Effects of long-term imidazole dipeptide supplementation on fat metabolism

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[Aims] Imidazole dipeptides have antioxidative effects (Nishitani et al.2009). However, the effect of imidazole dipeptide supplementation on fat metabolism during endurance exercise remains unclear. The purpose of the present study was to examine the effects of longterm imidazole dipeptide supplementation on fat metabolism during endurance exercise. [Methods] Twenty-eight young females were randomly assigned to one of three groups, either placebo (n=9, 2g/day of placebo), 1g (n=10, 1g/day of imidazole dipeptide) or 2g (n=9, 2g/day of imidazole dipeptide) groups. Before and after supplementation period(2months), oxidative stress(d-ROMs) and antioxidant capacity (BAP) were measured. Additionally, endurance exercise for 60 min was performed to compare substrate oxidation pattern during the exercise. [Results] BAP levels were significantly increased in both 1g group and 2g group after the supplementation period (p<0.05), whereas no change was observed in placebo group. Fat oxidation during exercise was significantly reduced in both 1g group and 2g group after the supplementation period (p<0.05). Postexercise serum glycerol concentration was significantly decreased in both 1g group and 2g group after the supplementation period (p < 0.05) [Conclusions] The imidazole dipeptides supplementation appeared to shift energy metabolism towards carbohydrate metabolism dominance. Long-term intake of imidazole dipeptides increases antioxidant capacity while suppressing fat metabolism during exercise. Keywords : imidazole dipeptide, fat oxidation, metabolism

175.

Changes in Japanese Food Guide adherence score in a nutrition intervention trial for athletes

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[Aims] To verify whether a nutrition intervention trial for athletes changes in Japanese Food Guide adherence scores. [Methods] This study was a 1-month randomized controlled trial from 2022 (UMIN000048617). The intervention group received a nutrition lecture. The control group had no intervention. Scores were assessed before and one month after the intervention through a 3-day food records. Each category (grain dishes, vegetable dishes, fish and meat dishes, milk, and fruits) was scored out of 20 points, for a total score of 100 points. [Results] Participants were 61 university soccer players (28 males [46%], age 20.4 [1.2], BMI 21.8 [1.4] kg/m²), with 31 in a control group and 30 in an intervention group. The total score changed from 76.6 (11.7) points to -1.1 (95% CI -5.9, 3.7) points in the control group and from 75.9 (11.1) points to +1.9 (95% CI -2.3, 6.1) points in the intervention group (P = 0.339). The changes in each category were as follows: grain dishes 0.0 vs. +1.5 points (P = 0.051), vegetable dishes -1.4 vs. 0.0 points (P = 0.287), fish and meat dishes 0.0 vs. 0.0 points, milk +0.6 vs. +1.2 points (P = 0.761), and fruits -0.3 vs. -0.7 (P = 0.835). [Conclusions] Although no statistically significant differences were observed, increases in the total score, grain dishes, and milk were observed in the intervention group.

Keywords : diet, RCT, soccer

174.

Effect of different exercise timing on fat oxidation depending on chronotype

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¹Nippon Sport Science University Graduate School, Tokvo, Japan, ²Nippon Sport Science University, Tokyo, Japan, ³Tokai Gakuen University, Aichi, Japan, ⁴Tokyo Kasei University, Tokyo, Japan, ⁵Osaka Metropolitan University, Osaka, Japan, ⁶Japan Society for the Promotion of Science, Tokyo, Japan, ⁷Ritsumeikan University, Shiga, Japan [Aims] This study was to examine the effect of different exercise timing on fat oxidation (FOX) depending on chronotype. [Methods] Participants were twenty-five healthy and non-trained males. Using the Morningness-Eveningness Questionnaire, participants were classified as either early chronotype (EC: n=11) or late chronotype (LC: n=14). The morning trial began at 9:00 and the evening trial began at 17:00. All participants performed cycling exercise at 50% of peak oxygen uptake intensity for 60 minutes. FOX was calculated by oxygen consumption and carbon dioxide production before exercise (pre), during exercise (every 15minutes) and 30 minutes after exercise (post30). [Results] In total participants, FOX was higher in the evening trial than in the morning trial at post30 (p<0.05). In ECs, there were no significant differences in FOX between the trials at any time point. In LCs, FOX was higher in the evening trial than in the morning trial at pre (p<0.05). Total FOX and the change in FOX did not differ significantly between trials for the each chronotype. [Conclusion] This study suggested that exercise timing might not affect FOX on chronotype.

