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ABSTRACT BOOK

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Category: Food & Nutrition

Dietary Inclusion of Kulitis (Amaranthus viridis) to Enhance Laying Hens' Egg Quality

Kirsten Khyla Zarate*,Ma. Kristine Tamayo,Kian Matthew Del Mundo,Mike Luigi Mario,Keziah Bayson,Lady Lorraine Guardian,Triza Nina Salvador
Lagro High School

Philippine poultry manufacturers choose selectively-bred hens over native hens in commercial egg-laying operations due to the native hens' lower egg production and lower egg weights. As such, it was decided to ascertain whether including 15% Kulitis (*Amaranthus viridis*) leaves in the hen diet can enhance egg quality, specifically overall egg weight, yolk color, and eggshell thickness. Two 26-week-old Darag hens weighing 1 kg were selected and fed standard feed (untreated hen) and Kulitis-infused feed pellets (treated hen) for 21 days. Water was given ad libitum. The first five eggs laid by each hen were collected and evaluated for overall egg weight and eggshell thickness, and the colors of the yolks were labeled utilizing the DSM Yolk Color Fan's hex color codes and their corresponding DSM values (1-16). Independent Samples T-test showed that the Kulitis-infused feed pellets increased egg weight and darkened the yolk color significantly ($P<0.05$), while eggshell thickness was not significantly affected ($P>0.05$). Overall, Kulitis-infused feed pellets enhanced overall egg weight and yolk color without affecting eggshell thickness.

Key words Kulitis leaf; feed additive; overall egg weight; eggshell thickness; yolk color

Category: Food & Nutrition

Quality Characteristics of Bread Made with Autumn Sown Wheat Flour In Korea

So Yoon Lee,Hyun Min Cho,Gi Tak Lee,Yun Jo Jung,Yeon Jae Jo,Heon Sang Jeong*
Chungbuk National University

This study investigated the quality characteristics of bread made with eight Korean wheat flours (Hanbaek, Sooan, Eunpa, Topdong, Alchan, Goso, Dajoong, and Baekkang cultivar) sown in autumn. The volume of Hanbaek and Alchan bread was 1,860 and 1,810 ml, respectively, which were higher than other cultivar, and the volume of Eunpa bread was the smallest value of 1,355 ml. The specific volume was the highest value of 4.46 mL/g in Hanbaek bread, and the lowest value of 3.20 mL/g in Eunpa bread. The hardness of Alchan and Baekkang bread was 305.10 and 271.13 g, respectively, and these value as similler to control. The highest hardness value was 662.87 g in Dajoong bread. From the above results, breads made with Hanbaek and Alchan cultivar have the larger volume and specific volume then other cultivar. Alchan and Baekkang bread have a soft texture like control. So Alchan cultivar is considered most suitable for baking than other cultivar.

Key words wheat flour, cultivar, sowing time, bread, quality characteristics

Category: Food & Nutrition

Quality Characteristics of Waxy Corn with Number of Used Times of Boiling Water

Gi Tak Lee[1],Hyun Min Cho[1],So Yoon Lee[1],Yun Jo Jung[1],Yeon Jae Jo[1],Tae-hoon Lee[2],Suk-Jung Park[2],Mi-Suk Ahn[2],Heon Sang Jeong*[1]

1. Chungbuk National University

2. Goesan Agricultural Technology and Extension Center, Goesan 28027, Korea

This study investigated the quality characteristics according to the number of uses of water that boils wax corn. Five corn was added to 2 liter of water, and water and salt were added each time, and boiled five times. The salinity of corn ranged from 0.18% to 0.22%, and the difference according to the number of times was small. The yellowness of corn ranged from 18.32 to 21.11, and there was no significant difference depending on the number of times. The total sugar content of corn was high at 28.42% and 28.51% in 1st and 2nd boilings, respectively, and decreased after that. The content of reducing sugar was high at 3.97% during 2nd treatments, and decreased thereafter. The hardness of boiled corn was the highest value of 827.77g at 2nd boiling and decreased thereafter. As a result of the sensory evaluation, the color, aroma, texture, taste, and overall preference showed the highest score in 2nd boiling. From the above results, it is judged that up to two times of boiling wax corn is the most suitable.

Key words waxy corn, quality characteristics, water, salt, sensory evaluation

Category: Food & Nutrition

Comparison of Quality Characteristics on Korean Traditional Wines Made with High-Yielding and Special Rice Cultivar

Hyun Min Cho[1],Gi Tak Lee[1],So Yoon Lee[1],Yeon Jae Jo[1],Yun Jo Jung[1],Hyun-Jin Park[2],Heon Sang Jeong*[1]
1. Chungbuk National University
2. National Institute of Crop Science, Rural Development Administration

This study compared the quality characteristics of traditional wine made with high-yielding rice (Namil cultivar), pigmented rice(Jeogjinju, Jeogjinjuchal, and Shenhyangheugmi cultivar) and special rice(Keunnunjami, Wolbaek, Haepyeongchal and Aromatic rice2 cultivar). The pH of wine ranged 4.77-5.07 and was higher in pigmented rice than white rice. Total acidity ranged from 0.26 of Namil to 0.32% of Jeogjinjuchal cultivar. The total sugar content was the highest value of Namil and Wolbaek was the lowest value. The alcohol content of rice wine was 15.07-17.43%, and white rice was higher than pigmented rice. In the case of lightness, pigmented rice wine was lower than white rice, and black rice was lower than red rice. In the sensory evaluation, Wolbaek cultivar was the lowest sensory score of 3.05, and Namil cultivar showed the highest score of 4.15 in overall preference. From the above results, it is suggest that special rice has a fermentation efficiency similar to that of white rice, and its good flavor makes it possible to manufacture high-quality traditional Korean rice wine.

Key words Traditional Korean rice wine, pigmented rice, aromatic rice, special rice, sensory evaluation

Category: Food & Nutrition

Physicochemical Characteristics of Carrot with Heating Temperature

Yun Jo Jung,Hyun Min Jo,Gi Tak Lee,So Yoon Lee,Yeon Jae Jo,Heon Sang Jeong*
Department of Food Science and Biotechnology, Chungbuk National University, Cheongju 28644, Korea.

This study investigated the changes in physicochemical and quality characteristics of carrots with heating temperature. As heating temperature increased, the pH decreased from 7.26 to 5.79 and the total acidity increased from 0.06 to 0.15. The 5-HMF content was not detected until 120℃, and increased from 22.99 ppm of 130℃ to 1740.62 ppm of 150℃. The browning index increased from 0.043 to 0.318 as heating temperature increased. Sucrose content decreased from 71.50 to 6.14 mg/g with increasing heating temperature, whereas glucose and fructose increased from 4.30 to 20.21 and 4.48 to 25.47 mg/g, respectively. Reducing sugars content also increased from 42.53 to 73.10 mg/g. Total organic acids content was increased as heting temperature increased to 140℃. The β-carotene content decreased from 1853.84 to 698.79 μg/dry g with increasing heat treatment temperature. From the above results, it can be concluded that heat treatment affects the physicochemical and quality of carrots, and suatable heat treatment is necessary for the development of carrot processed products.

Key words heat treatment tmeperature, carrot, physicochemical, quality characteristics

Category: Food & Nutrition

Development of a fiber rich food supplement for the elderly

Sambaran Mondal Sambaran Mondal,Mala Dey Mala Dey,Sweety Bardhan Sweety Bardhan,Sandipan Chatterjee Sandipan Chatterjee,Neepa Banerjee Neepa Banerjee,Shankarashis Mukherjee Shankarashis Mukherjee*
West Bengal State University

Background and objectives: Old age is a vulnerable stage of life. With increasing age, elderly persons are exposed to the risk of developing various health related diseases and disorders, among which constipation is quite common. Adequate consumption of dietary fiber is often not taking place in elderly persons, leading to the occurrence of several health complications including medical surgery. In this backdrop, the development of a low-cost dietary fiber rich supplement is being attempted.

Methods: The basic ingredients used were wheat, maize, millet, puffed rice, fruit pulp and others. Additional sugar, flavorant or preservatives was not added. The supplement is developed through several cooking, drying and processing steps. Sensory tests were carried out and nutrient contents were analyzed.

Results: 100 g of the supplement contains approx. 51.85 g of total fiber with 26.8 g of soluble fiber and 25.05 g of insoluble fiber, 1113 KJ of energy, 10 g of protein, 1.69 g of fat and 76.78 g of carbohydrate. As per sensory tests, consumption with mild hot water is recommended.

Conclusions: The high fiber content of the supplement may be useful as a supplementary diet to meet the dietary fiber requirement of elderly persons.

Key words High fiber supplement, supplement for elderly, dietary fiber.

Category: Food & Nutrition

Food material as a potential candidate for sport nutrition and prevention of sarcopenia

Young Jin Jang*
Seoul Women's University

Muscle mass and strength are reduced with aging, movement decrease, and obesity. Muscle loss is closely associated with acute and chronic disease, increased insulin resistance, and rheumatoid arthritis. Moreover, skeletal muscle strength is inversely associated with all-cause mortality in men. Prevention of muscle loss may therefore contribute to improved quality of life, and attenuate chronic disease and mortality for the aged. Physical exercise and protein supplementation can prevent skeletal muscle loss and promote skeletal muscle growth, but pharmacological treatments that aid this process have not yet been developed. Recently, several food extracts and phytochemicals have been described as helping to improve the quality of skeletal muscle and increase muscle mass. Recently, we investigated that the effect of Codium fragile extract on exercise endurance muscle weight, and muscle strength and identified its molecular mechanism. These results suggest that Codium fragile extract is potential candidates for sport nutrition or prevention of sarcopenia.

Key words Sarcopenia, Sport nutrition, Codium fragile, muscle mass, muscle strength

Category: Food & Nutrition

Dangjo chili pepper: Adding High Value through Jumping Functional Ingredients in Korean Agricultural Products

Ji Yeon Kim*,Kyeong Jin Kim,Soo-yeon Park
Seoul National University of Science and Technology

Dangjo chili peppers (*Capsicum annuum* L. cv. Dangjo) have been reported to have beneficial effects in reducing postprandial blood glucose levels. These effects have been recognized in Japan and have led to their registration as "foods with function claims". Through a series of breeding processes, Dangjo chili peppers were successfully enhanced to contain many α-glucosidase inhibitors (AGIs) compared to other varieties of peppers. α-Glucosidase is a membrane-bound enzyme located in the epithelium of the small intestine that catalyzes the hydrolysis of oligosaccharides and disaccharides into monosaccharides, which is subsequently absorbed. Therefore, inhibition of the α-glucosidase activity can contribute postprandial hyporglycemia. Several research studies have indicated that the effects of AGI can be attributed to phenolic or flavonoid compounds. In order to enhance the value of agricultural products, it was essential to establish a strategy for registration as the functional ingredients associated with the postprandial hypoglycemic effects of Dangjo chili peppers. Firstly, using ultrahigh-performance liquid chromatography coupled with linear trap quadrupole-orbitrap-mass spectrometry, the major compound was identified among various metabolites present in Dangjo chili peppers. Secondly, the postprandial hypoglycemic activity of Dangjo chili peppers was demonstrated through multiple approaches, including evaluating their α-glucosidase inhibitory activity and inhibition of glucose uptake in Caco-2 cell, conducting an oral carbohydrate tolerance test in C57BL/6 mice, and performing a human study with Koreans. This finding jumped up Dangjo chili peppers from being a common agricultural product to a functional ingredient. We hope this can become a first step in promoting the excellence of Korean agricultural products to the world.

Key words Dangjo chili pepper; α-Glucosidase inhibitor; Postprandial blood glucose; Quercitrin; Type 2 diabetes mellitus

Category: Food & Nutrition

Sensory-Chemical Quality Factors of Alcoholic Beverages Made from Apples and Pears - Role of Yeast Selection

Oskar Laaksonen*[1],Wenjia He[1,2],Baoru Yang[1]
1. Food Sciences, University of Turku
2. College of Food Science and Technology, Zhejiang University of Technology

In recent years, there has been growing interests to utilize alternative yeasts besides traditional Saccharomyces cerevisiae yeasts in production of alcoholic beverages in order to produce more and versatile flavors to the end-products and potentially lower ethanol contents. Moreover, certain yeasts may have specific activities to reduce some undesirable properties of the fruit. At the same time, apples and pears are good sources of various phytonutrients. Although they have been traditionally used in production of alcoholic beverages, fruit farmers and beverage producers have growing interests to utilize locally important cultivars in the products. Aim of this presentation is to assess and combine multiple of our recent studies focusing on chemical and sensory quality factors of beverages made from Finnish apples and pears using so-called non-Saccharomyces yeasts.Alcoholic beverages in the studies were made from traditional Finnish apple and novel pear cultivars. Non-Saccharomyces yeast strains were used in the fermentations of both fruits and compared to beverages made with S. cerevisiae strains. Compositional factors of the beverages were determined by chromatographic and mass spectrometric methods, and sensory quality of the beverages were determined using different descriptive methods.Fruit cultivar selection resulted primarily in more differences in the studies in comparison to the yeast factor. However, yeast strains showed significant differences. For example, Schizosaccharomyces pombe strain reduced the malic acid content of apple ciders resulting in less intense sourness, and Torulaspora delbrueckii strain resulted in sweeter pear beverages with more floral and cooked pear odors. At the same time, yeast strain selection affected significantly the phenolic compound contents of the beverages. These studies demonstrated the importance of fruit cultivar selection, as well as, the role and potential of non-Saccharomyces yeasts in production of alcoholic beverages.

Key words apple, pear, non-Saccharomyces yeasts, beverages, quality

Category: Food & Nutrition

ADMINISTRATION OF BELIMBING WULUH LEAF HERBAL TEA (Averrhoa Bilimbi L) TO REDUCE BLOOD PRESSURE IN HYPERTENSIVE PATIENTS

abdul Salam Djalil*[1],Healthy Hidayanty[1],Nurzakiah Hasan[1],Petrani Desva Tangkemali[2],Ismi Nurwaqiah Ibnu[3]

1. Hasanuddin University
2. Postgraduate Student Department of Nutrition, Faculty of Public Health, Hasanuddin University, Makassar, South Sulawesi, Indonesia
3. Public Health Study Program, Faculty of Medicine and Health Sciences, Jambi University, Jambi, West Sumatra, Indonesia

Background: The use of starfruit leaves is an alternative for overcoming the incidence of hypertension. Therefore, this study aims to determine the effect of education as well as the administration of herbal tea from belimbing wuluh leaves on blood pressure in hypertensive patients.

Research Method: This is a quasi-experimental study with a non-randomized pre-test and post-test as well as a control group design. The sample population consists of 50 people, who were divided into 2 treatment groups. Furthermore, group I was given herbal tea from 7 g of belimbing wuluh leaves and education, while II was only educated. Data analysis was then carried out using the Wilcoxon Signed Rank Test and the Mann-Whitney Test.

Results: The hypertensive patients in the group administered with herbal tea and education experienced a significant decrease in systolic blood pressure from 158.16 mmHg to 138.24 mmHg as well as diastolic blood pressure from 94. 32 mmHg to 84.68 mmHg ($p<0.05$). Similar findings were also observed in the control group, which was only educated. However, a higher reduction in blood pressure was found in the intervention group than in the control group.

Conclusions: Herbal tea from belimbing wuluh leaves has the ability to reduce blood pressure. Furthermore, future studies can modify the ingredients of the drink to improve its taste and effectiveness.

Key words Herbal Tea, Belimbing Wuluh Leaves, Education, Hypertension.

Category: Food & Nutrition

Evaluation of different recipes and determination of the presence of lactic acid bacteria in Sri Lankan traditional 'diyabath'

Shanika Gamage*[1],Tharanga Thoradeniya[1],Sharmila Jayasena[1],Carukshi Arambepola[2],Himalee DeSilva[3],Darshi Thoradeniya[4],Pujitha Wickramasinghe[5]

1. Department of Biochemistry & Molecular Biology, University of Colombo, Sri Lanka
2. Department of Community Medicine, University of Colombo, Sri Lanka
3. Faculty of Indigenous Medicine, University of Colombo, Sri Lanka
4. Department of History, University of Colombo, Sri Lanka
5. Department of Paediatrics, University of Colombo, Sri Lanka

Background and objectives: The indigenous fermented foods are getting increasing attention as low cost food to improve health and sustain the food supply. Diyabath' is a breakfast meal prepared by overnight fermentation of leftover cooked rice. Though its main purpose has been to reduce food wastage in households, Sri Lankan indigenous medical practitioners (IMP) recommend 'diyabath' to improve health. Fermented foods with lactic acid bacteria (LAB) enhance the digestive health in humans. Apart from the eight different traditional recipes of 'diyabath' identified in our previous survey, records on its scientific value and composition are limited. This study aimed at prioritising the recipes identified and assessing the LAB content to determine its potential use in an intervention-based investigation to promote health.

Methods: The eight recipes were presented to an expert panel of nutritionists, food scientists, community physicians and IMPs for evaluation according to 'Delphi method' on the rice variety, pot material, fermentation duration and additional ingredients used in post-fermentation. Via in-depth discussion conducted in two rounds of ranking, the panel agreed on most acceptable recipes for a health promoting intervention. The selected recipes were then analysed for the presence of LAB on Man-Rogosa-Sharpe agar -pH 5.7 (24-48 hrs at 30° C).

Results: The expert panel agreed on using red-raw rice(RR), traditional Mawee rice(TMWR) and parboiled rice(PR)for preparing 'diyabath' and using a clay pot for fermentation for 12-hours. After the fermentation, it was recommended to add coconut milk, red onion, salt and roasted red chili to the preparation. Diyabath prepared from the three selected rice showed LAB in the range of 106CFU/g, which is comparable with that of other probiotic-rich fermented cereal-based food.

Conclusion: Diyabath' prepared from cooked RR, TMWR and PR are recommended for further investigations. Further, LAB counts suggest 'diyabath' as a potential food to enhance digestive health in humans.

Key words Fermented cooked rice, Diyabath, Lactic acid bacteria, Fermentation

Category: Food & Nutrition

Anti-Obese Effects of Cinnamon Extracts Dietary Supplementation by modulating AMPK and SREBP-1c in High-Fat diet induced male mice model

Joohee Oh[2],Hyun-Sook Kim*[1]

1. Department of Food and Nutrition, Sookmyung Women's University, Republic of Korea
2. Department of Food and Nutrition, Sookmyung Women's University, Republic of Korea

Background and objectives: Obesity is a prominent health issue occurred by excessive lipid accumulation in the body. Cinnamon is a widely used spice that has been known for anti-diabetic effect but little on obesity. The aim of this study was to determine the inhibition of fat accumulation and anti-obese effects of cinnamon extracts dietary supplementation in high-fat diet induced male mice model.

Methods: After one week of adaptation period, the 40 of 6-week-old male C57BL/6J mice were randomly divided into 4 groups (n=10 for each group): Normal diet group (ND), normal diet with 1% Cinnamon extracts group (NC), high-fat diet group (HF), and high-fat-diet with 1% with cinnamon extracts group (HC).

Results: After 14 weeks, body weight, body weight gain, hepatic and white adipose tissue(WAT) hormone-sensitive lipase(HSL) activity, AMP-activated protein kinase (AMPK) and sterol regulatory element-binding protein 1(SREBP-1c) in liver and size of the adipose tissue in epididymis fat were measured. Body weight and Body weight gain showed significant lower increase in cinnamon fed group NC and HC($p<0.000$). Hepatic and WAT HSL activity showed the lowest level in HF among all groups($p=0.000$). The liver protein expression of AMPK showed the lowest level in HF among all groups($p<0.05$) and SREBP-1c showed significant decreased level in cinnamon fed group NC and HC($p=0.01$).

Conclusion: This study demonstrates that dietary cinnamon extracts supplementation can inhibit fat accumulation and have anti-obese effect via indicators such as HSL, AMPK and SREBP-1c and can reduce the size of adipose tissue in high-fat diet induced mice model.

Key words Anti-Obese, High-fat diet, Cinnamon, AMPK, SREBP-1c

Category: Food & Nutrition

Blackcurrant Extract (Ribes nigrum L.) Ameliorates Serum Lipid Profiles and Hepatic TG Content in High-Fat-High-Fructose Diet-Induced Hyperlipidemic Rat Model

Sookyeong Hong[1],Hyun-Sook Kim*[2],Gahyun Yoo[3]

1. Department of Food and Nutrition, Sookmyung Women's University, Republic of Korea
2. Department of Food and Nutrition, Sookmyung Women's University, Republic of Korea
3. Department of Food and Nutrition, Sookmyung Women's University, Republic of Korea

Background and objectives: Blackcurrant(Ribes nigrum L.) is high in polyphenols, phytochemicals which are linked with antioxidant effects. This research evaluated the effect of blackcurrant extract in lipid profiles of serum and liver tissue of rats fed with high-fat-high-fructose diet.

Methods: Thirty two 6-week-old male SD rats were fed normal diet(ND) (n=9) or high-fat-high-fructose diet group(HF) (n=23) for 14 weeks. After 7 weeks, oral administration of blackcurrant extract with doses of 0 mg/kg.b.w/day(HF) (n=9), 150 mg/kg.b.w/day(LC) (n=7), and 250 mg/kg.b.w/day(HC) (n=7) were given by gavage to HF groups. Serum lipid profiles, such as triglyceride(TG), total cholesterol(TC), and high density lipoprotein-cholesterol(HDL-C), and hepatic TG content were assessed through ELISA kit. In addition, liver function index such as glutamic oxaloacetic transaminase(GOT), and glutamic pyruvic transaminase(GPT) were also examined.

Results: The result of serum TG, TC, and LDL-C in LC and HC group had significant decrease compared to HF group, and similar result was shown in hepatic TG. HDL-C level of LC and HC group were higher than HF group but no significant differences were shown. The serum GOT levels were significantly lower in HC compared to HF group, while GPT levels had significant difference in both LC and HC compared to HF group.

Conclusions: Overall, the data in this study suggest that blackcurrant extract may attenuate lipid profiles in serum causing hypolipidemic effect, ameliorate hepatic TG, and lower liver function index. Further study of blackcurrant extract ameliorating hepatic lipid accumulation pathway is needed.

Key words Blackcurrant, hyperlipidemia, lipid profiles, hepatic TG

Category: Food & Nutrition

Effect of Storage conditions on the Cooking and Sensory Properties of Rice (Oryza sativa L.)

Dr. Mst. Sharmin Sultana*[1,2],Azrina Azlan[3,4,5]

1. 1. Department of Nutrition, Faculty of Medicine & Health Sciences, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia
2. 2. 3Laboratory of Halal Science Research, Halal Products Research Institute, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia.
3. Department of Nutrition, Faculty of Medicine & Health Sciences, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia.
4. 2Research Centre of Excellence for Nutrition and Non-Communicable Diseases, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia.
5. 3Laboratory of Halal Science Research, Halal Products Research Institute, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

The measurement of rice grain quality is crucial because it's the scale of rice innovation success to meet up the consumer's demand. Rice grain quality involves traits that cover biochemical composition (such as amylose, and protein), milling, and cooking, eating, sensory properties. Milling, storage, cooking, eating, nutrition, and market quality of rice grain. Cooking quality refers to the inclusive estimation of the color, smell, shape, taste, palatability, and some sensory properties after cooking. Gel consistency (GC), apparent amylose content (AAC), gelatinization temperature, cooking method and overall storage conditions are the main indicators affecting cooking and sensory quality of rice. In this study, the effect of storage conditions (5, 10, 30 oC) on the cooking quality of rice was investigated with 10 major rice varieties after 9 months storage. The Overall consumer acceptability had highest correlation with grain quality of rice (r = 0.865), followed by b* value of CR (r = −0.815), fat acidity (r = −0.754), cohesiveness (r = 0.659), and hardness (r = −0.560). Finally, the decline pattern of aroma profile with storage duration were observed for all the tested rice varieties. By contrast, the GT, AC and GC were increase up to 6 month and decrease rate were observed for the last 3 months.

Key words Keywords: Cooking and sensory quality; Nutrition parameter; Amylose, Taste, Palatability.

Category: Food & Nutrition

Opportunities and Barriers to Fruit and Vegetable Consumption among Consumers in Sri Lanka

S.M.H.D Sitisekara,H.S.P Appuhamy,S Pathmarajan,O.K.D Silva,H.M.N.J Karunarathna,R.M.T.K Ranathunga*,T Perera,K.D.R.R Silva
Department of Applied Nutrition, Faculty of Livestock Fisheries & Nutrition, Wayamba University of Sri Lanka

Background and Objectives: Fruit and Vegetables (F&V) are an essential part of a balanced diet. Consumption of F&V is still below the recommended level among Sri Lankans. Understanding the factors affecting their consumption can have a positive impact on interventions to promote F&V consumption. Therefore, this study aimed to identify the opportunities and barriers for F&V consumption among adolescents, adult pregnant and non-pregnant women in Sri Lanka.

Methods: A qualitative study was carried out in Western, North Western and Northern provinces in Sri Lanka. A total of 50 Focus Group Discussions (FGDs) were conducted among adolescents (18 FGDs), adult non-pregnant women (16 FGDs) and pregnant women (16 FGDs) in selected areas. Data were analyzed using Nvivo 12 software.

Results: Discussions revealed four main themes: 1. Perceptions (knowledge, attitudes and perceived health benefits); 2.Practices; 3. Opportunities and barriers of F&V consumption; and 4. Suggestions to improve F&V consumption. The majority were aware of the health benefits of F&V, but not of the recommendations. Consumption patterns were affected by cost, quality, availability, shelf life, and seasonal variations. Individual factors such as knowledge, personal preference, lifestyle, myths and medical concerns; and socio-demographic characteristics such as nationality, gender, income, education level, preferences of children, household size and accessibility were identified as the factors affecting F&V consumption. High cost and low availability were identified as major barriers to F&V consumption. Promoting home gardening, awareness of the health benefits of F&V, popularizing farmers' markets and financial support were given as suggestions to improve F&V consumption.

Conclusions: F&V consumption is influenced by cost, availability, preferences and convenience. In addition to addressing the above, targeted behavioral change interventions are required to improve F&V consumption in different population segments.

Key words Consumers, Focus Group Discussions, Fruit and Vegetables, Perceptions, Sri Lanka

Category: Food & Nutrition

中链甘油三酯联合 DHA 改善 APP/PS1 转基因小鼠 Aβ 沉积及脑能量代谢机制研究

MCTs combined with DHA intervention inhibit amyloid β-peptide accumulation by improving brain glucose metabolism in APP/PS1 transgenic mice

Zhenshu Li,Zehao Wang,Wen Li,Jing Yan,Guowei Huang*
School of Public Health, Tianjin Medical University

Background and Objectives: MCTs and DHA supplementation may improve glucose metabolism and reduce amyloid β-peptide accumulation. In senile neurodegenerative diseases, deterioration of glucose metabolism in the brain precedes symptoms and induces other pathological changes. The aim of this study was to evaluate the effects of combined intervention of MCTs and DHA on brain glucose metabolism and Aβ level in APP/PS1 mice.

Methods and Study Design: Three-month-old male mice were randomly assigned to four groups for eight months: (1) DHA diet group fed with the 0.233% DHA supplemented diet; (2) MCT diet group fed with the 10% MCTs supplemented diet; (3) DHA+MCT diet group fed with the 0.233% DHA and 10% MCTs supplemented diet; (4) Control diet group (Con-P) fed with the control diet. C8:0, C10:0, DHA, β-hydroxybutyric (β-HB) acid levels, the uptake of 18F-fluorodeoxyglucose (18F-FDG), Aβ, APP, BACE1, PS1 levels were detected after the intervention.

Results: The results showed that supplementation with MCTs and DHA improved hippocampal and whole brain glucose intake in APP/PS1 transgenic mice, the combined intervention improved hippocampus, cortex and whole brain glucose intake in mice and can be better than the intervention alone. Meanwhile, supplementation with MCTs and DHA inhibited amyloid β-peptide accumulation, decreased the abundance of APP, BACE1 and PS1 in the hippocampus and cerebral cortex of APP/PS1 transgenic mice, and the combined intervention was better than the intervention alone.

Conclusions: MCTs and/or DHA supplementation delayed inhibited amyloid β-peptide accumulation in the hippocampus and cerebral cortex of APP/PS1 transgenic mice, and the combination of MCTs and DHA was significantly more effective than an individual nutrient. The possible mechanism was that MCTs combined with DHA decreased the abundance of APP, BACE1 and PS1 by improved glucose intake, thus inhibiting amyloid β-peptide accumulation in APP/PS1 transgenic mice.

Key words MCTs; DHA; glucose metabolism; 18F- FDG PET/CT; Amyloid β-peptide

Category: Food & Nutrition

Flavonoids in the Bajakah Stem Plant Extract Effect on HOMA-IR Diabetic Wistar Male Rats with Streptozotocin Induction

Emyr Reisha Isaura*,Bambang Wirjatmadi
Airlangga University

Background: The prevalence number of Diabetic people increases rapidly each year. Health practitioners continue to work on the most effective treatment possible to reduce the prevalence. However, the result has not yet been optimal, while people try many alternative ways to treat Diabetes. One of the ways is using the local plant that has been believed to treat many diseases, called the Bajakah plant originally from Borneo Island, Indonesia. Therefore, our study aimed to test the effect of the Bajakah stem plant extract on diabetic male Wistar rats. **Methods**: We used 25 Wistar male rats grouped into five groups (C1, C2, X1, X2, and X3), got 7 days of acclimatization, and fed with 20 gr of BR-1, except for the intervention groups were added 50, 100, and 150 mg/kg body weight of the Bajakah extract on the day 24 until the end. We weighed and collected the blood results to see the HOMA-IR. **Results**: The study results are significantly different between the positive control group (C2) and the intervention group on the HOMA-IR value. The highest HOMA-IR value was in the positive control group (6.02±1.14) with 3 times higher than the other groups (1.14±0.12 - 1.58±0.21). **Conclusion**: The homeostasis model assessment of insulin resistance between the control and the intervention group shows that by the end of the intervention, the value of the rats in the intervention groups is the same as the negative control group (below 1.85). The Bajakah stem plant extract may be an alternative to treat Diabetic conditions.

Key words HOMA-IR, Bajakah extract, Diabetes, Wistar rats

Category: Food & Nutrition

Indigenous Foods and Their Nutritional Values of Ethnic Minority(Indigenous) Groups in Guangdong Province and Guangxi Region, China

Xiaohui Liu[1,2],Zeyuan Wang*[3],Siqi Pan[2],Ruihang Zhang[4],Hanxue Chu[5],Xiaohua Li[6],Zufu Chen[7],Shaowang Xu[7],Ao Huang[7],Yihong Li[8]

1. Leiden University
2. Minzu University of China
3. The University of Toronto
4. Northeastern University at Qinhuangdao
5. Beijing NO.4 High School
6. Qinghai University
7. Xiangsihu College of Guangxi Minzu University
8. Good Food Fund, China Biodiversity Conservation and Green Development Foundation

Indigenous peoples' food systems involve valuable knowledge of traditional cultures and local ecosystems. In China, the Indigenous and traditional foods of ethnic minorities inherit a long history and are rich in nutrients. Guangdong Province and Guangxi Zhuang Autonomous Region in China share a common historical origin, similar geographical features, and a common language. The two regions are rich in ethnic minorities and Indigenous foods which play an important role in the attempt to enhance food and nutrition security. However, to date, no systematic review of the Indigenous foods and their nutritional values of the ethnic minorities in the two regions has been published. Therefore, this paper selects publications on Indigenous foods from the two regions, specifying the names of the ethnic minorities, and publications published within the last 10 years. The authors finally cited 151 Chinese publications from Wanfang Data and 30 English publications from Google Scholar. The main conclusions are: First, there are 112 kinds of ingredients related to the 12 ethnic minorities in the Guangxi Region, with a variety of species and close integration with ethnic ritual culture; most of the ingredients in Guangdong Province are related to the 3 major Han groups, while the number of Indigenous ingredients of the minority groups is only 32. Second, the above-mentioned ingredients in Guangxi Region contain a more diverse range of nutrients, while the researches in Guangdong Province mainly focus on herbal tea plants, which do not have many types of nutrients, but have traditional Chinese medicine values. The results suggest that Indigenous foods of ethnic minorities are undervalued and knowledge is being lost from generation to generation. Therefore, it is necessary to recognize the unique nutritional value and multiple functions of Indigenous foods, and more researches on Indigenous food systems in Guangdong Province are essential to address this issue.

Key words Indigenous foods; Ethnic minorities; Nutritional value; Food systems; China

Category: Food & Nutrition

Mechanism of Taurine on Improving Hypercholesterolemia Using Transcriptomics

Qi Song,Satoru Kobayashi,Hiroaki Oda*
Laboratory of Nutritional Biochemistry, Nagoya University, Nagoya, Japan

Background and objectives:

Taurine, an important amino acid, is capable of lowering plasma cholesterol, increasing CYP7A1 (cytochrome P450 family 7A1) and mitigating atherosclerosis, while the underlying mechanisms remain for investigation. Here, we elucidated the molecular mechanisms of taurine-action, and explored its novel functions and potential direct target genes.

Methods:

Male Wistar rats were fed a high-cholesterol diet with or without 5% taurine for 14 days, blood lipids were assayed, hepatic transcriptome analysis was performed by DNA microarray and mRNA level. And DNA microarray analysis was performed on rat primary hepatocytes after exposure to 10 mM taurine for 24 hours.

Results:

Taurine significantly decreased the level of serum cholesterol, and increased hepatic CYP7A1 mRNA and transcriptional rate in rats fed the high-cholesterol diet. One hundred eighty-one genes (out of 20,500 genes) were regulated by taurine, and "pathway analysis" revealed that drug metabolism, lipid metabolism, amino acid metabolism and gluconeogenesis associated with insulin signaling pathways were regulated. SHP (Nuclear receptor subfamily 0 group B member 2, NROB2), one of the seven transcription factors regulated by taurine, was reduced, and "network analysis" showed that it was correlated with induction of CYP7A1 and CYP8B1. Taurine also reduced mRNA level of PEPCK (phosphoenolpyruvate carboxykinase) and IGFBP1 (insulin-like growth factor binding protein 1), increased the mRNA level of CYP8A1 and BHMT (betaine homocysteine methyltransferase) in a high-cholesterol fed rat livers. In primary hepatocytes, in line with animal experiments notably BHMT and OATP (organic anion transporting polypeptide) were up-regulated by taurine.

Conclusions:

The cholesterol-lowering effect of taurine was mainly achieved by the induction of CYP7A1 through the SHP pathway, and the inhibitory effects on drug metabolism, lipid hypermetabolism and gluconeogenesis were identified. Moreover, we have found that taurine directly regulates the gene expression of BHMT and OATP.

Key words Taurine, Cholesterol, Rat Liver, Hepatocyte, Transcriptomics

Category: Food & Nutrition

Dietary Diversity, Nutrition Status and Health Outcome Disparities in Rural and Urban India: Evidence from the Large-Scale Household Surveys

Sendhil Ramadas*[1],Adeeth Cariappa[2],Sheela Kharkwal[3],Kiran Kumara TM[4],Jyothimol Joseph[1],Pouchepparadjou A[5],Ramasundaram P[6]

1. Pondicherry University (A Central University), Puducherry, India
2. National Institution for Transforming India (NITI) Aayog, New Delhi, India
3. College of Agriculture, SKNAU, Jobner, Rajasthan, India
4. ICAR-National Institute of Agricultural Economics and Policy Research (NIAP), New Delhi, India
5. Pandit Jawaharlal Nehru College of Agriculture and Research Institute, Puducherry, India
6. Indian Council of Agricultural Research (ICAR), Krishi Anusandhan Bhavan II, New Delhi, India

Background and objectives: Nutrition status and health are ultimate outcomes of dietary diversity determining human capital quality. With changing dietary patterns in rural-urban India, the present study examines the effect of dietary diversity on nutrition status and health outcomes, followed by prioritizing regions for improvement.

Methods: Data marshaled from National Sample Survey Office and National Family Health Survey were used to construct dietary diversity index(DDI) using Simpson's approach, nutrition status index(NSI) using per-capita nutrients intake, and health outcome index(HOI). NSI+HOI were estimated using principal components approach. Multivariate regression was executed to capture the causal effect of DDI on NSI and HOI. Finally, biplot analysis was done to prioritize regions for better nutritional status and health outcomes.

Results: Dietary diversity indicated that most Indian states consume less/moderately diversified foods. Calorie intake witnessed significant reductions over time, corroborating its linkage with dietary diversity. Per-capita protein-intake remained steady, whereas fat-intake increased and higher in urban-India. Concerning children health outcomes, stunting increased in coastal states during 2019-20 relative to 2015-16. Wasting increased in Andhra Pradesh, Assam, and Bihar. Underweight increased in Kerala, Andhra Pradesh, Assam, West Bengal, and Gujarat. Overall, malnutrition (HOI) increased across regions. Men whose body mass index (BMI) is below normal decreased across regions, and obesity increased in all. Women whose BMI is below normal decreased, and obesity increased in majority. Anemic pregnant women increased majorly in southern states. Regression indicated a significant causal relationship between DDI and NSI/HOI. Regional prioritization registered a strong linkage between DDI, NSI, and HOI.

