14th ACN 2023
CHENGDU · CHINA

14th ACN 2023
ASIAN CONGRESS OF NUTRITION
SEPTEMBER 14-17th CHENGDU CHINA

14th ACN 2023

ABSTRACT BOOK

14th Asian Congress of Nutrition

Feeding the Future by Sustainable Nutrition

Chengdu, China
September 14-17, 2023

FEDERATION OF ASIAN NUTRITION SOCIETIES

IUNS
INTERNATIONAL UNION OF NUTRITIONAL SCIENCES

Chinese Nutrition Society
C·N·S

Category: Nutrition and Sustainable Development

DEHP 和 DBP 联合暴露对大鼠生长发育和糖脂代谢的影响

Effects of DEHP&DBP Co-exposure On Growth And Glycolipids Metabolism Of Rats

Weiwei Gao[1,2],Shuguang LI*[1]

1. Shanghai Literature Institute of Traditional Chinese Medicine
2. Shanghai Literature Institute of Traditional Chinese Medicine

OBJECTIVE: To investigate the effects of the exposure to Di-(2- ethylhexyl) -phthalate (DEHP) & Dibutyl phthalate（DBP）on the glycolipids metabolism in male Wistar-rats.

METHODS：44 healthy adult-male-Wistar-rats were randomly divided into four groups, including three experimental groups: low-dose (DEHP 50 / DBP 10 mg/Kg·bw, i.g.), medium-dose (DEHP 250 / DBP 50 mg/Kg·bw, i.g.), and high-dose (DEHP 1250 / DBP 250 mg/Kg, i.g.) groups, and one blank-control group(corn oil, i.g.). Fasting blood sugar and body weight were measured weekly during the 28-day-feeding period. At last, the oral glucose tolerance test (OGTT) was performed, with insulin, glycolipid biochemical indicators and antioxidant indicators detected, organs of rats also weighed.

RESULTS：To blank-control group，the rat-weights of experimental groups got slowly, especially in high-dose group ($P<0.05$); liver-coefficients of experimental groups were all significantly higher ($P<0.01$), but testis-coefficient of high-dose group significantly less ($P<0.01$). FPG of high-dose group was highest ($P<0.01$), while HOMA-β significantly lower ($P<0.05$) and HbA1c content reduced significantly ($P<0.05$). OGTT showed that peak of blood sugar of each group appeared at 30min after taking sugar, and decreased at 60min and 120min, close to the fasting level. The AUC of high-dose group increased significantly ($P<0.01$). TG, TC, and HDLC of the experimental groups were lower, with HDLC of low- dose group decreased significantly ($P<0.01$), while LDLC of high-dose group increased significantly ($P<0.05$). T-AOC and T-SOD activity of each group had an upward trend, while the GSH-PX activity decreased, especially in high-dose group ($P<0.01$); MDA increased in each experimental group, but not significantly ($P>0.05$).

CONCLUSIONS：DEHP&DBP was found to slow down the weight gain of rats, reduce antioxidant levels, and cause glycolipids metabolism and insulin secretion disorders, also induce insulin resistance.

Key words Diethylene phthalate(2-ethylhexyl) Ester; Dibutyl phthalate; Glycolipids metabolism; Insulin resistance; Oxidative stress; Antioxidants

Category: Nutrition and Sustainable Development

外源性类固醇激素暴露与女童性早熟的关联：一项巢式病例对照研究

Association of exposure to exogenous steroid hormones and precocious puberty in girls: A nested case-control study

Jingyi Tang*,Shijian Liu
School of Public Health, School of Medicine, Shanghai Jiao Tong University, Shanghai, China

Background: Exogenous steroid hormones (ESH) are universal in food. The adverse impacts of its exposure on precocious puberty remain unclear.

Objectives: To investigate the association between ESH and precocious puberty.

