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### **Substrate oxidation after breakfast may have different roles than after other meals**

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An adequate metabolic reaction in proportion to ingested macronutrients leads to prevention of storage of fat and hyperglycemia. The purpose of this research was to investigate whether there are differences between breakfast, lunch and dinner in the response of substrate oxidation after consumption of meals and whether there are inter-individual variability. Post-prandial substrate oxidation was measured in twenty adult men [age,  $20.5 \pm 1.4$  y; body mass index,  $20.8 \pm 1.5$  kg/m<sup>2</sup>] using a whole room indirect calorimeter, with respiratory quotient (RQ) being calculated every 30 minutes for 2 hours. The subjects ate three meals a day which consisted of similar energy amount and a normal macronutrient composition for Japanese subjects in each meal. Variation in post-prandial

RQ ( $\Delta$ RQ) was calculated as the difference from basal RQ measured at basal metabolic rate. Mean post-prandial RQ values in the three meals were not significantly different. RQ after breakfast was not associated with RQ after the other meals, although RQ after dinner correlated significantly with RQ after lunch ( $r = 0.643$ ;  $p = 0.002$ ).  $\Delta$ RQ of each meal correlated strongly with  $\Delta$ RQ of the other meals. The levels of post-prandial changes in RQ were relatively stable in each individual, although there was inter-individual variability in post-prandial RQ in breakfast. Further studies are needed to clarify whether these different physiological responses lead to individual variation in weight gain.

**Effect of electro-acupuncture  
on hindlimb suspension-induced skeletal muscle atrophy in mice**

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In this study, we aimed to examine the preventive effect of electro-acupuncture (EA) on skeletal muscle atrophy induced by hindlimb suspension (HS). A growing body of evidence has indicated that E3 ubiquitin ligases, such as atrogen-1 and MuRF1, play a central role in skeletal muscle atrophy. Acupuncture therapy has long been used for alleviating fatigue. Therefore, EA may ameliorate skeletal muscle atrophy. We also studied the effect of Chishin (the points where the needles are kept in the muscle for 30 min) on skeletal muscle atrophy caused by HS, and developed another clinical methods using acupuncture. The acupuncture interventions were conducted on the hindlimb muscles with HS daily for 2 weeks. A total of 28 male mice, 8 weeks old, were randomly placed into 4 groups: A) control, B) HS, C) HS + Chishin, and D) HS + EA 1 Hz (n = 7/group). We

measured their muscle mass and the mRNA expression of atrogen-1 and MuRF1. Then, we measured the activation of other important signalling pathways, mRNA levels of the transcription factor Foxo, and mRNA levels of the phosphoenzymes Akt1 and PI3K (using quantitative RT-PCR). The weight of soleus showed significantly greater gains in the HS + EA 1Hz group than in the HS group ( $p < 0.01$ ). The mRNA expression levels of atrogen-1 and MuRF1 in HS + EA 1Hz group were significantly lower than that in the HS group (68% and 71%, respectively). The expression levels of Akt1 showed significantly greater gains in the HS + Chishin group than in the HS group ( $p < 0.05$ ). These results suggested that EA1Hz and Chishin suppressed the activity of E3 ubiquitin ligases, thus preventing HS-induced muscle atrophy.

## **Effects of different intensities of endurance exercise on oxidative stress and leukocyte activation markers**

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The purpose of this study was to investigate the effects of three different intensities of exercise based on anaerobic threshold (AT) on reactive oxygen species (ROS) production and antioxidant capacity. Eight healthy male subjects performed three different intensities of exercise for 20 min: (1) 70% AT (LI), (2) 100% AT (MI), and (3) 130% AT (HI) on bicycle ergometers. A control (C) trial was conducted under resting conditions. Blood samples were taken pre-exercise, immediately after exercise and 30 min after exercise. Plasma derivatives of reactive oxygen metabolites (d-ROMs) concentration was significantly higher than pre-exercise values immediately ( $P<0.01$ ) and 30 min after exercise ( $P<0.05$ ) only in the HI trial.

