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**A study on right or wrong of “foul game” in basketball:  
With focus on the controversy between Fraleigh and Simon**

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The purpose of this study was to examine the point on the controversy between Fraleigh and Simon on right or wrong of “foul game” in basketball. “Foul game” is the action that a defense player toward the end of a close game will intentionally foul players in possession of the ball in order to stop the clock. Simon has the opinion that such action are allowed with the opinion that Fraleigh is not allowed. There are three points in the controversy between Fraleigh and Simon.

1. Importance of restorative skills
2. Function of the penalty for “foul game”
3. Presence or absence about agreement of participants for “foul game”

In this study, to examine these three points, the method is proposed, which we analyze the transition of the provisions in official basketball rule associated with “foul game”.

The results here are as follows.

1. Importance of restorative skills has become more significant.
2. The function of the penalty for “foul game” has shifted from the sanction for prohibited acts to the price for options.
3. Agreement of participants for “foul game” has moved turned to be acceptable.

To analyze transition of the provisions in other official basketball rules is the issue in the future.

## Comparative research on high level sport team in Japanese and Chinese university

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The paper tries to compare with university high level sport team in Japan and China, seeks to find better efficient model to operate Chinese university high level sport team and to solve current problems.

There are amount of papers on Chinese university high level sport team. However, few papers concern about theoretical research. What's more, Chinese university high level sport team is produced by series official policies. Bureaucracies and universities consider university high level sport team as instrument so that university sport team faces dilemma. Therefore, with comparative perspective study, the paper tries to solve current disadvantage situation of university high level sport in China.

The paper will apply these methods to study.

1). Literature review. Collecting and analyzing relative literature on university high level sport.

2). Questionnaire. Designing questionnaires and surveying Waseda and Tsinghua university sport team. 3). Case study and Comparative study.

As Waseda University and Tsinghua University case study, and comparing them from team management, team training, the influence of team on campus sport culture, and other factors.

There are some conclusions as follows: through comparative study, the development of Japanese university sport team is better than Chinese high level sport team and, Chinese university high level sport team should learns Japanese university sport team from the aim of team, management, coaches hiring, athletes selecting and other factors.

## **Patterns of Physical Activity out of Class Time among Japanese Junior High School Students**

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The purpose of this study was to describe the current patterns of physical activity (PA) and to identify the gender and grade differences in PA patterns among Japanese junior high school students. Participants were comprised of 714 adolescents aged 12-15 years old with complete demographic and anthropometric data (boys n=372, girls n=342) from Okayama prefecture, in Japan. Information on PA engaged inside and outside of school in a usual week was collected through a seven-item questionnaire. Each item focuses on one domain of PA, which was categorized by setting, period, and type of PA. To measure the variance of PA patterns by

genders and grades, independent t-test and ANOVA analysis were conducted respectively. Boys accumulated significantly more time of PA on both inside and outside of school setting than girls ( $p < .05$ ). Moreover, students at high grade were significantly less active than those at lower grade on both settings. Furthermore, time spent in each domains of PA (inside and outside of school facilities, lunch time PA, home-based PA, weekday and weekend extracurricular club activities) was different and was negatively related to the grade. In conclusion, gender and grade were significantly related to Japanese adolescents' PA pattern.

## The association of low birthweight with metabolic risk

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Low birthweight has been associated with risk of metabolic syndrome, but little is known whether physical fitness modify that association. It is necessary to examine how the association of birthweight with metabolic risk is influenced by fitness. At the beginning of the study, we examined the association of birthweight with metabolic risk factors in Japanese men and women aged 20-69 years. Metabolic risk (waist circumference, systolic and diastolic blood pressures, triglycerides, HDL cholesterol, and fasting plasma glucose) were assessed and birthweight was obtained from a questionnaire. Subjects were asked to recall their birthweight or obtain it from their parents or mother-child

notebook. In this study, subjects with very high birth weight ( > 3700g) were excluded, because of their potential family history of diabetes. The completed questionnaires of subjects were 386 (men: N = 142, women: N = 244). Multiple linear regression analysis revealed that birthweight was inversely associated with systolic blood pressure in women ( $P < 0.05$ ) after adjusting for age, weight, other metabolic risk factors, smoking status, and daily alcohol intake. This cross-sectional study indicates that born with a low birthweight is associated with high blood pressure in Japanese women. We plan to examine how the association is influenced by physical fitness.

## **Do anthropometric parameters correlate with the Achilles tendon moment arm in adolescents ?**

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The purpose of this study was to examine the relation between the Achilles tendon moment arm and selected anthropometric parameters. Ten adolescent boys were volunteered to participate in this study. A magnetic resonance imaging system was used to record a series of coronal images of the right ankle joint that was secured at 10° dorsiflexion, anatomical position, 10° plantarflexion. The finite helical axis of the ankle joint was determined from the movement of the talus relative to the fixed tibia, and the Achilles tendon moment arm was determined as the shortest distance from the ankle joint axis to the line of action of the Achilles tendon force.

