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ABSTRACT BOOK

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中国西北地区儿童睡眠与肠道微生物关联研究

The association of sleep pattern and gut microbiota in the children from the northwest region in China

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Introduction Sleep is increasingly gained the public attention for its potential health function. To date, the evidence had partly confirmed the association between sleep and gut microbiome, but it is unclear whether sleep pattern associates with the features of gut microbiota in Children.

Objectives This study was to examine the association of sleep pattern and gut microbiota in a group of apparently heathy children living in the northwest region in China.

Methods The hospital-based study finally included 100 eligible children. The basic information and sleep data including the bedtime and wake-up time of weekdays and weekends was together collected in detail by the designed questionnaire. The included children were classified into two groups according to the bedtime (earlier bedtime ≤22:00, later bedtime >22:00). A metagenome-wide association study was performed to examine gut microbiota in the children with earlier and later bedtime.

Results A significant difference in the richness and diversity of gut microbiota were observed in the children (ages 5.6 ± 2.2 years) with earlier and later bedtime (p=0.044). In genus level, there was significant difference in Collinsella, Akkermansia, Coprococcus and Bacteroides between the two groups; furthermore, the relative abundance of Coprococcus, and Akkermansia were obviously increased in the earlier bedtime children, while the relative abundance of Bacteroides were conversely decreased in the later bedtime children. In addition, in species level, Alistipes finegoldii and Akkermansia muciniphila were significantly enriched in the children with earlier bedtime as compared to those children with later bedtime.

Conclusion The current results of this study shows a noteworthy association between sleep pattern and gut microbiota in the northwest regional children in China. Of these, later bedtime sleep was distinctly associated with the specific commensal bacteria that might be due to the eating time or foods, which could affect the gut microbiota through modulating nutrient or neurotransmitter metabolism.

Key words Sleep pattern; Gut microbiota; Children; Metagenome-wide association study; Relative abundance

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Assessment of cardiometabolic health and HRQoL in an online questionnaire: NutrIMDEA survey

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Background and objectives: Precision health evaluation concerns metabolic wellbeing as well as the examination of risk factors and lifestyle determinants including quality of life domains. This investigation focused on the comparison of diverse cardiometabolic health related scores and the interactions of lifestyle, cardiometabolic markers and health-related quality of life (HRQoL) factors in order to develop precision nutrition.

Methods and study design: Information from 17,332 participants was analyzed from the NutrIMDEA cohort. The data collection period was carried out through an online survey. The baseline questionnaire considered socio-demographic data, cardiometabolic markers, anthropometric variables and lifestyle factors. Seven cardiometabolic related scores (LS7, HLS, 20-years DRS, FBS, CLI, WAI derived, LWB-I) were computed and interpreted. Also, physical and mental domains of SF12 Health Survey (PCS12/MCS12) were assessed.

Results: Analyses concerning cardiometabolic outcomes and HRQoL measurements demonstrated age and sex interactions. Total Physical Activity and the Mediterranean Diet Score (MEDAS-14) showed cardiometabolic interactions using LS7 as the comparison score. LWB-I as standard, evidenced the greatest association with the MCS12 component. Noteworthy, LS7 showed good discrimination against PCS12, while LWB-I demonstrated an excellent capacity for MCS12 contrasts.

Conclusions: A main finding was the interaction between MEDAS-14 and PA on the LS7 scale as well as the major effects of lifestyle factors on HRQoL (MCS12/PCS12) among scores, which need to be described with precision when implementing cardiometabolic screenings with health purposes.

Key words public health, precision nutrition, health-related quality of life, physical health, mental health

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Exercise-induced Bioactive Peptide Irisin for Health Promotion

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Objective: As we all know, Exercise is Medicine. Exercise is a publicly recognized and effective interventional strategy for health promotion or the rehabilitation of chronic diseases, which may be highly due to the generation and secretion of exercise-induced myokine irisin. However, the potential targeted molecular mechanisms for the prevention and treatment of chronic diseases upon exercise interventions urgently need to be systematically explored and elucidated.

Methods: The mouse models with common and high-incidence chronic diseases including metabolic diseases such as obesity, type II diabetes mellitus (T2DM) and non-alcoholic fatty liver disease (NAFLD), neurological diseases such as brain aging and AD, and musculoskeletal diseases such as sarcopenia and osteoporosis were established. These model mice were subjected to exercise and exogenous recombinant irisin interventions for confirming its functions and underlying mechanisms through behavioral examination, pathological tissue staining, TSM, Western blot, RT-PCR, and transcriptomic analysis. Meanwhile, the model mice with specific overexpression or knockout of irisin precursor, FNDC5, were also used for exploring targeted signal pathways and molecules as well as cross-talk communication from the perspectives of function-of-gain and function-of-loss.

Results: Exercise and exogenous recombinant irisin interventions could result in effective alleviation or treatment of above-mentioned chronic diseases through regulating energy metabolism, maintaining cellular homeostasis, rescuing the impaired functional status of autophagy, and enhancing mitochondrial quality control, as well as promoting cell communication among tissues and organs upon exercise-induced irisin. Exogenous recombinant irisin intervention revealed the similar efficacy with exercise interventions.

Conclusion: Exercise-induced irisin is beneficial to the prevention and rehabilitation of chronic diseases and health promotion. Meanwhile, irisin as the precision target is also good candidate for the monitoring and diagnosis of these chronic diseases. Moreover, elucidating and clarifying precision targeted molecules for chronic diseases could provide promising thoughts for the development of novel and effective drugs, functional foods, and exercise mimetics.

Key words Bioactive peptide; Irisin; Chronic disease; Functional food; Exercise mimetics

Category: Precision Nutrition

基于梯度提升回归树与人工蜂群算法的“糖 - 蛋白质”补剂推荐方法

Personalized Recommendation Method of "Carbohydrate-Protein" Supplement Based on Gradient Boosting Regression Tree and Artificial Bee Colony Algorithm

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Consumption of carbohydrate-protein supplements (CPS) is a classic method used by endurance athletes to improve sports performance, increase glycogen replenishment and positive nitrogen balance, and reduce muscle damage. Existing studies provide CPS consumption recommendations based only on a person's weight. It is important to note that various variables might impact individual nutritional demands, and one-sided index selection cannot accommodate the human body's diversity. The goal of this work was to develop a tailored CPS intake method for endurance athletes based on individual multiple characteristics, gradient boosting regression tree (GBRT), and artificial bee colony (ABC) algorithm. In this study, 171 endurance sports enthusiasts were recruited, and a 1-hour rowing race was used as the exercise protocol; 46 indicators of participants were collected; We investigated previous researchers' CPS supplementation method, which was to limit the rate of carbohydrate consumption between 0.5 and 1.2g/kg/h while maintaining a carbohydrate to protein ratio of 4:1; GBRT was used to construct endurance sports performance regression models; After the model was fitted, we selected 23 indicators from the original 45 based on the mean decrease in impurity (MDI) and modeled them again using GBRT, and found that the model’s performance was improved; Finally, we use the ABC algorithm, combined with the effective CPS strategies derived by previous researchers and the fitted GBRT, to provide a personalized CPS intake protocol. This study’s results indicate that it is feasible to use GBRT and ABC to make personalized CPS intake recommendations. Our next studies would focus on increasing the volume of the dataset to iterate, update, and enhance the robustness of the model.

Key words sports nutrition, carbohydrate-protein supplement, artificial intelligence, machine learning, sports performance