Conclusions: The dietary diversity level is low in most regions which gets reflected in the nutritional status and health outcome level, especially in children and women. It is suggested to reduce the inequality and variation accompanied by increasing the composition of fooditems in the consumption basket, especially by spending more on nutrient-dense commodities.

Key words Dietary diversity, NFHS, nutrition status, health outcome, biofortification

Category: Food & Nutrition

Nutritional Compositions, Bioactive Properties and Glycaemic Response of Nipa Palm (Nypa fruticans Wurmb) Syrup

Jureeporn Nounmusig*[1],Poonyaphet Datphaetcharat[2],Kansuda Wunjuntuk[3],Achiraya Kamchansuppasin[4]

1. Faculty of Science and Technology, Nakhon Si Thammarat Rajabhat University, Nakhon Si Thammarat, Thailand
2. Faculty of Science and Technology, Nakhon Si Thammarat Rajabhat University, Nakhon Si Thammarat, Thailand
3. Faculty of Agriculture, Kasetsart University, Bangkok, Thailand
4. Institute of Nutrition, Mahidol University, Salaya, Nakhon Pathom, Thailand

Background and objectives: The Nipa Palm (Nypa fruticans wurmb.) is a native plant inhabits along the coastline of Pak Panang, Nakhon Si Thammarat, Thailand. This study aimed to determine the nutritional composition, bioactive compounds, antioxidant capacities and glycaemic index (GI) of Nipa palm sugar.

Methods: Nipa palm was studied in vitro for its nutritional value, antioxidant properties and total phenolic compounds. The GI of Nipa palm sugar compared to honey, cane sugar and Palmyra palm sugar was evaluated in a human study by recruiting healthy volunteers who were randomly assigned to consume 50 g of available carbohydrates for each different sugar (ISO/FDIS 26642:2010).

Results: In Nipa palm sugar, potassium (K) was the main mineral (735.0±4.0 mg/100 g), followed by sodium (311.0±10.0 mg/100 g) and phosphorus (37.2±1.8 mg/100 g).The content of total phenolic compounds in Nipa palm sugar with Kiam wood (2.36±0.03 g GAE/L) is significantly higher ($p \leqslant 0.05$) than that of Nipa palm sugar without Kiam wood (0.82±0.03 g GAE/L). The antioxidant capacities of Nipa palm sugar with Kiam wood were 3.20±0.01mmol/L for Ferric Reducing Antioxidant Power, 596±004 mmol Trolox equivalents/L for ABTS and 16.60±0.04 mmol/L for DPPH radical scavenging ability, which was significantly higher than that of Nipa palm sugar without Kiam wood ($p \leqslant 0.05$). The GI results of Nipa palm sugar (38.7±2.8%), honey (46.7±3.6%) and Palmyra palm (43.3±2.8%) are classified as low GI diet, while cane sugar is classified as high GI diet (60.6±3.4%).

Conclusions: The present study shows that Nipa palm sugar could be an alternative natural sweetener with low GI, high total phenolic content and high antioxidant capacity.

Key words Nipa palm, Alternative natural sweetener, Glycaemic index, Glycaemic response

Category: Food & Nutrition

Lipid Oxidation Stress : Botanical Antioxidant Strategies for Health

Kiyotaka Nakagawa*[1],Jina Hong[2],Arun Rajgopal[2],Hirono Totsuka[3],Junya Ito[1],Shunji Kato[1],Takahiro Eitsuka[1]

1. Tohoku University
2. Access Business Group International, LLC
3. Amway Japan G.K.

[Objectives] Lipid oxidation stress has been an area of interest because of its involvement in aging as well as various diseases. Recently, we developed a sensitive liquid chromatography-tandem mass spectrometry (LC-MS/MS) method to analyze lipid hydroperoxide (LOOH) isomers, the primary oxidation products of lipids. LOOH is formed by the oxidation of unsaturated fatty acids that constitute lipids. Importantly oxidation takes place at different positions within the lipid structure (i.e., hydroperoxyl groups are introduced at different positions) depending on oxidation mechanisms (i.e., enzymatic oxidation, radical oxidation, or singlet oxygen oxidation). Our LC-MS/MS method, by utilizing sodium ions, can induce position-specific fragmentation of the hydroperoxide group of LOOH. Thus, the position of the hydroperoxide group can be accurately determined, and lipid oxidation mechanisms can be evaluated. Such identification of oxidation mechanisms should allow for the efficient prevention of lipid oxidation stress via selection of antioxidants that effectively prevent each oxidation mechanism. In this presentation, we would like to introduce the application of our LC-MS/MS method to achieve the antioxidant strategies for health.

[Methods and Results] An example of our studies involves ferroptosis, a new type of cell death. Using our LC-MS/MS method, we are currently investigating whether ferroptosis is induced by radical oxidation-induced LOOH, as previous studies have hypothesized. We also participated in collaborative studies on ferroptosis and discovered that vitamin K effectively inhibits ferroptosis via its antioxidant properties that trap radicals. We suspect that botanical extracts such as quercetin, rosemary and turmeric may also have such an inhibitory effect on ferroptosis and are currently investigating this possibility. We believe that these antioxidant strategies should contribute to the realization of a healthy society.

Key words Lipid oxidation; Oxidative stress; Oxidation mechanism; Antioxidant strategies; Botanical antioxidants

Category: Food & Nutrition

Evaluating the Association between the Cost of Diets and Dietary Intake: Assessing Diet Cost Indicators in 161 Countries

Shiwei Liang[1],Bingjie Zhou[3],Yutong Chen[3],Elena Naumova[3],Yan Bai*[2]
1. UMass Chan Medical School
2. The World Bank
3. Tufts University

This study aimed to analyze secondary data from global databases to reveal the associations between multiple diet cost indicators, and dietary intakes, and to compare the indicators in terms of sensitivity to the dietary outcomes.

We computed the weighted population-level nutrient adequacy levels and food intakes for 9 nutrients and 13 food groups for 8 adult sex-age groups in 161 countries, with estimated daily nutrient and food intake data retrieved from the Global Dietary Database. We then tested the association between dietary outcomes in 2018 and the diet cost and food price indicators in 2017 (Cost of a Health Diet, Cost of a Nutritious Adequate Diet, Cost of a Calories Adequate Diet, and Food Price Level Index), using logistic regression models adjusted for log GDP per capita and log daily food expenditure per capita as covariates.

For nutrient intakes, we found negative associations between intakes for riboflavin, vitamin C, zinc, and magnesium, while positive association for carbohydrates, and diet cost indicators. For food group intakes, we found negative associations between starchy vegetables, whole grain intakes, and unsaturated fats, while positive associations between refined grain intakes and non-starchy vegetables, and diet cost indicators.

This overview of population-stratified intakes for selected nutrients and food groups indicated that increased diet cost indicators are associated with higher intakes of carbohydrates and refined grains, but lower intakes of certain essential nutrients and healthy food groups, potentially signaling lower dietary quality. The least costs of diets meeting nutrition and health goals are generally more sensitive to changes in dietary intakes compared to the least cost diet indicator focused on energy only, and the traditional price level index for food. Therefore, the cost of a healthy diet could be used as a nutrition-sensitive diet cost indicator providing evidence for policymakers to guide agriculture, food and nutrition interventions and policies.

Key words Nutrient Intake, Food Intake, Diet Cost, Healthy diet

Category: Food & Nutrition

Optimization of seaweed flour (kappaphycus alvarezii) on physical analysis of Butter Cookies

LINLIN NIE,Wan Rosli Wan Ishak*,Nurraihana Hamzah,Majid Khan Majahar Ali
University Sains Malaysia

Inadequate intake of foods with high concentration of dietary fibre (DF) has been identified as one of the major dietary risk factors contributing to the burden of non-communicable diseases. Seaweed (Kappaphycus alvarezii) is rich in DF and low in carbohydrates can be used as raw functional ingredient in formulating foods to reduce the risk of having obesity, diabetes, cancer and dyslipidaemia. Moreover, a regular diet rich in seaweed can increase the nutritional content of food. Butter cookies are one of the most popular bakery products today and are loved by many consumers. Therefore, the addition of this natural ingredients of seaweed flour in butter cookies can increase their DF content and reduce the high calorie content of butter cookies. The general objective for this study is to optimize the formulation of butter cookies made from Seaweed Flour (Kappaphycus alvazerii) as partial replacement for wheat flour. Kappaphycus alvazerii flour manufactured by Imtanomic Sdn Bhd (ISB)'s was used as wheat flour substitute. Data optimization was performed according to Box Behnken Design (BBD) response surface methodology (RSM) using Design-Expert software. The BBDs of experiments provide modeling of the response surface to optimize the independent variables for the responses of physical characteristics (weight, spread ratio, firmness, crispness, thickness and diameter) of butter cookies. The results showed that the 16 experimental samples were first subjected to texture analysis in physical analysis and the data was obtained. Then the formulations were optimized using the RSM get two sets of optimized formulations, 12 sample and 14 sample respectively. In conclusion, adding seaweed flour to baked products could be an effective way to produce nutritious and health benefits. The optimized formula containing 8% seaweed, 6% butter, 6% margarine and 6% OBS. The good textural quality containing 8% seaweed, 12% butter and 12% OBS.

Key words Seaweed Flour (Kappaphycus alvarezii), Butter Cookie, Optimization

Category: Food & Nutrition

体外模型结合电脑模拟预测 EGCG 及其肠道微生物代谢物的 Nrf2 信号通路激活特征

In vitro and in silico based approach to study Nrf2 induction by EGCG and its colonic metabolites

Chen Liu*[1,2],Jolijn van Mil[2],Annelies Noorlander[2],Ivonne Rietjens[2]
1. Sichuan Agricultural University
2. Wageningen University

Background and Objectives

(-)-Epigallocatechin gallate (EGCG) is the most abundant and bioactive nutrient in green tea. It has been attributed to multiple beneficial effects. However, it has limited bioavailability and is prone to microbial metabolism when reaching the colon. Therefore, the formed low-molecular-weight metabolites could contribute to the observed bioactivities of EGCG. The present study aimed to characterize EGCG and its catechol-moiety-containing microbial metabolites gallic acid (GA) and pyrogallol (PG) in inducing Nrf2-mediated gene expression and also to develop a human physiologically based kinetic (PBK) model to predict kinetics of EGCG, GA, and PG in vivo.

Methods and Study Design

The Nrf2 activation by chosen compounds was characterized using an U2OS-Nrf2 CALUX reporter gene assay. The software Berkeley Madonna was used to optimize the human PBK model for EGCG, with sub-models for GA and PG. The resulting in vitro concentration-response curves were used to extrapolate the in vitro data to an in vivo dose-response curve for EGCG-mediated Nrf2 induction using PBK modeling-based reverse dosimetry.

Results

Results show that GA and PG were potent in activation of Nrf2-mediated gene expression than EGCG. By comparing to literature data, that the developed PBK model could adequately predict in vivo time-dependent blood concentrations of EGCG under different exposure conditions. The predicted in vivo dose response curve revealed that at daily intake levels of green tea or EGCG supplements, the resulting blood Cmax of EGCG was in the sub-micromolar range, concentrations at which Nrf2 activation was shown to be limited. Contribution GA and PG to the overall systemic Nrf2 induction upon EGCG exposure is expected to be limited.

Conclusion

Combining in vitro data with a human PBK model allowed the prediction of a dose-response curve for EGCG induced Nrf2-mediated gene expression in humans, and provided insight into the contribution of gut microbial metabolites to this effect.

Key words EGCG, gallic acid, pyrogallol, microbial metabolism, PBK model

Category: Food & Nutrition

Phenomenological analysis on whipping behavior of rice flour batter

Jiamin Yang,Chiaki Ichikawa,Daitaro Ishikawa,Tomoyuki Fujii*
Tohoku University

Background and objectives

Rice flour has many advantages for human health compared with wheat flour. So, we tried to use rice flour and soybean products instead of wheat, milk and eggs to develop allergy-free foods. However, rice flour is difficult to form network to keep air, so the optimization of process control method is crucial to develop a new rice flour-based cellular food with attractive texture. Therefore, the aim of this study is to evaluate the whipping properties of the rice flour-based batter by controlling the bubbles.

Methods

Six rice flours (RFa~RFf) were prepared from Hitomebore by different milling methods.

Powder properties: the mean particle size, the particle density and dynamic wetting test of rice flour were measured.

Physical properties of the liquid phase: both of 40-60% w/w sucrose-sodium dodecyl sulfate (SDS) aqueous solution and 10-40% w/w sucrose-soymilk solution were prepared to measure the surface tension and the viscosity.

Whipping properties: 5-50 g of each rice flour was added to the solutions of soymilk or SDS with sucrose to prepare rice flour-based batter, and the mean bubble size was obtained.

Results

The relationship between Bo (Bond number) and the wettability parameter $d_c\cos\theta/d_p$ clearly suggested that differences in the powder properties of rice flour could be evaluated by particle size and wettability. The foam was strongly dependent on the inertial force, viscous force, and surface tension, and affected by solids in the three-phase dispersion. In the solid-gas-liquid three-phase dispersion system, the normalized mean bubble diameter reflecting whipping behavior can be predicted by We, Re, Fr, Bo, and $d_c\cos\theta/d_p$ according to the amount of solid addition.

Conclusions

These results successfully demonstrated the potential to evaluate the whipping process by dimensionless parameters.Understanding the characteristics of air bubbles in the batter might lead to the optimization of processing for rice flour-based foods.

Key words Bubble size, dimensionless equation, dynamic wettability, three-phase dispersion, whipping

Category: Food & Nutrition

Effect of Nacre Extract from Pearl Oyster Shells against BPSD-like Symptoms in Senescence-Accelerated mouse P8 (SAMP8)

Tomoki Omachi*,Yasushi Hasegawa
Muroran Institute of Technology

Background and objectives:

Pearl powder has been utilized in traditional Chinese medicine for convulsions, epilepsy, and myopia, as well as in functional foods and cosmetics. Patients with Alzheimer's disease (AD) and other types of dementia exhibit behavioral and psychological symptoms of dementia (BPSD), including aggression, wandering, anxiety, and depression. We previously showed that an extract from nacreous layer in pearl oyster shells can ameliorates lipopolysaccharide (LPS)-induced depression- and anxiety-like behavior. In this study, we aimed to investigate the effect of nacre extract against BPSD-like behavior in SAMP8 mice.

Methods:

SAMP8 mice were grouped in three groups and fed either a basal diet without nacre extract or with 125mg/kg nacre extract or 250mg/kg nacre extract. Control mice (SAMR1) were fed a basal diet for 6 months. Behavioral tests were performed to assess anxiety, depression, circadian rhythm, and aggressiveness of mice. Following the behavioral tests, RNA-seq analyses were conducted to investigate the bioactive mechanisms of nacre extract.

Results:

Nacre extract improved anxious and depressive behaviors of SAMP8 mice in the forced swimming test and the elevated plus maze test. Treatment with nacre extract also decreased aggressiveness and normalized circadian rhythm disorder in SAMP8 mice. These results indicate that the nacre extract is effective in mitigating BPSD-like behavior in SAMP8 mice. RNA-seq analysis showed that the expressions of some ER stress-related genes were down-regulated in SAMP8 mice compared to the SAMR1 mice and the treatment with nacre extract restored the expressions. Furthermore, nacre extract suppressed the neuronal degenerations in hippocampus accompanying aging of SAMP8 mice.

Conclusion:

Our findings suggest that the nacre extract can alleviate BPSD-like behavior in SAMP8 mice by suppressing ER stress and apoptosis. Nacre extract may be useful as a functional food.

Key words Functional foods, Dementia, pearl, BPSD,industrial waste

Category: Food & Nutrition

Development of a Photographic Food Atlas as a Portion Estimate Tool for Adolescents in Sri Lanka

W.A.H.S. Wickramaarachchi[1],H.M.N.J. Karunarathna*[1],S.M.H.D Sitisekara[1],T. Perera[1],R.M.T.K. Ranathunge[1],K.D.R.R. Silva[1],A. Gelli[2]

1. Wayamba University of Sri Lanka

2. International Food Policy Research Institute (IFPRI), USA

Inaccurate portion size estimation by the respondents in dietary assessment causes estimation errors in food and nutrient intakes. Although weighing foods is considered the gold standard to assess food amounts in dietary assessments, it is time-consuming and requires high motivation. This hampers the use of weighing methods in large-scale dietary surveys. A food atlas is a set of food photographs portraying varying portion sizes of selected food items, that are bound together in a single volume that can be sued to estimate the portion sizes. This study aimed to develop a photographic food atlas with portion sizes of commonly consumed food in Sri Lanka for adolescents.

From 15 different food groups, 250 food items that are commonly consumed by Sri Lankan adolescents were prioritized based on the data collected from previous dietary surveys. Out of these prioritized food items, selected food items were cooked following standard recipes while other ready-to-eat food items were purchased from the local market. A series of photographs were taken using a smartphone with a 13-megapixel camera from 90-degree angles to capture the aerial views and 45-degree angles to capture the view of a person, sitting at a table and looking at a plate, respectively. White color crockery with a gray color background was used to present the food items.

A total of 250 food items with different portion sizes (6 portion sizes (n=138 foods), 4 portion sizes (n=68 foods), 2 portion sizes (n=14 foods), and single foods (n=30 foods)) that are commonly consumed by Sri Lankan adolescents were depicted in the Food Atlas.

This photographic Food Atlas will be a valuable tool for accurately estimating portion sizes of most common dishes consumed by adolescents in Sri Lanka. It can be used in educating, and counseling on appropriate portions of food to help improve dietary intake.

Key words Adolescents, Dietary Assessment, Food Atlas, Sri Lanka

Category: Food & Nutrition

Opportunities and Challenges for School Garden-Based Food Literacy Promotion in Secondary Schools in Sri Lanka

Udari A.A.D.B Udari A.A.D.B,Karunanayaka M.M.S Karunanayaka M.M.S*,Perera T Perera T,Silva K.D.R.R Silva K.D.R.R
Wayamba University

Opportunities and Challenges for School Garden-Based Food Literacy Promotion in Secondary Schools in Sri Lanka

Background and Objectives:

Addressing food literacy early in life is important to persuade adolescents to make healthier food choices. Different countries incorporate food literacy into children's lives through school garden. The exploration of multiple stakeholder perceptions regarding school-based gardens provides valuable insights into developing appropriate interventions. However, there are limited studies to understand the potential of implementing school gardens in Sri Lanka. Thus, this study aimed to explore the different stakeholders' opinions associated with school garden-based food literacy promotion.

Methods:

Key informant interviews (n=28) were conducted with teachers and principals of ten government schools in Western and North-Western provinces in Sri Lanka. In-Service Teacher Advisors (n=3) in zonal education offices and professionals in the field of nutrition (n=5) were also interviewed. Data were analyzed using thematic analysis.

Results:

The main themes identified during interviews include; 1. Perceptions (implementation of school gardens); 2. Opportunities and challenges of school gardens to promote food literacy; and 3. Suggestions for the effective conduct of school gardens. Present school gardens have been mainly initiated to provide agricultural knowledge and skills. Many participants indicated the significance of skill-based food literacy education through school gardens, referring to low food-related knowledge, skills, and practices among adolescents. Time constraints, the negative attitudes of teachers and students and lacking resources were the main challenges. Suggested recommendations included allocating a specific time for gardening, integrating food literacy concepts into school curricula, and facilitating teacher training resources.

Conclusions: The findings suggest that education administrators should consider the multidisciplinary stakeholders' opinions, in designing school garden projects focusing on effective food literacy promotion whilst, exploiting the opportunities and addressing the challenges

Keywords: Food Literacy Promotion, Adolescents, School Gardens, Nutrition, Sri Lanka

Conflicts of Interest: No conflict of interest to report with this study.

Key words Food Literacy Promotion, Adolescents, School Gardens, Nutrition, Sri Lanka

Category: Food & Nutrition

Reduction of micronutrients intake inadequacy by young child milk consumption in Indonesian children 1-5 years: a diet modelling analysis

Dantong Wang*[1],Diana Sunardi[2],Yulianti Wibowo[3],Tsz Ning Mak[1],Dantong Wang
1. Nestle Research
2. Department of Nutrition, Faculty of Medicine Universitas Indonesia - Cipto Mangunkusumo Hospital
3. Medical Nutrition Services, Nestle Indonesia

Background and objectives: Indonesian children under-five have a high prevalence of micronutrient deficiencies. Dairy products are the key food sources of nutrients for young children. The commonly consumed dairy products are young child milk (YCM, fortified milk tailored for young children), condensed milk and cow's milk. We hypothesized that the consumption of appropriate dairy products could help to reduce nutrient inadequacy. In this study we applied diet modelling approach to assess the potential impact of YCM on the nutrient intakes among children aged 1-5 years.

Methods: Data of children aged 1-5 years from Indonesian Individual Dietary Consumption Survey 2014 were analyzed in this study. Nutrient intakes of each child were estimated based on 1 day 24-hour dietary recall using Nutri-Survey software. Diet modelling was conducted among condensed milk consumers in two scenarios, substitution of condensed milk with an isovolumetric and isocaloric YCM. Subjects were separated into two age groups, 1-2 years (n=507) and 3-4 years (n=797), the prevalence of nutrient inadequate intakes were compared before and after substitution.

Results: The prevalence of nutrient inadequate intakes were high in condensed milk consumers, such as in Vit A (67%, 64%), folate (92%, 91%), Vit D (87%, 84%), iron (84%, 76%), and zinc (76%, 76%) in 1-2y and 3-4y, respectively. Compared to the baseline of each age group, both scenarios of substitution of condensed milk with a YCM reduced the prevalence of inadequate intakes of micronutrients by 20-40% (Vit A and folate) and 40-50% (Vit D and zinc). The reduction of prevalence of inadequate iron intake was 31% in 1-2y and 63% in 3-4y.

Conclusions: Substitution of condensed milk with a YCM reduced the prevalence of inadequate intakes of analyzed micronutrients. Nutrient intakes could be improved by YCM consumption in 1-5 years old children in Indonesia, along with nutrition education on feeding practices.

Key words Children under-five, nutrient intake, Young Child Milk, dietary modelling

Category: Food & Nutrition

Anti-obesity and anti-diabetic effects of the peel of a new citrus cultivar ‘Mizuki’ in high-fat diet induced obese mice

Yuyin Meng[1],Yan Hu[1],Toshihiro Kobayashi[2],Yoshihiro Sakashita[2],Yuko Yanagimoto[3],Junko Kaneyoshi[3],Rahmawati Aisyah[1],Thanutchaporn Kumrungsee[1],Ryohei Nakano[4],Noriyuki Yanaka*[1]

1. Hiroshima University
2. Aohata Corporation
3. Hiroshima Prefectural Technology Research Institute
4. Kyoto University

Background: Obesity and type 2 diabetes (T2D) are closely associated with higher incidence of serious diseases such as fatty liver and renal disease. In recent years, functional foods have been explored and expected to prevent obesity and T2D. A new citrus cultivar ‘*Mizuki*’ was recently developed in Japan, and in this study, we investigated dietary effects of *Mizuki* powder on obesity and diabetes development in mice.

Methods and Results: 6 weeks-old C57BL/6J mice were fed with normal diet, 60% kcal high-fat diet (HFD) and HFD with 5%w/w *Mizuki* powder for 8 weeks. Blood glucose level and white adipose tissue weight were significantly decreased in *Mizuki* group compared to HFD group. RNA-seq analysis showed hepatic mRNA expressions of inflammatory markers were suppressed in *Mizuki* group. We analyzed *Mizuki* ethanol extract by LCMS method and showed high concentration of neohesperidine and naringin in the extract. Next, we examined the effect of ethanol extract in HFD-induced obese mice and showed that supplementation of *Mizuki* ethanol extract significantly decreased glucose level and improved glucose tolerance in mice, suggesting an important role of polyphenol-rich ethanol extract. Finally, we investigated the preventative effect of *Mizuki* powder on diabetic nephropathy. Male C57BL6 mice were injected with low-dose streptozotocin (55mg/kg/day, five consecutive day) and fed 45% HFD with or without 5%w/w *Mizuki* powder for 16 weeks. Interestingly, kidney weight and glomerular area were significantly reduced by dietary *Mizuki* powder.

Conclusion: Dietary *Mizuki* can ameliorate obesity development and improve glucose metabolism in HFD obese mice. Moreover, dietary *Mizuki* prevents renal pathologies in diabetic nephropathy mice possibly through polyphenols effects.

Key words obesity, diabetes, polyphenol, kidney disease, high-fat diet

Category: Food & Nutrition

Anti-obesity effect of root extract of Peucedanum japonicum Thunb in mice and induction of hepatic CYP2B gene expression

Ruj Vatanapahu[1],Moe Mihara[1],Takashi Tagawa[2],Mai Kanazawa[2],Rahmawati Aisyah[1],Thanutchaporn Kumrungsee[1],Noriyuki Yanaka*[1]

1. Hiroshima University

2. Maruzen Pharmaceuticals Co., Ltd.

Background and Objectives: Obesity is becoming a major concern in the world because it increases risk of lifestyle diseases. Many kinds of phytochemicals from plant extracts reportedly show their ability to ameliorate obesity and its complications. *Peucedanum japonicum Thunb* (PJT) has been widely used as traditional medicine in East-Asia and examined for anti-obesity effects with the leaf extract. The root of PJT is also expected as functional foods, however, the dietary effect has not been explored. In this study, we examined anti-obesity effect of root extract of PJT in high-fat diet induced mice and propose its new mechanism responsible for its preventive effect on disease development.

Methods: 6 weeks-old C57BL/6J mice were fed a normal diet (Control), 60%kcal high fat diet (HFD), and a pair-fed HFD with 1% w/w PJT root ethanol extract (80%PJT) for 10 weeks. Blood serum and tissue samples such as liver and white adipose tissue (WAT) were collected for further analyses. We investigated the gene expression profiles of both liver and WAT using DNA microarray and qPCR analyses.

Results: 80%PJT supplementation significantly decreased not only the body weight gain, blood glucose level and WAT weight, but also blood AST and hepatic triglyceride levels. qPCR analysis showed that dietary 80%PJT lowered mRNA level of inflammatory markers such as Saa3 and MMP3 in WAT. 80%PJT supplementation also decreased inflammatory markers mRNA levels in liver and, interestingly, increased hepatic mRNA level of CYP2B which reportedly plays a role in lipid metabolism as an anti-obesity enzyme.

Conclusions: PJT root extract exerts anti-obesity effect, improves blood glucose level and prevents fatty liver development. This study suggests that PJT root is useful as a novel functional food to ameliorate obesity-related diseases partially through an upregulation of hepatic CYP2B gene expression.

Key words Obesity, Peucedanum japonicum Thunb, fatty liver, Cytochrome P450, CYP2B

Category: Food & Nutrition

Effects of Chinese Heart-Healthy Diet on Blood Lipids, Glucose and Estimated 10-year Cardiovascular Risk Among Chinese Adults: Results From the DECIDE-Diet Trial

Qianqian Li[1],Lin Feng[1],Yanfang Wang[1],Yangfeng Wu*[1,2,3]

1. Peking University Clinical Research Institute, Peking University First Hospital, Beijing, China
2. Department of Epidemiology and Biostatistics, School of Public Health, Peking University, Beijing, China
3. Key Laboratory of Molecular Cardiovascular Sciences (Peking University), Ministry of Education, Beijing, China

Background/Aims: Healthy diet is essential for the management of cardiovascular risk factors, but its effects among Chinese patients whose diet differ from Western diet remain largely unknown. The aim of this study was to analyze effects of the Chinese heart-healthy (CHH) diet on blood lipids, glucose and cardiovascular risk among Chinese adults.

Methods: In this multicenter, patient- and outcome assessor-blind, randomized controlled feeding trial, participants (baseline systolic blood pressure: 130 - 159mmHg) were randomized into CHH diet or local diet for 28 days of intervention after a 7-day run-in period on local diet. Blood lipids and glucose were measured with over-night fasting blood samples before and after intervention period, and 10-year cardiovascular risk was estimated using models previously developed and validated in Chinese adults. The changes in blood lipids, glucose and 10-year cardiovascular risk over the intervention period were compared between intervention groups adjusting for center. Sensitivity analyses were done with further adjustment for sex, age, baseline body mass index and medication use; and among per protocol population.

Results: Among 256 eligible participants (130 on CHH diet and 126 on control diet), 42% had hypercholesterolemia and 15% had diabetes at baseline. Compared with usual diet, the CHH diet lowered TC (-0.14mmol/L, equivalent to 3% reduction from the baseline, P=0.017) and 10-year cardiovascular risk (-1.24%, equivalent to 27% reduction, P=0.001) further. No effect on blood glucose was found. All sensitivity analyses confirmed the results on TC and 10-year cardiovascular risk, and analysis with multiple variables adjusted showed a borderline significant effect on blood glucose (-0.17mmol/L, equivalent to 3% reduction, P=0.051).

Conclusions: The CHH diet reduced TC and 10-year cardiovascular risk and was likely to reduce blood glucose among Chinese adults with mild hypertension. Further studies with longer term are warranted. (clinical trial: NCT03882645)

Key words China, Heart-healthy diet, Cardiovascular Risk, Blood Lipids, Blood Glucose

Category: Food & Nutrition

绿藻硫酸化多糖生物活性的新见解

New Insight in Biological Activities of Sulfated Polysaccharides from Ulvophyte Green Algae

Melvin Junior Tanner*[1],Fahrul Nurkolis[2],Hardinsyah Hardinsyah[3,4,5],Nurpudji Astuti Taslim[6],Bonglee Kim[7,8]

1. Alumnus of Nutrition, Faculty of Public Health, University of Indonesia
2. Biological Sciences, State Islamic University of Sunan Kalijaga (UIN Sunan Kalijaga), Yogyakarta, Yogyakarta, 55281, Indonesia
3. Applied Nutrition, Faculty of Human Ecology, IPB University, Bogor, 16680, Indonesia
4. President of The Federation of Asian Nutrition Societies (FANS) 2019-2023
5. President of The Food and Nutrition Society of Indonesia (PERGIZI PANGAN)
6. Clinical Nutrition, Faculty of Medicine, Hasanuddin University, Makassar, 90245, Indonesia
7. Department of Pathology, College of Korean Medicine, Kyung Hee University, Hoegidong Dong-dae-mun-gu, Seoul, 02447, Republic of Korea
8. Korean Medicine-Based Drug Repositioning Cancer Research Center, College of Korean Medicine, Kyung Hee University, Seoul, 02447, Republic of Korea

Background and objectives: Green algae are natural bioresources that have excellent bioactive potential, partly due to sulfated polysaccharides (SPs) which are still rarely explored for their biological activity. There is currently an urgent need for studies exploring the biological activity of SPs extracted from two Indonesian ulvophyte green algae: the sulfated polysaccharide of *Caulerpa racemosa* (SPCr) and sulfated polysaccharide of *Caulerpa lentillifera* (SPCl). To address the information gap, this study aims to identify the characteristics and health benefits of SPs extracted from Indonesian *C. racemosa* and *C. lentillifera* in terms of antioxidant, anti-obesity, anti-diabetic, and anticancer capacities; results are drawn from *in vitro* assays. **Methods**: This study's method of isolating SPs and their assessment of biological activities are based on previous and similar studies. Fresh samples of both green algae (*Caulerpa racemosa* and *Caulerpa lentillifera*) were collected from Indonesian sea waters. The SPs isolation protocol was carried out based on a previous similar study via enzymatic extraction by Protease. Characterization of total sugar concentrations was estimated using volumetric-chromatography procedures. The sulfate and monosaccharides content was measured using a High performance liquid chromatography. **Results**: The highest yield sulfate/total sugar ratio was presented by SPCr than that of SPCl. Overall, SPCr exhibits strong antioxidant activity, as shown by smaller EC_{50} values obtained from a series of antioxidant activity assays compared to the EC_{50} values of Trolox (Control). As an anti-obesity and antidiabetic, the overall EC_{50} value of both SPs was close to the EC_{50} of positive control (orlistat and acarbose). Even more interesting was that SPCl showed wide-ranging anticancer effects on colorectal, hepatoma, breast cancer cell lines, and leukemia. **Conclusions**: Finally, this study reveals new insight that SPs from two Indonesian green algae have the potential to be promising nutraceuticals as novel antioxidative actors and to fight obesity, diabetes, and even cancer

Key words Antioxidant activity, Sulfated Polysaccharides, Green Algae, Anti-obesity, Antidiabetic

Category: Food & Nutrition

槟榔果实提取物的代谢物概况、自由基清除和葡萄糖苷酶抑制活性

Metabolites Profile, Free Radical Scavenging, and Glucosidase Inhibitory Activities of Areca vestiaria Fruit Extract

Faqrizal Ria Qhabibi*[1],Fahrul Nurkolis[2],William Ben Gunawan[3],Nelly Mayulu[4],Nurpudji Astuti Taslim[5],Hardinsyah Hardinsyah[6,7,8]

1. Medical School Department, Faculty of Medicine, Brawijaya University
2. Biological Sciences, State Islamic University of Sunan Kalijaga (UIN Sunan Kalijaga), Yogyakarta, Yogyakarta, 55281, Indonesia
3. Alumnus of Nutrition Science, Faculty of Medicine, Diponegoro University, Semarang 50275, Indonesia
4. Department of Nutrition, Universitas Muhammadiyah Manado, Manado 95249, Indonesia
5. Clinical Nutrition, Faculty of Medicine, Hasanuddin University, Makassar, 90245, Indonesia
6. Applied Nutrition, Faculty of Human Ecology, IPB University, Bogor, 16680, Indonesia
7. President of The Federation of Asian Nutrition Societies (FANS) 2019-2023
8. 8. President of The Food and Nutrition Society of Indonesia (PERGIZI PANGAN)

Background and objectives: *Areca vestiaria* is a natural food that has the potential to be a new herbal and nutritionsupplement, but their metabolite profile is still not available. A better understanding of the bioactive compound profile of *A. vestiaria* will provide clearer insights into its benefits for health. The study aims to explore bioactive compounds, free radical scavenging (antioxidant activities in by 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2′-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) or ABTS inhibition, and its antidiabetic potential through carbohydrate (α-glucosidase) inhibition assay. **Methods**: Fresh samples of *A. vestiaria* fruit were collected from North Sulawesi Province, Indonesia. The dried simplica of *A. vestiaria* was extracted by maceration using 96% methanol (MeOH) solvent. Non-targeted metabolomic profiling studies were conducted with ultra-performance liquid chromatography-tandem mass spectrometry (UPLC-MS/MS) and electrospray ionization-mass spectrometry (ESI-MS). Mass spectrometry parameters were in positive ion mode (ESI+) and negative ion mode (ESI−) mode, and results are identified based on compatibility with the library. **Results**: The metabolomic profiling obtained 2504 raw compounds in ESI- and 2645 raw compounds in ESI+. After the compatibility has been analyzed, 356 compounds in ESI- and 543 compounds in ESI+ were successfully observed. The main compounds Alpha-Chlorohydrin (PubChemID:7290) and Tagatose (PubChemID:439312) were found in ESI+ and ESI-, respectively. The efficacy of ABTS and DPPH radical capture activity of *A. vestiaria* showed a dose-dependent curve, and the EC_{50} value of radical scavenging activity against ABTS and DPPH were similar to positive controls (Trolox and Glutathione). *In vitro* studies not only showed potential antioxidant activity but also showed that *A. vestiaria* (153.8 μg/mL) was more potent than the positive control (Acarbose;162.6 μg/mL) based on EC_{50} values in its inhibitory test against α-glucosidase (EC_{50} *A. vestiaria* <EC50 α-glucosidase). **Conclusions**: In conclusion, *A. vestiaria* fruit extract can be a bioresource of antioxidants and antidiabetics that has the potential to be further developed as nutraceuticals.

Key words Functional Food, Metabolites, Antioxidants, Antidiabetics, Areca vestiaria

Category: Food & Nutrition

The Difference in dietary quality between dietary supplements users and non-users among Korean adults: results from the Korean National Health and Nutrition Examination Survey 2018-2020

Tingting Wu,Mi Jeong Kim*
Silla University, Busan, Korea

Background and Objective

Dietary supplements are believed to be used to compensate nutritional shortcomings and improve various nutritional concern. This study aimed to compare Korean adults' dietary quality based on the Korean Healthy Eating Index (KHEI) between dietary supplement users and non-users using a national-level data.

Methods and Study Design

Data were obtained from the Korea National Health and Nutrition Examination Survey conducted between 2018 and 2020, which included a nationally representative sample of 11,038 adults aged 19-64 years. Participants were classified as supplement users or non-users based on their response to a dietary supplement use questionnaire. Scores of the 14 components of KHEI were calculated to evaluate dietary quality, with higher scores indicating better dietary quality. Data analyses methods pertinent to the complex sampling design were adopted.