Body height, lower leg length and calcaneus length were measured as anthropometric parameters. The results showed that Achilles tendon moment arm was  $31 \pm 6$  mm, and body height, lower leg length and calcaneus length were  $1.66 \pm 0.06$  m,  $381 \pm 19$  mm,  $72 \pm 5$  mm, respectively. No correlation was found significant between the Achilles tendon moment arm and the anthropometric parameters ( $r < 0.50$ ). The present results indicate that the length of the selected anthropometric parameters were not associated with the length of the Achilles tendon moment arm in adolescents.

## **A one-year longitudinal study on the mechanical properties of the Achilles tendon in adolescent boys**

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The present study aimed to investigate growth-related changes in the mechanical properties of the Achilles tendon. Seven adolescent boys aged 13.1 to 14.0 yrs participated in a one-year follow-up measurement. An ultrasonography technique was used to measure the length of the Achilles tendon and a magnetic resonance apparatus to measure the cross-sectional area (CSA) of the Achilles tendon. Tendon elongation was measured as the change in the tendon length while the subjects performed ramp isometric plantarflexion started from the rest up to the maximal voluntary contraction within 5 s. Stiffness of the Achilles tendon was determined as the ratio of the estimated tendon force to the measured tendon

elongation, and the corresponding Young's modulus was determined subsequently. For each subject, the measurements were taken in two occasions (Pre and Post) separated by one year. The results showed that the stiffness increased in four subjects, unchanged in one subject and decreased in two subjects. The increase in the stiffness was associated with the corresponding increase in Young's modulus and/or CSA of the Achilles tendon. On the other hand, the decrease in the stiffness was associated with a reduction in the Young's modulus. The results suggest that the developmental change in the mechanical properties of the Achilles tendon may not follow an age-specific pattern during puberty.

## **Sleep deprivation research for clarifying the mechanisms of the cardiovascular events during exercise: Focus on stress and circulation systems**

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The overall purpose of our research was to clarify the mechanisms of the cardiovascular events during exercise with sleep deprivation focusing on stress and circulation systems. Here we report three findings from our ongoing studies. First, we have examined effects of sleep deprivation on sympathoadrenal system (SAS) and hypothalamic-pituitary-adrenocortical axis (Study 1). Concentrations of chromogranin A (CgA) was significantly higher in the sleep deprivation trial than the sleep trial ( $P < 0.05$ ). Increased salivary CgA concentrations observed in the sleep deprivation suggest the activation of SAS. Second, we have investigated effects of sleep deprivation on exercise tolerance and stress hormones during maximal exercise in the

morning (Study 2). Exercise tolerance and stress hormones did not differ between the sleep trial and the sleep deprivation trial. Third, we have investigated effects of sleep deprivation on exercise tolerance and stress hormones during maximal exercise in the evening (Study 3). Concentrations of adrenocorticotrophic hormone at rest were significantly higher in the sleep deprivation trial than the sleep trial ( $P < 0.05$ ). Heart rate during exercise was significantly decreased by sleep deprivation trial ( $P < 0.05$ ). Sleep deprivation may increase ACTH secretion at rest and impair exercise tolerance in the evening. We are continuing further discussion of our data from various angles.

## **Utility of three-dimensional photonic image scanning technique for estimating percent body fat in adults and children**

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The underwater weighing and air displacement techniques have been widely used to estimate %fat. These techniques require well-trained laboratory staff and considerable effort of the subjects. The purpose of this study was to examine the utility of body volume measured by a three-dimensional photonic image scanning (3DPS) for estimating the %fat. The body volumes were determined with 3DPS for 52 females and 16 girls. The body volume was corrected for the residual lung volume that was determined by the rebreathing method, and used to determine the body density. Using the body density as the input, %fat was calculated with the Siri (1956) and Lohman (1989) equations. The outcomes were compared with the

corresponding reference values determined by the dual-energy x-ray absorptiometry (DXA). No difference was found in the mean values of %fat between 3DPS and DXA in both adults and children. The root mean square error of %fat between 3DPS and reference was 6.0% for adults, and 10.5% for children. These results suggested that 3DPS was potentially useful for estimating %fat. However the accuracy of estimation of %fat with 3DPS was not remarkably high with sizable inter-subject variability of the estimate error, especially for children. Further studies are needed to improve accuracy of body volume measurement with 3DPS before it is widely used to estimate %fat.