Percent changes in myeloperoxidase from pre-exercise to post-exercise were higher following the HI trial than the C and MI trials ( $P<0.01$ ). Plasma trolox equivalent antioxidant capacity (TEAC) was significantly increased immediately after exercise in the HI trial ( $P<0.01$ ). Plasma glutathione peroxidase (GPX) activity was significantly higher than pre-exercise values immediately after exercise in the MI ( $P<0.05$ ) and HI trial ( $P<0.01$ ). These findings suggest that endurance exercise above the AT level increases ROS production through neutrophil activation, but endogenous enzymes (especially GPX activity) or non-enzymatic antioxidants modulate the exercise-induced ROS generation.

## **Ethnic culture in modern leisure activities**

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Appadurai stated that Migration and media together help to de-territorialize cultural boundaries in modern era. Since the 19th century, colonialism, globalism, big scale tourism and internet have made huge influences on the transformation of ethnic culture. Yet, apart from changing among native people and local landscape, so called “ethnic culture” now also practiced in areas far from its original area along with moving immigrants or even learned by people rather than its native group, the mix is even more often and diverse in urban area. This study explores two emerging phenomena

of leisure culture in Taiwan, the numerous urban harvest festivals of Taiwanese aborigines and belly dance fad among Taiwanese women. The former expresses the extended tradition and created new culture meaning while large number of aborigines immigrate to urban areas; the latter shows how traditional Middle Eastern dance changes after the Western construction and localizing process in Taiwan. Both of them show the dynamic feature and multiple facets of ethnic culture in modern world.

**The role of physical activity in the prevention  
of atherosclerotic cardiovascular disease in older adults**

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We have conducted one study concerning the relationship between the amount of physical activity and oxidised low-density lipoprotein (LDL) in older adults. Our first study demonstrated that fasting plasma oxidised LDL and plasma monocyte chemoattractant protein-1 concentrations were negatively correlated with the amount of physical activity in older adults (Park et al., *Journal of Atherosclerosis and Thrombosis*, in press). These findings indicated that the oxidative modification of LDL may be prevented through regular physical activity. The findings of our first study on the relationship between physical activity status and

cardiovascular risk markers have led to the formulation of ideas for our further research in this area. We are currently conducting our second study examining the effectiveness of regular walking, if any, on lowering circulating concentration of oxidised LDL, oxidative states and a scavenger receptor expression in older adults. This would be help to clarify whether physical activity intervention can be used to slow the progression of atherosclerosis and reduce the potential risk of atherosclerotic cardiovascular disease in older adults.

## **The relationship between the P300-related time frequency components and physical activity**

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The purpose of this study was to determine the nature of the P300-related time-frequency (TF) components and to examine the relationship between the TF components and physical activity (PA). Electroencephalogram (EEG) was recorded from twenty-six older adults while they performed a flanker task. A single trial TF analysis was used to reveal TF components. Participants were divided into two groups according to their physical activities as measured by an accelerometer/pedometer. Higher PA group individuals (N=13) walked more than 30 minutes per day at an intensity stronger than 3 metabolic equivalents (METs), whereas Lower PA group

individuals (N=13) walked less than 30 minutes per day. Analyses revealed clear theta and delta activities in the P300 time window, suggesting that the P300 consists of both frequencies. On incompatible trials, the rate of power change increased for both theta ( $p < .05$ ) and delta bands ( $p < .05$ ) for the Higher PA group relative to the Lower PA group. However, this was not the case on compatible trials. These results suggest that physical activity should enhance attentional control and reduce response conflict on incompatible trials. Our study also suggests that the TF analysis would be a powerful tool to clarify cognitive processes associated with physical activity.

**Association of eHealth literacy with knowledge and screening practice about colorectal cancer among Japanese adults**

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In rapid developing an internet society, eHealth literacy becomes important to promote health and aid in health care among individuals. Although previous studies have been observed that poor health literacy is associated with less knowledge and screening practice about colorectal cancer (CRC), little is known about eHealth literacy. The present study examined the association of eHealth literacy with knowledge and screening practice about CRC. Data were analyzed for 3,000 Japanese adults (male: 50.0%, mean age±SD:39.6±10.9 years) who responded to Internet-based cross-sectional survey. Knowledge regarding definition, risk factor, and screening about CRC, previous CRC screening practice, the Japanese

version of the eHEALS (J-eHEALS), and demographic attributes were obtained. An adjusted logistic regression by sociodemographic attributes (gender, age, marital status, educational attainment, household income level, frequency of using internet) was used to determine the association of eHealth literacy with knowledge and previous CRC screening practice. The eHealth literacy was positively associated with knowledge about CRC (OR = 1.25; 95%CI = 1.10-1.45) and previous CRC screening practice(OR = 1.46; 95%CI = 1.18-1.80). From the results of the present study, individuals with low eHealth literacy seem to have less knowledge about CRC and perform CRC screening practice among Japanese adults.