Methods: This nested case-control study recruited 50 girls, aged 7-10, from a school-based multi-center cohort. Urine and blood samples were collected before breakfast. ESH and endogenous steroid hormone (EGSH) were detected by ultra-performance liquid chromatography coupled with triple quadrupole mass spectrometry (UPLC-MS/MS). Precocious puberty was assessed according to the Tanner staging by pediatricians. We explored the single effects of exogenous and endogenous steroid hormones using two methods. To solve the collinearity problem, orthogonal partial least squares discriminant analysis and least absolute shrinkage and selection operator regression were separately applied to select variables. Then the multivariable logistic regression analysis was utilized to assess the association between steroid hormones and precocious puberty. The Bayesian kernel machine regression model was used to evaluate the joint effect of exogenous steroid hormones exposure.

Results: We detected 17 and 15 steroid hormones, showing high correlations, in urine and serum samples. Compared with normal girls, girls with precocious puberty had lower ESH and EGSH levels. Surprisingly, a higher risk of precocious puberty was associated with low concentrations of 11-Deoxycortisol (odds ratio: 0.16, 95% CI: 0.04-0.48) and prednisolone acetate (odds ratio: 0.14, 95% CI: 0.03-0.47) in serum. Likewise, there was an inverse correction between methyltestosterone in urine and precocious puberty (odds ratio: 0.21, 95% CI: 0.04-0.71). The Bayesian kernel machine regression analysis showed a negative relationship between ESH exposure and precocious puberty, but not significant.

Conclusion: Exposure to exogenous steroid hormones, especially prednisolone acetate, and methyltestosterone was negatively associated with precocious puberty.

Key words exogenous steroid hormone, precocious puberty, 11-Deoxycortisol, prednisolone acetate, methyltestosterone

Category: Nutrition and Sustainable Development

基于 SERS 的便携式横向流动适配体竞争法靶向干扰素-γ 的高灵敏度即时检测

Portable lateral flow aptamer competitive assay based on SERS towards highly sensitive point-of-care testing of interferon-γ

Jiaying Hu*[1],Jiali Jin[1],Si Chen[1,2],Danting Yang[1,2]
1. Health Science Center, Ningbo University
2. Zhejiang Key Laboratory of Pathophysiology

Interferon gamma (IFN-γ), one kind of inflammatory cytokines, primarily produced by natural killer (NK) cells and thymus-derived (T) cells, is used to determine disease specific innate immune responses and serve as an active diagnostic biomarker of a broad spectrum of diseases such as auto inflammatory disease, viral and bacterial, parasites infections, and tumor control. The physiological concentration of IFN-γ at pg·mL-1 level for most diseases such as tuberculosis and lung cancer demands highly sensitive and selective detection methods. Establishing a simple, rapid, and low-cost assay for ultrasensitive and highly selective detection of IFN-γ is in urgent demand especially vitally important for diagnosis in resource-limited areas. A novel Au NPs based colorimetric LFA for rapid, visual and ultrasensitive detection of interferon-gamma (IFN-γ) in both PBS buffer and human serum is presented. The LFA platform relies on the competition of Au NPs-aptamer sequence between the complementary DNA in the test line (T-line) and IFN-γ in the sample solution. The presence of IFN-γ can be easily observed in the T-line by naked eye and detected at pg·mL-1 level by a portable colorimetric intensity reader. Linear detection range of 10-500 pg·mL-1 could be obtained. In addition, as low as 10 pg/mL of IFN-γ in human serum could be detected, which is comparable with the results from ELISA. Therefore, this aptamer-based lateral flow strip assay for IFN-γ detection developed in this study has a great potential not only to be a reliable on-site IFN-γ detection system.