Results

Between 2018 and 2020, the KHEI score decreased from 61.04 to 58.64 ($P<0.05$), while supplement use increased from 44.76% to 59.57% ($P<0.05$). Non-users had lower dietary quality than users (58.55 vs. 60.94, $P < 0.001$), with lower intake of dairy products (3.55 vs. 4.08, $P < 0.001$), breakfast (5.82 vs. 6.34, $P < 0.001$), and fresh fruit (2.04 vs. 2.28, $P < 0.001$), even after adjusting for socio-demographic factors, health behaviors and health conditions as potential confounding variables.

Conclusion

The findings suggest that the use of dietary supplements may not serve as a substitute for a low-quality diet, underscoring the necessity of improving the overall dietary quality among Korean adults, especially in those who do not use supplements. Potential correlates of dietary supplement use need to be further explored in order to have a better understanding to the associations between dietary behaviors and quality with individuals' belief and attitudes regarding dietary supplement use.

Key words dietary supplements, dietary quality, Health eating index,

Category: Food & Nutrition

In vitro Glycaemic Index of Food Products with Less Refined Sugar compared to Refined Sugar

Azrina Azlan*[1],Sharmin Sultana[2],Ilya Iryani Mahmod[3]
1. Universiti Putra Malaysia
2. Laboratory of Science Research, Halal Products Research Institute, Universiti Putra Malaysia
3. Department of Nutrition, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

Excessive consumption of sugar in food is always related to the negative impact on diet quality and health. Cake, cookies, ice cream, sweetened creamer and coffee are popular sugar-rich food that contribute significant amounts of added sugar to people's diets. Reformulation of food allow efficient reduction in dietary sugar intake at a population level without shifting the individual's dietary pattern. The study aimed to replace the use of refined sugar (RS) in selected foods with less refined sugar (LRS) to reduce the glycaemic index. LRS was used in both solid and liquid foods (cake, cookies, ice cream, sweetened creamer and coffee) to replace RS and submitted to in vitro digestion to predict the in vitro glycaemic index (eGI). Results showed reduction in the predicted eGI of food samples (butter cake, sweetened creamer, ice cream, coffee B, C, D, E) after LRS substitution ranging from 2 to 8 units lower compared to the eGI using RS. The present findings suggest that LRS is a potential refined sugar replacer in high-sugar food to reduce the glycaemic index and should be considered as alternate ingredient for RS in product reformulation in coming years.

Key words Glycaemic index, in vitro, refined sugar, less refined sugar, starch hydrolysis

Category: Food & Nutrition

巴基斯坦学龄前儿童的食物恐新症的相关因素以及其与儿童膳食摄入的关联研究

Associate factors and dietary outcomes of food neophobia among Pakistani preschool children

Muhammad Jamal Khan[4],Almab Zainab[1],Muhammad Bilal Khan[2],Syed Ubaid Ullah Shah[3],Minchan Wu[1],Jiaqi Huo[1],Hanshuang Zou[1],Qian Lin*[1]

1. Xiangya School of Public Health, Central South University China
2. Department of Agronomy, The University of Agriculture Peshawar, Pakistan
3. School of Health Sciences, Massey University (Palmerston Noth Campus), New Zealand
4. Department of Nutritional Sciences and Food Hygiene, Xiangya School of Public Health, Central South University, China

Background and Objectives: Food neophobia is the aversion to new or unfamiliar foods, a common childhood problem that leads to a limited and unhealthy diet. So, this study aimed to explore the prevalence, associate factors and dietary outcome of food neophobia among Pakistani preschoolers.

Methodology: A cross sectional study was conducted using printed questionnaires and the target population was preschoolers aged 3-6 years and their primary caregivers. Statistical tests included student t-test, chi square test, and linear regression analysis. A two-tailed $P<0.05$ was considered statistically significant in all analyses.

Results: A sample of 400 preschoolers and their primary caregiver from 12 kindergartens across 6 cities participated in this study. The mean age of preschooler's was 55.3 ± 11.0 months and about 52.0% of them were girls. The prevalence of food neophobia among preschoolers was recorded to be 85.6%. Moreover, factors such as maternal education level ($\beta = 1.761$, $P<0.05$), child food fussiness score ($\beta = 4.099$, $P<0.001$), and caregiver's food neophobia score ($\beta = 0.199$, $P<0.001$) were positively associated with preschooler's food neophobia score. While, factors such as child breastfeeding history ($\beta = -2.644$, $P<0.05$), child enjoyment of food score ($\beta = -1.633$, $P<0.001$), and child food responsiveness score ($\beta = -0.869$, $P<0.05$) were negatively associated with preschooler's food neophobia score. In addition to these, preschooler's food neophobia score was negatively associated to preschooler's dietary diversity score ($\beta = -0.049$, $P<0.05$), fruits preference score ($\beta = -0.016$, $P<0.01$) and fast-food preference score ($\beta = -0.014$, $P<0.05$).

Conclusion: A high prevalence of food neophobia among Pakistani preschoolers was observed and factors such as breastfeeding, enjoyment of food, food fussiness, food responsiveness, and maternal food neophobia, were significantly associated with preschooler's food neophobia. Whereas, food neophobia of Pakistani preschoolers was negatively correlated with their dietary diversity and fruit preferences.

Key words Food neophobia; preschool children; associated factors; and dietary outcomes.

Category: Food & Nutrition

Assessment of optimal combinations of therapeutic bacteria for metabolic associated fatty liver disease: a systematic review and network meta-analysis

Yafang Yang[1],Chao Yang*[1],Min Wan[2],Dengfeng Xu[3],Da Pan[4],Guiju Sun[4],Ligang Yang[4]
1. Jiangnan University
2. Rongxiang Community Health Service Center, Wuxi 214000, China.
3. Department of Public Health and Preventive Medicine, Wuxi 214000, China.
4. Southeast University

Background: Probiotics administered is a promising therapy in improving conditions in patients with MAFLD. This systematic review and network meta-analysis aimed to compare and estimate the relative effects and the optimum species for probiotics used in the treatment of MAFLD patients.

Methods: The PubMed, Web of Science, Embase, and Cochrane databases were searched from inception to 16 February 2023 for RCTs that were only available in the English language. The heterogeneity and bias risk of the qualifying studies were evaluated. The GRADE framework was used to assess the quality of evidence contributing to each network estimate. We also used meta-regression to explore whether the treatment length, country, and dose influenced the efficacy.

Results: A total of 2,276 patients with MAFLD from 39 RCTs were included in the analysis. The quality of evidence was rated as high in most comparisons. For primary outcomes, Lactobacillus + Bifidobacterium + Streptococcus exhibited the best probability to be the optimal probiotics in enhancing acceptability and alleviating AST (SMD: -1.65 95% CI: -2.49, -0.81), ALT (SMD = -1.44, 95% CI: -2.12, -0.76), and GGT (SMD = -1.60, 95% CI: -2.64, -0.56). In terms of the secondary outcomes, Lactobacillus + Bifidobacterium + Streptococcus was also the best choice for improving BMI (SMD = -0.46, 95% CI: -0.79, -0.12), HDL (SMD = -1.00, 95% CI: -1.50, -0.50), TC (SMD = -0.82, 95% CI: -1.36, -0.28), and TNF-α (SMD = -1.74, 95% CI: -2.81, -0.66).

Conclusion: This network meta-analysis revealed that the combination of Lactobacillus + Bifidobacterium + Streptococcus was likely to be the most effective and optimum species for probiotics in the treatment of MAFLD through improving liver enzymes, lipid profiles, and inflammation. A treatment guideline for MAFLD with probiotics could be formed using this network meta-analysis since there are currently few direct comparisons between different medications.

Key words metabolic-associated fatty liver disease, probiotics, efficacy, network meta-analysis, acceptability

Category: Food & Nutrition

Effect of drying temperature ranges on the efficacy of probiotics

Ming Yu[1],Xinyu Chang[1],Xiao Dong Chen[2],Romain Jeantet[3],Didier Dupont[3],Xin Teng[1],Song Huang*[1,4]
1. Bluepha Co., Ltd, Shenzhen, China
2. Xiao Dong Pro-health (Suzhou) Instrumentation Co Ltd, Suzhou, China
3. UMR1253 STLO, L'institut Agro, INRAE, Rennes, France
4. Department of Chemical and Biological Engineering, Xiamen University, Xiamen, China

Background and Objectives:

The drying process is a crucial step in the production of probiotics. Currently, freeze drying is the most commonly used process in the industry due to the absence of oxygen and low temperatures. However, this process requires probiotic bacteria to endure hours of extremely low-temperature frozen conditions, which may weaken their efficacy after passing through the digestive tract. The aim of this study was to evaluate the efficacy of probiotics dried using different processes, with a focus on factors beyond viable bacteria count, such as colonization ability, competitive capacity, and beneficial metabolite productivity after digestion.

Methods and Study Design:

To achieve our objective, we designed different drying processes to ensure that the probiotic bacteria were dried similarly, regardless of the temperature ranges used. We then evaluated the efficacy of probiotics from different drying processes by comparing key probiotic function-related indicators. We assessed the colonization ability, competitive capacity, and beneficial metabolite productivity after digestion.

Results:

Our results showed that the drying temperature ranges had a significant effect on the efficacy of probiotics. Although freeze drying may produce a high viable count of bacteria, it may not guarantee probiotic efficacy. Therefore, additional evaluation criteria need to be used to assess the suitability of an industrial process for probiotic production. Our study suggests that an alternative drying process, such as mild temperature drying, may be more suitable for the production of live bacteria.

Conclusion:

In conclusion, our study highlights the need to consider factors beyond viable bacteria count when evaluating the efficacy of probiotics. We recommend the use of additional evaluation criteria to assess the suitability of industrial processes for probiotic production. Mild temperature drying may be a more suitable alternative to freeze drying for the production of live bacteria.

Key words Probiotics; Freeze Drying; Efficacy; Production Process

Category: Food & Nutrition

彩色花青素颜料的广泛应用

A Wide Application of Colored Anthocyanin Pigments

HOCK ENG KHOO*
Guilin University of Technology

Anthocyanins are colored pigments naturally occur in plants. Most red, blue, and purple-colored fruits and vegetables contain anthocyanins as their main colorful bioactive compounds. Types of anthocyanins, sources, and their wide applications are the main focuses of this topic, where the types and sources of anthocyanidins are reported. These colored pigments are found in different parts of plants, such as flowers, fruits, leaves, grains, roots, or tubers. The reported health benefits of anthocyanins are antioxidants, cardioprevention, anticancer, antidiabetes, antiobesity, antimicrobial, and neuroprotective agents. Anthocyanin is the glycosylated form of anthocyanidin, and acylated forms of anthocyanins are found in many parts of the plant. Glycosylation of anthocyanidin occurs at the R3 position of its structure. Deoxylated and methylated derivatives of anthocyanidins occur in nature on top of the hydroxyl group in the anthocyanidins. These colored pigments exist as flavylium ions at low pH. The colors of anthocyanins are dependent on their type. The antioxidative effect of these colored pigments is due to their hydroxyl and methoxyl functional groups. These functional groups notably reduce oxidative stress by scavenging free radicals via electron and many medical complications, a reduction in oxidative stress remarkably reduces inflammation. It prevents cancers and lessens many other metabolic complications. Anthocyanins can also improve visual and neuro health besides these communicable and non-communicable diseases. The disease-preventive and protective effects of these colored pigments are mainly through direct and indirect pathways. The direct pathway is via reduction of oxidative stress, whereas indirect pathways involve cyclooxygenase, mitogen-activated protein kinase, and inflammatory cytokines signaling mechanisms. Anthocyanins are the sources of functional foods, nutraceuticals, and pharmaceutical ingredients besides their red, purple, and blue hues. These colored pigments have broad applications, from food ingredients and medicine to industrial usages.

Key words Aglycone, berries, colorant, oxonium ion, reactive oxygen species

Category: Food & Nutrition

影响贝宁北部阿塔科拉地区家庭消费被忽视和利用不足的物种的因素

Factors influencing the consumption of neglected and underutilized species by households in atacora, northern Benin

Bissola BANKOLE*[1],Sam BODJRENOU[2],Flora CHADARE[3],Waliou AMOUSSSA-HOUNKPATIN[1]

1. School of Nutrition, Food Science and Technology, Faculty of Agronomics Sciences, University of Abomey-Calavi

2. Alliance Bioversity International - CIAT, Benin, Atlantique, Abomey-calavi, Benin

3. School of Sciences and Techniques of Conservation and Transformation of Agricultural products, National University of Agriculture, Benin, Plateau, Sakété, Benin

Local resources, although excellent sources of nutrients that can contribute to dietary health, are being marginalized or ignored because of their unexploited potential. This article aimed to determine the factors influencing consumption of some species in the diet of the populations of three communes of Atacora. First of all, the socio-demographics data were collected. Then, a food consumption survey based on consumption frequencies was conducted during two periods (abundance and scarcity food) in two villages randomly selected by commune. A size n=80 households were surveyed per commune. Almost all of the households consumed all the food groups except sugar, eggs and egg products, milk and milk products, and others (insects) in both periods. Considering specifically the plant species targeted, Adansonia digitata (>30%) and Moringa oleifera (>35%) were the most consumed species in the form of fresh leaves in soups by households during both periods, regardless of the study commune. As for Vigna radiata and Occimum gratissimum, seeds boiled of mung bean and fresh African basilic leaves soup were consumed by households to a lesser extent (<15%). The period (abundance and scarcity) as well as the profession of mothers have an influence on the frequency of consumption of these different plant species ($P<0.05$). It is important to promote their consumption through some conservation methods and improvement of some foods based on them.

Key words Plant species, availaibility, Benin, consumption frequency

Category: Food & Nutrition

泰國食用野生蘑菇（Amanita hemibapha 和 Termitomyces clypeatus）不同烹飪方法甲醇提取物的植物化學篩选和抗氧化潛力

Phytochemical screening and antioxidant potential of methanol extracts from Thai edible wild mushrooms (Amanita hemibapha and Termitomyces clypeatus) in different cooking methods

KANSUDA WUNJUNTUK*[1],Kunchit Judprasong[2],Satinee Sukcheunluethai[1],Yosita Kunakornkarn[1],Sarindawadee Sudtha[1],Jerana Wattanaeabpun[1],Euaphorn Jaraspermsuk[3],Akkarapol Chaisri[1]

1. Department of Home Economics, Faculty of Agriculture, Kasetsart University, Bangkok 10900, Thailand

2. Institute of Nutrition, Mahidol University, Nakhon Pathom 73170, Thailand

3. Department of Food Management Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom 73000, Thailand

Background and aims: Wild mushrooms consumption has grown extraordinarily owing to their high nutritional value, desirable taste, and aroma. In the present study series of experiments were performed to screen phytochemical constituents and antioxidant capacity of two wild edible mushrooms (*Amanita hemibapha* and *Termitomyces clypeatus*) from the forest area around Srinakarin Dam in Kanchanaburi province, Thailand.

Methods: Samples were prepared to be raw, boiled, and stir-fried mushrooms. The methanolic extracts of freeze-dried samples were analyzed for antioxidant activity by 1,1-Diphenyl-2-picrylhydrazyl (DPPH) radical scavenging and phytochemical screening tests.

Results: The phytochemical screening test showed that an extract of raw *Termitomyces clypeatus* had positive results for flavonoids, saponins, coumarins and cardiac glycosides while boiling and stir-frying gave positive results only for saponins. The *Amanita hemibapha* extracts showed no different screening results of phytochemical components in raw, boiled and stir-fried samples, except there was no positive result for flavonoids at all cooking methods. The extracts of raw *Termitomyces clypeatus* and *Amanita hemibapha* had the antioxidant capacity of 19.21±0.69 and 11.77±0.45 μg Trolox/100 g dry weight, respectively. The boiling and stir-frying significantly reduced ($p < 0.05$) antioxidant activity by 60% and 55% for *Termitomyces clypeatus* and by 75% and 56% for *Amanita hemibapha*.

Conclusions: These results make it possible to infer the future development of healthy recipes and food products from these two wild edible mushrooms, as well as evidenced by scientific knowledge-based and antioxidant capacities for further experiments.

Key words Edible wild mushroom, Termitomyces clypeatus, Amanita hemibapha, phytochemical screening test, antioxidants, Boiling, Stir-frying

Category: Food & Nutrition

棕榈糖康普茶作为益生菌饮料的抗糖尿病潜力和理化特性

Antidiabetic potential and physicochemical characterization of palm sugar kombucha as a probiotic drink

William Ben Gunawan*[1],Matthew Nathaniel Handoko[1],Fahrul Nurkolis[2],Diana Nur Afifah[1],Adriyan Pramono[1,3],Ayu Rahadiyanti[1],Etisa Adi Murbawani[1],Nelly Mayulu[4],Nurpudji Astuti Taslim[5]

1. Nutrition Science Department. Faculty of Medicine. Diponegoro University. Semarang. Central Java. 50275. Indonesia

2. Biological Sciences. State Islamic University of Sunan Kalijaga (UIN Sunan Kalijaga Yogyakarta). Yogyakarta. 55281. Indonesia

3. Center of Nutrition Research (CENURE). Semarang. Central Java. 50275. Indonesia.

4. Food and Nutrition. Universitas Muhammadiyah Manado. Manado. North Sulawesi. 95249. Indonesia

5. Clinical Nutrition. Faculty of Medicine. Hasanuddin University. Makassar. South Sulawesi. 90245. Indonesia

Background and objectives: Type 2 Diabetes Mellitus (DMT2) can be prevented through the consumption of functional foods. Functional foods contain vitamin C, polyphenols, and antioxidant activity that play an important role in insulin regulation, inflammation, and oxidative stress. Palm sugar can be incorporated into kombucha which has a variety of health benefits. This study aims to determine the best formulation of palm sugar (*Arenga pinnata*) kombucha based on antioxidant activity, vitamin C, total phenolic levels, and inhibition activity of α-amylase and α-glucosidase. The characteristics of kombucha were also analyzed based on the proximate composition and ethanol content. **Methods**: Kombucha formulations were varied into several formulations (A - K) based on the composition of palm sugar and starter kombucha solution. Kombucha samples were fermented for 12 days at room temperature. Vitamin C analysis was performed by iodometric titration, while the antioxidant activity and total phenolic content were observed through 2,2-diphenyl-1-picrylhydrazyl inhibition testing and Folin-Ciocalteu method, respectively. Enzymatic inhibition activities of α-amylase and α-glucosidase were observed in vitro against the breakdown of sucrose. Quantification of ethanol levels was carried out using a UV-Vis spectrophotometer. The data obtained in triplicates were analyzed with the Shapiro-Wilk approach and analysis of variance. **Results**: There were significant differences in vitamin C, total phenolic, and antioxidant activity between formulations ($p<0.05$), with formula I, J, and K determined as the best formulations. There were also significant differences in inhibition activity α-amylase and α-glucosidase between the three best formulations, with formula K as the best formulation. Formula K had an ethanol content of 0.41 ± 0.08%. **Conclusions**: Palm sugar kombucha consisting of 40 g of palm sugar, 50 mL of water, 10 g of SCOBY gel, and 5 mL of kombucha starter solution was the best formulation with antidiabetic potential and relatively low ethanol levels.

Key words Kombucha, Palm Sugar, Antioxidant, α-Amylase, α-Glucosidase

Category: Food & Nutrition

海葡萄提取物补充剂对 7,12-二甲基苯并 [a] 蒽诱导的心血管肿瘤大鼠模型中胆固醇和超氧化物歧化酶变化的影响

Effects of Sea grapes Extract Supplementation on Cholesterol and Superoxide dismutase Changes in 7,12-dimethylbenz [a] anthracene-induced Cardio-oncological Rat Models

Happy Kurnia Permatasari*[1],Fahrul Nurkolis[2],Hardinsyah Hardinsyah[3]

1. Department of Biochemistry and Biomolecular. Faculty of Medicine. Brawijaya University. Malang. East Java. 65145. Indonesia

2. Biological Sciences Department. State Islamic University of Sunan Kalijaga Yogyakarta (UIN Sunan Kalijaga Yogyakarta) . Yogyakarta. 55281. Indonesia

3. Applied Nutrition. Faculty of Human Ecology. IPB University. Bogor. West Java. 16680. Indonesia

Background and objectives: Increasing cholesterol levels and radical-oxidants is associated with higher breast cancer risk. Cholesterol-lowering supplements (as a functional food) exhibit beneficial effects by reducing the risk and mortality of cancers, as well as their radical scavenging activity. Therefore, this research aimed to study the anticancer activity of Sea grapes (*Caulerpa racemosa*) extract (SGE) that is associated with cholesterol and Superoxide dismutase (SOD) levels on 7,12-dimethylbenz(a)anthracene (DMBA) induced breast cancer in rats. **Methods**: Fifty Sprague-Dawley male rats (4 weeks; 200-250 g) were divided into 5 groups (A = normal control; B = negative control; C = 2.7mg/200gBW (Body Weight) of SGE; D = 5.4mg/200gBW of SGE; E = 10.8mg/200gBW of SGE). All rats received a standard diet and ad libitum water. Rats from group B until D was given 80mg/kgBW of DMBA (C20H16; PubChem CID: 6001) on the 38th day of life to induce mammary gland tumors. Carcinogenic agents dissolved in rapeseed oil were selected as DMBA senders. After 8 weeks, the rats were decapitated, blood was taken from the cardio tissue, weighed, and stored at -80℃ for further analysis. The research protocol has received internationally ethical approval (International Register of Preclinical Trials Protocols; PCTE0000283). **Results**: There was a significant decrease in low-density lipoprotein (LDL) and triglyceride levels along with an increase in the number of SGE supplements given to the group ($p<0.001$). A similar tendency was also observed in the increase of High-density lipoprotein and SOD levels. The value of total cholesterol in each group given SGE also showed a significant difference when compared to group B ($p<0.05$). **Conclusions**: Supplementation of SGE may improve lipid profile conditions by altering cholesterol levels in DMBA-induced rats with great radical scavenging activity (SOD Level). SGE has the potential as a functional food against breast cancer, human clinical trials is urgently needed.

Key words Cancer, Breast cancer, Caulerpa racemosa, Cholesterol, 7,12-Dimethylbenz [a] anthracene

Category: Food & Nutrition

在曲奇配方中使用辣木粉、辣木叶和黑豆豆豉来促进贫血青少年的功能性食品

The use of porang flour, moringa leaves, and black soybean-based tempe in cookies formulations to promote functional food for adolescents with anemia

NELLY MAYULU*[6],Fahrul Nurkolis[3],William Ben Gunawan[1],Hardinsyah Hardinsyah[4],Mochammad Rizal[5],Nurpudji Astuti Taslim[2]

1. Nutrition Sciences Department. Faculty of Medicine. Diponegoro University. Semarang. Central Java. Indonesia
2. Clinical Nutrition. Faculty of Medicine. Hasanuddin University. Makassar. South Sulawesi. Indonesia
3. Biological Sciences. State Islamic University of Sunan Kalijaga (UIN Sunan Kalijaga Yogyakarta) Yogyakarta. Yogyakarta. Indonesia
4. Applied Nutrition. Faculty of Human Ecology. IPB University. Bogor. West Java. Indonesia
5. Division of Nutritional Sciences. Cornell University. Ithaca. New York. USA
6. Department of Food and Nutrition. Universitas Muhammadiyah Manado. Manado. North Sulawesi. Indonesia

Background and Objectives: Anemia is a global public health problem that includes 32% of Indonesian adolescents. This study aims to incorporate porang flour (*Amorphophallus muelleri*), moringa leaves (*Moringa oleifera*), and tempe into cookies and examine their iron (Fe), folic acid, cobalamin (vitamin B12), unsaturated fatty acids, amino acids, and antioxidants activity to determine their potential as functional food snacks for adolescents with anemia. **Methods**: This study is experimental with a completely randomized trial design (CRD) with three treatments or formulations based on the combination of porang, moringa leaves, and black soybean-based tempe as follows: F1 (91:3:3:3)%, F2 (85:3:6:6)%, and F3 (77:3:10:10)%. The cookie sample was then analyzed for water content, ash, iron, folic acid, cobalt, and antioxidant activity. The differences between the samples were analyzed based on the activity of antioxidants, iron, folic acid, unsaturated fatty acids, amino acids, and vitamin B12 (cobalamin) in data obtained from triplicates using multivariate ANOVA analysis with 95% CI (0.05%). **Results**: The results of the ash and water content tests of all three cookie formulations showed values in accordance with the Indonesian National Standard (SNI) for cookie products. F3 has significantly higher iron, folic acid, and cobalt levels than F1 and F2 ($p<0.05$). Antioxidant activity is highest in F3, but there is no statistical difference between F2 and F3 ($p>0.05$). The results showed a significant difference in the unsaturated fatty acid parameter between the groups ($p<0.001$). The highest essential and non-essential amino acid content were found in F3. **Conclusions**: The combination of porang's tubers, moringa leaves, and tempe made from black soybeans, especially F3, has the potential to be used as a functional cookie as a source of iron (Fe), folic acid, cobalamin, unsaturated fatty acids, amino acids, and antioxidants for adolescent anemia. *In vivo* and human clinical trial studies are urgently needed.

Key words Tempe, Antioxidant, Anemia, Functional Food, Cookies

Category: Food & Nutrition

Clitoria ternatea 康普茶作为功能性饮料的抗肥胖潜力的代谢组学分析、体外和体内研究

Metabolomic assay, in silico, in vitro and in vivo studies of antiobesity potential of Clitoria ternatea kombucha as functional beverage

Hardinsyah Hardinsyah*[1],Fahrul Nurkolis[2],William Ben Gunawan[3],Darmawan Alisaputra[4],Rudy Kurniawan[5],Nelly Mayulu[7],Nurpudji Astuti Taslim[6],Trina Ekawati Tallei[8]

1. Applied Nutrition. Faculty of Human Ecology. IPB University. Bogor. Indonesia.
2. Department of Biological Sciences. State Islamic University of Sunan Kalijaga (UIN Sunan Kalijaga). Yogyakarta. Indonesia
3. Department of Nutrition Science. Faculty of Medicine. Diponegoro University. Semarang. Indonesia
4. Department of Chemistry. State Islamic University of Sunan Kalijaga (UIN Sunan Kalijaga). Yogyakarta. Indonesia
5. Alumnus of Department of Internal Medicine. Faculty of Medicine. University of Indonesia - Cipto Mangunkusumo Hospital. Indonesia
6. Department of Clinical Nutrition. Faculty of Medicine. Hasanuddin University. Makassar. Indonesia
7. Department of Nutrition and Food. Faculty of Medicine. Universitas Muhammadiyah Manado. Manado. Indonesia
8. Biology Department. Faculty of Mathematics and Natural Sciences. Sam Ratulangi University. Manado. Indonesia

Backgrounds: Obesity prevalence is increasing rapidly and the nutraceuticals made from natural ingredients against obesity and its comorbidities needs to be explored. This study aims to innovate a fermented drink from *Clitoria ternatea* kombucha (CTK), find out their metabolites profile, and determine the antiobesity potential through molecular docking (*in silico*), *in vitro* and in metabolically disorder mice that receive a diet rich in cholesterol and fat (CFED). **Methods**: CTK formulation refers to previous research while metabolomic profiling was determined using HPLC-ESI-HRMS/MS. 40 male *Mus musculus* were categorized into four groups, i.e., A = Control/Normal Diet; B = CFED Only; C = CFED + CTK 65 mg/kg BW (Body Weight); D = CFED + CTK 130 mg/kg BW, and then sacrificed after 6 weeks of intervention. **Results**: A total of 79 compounds were identified in CTK, and 13 ideal compounds were selected for *in silico* study. The study found that Kaempferol, Quercetin-3β-D-glucoside, Quercetin, Dibenzylamine, and α-Pyrrolidinopropiophenone showed the best potential as the functional antiobesity compounds since their affinity value ranked high in against obesity receptors (human pancreatic lipase, α-amylase, α-glucosidase, porcine pancreatic lipase, and fat mass- and -obesity-associated (FTO)protein). *In vitro* studies showed the potential activity of CTK in inhibiting not only ABTS, but also lipase, α-amylase, α-glucosidase to levels similar to acarbose (control) at 50–250 μg/mL. In the *in vivo* study, the administration of CTK (130 mg/kg BW) significantly alleviated obesity markers caused by high-fat diet ($p<0.05$). Specifically, lipid profile (HDL, LDL, TC, TG), blood glucose, markers of oxidative stress (SOD liver), metabolic enzymes (lipase, amylase), and markers of inflammation (PGC-1α, TNF-α, and IL-10) were in most cases restored to normal values.
Conclusions: In conclusion, major metabolites compounds of CTK have the potential to be promising functional foods antiobesity. However, further human clinical trial studies should validate these health benefits.

Key words Obesity, kombucha, Clitoria ternatea, metabolites, functional food

Category: Food & Nutrition

印度尼西亚现代和传统人群的饮食模式和超加工食品消费：营养状况和身体成分分析

Dietary patterns and ultra-processed foods consumption in modern and traditional populations in Indonesia: An analysis of nutritional status and body composition

Nurpudji Astuti Taslim*[3],Nevi Dwi Handayani[1],Aminuddin Aminuddin[2],Agussalim Bukhari[2],Andi Faradillah[2],A. Yasmin Syauki[2],Wanty Arruan[1]

1. Clinical Nutrition Medical Specialty Education Program, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, 90245, Indonesia
2. Department of Clinical Nutrition. Faculty of Medicine. Hasanuddin University. Makassar. South Sulawesi. Indonesia
3. Department of Clinical Nutrition. Faculty of Medicine. Hasanuddin University. Makassar. South Sulawesi. Indonesia

Dietary patterns play an important role in the emergence of non-communicable diseases such as obesity, hypertension, and metabolic syndrome. This study aims to examine the impact of ultra-processed food on the nutritional status and body composition of modern and traditional population groups in Makassar city and Tana Toa Village, Kajang Subdistrict, Bulukumba Regency, South Sulawesi Province, Indonesia. The study has received ethical approval from the Research Ethics Commission of the Faculty of Medicine, Hasanuddin University with ethics number No.633/UN4.6.4.5.31/PP36/2022. The inclusion criteria in this study included: people in the Makassar population > 50 years old. Exclusion criteria were (1) having chronic gastrointestinal disease/chronic inflammation, (2) having Diabetes Mellitus, (3) consuming antibiotics in the last 3 months, (4) consuming prebiotics/probiotics, (5) having income > IDR 3,400.000,-, (6) rarely (<1x/week) consumes UPF.About 100 samples were taken from people over 50 years old, where 50 samples were taken from both the modern group and the traditional group. To evaluate the dietary pattern, the diet of the sampling persons was analyzed by using a semi-quantitative Food Frequency Questionnaire (SQ-FFQ), and a 24-hours food recall (FR) to examine the food intake. Body Mass Index (BMI) and Waist Circumference (WC) were used to determine the nutritional status, while the body composition was assessed by Tanita BC 730. According to the scatter plot, the higher the ultra-processed food energy consumed, the higher the BMI, Waist Circumference, and Fat Mass results, with the respective effects of 18.4%, 35.3%, and 13.7%. From this study, it was found that there were significant differences ($p<0.05$) between the traditional and modern groups in all variables except for height based on the independent t-test found no significant difference ($p>0.05$). In conclusion, dietary patterns with higher consumption of ultra-processed foods influence the increase of body mass index, waist circumference, and fat mass.

Key words dietary patterns, ultra-processed food, nutritional status, body composition, food science

Category: Food & Nutrition

基于胰高血糖素样肽-1 的“肠促胰素效应”研究枸杞多糖的降糖机制

Hypoglycemic mechanism of polysaccharide in Gouqi based on the “incretin effect” of glucagon-like peptide 1

Cong Zhao[1],He Zhao[1],Chun-Chen Zhang[1],Xiao-Hui Yang[1],Kang Chen[1],Yang Xue[1],Qian Li[1],Shu-Ying Deng[2],Hui-Zhen Cai*[1]

1. NingXia Medical University

2. Disease Prevention and Control Center in Xiang Yang

Studies have shown that sodium/glucose cotransporter 1 has the function of regulating glucagon-like peptide 1 that promotes insulin secretion in a glucose-dependent manner. We found that Lycium barbarum polysaccharide could reduce sodium/glucose cotransporter 1 levels. Thus, the effects of Lycium barbarum polysaccharide on the first- and second-phase secretion of glucagon-like peptide 1 were systematically assessed in vitro using STC1 cells and in vivo using diabetic KK^{Ay} mice. Results show that the level of glucagon-like peptide 1, the expression of Gcg gene, and β-catenin, Epac and cAMP protein increased gradually with the increase of Lycium barbarum polysaccharide concentration; Lycium barbarum polysaccharide is related to the reduction of blood fasting glucose, decrease of postprandial blood glucose, inhibiting activity of alpha-glucosidase and suppression of the level of glucagon-like peptide 1. Thus, Lycium barbarum polysaccharide could induce the first-phrase secretion of glucagon-like peptide 1 by stimulating calcium iron influx in vitro and inhibiting alpha-glucosidase activity in vivo. Expression of Gcg gene regulating by Wnt/β-catenin and cAMP/Epac pathways, as well as inhibition of alpha-glucosidase activity was responsible for the second-phrase secretion of glucagon-like peptide 1. Therefore, Lycium barbarum polysaccharide has the function to stimulate secretion of glucagon-like peptide 1. However, dipeptidyl peptidase 4 activated by Lycium barbarum polysaccharide might offset the second-phrase secretion of glucagon-like peptide 1. We suggest considering simultaneous use of Lycium barbarum polysaccharide and dipeptidyl peptidase 4 inhibitor to stimulate secretion of glucagon-like peptide 1. This subject is supported by the National Natural Science Fund of China (81803235, 81973046), Ningxia Natural Science fund (2022AAC03206) and Top Discipline of Public Health and Prevent Medicine, Education Department of Ningxia (NXYLXK2017B08).

Key words Lycium barbarum polysaccharide; Incretin effect; Glucagon-like peptide 1; alpha-glucosidase; Dipeptidyl peptidase 4

Category: Food & Nutrition

基于中医传承辅助平台探讨气阴两虚型糖尿病中药食同源中药的用药规律

Law of medicine and food homologous traditional Chinese medicine used in Qi-Yin deficiency type diabetes based on the TCM inheritance assistant platform

Juanjuan Duan,Baoming Li,Cheng Li,Yuexiao Chen,Ming Zhao,Shuai Zhu,Jing Zhu*
Institute of Biotechnology and Health, Beijing Academy of Science and Technology

Abstract Objective To analyze the medicine characteristics and prescription regularity on medicine and food homologous traditional Chinese medicine (TCM) for Qi-Yin deficiency type diabetes through data mining. Methods The clinical TCM prescriptions for the treatment of Qi-Yin deficiency diabetes mellitus were collected in Chinese National Knowledge Infrastructure, Wanfang Data, PubMed, Web of science in the past 5 years, and the TCM Inheritance Assistant Platform Management System (V3.0) was used to operate data mining such as association rules, clustering, complex system entropy clustering, etc., to summarize the drug composition and law of the treatment on Qi-Yin deficiency type diabetes mellitus with medicine and food homologous TCM. Results Up to March 2023, a total of 420 formulations were included. The most commonly used drug flavor was sweet, four qi was cold, the channel tropism were spleen meridian and lung meridian, and 62 TCM homologous of medicine and food were involved. Among them, 32 herbs with a frequency > 1% were used, and 10 herbs with a frequency of more than 50 times were Huangqi (Astragali Radix), Shanyao (Dioscoreae Rhizoma), Gegen (Puerariae Lobatae Radix), Fuling (Poria), Gancao (Glycyrrhizae Radix et Rhizoma), Shanzhuyu (Corni Fructus), Dangshen (Codonopsis Radix), Danggui (Angelicae Sinensis Radix), Huangjing (Polygonati Rhizoma), Renshen (Ginseng Radix et Rhizoma).The correlation analysis of "medicine pair", such as "Dioscoreae Rhizoma - Puerariae Lobatae Radix" was obtained. Conclusion This study can provide data basis for the development of auxiliary hypoglycemic health food and the compatibility of prescriptions, provide a new basis for the compatibility of prescription, and broaden the research ideas of products on blood glucose control with medicine and food homologous TCM.

Key words medicine and food homologous traditional Chinese medicine, Qi-Yin deficiency type diabetes, traditional Chinese medicine Inheritance Assistant Platform, medication characteristics, prescription regularity.

Category: Food & Nutrition

胶原蛋白三肽补充剂对中青年女性面部改善的作用：一项随机、双盲、安慰剂对照实验

Effect of Collagen Tripeptide Supplements on Facial Skin Improvement in Young and Middle-aged Women: A Randomized, Double-Blind, Placebo-Controlled Trial

Shan Lu*
Shenzhen Porshealth Bioengineering Co., Ltd

Objective: To evaluate the effect of a dietary supplement containing collegan tripeptide on skin anti-aging and skin hydration.