Keywords : circadian rhythm, fat metabolism, endurance exercise

176.

Effect of glucose-containing ice cream ingestion immediately following exercise on subsequent endurance exercise performance two hours later

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¹Asahikawa City University Junior College, ²Hachinohe Gakuin University, ³Ritsumeikan University, ⁴Rakuno Gakuen University [Aim] The purpose of the present study was to compare among the effects of ingesting glucose-containing ice cream, carbohydrateelectrolyte beverage and water immediately following exercise on subsequent endurance exercise performance two hours later. [Methods] Five male subjects ingested one of three trial foods immediately following high-intensity intermittent exercise. The trial foods consisted of glucose-containing ice cream (ICE), carbohydrateelectrolyte beverage (CHO), and water (CON), which were ingested in a random order on separate day for each subject. The ICE and CHO contained 1.2 g/kg body weight of carbohydrates. Two hours after ingestion of the trial food, endurance exercise performance was measured as the time to exhaustion at an intensity equivalent to 60% of VO2 peak. Muscle glycogen concentration, blood glucoserelated parameters, and blood lipid-related parameters were measured. [Results] The rate of muscle glycogen recovery in ICE was significantly (p<0.05) higher compared to those in CON and CHO. However, the times to exhaustion did not differ among the groups. [Conclusion] The results indicate that glucose-containing ice cream is more effective in promoting muscle glycogen recovery compared with water and carbohydrate-electrolyte beverage, but does not affect subsequent endurance exercise performance two hours later. Keywords : muscle glycogen, insulin, incretin

Relationship between serum ferritin and athletic performance in middle school soccer players

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[Aims] To investigate the relationship between iron status and athletic performance in male middle school soccer players with increasing iron demand. [Methods] Twenty-seven players were surveyed. In August and December, body measurements, blood tests, and fitness tests were conducted. Based on the serum ferritin value (Fer) of 35ng/ml in August, subjects were divided into a low Fer group (LFG; n=16) and a high Fer group (HFG; n=11). Statistical analysis was done using IBM SPSS Ver. 29 (p<0.05). [Results] The body height of the LFG in April was significantly lower than that of the HFG. A negative correlation (r=-0.57) was observed between Fer and bone metabolism-reflecting ALP. As a result of individual dietary guidance, the Fer of the LFG increased significantly from Aug. to Dec., and in the fitness test, only the LFG significantly reduced the time of the 20m run and Arrowhead agility test. [Conclusions] Athletes in a growth spurt phase with short stature and active bone growth showed low Fer and high ALP, and athletic performance improved due to stored iron adequacy. Individual nutritional support and sufficiency of stored iron can be expected to improve the competition performance of male middle school athletes.

Keywords : middle school boys, serum ferritin, soccer

179.

The relationship between energy availability and nocturnal interstitial fluid glucose concentration in elite male triathletes during training camp: A case study

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[Aims] Sustained reduction of energy availability (EA) in athletes impairs health and exercise performance. However, the effect of different EA levels on nocturnal blood glucose levels in athletes is not clear. To investigate the effects of different EA levels on nocturnal interstitial fluid glucose concentration (IGC) in 5 male elite triathletes. [Methods] IGC and exercise energy expenditure, calculated based on training logs, were measured during the training camps. In addition, dietary survey was conducted. IGC changes in subjects 1-3 were measured over 4 consecutive days of each training camp in April and February (8 days in total). The remaining two subjects participated in one period of each camp and IGC changes were measured over 4 consecutive days. In total, data from 32 days were collected from all 5 subjects. [Results] Days with < 30 kcal/kg FFM/day of EA (n = 12) showed significantly lower mean nocturnal (23:00-6:00) IGC compared to days with \geq 30 kcal/kg FFM/day of EA (n = 20) (97 \pm 10 mg/dL vs. 109 \pm 6 mg/dL, p < 0.001). On the other hand, IGC did not drop < 70mg/dL for any subjects. [Discussion] Large day-to-day differences in EA was found. Whether we should evaluate for every single day is debatable, however, lowered EA may decrease mean nocturnal IGC. [Conclusion] Nocturnal IGC may be influenced by daily EA during a training camp among elite male triathletes.