**Effect of voluntary exercise and energy restriction on bone mineral density  
in female rat model**

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Some athletic women with chronic exercise training and energy deficits are at risk for osteoporosis. The aim of the present study was to establish animal model of osteoporosis for female athlete. We have designed to investigate the effect of long-term energy restriction on bone mineral density (BMD), and  $17\beta$ -estradiol level in voluntary wheel running female rats. Fourteen female Sprague-Dawley rats (8 wk old) were randomly assigned to two groups, running group or sedentary group. Water and diet were available to all rats initial 10-wk baseline period. Running group were free access to wheels throughout the

study. At 18 wk of age, the rats in running group were randomized into two groups: Run-Control-fed (ad lib-fed) group (RC group) or Run-Restricted-fed (30 % energy restriction) group (RR group). After 14-wk intervention, BMD of femur in RR group were lower than RC and Sedentary groups ( $p < 0.05$ ). Serum  $17\beta$ -estradiol level was significantly lower in RR and RC groups than sedentary group. The present study indicated that long term energy restriction in voluntary wheel running induced bone loss in female rats. This may establish a foundation for osteoporosis for female athlete rat model.



**Perceived environmental factors associated with physical activity  
among normal-weight and overweight Japanese men**

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Although it is crucial to examine the environmental correlates of physical activity (PA) for developing more effective interventions for overweight populations, limited studies have investigated differences in the environmental correlates on body mass index (BMI). The purpose of the present study was to examine the perceived environmental correlates of PA among normal-weight and overweight Japanese men. Data were analyzed for 1420 men (aged  $44.4 \pm 8.3$  years), who responded to an internet-based cross-sectional survey of answering the short version of the International Physical Activity Questionnaire and its Environment Module. Binary logistic regression analyses were utilized to examine the environmental factors associated with meeting the PA recommendation (150

minutes/week) between the normal-weight and overweight men. After adjusting for socio-demographic variables, 10 environmental correlates of walking in normal-weight and 3 in overweight men were observed. For the normal-weight men, street connectivity was a positive environmental factor associated with moderate-to-vigorous PA (MVPA) excluding walking. In contrast, for the overweight men, seeing people being active was positively associated with MVPA excluding walking. The results indicated that BMI status is a potential moderator between perceived environmental factors and PA, and suggested that different environmental intervention approaches should be developed for an overweight population by using those for normal-weight population.

**Motor programming of response sequence and movement duration:  
A chronometric analysis**

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The present study investigated the effects of response sequence and movement duration on motor programming using the additive factor method (AFM). Participants were asked to perform choice reaction time tasks, in which they responded to the kanji characters for left and right by tapping their left or right finger, respectively, in different sequence lengths (1-tap vs. 3-taps), sequence complexity (index→index→index vs. index→ring→middle), and movement duration (50 vs. 500 ms). These conditions were consistent within each block, but counter-balanced in terms of order. Reaction time (RT) showed under-additive interactions between movement duration and response sequence. In the short duration tapping task, a sequence effect on RT was found; the longer

and the more complex sequences resulted in longer RT. In the longer duration tapping task, the sequence effect on RT vanished. These results are consistent with the two-process model proposed by Klapp (1995) that suggests a parallel processing of motor programming in the sequence choice task. Because we found behavioral evidence supporting motor parameter effects, we are also obtaining electrophysiological evidence to clarify that these effects really result from motoric processing. The response-locked lateralized readiness potential (LRP) should differ among conditions, although the stimulus-locked LRP would not. We believe that this study will shed light on the organization mechanism of motor programming.

