, SII)为(中性粒细胞×血小板)/淋巴细胞比值。
结果 314 例受试者中，共有 55 例(17.5%)发生了 POD，对照组术后谵妄的发生率明显高于亚甲蓝组（符合方案集：24.5% vs. 12.1%, P=0.005; 意向性分析集： 23.6% vs. 11.5%, P=0.005）。经二分类 Logistic 回归分析校正后，对照组术后谵妄的发生率仍明显高于亚甲蓝组（符合方案集：OR=O.39, 95%CI 0.21-0.74, P=0.004; 意向性分析集：OR=O.38, 95%CI 0.20-0.72, P=0.003），对于 POD 持续时间，对照组发生 POD 的持续时间中位数为 2.0(1.0-2.0)天，亚甲蓝组发生 POD 的持续时间中位数为 1.5(1.0-2.0)天，两组无明显统计学差异（P=0.681），且两组患者不良事件发生率相当。对照组和亚甲蓝组术前和术后血液炎症标志物 NLR(中性粒细胞与淋巴细胞比率)、LMR（淋巴细胞与单核细胞比率）、PLR（血小板与淋巴细胞比率）和 SII（全身免疫炎症指数）无明显统计学差异。
结论 围术期输注 3mg/kg 亚甲蓝可降低胰腺肿瘤手术患者术后谵妄的发生率，且不增加不良事件的发生，但亚甲蓝降低术后谵妄发生率的具体机制仍有待进一步探索。

PU-1316

那西妥单抗免疫治疗致神经母细胞瘤患儿过敏性休克一例

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目的 探讨那西妥单抗在神经母细胞瘤患儿免疫治疗中严重不良反应的应对措施。

方法 患儿，女，2 岁 11 月，97cm，16.5 kg，ASA Ⅲ级，因“发现左侧腹膜后神经母细胞瘤 1 年余”于 2023 年 9 月入我院。患儿曾于 2022 年 5 月行腹膜后神经母细胞瘤切除术＋腹膜后淋巴结清扫术，病理显示神经母细胞瘤，低分化型，可见脉管内瘤栓。患儿于治疗前 2h 静脉注射甲泼尼龙 33mg，前 1h 口服西替利嗪 5mg，前 30 min 口服咪达唑仑口服液 6mg，入室后生命体征 HR 80 次/分、NIBP 108/57mmHg、SpO298%、RR18 次/分，充分吸氧去氮后静脉注射丙泊酚 2.5mg/kg、舒芬太尼 0.2μg/kg，患儿保留自主呼吸鼻导管吸氧 2L/min, 维持采用泵注丙泊酚 3mg·kg-1·h-1，瑞芬太尼 0.2μg·kg-1·min-1。那西妥单抗输注总量为 49.5mg，泵注速度为 3mg·kg-1·h-1，预计输注时长 1h，输注 10min 时 HR 逐渐升至 158 次/分、NIBP 降至 76/40 mmHg、SpO2 逐渐降至 76%、RR 升至 38 次/分，查体发现患儿出现面色苍白、口唇发绀水肿、面部散在斑丘疹，三凹征明显并出现喉鸣，听诊双肺呼吸音粗未闻及干湿啰音，考虑发生过敏性休克。立即停止输注那西妥单抗和静脉麻醉药，100%O2 面罩正压通气，显示气道峰压 30cmH2O，吸引气道后迅速静脉注射 1:100000 肾上腺素 33μg，并快速输注 0.9%NaCl100ml 扩容，5min 后患儿面色逐渐恢复红润，生命体征趋于平稳，HR142 次/分、NIBP118/84 mmHg、SpO297%、气道峰压降至 18cmH2O，喉鸣消失三凹征有所减轻，遂调整方案，静脉注射顺阿曲库铵 0.15mg/kg 后插入 2#喉罩接呼吸机行正压通气，通气模式采用压力控制容量保证模式，VT 6～8 ml/kg，RR16～22 次/分，维持 PETCO2 40～50 mmHg，维持方法同前。观察 3min 患儿生命体征平稳，继续泵注那西妥单抗。后续治疗期间，SpO2≥98%，HR 90～110 次/分，气道峰压 14～18cmH2O，治疗结束时停止维持药物泵入，5 min 后患儿恢复自主呼吸拔除喉罩并苏醒，查体患儿口唇水肿消退，面部斑丘疹处仅留红斑，无呼吸困难，听诊双肺呼吸音无明显异常，继续观察 5min 生命体征平稳，Steward 苏醒评分 6 分出室，回病房后嘱持续监测生命体征 6h。随访未见异常。

结果 首都医科大学附属北京儿童医院保定医院肿瘤外科和麻醉科通过输注那西妥单抗对 1 例高危 NB 患儿进行 5 个周期的免疫治疗，在第 1 疗程中出现了过敏性休克，经积极救治后迅速好转。

结论 由于那西妥单抗在 HR-NB 患儿治疗过程中应用的必要性，因此无论选择在门诊还是住院病房亦或手术室进行输注，应提前做好输注期间不良事件的防治预案，尤其是针对发生率较高的低血压和疼痛以及严重不良反应过敏性休克，这可能需要充足的人员配备和多学科的共同参与，以保证患儿在输注疗程中的安全和顺利。