Keywords : triathlete, energy availability (EA), continuous glucose monitor (CGM)

178.

Effect of intake paprika xanthophyll on human body

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¹Graduate school of Health and Well-being, Univ. Kansai, Osaka, Japan, ²Faculty of Health and Well-being, Univ. Kansai, Osaka, Japan [Background] Red blood cells (RBCs) can deform, allowing them to pass through narrow capillaries, thus delivering oxygen to tissues throughout the body. However, as RBC membranes age, they become stiffer, which reduces their deformability and negatively affects oxygen delivery. Ingestion of paprika xanthophyll (PX), a nutrient with strong antioxidant properties, is believed to increase the content of PX in RBC membranes and improve RBC deformability after 4 weeks of intake. In previous studies have reported a decrease in heart rate (HR) during steady-state exercise with PX intake. [Aims] The aim of this study was to clarify the effects of PX intake on the body during incremental exercise. [Method] The participants were 20 university students, divided into two groups: a PX intake group (9 mg/day for four weeks) and a non-intake group. A crossover comparative trial was conducted. Exercises were performed using a cycle ergometer, and both constant-load and ramp exercise tests were conducted. Respiratory gas was analyzed, and the HR and rating of perceived exertion (RPE) were measured. [Results & Discussion] In the steady-state exercise test, HR and RPE were significantly lower after PX intake compared to before intake. In the ramp exercise test, the average HR was significantly lower after PX intake. Additionally, there was a significant delay in the appearance of the ventilatory threshold during exercise after PX intake. These findings suggest that PX intake enhances oxygen transport efficiency, leading to positive changes in the body during incremental exercise.

Keywords : oxygen transport efficiency, exercise efficiency, erythrocyte deformability

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Nutritional management for JAXA astronauts on the International Space Station

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¹Dept. Food Science, Univ. Otsuma Women's, Tokyo, Japan, ²AIM SERVICES CO., LTD., ³Japan Manned Space Systems Corporation [Aims] Based on a contract with the Japan Aerospace Exploration Agency (JAXA), as nutritional specialists in the JAXA medical operation team, we have supported the health management of JAXA astronauts who have been assigned or will be assigned to longduration International Space Station (ISS) missions since 2021. Long-duration spaceflights cause multiple health problems. We established a nutritional management system to maintain the health and optimal performance of JAXA astronauts aboard the ISS (crew). [Method] Crew entered detailed dietary records into an iPadbased application developed by the European Space Agency on ISS. Based on records obtained on a weekly basis via the National Aeronautics and Space Administration (NASA), we assessed their diet and provided practical guidance on nutrition through the JAXA Flight Surgeon (FS). For this assessment, we decided on the crew's energy and nutrient requirements based on our preflight support and NASA technical standards. We worked with the JAXA FS when we considered tailored guidance, while monitoring crew activity and body mass on the ISS. [Results] The nutritional management system was implemented smoothly. [Conclusion] Our support for the ISS mission was good. We will develop our management system based on the lessons learned from ISS missions.