**The Introduction and Acceptance of Japanese Yakyuu in Taiwan:  
Take Taiwanese Kano Baseball Team in Japanese Colonial Period for Example**

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Baseball is called ‘national technique’ in Taiwan. However, Japanese influences can be found everywhere in the field of this national technique, from using terminology in Japanese to the ethical concept of respecting seniors which is almost the epitome of modern Japanese society. Modern sports introduced to Japanese in Meiji period, then developed to Japanese modern sports after mingling with local Bushidou culture. The purpose of this study is to explore how Japanese baseball was introduced and accepted by Taiwanese people during the Japanese colonial period. Besides, this study also aims at exploring what body culture of Japanese yakyuu

Kano baseball team perform in the game. Three results are achieved. First, baseball imported to Japan after the Meiji Restoration and fused with local Bushidou culture, then transformed to Bushidou Yakyuu which aims at spirit training. Second, the development of Taiwanese baseball was influenced by Japanese Bushidou yakyuu especially based on concepts of ‘spirit yakyuu’ and ‘equalitarianism’. Third, this study found Kano baseball team performed the integration of body culture including body technique, manners and spirit training of Japanese. yakyuu in 1931 All Japan Middle School Baseball Tournament.

## **The Relevant Factors of Social Participation among Older adults: A Review of Previous Research**

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The previous researches showed the social participation was beneficial to older adults. However, only 40% of them engaged persistently in social participation. Therefore, the relevant factors should be examined and the strategies should be developed in order to enhance the social participation and maintain it. The present study aims to investigate the research in the past 30 years for examining factors which influence on social participation. On the basis of the problem of population aging, the United Nations General Assembly decided the theme of this year towards a society for all ages in 1992, and declared 1999 as the International Year of Older adults. In 1991, the UN Principles for Older adults may be divided into five different clusters of relevant issues: independence, participation,

self-fulfillment, care, and dignity. Governments were encouraged to incorporate the principles into their national programs whenever possible. The United Nations Principles for Older adults started from 1991. Thus, the precedence studies from 1991 to 2011 will be reviewed and the literature search will be performed in CiNii, Ichushi with Japanese and PubMed with English.

The present research will start with searching the key words by “social participation”, “elder”, “relevant factors”, and “social activity”. Then the participation, approach, scale and relevant factors of the research selected will be analyzed. The relevant factors will divide into 4 parts by “physical, mental, psychological and social factor”.

### **Three-dimensional Error-assessment of the Acromia-Sensor-Tracking protocol to Measure Scapular Movements in Different Arm Positions and Physique**

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The acromial-sensor-tracking protocol is a frequently-used method for measuring the scapula motions non-invasively. The major source of error with this protocol is that the sensor attached to the skin overlying acromion might be displaced on the scapula due to skin artifacts. The purpose of this study was to assess the measurement error due to this skin artifact in different scapular positions for different individuals of various physical characteristics. Three male volunteers (BMI: 18.1, 18.4, 29.1) participated in this study. Each subject was sandwiched in an Open MRI system and stabilized his arms in 6 different positions (anatomical position; 90° & 150° abduction; maximum horizontal abduction, forced horizontal adduction; forced internal rotation,

maximum external rotation). The images of the scapula and a 25 x 27 x 40 mm marker attached to the skin overlaying the acromion were recorded with the MRI system. The position and the orientation of the scapula determined from the marker position were compared with the corresponding values determined directly from scapular bony landmarks. The root-mean-square errors in the measurements of scapula positions and orientations ranged 1.4-8.9 mm and 0.7-13.4 degrees, respectively. The direction of the orientation errors differed among three subjects and large errors were observed in forced arm position. These results indicate that the measurement accuracy is dependent on the physique and arm position.

## **The difference of hardness change before and after exercise with two different stretching methods -including differences with two hardness measuring methods-**

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This study examined the effect of two different stretching methods to the quadriceps muscle hardness before and after exercise. Two different methods were used for the stiffness measurement. One was with ultrasonography (EUB-7500, Hitachi Medical, Japan). The other was with push-hit hardness meter (NEUTONE, Tryall, Japan). Push-hit hardness meter measured the repulsion force at the time of pushing the muscle. Ultrasonography measured the strain ratio of the muscle. Ten healthy male were used. After performed the dynamic or static stretching with leg extension, quadriceps muscle hardness was measured. As the exercise term, we applied the same moderate to hard eccentric quadriceps exercise were applied. Immediately after exercise the same hardness measurement was performed again.

With push-hit hardness meter, the increment rate of the dynamic stretching ( $1.039\pm 0.070$ ) was

significantly lower than the static stretching ( $1.117\pm 0.069$ ) after exercise. In case of the ultrasonography, there was no difference between the dynamic stretching ( $0.992\pm 0.159$ ) and the static stretching ( $0.918\pm 0.098$ ). We suggested that dynamic stretching has a suppression effect to the increasing muscle stiffness after eccentric exercise in comparison with static stretching. With ultrasonography, muscle stiffness at a particular site could be observed. But this method could detect only the vertical deformation of the muscle fiber. Whereas with push-hit hardness meter, other factors, such as femoral bone, thickness of vastus intermedius and soft tissue deformation may have the certain effect.