Methods: A randomized controlled trial was performed on 70 healthy women aged between 30 to 50. Participants were randomized to receive the food supplement or placebo daily for 8 weeks. The food supplements provide a blend of 12g of collagen peptides, which contains 2.4g collagen tripeptide, elastin peptide, Sodium Hyaluronate complex. Facial skin assessment was carried out at baseline, 4 weeks, and 8weeks. Moreover, in order to evaluate the absorption of collagen peptides in vivo, the concentration of Gly-Pro-Hyp (GPH) and Pro-Hyp (PH) in the blood were detected at baseline and 8 weeks. GPH and PH are major active constituent of collagen-derived peptides.

Results: 63 volunteers completed the trial after 8 weeks intervention. The placebo group showed no improvement throughout the entire trial. On the contrary, the skin of volunteers taking Collagen tripeptide supplements was significant improved at 4 weeks, and further skin improvement was showed at 8 weeks. Skin improvement includes better skin hydration, transepidermal water loss, collagen content in dermis, skin elasticity and wrinkle. In addition, the concentration of GPH and PH in blood of collagen group significatly increased by 67.12% and 102.21% at 8 weeks respectively, compare with the baseline ($p<0.0001$).

Conclusions: Continuous intake of collagen tripeptide can effectively improve the facial skin condition of young and middle-aged female.

Key words Collagen tripeptide, collagen peptide, skin anti-aging, skin hydration, GPH

Category: Food & Nutrition

类益生元成分膳食多酚根皮苷的肠道微生物分解动力学
intestinal microbiota catabolic kinetics of the prebiotic-like dietary polyphenol phlorizin

Tong Peng[2],yuan deng[1],shiyuan long[1],xiaoyu zhang[1],jiang chen*[1]
1. sichuan normal university
2. Keystonecare Technology Co., Ltd

Dietary polyphenols are an integral part of many foods and are associated with some beneficial health effects. Even so, dietary polyphenols in the form of prototype compounds have limited bioavailability and hardly enter the circulatory system, which is contradictory to its good biological activities. Phlorizin is an important component of apple polyphenol to maintain blood glucose homeostasis. Previous studies on fecal excretion kinetics of phlorizin have shown that phlorizin is extensively utilized by gut microbiota in the form of prebiotic-like effects. In this study, the in vitro anaerobic incubation was used to investigate the interaction of phlorizin with microbiota by metabolomics and microbiolomics techniques. The apparent catabolic rate and cumulative metabolic rate were used to compare the catabolic kinetic characteristics of phlorizin and its metabolites from different angles. Besides, we found that about 30% of phlorizin was metabolized and consumed by the gut microbiota, and that *Lactobacillus* might be involved in the process of producing phloretin by catabolism of phlorizin, Bacteroides might be involved in the process of producing phloretic (3-(4-hydroxyphenyl) propionic acid) by catabolism of phloretin, and *Lachnospiraceae* might be involved in the process of producing 4- hydroxyphenylacetic acid by catabolism of phloretic. In addition, seven strains belonging to *Lactobacillus animalis* and *Limosilactobacillus reuteri* were isolated by selective culture medium, both of which were confirmed to participate in the catabolic process of phlorizin to phloretin. These signatures can be used to define nutritional phenotypes with different kinetic characteristics for the bioconversion capacity for polyphenols. This approach will pave the way for personalization of nutrition based on gut microbial functionality of individuals or populations.

Key words Prebiotic ; Dietary polyphenols; Gut microbiota; Beneficial bacteria; Metabolites

Category: Food & Nutrition

2015年中国老年人膳食纤维摄入与糖代谢状况的关联性分析
Relationship between dietary fiber intake and glucose metabolism in the elderly of China in2015

Weihua Dong[1],Qingqing Man[1],Yuqian Li[1],Shanshan Jia[1],Dongmei Yu[2],Liyun Zhao[1],Jian Zhang[1],Pengkun Song*[1]
1. National Institute for Nutrition and Health, Chinese Center for Disease Control and Prevention
2. National Institute for Nutrition and Health, Chinese Center for Disease Control and Prevention

Objective To investigate the dietary fiber intake status and analyze the relationship between dietary fiber and glucose metabolic disorder of the elderly in China. METHODS Data were collected from the participants of Chinese adult chronic diseases and nutrition surveillance in 2015.A total of 20996 elderly people aged 60 years and above were included.General information were collected by standardized questionnaires, anthropometric index and blood pressure of respondents were measured according to standard method. Food intake was collected by three consecutive day 24h dietary recalls, dietary fiber was calculated through China food composition.Fasting venous blood samples were collected to measure biochemical indicators related to diabetes. Subjects were divided into three groups: normal glucose (NG, normal glucose), pre-diabetes (Pre-DM, pre-diabetes mellitus) and diabetes (T2DM, type 2 diabetes mellitus) .Multiple logistic regression model was used to analyze the relationship between dietary fiber intake and Pre-DM as well as T2DM. RESULTS A total of 6526 cases of pre-diabetes were detected in 20996 elderly participants with detection rate of 31.1%.There 3274 cases were male and 3252 cases were female, the detection rates of both genders were 30.4% and 31.8%,respectively.While 1572 participants were detected as T2DM(784 of males and 788 of females),the detection rate of T2DM was 7.5%, 7.3% for males and 7.7% for females.After adjusting for potential confounding factors, compared to participants with very low fiber intake, participants in subgroups of higher,lower and low fiber intake were associated with decreased risk of pre-diabetes, and OR and 95% CI were (OR= 0.911,95% CI:0.835-0.993),(OR= 0.861,95% CI:0.790-0.938)and(OR=0.913,95% CI:0.838-0.994),respectively.However, there was only a statistically significant negative association between the higher intake of dietary fiber and T2DM (OR = 0.848; 95% CI: 0.726-0.991). CONCLUSION Dietary fiber intake was negatively related with diabetes and pre-diabetes mellitus. The risk of glucose metabolic disorder was decreased with the increase of dietary fiber intake.

Key words dietary fiber,type 2 diabetes, elderly,cross-sectional study

Category: Food & Nutrition

孕期食用人工甜味剂与后代超重和肥胖的风险

Artificial Sweetener Consumption During Pregnancy and Risk of Overweight and Obesity in Offspring

Zi Ye[1,2,3],Jie Wang*[1,2,3],Zhenyu Yang[1,2,3]

1. National Institute for Nutrition and Health, Chinese Center for Disease Control and Prevention
2. Key Laboratory of Human Milk Science, Chinese Center for Disease Control and Prevention
3. Key Laboratory of Trace Element Nutrition, National Health Commission of China

Background Artificial sweeteners (AS) are widely replacing caloric sweeteners to benefit health. However, AS consumption during pregnancy could have long-term impacts on the health of offspring. **Objective** We aimed to review the possible association of AS consumption during pregnancy with childhood overweight and obesity. **Methods** Databases for the literature search included PubMed, Cochrane, CNKI, and Wanfang. **Results** Five to ten percent of women consumed artificially sweetened beverages (ASB) daily during pregnancy. Compared to never consumption, daily ASB intake during pregnancy was associated with a higher risk of offspring large-for-gestational age at birth (aRR = 1.57, 95% CI: 1.05 ~ 2.35) and overweight or obese in childhood (aOR = 2.19, 95% CI:1.23 ~ 3.88 at one year of age; aRR = 1.93, 95% CI: 1.24 ~ 3.01 at seven years of age). Associations of maternal AS consumption during pregnancy with offspring BMI z-scores became stronger with increasing age from 3 to 18 years old (P<0.0001). In addition, compared to lowest quartile of AS consumption (0.00 servings/day), the highest quartile of AS consumption (0.98 servings/day) during pregnancy was associated with higher skinfolds at three years old (β = 1.17 mm, 95% CI: 0.47 ~ 1.88), seven years old (β = 2.33 mm, 95% CI: 0.80 ~ 3.87), and 13 years old (β = 2.27 mm, 95% CI: -0.06 ~ 4.60). Human studies have shown that AS can be transported from mother to offspring through the placenta and breast milk. The AS intake during pregnancy was associated with gut microbiota structure in infants, and the latter was associated with infant BMI. **Conclusion** Artificial sweetener consumption during pregnancy is associated with childhood overweight or obesity, and more scientific evidence is needed to reveal the impact of AS consumption during pregnancy or lactation on the health of offspring.

Key words artificial sweetener; pregnancy; offspring; overweight; obesity

Category: Food & Nutrition

基于多组学联合分析探究丁香酚经鼻入脑改善高能量饮食导致神经功能损伤的作用机制

Investigation of the mechanism of high-energy-diet induced neurological impairment by intranasal eugenol based on combined multi-omics analysis

Yuge Jiang[1,2],Bowen Li[2],Chuanxing Feng[2],Yuncong Xu[3],Yonghui Shi[2],Guowei Le*[2]
1. Anhui University of Chinese Medicine
2. Jiangnan University
3. China Agricultural University

Purpose: High energy dietary patterns rich in fat and fructose can lead to neurological dysfunction that is not directly improved by oral functional compounds. This study found that the edible flavor eugenol may act directly on the hippocampus via the transnasal route to the brain to improve neurological dysfunction.

Method: Fifty 6-week-old male C57/BL6N mice were divided into five groups: the control group received basal chow, and the model group was fed a high-fat (45% calories), high-fructose (15% water) diet for 18 weeks and given eugenol by intranasal drip (10 mg/kg) and different doses by gavage (10 mg/kg, 20 mg/kg). Neurological function was assessed by behavioral and pathological measures; the distribution and retention of eugenol in the brain was analyzed by metabolomics; the molecular mechanism of eugenol action in the hippocampus was analyzed by transcriptomics.

Result: Both the oral and intranasal eugenol groups significantly reduced body weight, blood lipids, and blood glucose in mice compared to the control group. The intranasal drop of eugenol significantly improved the performance of mice on a high energy diet in the water maze and novel object recognition experiments. Time-metabolomics results showed that eugenol accumulated in the hippocampus and hypothalamus of mice within 12 hours of intranasal administration, whereas oral administration did not. The combined transcriptomic and metabolomic analyses showed that eugenol was significantly different from the model group in signaling pathways such as hippocampal neurotransmitter transmission, TRP signaling and apoptosis after transnasal drip. Subsequent cytological validation results showed that eugenol affected neuronal cell Ca2+ influx via TRPV1 signaling after brain entry, which in turn ameliorated neuronal apoptosis caused by high glucose environment via PI3K-Akt signaling.

Conclusion: Eugenol improves neurological function at lower doses by the intranasal route compared to the transoral route.

Key words High-Energy-Diet, Intranasal, Neurological function, Edible spices, Multi-omics

Category: Food & Nutrition

植物乳杆菌 NX-1 发酵黄芪的抗炎活性研究

Anti-inflammatory activity of Astragalus fermented by Lactobacillus plantarum NX-1

SHUYU LIN[1],YAO XIONG[1],YIHENG LIN[1],JUNWEI ZHENG[1],SHIHUI FANG[1],TAO CHEN[1,2],ZHAO ZHANG*[1,2]

1. Guangdong Longsee Biomedical Co.,Ltd

2. Guangdong Yi-Yuan Lanxin Biotechnology Co.,Ltd

Aims:

To establish a stable probiotic fermentation protocol for traditional Chinese medicine *Astragalus*, which obtain more active ingredients. Furthermore, to evaluate the anti-inflammatory activity of fermented *Astragalus*.

Methods:

A certain amount of crushed *Astragalus* was extracted three times with 5, 5, 6 volumes of distilled water. Concentrated the water extract to 0.5 g/mL and the supernatant was collected by centrifugation and sterilized. *Lactobacillus plantarum* NX-1 was added into the supernatant with 3% initial inoculum and fermented at 36℃ for 7d. After that, the fermentation supernatant was centrifuged and sterilized for cell experiments.

After the RAW264.7 macrophages were incubated at 5% CO_2 and 37℃ for 12h, cells were divided into four groups including inflammatory group, test sample group, positive control group and blank group. To build cellular inflammation model, all groups were treated with LPS expect the blank group. The anti-inflammatory activity tests included cell viability assay, determination of NO content, and ELISA for inflammation-related cytokines detection.

Results:

As it turns out, the content of active ingredients in fermentation broth was increased compared with that in water extracts. The content of polysaccharides, saponins and flavonoids in fermented *Astragalus* increased by 0.23%, 0.16% and 0.14%, respectively. In the cell viability assay, fermented *Astragalus* showed no apparent inhibition to the viability. In addition, fermented *Astragalus* could significantly inhibited the release level of NO by 28%, and inhibited the levels of TNF-a, IL-1β and IL-6 by 0.43, 0.34 and 0.58 folds compared to the water extracts.

Conclusions:

Fermentation with *Lactobacillus plantarum* NX-1 can effectively increase the content of active components in *Astragalus* and enhance its anti-inflammatory activity.

Key words Astragalus, Lactobacillus plantarum NX-1, fermentation, anti-inflammatory activity

Category: Food & Nutrition

鼠李糖乳杆菌 NX-2 在斑马鱼模型中的降尿酸作用

Lowering uric acid effect of Lactobacillus rhamnosus NX-2 in zebrafish model

Yan Ma[1],Tao Chen[1,2],Zhao Zhang*[1,2]
1. Guangdong Longsee Biomedical Co.,Ltd
2. Guangdong Yi-Yuan Lanxin Biotechnology Co.,Ltd

Abstract: Objective The aim of this study is to screen the lowering uric acid effect of probiotics by using the zebrafish model. Methods Firstly, zebrafish hyperuric acid model was established by using 10 mM potassium oxalate with 0.5 mM xanthine sodium salt. Secondly, the zebrafish hyperuric acid model was treated with Lactobacillus rhamnosus NX-2 culture supernatant, suspension (1×109 CFU/mL) and intracellular cell-free supernatant at 37° C for 48 h. Finally, the activity of xanthine oxidase and concentration of uric acid in zebrafish were measured using xanthine oxidase assay kit and uric acid assay kit. Results Compared with the control group (8.79 ± 0.48 U/L), the activity of xanthine oxidase in zebrafish in the model group (14.51 ± 0.70 U/L) was significantly increased (P < 0.001), meanwhile, compared with the control group (21.01 ± 1.42 μmoL/L), the level of uric acid in zebrafish in the model group (58.18±1.52 μmoL/L) was significantly increased (P < 0.001), indicating that the zebrafish hyperuric acid model was successfully established. (Fig. 1A and 1B). Compared with the model group (14.51 ± 0.70 U/L), allopurinol significantly reduced the activity of xanthine oxidase (10.16 ± 0.62 U/L) in zebrafish(P < 0.001), indicating that this test is effective in evaluating the lowering uric acid effect. In addition, Lactobacillus rhamnosus NX-2 culture supernatant, suspension and intracellular cell-free supernatant significantly reduced the concentration of uric acid (31.25 ± 1.24 μmoL/L), (46.03 ± 1.38 μmoL/L), (41.59 ± 1.49 μmoL/L) in zebrafish compared with the model group (58.18±1.52 μmoL/L) (P < 0.001).
Conclusions Lactobacillus rhamnosus NX-2 can significantly reduce the uric acid concentration in zebrafish hyperuric acid model, suggesting that it has potential applications in regulating uric acid levels.

Key words Zebrafish; Probiotics; hyperuricemia

Category: Food & Nutrition

GOS 和 2'-FL 组合的互补益处，通过对早期肠道微生物群发育和活动的影响 - 涵盖局部和全身影响。

The complementary benefits of combined GOS and 2'-FL through the impact on gut microbiota development and activity in early life - covering both local and systemic effects.

Arjen Nauta*
FrieslandCampina

The gut microbiota plays a central role and setting the right scene early in life is key, as disturbances in microbiota colonization and development can impact health and well-being even later in life. The protective role of the gut microbiota in preventing invading pathogens to thrive has been known for decades, as well as making food components (bio-)available for the human host. However, the gut microbiota and their metabolites also contribute to, amongst others, gut physiology, gut mobility and even signal to the brain and, thus, not only have a local impact but also support systemic (metabolic) processes.

It has become apparent that breast milk, the gold standard of infant nutrition, not only nourishes the newborn infant but also pampers the gut microbiota. Amongst others, it contains many different human milk oligosaccharides (hMOs), that jointly suppress the outgrowth of undesired microbiota members and stimulate e.g. the beneficial Bifidobacteria. In case breast milk is not or insufficiently available, infant milk formula can be provided to the infant. Most infant milk formulas today are supplemented with oligosaccharides and give rise to a more breastfed-like microbiota composition as compared to formulas used some 20 years ago. Galacto-oligosaccharides (GOS), a mixture of many oligosaccharide structures on basis of two hMO building blocks differing in length and linkages, can in part fulfill the role of hMO mixtures and can complement the benefits of single hMOs. We will present several complementary benefits of the combination of GOS and 2’-fucosyllactose (2’-FL), the first commercially available hMO, and opportunities for steering relative Bifidobacterium (sub-)species abundances which are of relevance for cross-feeding and the production of beneficial metabolites, the reduction of undesired microbiota members, and targeting of different sites in the colon with both gastro-intestinal and metabolic relevance.

Key words GOS; 2'-FL; gut microbiota; early life

Category: Food & Nutrition

膳食摄入与女性膝关节骨关节炎的关系：一项医院病例对照研究

The association of dietary intake and knee osteoarthritis in females: a hospital-based case-control study

Xiaolu Yu[1,2],Jianyi He[1],Ye Yuan[1],Qiwei Ma[1],Min Liu[1],Ruiqi Wang[1],Li Liu*[1]

1. 1. SCHOOL OF PUBLIC HEALTH CHINA MEDICAL UNIVERSITY ; 2. LIAONING VOCATIONAL COLLEGE OF MEDICINE

2. LIAONING VOCATIONAL COLLEGE OF MEDICINE

Objective: The quantity and quality of diet may be involved in the pathogenesis of osteoarthritis (OA). Our aim of this study was to investigate associations of dietary factors, including the type and consumption of food and female knee osteoarthritis (OA) in northeastern area of China.

Material: We conducted a case-control study of females, including 136 primary knee OA cases and 136 controls matched in age. Data was collected using interview-based questionnaires. A Conditional logistic regression model was established to estimate the relationship between the type and consumption of food and female knee OA with adjusting for potential confounders.

Results: Tobacco smoking (P=0.002), working posture (P=0.001) and BMI ≥28 (P=0.007) were positively correlated with knee OA in female. Conversely, increasing intakes of meat and poultry, aquatic products, soybeans and nuts consumption were negatively associated with knee OA. Compared to those who consumed meat and poultry group, aquatic products, soybeans and nuts in lower tertile, ORs for those who consumed in the upper tertile were 0.993(95%CI 0.990-0.997), 0.988(95% CI 0.977-0.999), 0.987(95% CI 0.977-0.997) and 0.984(95% CI 0.975-0.993), respectively.

Conclusion: Increased dietary intake of soybeans, meat and poultry, aquatic product and nuts appears to be a beneficial factor for preventing the occurrence of knee OA.

Key words Osteoarthritis, Risk factors, Diet, Case-control study, food frequency questionnaire

Category: Food & Nutrition

植物乳杆菌 NX-1 在斑马鱼模型中的降糖作用

Hypoglycemic effects of Lactobacillus plantarum NX-1 in zebrafish model

Kangdi Zheng[1],Yan Ma[1],Yan Liu[2],Xiaoting Huang[1],Dan Chen[1],Zirui Zhang[1],Yuanting Cen[1],Tao Chen[1],Zhao Zhang*[1]

1. Guangdong Longsee Biomedical Co.,Ltd

2. Guangdong Yi-Yuan Lanxin Biotechnology Co.,Ltd

Objective The aim of this study is to screen the hypoglycemic effect of probiotics by using the zebrafish model. **Methods** Firstly, zebrafish diabetic model was established by using 20 mg/mL glucose with 0.02 mM alloxan. Secondly, the zebrafish diabetes model was treated with *Lactobacillus plantarum* NX-1, *Lactobacillus gasseri* LS03, and *Lactobacillus reuteri* C2 (1×10^6 CFU/mL) at 28 ° C for 72 h, and replaced with a new solution every 24 h. Finally, the concentration of glucose in zebrafish was measured using a glucose (GO) assay kit. **Results** Compared with the control group (1.12 ± 0.10 nmoL/fish), the concentration of glucose in zebrafish in the model group (4.29 ± 0.21 nmoL/fish) was significantly increased ($P < 0.005$), indicating that the zebrafish diabetes model was successfully established (**Fig. 1A** and **1B**). Compared with the model group (4.29 ± 0.21 nmoL/fish), acarbose significantly reduced the concentration of glucose (1.92 ± 0.15 nmol/fish) in zebrafish with a glucose-lowering rate of 74.91 ± 4.61% ($P < 0.005$), indicating that this test is effective in evaluating the hypoglycemic effect. In addition, *Lactobacillus plantarum* NX-1 significantly reduced the concentration of glucose (2.91 ± 0.15 nmoL/fish) in zebrafish with a glucose-lowering rate of 43.39 ± 4.83 ($P < 0.005$) compared with the model group (4.29 ± 0.21 nmoL/fish) ($P < 0.005$). **Conclusions** *Lactobacillus plantarum* NX-1 can significantly reduce the glucose concentration o in zebrafish diabetes model, suggesting that it has potential applications in regulating blood glucose levels.

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Key words Zebrafish; Probiotics; Diabetes

Category: Food & Nutrition

蛋清源多肽通过 ceRNA 调控网络在雌性原发性高血压大鼠中发挥降压作用

Egg white-derived peptides decreased blood pressure via the competing endogenous RNA regulatory networks in female spontaneously hypertensive rats

Wang Liao[1],Xinyi Cao[1],Hui Xia[1],Shaokang Wang[1],Guiju Sun[1],Yiwen Yu*[2]

1. Key Laboratory of Environmental Medicine and Engineering of Ministry of Education & Department of Nutrition and Food Hygiene, School of Public Health, Southeast University

2. Key Laboratory of Environmental Medicine and Engineering of Ministry of Education and Department of Epidemiology & Biostatistics, School of Public Health, Southeast University

Introduction: Food protein-derived antihypertensive peptides have been considered as a promising strategy of nutritional intervention for the management of high blood pressure. Despite numerous studies reporting the effects and mechanisms of antihypertensive peptides including peptides derived from egg white proteins, the role of peptides in female hypertensive animal model is unknown. On the other hand, the role of epigenetic modulation by the peptide treatment has been rarely investigated.

Objectives: The objectives of this study were to investigate the effect of egg white protein hydrolysate (EWH) in female spontaneously hypertensive rats (SHRs) as well as to explore the underlying mechanisms from the perspectives of transcriptome and the profiles of non-coding RNAs.

Methods: Young (12-14-week-old) female SHRs were orally administrated with 500 mg/kg body weight or 1000 mg/kg body weight of EWH daily for 10 weeks. Blood pressure of the rats were monitored by the tail-cuff method weekly. The mRNA and non-coding RNAs (miRNA, lncRNA, and circRNA) were profiled by the high-throughput RNA-seq technique. Differentially expressed (DE) RNAs in the aorta were identified for the construction of the competing endogenous RNA (ceRNA) networks. Key molecules in the networks were identified and validated by qRT-PCR.

Results: The treatment of high dose 1000 mg/kg body weight EWH showed a significant effect in reducing blood pressure in female SHRs. Bioinformatic analyses revealed 813, 90, 347 and 869 DE-mRNA, DE-miRNA, DE-LncRNA and DE-CircRNA, respectively. The CNTN5-LncRNA-XR_001835895.1- miR-384-5p was identified the central network which was validated in both aorta and circulation of the female SHRs.

Conclusion: The results from this study demonstrated that the treatment of EWH reduced blood pressure via regulating the ceRNA networks in female SHRs, which provided novel insights into the view of the mechanisms of food protein-derived antihypertensive peptides.

Key words Bioactive peptides; Antihypertensive peptides; Egg white proteins; Epigenetic regulations; Female spontaneously hypertensive rats

Category: Food & Nutrition

山药多酚通过调节 NF-KB/COX-2 信号通路改善肠黏膜损伤的分子靶点及其机制

Molecular Targets and mechanisms of Chinese yam pholyphenol alleviates intestinal mucosal injury via modulation of the NF-KB/COX-2 signaling pathway

Qian Li*,Yuxiao Zou,Qiong Yang,Erna Li,Fan Liu,Sentai Liao
Guangdong Academy of Agricultural Science

Background and objectives: Chinese yam tuber has been edible with a history for more than 3000 years in China. According to the records of Chinese Pharmacopoeia, it has a significant effect of invigorating the intestines and improving long-term diarrhea. However, the related material basis and mechanism of action are lack of scientific explanation.

Methods: we evaluated the protective effect and molecular mechanism of Chinese yam phenolic extract (CYPE) and a dominant phenanthrene (6,7-dihydroxy-2,4-dimethoxyphe-nanthrene, CYP4) with DSS induced intestinal mucosal injury in BALB/c mice. Further, the target and molecular mechanisms of the modulation effect on the NF-kB/COX-2 signaling pathway were explored by means of molecular docking and gene silencing.

Results: both disease activity index, histological damage scores and survival rate in DSS mice were improved with pre-intervention of CYPE and CYP4, which exhibited better efficiency than PC. In addition, CYP4 treatment ameliorated the inflammatory cytokine production including TNF-α, IFN-γ, IL-10, and IL-23 in colon. Furthermore, the protein expression of ERK1/2, NF-κB p65, pNF-κB and COX-2 were suppressed in CYE4 groups as compared with MC. The binding of PC4 and COX-2 was stronger due to the hydrogen bond between hydroxyl group and Tyr385. No significant differences were found in pIκBα, pNF-κB and pERK1/2 expression between control and CYE4 group after COX-2 gene silencing, while these protein expressions significantly decreased in CYE4 group without silencing.

Conclusions: It was demonstrated for the first time that CYPE and CYP4 protected intestinal mucosal from damage and prevented DSS induced colitis in mice. CYP4 was one of the active principles obligatory for biological effect of Chinese yam in protecting intestinal health. Our findings confirmed that COX-2 was the important target for CYE4 in alleviating ulcerative colitis. These findings indicated that PC4 was supposed to inhibiting NF-κB pathway via suppression of positive feedback target COX-2.

Key words Chinese yam polyphenols; intestinal mucosal damage; NF-κB/COX-2 signaling pathway; molecular docking; gene silencing

Category: Food & Nutrition

综合网络药理学和细胞实验探讨玉米黄素改善非酒精性脂肪肝作用机制

Integrated network pharmacology and cellular assay for the investigation of an anti-NAFLD effect of Zeaxanthin

Youwei Zhao*,Huimin Liu,Meihong Liu,Mingzhu Zheng,Jingsheng Liu
Jilin Agricultural University

BACKGROUND: NAFLD is one of the most prevalent liver diseases in the world. This study uses network pharmacology methods to predict and verify the molecular targets and pathways of ZEA's resistance to NAFLD and explore the anti-NAFLD effect and mechanism of ZEA. Furthermore, these results were confirmed by molecular docking and cell experiments.

RESULTS: 33 core targets of zeaxanthin targeting NAFLD were identified. Through GO enrichment analysis and KEGG pathway analysis on 33 common targets, it was found that PPARs are the most relevant pathway for ZEA to improve NAFLD. Molecular docking results showed that ZEA and PPARα bind and have good affinity through hydrogen bonds. In vitro, experimental studies have demonstrated that ZEA can activate PPARα, downregulate mRNA expression of Srebp1c and Fas, reduce adipogenesis in HepG2 cells, upregulate mRNA expression of mitochondrial and peroxisome fatty acid oxidation-related factors Cpt1a and Acox1, increase fatty acid oxidation in HepG2 cells, and improve FFA induced lipid deposition in HepG2 cells.

CONCLUSION: This study found the potential mechanism of zeaxanthin in improving NAFLD, confirmed the role of zeaxanthin in activating the PPARα pathway in improving NAFLD, and provided evidence for the development of zeaxanthin as a functional food resistant to NAFLD.

Key words zeaxanthin; Non-alcoholic fatty liver disease; Network pharmacology; Molecular docking; PPARα

Category: Food & Nutrition

昆布多糖对洛哌丁胺所致功能性消化不良小鼠的胃肠调节作用

Regulatory Effects of Laminarin on Functional Dyspepsia Mice Induced by Loperamide

Ling Wang*[2],Tianxu Liu[1]
1. Huazhong Agricultural University
2. College of Food Science and Technology, Huazhong Agricultural University, Wuhan, 430070, Hubei, China.

Regulatory Effects of Laminarin on Functional Dyspepsia Mice Induced by Loperamide

Ling Wanga, b, Tianxu Liua, b

a College of Food Science and Technology, Huazhong Agricultural University, Wuhan, 430070, Hubei, China.

b Key Laboratory of Environment Correlative Dietology (Huazhong Agricultural University), Ministry of Education, Wuhan, 430070, Hubei, China

Background and Objectives: Gastrointestinal dysmotility is a common cause of functional dyspepsia. Laminarin possesses many physiological properties, however, its relative abilities in regulating gastrointestinal motility have not been illustrated yet. In this study, we aimed to investigate the regulatory effects of laminarin on functional dyspepsia mice induced by loperamide.

Methods and Study Design: 18-20g BALB/c mice were used to establish the model of gastric dysmotility. We chose loperamide subcutaneous injection for seven days to induce representative symptoms of gastrointestinal hypomotility. During this period, the treatment groups were intervened with oral administration of laminarin. Meanwhile, we employed mosapride as a positive control in our study.

Results: As a result, laminarin could reverse this dysfunction mainly through regulating gastrointestinal hormones (motilin and ghrelin), cholinergic pathway, and gastric contraction-related gene expression (ANO1). Besides, the administration of laminarin partially recovered the gut microbial imbalance induced by loperamide, it not only increased the diversity of gut microbial profile, but also modulated the abundance of gut microorganisms including the raised richness of Lachnospiraceae, Prevotella, Oscillibacter, etc.

Conclusion: We provided evidence to support that laminarin might have potential abilities to regulate gastrointestinal motility and maintain the stability of gastrointestinal microecology. It’s of great significance for further exploration and utilization of marine plant-derived bioactive substances.

Key words Functional dyspepsia; Laminarin; Gastric motility

Category: Food & Nutrition

黄瓜葫芦素C抗结肠癌作用：网络药理学分析与实验验证

Preliminary Investigation on the Anti-Colon Cancer of Cucurbitacin C from Cucumber: A Network Pharmacological Study and Experimental Validation

Jingke Liu,Daidi Fan*,Deng Jianjun
Northwest University

Background: Colon cancer (CC) is a common malignant tumor of the gastrointestinal tract and is one of the leading causes of death among cancer patients worldwide. Cucurbitacin is a group of tetracyclic triterpenoids widely present in cucurbitaceae plants with various pharmacological activities. Cucurbitacin C (CuC) is a cucurbitacin derivative only found in cucumber, but its pharmacological activity remains unclear.

Methods: Potential targets and anti-CC activity of CuC were screened using a network pharmacology and bioinformatics approach. The proliferation and migration inhibitory activities of CuC were investigated by human CC cell model.

Results: The anti-CC targets of CuC were obtained from the database, differentially expressed genes in CC patients were identified from The Cancer Genome Atlas, and drug-disease target crossover formed 64 crossover targets. The PPI network screened 20 central genes, including matrix metalloproteinase family (MMP) genes and genes that regulate growth factors (GF). Enrichment analysis showed that cross-targets were enriched in four signaling pathways, including PI3K-Akt, Ras, MAPK, and IL-17 signaling pathways, and correlation and expression analysis of the enriched central genes identified 7 key targets. Predictive analysis and receiver operating characteristic (ROC) results showed that MMP-1, MMP-3, and MMP-13 were significantly associated with poor patient prognosis. Finally, in vitro experiments demonstrated that CuC significantly inhibited the proliferation and migration activity of human CC cells HCT-116, and large doses of CuC induced apoptosis of HCT-116 cells. The expression of PGF, MMP-1, MMP-3, MMP-9, and MMP-13 was decreased in CuC-treated HCT-116 cells.

Conclusions: Network pharmacology and bioinformatics identify MMP family members as key targets for CuC in the treatment of colon cancer. CuC was found to promote apoptosis as well as inhibit the migratory activity of HCT-116 cells and downregulate the expression of MMP family and PGF genes. The results suggest that CuC may be a promising agent for the treatment of colon cancer.

Key words Colon cancer, Cucurbitacin C, Network pharmacological, Matrix metalloproteinases

Category: Food & Nutrition

青岛地区非酒精性脂肪肝患者饮食模式及肠道菌群分析

Dietary pattern and intestinal flora of patients with nonalcoholic fatty liver disease in Qingdao area

Ze Xu*,Bo Zhang,Yongye Sun
Department of Nutrition and Food Hygiene, School of Public Health

Aim

To investigate the relationship between dietary pattern, Dietary inflammatory index (DII) and Nonalcoholic fatty liver disease (NAFLD) in Qingdao area, and explore the correlation between the gut microbiota and dietary factors and biochemical indexes.

Methods

A total of 234 NAFLD patients and 235 controls were enrolled in this case-control study. Food frequency questionnaire survey dietary intake of participants, factor analysis was used to extract dietary patterns, DII was calculated using 20 nutrients or foods. Multivariate Logistic regression model was to analyze the relationship between the scores of different dietary patterns, DII and NAFLD. Illumina novaseq6000 was used for 16S rDNA sequencing of gut microbiota, and analyze α, β-diversity, relative abundance of gut microbiota and LEfSe analysis. Spearman rank correlation was used to analyze the correlation between different intestinal bacteria with biochemical indexes and dietary factors.

Results

After multivariate adjustment, the rice noodle processed meat dietary pattern was positively correlated with the risk of NAFLD, while the multi-grain vegetable dietary pattern was negatively correlated with the risk of NAFLD. The OR (95%CI) was 2.62 (1.91,3.61) and 0.64 (0.51,0.82), respectively. Compared with the lowest quintile of DII score, the highest quintile significantly increased the risk of NAFLD, OR (95%CI) was 2.30 (1.14,4.65).

Compared with controls, the relative abundance of Escherichia_Shigella and Klebsiella increasing were higher in NAFLD participants, and the relative abundance of Faecalibacterium and Subdoligranulum rare were lower. The relative abundance of Escherichia_Shigella was positively correlated with serum total cholesterol, low density lipoprotein cholesterol and intake of livestock and meat in NAFLD patients, and the relative abundance of Klebsiella was positively correlated with serum glutamic-oxaloacetic transaminase level.

Conclusion

Multi-grain vegetable dietary pattern and lower dietary inflammatory intake were associated with a lower risk of NAFLD. The difference of microflora between NAFLD patients and controls was related to meat intake and lipid metabolism.

Key words Nonalcoholic fatty liver disease; Dietary pattern; intestinal flora

Category: Food & Nutrition

坚果消费、肠道微生物群和体脂分布：一项基于社区的大型人群研究结果

Nut consumption, gut microbiota and body fat distribution: results from a large community-based population study

Yuwei Shi*,Shankuan Zhu,Wei He
Zhejiang University

Background & objective: Limited researches have shown the relationship among nut consumption, gut microbiota and body regional fat accumulation. We aimed to investigate the association between nut intake and fat distribution, and the mediating role of gut microbiota in the association.

Methods: This study included 2255 Chinese adults (63.33% female) aged 56.95 ± 11.91 y (mean ± SD) in the urban area of the Lanxi cohort. Body fat was assessed by dual-energy x-ray absorptiometry (DXA). We used both anthropometry and DXA measurements to evaluate the fat distribution. Nut intake was calculated by food frequency questionnaires (FFQ). 1787 individuals with stool samples were measured using 16S rRNA sequencing. We used multivariable-adjusted linear regression and Spearman correlation to investigate the associations of nut consumption with fat distribution and gut microbial characteristics as well as the associations of identified nut-associated microbial features with fat distribution. Validation study was performed in the rural area of Lanxi cohort involving 1409 participants.

Results: Nut consumption was beneficially associated with all regional fat accumulation indicators. Gut microbial analysis suggested that a high intake of nuts was associated with an increased α-diversity and overall structure (β-diversity). 7 genera were identified to associate with nut consumption, among them 3 genera significantly associated with fat distribution. Moreover, favorable associations of α-diversity indices and two nut-microbiota scores (created based on abovementioned genera) with fat distribution were found. Functional annotation analysis revealed that several discrepant metabolic pathways, identified within different intake level of nuts based on 16S data, were associated with fat distribution indicators.

Conclusion: This study suggested higher nut consumption was associated with favorable body fat distribution, potentially mediated by gut microbiota and related metabolic pathways. Our results supported the importance to consume nuts in accordance with dietary recommendations for preventing abdominal obesity and improving body shape.

Key words nut consumption; gut microbiota; body fat distribution

Category: Food & Nutrition

猪油或加大豆油对健康超重和肥胖受试者心血管代谢性疾病风险因子和肝功能标志物的影响：一项随机对照喂养试验

Effect of Lard or Plus Soybean Oil on Cardiometabolic Risk Factors and Markers of Liver Function in Healthy Overweight and Obese Subjects: A Randomized Controlled-Feeding Trial

Zhiyuan Liu*[1],Jihong Yuan[2],Duo Li[1]

1. Institute of Nutrition & Health, Qingdao University, Qingdao, China

2. No. 2 Department of Nutrition, Chinese People's Liberation Army General Hospital, Beijing, China

Aim: The association between dietary fat and cardiometabolic risk factors or liver diseases is increasingly recognised. The present parallel, three-arm, randomized controlled-feeding trial compared the effects of lard, soybean oil, and both (blend oil: 50% lard and 50% soybean oil) on biomarkers of blood pressure (BP), serum lipid profile, and liver function in healthy overweight and obese subjects.