Keywords : ISS, JAXA astronauts, nutritional management

Effects of 4-weeks sea buckthorn juice supplementation on endothelial function

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[Introduction] Post-prandial hyperglycemia has been shown to promote arteriosclerosis and increase the risk of cardiovascular disease through oxidative stress-induced endothelial dysfunction. Reducing oxidative stress via nutritional interventions may be effective for mitigating endothelial dysfunction associated with postprandial hyperglycemia. [Aims] To determine effects of 4-weeks sea buckthorn juice supplementation on endothelial function. [Methods] A double-blind, randomized crossover-controlled trial was conducted. Eleven healthy males completed two 4-weeks of juice supplementation (60 mL/day) under two trials: sea buckthorn juice (SB) or a placebo juice (PL). A 75-g oral glucose tolerance test (OGTT) was performed before and after the 4-weeks of juice supplementation. Venous blood sampling and brachial flow-mediated dilation (FMD) tests were conducted before, 60, and 120 min after OGTT. Plasma diacron-reactive oxygen metabolites (d-ROMs) and biological antioxidant potential (BAP) were measured as indication of state of oxidative stress. [Results] There were no differences in the changes in blood glucose levels, plasma d-ROMs or BAP during OGTT before and after the 4-weeks of juice supplementation between the two trials (p>0.05). Fasting FMD was significantly higher after the SB juice supplementation compared to the PL trial (p<0.05), while changes in FMD during OGTT showed similar responses between the two trials. [Conclusion] Sea buckthorn juice supplementation for 4-weeks improved fasting FMD. However, the supplementation did not affect the changes in endothelial function following glucose loading.

Keywords : endothelial function, hyperglycemia, flow-mediated dilation

183.

Association of fat to muscle mass ratio with dietary intake in a cross sectional study

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[Aims] The fat-to-muscle ratio FMR (fat to muscle ratio) is a more comprehensive assessment of body composition than BMI or muscle mass alone, and maintaining a low FMR value is recommended to prevent obesity-related complications in the elderly. However, it is unclear whether specific nutrient intake is related to FMR. To investigate the relationship between FMR and nutritional intake status in the elderly. [Methods] Subjects were 154 elderly persons (61 males and 93 females, 71.3 ± 6.4 years old). Body composition was measured by the DXA method, and FMR, the value obtained by dividing fat mass by muscle mass, was calculated. Nutritional intake was assessed by a simple self-administered dietary history questionnaire (BDHQ) and examined by multiple regression analysis. [Results] The FMR of the subjects was 0.435 ± 0.163 . Nutrient intake was 80.5 \pm 22.6 g/day for protein, 236.1 \pm 74.0 g/day for carbohydrate, 13.2 ± 4.8 g/day for fiber, and 4569 ± 1229 mg/day for sodium. The correlation was negative for protein, carbohydrates, and dietary fiber. The results of the relationship between FMR and sodium intake without energy production are consistent with previous studies. [Conclusions] A diet high in protein, carbohydrate, and fiber and low in sodium intake is associated with low FMR.

Keywords : dietary protein intake, physical activity, dietary carbohydrate intake

182.

Effect of consecutive breakfast skipping on glycemic control after lunch

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[Aims] Postprandial hyperglycemia is a known risk factor for cardiovascular disease, and skipping breakfast often leads to postprandial hyperglycemia after lunch. However, it remains unclear whether this hyperglycemic response is a transient phenomenon. This study investigated the effect of consecutive breakfast skipping on lunchtime glycemic control. [Methods] Nine healthy adults (6 females, 3 males) participated in two randomized, 9-day experimental protocols. In the Eat condition, participants consumed breakfast, lunch, and dinner at consistent times from day 1 to day 9. In the Skip condition, breakfast was skipped from day 1 to day 8, and only lunch and dinner were consumed; breakfast was reintroduced on day 9. In the Skip condition, the energy from the skipped breakfast was evenly distributed between lunch and dinner. Blood glucose and plasma insulin were measured before breakfast, and 30 and 180 min after both breakfast and lunch. [Results] Post-lunch blood glucose levels were higher in the Skip condition compared to the Eat condition on day 1, but no differences were observed on days 2, 5, 8, or 9. Post-lunch plasma insulin levels were elevated in the Skip condition compared to the Eat condition on days 1, 2, 5, and 8. [Conclusions] These findings suggest that the postprandial hyperglycemia observed after lunch due to breakfast skipping may be a transient phenomenon that occurs primarily on the first day of skipping breakfast.

Keywords : blood glucose, plasma insulin, breakfast skipping

184.