## Effect of home-based tube rowing training on trunk muscles in elderly men

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The purpose of this study was to examine the effect of home-based rowing training by using resistance tube on trunk muscles in elderly untrained men. Twenty healthy untrained elderly men aged 65–79 years were assigned to either a tube-rowing training (n = 8) or control group (n = 11). Those in the tube-rowing training group underwent the home-based rowing exercise training by using resistance tube, three times a week for 3 months. The cross-sectional areas (CSAs) of trunk muscle were measured by a MRI at the baseline and post 3 month-training. There were no differences between the two groups for all the

baseline measurement values. The exercise training achievement rate was 97%. After the 3 month-training, total trunk muscle, rectus abdominis, and psoas major CSAs in the training group increased by 4%, 9%, and 9%, respectively ( $P < 0.01$ – $0.001$ ). Furthermore, the training group had significantly higher change rate of these muscle CSAs than the control group ( $P < 0.01$ – $0.001$ ). No changes were observed for all the CSA values in the control group. These findings suggested that home-based tube rowing training is a favorable tool for increasing rectus abdominis and psoas major for elderly men.

## **Influence of aquatic exercise for elderly people with chronic low back pain**

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The purpose of this study was to investigate the influence of aquatic exercise for elderly people with chronic low back pain. A total of 21 elderly people (2 males and 19 females,  $66.2 \pm 11.9$  years, mean  $\pm$  SD) were included in this study. Aquatic exercise program consisted of 5 sessions (walk, pelvis exercise, hip joint exercise, kickboard exercise, floatable stick exercise), twice a week for 12 weeks in a swimming pool at 30°C. They were assessed for physical measurement, muscle strength, balance, flexibility, Visual Analog Scale, Quality of life (QOL) was estimated by JOABPEQ and questionnaire. Evaluations were performed before

exercise and after exercise. The body fat decreased ( $p < 0.01$ ), muscle strength ( $p < 0.01$ ), flexibility ( $p < 0.01$ ) and balance ( $p < 0.05$ ) increased. The degree of low back pain and the pain of lower limbs showed tendency of reduction, but QOL were no significant differences. Many people were satisfied for aquatic exercise and answered it that we wanted to continue in future. The result of this study suggested that aquatic exercise has effects for elderly people with chronic low back pain to increase flexibility, balance and muscle strength and aquatic exercise can also continue for long period.

**Effectiveness of lumbar stabilization exercises  
for reducing chronic low back pain and improving quality-of-life**

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The purpose of this study was to investigate the effectiveness of lumbar stabilization exercises for treating chronic low back pain (CLBP). The subjects were 18 patients with CLBP. The exercises involved drawing-in and prone kneeling. The exercises were performed during 3-month intervention period. Pain was evaluated using the Visual Analog Scale (VAS), while Quality-of-Life (QOL) was estimated using the Japanese Orthopaedic Association Back Pain Evaluation Questionnaire (JOABPEQ). Pain and QOL were assessed prior to the intervention (T0), and at one (T1), three (T3), and six months (T6) after the intervention. Prior to the intervention, pain was

significantly improved over the study period. At T1, patients reported significant improvements in the lumbar functions score and social life functions score. These same changes were still observed at T3. And patients also reported significant increases in low back pain score and walking ability score. At T6, the change in low back pain score had disappeared, however the other score tendencies are remained, especially significant improvements in mental health score. These results suggest that performance of lumbar stabilization exercises is an effective method for improving comfort and QOL in patients with CLBP.

## **Mechanisms of metabolic syndrome improvement by exercise training**

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Visceral obesity increases the risk for metabolic syndrome, such as atherosclerosis and nonalcoholic steatohepatitis. In particular, chronic inflammation within adipose tissue plays an important role in pathogenesis of these metabolic syndrome. In addition, high fat-induced obese mice enhanced activation and infiltration of immune cells such as macrophages in adipose tissue. These immune cells are known to induce inflammation in adipose tissue. On the other hand, chronic exercise is effective in prevention and improvement of metabolic syndrome according to attenuation of inflammation. However, it remains unclear whether exercise training attenuates inflammation in adipose tissue.

We observed that exercise training attenuated inflammation states in adipose tissues via acceleration of macrophage phenotypic switching (Kawanishi et al., Exercise Immunology Review). Recently, it is shown that T lymphocytes such as natural killer T (NKT), T helper type 17 (Th17) and regulatory T (Treg) cells modulate activation and infiltration of macrophages and neutrophils in obese mice. Therefore, the purpose of the second study was to clarify whether exercise training suppresses activation of macrophages and neutrophils via functional modulation of T lymphocytes in obese mice by using flow cytometry.