Methods: The 171 volunteers were randomized into three groups and consumed isoenergetic diets with 30 g of three different edible oils each day, which were added into diets during cooking for 12 weeks.

Results: The 122 (71.3%) volunteers completed the study. Diastolic BP (DBP) in the blend oil group decreased compared with those in the two other groups after 12 weeks of intervention ($P = 0.004$ for the interaction between diet group and time). Blend oil decreased DBP compared with lard ($P < 0.001$) and soybean oil ($P = 0.002$). Correspondingly, the serum concentration of nitric oxide increased in the blend oil group ($P = 0.024$ for the interaction between diet group and time). Blend oil increased nitric oxide compared with lard ($P = 0.001$) and soybean oil ($P = 0.016$). Markers of liver function, including aspartate aminotransferase (AST), alanine aminotransferase (ALT), and gamma-glutamyltransferase (γ-GT), declined in the blend oil group relative to the two other groups ($P = 0.015$, 0.001, and 0.007 for the interaction between diet group and time, respectively). Blend oil decreased AST, ALT, and γ-GT compared with lard ($P < 0.001$, < 0.001, and < 0.001, respectively) and soybean oil ($P = 0.045$, 0.011, and 0.006, respectively). There were no significant differences in changes in serum lipids, glucose, body weight, or waist circumference between groups.

Conclusion: This study provides evidence for the metabolic benefits of consuming lard plus soybean oil in healthy overweight and obese subjects.

Key words lard; soybean oil; obesity; cardiometabolic risk factors; markers of liver function

Category: Food & Nutrition

杀菌方式对红烧牦牛酸醡肉风味特性的影响

Effects of sterilization methods on flavor characteristics of braised sour yak meat

Yiqin Peng*[1],Jie Ding[2],Xuesong Lu[3],Xiang Li[4],Meng Xiao[2],Jianghong He[2],Yuting Su[2],Chengci Liu[2],Yang Li[2]

1. Key Laboratory of Culinary Science in Sichuan Provincial Higher Education Institutions, Sichuan Tourism University

2. College of Food Science and Technology, Sichuan Tourism University

3. College of Sports and Leisure, Sichuan Tourism University

4. Industrial College of Prefabricated dishes, Sichuan Tourism University

【Background】Sour yak meat has a unique taste and was a characteristic product in Tibetan areas of western Sichuan. However, there are fewer products that deeply process sour yak meat.【Objective】The production of braised yak sour meat enriched the types of deep-processed products of sour yak meat. It is of great significance to study the sterilization method of braised sour yak meat for large-scale production and promotion.【Method】Unsterilized samples were used as control (CK). The Euclidean distances (Ed) of different samples in artificial sense and intelligent sense(electronic nose (E-nose), electronic tongue (E-tongue), texture, color) were measured. The effects of water sterilization, ultrasonic water sterilization, high pressure sterilization and irradiation sterilization (4kGy, 6kGy, 8kGy) on the flavor profile of samples were evaluated.【Results】The results showed: The smallest differences in color, texture, E-nose and E-tongue between 4kGy irradiated samples and CK, and the Ed were 4.17, 2.11, 0.34 and 197.56, respectively. Compared with the CK, the color, texture, E-nose and E-tongue of the sample by high pressure sterilization were the most different, and the Ed were 15.17, 44.52, 2.01 and 1117.83, respectively. Comprehensive analysis of intelligent sensory and artificial sensory of samples with different sterilization methods, the overall flavor of 4kGy irradiated samples and CK was the smallest difference, followed by 6kGy irradiation, 8kGy irradiation, water sterilization and ultrasonic water sterilization. High pressure sterilization had the greatest influence on flavor, and the Ed of overall flavor profile difference was 197.64, 291.35, 448.59, 607.51, 671.21 and 1118.82.【Conclusion】The study provides data reference for the selection of sterilization methods for prefabricated braised sour yak meat in large-scale production.

Key words braised sour yak meat; sterilization methods; flavor characteristics; intelligent senses

Category: Food & Nutrition

鲜切莲藕及褐变莲藕提取物降低游离脂肪酸诱导的 HepG2 细胞胆固醇代谢通路差异比较

Comparison of fresh-cut lotus root and browned lotus root extracts in reducing free fatty acid-induced cholesterol metabolism pathway in HepG2 cells

Xiaoru Liu*,Shuyuan Zhong,Jingfang Li,Meng Wei,Zeyuan Deng
State Key Laboratory of Food Science and Technology, Nanchang University

Objective: This study aimed to compare the mechanisms of fresh lotus root extracts (FLRE) and browned lotus root extracts (BLRE) on cholesterol metabolism and verify whether the main component's monomer regulates cholesterol metabolism as the extracts did through in vitro experiments.

Methods: The FLRE and BLRE extracts and monomeric compounds are applied to HepG2 cells induced by free fatty acids (FFA). Extracellular total cholesterol (TC) and triglyceride (TG) levels were also detected. RT-PCR and Western blot were used to observe cholesterol metabolism-related gene and protein expression.

Results: The in vitro results showed that BLRE and FLRE could reduce TC and TG levels in HepG2 cells. BLRE suppressed the synthesis of cholesterol, while FLRE promoted the synthesis of bile acid (BA) as well as the clearance and efflux of cholesterol. Furthermore, the main monomers of BLRE also decreased cholesterol synthesis, which is the same as BLRE. In addition, the main monomers of FLRE promoted the synthesis of BAs, similar to FLRE. BLRE and FLRE promote cholesterol metabolism by different pathways.

Conclusion: This study innovatively focused on the biological activity of plant enzymatic browning products. The extracts of lotus roots after browning had a cholesterol-lowering effect as the fresh lotus root extracts did, but with different metabolic mechanisms and pathways. The FLRE ameliorated cellular cholesterol elevation through two pathways: by inhibiting FXR/FGF19 signaling-pathway-mediated CYP7A1/CYP27A1 feedback regulation to promote cholesterol conversion to bile acids; and by activating SREBP2 to up-regulate LDLR, maintain cholesterol homeostasis, and promote LDL-C clearance and cholesterol-efflux-associated ABCA1 gene expression. The BLRE and FLRE mainly regulate cholesterol metabolism by inhibiting the expression of SREBP2 and HMGCR, genes related to cholesterol synthesis. In addition, catechin and caffeic acid are vital substances in fresh lotus root that promote cholesterol metabolism, and theaflavin and forsythoside A are crucial substances in browned lotus root.

Key words browned lotus root; cholesterol metabolism; bile acid synthesis; cholesterol synthesis

Category: Food & Nutrition

β-胡萝卜素通过调控肝脏铁死亡途径减轻高脂饮食诱导的肥胖
β-carotene alleviates high-fat diet induced obesity by regulating the liver ferroptosis

Huihui Huang*,Yang Liu,Deliang Wen
China Medical University

Background:Obesity has become a major public health problem and ferroptosis is associated with obesity and metabolic diseases.The purpose of this study was to investigate whether β-carotene can reduce high-fat diet induced obesity by regulating lipid peroxidation associated with ferroptosis in liver.

Method:Four-week-old male C57BL/6J mice were randomly divided into four groups and fed as follows:1)control group(10% of calories from fat,n=8),2)control group with β-carotene (n = 8),3)high-fat diet group(60% of calories from fat,n =8) and 4)high-fat diet with β-carotene(n =8).After 12 weeks' feeding,the obese mouse model was established and then β-carotene (3mg/kg) was given intragastric administration.

Result:1.After 8 weeks' intervention,the weight,body fat and the expression of ferroptosis related proteins between control group and control group with β-carotene were no statistical difference.Compared with high-fat diet group,the weight,body fat,the area under curve of Oral Glucose Tolerance Test and Insulin Tolerance Test,serum contents of Fe,triglyceride,low-density lipoprotein cholesterol and total cholesterol in high-fat diet with β-carotene group were significantly decreased(P<0.05).

2.Hematoxylin-eosin staining showed that compared with high-fat diet group,the lipid droplet in the liver of high-fat diet with β-carotene group were significantly reduced.

3.Compared with control group,the protein expression of Ferritin light chain,Heme oxygenase-1,Cyclooxygenase-2,Acyl-CoA synthetase long chain family member 4,Ferritin heavy chain and Transferrin in high-fat diet group was significantly increased;Glutathione peroxidase 4 and Ferroportin1 was down-regulated(P<0.05).Compared with high-fat diet group,those protein expression in high-fat diet with β-carotene group was significantly down-regulated,Glutathione peroxidase 4 and Ferroportin1 was increased(P<0.05),which is consistent with the results of Immunohistochemistry.

Conclusion:After 8 weeks of β-carotene intragastric administration,the weight,body fat,glycolipid metabolism and lipid peroxidation associated with ferroptosis of the liver in high-fat diet induced obese mice had been improved.We demonstrated that β-carotene alleviates high-fat diet induced obesity by improving hepatic lipid peroxidation induced by ferroptosis,which provided a perspective for further research on the mechanism of reducing obesity and related metabolic diseases by inhibiting ferroptosis related pathways.

Key words β-carotene ; obesity ; ferroptosis ; lipid peroxidation ; high-fat diet

Category: Food & Nutrition

油炸食品消费、肠道微生物群、脂肪分布和 2 型糖尿病:来自两个大型社区队列研究的结果

Fried food consumption, gut microbiome, fat distribution, and type 2 diabetes: results from two large community-based cohort studies

Yiting Duan*[1],Yuwei Li[1],wenjie Wang[1],Chengquan Xu[1],Xinmei Li[1],Yifeng Wang[1],Weifang Zeng[3],Julianna C Hsing[2],Ying Lu[4],Ann W Hsing[2],Wei He[1],Shankuan Zhu[1]

1. Zhejiang University

2. Department of Epidemiology and Population Health, Stanford School of Medicine, Stanford University, Stanford, CA, USA

3. Lanxi Hospital of Traditional Chinese Medicine, Lanxi, Zhejiang, China

4. Department of Biomedical Sciences, Stanford School of Medicine, Stanford University, Stanford, CA, USA

Objective: The aim of this study was to investigate the associations of fat distribution and type 2 diabetes (T2D) risk with fried food consumption and gut microbiota in two large community-based populations.

Methods: Our study utilized data from two separate cohorts, including 5,268 participants from the Well-China Cohort and 1,736 participants from the Lanxi Cohort. We used a validated food frequency questionnaire to assess the frequency of fried food consumption. Fecal samples were collected between 2016 and 2019. Android fat, gynoid fat, trunk fat, and legs fat mass were measured by the dual-energy X-ray absorption (DXA). We used the MaAsLin method to identify differential bacteria associated with fried food and established the microbial score (FMI) of the differential bacteria associated with fried food. Multivariable linear regression and logistic regression were used to explore the potential association between the FMI and fat distribution as well as T2D risks.

Result: In the Well China Cohort, FMI was significantly associated with the frequency of fried food consumption. FMI was positively associated with BMI (P-trend<0.001) and WC (P-trend<0.001). Moreover, FMI was positively associated with android fat mass (P-trend<0.001), gynoid fat mass (P-trend=0.01), AOI (android fat mass/gynoid fat mass) (P-trend=0.008), trunk fat mass (P-trend<0.001), and legs fat mass(P-trend=0.01). These associations were successfully replicated in the separate Lanxi Cohort. However, positive associations of FMI with glycosylated hemoglobin (P-trend<0.001), fasting glucose (P-trend<0.001), and T2D (P-trend<0.001) were only observed in Well-China Cohort.

Conclusion: Our findings suggested that a high fried food-related microbial score was associated with a higher risk of central obesity and T2D. Reduction of fried food consumption might be a potential strategy to prevent obesity and T2D.

Key words Key words: Fried food consumption, Gut microbiome, Fat, Fat distribution, Type 2 diabetes

Category: Food & Nutrition

食物数据的新领域：食品成分和品质特征数据与食品真实性判别模型建立和应用（肉和乳特征评价和真实性判别研究）

New Application of Food Data：Food Composition and Property Data and Food Authentication Modeling (Meat & Milk Properties and Authentication studies)

Jun Guo*[1],Hai Zhou Sun[2]
1. Inner Mongolian Agricultural University
2. Inner Mongolia Academy of Agricultural & Animal Husbandry Sciences

Food composition data widely applied in fields of scientific research, health education, food design, quality and safety control, food labeling and standardizing, and we know how we are usually using food data, statistical parameters. That it?! actually, food data set analysis that facilitated or based on modern chemometrics and multi-omics data matrix processing, multivariate algorithm and modeling, may linked with artificial logic road-map or machine learning, can illustrate and provide us amazing or incredible direct visible projections and comprehensive analytical results. Almost all category that we made on food, including non-scientific classification such as brand, has own fingerprint. Food carrying own inner Barcode or QR code data sets that can identify themself. Certain category of food has certain nutrients or chemicals sets such as fatty acids, amino acids, minerals, carotenoids, peptides and isotopes etc profiles; physical and chemicals properties indexes as texture, color, acidity; and instrument fingerprints as optical, chromatic, mass and NMR spectra. And food composition, properties and fingerprint data matrix can be correlated with food categories, such as species/breed; geographical origin; farming and feeding patterns as organic vs non-organic, pasturing/grass feed vs barn/grain feed; processing methods as traditional vs modern, and heating, homogenizing, fermenting etc as well. And even industrial and commercial sorting as different brand, prices grade, product series and special declarations can be modeled with their industrial fingerprints. Generally, now a days, food data modeling has provided us new methodology in food evaluation, food integrity and food authenticity identification and discrimination, and further for species, breed, geographical indication, organic, grass feed, tradition and brand etc standardizing, regulation and protection. Can be applied in farming and feeding protocols improvement as well. We have conducted some preliminary studies on Inner Mongolian meat & milk authentication.

Key words Food data; Food composition; Food integrity ; Food authenticity; Food modeling

Category: Food & Nutrition

桑葚果酒生产工艺优化及其体外抗氧化活性研究

Optimization of Processing Technology for Mulberry (Morus atropurpurea) Wine Production and its antioxidant activity in vitro

Jing Hu*[1],Yihu Hu[1],Honglian Hu[1],Jianghong He[1],Yiqin Peng[2],Meng Xiao[3],Chunyan Liu[4],Jie Ding[1,3]

1. College of Food Science and Technology, Sichuan Tourism University

2. Key Laboratory of Culinary Science in Sichuan Provincial Higher Education Institutions, Sichuan Tourism University

3. Industrial College of Prefabricated dishes, Sichuan Tourism University

4. Chengdu Kuafu Technology Co., Ltd

【Background】Mulberry (Morus atropurpurea) is widely known for its richness in flavonoids and anthocyanins, which make it an attractive substrate for wine fermentation. However, mulberries have a short shelf life and are prone to rapid deterioration after harvest. 【Objective】Mulberry wine exerts antioxidant, anti-inflammatory and hypoglycemic effects, which is worth studying the deep-processing to fulfill its maximizing value.【Method】The aim of this study is to investigate the production of wine from mulberry juice by optimizing the ultrasound frequency, processing time and temperature, and fermentation time to obtain the optimum technological parameters and to evaluate its antioxidant activity. 【Results】Response surface methodology coupled with the entropy weight coefficient method was used in the present study to obtain optimized process conditions. All models showed significant p-values for the interaction of variance (<0.05). The factors influencing the overall product quality score (including total phenolic content, TSS, pH, color difference, and sensory score) were ultrasonic processing time, fermentation time, ultrasonic frequency, and ultrasonic temperature, in that order. The optimal preparation process was obtained with an ultrasonic temperature of 35 ℃, ultrasonic time of 30 min, ultrasonic frequency of 300 W, and fermentation time of 4 d. Under these conditions, the total phenolic content was the highest (16.20 mg/ml), and the scavenging ability of the wine on •OH, DPPH, and ABTS+ was 55.71%, 59.90%, and 89.86%, respectively. 【Conclusion】Due to its good taste, bright color and high nutritional value, mulberry wine produced using optimal process parameters has great economic potential.

Key words Mulberry; wine; ultrasonic extraction; fermentation; optimization; response surface methodology (RSM)

Category: Food & Nutrition

川西藏区牦牛酸肉自然发酵过程中理化特性和风味品质的动态变化

Dynamic Changes in Physico-Chemical Characteristics and Flavor Quality of Yak Sour Meat during Spontaneous Fermentation in Tibetan Region of Sichuan Province, China

Jie Ding*[1,2],Yiqin Peng[3],Chunyan Liu[2,4],Yuwei Zhang[2,5],Xinjie Hu[5],Zhan Tian[2],Rui Li[2],Yigu Tian[2],Xuesong Lu[6],Xiang Li[1,7],Meng Xiao[1]

1. College of Prefabricated Vegetable Industry, Sichuan Tourism University
2. College of Food Science and Technology, Sichuan Tourism University
3. Emphases Laboratory of Culinary Science, Sichuan Tourism University
4. Chengdu Kuafu Technology Co., Ltd, Chengdu
5. College of Food Science, Sichuan Agricultural University
6. College of Sports and Leisure, Sichuan Tourism University
7. College of Culinary, Sichuan Tourism University

Yak sour meat is a kind of prefabricated vegetable product with rich nutrition and local characteristics developed by Sichuan Tourism College. The nutritional quality of naturally fermented yak meat was greatly affected by seasonal climate. In order to explore the quality change rule of naturally fermented yak sour meat under different climatic conditions in western Sichuan Tibetan area. The effects of fermentation temperature (5 ° C, 10 ° C, 20 ° C, 30 ° C) on the physicochemical properties, free amino acids, color characteristics, texture characteristics and sensory of yak sour meat were studied. The results showed: The fermentation temperature was negatively correlated with acidity, resilience, chewiness, and moisture content, and positively correlated with nitrite content, TVB-N, firmness and total bacterial count. The TVB-N of yak sour meat fermented at different fermentation temperatures met the national standards. High temperature fermentation was conducive to the production of more essential amino acids in yak sour meat. The essential amino acid content of yak sour meat in the 30 ° C fermentation group was significantly higher than that in other fermentation groups during fermentation, and the essential amino acid content at the end of fermentation was 22.38±0.54 mg/10g. When the fermentation temperature was higher than 10 ° C, the L value of yak sour meat was higher, and the higher the fermentation temperature, the higher the a * value and the lower the b* value. The sensory scores of yak sour meat fermented at 5 ° C, 10 ° C, 20 ° C and 30 ° C were the highest at 192 h (73.42), 120 h (69.30), 60 h (65.82) and 32 h (71.00), respectively. In summary, The higher the fermentation temperature, the greater the change of quality of yak sour meat, and the shorter the fermentation maturity time.

Key words Yak Sour Meat, Spontaneous Fermentation, Physico-Chemical Characteristics, Flavor Quality

Category: Food & Nutrition

妊娠期糖尿病和健康产妇乳汁外泌体具有差异 miRNAs 表达谱和不同的调节肝细胞增殖的活性

Human Milk Exosomes from Gestational Diabetes Mellitus (GDM) and Healthy Parturient Exhibit Differential miRNAs Profile and Distinct Regulatory Bioactivities on Hepatocyte Proliferation

Longying Cha*[1],Jiaqi Mo[2],Huiyu Luo[2],Longying Zha[2]
1. 南方医科大学公共卫生学院营养与食品卫生学系/环境卫生学系
2. 南方医科大学公共卫生学院营养与食品卫生学系

Objectives: Exosomes are a novel type of bioactive component in human milk (HM) and influence infant development, growth, and health. Recent studies indicate that HM exosomes and miRNAs relate to gestational diabetes mellitus (GDM). This study aimed to compare the differential miRNAs in HM exosomes from GDM and healthy parturient, and to investigate the bioactivities of HM exosomes on regulating hepatocyte proliferation and insulin sensitivity.

Methods: Exosomes were isolated by ultracentrifugation from HM of GDM (GDM-EXO) and healthy (NOR-EXO) parturients and characterized by Western blot, nanoparticle tracking analysis and transmission electron microscopy. The exosomal miRNAs from colostrum, transitional milk and mature milk were sequenced by BGISEQ-500 system. HepG2 cells were incubated with 20, 40 or 80 μg/mL of HM exosomes and the proliferation and glucose consumption were assessed. Eighteen Balb/c mice were randomly allotted to the control (CTL), NOR-EXO and GDM-EXO group, and gavaged with 50 mg/kg·BW of PBS, NOR-EXO and GDM-EXO, respectively for 2 weeks. Upon the end, fasting blood glucose and insulin was measured. The expression of molecules relating to cell proliferation (mTOR and p-mTOR) and insulin signaling (IRS1, p-IRS1, Akt and p-Akt) in both HepG2 cells and mice liver were detected by Western blot.

Results: GDM-EXO and NOR-EXO had similar morphology, size, concentration and exosome-specific markers (CD9 and TSG101) expression. GDM-EXO and NOR-EXO specifically harbored 1299 and 8 miRNAs, respectively. Moreover, GDM-EXO had 176 up-regulated and 47 down-regulated miRNAs compared with NOR-EXO. Both GDM-EXO and NOR-EXO were absorbed in cultured HepG2 hepatocytes and mice liver, but did not affect insulin sensitivity. GDM-EXO inhibited hepatocytes proliferation by down-regulating mammalian target of rapamycin (mTOR) possibly via the delivery of exosomal miR-101-3p.

Conclusion: HM exosomes from GDM and healthy parturient exhibit differential miRNAs profiles and distinct regulatory bioactivity on hepatocyte proliferation.

Key words Gestational Diabetes Mellitus; Exosomes; miRNAs; Human milk; Hepatocyte proliferation

Category: Food & Nutrition

中国西南地区成人饮食文化营养知信行现状及影响因素分析的横断面研究

Analysis of the Current Situation and Influencing Factors of Dietary-Culture-Related Nutrition Knowledge, Attitudes, and Practices of the Southwest of China's adults: A cross-sectional Study

Qian Zhang*[1],Yuan Yang[2],Lian Xiang[1],Tingwan Du[1],Lilai Ma[1],Yanqiu Zhou[1],Ling Ma[1]

1. Southwest Medical University

2. Xiamen University

Background: With the development of economy and society, people's attitudes and behaviors towards nutrition are also changing. People's nutrition Knowledge, Attitudes, and Practices (KAP) is not only influenced by the demographic characteristics, but also the dietary culture.

Objectives: To assess the dietary-culture-related nutrition knowledge, attitudes, and practices(KAP) of southwest of China’s citizens during the corona virus disease 2019(COVID-19) pandemic.

Study Design: A cross-sectional survey was conducted using an online KAP questionnaire in southwest of China. Volunteers were recruited at Southwest Medical University and were first trained to unify standards of distributing questionnaires. Participants were recruited by convenient- and snowball-sampling methods. Multiple regression analysis was used to analyze the influential factors.

Results: After 50 days of investigation, 2380 participants (38.5% men) were valid. The mean score of adults’ nutrition knowledge was 3.97±2.17 and the mean awareness rate was 39.7%. Women participants in the age group of 50-65 with higher education level had higher nutrition knowledge qualification rate. During the COVID-19 pandemic, the positive rate of attitude toward dietary-culture-related nutrition was 93.5%, and women who had higher level of education and immigrated from other places had better attitudes. Moreover, the positive rate of dietary habits was 90.4%, and older women had better dietary behavior.

Conclusions: participants’ knowledge of nutrition was poor, but their dietary habits and attitudes toward dietary-culture-related nutrition were generally positive, it is necessary to improve nutrition education.

Key words southwest of China, adults, dietary culture, nutrition knowledge-attitude-practice

Category: Food & Nutrition

刺梨提取物对溃疡性结肠炎的保护效果和机制探究

The protective effect and mechanism of Rosa Roxburghii Tratt extract on Ulcerative Colitis

Xingjie Li*,Yihan Ling,Shuwen Zhang,Ting Zhou,Shouxun Wu,Wenya Yin
Sichuan university

Background and objectives: Ulcerative colitis is a chronic inflammatory bowel disease, this study aimed to investigate the protective effect of Rosa Roxburghii Tratt extract(RRTE) on Ulcerative Colitis (UC) and its potential molecular mechanism.

Methods: The flavonoids and terpenoids in Rosa Roxburghii Tratt were extracted by alkali solubilization and acid precipitation method after alcohol extraction, and the content of flavonoids and terpenoids in RRTE was determined by colorimetry; additionally, the DPPH+ and ABTS+ free radical scavenging rates were measured to assess the antioxidant capacity of the RRTE. Dextran sulfate sodium (DSS) was used to establish the UC animal model. The protective effect of RRTE was investigated by Body weight, DAI score, colon length, Hematoxylin-eosin staining(HE), immunohistochemistry(IHC), and 16rRNA sequencing; furthermore, the possible molecular mechanisms were explored by using transcriptomics.

Results: The flavonoids and terpenoids content of RRTE were 453.70 ± 6.662 mg/g and 237.00 ± 21.46 mg/g, and the IC50 of $DPPH^+$ and $ABTS^+$ were 77.91 μg/ml and 367.5 μg/ml. RRTE could slow down weight loss, reduce the shortening of colon length, and decrease the DAI score($P<0.05$); which also could improve the structure of mouse colonic mucosa, reduce inflammatory infiltration, and increase the expression of the tight junction proteins to protect the mechanical barrier; furthermore, RRTE could rebalance the gut microbiota by increasing the abundance of *Firmicutes* and reducing *Proteobacteria*; NGS results showed that there were 2746, 2943 differentially expressed genes(DEGs) in the model group(M) VS the control group(C), and in the high-dose group(H) VS C, respectively, and 1747 differential genes in H VS M. KEGG pathway analysis showed that DEGs related to immune response, inflammatory signaling pathways, and IL-17 and TNF signaling pathways were significantly enriched in the high-dose group.

Conclusion: RRTE could ameliorate DSS-Induced Ulcerative Colitis, suggesting that it could be a new strategy for UC treatment.

Key words Ulcerative colitis, Rosa Roxburghii Tratt, Flavonoids, Terpenoids, RNA-seq, gut microbiota

Category: Food & Nutrition

热激结合涂膜处理维持了蓝莓果实冷藏期间的营养价值

Heat shock combined with coating treatment maintained the nutritional value of blueberry fruit during cold storage

Chunyan Liu*[1,2,3],Jie Ding[1,2],Peng Huang[1],Hongying Li[1],Yiiqn Peng[2],Yuwei Zhang[1],Xinjie Hu[1],Yaowen Liu[1],Wen Qin[1]

1. College of Food Science, Sichuan Agricultural University
2. College of Food Science and Technology, Sichuan Tourism University
3. Chengdu Kuafu Technology Co., Ltd

Previous studies have shown the 45 ° C heat shock for 60 min combined with TKL coating (HTK) treatment could prolong the cold-stored period of 21 d, compared with the control group. However, its effect on the nutritional components of blueberry fruit has not been reported. Therefore, this study explored the changes of nutrients in blueberry from the aspects of antioxidant substances, antioxidant enzymes and phenolic secondary metabolites. The results showed: 1. Compared with the control group, the HTK treatment inhibit the increase of superoxide anion, malondialdehyde content, relative conductivity and browning index of blueberry after harvest, and inhibit the decrease of proline content, so significantly reduce the oxidative stress level of blueberry fruit. At the same time, delayed peak time of SOD , POD and CAT activity, improved key defensive enzyme activity at the end of storage. 2. The HTK treatment reduced the scorbic acid-glutathione cycle efficiency, and maintained content of ascorbic acid and reduced glutathione with blueberry during low temperature storage. At the same time, the increased total phenol content of blueberry and delayed anthocyanin content decline. 3. The isolated 41 phenolic secondary metabolites from blueberries, including phenolic acids (10), flavanols (6), flavonols (22), and flavonoids (3). Compared with the control group, the HTK treatment delayed the synthesis time of phenolic compounds and inhibited the degradation of some metabolites in the biosynthesis pathway of flavonoids and phenylpropanoids, thereby increasing the total phenolic content of blueberry at the end of storage and maintaining high antioxidant capacity. In summary, HTK treatment delayed the degradation rate of phenolic metabolites, increasing the total phenolic content of blueberry at the end of storage, reduced the ASA-GSH cycle rate, inhibited the decrease content of ascorbic acid and glutathione, and thus inhibiting the loss of nutrients in postharvest blueberry.

Key words blueberry, heat shock, coating, nutritional value

Category: Food & Nutrition

刺梨不同极性提取物的抗氧化活性及缓解肺纤维化的作用

Antioxidant activity of different polarity extracts of Rosa roxburghii Tratt and the effect of alleviating pulmonary fibrosis

Ting Zhou*
West China School of Public Health and West China Fourth Hospital, Sichuan University,

Abstract: Background: Rosa roxburghii Tratt (RRT) has multiple biological activities including anti-inflammatory, antibacterial, and anticancer, which is used both as medicine and food. Objectives: To investigate the antioxidant activity of different polarity extracts of RRT and their alleviating effects on pulmonary fibrosis in vivo and in vitro. Methods: Water extract (WE), Methanol extract (ME) and ethanol extract (AE) were obtained using solvents of different polarity (water, methanol, ethanol), ethyl acetate phase (EAE) and water phase (WPE) were obtained by extracting WE using Minor polar solvent (ethyl acetate). The active components and antioxidant capacity of five extracts were determined, and the anti-pulmonary fibrosis effects were investigated by bleomycin (BLM)-induced pulmonary fibrosis mice model and TGF-β1-induced cell model. Results: The bioactive substances in the EAE were significantly more than other extracts with content of polyphenols, flavonoids and triterpene acids being 27.56±4.06, 759.97±2.92, 211.29±0.02 μg/mg respectively($P<0.01$); and it had the strongest antioxidant capacity with IC50 of 525.63±37.66, 55.98±0.60 μg/mL for DPPH and ABTS. Attractively, compared to other extracts, EAE showed better protection against pulmonary fibrosis on attenuating BLM-induced elevated lung weight coefficients in mice, reducing lung inflammatory infiltration and collagen. Moreover, EAE could modulates the composition of the intestinal flora, increasing the relative abundance of Allobaculum, Lactobacillus, Akkermansia and decreasing the relative abundance of Prevotella. Meanwhile, they exhibited similar anti-pulmonary fibrosis effects on reducing the level of Reactive oxygen species (ROS), restoring cell membrane potential, inhibiting calcium ion increase in TGF-β1-induced A549 cells. Conclusion: The EAE could regulate the BLM-induced disorder in gut microbiota of mice and regulate mitochondrial function to alleviate pulmonary fibrosis, which is consistent with the most active substance and the strongest antioxidant activity of EAE.

Key words Rosa roxburghii Tratt extracts; pulmonary fibrosis; antioxidant capacity; mitochondrial function; gut microbiota

Category: Food & Nutrition

中国农村地区6-23月龄婴幼儿看护人的喂养行为及其情境因素研究——基于生态瞬时评估法

Ecological momentary assessment of caregivers' feeding behaviors and contextual factors among children aged 6–23 months in rural China

Zhengjie Cai*,Yuju Wu,Linhua Li,Huan Zhou
SiChuan University

Background: Assessment in caregivers' feeding behaviors typically relies on retrospective self-reports, which are limited by recall bias and fails to capture how behaviors changes across context-specific factors. Ecological momentary assessment (EMA) is a novel approach to capture caregivers' feeding behaviors and contextual factors in real-time.

Objectives: This study aims to assess caregivers' complementary feeding behaviors and identify contextual factors (including internal and external factors) that contribute to feeding behaviors using EMA method.

Methods: Children aged 6–23 months and their caregivers in 29 rural townships were recruited. Complementary feeding behaviors and contextual factors were assessed for seven consecutive days via EMA method. The mixed-effects models were used to ascertain the influence of contextual factors on feeding behaviors after adjusting for potential confounders.

Results: A total of 151 children (mean age=13.8 months) and their primary caregivers included in the final analysis. EMA captured 2588 meals occasions of children. The average number of children's food groups intake was 2.6 (five food groups in total) in each occasion. Regarding external factors, 49% of meal occasions, children were walking or running; 8.7% and 20.5% of meal occasions, children were watching TV/phones and playing with toys; 48.5% of meal occasions, children were eating with family members. Regarding internal factors, the mean positive and negative emotional scores of caregivers were 3.44 and 1.45 (range from 1-5), respectively. The results of mixed-effects models indicated that children who were eating on the fixed chair compared to those who were walking or running ($p<0.0001$), children who were eating with family members compared with those who were eating alone ($p=0.006$), and higher positive emotion score of caregivers ($p=0.028$), were all associated with a higher number of food groups consumed during meal.

Conclusions: Contextual factors were associated with caregivers' feeding behaviors. EMA is a novel method, allowing identification of contextual factors associated with feeding behaviors in natural environments.

Key words Ecological momentary assessment; Food parenting practices; Contextual factors; Dietary intake; Children aged 6-23 months

Category: Food & Nutrition

粳米饭在口腔加工中的滋味变化及感知机制研究

Study on taste release and perception mechanism of japonica rice during oral processing

Limuhan_asimi Sai*[1],Xin Ren[2],Min Zhang[2]

1. School of Public Health, Xinjiang Medical University

2. Beijing Advanced Innovation Center for Food Nutrition and Human Health, Beijing Technology and Business University, Beijing 100048, China;

The taste of japonica rice is an important factor directly affecting consumers' preferences. However, japonica rice's taste release and perceptual mechanism in oral processing are unclear. Therefore, we studied japonica rice's taste release and perception during oral processing using high-performance liquid chromatography and molecular docking simulation. The results showed that umami was the prominent taste in the early stage of oral processing. On the other hand, the sweet taste was the prominent taste in the later stage. Furthermore, 16 key taste substances were detected in the oral processing of japonica rice. The partial least squares analysis (PLSR) showed that glucose, sucrose, proline, maltose, and fructose were significantly and positively correlated with the perception of sweetness in japonica rice. Aspartic acid and glutamic acid increased umami perception and attenuated sweetness and sourness perception in japonica rice. Glucose and sucrose bind to the amino acid residues of sweet taste receptors T1R2/T1R3, forming hydrogen bonds and hydrophobic bond forces, increasing the activity of T1R2/T1R3, thereby sensing sweet taste. Aspartic acid and glutamic acid bind to amino acid residues of umami receptors T1R1/T1R3 to form hydrogen bonds and hydrophobic bond forces, resulting in increased activity of T1R1/T1R3 for umami perception.

Key words Japonica rice; Taste, Oral processing, Perception

Category: Food & Nutrition

肠道菌群对于大豆皂苷发挥减轻蛋氨酸和胆碱缺乏(MCD)饮食诱导的非酒精性脂肪性肝炎(NASH)小鼠的脂肪性肝炎的生物活性至关重要

Gut Microbiota Plays Essential Roles in Soyasaponin's Alleviative Bioactivities Against Steatohepatitis in the Methionine and Choline Deficient (MCD) Diet-induced Non-alcoholic Steatohepatitis (NASH) Mice

Chuhong Su*[2],Zhongdaixi Zheng[3],Fei Xiong[1],Longying Zha[1]
1. 南方医科大学公共卫生学院营养与食品卫生学系
2. 南方医科大学公共卫生学院营养与食品卫生学系
3. 南方医科大学公共卫生学院营养与食品卫生学系/环境卫生学系

Objectives: NASH is a wide-spread progressive chronic disease with complex pathogenesis which has been recently shown to be closely related to gut microbiota. This study aimed to investigate the preventive bioactivities of food-derived phytochemicals soyasaponins against NASH and further explore its mechanism by looking at the gut microbiota.

Methods: The MCD diet-fed male C57BL/6 mice were intervened with soyasaponins (40 and 80 μmol/kg BW) or obeticholic acid (0.4 mg/kg body weight, as positive control) for 16 weeks. Pseudo-germ-free mice were generated with an antibiotics cocktail (ampicillin 1 g/L, neomycin 1 g/L, metronidazole 1 g/L, and vancomycin 0.5 g/L) for 2 weeks before the experiment. Hepatic pathology was assessed by hematoxylin-eosin and Masson's trichrome staining. Gut microbiota in feces were determined by 16S rRNA amplicon sequencing. Bile acids in serum, liver, and feces were measured by a ultra performance liquid chromatography-tandem mass spectrometry.

Results: Soyasaponins alleviated steatohepatitis and fibrosis, reduced triglyceride and total cholesterol in liver, and promoted fecal triglyceride excretion. Soyasaponins improved the gut microbial composition by decreasing Firmicutes, Erysipelotrichaceae (Ileibacterium, Faecalibaculum, Allobaculum, Erysipelatoclostridium), unidentified-Clostridiales, Eggerthellaceae, Atopobiaceae, Aerococcus and Rikenella, increasing Proteobacteria, Verrucomicrobia, Akkermansiaceae (Akkermansia), Romboutsia, and Roseburia. Soyasaponins alleviated the intestinal barrier damage as evidenced by improving pathological Chiu's score and up-regulating the expression of ileal tight junction proteins, occludin and zonula occludens-1. Soyasaponins reduced the bile acids accumulation in serum and liver and promoted its fecal excretion. The preventive bioactivities of soyasaponins against NASH were vanished in the pseudo-germ-free mice.