Relationship between intestinal bacteria and blood status and body composition in male long-distance track and field runners

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[Aims] The relationship between gut microbiota and health and sports performance has attracted attention in recent years. However, it is difficult to say that the characteristics of the gut microbiota of athletes have been clarified, and it is unclear what characteristics are exhibited by groups of athletes who are particularly prone to chronic energy deficiency, such as endurance athletes. The purpose of this study is to clarify the relationship between gut microbiota and blood conditions/body composition in male long-distance runners. [Methods] We collected stool and blood samples from 31 male university students in the early morning when they were hungry and measured their body composition using DXA. We analyzed the gut microbiota using 16S rRNA metagenomic analysis and evaluated the relationship between the blood and body composition data using Pearson product-moment correlation. [Results] Significant correlations were observed between blood parameters and body composition in six major intestinal bacteria. In particular, a significant negative correlation was observed between bone mineral density of lumbar spine, red blood cell count, hemoglobin, and hematocrit in Akkermansia muciniphila. [Conclusions] The presence of intestinal bacteria that may be related to the risk of sports injuries was found in male longdistance runners.

Keywords : gut microbiota, endurance athlete, sports injury

The influence of nutritional knowledge on eating behavior of female college handball players

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¹Sch of Health & Nutrition, Tokai Gakuen Univ, Aichi, Japan. [Objective] This study examined the effect of nutrition education

on nutritional knowledge and eating behavior in female university handball players. [Method] Nutrition support was provided to 20 members of the handball club for five months. Nutrition seminars were held three times and nutritional information materials were distributed twice. Body composition measurements, energy and nutrient intake, and energy consumption were surveyed, and a nutritional knowledge test was conducted. Comparisons were made before and after the intervention. [Results] Body fat mass was significantly reduced (p<0.05). Carbohydrate intake (4.2±1.6g/kg/day, 5.4±1.7g/kg/ day) was significantly increased (p<0.05). The percentage of correct answers on the nutritional knowledge test increased significantly after the intervention (p<0.05). However, no correlation was observed between nutritional knowledge and energy and nutrient intake. [Discussion] No significant difference was observed in energy intake before and after the intervention, but body fat mass decreased. The results of the dietary survey suggest that the decrease in the lipid energy ratio and increase in the carbohydrate energy ratio may have influenced the change in body composition. In addition, the rate of correct answers to the nutritional knowledge questions increased significantly after the intervention. This is thought to be the effect of the nutritional education. However, increased nutritional knowledge did not lead to appropriate improvements in eating behavior. Keywords : handball, nutrition, nutritional knowledge

187.

Acute effects of difference in dark chocolate intake before resistance exercise on arterial stiffness

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[Aims] This study investigated the effects of difference in dark chocolate intake before resistance exercise on arterial stiffness. [Methods] Eleven healthy males (aged: 23±1.2) performed an intake 0g, 25g and 50g of dark chocolate. All participants performed 5sets of 5 repetitions using 80% of the 1RM bench press and 5 sets 10 repetitions using 70% of the 1RM biceps curl. Brachial-ankle pulse wave velocity (baPWV) was measured before chocolate intake (baseline), before, immediately after, at 30 and 60 min after completing the resistance exercise.[Result] baPWV was significantly increased immediately after the resistance exercise compared with baseline in all trials (p<0.001). It was significantly increased 30 and 60 min after resistance exercise compared with 0g and 25g dark chocolate intake trials. In the 50g dark chocolate intake trial, baP-WV was significantly decreased at 30 min after resistance exercise compared to 0g and 25g dark chocolate intake trial (p<0.001), 60 min after resistance exercise compared to 25g dark chocolate intake trial (p<0.05). [Conclusions] These results suggest that 50g dark chocolate intake before resistance exercise quickly reduces pastexercise increases in arterial stiffness.

Keywords : dark chocolate, resistance exercise, baPWV

186.

Estimating energy expenditure during decathlon event using a triaxial accelerometer

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Keywords : energy expenditure, decathlon, physical activity

188.