**Psychological, social and environmental factors associated with the use of senior center  
in Korean older adults: Rationale, design and methods**

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Health promotion in older adults using an integrated senior center in Korea is important in planning and model construction of long-term care prevention. The purpose of this study is to examine the relationships between the use of senior center and psychological, social or environmental factors in Korean older adults. This study will be conducted by using a questionnaire survey to distinguish between two types of older adults who live in Seoul, Korea. The survey included the self-reported measure of demographic, health-related, psychological (self-efficacy, pros and cons), social (social support) and

environmental (access to facilities) items as the dependent variables, and the usage situation of senior center as the independent variable. This study will be recruited 300 people in total, in which the user of the senior centers will be 150 and non-users will be 150. A chi-squared test will be utilized to compare differences in demographic and health-related variables among the user and non-users. Additionally, a logistic regression analysis will be used to examine associations between the use of senior center and the various predictors.

## Effects of pre-sleep intensive exercise on the following night sleep

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The purpose of the present study is to examine the effect of high-intensity exercise on sleep components evaluated by polysomnography (PSG). Seven male adults participated in the experimental condition consisting of three consecutive days. The first night was set for acclimatization. Subsequent two nights were set as “no-exercise day (second night, control condition)” and “exercise day (third night, exercise condition)”, respectively. On the exercise day, the subjects performed ten sets of 5 sec maximal pedaling exercise with 25 sec rest periods between sets. An applied load for maximal intermittent exercise was equivalent to

7.5 % of each subject’s body weight. The exercise was then repeated after 30 min. Respiratory parameters and blood lactate concentration were measured before and after exercises. During sleep (bedtime from 23:30-07:30), EEG, heart rate, and rectal temperature were continuously recorded. Exercise caused increases in resting oxygen uptake, blood lactate concentration, and rectal temperature ( $p<0.05$ ). Furthermore, there were significant differences in heart rate and heart rate variability between control condition and exercise condition. We present preliminary data of heart rate variability and EEG frequency analysis.



## **Correlates of awareness of the Japanese Food Guide Spinning Top and change of awareness from 2007 to 2009**

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The purpose of this study was to examine the characteristics of those who were not aware of the Japanese Food Guide Spinning Top (JFG), and change of awareness of the JFG. A longitudinal study was conducted, using an Internet-based questionnaire with 787 Japanese adults (39.8±9.7 years) recruited from the registrants of the Japanese social research company. The survey was conducted in November 2007 and December 2008. The survey included items on awareness of the JFG as the dependent variable, and socio-demographics factors (gender, age, marital status, educational status, employment status, household income) and health risk factors (obesity,

abdominal obesity) as the independent variables. Logistic regression analysis was used to analyze the relationship between awareness and each variable. Changing of awareness (2007-2009) were analyzed using McNemar test. After adjusting for all variables, being male and those with abdominal obesity were negatively associated with awareness of the JFG at 2007. Overall, awareness of the JFG increased from 56.0% at 2007 to 61.8% at 2009, and awareness of the JFG increased in male (41.0%, 49.8%) and abdominal obesity (40.3%, 48.9%). From 2007 to 2009, the dissemination of the JFG reached the socio-demographic subgroups which were less likely to be aware of JFG at 2007.

## **Aerobic exercise-induced changes of ankle to brachial pressure index and menstrual cycle-dependent inflammation**

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To examine the hypothesis that exercise-induced vascular reactivity decreases through nitric oxide (NO) which is increased by leukocyte activation, we investigated exercise-induced changes in variables of the ankle to brachial pressure index (ABI), NO production and leukocyte activation during the normal menstrual cycle. Ten healthy sedentary females (20.5±0.7 years) performed 60 min of cycling at 75% of their individual anaerobic threshold (AT) at three phases of the menstrual cycle (menstrual, follicular and luteal phases). ABI was evaluated before and after exercise, and blood was sampled before, immediately after and 30 min after exercise. We measured the concentrations of plasma nitrotyrosine as a marker of NO production,

interleukin (IL)-6 and calprotectin as markers of inflammation and leukocyte activation. ABI significantly decreased after exercise in the menstrual phase, IL-6 increased significantly following exercise in all phases and calprotectin significantly increased immediately after exercise in the menstrual phase. A positive correlation was observed between exercise-induced changes in nitrotyrosine and calprotectin in the menstrual phase only. These findings suggest the possibility that aerobic exercise induces leukocyte activation, and NO which is produced by leukocyte activation affects vascular reactivity after exercise, especially in the menstrual phase.