Key words Lateral flow assay; interferon-gamma; gold nanoparticles; aptamer; point of care testing

Category: Nutrition and Sustainable Development

铁自噬激活和 sideroflexin1 依赖的线粒体铁超载在棒曲霉素所致心脏炎症和纤维化中的作用

Ferritinophagy activation and sideroflexin1-dependent mitochondria iron overload contribute to patulin-induced cardiac inflammation and fibrosis

Ningning Wang*,Shuang Liu
Dalian Medical University

Patulin (PAT) is a mycotoxin that commonly presents throughout the ecosystem where the fungi grow, and mainly contaminates food, soil and water. PAT has been considered cardiotoxic according to previous studies. However, the detailed mechanism is yet to be fully elucidated. The present study aimed to explore the role and underlying mechanism of ferroptosis in PAT-induced cardiac injury. Here, we confirmed in vivo and in vitro that ferroptosis was involved in PAT-induced myocardial inflammation and fibrosis. Mice exposed to PAT (1 and 2mg/kg body weight for 14 days) provoked myocardial inflammation and fibrosis, along with disrupted iron homeostasis, elevated lipid peroxidation, depleted glutathione peroxidase 4, and deformed mitochondrial morphology. When the primary neonatal rat cardiomyocytes (NRCMs) and H9c2 cells were subjected to PAT, ferroptosis was initiated in a dose-dependent manner, which could be significantly restrained by ferrostatin-1. Mechanistically, we found nuclear receptor coactivator (NCOA) 4, a master regulator of ferritinophagy, bound to and degraded ferritin in response to PAT treatment, thereby releasing large amounts of ferrous iron and further leading to sideroflexin (SFXN) 1-dependent mitochondria iron redundancy. Conversely, knockdown of NCOA4 or SFXN1 with siRNAs could effectively ameliorate ferroptotic cell death, cellular or mitochondrial iron overload and lipid peroxides accumulation.
Furthermore, myocardial inflammation and fibrosis in PAT-exposed mice was alleviated by mitochondrial iron chelator deferiprone. Overall, our findings underscore that ferritinophagy activation and SFXN1-dependent mitochondrial iron overload play a critical role in PAT-induced myocardial ferroptosis and consequent cardiotoxicity.

Key words Patulin Cardiotoxicity; Ferroptosis; Ferritinophagy; Sideroflexin1; Mitochondrial iron overload

Category: Nutrition and Sustainable Development

新型合成生物食品的潜在风险因子及控制技术研究进展

Recent advances in potential risk factors and control technologies for novel synthetic biological foods

Yuxin Wang*,Jin Wang
School of Public Health, Southeast University

Nowadays, more and more consumers are becoming concerned about the relationship between food, nutrition and environmental sustainability. Synthetic biology can address many of today's food safety and health issues, as well as many food challenges that may arise in the future. Novel synthetic biological food is one of the products of the combination of synthetic biology and food science, mainly through the use of different living or non-living materials and technologies to develop a variety of products, which are rich taste and can meet people's pursuit of health, while effectively reducing the use of animal-derived materials, in line with the needs of environmentally friendly food. In this paper, the essence, consumer acceptability, advantages and disadvantages of four representative novel synthetic biological foods, namely plant-based food, cell-based food, fermented food and microalgae food, are reviewed, focusing on their current situation and future prospects. At the same time, the potential risk factors, such as allergens, mycotoxins and antitrophic factors, are also elaborated. Novel food control technologies, including screening technologies such as aptamer and microfluidic, and processing technologies such as ohmic heating and low-temperature plasma, can alter the protein structure of risk factors in order to affect their biological activities, so as to facilitate the industrial upgrading of novel synthetic biological foods. In conclusion, with the increase of environmental and health awareness, the potential for the development of novel synthetic biological foods will grow in the future.