Effects of sports nutrition management to improve gut health on the condition of athletes performing long-term, high-intensity exercise

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[Aims] Athletes who engage in prolonged, high-intensity exercise are at risk of impaired gut health, which may increase their susceptibility to other ailments, such as respiratory tract infections, ultimately decreasing their performance. We investigated the effects of nutritional counseling and education by a registered dietitian on gut health of athletes who train for long durations at high intensity. [Methods] The subjects were 11 male university triathletes, swimmers, and long-distance track-and-field athletes who reported poor gut health condition. A nutritional supplementation plan was developed for each athlete, with a daily intake of 25-30g of dietary fiber and two or more servings of fermented foods over a 1-month period. Saliva tests, urine tests, dietary surveys, training volume assessments, body composition measurements, and subjective surveys of physical condition were conducted before and after the intervention. [Results] Dietary fiber intake significantly increased from an average of 22.3±6.8g before to 30.5±4.0g after the intervention, and the consumption of fermented foods tendency increased from an average of 1.56±0.97 to 2.67±1.33 . Additionally, a subjective survey of gut health condition showed a significant reduction in the number of athletes reporting diarrhea or watery stools after the intervention. [Conclusion] Sports nutrition management that considers the intestinal environment may improve gut health in athletes undergoing long-term, high-intensity training.

Keywords : sports nutrition, gut health, condition

Relationship among skeletal muscle tissue cross-sectional area, intramuscular adipose tissue content, and plant protein intake in young and older women

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Aims: Accumulation of adipose tissue within skeletal muscle (IntraMAT) has been reported, which may induce skeletal muscle weakness and metabolic diseases. Consequently it is important to understand the factors that associated with IntraMAT accumulation. IntraMAT content in the total thigh was inversely associated with muscle cross-sectional area (mCSA) in younger and older individuals. Therefore, it may be possible to understand IntraMAT accumulation by focusing on factors related to mCSA. One of the factors that relevant mCSA is protein intake. Protein intake may be related to IntraMAT accumulation by affecting the mCSA. The purpose of this study was to explore the relationship among mCSA of the thigh, IntraMAT content, or protein intake status in young and older women. Methods: Twenty-two young women (20.0 ± 1.5 years) and 24 older women (72.4 \pm 3.3 years) volunteered to participate in this study. Magnetic resonance imaging was used to obtain mCSA of the thigh and IntraMAT content. The protein energy ratio was assessed using a simple self-administered dietary history questionnaire. Results: In both groups, a significant negative correlation was found between mCSA and IntraMAT. In older women, the plant protein energy ratio showed a significant positive correlation with mCSA (r = 0.534) and a significant negative correlation with IntraMAT. Conclusion: These results suggest that higher intake of plant protein might decrease on IntraMAT accumulation in older women, but not in young.

Keywords : IntraMAT, muscle CSA, protein intake

191.

Maslinic acid supplementation suppressed early onset muscle soreness and systemic fatigue after full marathon: A randomized, double-blind, placebo-controlled trial

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[Aim] Completing a full marathon, which is a strenuous exercise, not only causes muscle soreness and fatigue, but also increases damage markers in the blood. Therefore, supplementary strategies can be used to reduce these effects. Maslinic acid is known to have the effect of suppressing pain and inflammation. This study aimed to examine the effects of maslinic acid intake on subjective muscle pain and fatigue and blood markers during a full marathon. [Methods] Twenty-seven healthy participants were randomly divided into placebo (Pla group) and maslinic acid (MA group) groups. Subjective muscle soreness and systemic fatigue and blood sampling were conducted early in the morning (Pre), immediately after completing the full marathon race (Post), and one day after the race (Day1). [Results] A main effect of time at Post was observed for blood markers compared with the Pla and MA groups. Subjective muscle soreness and systemic fatigue score after the full marathon were compared between the Pla and MA groups, which showed significantly higher values, regardless of the group. However, muscle soreness in almost all body parts and systemic fatigue were significantly lower in the MA group than those in the Pla group on Day1. [Conclusion] Maslinic acid intake during a full marathon suppressed subjective muscle soreness and fatigue on Day1.

Keywords : strenuous exercise, supplementation, muscle soreness

190.