**Psychological, social, and environmental factors  
to meeting physical activity recommendations among Chinese adults**

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Background: The present study investigated psychological, social, and environmental factors associated with meeting physical activity recommendations among Chinese adults. Methods: Data were analyzed for 1394 Chinese adults who responded an Internet based cross-sectional survey. Self-reported measure of physical activity, psychological (self-efficacy, pros, and cons), social (social support, health professional advice), environmental (home fitness equipment, access to facilities, neighborhood safety, enjoyable scenery, frequently observing others exercising, residential area), and demographic variables were obtained. Based on the on the ACSM/AHA physical activity guideline. An adjusted logistic regression model

was utilized. Results: When adjusting for all other variables, self-efficacy (men:OR=2.30, women:OR=1.99) and access to facilities (men:OR=1.99, women:OR=2.07) for both genders. In women, advice from health professional (OR=2.11) and living in rural areas (OR=2.22) were positive associated with meeting the physical activity recommendations. Conclusion: In the psychological, social, and environmental domains, significant correlates of attaining the recommended level of physical activity were observed. These findings suggest that an intervention design that accounts for those correlates may more effectively promote physical activity among Chinese adults.

**Triceps surae muscle-tendon unit changes its length as a function of ankle joint angles and contraction levels: The effect of foot arch deformation**

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In the present study, the changes in the triceps surae muscle-tendon unit (MTU) length and the foot arch angle were determined for a given ankle joint angle with and without muscle contraction. A magnetic resonance imaging system was used to take a series of sagittal images of the foot while 1) the subject's ankle joint was secured without muscle contraction at 10° dorsiflexed position, neutral position (NP), and 10° (PF10) and 20° plantar flexed position, and 2) the subject performed isometric plantar flexions with the efforts of 30%, 60%, and 80% of maximal voluntary contraction (MVC) at NP. The displacement of the calcaneal tuber in each trial was measured as the changes of the triceps surae

MTU length. The results demonstrated that the ankle joint angle was increased (i.e., plantar flexed) upon muscle contraction, and that the angles measured at 80%MVC and PF10 without muscle contraction were comparable. Then, the amount of shortening in the triceps surae MTU length relative to NP at rest was significantly greater at 80%MVC ( $14 \pm 4$  mm) than at PF10 ( $6 \pm 2$  mm). The foot arch angle increased as the contraction level increased from rest to 80%MVC ( $8 \pm 3^\circ$ ), whereas it decreased at PF10 ( $-2 \pm 2^\circ$ ). These results indicate that the triceps surae MTU length for a given ankle joint angle is affected by the contraction-induced foot deformation.

**Sources of strength training information, perceived health benefits of strength training, and strength training intention among Japanese older adults**

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To develop communication strategies for promoting perceived health benefits of strength training and the strength training intention, identification of effective communication channels for disseminating strength training information is necessary. This study aimed to identify which information sources of strength training were associated with perceived health benefits and the strength training intention among Japanese older adults. The participants were 1,144 older adults (60–74 years) randomly sampled from Tokorozawa City, Japan. A questionnaire survey was conducted. The study design was cross-sectional. The independent variables were source of strength training information (e.g., television, newspaper, posters in public spaces, and friends), and the

dependent variables were perceived health benefits (high or low) and intention (yes or no). Logistic regression analysis was used. After adjusting for demographic factors and all other information sources, information from health care providers (OR=2.08), friends (OR=2.28), television (OR=1.48), books (OR=1.58), and the Internet (OR=3.01) were positively correlated with intention. Higher perceived health benefits were significantly associated with information from family (OR=1.53) and books (OR=1.43). These results suggest that providing strength training information via interpersonal channels, television, the Internet, and books might be effective to enhance the perceived health benefits and the intention among older adults.