Key words Novel synthetic biological foods; Potential risk factors; Screening technology; Processing technology

Category: Nutrition and Sustainable Development

基于核酸适配体识别和 DNA 步行者扩增策略的荧光传感器构建及对雌二醇的测定研究

A novel fluorescent sensor based on aptamer recognition and DNA walker amplification strategy and its determination of 17β-estradiol

Yajun Zhang*,Meng Jiang,Hongying Zhang,Lingmei Niu
Hebei Medical University

Objective: Studies about 17β-estradiol have shown that excessive estrogen will disturb the endocrine balance of human body and lead to diseases, Therefore, it is very necessary to develop various detection methods suitable for low concentration estradiol. Based on aptamer specific recognition, DNA walker molecular machine and Exonuclease III-assisted dual cycle signal amplification technology, a fluorescent aptamer sensor was constructed and applied to the detection of 17β-estradiol. The fluorescent aptamer sensor designed in this study is mainly composed of DNA walker.

Methods: The system of DNA walker consists of graphene oxide with fluorescence quenching function, signal probe double-stranded DNA (dsDNA), hairpin probe 1 with 17β-estradiol aptamer sequence, hairpin probe 2, and Exonuclease Ⅲ. By adding 17β-estradiol of different concentrations into the system, DNA S1 solution of different concentrations can be obtained through the action of Exo Ⅲ. At the same time, as the starter chain that triggers DNA walker, it can perform the second round of signal amplification reaction with dsDNA on graphene oxide, thus realizing the double amplification of fluorescence signal. Therefore, the quantitative detection of 17β-estradiol was realized by increasing the amount of fluorescence signal. Atomic force microscopy and polyacrylamide gel electrophoresis were used to verify the feasibility of DNA walker participating in the reaction.

Results: Under the optimal conditions, 17β-estradiol concentration showed a good linear relationship with fluorescence in the range of 5.0×10-10-1.8×10-8 M, and the detection limit was 5.6×10-11 M.

Conclusion: The fluorescent aptamer sensor established in this study has good selectivity, simple operation and good specificity, and the results of its application in the determination of milk samples are satisfactory.

Key words Aptamer; Fluorescence sensor; DNA walker; Exonuclease Ⅲ;17β-estradiol

Category: Nutrition and Sustainable Development

长期航天飞行的食品系统:了解非营养性的多酚在宇航员健康中的作用

Food systems for long-term spaceflight: Understanding the role of non-nutrient polyphenols in astronauts' health

Menglan Zhao*
Shanghai Normal University Tianhua College

Background: Manned space exploration missions have developed at a rapid pace, with missions to Mars likely to be in excess of 1000 days being planned for the next 20 years. Meanwhile, until now the formulation of space food systems has not focused on non-nutrients, and has not considered issues arising from their absence during space missions or the possibility of them to solve the challenges caused by space hazards.

Aims: This study investigates, by systematic review, current space food systems and the potential for non-nutrients, such as flavonoids and polyphenols, to counteract radiation- and low gravity-induced degeneration of bone, vision, muscle strength, immune function and cognition.

Results and Discussion: A systematic approach found 39 related animal model studies, and that polyphenol dietary interventions have been shown to mitigate radiation-related physiological problems and cognitive decline, as well as reduce the implications of radiotherapy. From the results of these studies, it appears that berry extracts have a significant effect on preventing cognitive problems through attenuating the expression of NADPH-oxidoreductase-2 (NOX2) and cycloocygenase-2 (COX2) in both frontal cortex and hippocampus and immune system problems caused by radiation similar to that experienced in space. For physiological problems like alteration of blood-testicular barrier permeability and oxidative stress in kidney and liver caused by gamma rays and X-rays, various polyphenol compounds including resveratrol and tea polyphenols have a certain degree of protective effect like enhancing metabolism of heart and decreasing DNA damage respectively. Only one study showed no difference in the performances of a blueberry extract-fed group and a control group exposed to ^{56}Fe irradiation after 12 months.

Conclusion: In conclusion, current animal studies have shown that polyphenols can mitigate radiation damage to some extent, but more research is needed to enable the application of a polyphenol diet to actual space flights.

Key words space radiation, space flight, nutrient, polyphenols, oxidative stress, cognition