The effects of degree of chewing frequency during a meal on food reward and an appetitestimulating hormone in young men

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¹Waseda University

[Aims] Increasing the number of chews during a meal has been reported to suppress postprandial glucose and ghrelin, an appetitestimulating hormone. However, the effects of the number of chewing on food reward which regulates desire for and pleasure in food are unknown. We investigated whether the degree of chewing frequency during a meal influences food reward and ghrelin. [Methods] Twenty-four young healthy men (23.0±1.5 years mean±standard deviation) consumed a prescribed meal in a fasted state. The frequency of chewing during the meal was measured using a chewing-count measurement device. The median value of the number of chews was classified into a high mastication group (12 subjects; 73±7 times/minute) or a low mastication group (12 subjects; 52±10). Questionnaires and blood samples were collected before (0930) and after (1000, 1030, 1100, 1130, 1200) the meal to assess subjective appetite, glucose, insulin and active ghrelin. Food reward was assessed using a computer-based food choice behaviour task tool before and after the meal. [Results] Lowered glucose concentrations were observed in the high mastication group than in the low mastication group (a min effect of trial, p=0.046). No differences were found between the two groups for insulin, active ghrelin, subjective appetite and food reward. [Conclusions] The degree of chewing frequency during the meal appears to have no effect on food reward and ghrelin in healthy young men.

Keywords : chewing, food reward, ghrelin

192.

Examination of the osteoporosis prevention effects of daidzein intake and exercise

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[Introduction] In Japan, the prevalence of osteoporosis is rapidly increasing, particularly among postmenopausal women, due to an aging population. Evidence suggests that daidzein (Dz), a type of soy isoflavone, exhibits a preventive effect against postmenopausal osteoporosis. Dz is metabolized by intestinal bacteria to equol, resulting in estrogenic effects. The literature has also indicated that changes in intestinal bacterial flora may be involved in exercise (Ex)-induced improvements in metabolic function. [Objective] To determine the effect of Ex and Dz intake on osteoporosis prevention through changes in the gut microbiota. [Methods] An ovariectomized (OVX) rat model of postmenopausal osteoporosis was created and subjected to voluntary Ex via a running wheel or Dz intake. Body weight, muscle weight, bone density, and urinary equol concentration were measured in the OVX group and the sham group. Additionally, DNA was extracted from feces to identify intestinal bacterial flora using 16S rRNA analysis. [Results & Discussion] The body weight gain associated with OVX was suppressed by Ex loading. The Dz intake group showed higher urinary equol concentrations and a greater decrease in cortical bone density, as compared with the sham group. Ex in the presence of Dz did not result in an additive effect on equol production or an increase in cortical bone density. [Conclusion] Voluntary Ex suppressed weight gain. However, Dz did not modify the regulation of cortical bone density via equol.

Keywords : daizein, equol, osteoporosis

Energy intake of male student jumpers during the transition and preparation for the competition phase

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[Background] Adequate energy intake is known to affect athletic performance and other factors. However, few studies have shown seasonal changes in energy intake in jumpers. [Purpose] To clarify the changes in energy intake of male student jumpers during the transition and preparation periods leading up to the competition period. [Methods] 27 male student jumpers were included in the study. The Food Frequency Questionnaire (FFQ NEXT shortened version) was used to investigate energy intake. Body composition was measured using the DXA method (Holyzon, Hologic). The athletes' estimated energy requirements were calculated using the athletes' estimated basal metabolic rate, physical activity level (PAL), and lean body mass. The energy intake percentage was calculated as the ratio of energy intake to the estimated energy requirement. [Results, Discussion, and Conclusions] The energy intake percentage was significantly higher during the transition period than during the preparation period. Since lean body mass increased significantly from the transition period to the preparation period, the estimated energy requirement also increased, suggesting that energy intake during the preparation period may not be sufficient. Energy intake of male student jumpers was found to decrease from the transition period to the preparation period.