Conclusion: Gut microbiota plays essential roles in soyasaponin's preventive bioactivities against steatohepatitis in the MCD diet-induced NASH mice.

Key words Soyasaponin, non-alcoholic steatohepatitis, gut microbiota, bile acids

Category: Food & Nutrition

低聚木糖经调控 NKG2D 信号通路修复肠道屏障功能障碍改善妊娠期糖尿病小鼠胰岛素抵抗

Xylooligosaccharide Ameliorates Insulin Resistance through Regulating NKG2D Signaling Pathway and Improving Intestinal Barrier Dysfunction in Gestational Diabetes Mellitus (GDM) Mice

Jiexian Wang*[2],Junyi Yang[3],Qing Li[1]
1. 南方医科大学南方医院营养科
2. 南方医科大学公共卫生学院营养与食品卫生学系
3. 南方医科大学南方医院营养科

Objective: Natural killer group 2 member D (NKG2D) signaling pathway is vital for the maintenance of intestinal barrier which contributes to the improvement of insulin resistance. This study aimed to explore whether xylooligosaccharide (XOS), a well-defined prebiotics, improves intestinal barrier dysfunction and insulin resistance through regulating NKG2D signaling pathway in GDM mice.

Methods: Sixty female mice were randomly allotted to 4 groups (n=15): Control, HFD, GDM, and GDM+XOS. The control mice were fed with AIN-93 diet while mice in all other groups fed with 45% high fat diet. GDM mice were established by intraperitoneal injecting with 55 mg/kg streptozocin for 5 days from the first day of pregnancy. Mice in the GDM+XOS group were fed with high fat diet containing 2% XOS following the successful modeling of GDM. On the 18th day of pregnancy, the serum and liver tissues were collected. The relative abundance of Akkermansia muciniphila (Akk) in colonic contents was measured by qPCR. The intestinal tissues was used for Hematoxylin-eosin staining, flow cytometry and protein determination.

Results: XOS significantly reduced ($p<0.05$) fasting blood glucose, fasting insulin, HOMA-IR, impaired glucose tolerance, and increased ($p<0.05$) Akt phosphorylation in the liver. XOS decreased ($p<0.05$) TNFα, IL-1β, IL-15 and LPS in serum. XOS increased ($p<0.05$) the relative abundance of Akk in colon, improved ($p<0.05$) the intestinal mucosal barrier damage, and enhanced ($p<0.05$) the expression of tight junction proteins (Occludin and ZO-1). Furthermore, XOS reduced ($p<0.05$) the recruitment of CD8+T lymphocytes in intestinal epithelial cells and the expression of NKG2D ligand (RAE-1) in the intestinal tissues.

Conclusion: XOS ameliorates insulin resistance through regulating NKG2D signaling pathway and improving intestinal barrier dysfunction in GDM mice. This study provides theoretical basis for the reasonable use of XOS in clinical prevention and treatment of insulin resistance in GDM.

Key words Gestational diabetes mellitus; Xylooligosaccharides; NKG2D; Akkermansia muciniphila

Category: Food & Nutrition

用全基因组关联分析探究与高血压相关的饮食模式的基因-饮食相互作用位点

Genome-wide association study of dietary patterns associated with hypertension reveals gene-diet interaction loci

Shuxiao Shi*,Victor W Zhong,Jingqi Zhou
School of Public Health, Shanghai Jiao Tong University School of Medicine

Aims

While the association between dietary patterns (DPs) and hypertension has been extensively studied, there is still a lack of comprehensive research on the combined effects of genetic disposition and DPs. This study aimed to identify food-based DPs and genetic variants related to hypertension through gene-DP interaction modeling.

Methods

Dietary data were collected using a 24-h online dietary assessment on ≥2 occasions based on the UK Biobank. DPs were derived using quadratically regularized principal component analysis (PCA) regression. This method uses a quadratic penalty term on the matrix factorization that helps to overcome the limitations of traditional PCA and prevents overfitting. A phenome-wide association analysis examined the association between multiple phenotypes and DPs. Multivariable Cox-proportional hazards models assessed the relationship between the first principal component (DP1) and the risk of incident hypertension while adjusting for demographic and lifestyle factors as covariates. Additionally, the whole genome-wide analysis was conducted to investigate the gene-diet interaction effects of the hypertension-related DP on blood pressure using a cohort of up to 98,179 UK Biobank participants.

Results

We identified three DPs. DP1, correlated positively with fiber-rich foods and fruits and inversely with fried food, showed a significant association with hypertension. Hypertension was found to be significantly associated with DP1. After a median follow-up of 6.2 years, DP1 was associated with a lower risk of new onset of hypertension (HR: 0.79; 95% CI: 0.74-0.84).

Sixteen interaction loci with significant interaction effects ($P < 1\times10^{-6}$) were found, including the variant MYH14, UNC13C and VAV3 gene clusters, which exclusively exhibited interaction effects.

Conclusions

This study reveals gene-diet pattern interaction effects in genetic loci, where the effects on blood pressure are modified by hypertension-related DPs, especially those involving fiber-rich foods and fruit intake. These findings highlight the significance of personalized nutrition and its potential impact on health outcomes.

Key words Dietary patterns, Principal component analysis, Gene-Dietary pattern interaction, Hypertension

Category: Food & Nutrition

医学院校大学生营养膳食状况调查与影响因素分析

Investigation on nutritional and dietary status of medical college students and analysis of influencing factors

Qianwen Chen*[1],Yan Meng[1],Jingwen Tong[1],Jingyang Wei[1],Kuo Wang[1],Manman Li[1],Shuang Liang[2]

1. Mudanjiang Medical College

2. The Second Affiliated Hospital of Mudanjiang Medical College

Objective: To understand the nutritional status of medical college students and analyze the influencing factors, so as to provide the basis for promoting the health of medical college students. Methods: A total of 800 undergraduates in Mudanjiang Medical College were selected by multistage cluster random sampling for questionnaire investigation and medical examination. Nutrient intake was evaluated according to Dietary Guidelines for China Residents (2007); Using body mass index to evaluate students' nutritional status; Chi-square test was used for analysis. Results Among the 800 college students, the nutritional status of low weight, normal, overweight and obesity were 11.8%, 74.4%, 10.7% and 3.0%, respectively (P<0.05). The proportion of people whose intake of each nutrient was less than 80% of the recommended intake was 72.73%, 95.16% and 87.30% for boys and 64.72%, 92.42% and 91.34% for girls in protein, fat and carbohydrate respectively. The trace elements of calcium, iron and zinc were 88.15%, 65.23% and 84.68% in boys and 91.61%, 71.43% and 62.82% in girls, respectively. The percentages of vitamin A, B1, B2, PP and C in male students were 82.54%, 85.99%, 84.03%, 63.74% and 88.63%, respectively, while those in female students were 69.86%, 89.46%, 75.15%, 59.42% and 81.43%, respectively. Factors considered in the study included gender ($\chi 2=37.63$,P=0.001), per capita monthly income of the family ($\chi 2=12.61$,P=0.022), average monthly living expenses during school ($\chi 2=5.43$,P=0.026), monthly food expenses during school ($\chi 2=7.23$,P=0.034), exercise duration ($\chi 2=13.25$,P=0.002), and exercise intensity ($\chi 2=6.04$,P=0.021). Conclusion: A certain proportion of students in medical colleges and universities fail to reach the standard of total energy or various nutritional components in food intake. The nutritional status of medical college students was affected by many factors, such as gender, family average monthly income, average monthly living expenses during the school period, the monthly cost of food, the time and intensity of physical exercise.

Key words College students; nutritional and dietary status; food intake

Category: Food & Nutrition

孕前饮食模式与婴儿出生体重:一项前瞻性队列研究

Prepregnancy dietary patterns and infant birth weight: a prospective cohort study

Yiman Zhang*
North China University of Science and Technology

Background: Maternal nutrition can have a profound effect on fetal growth, development, and subsequent infant birth weight. Yet little is known about the influence of prepregnancy dietary patterns.

Objectives: To examine the association between prepregnancy dietary patterns and birth weight.

Methods: This study included 911 singleton live-born infants from the Taicang and Wuqiang mother–child cohort study (TAWS). Participants completed height and weight measurements and a 58-item food dietary frequency questionnaire at early-pregnancy. Newborn birth information was obtained from Wuqiang County Hospital. Macrosomia was defined as ≥4000 g. Large for gestational age (LGA) was defined as birth weight higher than the 90th percentile for the same gender and gestational age. Dietary patterns were extracted by using principal component analysis. Logistic regression models were used to investigate the association between prepregnancy dietary patterns (in tertiles) and macrosomia and LGA, and subgroup analysis was further explored by pre-pregnancy BMI.

Results: Four dietary patterns were identified based on 15 food groups: “cereals-vegetables-fruits”, “vegetables- poultry- aquatic products”, “milk-meat-eggs” and “nuts- aquatic products- snacks”. After adjustments for sociodemographic characteristics, pregnancy complications and the other dietary patterns, greater adherence to the “cereals-vegetables-fruits” pattern before pregnancy was associated with a higher risk of macrosomia (adjusted OR = 2.220, 95% CI: 1.018, 4.843), while greater adherence to the “nuts-aquatic products-snacks” pattern was associated with a lower risk of macrosomia (adjusted OR = 0.357, 95% CI: 0.175,0.725) compared with the lowest tertile. No significant associations were observed between prepregnancy dietary patterns and LGA. However, after subgroup analysis of pre-pregnancy BMI, “cereals-vegetables-fruits” pattern was associated with increased risk of LGA in overweight and obese mothers (adjusted OR = 2.353, 95% CI: 1.010, 5.480).

Conclusion: Unbalanced pre-pregnancy diet increases the risk of macrosomia and LGA, especially for those who are overweight or obese pre-pregnancy.

Key words dietary patterns, pregnancy, macrosomia, LGA , birth weight

Category: Food & Nutrition

脂肪摄入水平影响不同脂肪酸构成对大鼠生长、糖脂代谢、炎症和氧化应激的作用

Fat levels affect the effects of different fatty acid composition on the growth, glucolipid metabolism, inflammation and oxidative stress of rats

Yuhao Zhou*[1],Ligang Yang[1],Chu Chu[1],Shiqi Chen[2],Junhao Yang[1],Guiju Sun[1]

1. Department of Nutrition and Food Hygiene, School of Public Health, Southeast University.

2. Palm Oil Research and Technical Service Institute of Malaysian Palm Oil Board

Background: The effects of various edible oils on human health are influenced by their fatty acid profiles, micronutrients, and the quantity of dietary fats. However, the health effect resulting from different intakes of edible oils with various fatty acid profiles remains unclear.

Objective: This study compared the health effects of olive oil, soybean oil, and blended oil on rats fed normal and high-fat diets.

Methods: 36 male Sprague Dawley rats were randomly divided into six groups (n = 6 per group) and fed with olive oil, soybean oil, and blended oil in diets containing normal or high levels of fat. After 15 weeks, rats were sacrificed to measure glucolipid metabolism, oxidative stress, and inflammation.

Results: Olive oil-fed rats had lower serum triglyceride, low-density lipoprotein cholesterol, malondialdehyde, oxidized LDL-C, and TC than soybean oil-fed and blended oil-fed rats in normal-fat diets. Olive oil increased femur weight in normal-fat and high-fat diets. Soybean oil-fed rats had lower serum ApoA1 and ApoB levels and higher serum HDL-C than blended oil-fed high-fat diet rats. Soybean oil increased serum high-sensitivity C-reactive protein and tumor necrosis factor, decreased serum glutathione peroxidase in normal-fat diets, and increased serum reactive oxygen species in high-fat diets. Blended oil-fed rats had lower serum interleukin-6, higher superoxide dismutase, and lower serum non-esterified fatty acids than olive and soybean oil-fed rats.

Conclusion: The healthy fatty acid profile is characterized by a high content of monounsaturated fatty acids, a low n-6: n-3 polyunsaturated fatty acid ratio and an appropriate unsaturated fatty acid: saturated fatty acid ratio. These effects are weakened in high-fat diets compared with normal-fat diets.

Key words fat intake levels; fatty acid profiles; edible oil; blended edible oil; health effect

Category: Food & Nutrition

桑葚花青素通过缓解小鼠肝脏脂肪变性和调节肠道微生物群以预防肥胖

Mulberry Anthocyanins prevent obesity by alleviating hepatic steatosis and modulating gut microbiota in mice

Jianhui Liu*
Nanjing University of Finance and Economics

As a worldwide epidemic, obesity is usually accompanied by metabolic disorders and chronic low-grade inflammation. Polyphenol-rich nutraceuticals have attracted increasing attention for their prebiotic activity. This research was to study the effects of anthocyanin extracts of mulberry on obesity and gut microbiota. Mice were fed high-fat diets with supplementation of 1% (a low dose) and 2% (a high dose) of anthocyanin-rich mulberry extracts. Results showed that feeding mulberry anthocyanin extracts at both low and high doses significantly decreased the body weight gain, the total adipose tissue weight, and the liver lipids in high-fat diet-induced obese mice, accompanied by a significant reduction in plasma total cholesterol (TC) and tumor necrosis factor α (TNF-α). And the mulberry extracts alleviated hepatic steatosis through decreasing the mRNA expressions of acetyl-CoA carboxylase (ACC), fatty acid synthase (FAS), sterol regulatory element-binding protein-1c gene (SREBP-1c), and increasing that of peroxisome proliferator-activated receptor α (PPARα) and PPARγ. The metagenomic analysis showed that the supplementation of anthocyanin-rich mulberry extracts reduced plasma LPS, mainly mediated by reducing the relative abundance of Rikenella and Rikenellaceae. Supplementation of anthocyanin-rich mulberry extracts into a high-fat diet promoted the growth of Lachnoclostridium, Roseburia, and [Clostridium]_innocuum_group in genus level, leading to a greater production of fecal SCFAs.

Key words Mulberry, Anthocyanin, obesity, microbiota

Category: Food & Nutrition

植物甾醇上调ROS介导的线粒体功能障碍及抑制Akt/mTOR信号通路发挥抑制肺癌作用

Phytosterol exhibits antitumor effects in lung cancer through up-regulation of ROS-mediated mitochondria dysfunction and Akt/mTOR signaling inhibition

qian zhu*[1],Jingjing Wu[2],Mengyuan Gao[1],Jianling Li[1],Han Luo[1],Hongya Liu[1],Jian Ma[1],Yongjia Li[1],ZhongWen Gong[1],Qianyao Chen[1],Xuemei Lian[1]

1. Chongqing Medical University

2. Qiannan Center for Disease Control and Prevention

Objetcive: To determine the efficacy of phytosterol on the development of chemical-induced lung tumors and the underlying mechanism. **Method:** Six-week-old C57BL/6J mice were fed with either a 2% phytosterol diet or matching control diet, respectively. Following 3 weeks diet adapting, lung tumor was induced using a multi-dose intraperitoneal injections of ethyl carbamate (urethane, 1 g/kg body weight) while control mice received saline injection. Tumors (number, diameter) and lung tissue transcriptomic were examined after 15-week incubation period. In vitro, β-sitosterol was used to treat lung adenocarcinoma cells (A549, NCI-H1975) to explore the effect of β-sitosterol on the viability of lung adenocarcinoma cells. **Results:** 2% phytosterol diet inhibited the progression of lung tumor and increased malondialdehyde (MDA) level in lung tissue. Oxidative phosphorylation pathway at transcriptome level was down-regulated and the expression of autophagy related genes was raised in lung tissue. β-sitosterol inhibited cell proliferation of lung adenocarcinoma cells and significantly increased the levels of intracellular reactive oxygen species (ROS) and MDA. Furthermore, phytosterol induced phosphorylation inhibition of Akt/mTOR signaling pathway in vivo and in vitro. **Conclusion:** Phytosterols have potential antitumor effect on lung cancer, and the interactions between ROS excess, Akt/mTOR signaling inhibition and protective autophagy may be involved.

Key words Phytosterol, Lung cancer, Oxidative phosphorylation, ROS, Akt/mTOR signaling

Category: Food & Nutrition

膳食补充 α-亚麻酸对血脂异常患者炎症标志物的影响：一项随机对照试验的系统评价和荟萃分析

Effect of dietary alpha-linolenic acid supplementation on inflammatory biomarkers in individuals with dyslipidemias: A systematic review and meta-analysis of randomized controlled trials

Shiyu Yin*,Guiju Sun
Southeast University

Background and aims: Dyslipidemias are highly prevalent worldwide. Inflammation is associated with dyslipidemia and risk factors for cardiovascular disease (CVD). Alpha-linolenic acid (ALA), a plant-based essential fatty acid, has been associated with reduced CVD risks. This systematic review and meta-analysis aims to investigate the effects of supplementation with ALA on inflammatory biomarker in individuals with dyslipidemias.

Methods: This review included studies with dyslipidemic adults, using oral supplementation or food or combined interventions containing vegetable sources of ALA. All studies were randomized trials with parallel or crossover design. The Cochrane Collaboration's tool was use for assessing risk of bias.

Results: Twelve eligible RCTs, including 540 participants were included in the meta-analysis. Dietary ALA supplementation significantly reduced CRP concentration (SMD = -0.62, 95% CI: -1.11, -0.13, $p < 0.001$), whereas had no significant effect on hs-CRP (SMD = -0.36, 95% CI: -1.26, 0.54, $p = 0.483$), IL-6 (SMD = -0.21, 95% CI: -0.43, 0.02, $p = 0.08$), and TNF-α concentration (SMD = -0.16, 95% CI: -0.48, 0.18, $p = 0.33$). No significant publication bias was observed for all inflammatory markers as suggested by funnel plot and Egger's regression test.

Conclusion: ALA supplementation showed beneficial effect on reducing inflammatory biomarker CRP in individuals with dyslipidemia, but had no effect on IL-6, and TNF-α. Further investigations are needed to determine the effectiveness of difference sources of ALA in dyslipidemias.

Key words alpha-linolenic acid, inflammatory biomarkers

Category: Food & Nutrition

大豆皂苷A1经调控TLR4/MyD88和AMPK信号通路抑制HepG2肝细胞中脂多糖引起的炎症和脂质沉积

Soyasaponin A1 ameliorates lipopolysaccharide-induced inflammation and lipid accumulation by regulating TLR4/MyD88 and AMPK signaling pathways in HepG2 cells

Junbin Chen*[2],Zhongdaixi Zheng[3],Fei Xiong[1],Longying Zha[1]
1. Southern Medical University
2. 南方医科大学公共卫生学院营养与食品卫生学系
3. 南方医科大学公共卫生学院营养与食品卫生学系/环境卫生学系

Objective: Soyasaponin A1 (SS-A1), an oleanane triterpenoids phytochemical extracted from soy, has been found to exhibit anti-inflammatory and lipid-lowing properties, while the molecular mechanisms for these benefits remain incompletely unknown. This study aimed to investigate the effect of SS-A1 on inflammation and lipid accumulation and its underlying mechanisms in the lipopolysaccharide (LPS)-challenged HepG2 cells.

Methods: HepG2 cells were pre-treated with SS-A1 (10, 20, 40 μmol/L) for 2 h followed by 1 μg/mL LPS treatment for 12 h. The cell viability was detected by MTT assay. The concentration of total cholesterol (TC) and triglyceride (TG) were determined after SS-A1 treatment. Filipin staining was used to analyze the free cholesterol in HepG2 cells. Western blot was used to measure the expression of inflammatory cytokines and the molecules in TLR4/MyD88 and AMPK pathways.

Results: SS-A1 significantly decreased ($p<0.05$) the LPS-elevated protein levels of iNOS, IL-6 and TNF-α through suppressing the expression of TLR4, MD-2, MyD88, p-IRAK1 and TRAF6 and phosphorylation of NF-κB p65. SS-A1 also significantly inhibited ($p<0.05$) the recruitments of TLR4 and MyD88 into lipid rafts. SS-A1 reduced ($p<0.05$) the LPS-increased content of free cholesterol, TC and TG. Moreover, SS-A1 effectively reversed ($p<0.05$) the LPS-induced phosphorylation of AMPKα and protein expression of SREBP-1c, FAS, ACC, CPT1A, SREBP-2, HMGCR, ABCA1 and LDLR.

Conclusion: SS-A1 attenuates inflammation by suppressing the activation of TLR4 pathway and reduce the hepatocytic lipid accumulation by regulating the AMPK pathway in the LPS-challenged HepG2 cells. This study provides novel understanding about the anti-inflammatory and lipid-lowing mechanism of soyasaponin in hepatocytes.

Key words Soyasaponin, inflammation, lipid accumulation, TLR4/MyD88, AMPK

Category: Food & Nutrition

磷脂或三酰甘油形式的 n-3 多不饱和脂肪酸通过介导大麻素受体 1/脂联素/神经酰胺途径减轻非酒精性脂肪肝

n-3 polyunsaturated fatty acids in phospholipid or triacylglycerol form attenuate nonalcoholic fatty liver disease via mediating cannabinoid receptor 1/adiponectin/ceramide pathway

Yanfang Chen*
Qingdao University

Objective: Supplements of n-3 polyunsaturated fatty acids (PUFA) occur in either phospholipid or triacylglycerol form. The present study aimed to compare whether the different n-3 PUFA of marine-origin, namely krill oil, DHA/EPA-phospholipid (PL), and EPA/DHA-triacylglycerol (TAG) forms had differential health effects to ameliorate nonalcoholic fatty liver disease (NAFLD).

Design: The NAFLD model was established in mice fed a high-fat and high-cholesterol diet (HFD). The mice showed evidence of weight gain, dyslipidemia, insulin resistance and hepatic steatosis after 9 weeks of HFD, while the three forms of the n-3 PUFA reduced hepatic TAG accumulation, fatty liver and improved insulin instance, and hepatic biomarkers after 9 weeks of intervention.

Results: Of these, krill oil intervention conspicuously improved adipocyte hypertrophy and hepatic steatosis in comparison with DHA/EPA-PL and EPA/DHA-TAG groups. Importantly, only krill oil intervention significantly reduced serum low density lipoprotein-cholesterol, alanine transaminase and aspartate transaminase concentrations, compared with the HFD group. Supplemental n-3 PUFA decreased high levels of circulating anandamide (AEA) and 2-arachidonoylglycerol (2-AG), compared with NAFLD model group, thereby inhibiting CB1 activation and promoting adiponectin release in adipocyte. Besides, targeted lipidomic analyses indicated that the increased adiponectin levels were accompanied by reductions in hepatic ceramide levels. The reduced ceramide levels were associated with inhibiting lipid synthesis and increasing fatty acid β-oxidation, finally inhibiting TAG accumulation in the liver.

Conclusions: Through mediating CB1/adiponectin/ceramide pathway, the present study suggested that administration of krill oil had superior health effects in the treatment of NAFLD in comparison with DHA/EPA-PL and EPA/DHA-TAG.

Key words n-3 polyunsaturated fatty acids; Endocannabinoid system; Adiponectin; Ceramides; Non-alcoholic fatty liver

Category: Food & Nutrition

大豆蛋白较乳清蛋白改善了高脂饮食喂养小鼠胰岛素抵抗：通过调节脂质代谢、AMPK/mTOR 通路和肠道菌群

Soy protein compared with whey protein ameliorates insulin resistance by regulating lipid metabolism, AMPK/mTOR pathway and gut microbiota in high-fat diet-fed mice

Andong Ji*[1,2],Wei Chen[6],Chang Liu[3],Tianyu Zhang[1,2],Runjia Shi[1,2],Xinqi Wang[1,2],Huina Xu[1,2],Duo Li[1,2,4,5]

1. School of Public Health, Qingdao University
2. Institute of Nutrition and Health, Qingdao University
3. Chengyang District Center for Disease Control and Prevention, Qingdao
4. Department of Food Science and Nutrition, Zhejiang University
5. Department of Nutrition, Dietetics and Food, Monash University
6. Department of Clinical Nutrition, Chinese Academy of Medical Sciences-Peking Union Medical College, Peking Union Medical College Hospital, Beijing

The findings of soy protein *versus* whey protein supplementation on glycemic regulation are inconsistent. The aim of the present study was to investigate the preventive effect of soy protein isolate (SPI) and whey protein isolate (WPI) on a high-fat diet (HFD) induced insulin resistance and its potential molecular mechanisms. Male C57BL/6J mice were randomly divided into seven groups (n = 12 per group): normal control, HFD plus 10% SPI, HFD plus 20% SPI, HFD plus 30% SPI, HFD plus 10% WPI, HFD plus 20% WPI, and HFD plus 30% WPI. After 12 weeks of feeding, compared with the WPI groups, serum concentration of insulin, homeostasis model assessment of insulin resistance (HOMA-IR) and liver weight were significantly lower in the SPI groups. Compared with the WPI groups, the mRNA levels of *CD36*, *SLC27A1*, *PPARγ* and *AMPKα* were significantly higher, and those of *LPL*, *SREBP1c*, *FASN* and *ACC1* were significantly lower in the liver in the SPI groups. In the liver or gastrocnemius muscle, compared with the WPI groups, the mRNA levels of *GLUT4*, *IRS-1*, *PI3K* and *AKT* were significantly higher, and those of *mTOR* and *S6K1* were significantly lower, and the protein levels of GLUT4, p-AMPKα/AMPKα, p-PI3K/PI3K and p-AKT/AKT were significantly higher, and those of p-IRS-1/IRS-1, p-mTOR/mTOR and p-S6K1/S6K1 were significantly lower in the SPI groups. The Chao1 and ACE indices were higher, and the relative abundance of *Staphylococcus* and *Weissella* was lower in the SPI groups than those in the WPI groups. In conclusion, soy protein was more effective than whey protein in preventing IR in HFD-fed mice by regulating lipid metabolism, the AMPK/mTOR pathway, and gut microbiota.

Key words whey protein, soy protein, insulin resistance, lipid metabolism, AMPK, mTOR, gut microbiota

Category: Food & Nutrition

川菜系中国心脏健康膳食对高血压成年人降压效果的随机对照研究

Effects of Chinese heart-healthy diet (Sichuan cuisine) on lowering blood pressure in adults with hypertension: a randomized controlled feeding trial

Hong Chen*,Yishan Guo,Danping Su,Shiyu Zhang,Yanxi Ding,Qiuyu Feng,Mengtong Yang,Sijia Chen,Cong Chen,Wenya Yin,Ming Li,Guo Zeng
Department of Nutrition and Food Safety, West China School of Public Health and West China Fourth Hospital, Sichuan University, Chengdu, Sichuan, China

Background and Objectives: Sichuan cuisine is one of four major Chinese Cuisines which is popular, but it is characterized by high salt and oil which may adverse to blood pressure. The effects of modified Sichuan Cuisine on blood pressure (BP) have not been reported. We aim to evaluate the effects Chinese heart-healthy diet of Sichuan cuisine version (CHH-SC) on BP among hypertension adults.

Methods and Study Design: The CHH trial was a multicenter randomized controlled feeding trial among Chinese people with high BP. We conducted a secondary analysis of the CHH trial using the data from Sichuan Chengdu center, the southwest of China. Totally 53 people aged 25 to 75 with systolic blood pressure (SBP) between 130 to 159 mm Hg was recruited. Eligible participants accepted a 1-week run-in period with local usual diet and randomized 1:1 to consume CHH-SC diet (n=27) or local usual diet (n=26) for next 4 weeks. BP was measured weekly throughout the study. The primary outcome is the net change of SBP between groups and secondary outcomes include diastolic blood pressure (DBP), mean arterial pressure (MAP). Generalized estimating equations were used to estimate the intervention effects.

Results: The mean SBP, DBP and MAP all significant reduced after the intervention in both groups. Compared with control group, the SBP significant reduced 7.87, 8.80, 9.10, 10.95 mm Hg at the end of week 1 to 4 respectively in CHH-SC group ($P<0.05$); the DBP significant reduced 4.00 mm Hg at week 2 ($P=0.003$) and 3.52 mm Hg at week 4 ($P=0.008$); the MAP were 3.77, 5.60, 4.24, 6.00 mm Hg lower at the end of week 1 to 4 ($P<0.05$).

Conclusions: Adopting Chinese heart-healthy diet of Sichuan cuisine version for 4 weeks can reduce blood pressure in adults with hypertension.

Key words Chinese heart-healthy diet, Sichuan cuisine, blood pressure, hypertension, adults.

Category: Food & Nutrition

川菜系中国心脏健康膳食对10年心血管疾病风险和血管年龄影响的随机对照研究

Effects of the Chinese heart-healthy diet (Sichuan cuisine) on the 10-year cardiovascular disease risk and vascular age: a randomized controlled feeding trial

Danping Su*,Qiuyu Feng,Mengtong Yang,Yishan Guo,Hong Chen,Cong Chen,Sijia Chen,Shiyu Zhang,Yanxi Ding,Ming Li,Wenya Yin,Guo Zeng
Department of Nutrition and Food Safety, West China School of Public Health and West China Fourth Hospital, Sichuan University, Chengdu, Sichuan, China

Background and Objectives: The Chinese heart-healthy diet (CHH diet) effectively reduced blood pressure but its effects on the estimated risk of cardiovascular disease (CVD) are not fully explored among the residents who are used to Sichuan cuisine. We aimed to estimate the effects of the CHH diet-Sichuan cuisine version (CHH diet-SC) on the 10-year risk of general CVD and vascular age among local patients with mild hypertension.

Methods and Study Design: A multicenter single-blinded randomized controlled feeding trial was conducted to assess the effect of the cuisine-based CHH diet on blood pressure and cardiovascular health among adults with mild hypertension. Data of 53 participants (27 in the CHH diet-SC and 26 in the control diet) from local communities in Chengdu, the southwestern region of China, were analyzed in the manners of per-protocol and full analysis set. The sex-specific General Cardiovascular Risk Profile (GCVD) model was applied to estimate the 10-year CVD risk and calculate the vascular age.

Results: The mean absolute and relative estimated CVD risks were reduced by 4.5% and 27.9% respectively in the CHH diet-SC group, and 1.6% and 8.4% in the control group, with the corresponding between-group relative risk reduction of 19.5% (P<0.001). The sensitivity analysis with the intention-to-treat principle did not alter the results. The intraclass correlation coefficient between GCVD and Globorisk models was estimated to be 0.860 (95% CI, 0.770 to 0.916) in men and 0.637 (95% CI, 0.428 to 0.782) in women confirming the robustness. In addition, the between-group difference in the changes of vascular age was -4.4 years (95% CI, -7.4 to -1.5; P=0.004) during the intervention.

Conclusions: Compared with a typical local diet, adopting the CHH diet-SC over one month significantly reduced the estimated 10-year CVD risk and the vascular age among Sichuan local Chinese adults with mild hypertension.

Key words cardiovascular disease; cuisine culture; CHH diet-Sichuan cuisine (CHH diet-SC); healthy diet; vascular age

Category: Food & Nutrition

岩藻多糖对洛哌丁胺所致功能性消化不良小鼠的胃肠调节作用

Regulatory Effects of Fucoidan on Functional Dyspepsia Mice Induced by Loperamide

Tianxu Liu*,Ling Wang
College of Food Science and Technology of Huazhong Agricultural University

Background and Objectives: Gastrointestinal dysmotility is a common cause of functional dyspepsia. Fucoidan possesses many physiological properties, however, its relative abilities in regulating gastrointestinal motility have not been illustrated yet. In this study, we aimed to investigate the regulatory effects of fucoidan on functional dyspepsia mice induced by loperamide.

Methods and Study Design: 18-20g BALB/c mice were used to establish the model of gastric dysmotility. We chose loperamide subcutaneous injection for seven days to induce representative symptoms of gastrointestinal hypomotility. During this period, the treatment groups were intervened with oral administration of fucoidan. Meanwhile, we employed mosapride as a positive control in our study.

Results: As a result, fucoidan could reverse this dysfunction mainly through regulating gastrointestinal hormones (motilin and ghrelin), cholinergic pathway, total bile acids level, c-kit protein expression, and gastric contraction-related gene expression (ANO1 and RYR3). Besides, the administration of fucoidan partially recovered the gut microbial imbalance induced by loperamide, it not only increased the diversity of gut microbial profile, but also modulated the abundance of gut microorganisms including the raised richness ofLachnospiraceae, Odoribacter, Oscillibacter, etc and decreased proportion of Streptococcus, etc.

Conclusion: We provided evidence to support that fucoidan might have potential abilities to regulate gastrointestinal motility and maintain the stability of gastrointestinal microecology. It’s of great significance for further exploration and utilization of marine plant-derived bioactive substances.

Key words Functional dyspepsia; Fucoidan; Gastric motility; Gastric homeostasis; Gut microbiota.

Category: Food & Nutrition

基于传统中药的功能化抗菌纳米材料的制备、应用及抗菌机理研究

Preparation, application and antibacterial mechanism of functionalized antibacterial nanomaterials based on traditional Chinese medicine

Qian Li*[1],Liqun Wang[2],Wenshan Yan[1],Gulimire Aosiman[1],Xiaoru Shi[1],Yuxin He[1]
1. Lanzhou University
2. Lanzhou University Sencond Hospital

The microorganisms caused infectious diseases that account for nearly one third of annual global mortalities. Chemical drugs and antimicrobial agents are the primary clinical treatment methods for bacteria diseases. However, it's showed that many chemical drugs have specific biological toxicity and disrupt normal tissue cells, especially for children. In addition, many pathogens have evolved and resulted in the condition of Antimicrobial resistant (AMR). WHO has declared that AMR is one of the top 10 global public health threats facing humanity. Especially alarming is the rapid global spread of multi- and pan-resistant bacteria (also known as "superbugs") that cause infections that are not treatable with existing antimicrobial medicines. New antibacterials are urgently needed.

In this work, the traditional Chinese Medicine licorice and its boiled residue were used as the precursor to synthesize the extract hydrogel and the carbon dots (CDs) by "one-step method". After characterization, it's suggested that the licorice residue extract hydrogel had shown obvious antibacterial activity for both Grams positive and negative bacteria. Furthermore, the antibacterial activity of the N-doped and multifunctional quaternized CDs, which were produced from licorice, were investigated. The unmodified licorice and coffee residue CDs was prepared as the control group which was also from the natural sources. It's showed that the quaternized licorice CDs have stronger antibacterial activity for both Grams positive and negative bacteria when the coffee residue CDs can only resist to the Grams positive one. However, the N-doped and unmodified licorice CDs showed less antibacterial activity than the coffee residue CDs.

The further research is investigating their antibacterial activity in vitro and study its cytotoxicity and damage to organisms. It's hoping that these functional carbon dots can provide new ideas and strategies for solving antibacterial resistance and development of antibacterial drugs, so as to provide new options for strive against AMR.

Key words licorice, traditional Chinese medicine, nanomaterials, antimicrobial resistance, antibacterial mechanism

Category: Food & Nutrition

酪蛋白发酵水解产物经消化和吸收后的抗氧化性体外研究

The Antioxidant Potential of the Fermented Casein Hydrolysates after Digestion and Absorption in Vitro

Ruirui Li*[1],Lu Li[1],Lvning Zhang[1],Shufang Shan[2],Xiaoyu Wang[2],Yujie Xu[2],Guo Cheng[2]

1. West China School of Public Health, Sichuan University

2. Laboratory of Molecular Translational Medicine, Center for Translational Medicine, Key Laboratory of Birth Defects and Related Diseases of Women and Children (Sichuan University), Ministry of Education, West China Second University Hospital, Sichuan University, Chengdu, Sichuan, China.

Background and Objectives: Fermentation can facilitate the release of antioxidant peptides, whereas, it is unclear whether peptides from fermented milk can actually arrive at target organs and be able to contribute to the antioxidant capacity of fermented milk. Thus, this study was to evaluate the antioxidant efficacy of casein hydrolysates fermented by typical zymophytes by simulating each process of food intake.

Methods: Standard strains of Streptococcus thermophilus, Lactobacillus delbrueckii subsp., Bifidobacterium longum (1×10^8 colony-forming units/ml) were suspended in sterile 2.5% casein solution and incubated at 37℃ for 24 h. Subsequently, supernatants of fermentation broth after centrifugation were digested in vitro according to the standardized protocol INFOGEST 2.0. Caco-2 cell monolayer model was used to mimic enzymolysis and absorption in the gastrointestinal tract. Peptide concentration and degree of hydrolysis were quantified by biuret method and phthalic aldehyde method; the fractions permeated Caco-2 barrier were characterized by Coomassie brilliant blue staining and reverse phase high performance liquid chromagraphy. The antioxidant activity was evaluated by 2,2-Diphenyl-1-picrylhydrazyl free radical scavenging assay and hydroxyl radical scavenging assay.