Keywords : energy intake, body composition, track and field jump athletes

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Impact of breakfast skipping and exercise on blood glucose and vascular function after lunch

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[Aims] Previous studies indicate a correlation between habitual breakfast skipping and increased cardiovascular disease risk. In contrast, regular exercise effectively reduces this risk. We examined the effects of exercise intensity after breakfast skipping on glucose, lipid metabolism and vascular function post-lunch. [Methods] Ten healthy adults performed high-intensity intermittent exercise (H condition) and low-intensity continuous exercise (L condition) with equal work capacity after breakfast skipping. The control (C) condition involved no exercise. Participants underwent a 75-g glucose tolerance test (OGTT) instead of lunch after 90 min of exercise. Vascular function was assessed by flow-mediated vasodilation (FMD) before exercise, pre-OGTT, and at 1 and 2 hours post-OGTT. Blood glucose (BG), plasma insulin (PI), plasma free fatty acids (FFA), and oxidative stress (d-ROMs, BAP) were measured throughout. [Results] GE did not differ among conditions. BG during OGTT was lower in H and L than in C. FFA increased significantly in L compared to C and H post-exercise. PI and TG showed no differences. %FMD was higher in H than L before and at 1 hour post-OGTT. d-ROMs were lower at 2 hours post-OGTT in L compared to baseline. BAP increased in H and decreased in L at 2 hours post-OGTT compared to baseline. [Conclusions] These findings suggest high-intensity intermittent exercise may mitigate vascular endothelial dysfunction caused by breakfast skipping, while lowintensity continuous exercise may enhance it.

Keywords : blood glucose, free fatty acid, vascular endothelial function

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Effects of lifestyle modifications on gut microbiome: N-of-1 study

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Background: Consistent findings on changes in gut microbiota due to exercise and diet have not been obtained. It is presumed that individual differences in the microbiota are involved. Objective: We examined changes in the gut microbiota to repeated lifestyle interventions. Methods: A 56-year-old male subject was asked to increase exercise (E), protein intake (P), and vegetable intake (V) for one week six times each in one year. Before (C) and after (WO) a week of each intervention let the subject lead normal lives. Exercise, nutrition, bowel movements, and gut microbiota were measured daily. Results: All interventions were carried out as planned. Compared to C and WO, the α diversity of the microbiota was higher in P, and there was no difference in E and V. In the dominant bacteria, Prevotella 9 decreased and Bacteroides increased in P. Four bacteria such as Akkermansia increased and three bacteria such as Eubacterium rectale decreased. Six bacteria such as Eubacterium rectale increased, and four bacteria such as Akkermansia decreased in V. The β diversity of P and V differed from C and WO, and the direction of change was opposite. The shape, color and quantity of stool, protein and fiber intake, body weight and %fat were correlated with variances in β diversity. No microbiota changes were observed in E. Conclusions: The gut microbiome of a 56-year-old man fluctuates repeatedly with increased protein and vegetable intake per week. Keywords : microbiome, nutrition, exercise

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Associations of chronotype with skipping breakfast and body composition among female university students

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Although Morningness-Eveningness questionnaire (MEQ) score and physical activity level (PAL) are related to body composition, they are not related to total energy intake (TEI) in female university students (Oshita et al, J Physiol Anthropol. 43: 13, 2024). However, chronotype is reported to lead the differences in daily dietary patterns. The aim of this study was to investigate the relationship between chronotype, breakfast skipping and body composition in female students. A total of 215 female university students were divided into two groups: consumed breakfast on a near-daily basis (EAT; n = 143) and not consume breakfast on a daily basis (SKIP; n = 72). No significant differences were observed in PAL and TEI between the groups. MEQ score of the EAT was significantly higher than that of the SKIP, and 51.4% of the SKIP were classified as evening types (ET). Although fat-free mass was significantly lower in the SKIP than in the EAT, the effect sizes were small. The SKIP may have eaten more after lunch, which could explain there was no difference in daily TEI. These differences in diet may have led to differences in body composition. Female students who skipped breakfast exhibited lower MEQ scores than those who did not skip breakfast, and over half of the former group was classified as ET. While there was no significant difference in daily total PAL and TEI between the two groups, muscle mass was marginally but significantly lower in the breakfast skippers.

Keywords : muscle mass, energy intake, nutritional status