Results: Peptide concentrations and degrees of hydrolysis after fermentation were 0.59~2.48 mg/ml and 10.77~21.32%, respectively, the hydrolysis efficiency of Bifidobacterium longum was the highest. Casein was thoroughly hydrolyzed after simulating digestion with similar peptide concentrations (3.64~3.82 mg/ml). Peptides indeed were transported to the basolateral side of Caco-2 cell monolayer. Fermented casein hydrolysates and the fractions permeated Caco-2 barrier demonstrated the hydroxyl radical scavenging capacity. Hydroxyl radical scavenging rates of the fractions permeated Caco-2 barrier were different among groups ($P<0.05$) and higher in fermented groups (Streptococcus thermophilus: 3.96±1.68%; Lactobacillus delbrueckii subsp.: 5.17±1.76%, Bifidobacterium longum: 5.09±3.29%) than unfermented control (-1.17±5.94%).

Conclusions: Fermentation improved the release of bioactive peptides, and the fractions of fermented casein hydrolysates that entering the bloodstream exhibited antioxidant potential.

Key words casein, fermentation, INFOGEST 2.0, Caco-2, antioxidant

Category: Food & Nutrition

探索中国传统饮食及其与健康状况的关系—— 一项系统综述

Exploring the Traditional Chinese Diet and Its Association With Health Status - A Systematic Review

Jizhao Niu*[1],Bai Li[1],Qing Zhang[2],Ge Chen[3],Angeliki Papadaki[1]
1. Centre for Exercise, Nutrition, and Health Science, University of Bristol
2. Nutrition and Behaviour Unit, University of Bristol
3. Oral and Dental Science, University of Bristol

Background & objectives: Traditional dietary patterns can potentially reduce the increasing prevalence of non-communicable diseases. To our knowledge, there is no consistent definition of the traditional Chinese diet. The aim of this systematic review was to systematically evaluate definitions in the literature, provide a concise definition of the traditional Chinese diet and assess the diet's association with health outcomes.

Methods and study design: This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Fourteen databases were searched up to April 25th, 2022; screening, data extraction and risk of bias assessment were conducted independently by three reviewers. The narrative synthesis was applied in reporting the results.

Results: Ninety-nine studies were included, 54 of which assessed associations with health outcomes. All studies reported the food groups, and 35 reported food items characterising the traditional diet. Food groups consistently reported in at least 75% of studies were rice and leafy vegetables; the most frequent food items were white rice, spinach, bokchoy, and cabbage. Studies referring exclusively to southern China (n=19) reported fish and seafood, while studies referring exclusively to northern China (n=12) consistently mentioned wheat and wheat products, as well as wheat with a filling as characteristic of these diets. The traditional Chinese diet was associated with a lower risk of obesity, was inversely associated with weight gain, and weakly associated with reduced risk of diabetes. The associations with other non-communicable diseases were not consistent. These inconsistent findings might be due to the different definitions of the traditional diet used in these studies.

Conclusions: This study was the first to systematically evaluate the definition of the traditional Chinese diet and its association with health outcomes. More studies are needed to establish the quantities of foods in the traditional diet and its potential role in preventing non-communicable diseases in China.

Key words Chinese diet, definition, non-communicable diseases, systematic review, traditional diets

Category: Food & Nutrition

铁皮石斛合剂可调节 HFHS/STZ 诱导的 2 型糖尿病小鼠糖脂代谢并恢复其肠道菌群

Dendrobium officinale mixture regulates glycolipid metabolism and restores gut microbiota in HFHS/STZ-induced mice with type 2 diabetes mellitus

Ziqi Zhao*,Zengli Wang,Xiaohui Guo
China Agricultural University

Objective: Dendrobium officinale mixture contains polysaccharides, saponins and other bioactive ingredients and consists of Dendrobium officinale, Astragalus membranaceus, Radix pseudostellariae and Lycium barbarum. In this study, the effect of Dendrobium officinale mixture on mice with type 2 diabetes mellitus (T2DM) induced by a high-fat, high-sugar diet (HFHS) in combination with streptozotocin (STZ) was investigated.

Methods: A high-fat, high-sugar diet combined with STZ was used to induce T2DM in mice. The Dendrobium officinale mixture was administered at doses of 3.4, 6.8, and 13.6 g/kg/d for 12 weeks, metformin (200 mg/kg) served as a positive control, and high-fat diet served as a negative control. Feed intake, body weight, serum and tissue indices were measured, and gut microbiota was assessed by 16S rRNA high-throughput sequencing both at baseline and at the end of dosing.

Results: The results showed that the oral mixture at medium and high doses decreased fasting blood glucose, blood lipids, and serum glycosylated protein levels while improving glucose tolerance, HOMA-IR, and the proportion of pancreatic β-cells in T2DM mice. Meanwhile, the state of oxidative stress in the liver was improved significantly, while liver glycogen levels increased. Moreover, the oral mixture alleviated dysbiosis of the gut microbiota in T2DM mice by increasing the species richness, community diversity, and abundance of probiotics, particularly Akkermansia.

Conclusion: The mixture of Dendrobium officinale at medium and high doses showed hypoglycemic effect by regulating disorders of glycolipid metabolism in mice with T2DM, ameliorating the imbalance of gut microbiota, and increasing the abundance of Akkermansia.

Key words Dendrobium officinale mixture; Type 2 diabetes mellitus; hypoglycemic effect; gut microbiota

Category: Food & Nutrition

中国四类含糖预包装食品糖含量分析

Analysis and evaluation of sugar content in four categories of pre-packaged foods in China

HAIJUN GUO*[1],YUAN LI[2],CHUNLEI GUO[3],FEIFEI HUANG[4],HUIJUN WANG[4],PUHONG ZHANG[2]

1. George Institute for Global Health, China
2. George Institute for Global Health, China
3. 中国学生营养与健康促进会
4. 中国疾病预防控制中心营养与健康所

Abstract: Objective To analyse the sugar content of four categories of pre-packaged foods, including dairy products, confectionary, bakery products and non-alcoholic beverages, so as to provide suggestions on healthy snack choice.

Methods: The dataset subtracted from FoodSwitch (2017 to 2020) was used to evaluate sugar content at low (green), medium (yellow), and high (red) levels according to the UK's traffic light standards. Sugar content of each food and the percentage of nutrition reference value per serving were also presented.

Results: There were 4872 pre-packaged foods analysed, with a median of 9.5 g/100g sugar in total. Confectionary contained sugar 43.0g/100g, while bakery products contained sugar 16.1g/100g in average. 68.2% of confectionary was evaluated at red light level, and 23.1% of non-alcohol beverage at same level. Bakery products had highest green level (30.3%). Among the subgroups of food, ice cream (82.7%) and candy (71.6%) were at the highest red level of traffic lights. One portion of non-alcoholic beverages contained the highest sugar (18.0 g), accounting for 36.0% of nutrition reference value.

Conclusions: There are significant differences in sugar content among the four categories of pre-packaged foods, and percentage of confectionary with red light is the highest, while non-alcoholic beverages contain the highest sugar per serving. Scientific guidance is needed for selecting pre-packaged foods wisely to control high sugar consumption and related health risks.

Key words Sugar; Pre-packaged food; Evaluation

Category: Food & Nutrition

石斛多糖可预防高脂饮食诱导的肥胖小鼠的骨量减少

Dendrobium officinale polysaccharide prevents bone loss in high-fat diet-induced obese mice

Xiangyuan Meng*[1,2,3],Xinpeng Liu[1],Yujie Wang[1],Dan Liu[1],Qi Xu[1],Tianlin Gao[2,3]

1. School of Public Health, Jilin University
2. Institute of Nutrition and Health, Qingdao University
3. School of Public Health, Qingdao University

Background and Objective:

Obesity triggers persistent inflammation throughout the body, which ultimately results in a reduction in bone mass. Phytochemicals are potential interventions to prevent the loss of bone mass caused by obesity. Our preliminary research indicates that dendrobium officinale polysaccharide (DOP), a phytochemical from *dendrobium officinale*, can reduce body weight in obese mice and ameliorate inflammation. However, it is still unclear whether DOP can mitigate bone loss in obese mice.

Methods and Study Design:

Forty male C57BL/6J mice were randomly divided into four groups (n=10 per group): Control group (CON), High-fat diet group (HFD), lovastatin group (LOV, 5 mg/kg/day), and DOP group (200 mg/kg/day). The experiment lasted for 8 weeks, during which micro-CT was used to assess the 3D structure of the femurs and calculate the microstructural parameters, and a three-point bending test was conducted to evaluate the femurs' biomechanical properties. The levels of biomarkers related to inflammation, bone resorption, bone formation, and bone mineralization in both serum and femurs were measured using Elisa and Western Blot analysis.

Results:

After establishing the obesity model, the levels of serum TNF-α and IL-6 in the HFD group were significantly higher than those in the CON group, and impaired trabecula bone microstructure was observed. Mice in the DOP group had reduced serum IL-6 and TNF-α levels and significantly higher femoral bone mineral density and trabecular bone volume fraction compared to the HFD group. The elasticity modulus in the DOP group was significantly higher than in the HFD group. Moreover, the serum level of TRACP and PTH and the protein level ratio of OPG/RANKL in the femurs of the DOP group were significantly higher than those in the HFD group.

Conclusion:

DOP ameliorated obesity-induced inflammation, reduced bone resorption in obese mice, significantly increased the OPG/RANKL ratio, promoted osteogenesis, and effectively prevented bone loss in high-fat diet-induced obese mice.

Key words Obesity, Inflammation, Bone mass, Dendrobium officinale polysaccharide

Category: Food & Nutrition

罗汉果的药理活性和营养成分：中国药食同源植物的代表

Nutritional ingredient and Pharmacological activity of Longan (Dimocarpus longan Lour.): a representative of "edible and medicinal plants" in China.

Qi Yang*
Guangxi University of Triditional Chinese Medicine

Longan(Dimocarpus longan Lour.) is considered the fruit of a plant with medicinal health functions and edible functions as food in China. The kinds of "edible and medicinal plants" were announced by the former Ministry of Health in China in 2002. Longan(Dimocarpus longan Lour.) tastes sweet, and it is rich in nutrition, rich in vitamin C, vitamin B group, calcium, magnesium, iron vitamins, and minerals beneficial to the human body, has a clear pharmacological activity on the same time, it contains polysaccharides, lipids, polyphenols, flavonoids have chemical components such as anti-stress, anti-aging, anti-anxiety, immune regulation, etc. This paper summarizes the evidence of pharmacological activity and food nutrition evidence of longan as a home variety of medicine and food, presenting challenges and prospects, and providing a basis for future development of related products.

Key words Longan; edible and medicinal plants; nutrition; pharmacological

Category: Food & Nutrition

人类母乳来源的外囊泡通过调控 AMPK/Akt/mTOR/P70s6K 信号通路，增强幼年小鼠的肌肉生长和运动表现。

Human Breast Milk Extracellular Vesicles Enhance Muscle Growth and Physical Performance of Immature Mice Associating with AMPK/Akt/mTOR/P70s6K Signaling Pathway

Zitong Meng*,Wei Yang
Huazhong University of Science and Technology

Aim: Extracellular vesicles (EVs) play an important role in the composition of both human and bovine milk. It also exerts various functions in different tissues according to excellent published studies. However, the regulatory mechanism of milk-derived EVs on skeletal muscle growth and\or performance have yet to be fully explored.

Methods: To address this issue, we used grip strength analysis, rotarod performance testing, Jenner-Giemsa and HE staining and Western blotting to investigate the effects of human milk extracellular vesicles (HME) and bovine milk extracellular vesicles (BME) on the related growth markers of 4-week mouse skeletal muscle and in C2C12 cells, as well as the effects on exercise performance.

Results: Our findings demonstrated that both HME and BME significantly increase the diameter of C2C12 myotubes. Additionally, HME demonstrates higher exercise performance and muscle fiber morphology than BME. Furthermore, we quantified and analyzed the amino acid spectra of HME and BME and the mouse quadriceps muscles after intervention by targeted metabolomics. After KEGG and correlation analyses for biological function of HME and BME, results showed L-ornithine to be a key molecular target for HME or BME to affect mouse skeletal muscle function, as it demonstrates a significant positive correlation with the activation of the AKT/mTOR pathway and myogenic regulatory factors (MRFs).

Conclusion: Overall, our results provide valuable insight into the amino acid composition of HME and BME and their effects on skeletal muscle growth and performance.

Key words HME; BME; amino acid; muscle protein synthesis

Category: Food & Nutrition

L-阿拉伯糖复配糖对小鼠血糖的影响

Study on the Effect of L-arabinose Compound Sugar on Blood Glucose in Mice

Xin Chen*,Chen Wang,Liming Wang,Shuna Zhao,Yun Zhao,Mengtao Liu,Qingjia Meng
COFCO NUTRITION AND HEALTH RESEARCH INSTITUTE

Abstract: Objective: To provide a theoretical basis for L-arabinose-sugar mixtures as low glycemic index foods, the effects of the mixtures on the blood glucose levels in C57BL/6N mice were investigated in this article. Method: Using pure glucose as the reference and metformin as the positive control respectively, L-arabinose-sugar mixtures were given to the Mice by gavage. The blood glucose of mice was measured at 0 min, 15 min, 30 min, 60 min, and 120 min after dosage. The effects on the blood glucose level in mice for all the tested substances were evaluated with the increased area under the curve (IAUC), blood glucose peak, and glycemic index (GI). Result: Compared with glucose group, white sugar or brown sugar mixing with L-arabinose can both significantly reduce the IAUC($P<0.05$) and blood glucose peak （$P<0.05$）. With the same content of available carbohydrate in white sugar, brown sugar contains significantly higher amount ($P<0.05$) of fat, protein, water, ash, potassium, magnesium, zinc, chromium, phosphorus, iodine, total polyphenols and total flavonoids. By adding the same percent of L-arabinose, the GI of white sugar mixtures in C57BL/6N mice is 52, and the GI of brown sugar mixtures in C57BL/6N mice is 42. Conclusion: The results showed that white sugar or brown sugar mixing with L-arabinose could effectively reduce the fluctuations in blood glucose levels. Through the component analysis study, it revealed that chromium, zinc, magnesium, phosphorus, iodine, polyphenols and flavonoids in brown sugar might attenuate blood glucose levels.

Key words L-arabinose; sugar mixtures; blood glucose; glycemic index

Category: Food & Nutrition

高植物甾醇玉米油改善高脂血症金黄地鼠的胆固醇代谢

Corn oil containing high phytosterol improves cholesterol metabolism in golden hamsters with hyperlipidemia

Xin Chen*[2],Liming Wang[2],Jie Xiao[1],Xinghe Niu[1],Xiangyu Wang[1],Jiayi Shang[1],Dongzhe Sun[1],Jian Ying[1]

1. COFCO NUTRITION AND HEALTH RESEARCH INSTITUTE
2. COFCO NUTRITION AND HEALTH RESEARCH INSTITUTE

Abstract Previous evidence showed that phytosterol provided health benefits on improving cholesterol metabolism. Phytosterol extensively existed in vegetable oils, nuts, vegetables and fruits. This study aims to explore whether corn oil rich in phytosterol could regulate cholesterol metabolism. Mechanism of actions were further explored. Golden hamsters were fed with a high-fat and high-cholesterol diet to establish a hyperlipidemia model. Corn oil containing 17 000 mg/kg phytosterol was administrated, using olive oil as control. Weight gains, blood lipid levels, organ index and intestinal microbiota of gold hamsters were monitored. Results showed that after 10 weeks of corn oil intervention, the golden hamsters' weight gain was decreased by 40.9% and serum total cholesterol and low-density lipoprotein cholesterol were decreased by 19.1% and 45.5% respectively; liver total cholesterol and arteriosclerosis index were reduced by 8.5% and 29.4% respectively. However, serum total triglycerides were not changed after the intervention. Gut microbiota was regulated. The ratio of Firmicutes/Bacteroidetes was reduced, while the abundance of Desulfovibriowas decreased. Thus, high phytosterol corn oil could reduce weight gain, serum total cholesterol and the arteriosclerosis index by inhibiting the absorption of cholesterol and regulating gut microbiota. High phytosterol corn oil showed advantages than olive oil in reducing weight gain, blood total cholesterol, low-density lipoprotein cholesterol, arteriosclerosis index and improving intestinal microbiota.

Key words phytosterol; cholesterol; arteriosclerosis; cardiovascular and cerebrovascular diseases; gut microbiota

Category: Food & Nutrition

水果营养质量综合指数评价方法的建立与应用

Development and application of evaluation method with composite nutrient quality index for fruits

Zhiheng Zhang*[1],Wenlan Hu[2],Hui Li[1]

1. Institute of Agro-Products Safety and Nutrition, Zhejiang Academy of Agricultural Sciences, China
2. Gongshu District Center for Disease Control and Prevention, Hangzhou City, Zhejiang Province, China

To provide an applicable method for comprehensive evaluation of fruit nutrient quality, 14 key nutritional indicators were selected by comparing and analyzing Chinese intake of dietary nutrients and the satisfaction degree of their needs. Among which vitamin A, vitamin B_1, vitamin B_2, vitamin C, vitamin E, calcium and selenium were significantly inadequate nutrients, protein, niacin, potassium, magnesium and zinc were inadequate nutrients, and fat and sodium were excessive nutrients. Combined with the corresponding nutrient content levels of various fruits, the fiducial values of key nutrients content were calculated. The nutrient quality index of key nutrients for fruit products was obtained by comparing the contents of key nutrients with the corresponding fiducial values. According to the deficiency and excessiveness degree of Chinese dietary intake of various key nutrients, the weight of the nutrients was determined and composite nutrient quality index for fruit (CNQIF) model was established. According to the distribution of CNQIF for representative fruits, the grading standards were established. The comprehensive evaluation results of nutritional quality of 48 representative fruits by using CNQIF model showed that 1 fruit of 5A grade, 2 fruits of 4A grade, 1 fruit of 3A grade, 5 fruits of 2A grade, 9 fruits of A grade, 12 fruits of B grade and 18 fruits of C grade. CNQIF and grading standards can reflect the nutritional quality of fruits comprehensively, and can be used for nutritional quality comprehensive evaluation and comparison of fruits (such as different kinds, varieties, strains and sources), setting nutrient quality standards of fruit products and guiding consumption (especially suitable for Chinese consumers), etc.

Key words fruit; nutrient quality; composite index; evaluation method; grading

Category: Food & Nutrition

视觉模拟量表在食物饱腹感评估中的可重复性，有效性和可靠性研究

Reproducibility, validity, and reliability of visual analogue scales in assessment of satiety

Qier MU*[1],Yadi ZHANG[3],Cheng LI[2],Jing ZHU[2]
1. Beijing Institute of Nutritional Resources
2. Institute of Biotechnology and Health, Beijing Academy of Science and Technology
3. Capital Medical University

Objectives: To examine the reproducibility, validity, and reliability of visual analogue scales (VAS) for the measurement of food satiety.

Methods: VAS were used to record the feelings of fullness, hunger, desire to eat, and prospective food consumption of the meals by subjects. Subsequently, an ad libitum lunch was served and the energy intake of each subject was recorded. One of the test foods was provided twice and reproducibility was assessed by the coefficient of repeatability. The validity was judged by comparing the energy intake at the next meal for two test foods with distinct satiety. The reliability was determined by repeating the tests in three independent laboratories.

Results: The intraclass CR of the four indicators of satiety were all greater than 0.5, indicating moderate reproducibility. The VAS scores at 240 min showed a positive correlation with the subsequent energy intake. Moreover, taking two test foods with different VAS scores significantly influenced the energy intake at the next meal. The VAS scores of satiety were significantly correlated with food intake at the next meal. One test food was higher in satiety in all three laboratories.

Conclusions: VAS showed moderate reproducibility, high validity, and reliability in assessing food satiety.

Key words Visual analog scales (VAS); Satiety

Category: Food & Nutrition

磷脂型EPA通过激活SIRT1缓解癌症恶病质骨骼肌萎缩作用研究

Eicosapentaenoic acid-enriched phospholipids alleviate skeletal muscle atrophy in cancer-associated cachexia via a sirtuin 1-dependent mechanism

Lei Du*[1],Zijian Wu[1],Mengqing Zhou[1],Yingchao Li[1],Yuhonog Yang[2]

1. Department of Nutrition and Food Hygiene, School of Public Health, Cheeloo College of Medicine, Shandong University

2. School of Food Science & Engineering, Qilu University of Technology (Shandong Academy of Sciences)

Scope: Skeletal muscle atrophy is a critical feature of cancer-associated cachexia (CAC) and it is responsible for poor quality of life and high mortality in cancer patients. Our previous study demonstrated that eicosapentaenoic acid-enriched phospholipids (EPA-PL) prevented body weight loss in a mouse model of CAC. However, the role of EPA-PL on cancer-induced skeletal muscle atrophy remains unclear.

Methods and results: In the present study, a Lewis lung carcinoma (LLC) mouse model was established, then the effect and underlying mechanism of EPA-PL on skeletal muscle atrophy in LLC-bearing mice were investigated. The results revealed that EPA-PL treatment significantly attenuated skeletal muscle atrophy in LLC-bearing mice, as evidenced by suppressing the reductions of skeletal muscle mass, myofiber cross-sectional area and grip strength. Besides, we found that EPA-PL alleviated cancer-induced skeletal muscle atrophy via balancing muscle protein degradation and synthesis, inhibiting type I oxidative muscle fibers atrophy and promoting mitochondrial function. Furthermore, our results also indicated that EPA-PL might counteract skeletal muscle atrophy in LLC mouse model via a sirtuin 1-dependent mechanism.

Conclusion: These findings provide evidence that EPA-PL might be beneficial as a nutritional supplement for prevention and treatment of cancer-induced skeletal muscle atrophy.

Key words cancer-associated cachexia; mitochondrial biogenesis; protein turnover; skeletal muscle atrophy; sirtuin 1.

Category: Food & Nutrition

黑米饮食通过调节肠道微生物和代谢物延缓结肠癌症的发生

Black rice diet alleviates colorectal cancer tumorigenesis through modulating gut microbiome and metabolites

Zhenxia Chen*[1,2],Ling Wang[1],Yi-Xuan Tu[1]
1. Huazhong Agricultural University
2. 湖北洪山实验室

Background and Objectives: Colorectal cancer (CRC) is the third most common cancer in the world. Whole grains and dietary fiber reduce the risk of colorectal cancer. We examined the role of Black rice diet in antagonizing CRC through modulating gut microbiota and metabolites.

Methods and Study Design: Black rice diet or control diet was fed to mice littermates in CRC mouse models of ApcMin/+ mice and AOM/DSS mice. Germ-free mice for fecal microbiota transplantation were used for validation. Gut microbiota and metabolites were detected using metagenomic sequencing and high-performance liquid chromatography–mass spectrometry, respectively. Gut barrier function was determined using lipopolysaccharides level and transmission electron microscopy.

Results: Black rice diet inhibited colorectal tumorigenesis in both ApcMin/+ mice and AOM/DSS mice compared with control diet–fed mice. Black rice diet prolongs life span of colorectal cancer model mice. A significant shift of gut microbiota composition with increased probiotic Bacteroides uniformis and Lactobacillus, along with the relatively intact gut barrier function was exhibited in Black rice-fed mice. Moreover, transfer of stools from Black rice-fed mice to germ-free mice without interference decreased colonic cell proliferation and protected gut barrier function. Gut metabolites alteration, including elevated indole-3-lactic acid and folic acid, which were confirmed to activated gut AhR pathway and inhibited CRC cell proliferation and colorectal cancer tumorigenesis.

Conclusions: Black rice diet alleviates colorectal cancer tumorigenesis through antagonizing gut microbial dysbiosis and protecting gut barrier function in colorectal cancer model mice.

Key words Black rice; colorectal cancer; gut; microbiome; metabolites

Category: Food & Nutrition

健康教育联合紫苜蓿粉对血脂异常的改善效果研究

Study on the improvement of dyslipidemia by combining health education with alfalfa powder

Pei Wang*[1,2],Chen Zhang[3],Jiazhang Huang[2],Tong Jiang[4],Hongbo Pan[4],Guiju Sun[1]

1. School of Public Health, Southeast University

2. Institute of Food and Nutrition Development, Ministry of Agriculture and Rural Affairs

3. Zhongda Hospital, Southeast University

4. Beijing Billion Power Nutrition Technology Limited Liability Company

[Background] Dyslipidemia is a risk factor for cardiovascular diseases such as coronary heart disease and stroke. Health education is believed to improve people's health awareness, improve lifestyle, and consequently affect blood lipid levels. Alfalfa powder is health food containing natural plant components such as alfalfa saponins and flavonoids, which may have some improvement effects on dyslipidemia.

[Objective]To investigate the improvement effect of health education combined with alfalfa powder on human blood lipid disorders, and to provide a convenient, safe, and effective comprehensive intervention program for regulating blood lipid levels.

[Methods] This study adopted a randomized controlled trial design and randomly assigned 140 dyslipidemia patients into two groups, with 70 patients in each. The control group received routine health education, including guidance on diet, exercise, while the experimental group took 15g of alfalfa powder per day on the basis of the health education, continuously for 24 weeks. Before and after the experiment, the dietary conditions of the two groups were collected through questionnaires, and indicators such as total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) were measured for each group. Data analysis was performed using R, with a significance level of $P<0.05$. [Results] Compared with before, there were changes in blood lipid indicators in both groups. TC and LDL-C of the experimental group were significantly reduced ($p<0.05$), while the TC of the control group showed a decreasing trend; compared with the control group, the experimental group showed a more significant decrease in TC, TG, and LDL-C, with statistically significant differences ($P<0.05$). [Conclusions] Health education is an effective intervention method that can help patients regulate their blood lipid levels. The combined intervention of health education and alfalfa powder has a better effect on subjects, significantly improving the levels of total cholesterol, total triglycerides, and LDL-C.

Key words Dyslipidemia, Health education, Alfalfa powder

Category: Food & Nutrition

脂肪质量指数和去脂肪质量指数：中国大学生的膳食模式和质量
Fat or fat free mass index: dietary patterns and quality of Chinese college students

Hongrui Li*,Yuandi Xi*
Capital Medical University

Objective: Little is known about the effects of dietary pattern and dietary quality on the risk of high body mass index (BMI) among medical university students in China. This study aimed to evaluate these associations.

Methods: A total of 498 participants from Capital Medical University were included. Dietary patterns were identified by principal components analysis. Dietary inflammatory indexes (DII) were calculated based on semi-quantitative food frequency questionnaire. Dietary quality was assessed by using diet balance index (DBI). Multivariate linear regression models and multiple logistic regression analyses were used to examine the relationship between dietary patterns, dietary quality and BMI.

Results: The majority of participants with overweight and obesity had abdominal obesity and some students who with normal BMI also had abdominal obesity. Four dietary patterns were detected in the subjects. The pattern with the higher energy intake was positively correlated with BMI and fat mass index (FMI), while being negatively correlated with fat free mass index (FFMI) ($p<0.05$). Individuals who followed the pattern similar to the Mediterranean diet had the highest fat free mass and skeletal muscle mass but the lowest FMI, visceral fat area (VFA), waist-hip ratio, and FMI/FFMI ratio ($p<0.05$). Higher energy-adjusted DII was associated with high BMI. Higher bound score (HBS) and diet quality distance (DQD) were both negatively correlated with FFMI ($p<0.05$).

Conclusion: FMI and FFMI had an important role in predicting overweight and obesity. Students who followed healthful dietary patterns or the high-quality diet that is similar to the Mediterranean diet were more likely to have a healthy BMI and normal body composition.

Key words dietary pattern; diet balance index; dietary inflammatory index; body mass index; fat mass index; fat-free mass index

Category: Food & Nutrition

海洋食品甘油磷脂在营养健康方面的构效关系及与陆生食品功效成分协同增效研究

The structure-activity relationship of glycerophospholipids from seafood in nutritional and health benefits and their synergistic effects with terrestrial functional components based on the sea-land combination perspective

Tiantian Zhang*
Ocean University of China

In traditional fish oil, EPA is mainly in the form of triglyceride or ethyl ester, which has important physiological functions such as prevention of cardiovascular diseases. Notably, seafood is rich in EPA, and the EPA is mainly in the form of phospholipids (PL). The common molecular species are phosphatidylcholine (PC), phosphatidylserine (PS), phosphatidylethanolamine (PE) and phosphatidylethanolamine plasmalogen (pPE). These marine novel lipids exhibit special physiological effects due to their unique molecular structure. In this study, EPA-PL was isolated from marine products, and a series of EPA-PL with regular structural features were prepared by phospholipase D biosynthesis technology. The effects of different molecular forms of EPA on lipid metabolism and brain function were compared, and the possible underlying mechanisms were also illustrated. Results showed that EPA-PL possessed better bioavailability than the EPA in the traditional ethyl ester form, and EPA-PL could not only relieve atherosclerotic lesions but also significantly improve cognitive function in mice. Interestingly, EPA-pPE exhibited unique physiological effects in regulating lipid metabolism and improving brain function, which was closely related to the vinyl ether linkage at the sn-1 position. Additionally, we have found that the digestion and absorption process of EPA-pPE was significantly different from other lipids, EPA-pPE might alter the intestinal micro-ecology due to its retention in the second half of the digestive tract rich in intestinal flora. Moreover, theanine and krill oil had a synergistic effect on improving the spatial location learning and memory ability, while nobiletin and krill oil had a synergistic effect on improving the object recognition and memory ability. These results may provide a theoretical basis for the study about the nutritional efficacy of EPA, and also provide the value guidance for the sea-land combination and the comprehensive development and utilization of resources, the development of dietary supplements or functional foods with multi-target effects.

Key words DHA/EPA; Structure-Activity Relationship; Lipid Metabolism; Brain Function; sea-land combination

Category: Food & Nutrition

花青素通过阿尔茨海默病体内外模型的自噬抑制淀粉样蛋白 β 的毒性

Anthocyanin suppresses the amyloid beta toxicity through autophagy in vivo and in vitro models of Alzheimer’s disease

Yugang Jiang*,Wei Liu,Yunling He,Hui Li,Wenyou Huang
Tianjin Institute of Environment and Operational Medicine

Background: The mechanism of autophagy regulated by anthocyanin in Alzheimer’s disease (AD) progression are obscure. We observed the effects of anthocyanin on the toxicity of Aβ deposits in vitro and in vivo models of AD. Methods: During the in vivo experiment, control and AD mice were fed a normalAIN-93 dietfrom the first day or pregnancy till the offspring weaning (21 d). Another group of mice weregiven an AIN-93 diet containing 2% blueberry extracts (BB). Offsprings were examined until 9 months old. The capacity of learning and memory was assessed by Morris Water Maze (MWM) test, the levels of Aβ1-42 in the brain were determined by sandwich ELISA, Aβ deposition was assessed by immunohistochemistry. During the in vitro experiment, cultured SH-SY5Y cells were treated with Aβ25-35 (10μM) for 24h, pretreated with Cy-3G (100μM) for 12h prior to Aβ25-35, and pretreated with Cy-3G. Cells apoptosis rate were detected by Hoechst 33342. The expressions of LC3B, and Beclin-1 were assessed by Western Blot in vivo and in vitro. Results：(ⅰ) Comparing to control mice, AD animals performed more poorly in the MWM test.However, the BB treatment improved AD mice’ performance. Moreover, the BB treatment suppressed the Aβ deposition. The AD mice expressed higher levelsof LC3B and Beclin-1, while the BB treatment reversed these changes. (ⅱ) Exposure of SH-SY5Y cells to Aβ25-35 (10μM) for 24h induced notably injury, significantly increased the number of apoptotic nuclei, upregulated the expression of LC3B-Ⅱ/ LC3B-Ⅰ and Beclin-1 protein level. Cy-3G plus Aβ25-35 almost completely reversed Aβ25-35-induced injury and above alterations. Conclusions: Alterations of autophagy-related proteins by anthocyanin suppresses the toxicity of Aβ deposits in in vivo and in vitro models of Alzheimer’s disease.

Key words Alzheimer’s disease, anthocyanins, perinatal period, autophagy

Category: Food & Nutrition

基于 PI3K/AKT 信号通路探讨岩藻多糖对 T2DM 大鼠骨骼肌萎缩的改善作用

The improvement of fucoidan on skeletal muscle atrophy in type 2 diabetes rats based on PI3K/AKT

Caixia Li*,Yaping Liu,Haoyue Huang,Wenjie Li,Xing Li
Department of Nutrition and Food Hygiene, College of Public Health, Zhengzhou University

Type 2 diabetes mellitus (T2DM), a multifactorial chronic metabolic disease that is characterized by hyperglycemia. As known to all, abnormal glucose metabolism can easily induce protein metabolism disorder and eventually result in skeletal muscle atrophy. The current study aimed to explore the ameliorative effects of fucoidan on high fat diets (HFD) and low-dose streptozotocin (STZ) induced atrophy of the skeletal muscle in rats. Our results showed that treatment with fucoidan significantly decreased the levels of fasting blood glucose, while up-regulating the Insulin-like Growth Factor 1 in T2DM rats. Also, fucoidan intervention significantly up-regulated the level of total protein and down-regulated blood urea nitrogen and serum creatinine in T2DM rats, while rectifying protein metabolism disorder and ameliorating skeletal muscle atrophy. Furthermore, our results indicated that fucoidan improved glucose metabolism via activating phosphoinositide 3-kinase (PI3K)/protein kinase B (Akt) pathway in T2DM rats. Additionally, fucoidan also improved protein anabolism by up-regulating the PI3K/Akt/mammalian target of rapamycin(mTOR) pathway, and rectified protein catabolism disorder by down-regulating the PI3K/Akt/forkhead boxO (FoxO) transduction in T2DM rats. Collectively, fucoidan ameliorated skeletal muscle glucose metabolism disorder, improved protein anabolism and inhibited protein catabolism, thus ultimately ameliorating diabetes skeletal muscle atrophy, providing a new idea and treatment target for T2DM.

Key words T2DM; fucoidan; skeletal muscle; glucose metabolism; protein metabolism

Category: Food & Nutrition

碱提取法对可可荚壳进行纤维分馏
Fibrous Fractionation of Cocoa Pod Husks by Alkali Extraction Method

Jia Wang*
Aerospace Center Hospital

This project is to fractionate cellulose, hemicellulose and lignin from CPH by using different concentration of alkali solution and characterize mainly hemicellulose fraction. Two extraction methods were used (1-Cycle extraction, 2-Cycles extraction) The composition of hemicellulose was analyzed (carbohydrates, proteins) and also the main Physical and chemical properties (water retention capacity, oil retention capacity, rheology) of hemicelluloses.

Key words cocoa pod husks, dietary fiber, hemicellulose, chemical composition, alkali extraction

Category: Food & Nutrition

海藻玉壶汤基于减少炎症因子和干扰 TGF-β/Smad 通路抑制矽肺进程的机制研究

HaizaoYuhu Decoction alleviates silicosis by reducing inflammatory factors and inhibiting the TGF-β/Smad pathway

Rui Qian*,Yuqin Yao,Xie Linshen
Sichuan University West China School of Public Health

Abstract:

Background and Objectives: Silicosis is a progressive pulmonary disease caused by the deposition of exogenous silica, which induces inflammation and fibrosis. The development of modern Chinese medicine technique has opened up the possibility of improving silicosis with traditional Chinese medicine. Haizao Yuhu Decoction (HYD), as an ancient formula with a 400-year history, can eliminate inflammation and alleviate nodule. Our study aims to investigate the therapeutic effect and mechanism of HYD on silicosis.

Methods and Study Design: In this study, we analyzed the potential therapeutic targets and involved pathways of HYD in silicosis utilizing network pharmacology. Meanwhile, these crucial molecular targets mentioned above were identified by *in vivo* and *in vitro* experiments, and our study completed molecular biology validation, including Western Blot, enzyme linked immunosorbent assay, immunocytochemistry, and so on.

Results: The network pharmacology analysis concluded that the silicosis-related target genes of HYD were enriched on inflammatory factors and fibrosis pathways. Combined with Protein-Protein Interaction (PPI) network analysis, Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway, related inflammatory factors interleukin-1β (IL-1β), interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α) and transforming growth factor β (TGF-β) were detected. In the silicosis mouse models, HYD obviously improved inflammation and fibrosis in pathologically stained sections, and the concentration of IL-1β, IL-6 and TGF-β1 were reduced by HYD in the silicosis lung tissue. Meanwhile, HYD showed inhibitory effect on silicosis via the TGF-β/Smad pathway, manifesting that reducing proteins expression of phosphorylated Smad both *in vivo* and *in vitro* experiments.

Conclusions: These results suggested that HYD has therapeutic potential for silicosis and the mechanism is to reduce inflammatory factor secretion and inhibit the TGF-β/Smad pathway. Our study was expected to provide new insights into the application of clinical application of HYD.

Key words Silicosis; HaizaoYuhu Decoction; Inflammatory factors; Fibrosis; TGF-β/Smad pathway

Category: Food & Nutrition

补充维生素K对中老年人群不同部位骨密度和骨代谢的影响:随机对照试验和系统综述的荟萃分析

Effects of vitamin K supplementation on bone mineral density at different sites and bone metabolism in the middle-aged and elderly population: a meta-analysis of randomized controlled trials and systematic review.

chenqi Xie*,haoyu Wang,hao Zhang,haoran Chang,tianlin Gao
Qingdao University

Abstract

Background and aims

Vitamin K has received attention as an important nutrient with links to bone mineral density (BMD) and bone metabolism. Previous studies remained conflicting and incomplete on this link. This meta-analysis and systematic review aimed to investigate the effects of vitamin K supplementation on BMD at different sites and bone metabolism in middle-aged and older adults comprehensively.

Method

The databases of PubMed, Web of Science and Cochrane Library were searched thoroughly for literatures from the time of construction to October 2022, and RCTs that met the inclusion criteria in this meta-analysis and systematic review were extracted.

Results

This meta-analysis included 17 studies with a total of 4800 participants. The results have shown that vitamin K supplementation increased the BMD of the lumbar spine. The overall effect of vitamin K supplementation showed a significant increase in carboxylated osteocalcin (cOC) and the ratio of cOC to ucOC. Accordingly, significant reductions of uncarboxylated osteocalcin (ucOC) and the ratio of ucOC to tOC were found with vitamin K supplementation. However, a pooled effect of vitamin K supplementation revealed no effect on total osteocalcin (tOC). In the subgroup analysis, vitamin K2 significantly increased lumbar spine BMD, cOC, and decreased ucOC, particularly in the subgroup of Asian and female. Additionally, vitamin K supplementation significantly increased lumbar spine BMD and decreased ucOC in osteoporotic patients compared to healthy participants.

Conclusion

Vitamin K, especially vitamin K2, had effects on maintaining or increasing lumbar spine BMD and reducing uncarboxylated osteocalcin (ucOC) in Asian women with osteoporosis, while vitamin K reduced the ratio of ucOC to tOC; increased the ratio of carboxylated osteocalcin (cOC) and cOC to ucOC, but had no significant effect on total osteocalcin (tOC). In conclusion, vitamin K has modulating effects on bone density and bone metabolism in middle-aged and elderly population.

Key words vitamin K; Bone mineral density; uncarboxylated osteocalcin; carboxylated osteocalcin; middle-aged and elderly

Category: Food & Nutrition

蓝莓提取物抗小鼠疲劳机制的转录组学分析

Transcriptomic Analysis of the Anti-fatigue Mechanism of Blueberry Extract in Mice

Wenyou Huang*[1,2],Xuqi Guo[1],Hui Li[1,2],Yaxin Xu[1],Yugang Jiang[1]

1. Tianjin Institute of Environmental and Operational Medicine
2. Department of Public Health, China Medical University

Objective Fatigue affects the quality of life, physical health and mental state of modern people. Previous research suggested that blueberry extract (BBE) has anti-fatigue effect, but the mechanism is not clear. In this study, transcriptome technology and bioinformatics analysis were used to explore the key nodes and core target genes of the biological process of BBE's anti-fatigue effect.

Methods BALB/c mice were gavaged with 100 mg/kg • BW • d BBE for 30 days. The swimming time and anti-fatigue biochemical effect indicators were measured, and the expression of anti-fatigue related genes and proteins were detected.

Results The time of weight-loaded exhaustion swimming in mice was significantly prolonged and the related indicators of fatigue effect were reversed after treated with BBE. By sequencing and analyzing the transcriptome of mice muscle tissue, it was found that there were 36 common differential genes and 7 genes related to exercise or energy metabolism, which were Gpam, Slc8a1, Cdh10, Zfp92, Mt2, Mt1 and Kif2 respectively. The results of RT-PCR and Western blot showed that the expression levels of Gpam, Slc8a1, Mt2 mRNA and protein increased significantly.

Conclusion This study verified that BBE has a significant anti-fatigue effect, and clarified the mechanism of BBE's anti-fatigue effect by regulating the expression of Gpam, Slc8a1, Mt2 and other genes and the activation of metabolic pathways and cGMP-PKG signaling pathway. This study may serve as a basis to develop BBE into anti-fatigue nutrition preparations.

Key words blueberry extract, fatigue resistance, oxidation resistance, exhaustive swimming, transcriptomics, metabolic pathway

Category: Food & Nutrition

菜肴营养素指数对青年消费者食物选择行为的影响

The Influence of Dishes Nutrient Index on Food Choice Behavior of Young Consumers

Jili Chen*[2],Jinying Yang[1],Sasa Xie[1],Min Yang[1,3]
1. 浙江大学
2. 浙江大学医学院公共卫生系
3. 浙江大学医学院第二附属医院临床大数据分析中心

ABSTRACT

Backgrounds & Objective: The objective of this study was to assess the effectiveness of the Dishes Nutrition Index (DNI) as a nutrition label for catering foods in promoting healthier food choice behaviors among young consumers.

Methods: In this randomized controlled experiment, an online questionnaire with a virtual menu was used. Young consumers aged 18-44 (N=441) were randomly assigned to either a control group (N=223) or an experimental group (N=218), based on the presence or absence of DNI labels. Participants were tasked with identifying the healthiest dishes and rating their willingness to choose each dish using the Likert 11-point subscale. The dishes included three categories: vegetarian, meat and both. Additionally, subjective influencing factors (emphasis level on nutrition, taste, name and appearance) and demographic information (gender, age, education level and BMI) were collected as covariates. The outcome variables encompassed participants' ability to recognized the healthiest dishes and their willingness to choose the healthy dishes, which reflected participants' choice behavior toward healthy food.

Results: The study revealed that the DNI label effectively facilitated correct identification of the healthiest dishes among young consumers, in both dishes (OR=2.55, 95% CI=1.69-3.89, P<0.001) and vegetarian dishes (OR=5.26, 95% CI=2.89-10.12, P<0.001). Additionally, the inclination to select healthier dishes (OR=1.71, 95% CI=1.16-2.54, P=0.007) and meat dishes (OR=1.59, 95% CI=1.07-2.36, P=0.022) was augmented. Notably, consumers' priority placed on nutritional value independently influenced their intention to choose healthier dishes (OR=1.12, 95% CI=1.02-1.24, P=0.019). Furthermore, variations in the impact of healthy dish choice behavior were discerned across gender and education levels among young consumers.

Conclusion: Serving as an innovative nutrition label for catering food, the DNI label can promote healthier food choice behavior among young consumers.

Keywords: Dishes Nutrient Index; Food Choice Behavior; Young Consumers; Catering Food

Key words Nutrition Label; Dishes Nutrient Index; Food Choice Behavior; Catering Food; Effectiveness

Category: Food & Nutrition

成人补充 n-3 多不饱和脂肪酸对骨代谢标志物及骨密度的作用：随机对照试验的系统综述和荟萃分析

The effects of n-3 PUFA supplementation on bone metabolism markers, body bone mineral density in adults: A systematic review and meta-analysis of RCTs

Jie Gao*[1,2],Yiran Gu[1],Mai Zhang[1],Zhenquan Lu[1],Tianlin Gao[1,2]
1. Qingdao University
2. Institute of Nutrition & Health, Qingdao University

Background

The results of supplemental n-3 polyunsaturated fatty acids on bone metabolism remained inconsistent. The present study aimed to investigate the effects of n-3 PUFA supplementation on bone metabolism markers and bone mineral density with a meta-analysis of randomized controlled trials.

Methods

A systematic literature search was implemented with PubMed, Web of Science and EBSCO databases updated to Oct 16, 2022. The intervention effects were calculated as standard mean differences for changes in BAP, OC, serum calcium, 25(OH)D, PTH, CPR and blood n-3 PUFA. Others were calculated as mean differences. The present study also compared n-3 PUFA with untreated control, placebo control, or lower-dose n-3 PUFA supplements.

Findings

Nineteen RCTs were included. No significant effects were founded. Subgroup analyses were also calculated. For lumbar spine BMD, there was a significant increase in eastern country. For femoral neck BMD, there were significant increases in females, people aged less than 60 years, eastern country, placebo control and studies lasted no more than 6 months. For 25(OH)D, there were increases in people aged no less than 60 years, treated with n-3 PUFA only and in studies lasted no more than 6 months. For NTx-1, there was a decrease in both genders. For serum calcium, reduction was founded in studies lasted more than 6 months.

Interpretation

In this study, we did not find significant effects of n-3 PUFA on bone mineral density or metabolism markers. Although some beneficial effects of n-3 PUFA supplementation on bone health were found on younger postmenopausal women (<60 years old) in a short time (≤6 months), it also needs high quality and long-term RCT and is suggested to be supplemented as an auxiliary nutrient combined with bone health nutrient supplement, which might strengthen the effect of bone nutrient supplement in specific population.

Key words n-3 PUFA, BMD, bone marker

Category: Food & Nutrition

在从不吸烟的二型糖尿病患者中咖啡消费量和咖啡类型偏好与新发微血管疾病的关联性研究

Coffee consumption, coffee type preference, and incidence of microvascular disease in never-smoking adults with type 2 diabetes

Yujie Liu*[1],Li-Qiang Qin[1,2],Guo-Chong Chen[1]
1. Suzhou Medical College of Soochow University
2. Changzhou Geriatric Hospital affiliated to Soochow University

Abstract

Background and objective: To evaluate the associations between consumption and preference of coffee types and risk of microvascular disease among never-smokers with type 2 diabetes mellitus.

Methods and Study Design: We included 7771 never-smoking participants with type 2 diabetes mellitus from the UK Biobank without known microvascular disease or cardiovascular disease at baseline. Total coffee consumption was divided into 0, 0.5-1, 2-4, and ≥5 cups/day. Participants also reported which type of coffee they mainly consumed, including decaffeinated, ground, and instant coffee. Microvascular disease included retinopathy, peripheral neuropathy, and chronic kidney disease. Cox regression models were used to estimate hazard ratios and 95% confidential intervals of total microvascular disease and individual microvascular disease associated with coffee consumption.

Results: During a median follow-up of 12.7 years, 803 incident retinopathy, 190 incident peripheral neuropathy, and 628 incident chronic kidney disease cases were identified. There was an inverse association between coffee consumption and risk of total microvascular disease, with hazard ratios (95% confidential intervals) of 0.90 (0.77, 1.04) for 0.5-1 cup/day, 0.80 (0.69, 0.93) for 2-4 cups/day, and 0.80 (0.64, 1.00) for ≥5 cups/day when compared with no coffee consumption, and 0.94 (0.88,0.99) for each additional increment of 2 cups/day. Such an inverse association was mainly driven by the association of coffee consumption with chronic kidney disease (hazard ratio per 2 cups/day =0.85), while no associations were found for retinopathy (hazard ratio per 2 cups/day =1.00) and peripheral neuropathy (hazard ratio per 2 cups/day =0.93). Participants with different preferences of coffee had similarly lower risk of microvascular disease as compared with non-consumers.

Conclusions: Among never-smoking adults with type 2 diabetes mellitus, coffee consumption was associated with a lower risk of chronic kidney disease, but not retinopathy or peripheral neuropathy, and the associations appeared not to be varied by coffee type preferences.

Key words Coffee consumption; Chronic kidney disease; Retinopathy; Peripheral neuropathy; Type 2 diabetes mellitus.

Category: Food & Nutrition

灵芝的抗氧化特性
Antioxidant Properties of Ganoderma spp.

Bojie Chen*,Yang Liu,Xia Li,Hock Eng Khoo
College of Chemistry and Bioengineering, Guilin University of Technology

Ganoderma is a kind of basidiomycetes that can be used as medicine and food. It is necessary to determine the antioxidant properties of different types of Ganoderma. The fruiting bodies of wild and cultivated red Ganoderma lucidum and black G. atrum were separated into canopy and stalk. The bioactive antioxidants of the defatted samples were extracted using absolute methanol for 60 min in a 60° C-water bath twice. Total flavonoid content and antioxidant activities were determined using spectrophotometric methods. Ash content determination was also done. The total flavonoid content of all stalk samples was significantly higher than that of the canopy samples, whereas the flavonoid content of the stalk sample of wild red Ganoderma was remarkably lower than the other stalk samples. All canopy samples of the Ganoderma had EC50 values of DPPH radical scavenging higher than the stalk samples, except for the cultivated canopy of black Ganoderma. The lower EC50 values of these Ganoderma samples reflected that they possessed a higher total flavonoid content. The high reducing power was attributed to the high flavonoid content. The reducing power of the cultivated stalk of black Ganoderma was the highest. The ash content was remarkably highest in the wild-type stalk of red Ganoderma because the polyphenolic structures had the highest carbon percentage. The lower flavonoid content of wild-type stalk of red Ganoderma among the stalk samples also showed that it contained other hydrocarbon structures, such as terpenoids, besides fatty acids and flavonoids. Wild and cultivated types of Ganoderma have their uniqueness in terms of antioxidant properties. Flavonoids are concentrated in the stalks of these Ganoderma samples, whereas their canopy could have a higher polysaccharide and saponin content. The ash content analysis revealed that the wild type of Ganoderma had higher carbon content than cultivated samples.

Key words Antioxidant Capacity, Ferric reducing antioxidant power; Lingzhi; Mycelium; Quercetin

Category: Food & Nutrition

PB-LSTM：基于高效特征表示的深度学习模型用于快速筛选二肽基肽酶 IV 的抑制肽

PB-LSTM: A Deep Learning Model Based on Efficient Features Representation for Rapid Screening of Dipeptidyl Peptidase IV Inhibitory Peptides

Yiyun Zhang*[1],Liyang Wang[2],Yong Xue[1,3]

1. National Engineering and Technology Research Center for Fruits and Vegetables, College of Food Science and Nutritional Engineering, China Agricultural University

2. School of Clinical Medicine, Tsinghua University

3. National Center of Technology Innovation (Deep Processing of Highland Barley) in Food Industry, China Agricultural University

Diabetes is a prevalent chronic disease that disproportionately affects the middle-aged and elderly population, often resulting in complications and significant discomfort. Dipeptidyl peptidase IV inhibitory peptides present a promising approach for treating type Ⅱ diabetes due to their many attractive benefits. However, the current experimental method for discovering new inhibitory peptides is both inefficient and costly, necessitating the development of new screening methods for relevant research. In this study, we proposed a novel deep learning model named PB-LSTM based on high-efficiency feature representation to screen for dipeptidyl peptidase IV inhibitory peptides. Specifically, we demonstrated that a combination of Pseudo amino acid composition and Binary profile patterns yielded optimal performance when representing peptide sequences related to dipeptidyl peptidase IV inhibitory peptides, as determined by comparing various peptide sequence feature extraction methods in our self-designed data set. We further presented empirical evidence to indicate that PB-LSTM, a technique utilizing long short-term memory networks, exhibited superior performance compared to other machine learning algorithms that are commonly utilized in peptide prediction. The cross-validation results indicated that PB-LSTM achieved the highest prediction accuracy of 98.02% and an area under the curve value of 0.9949. The prediction results of the model were verified using molecular docking with Autodock Vina, demonstrating its superior screening rate and precision when compared to other methods. Our study provides a promising method for discovering dipeptidyl peptidase IV inhibitory peptides, which may have significant implications for the treatment of type II diabetes.

Key words Type II diabetes; Dipeptidyl peptidase IV inhibitory peptides; Deep learning; Features representation; Molecular docking

Category: Food & Nutrition

儿童超重肥胖脂肪酸标志物及与膳食模式的关联

Fatty acids biomarkers of overweight and obesity and its associations with dietary patterns among Chinese children

Zhi Huang*[1],Ziming Li[2],Xiaochen Yin[2],Yuming Hu[2]
1. Hunan University of Medicine
2. Hunan Provincial Center for Disease Control and Prevention

Background: Childhood overweight and obesity is becoming an emerging face of malnutrition. The aims of this study were to explore FAs biomarkers of overweight and obesity and its associations with dietary patterns among Chinese children.

Methods: An observational study was conducted on 94 children aged 5 to 7 years old (50 normal, 26 who were overweight and 18 with obesity). Plasma was analyzed for FA composition by gas chromatography-mass spectrometry (GC-MS). Diet was collected by food frequency questionnaires (FFQ) and dietary patterns were evaluated by principal component analysis (PCA).The multivariate analysis was used to exploring fatty acids biomarkers of overweight and obesity.

Results: Eleven types of FAs were detected in plasma. C16:0, C18:0, C18:1n-9 and C18:2n-6 accounted for more than 90 % of the total FAs for plasma of children. C16:0, SFA, C18:2n-6, n-6 PUFA and PUFA were related biomarkers to distinguish overweight and obesity in children. Children more adhered to plant pattern are lower lever of plasma C16:0, C18:0, SFA and C20:4n-6, but higher level of C18:2n-6, n-6 PUFA and PUFA.

Conclusion: plasma SFA and PUFA, especially for C16:0 and C18:2n-6 as potential biomarkers to distinguish overweight from obesity among children. Plant pattern was negatively associated with plasma C16:0, SFA, but positively associated with C18:2n-6, n-6 PUFA and PUFA, which may be a useful tool for prevention of children from overweight from obesity.

Key words Fatty acids, Overweight, Obesity, Dietary patterns, Children, Biomarkers.

Category: Food & Nutrition

复合益生元在急性结肠炎小鼠模型中的预防和治疗作用

Effects of compound prebiotics as prophylactic and therapeutic supplementation in a mouse model of acute colitis

Jing Cong*,Siyu Zhou,Tianyu Zhao,Yun Zhang
The Affiliated Hospital of Qingdao University

Background and Objectives: Compound prebiotics have been explored in modulation of intestinal microbiota and remission of inflammatory responses in the acute colitis. Yet, research on the roles of simultaneous prophylactic and therapeutic compound prebiotics intervention in relation to AC remains lacking.

Methods and Study Design: Here, compound prebiotics were pre-fed to examine preventive effects. Compound prebiotics, compound prebiotics combined with mesalazine (5-aminosalicylic acids), and mesalazine were used to evaluate therapeutic effects on the dextran sulfate sodium -induced acute colitis.

Results: Results showed that prophylactic compound prebiotics and therapeutic compound prebiotics combined with mesalazine alleviated acute colitis, evidenced by variations of body weight, colon length, spleen index, disease activity index score, histological score, and intestinal mucosa. Ruminococcus and Bifidobacterium were detected in significant abundance in groups of prophylactic compound prebiotics and therapeutic compound prebiotics combined with mesalazine, respectively. Phylogenetic ecological network analysis revealed that therapeutic compound prebiotics combined with mesalazine probably had the strongest coupling between microbes in changing intestinal microbiota to influence treatment. However, changes in short chain fatty acids seemed to have no persuasive results, probably due to the reduced short chain fatty acid level in feces and variability in transit, absorption, and utilization. Furthermore, therapeutic compound prebiotics exerted higher value in terms of observed species and Shannon diversity, as well as a more concentrated distribution by principal coordinates analysis.

Conclusions: Together, the favorable roles of compound prebiotics in colitis provide directions for prebiotics in designing effective prophylactic functional diets and treatment strategies.

Key words compound prebiotics; acute colitis; intestinal microbiota; prevention; treatment

Category: Food & Nutrition

螺旋藻蛋白-壳聚糖复合物稳定皮克林乳液用于虾青素递送

Pickering emulsions stabilized with spirulina protein-chitosan complex for astaxanthin delivery

Ronggang Liu*[1,2,3],Mingqian Tan[1,2,3]

1. Academy of Food Interdisciplinary Science, School of Food Science and Technology, Dalian Polytechnic University

2. School of Food Science and Technology, Dalian Polytechnic University

3. National Engineering Research Center of Seafood, Dalian Polytechnic University

Astaxanthin is a lipid-soluble carotenoid with good anti-oxidation, hepatic steatosis reduction, anti-inflammation and intestinal microbiota regulation ability, whose poor stability and pH vulnerability limit its bioavailability. Spirulina protein derived from spirulina has good emulsifying ability with potential application in nutraceuticals, medicines and cosmetics. In this study, spirulina protein-chitosan complex were prepared by the self-assembly method, and their interaction mechanism and microstructure were characterized. Pickering emulsions were fabricated using spirulina protein-chitosan complex as an emulsifier. The particle size, zeta potential and three-phase contact angle of spirulina protein-chitosan complex with different spirulina protein to chitosan ratios were investigated. A mass ratio of 1:2.5 spirulina protein-chitosan complex showed good emulsifying ability in preparing Pickering emulsion. Higher storage modulus and viscoelasticity were observed with higher spirulina protein-chitosan complex concentrations and oil fractions. The spirulina protein-chitosan Pickering emulsion significantly improved the stability and bioavailability of astaxanthin. The results indicated that the spirulina protein-chitosan complex could act as a Pickering emulsion stabilizer and had the potential to deliver protective hydrophobic astaxanthin.

Key words astaxanthin, spirulina, Pickering emulsions, delivery, bioavailability

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双靶向虾青素纳米载体对非酒精性脂肪肝的干预研究

Dual targeting astaxanthin nanocarriers for relief of nonalcoholic fatty liver disease

Yukun Song*,Tongtong Che,Mingqian Tan
Dalian Polytechnic University

Nonalcoholic fatty liver disease (NAFLD) is a metabolic syndrome disorder, and intervention of NAFLD in the early stage can prevent it from developing into a severe metabolic disease. Here, the hepatic parenchymal cell-targeted and mitochondrial-targeted glycosylated whey protein isolate (WPI) nanocarriers were constructed to delivering astaxanthin (AST) to liver tissue for maximizing AST intervention efficiency. The hepatic parenchymal cell-targeting was achieved using galactose (Gal) conjugated onto WPI through Maillard reaction by recognizing asialoglycoprotein receptors specifically expressed in hepatocytes. Grafting triphenylphosphonium (TPP) onto glycosylated WPI (WPI-Gal) by amidation reaction enabled the nanocarriers (AST@TPP-WPI-Gal) to achieve dual targeting capability to liver tissue and mitochondria and improve the bioavailability of AST. In vitro experiment results demonstrated the AST@TPP-WPI-Gal nanocarriers could target mitochondria in the steatotic HepG2 cells with an enhanced anti-oxidative and anti-adipogenesis effect. In vivo experiments in mice models of NAFLD further verified the ability of AST@TPP-WPI-Gal targeting to liver tissue, regulating blood lipid disorders, and protecting liver function. AST@TPP-WPI-Gal remarkably reduced 40% lipid accumulation in the liver compared with that of free AST, alleviating the symptoms of NAFLD in mice. The results indicate that AST@TPP-WPI-Gal has great potential as hepatic-targeted agent for nutrition intervention of NAFLD.

Key words Astaxanthin; Hepatic parenchymal cell-targeted; Mitochondrial-targeted; Nonalcoholic fatty liver disease;

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ω-3 多不饱和脂肪酸、小麦低聚肽及其联合干预在预防和逆转衰老导致的肌少症中的作用

Role of fish oil-derived ω-3 polyunsaturated fatty acids, wheat oligopeptide and their combined intervention in preventing and reversing sarcopenia during aging process

Da Pan*,Xian Yang,Dengfeng Xu,Shaokang Wang,Guiju Sun
Key Laboratory of Environmental Medicine and Engineering of Ministry of Education, and Department of Nutrition and Food Hygiene, School of Public Health, Southeast University, Nanjing, P.R. China

Background and Objectives: Sarcopenia, the loss of skeletal muscle mass and function with age, has recently attracted attention due to the aging of populations. Nutritional support is potentially considered an essential step to prevent muscle loss and enhance physical function in older adults. This study aimed to assess the role of potential nutritional strategies, i.e., fish oil-derived ω-3 polyunsaturated fatty acids (PUFAs), wheat oligopeptide and their combined intervention, in preventing and reversing sarcopenia in aging process.

Methods and Study Design: Here we evaluated the effects of fish oil-derived ω-3 PUFA, wheat oligopeptide and their combined intervention on muscle atrophy and fatty infiltration in natural aging rats via measurements of muscle mass, grip strength and biochemical parameters, and analyses of magnetic resonance imaging, histopathology, proteomics and western blot.

Results: The interventions of fish oil-derived ω-3 PUFA, wheat oligopeptide and their combination, to varying degrees, improved muscle mass and grip strength, and inhibited muscle atrophy and fatty infiltration. The results of biochemical parameters, proteomics and western blot suggested that the potential mechanism involves the inhibition of skeletal muscle atrophy, promotion of protein synthesis and muscle regeneration, reduction of inflammation, oxidative stress and blood lipid, and enhancement of muscle strength. In this study, the combination of 400 mg/kg body weight fish oil + 200 mg/kg body weight wheat oligopeptide (group WFM 2) was potential to be the optimal intervention strategy and therefore a promising nutritional support to prevent sarcopenia in older adults.

Conclusions: We found that all the intervention groups, to varying degrees, had protective effects against sarcopenia, while the combined intervention effect of fish oil-derived ω-3 PUFA and wheat oligopeptide may be greater than the effect of single intervention.

Key words aging; sarcopenia; fish oil-derived ω-3 polyunsaturated fatty acids; wheat oligopeptide

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脱脂核桃的蛋白水解物的生物活性：胃蛋白酶和碱性蛋白酶（体外）模型

Bioactive properties of defatted walnut protein hydrolysates: pepsin and alcalase (in vitro) model

Yanran Chen*[1],Joanne Maycock[2]
1. Sinochem Health Company
2. University of Leeds

Bioactive peptides are hydrolysed products of proteins that have been proven to exert several biological properties such as antioxidant activity, anti-inflammation and anti-diabetes. The hydrolysates obtained from plant origins are less investigated. In the present study, defatted walnut protein isolates prepared using alkaline extraction method. To compare the biological functions of defatted walnut protein isolates and their hydrolysates, protein isolates was undergone the hydrolysis by two different proteases including pepsin and alcalase. After proteolysis, 2,2′-anizo-bis-(3-ethylbenzthiazoline-6-sulfonic acid) (ABTS) radical scavenging activity and inhibitory properties against alpha-glucosidase of defatted walnut protein hydrolysates have been evaluated. The results from the present study suggested the hydrolysates possess more active antioxidant activity than intact protein isolates. Peptides with alpha-glucosidase inhibitory activity can be generated from peptic treatment. Therefore, the research indicates that hydrolysates derived from defatted walnut proteins could be used as a functional food ingredient and have potential health benefits to regulate type 2 diabetes.

Key words antioxidant activity, α-glucosidase inhibitor, peptide, walnut proteins

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大黄素通过影响巨噬细胞表型降低脂肪组织炎症

Emodin decreased adipose tissue inflammation via affecting macrophage phenotype

Fang Yu*
Air Force Medical University

Objective: To elucidate if Emodin is participated in adipose tissue inflammation and its underlying mechanisms. Methods: 3T3-L1 adipocytes and RAW264.7 macrophages were co-cultured to mimic adipose tissue inflammation microenvironment in obesity in vitro. Real-time PCR and enzyme-linked immunosorbent assay (ELISA) were applied to examine the levels of IL-1β, IL-6, TNFα and Adiponectin in co-cultured cells and supernatants. Real-time PCR and western blot were performed to detect the expression of M1/M2 marker genes in CD11b microbeads isolated macrophages. Western blot was applied to detect JAK1 and STAT6 expression. Transwell migration assay was applied to determine the capacity of macrophage migration. STAT6 specific inhibitor AS1517499 was applied to elucidate the molecular mechanisms by which Emodin affects adipose tissue inflammation. Results: Emodin remarkably inhibited IL-1β, IL-6 and TNFα levels, whereas enhanced Adiponectin level in co-cultured cells and supernatants. Emodin apparently suppressed the expression of M1 marker gene (iNOS), whereas elevated the expression of M2 marker genes (IL-10 and Arg1) in isolated macrophages. Emodin greatly enhanced phosphorylated JAK1 and STAT6 levels. AS1517499 significantly abrogated the inhibitory effect of Emodin on the expression of inflammatory factors. Emodin remarkably repressed macrophage migration induced by adipocyte-conditioned medium. Conclusion: Emodin may decrease adipose tissue inflammation through promoting M2 macrophage polarization via JAK1/STAT6 signaling pathway.

Key words Emodin; Adipose tissue macrophages; Inflammation; Obesity; STAT6

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基于内质网应激探讨维生素 D3 对糖尿病大鼠胰岛功能的保护作用

The effect and mechanism of vitamin D3 in improving pancreas function in T2DM rats by inhibiting endoplasmic reticulum stress

Tong Zhao*,Dongdong Zhang,Wenjie Li
Zhengzhou University

Abstract

Background: T2DM is a metabolic disease defined by chronically raised blood glucose levels, which are frequently accompanied with lipid metabolism disorders and increased occurrence of ERS. Vitamin D has various biological effects and is thought to be closely related to glucolipid metabolism and ERS mitigation. Therefore, this study was conducted to investigate the molecular mechanism of the regulatory effect of vitamin D3 intervention on the disorders of glucolipid metabolism in T2DM rats.

Materials and methods: Based on their body weight, 50 male SD rats were placed into several intervention groups for a total of 10 weeks. After intervention, the levels of blood glucose, blood lipids, insulin and 25(OH)D were measured, and the expression of GAPDH, VDR, GRP78, PERK, p-PERK, eIF2a, ATF4, CHOP, Bax and Bcl-2 in pancreatic tissues were detected by Western blot. The insulin content and pancreatic tissue apoptosis was determined by immunohistochemistry and TUNEL method.

Results: (1) High-dose vitamin D3 significantly decreased FPG and triglycerides and significantly increased HOMA-β and HDL-C in T2DM rats. (2) The intervention group rats had more islets and intra-islet cells, the morphological structure and insulin content was also improved compared with MC group by HE and TUNEL staining and insulin immunohistochemistry (3) The SOD activity in serum and pancreas was increased, the MDA level was significantly decreased, and the serum TNF-α and IL-1β levels were decreased compared to T2DM rat($P<0.05$). (4) Western blot results showed that VDR and Bcl-2 protein expressions were significantly increased and GRP78, p-PERK/PERK, eIF2a, ATF4, CHOP, and Bax protein expressions were down-regulated to different degrees ($P<0.05$) after intervention.

Conclusion: Vitamin D3 plays a beneficial role in alleviating the basal symptoms of T2DM rats, and may inhibit ERS-induced apoptosis and protect islet function through the PERK/CHOP signaling pathway.

Key words 25(OH)D3; type 2 diabetes mellitus; PERK/CHOP pathway; apoptosis

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茶皂素促进C2C12骨骼肌细胞增殖和分化作用研究

Effects of tea saponin on proliferation and differentiation of C2C12 Skeletal Muscle cells

Xiao Ma*[2],Di Tian[1],Ling Song[1],Xinxin Pang[1],Tianzhen Chen[1],Yu Gao[1],Yunfen Yang[1],Jie Guo[1]

1. Yunnan Agricultural University
2. Yunnan Agricultural University

Background and Objectives:

In this study mainly focused on the effect of tea saponin on the proliferation and differentiation of C2C12 skeletal muscle cells. Skeletal muscle belongs to striated muscle, which is a kind of muscle tissue in animal body and the most important dynamic organ of the body. At the same time, skeletal muscle is an important regulatory organ of the nervous system and endocrine system. However, in the process of body movement or some pathological conditions, skeletal muscle is prone to injury or metabolic disorders, which will seriously affect the normal movement and life of patients. This study provided theoretical basis for the treatment and repair of damaged skeletal muscle, maintenance of normal metabolism and improvement of skeletal muscle function by exploring the natural product component tea saponin.

Tea saponin, a kind of oleanane type triterpenoid saponin, is one of the main active components in tea saponin. In recent years, the medicinal value of tea saponin has been widely concerned. A number of studies have found that it has many important effects on human health, such as anti-tumor, anti-virus and bacteriostasis. However, there are few reports on the regulation of tea saponin on skeletal muscle development and metabolism. Therefore, this experiment mainly explored the effects of tea saponin on proliferation, apoptosis, migration, differentiation and glucose consumption of C2C12 skeletal muscle cells.

Methods and Study Design:

Skeletal muscle cells of C2C12 were cultured with tea saponin in different concentrations. The effect of tea saponin on proliferation and apoptosis of C2C12 skeletal muscle cells was studied by MTT and flow cytometry. The effect of tea saponin on migration of C2C12 skeletal muscle cells was studied by scar experiment. The expression of MyoD, MyoG and MYH7 was detected by Western blot, and the differentiation promoting effect of tea saponin on C2C12 skeletal muscle cells was studied. The morphological changes of C2C12 skeletal muscle cells and the ability of cell fusion to form muscle tubes were detected by HE staining and immunofluorescence staining. The glucose consumption of C2C12 skeletal muscle cells was detected by glucose oxidase method to study the effect of tea saponin on promoting glucose uptake in C2C12 skeletal muscle cells.

SPSS 22.0, GraphPad Prism 8, ImageJ and other software were used for graphics processing and statistical analysis.

Results:

(1) Tea saponin in the range of 0~32 μg/mL significantly promoted the viability of C2C12 skeletal muscle cells in a dose-dependent manner in the range of 0~32 μg/mL. However, the number of C2C12 skeletal muscle cells was significantly reduced when tea saponin concentration increased to 64 μg/mL.

(2) Flow cytometry showed that tea saponin inhibited apoptosis of C2C12 skeletal muscle cells.

(3) Compared with the blank control group, tea saponin treatment for 12 h can promote the migration of C2C12 skeletal muscle cells.

(4) In the range of 32 μg/mL tea saponin, the number of C2C12 skeletal muscle cells increased significantly with the increase of tea saponin concentration.

(5) The differentiation was observed by HE staining and immunofluorescence staining. It was found that on the first day of differentiation, the status of C2C12 skeletal muscle cells treated with tea saponin was different from that of the blank group. The number of cells treated with tea saponin was large, but there was no significant difference in morphology. On the 3rd day of differentiation, the formation of many fine muscle tubes and cell fusion appeared in the tea saponin treated condition, while the formation and cell fusion in the blank group were lower than those in the tea saponin treated group. On the 5th day of differentiation, the number of myoducts of C2C12 skeletal muscle cells treated with tea saponin increased significantly, and the myoducts grew and became dense, while the number of cells myoducts in blank group was less and the morphology was small.

(6) Western blot analysis showed that the protein expression levels of MYOD, MYOG and MYH7 were significantly increased after tea saponin treatment. Compared with the blank group, tea saponin group (16 μg/mL) promoted the formation of muscle ducts and up-regulated the expression of MYH7 on the 1st, 3rd and 5th day of differentiation of C2C12 skeletal muscle cells, and the promotion effect became more obvious as time went on.

(7) Tea saponin can also increase the glucose consumption of C2C12 skeletal muscle cells after 5 days of differentiation, suggesting that tea saponin can promote the proliferation, differentiation and glucose uptake of C2C12 skeletal muscle cells to some extent.

Conclusions:

In conclusion, tea saponin is involved in the development, differentiation and metabolic regulation of skeletal muscle, and the incubation of C2C12 skeletal muscle cells with tea saponin can not only promote cell proliferation, improve cell viability, but also promote cell differentiation. It provides a theoretical basis for the clinical research and application of tea saponin in the repair of skeletal muscle injury, the treatment of muscle atrophy and the improvement of skeletal muscle function.

Key words Tea Saponin; C2C12 skeletal muscle cells; proliferation; differentiation; MYH7

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cMIND 饮食、室内空气污染与抑郁症:一项基于 2011 - 2018 年 CLHLS 的队列研究

cMIND diet, indoor air pollution, and depression: a cohort study based on CLHLS from 2011 to 2018

Ruoyu Wang*,Zhaofeng Zhang
School of Public Health, Peking University

Background and Objectives The modifying effects of healthy dietary patterns on the relationship between air pollution and depression are unclear. To explore the interaction between a Chinese version of the Mediterranean-DASH diet intervention for neurodegenerative delay (cMIND) diet and indoor air pollution on depression among older adults.

Methods and Study Design This cohort study used 2011-2018 data from the Chinese Longitudinal Healthy Longevity Survey (CLHLS). Participants included 2724 adults aged 65 and older. The cMIND diet scores ranged from 0 to 12 based on responses to a validated food frequency questionnaire. The index for indoor air pollution exposure was categorized as no, moderate, and severe pollution, integrating the impacts of different types of cooking fuels and dampness/mold. Depression was measured using the Phenotypes and eXposures (PhenX) Toolkit. Cox proportional hazards regression models were used to explore the associations and further stratified the analysis by the cMIND diet scores.

Results Living with severe indoor pollution was associated with a 40% increase in the risk of depression (HR: 1.40, 95% CI: 1.07, 1.82) compared to living without indoor pollution. We observed a significant interaction between indoor air pollution exposure and cMIND diet scores, with the corresponding associations of severe pollution being more pronounced among participants with a lower cMIND diet score (HR: 1.72, 95% CI: 1.24, 2.38) than among those with a higher cMIND diet score.

Conclusions The cMIND diet may attenuate the detrimental impacts of indoor pollution on depression among older adults. The findings of this study could encourage the government to commit to promoting the cMIND diet to achieve the goals of the healthy eating campaign and mental health action programs, as outlined in the blueprint of Healthy China 2030.

Key words Depression; Indoor air pollution; cMIND diet; Elderly population