Dynamic stretching inhibited the increment of muscle hardness after exercise in comparison to static stretching.

## A Study of Leisure and Sports Policy for the Elderly in Japan and Taiwan

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The purpose of this study was to understand the leisure and sports policies provided by the government for the elderly in both Taiwan and Japan; this study intended to find out the similarities and differences. The method employed by this study was content analysis. The results in Taiwan showed that the government conducted sports fitness programs for the elderly in the community. Next, owing to travelling overseas is one of the most popular leisure activities of the elderly, government thus put more emphasis on programming for senior travelling. In addition, multiple leisure curriculums and a professional system for instructors were developed to furnish their needs. In terms of advocating aging in place, government encouraged local governments to increase the places of learning inside the community.

On the other hand, the results in Japan

indicated that sports events and festivals that specially designed for the elderly are frequently held.

For solving health problem of the elderly, the law of health promotion was legislated in 2002. Besides, each local government developed different strategies of health promotion for the elderly. Meanwhile, to express the concept of social capital for all, the comprehensive sports clubs were built for all citizens and the elderly. Furthermore, the allowance of senior clubs was subsidized by government. To summarize, since the social welfare and leisure policy of the elderly started relatively later in Taiwan, government mostly adapted experiences from other foreign countries. Conversely, since fitness and stamina would be the most important objective of the Japanese elderly, more efforts were put on health promotion and sports activities.

## Motor Programming of Response Complexity and Movement Duration

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The purpose of this study is to reveal the organization mechanism of motor programming by manipulating two motor-related factors associated with motoric processing stages. Sixteen college students performed choice reaction time tasks, in which they responded to the English letters L and R by tapping their left and right fingers, respectively, in different sequence complexity (index-index-index vs. index-ring-middle fingers) and movement duration of the third button press (short-short-short vs. short-short-long). Both complexity ( $F(1,16)=21.99, p=.00$ ) and duration effect ( $F(1,16)=5.39, p=.03$ ) on reaction time

was significant which showed slower response in complex and longer tasks. There was no interaction between complexity and duration. ERPs showed both complexity ( $F_c(1,16)=3.77, p=.03$ ) and duration ( $F_c(1,16)=4.04, p=.02$ ) effects on response-locked LRP but no significant difference on P3 or stimulus-locked LRP latency. Two separate motoric stages associated with response complexity and duration seemed to exist according to Additive Factor Method logic. Evidence from the electrophysiological data indicated the motoric loci of complexity and duration effects.

## **Does habitual physical activity affect the ability to regulate energy intake?**

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Physical activity influences the regulation of energy intake through the control of appetite. Although there is a lot of evidence that effect of a bout of exercise on appetite, there is no evidence that effect of habitual physical activity patterns (ex. intensity, continuity) on appetite. The purpose of this study was to examine the relationship between patterns of habitual physical activity and the ability to promptly regulate energy intake in compensation for provided energy intake.

Physical activity measurement and crossover trials of energy pre-load test were conducted fourteen non-obese male subjects. Physical activity was measured over 6-days and metabolic equivalents (METs) were calculated every 10

seconds by using tri-axis accelerometer Active style pro HJA-350IT (OMRON HEALTHCARE, Kyoto, Japan). The ability to regulate energy intake was evaluated by difference between ad lib energy intakes of sandwiches after 75 minutes of energy pre-load which varied in energy density.

The ability to regulate energy intake were positively correlated with physical activity level (PAL) and tended to be correlated negatively with consecutive time of sedentary (from 1 to 1.4 METs) activity. These results suggest that habitual physical activity may contribute to the ability to promptly regulate energy intake in compensation for previous energy intake.

## Acupuncture Ameliorated Immobilization-induced Skeletal Muscle Atrophy in Mice

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Loss of skeletal muscle mass has a profound effect on daily life. Interventions such as exercise training are not feasible in the elderly and in patients with severe diseases. Acupuncture is a traditional East Asian medicine that is used for treating skeletal muscle disorders. We hypothesized that acupuncture is a promising non-pharmacological strategy for preventing skeletal muscle atrophy. Thirty-two male mice (C57 BL/6, 8 weeks) were randomly assigned into 4 groups (8 mice in each group): (A) control, (B) immobilization (IMM), (C) IMM + manual acupuncture (MA), and (D) IMM + MA +

electro-acupuncture (EA). Acupuncture was performed on the gastrocnemius muscle for 30 min every day for 5 days. After 5 days of IMM intervention, a significant reduction in the soleus muscle mass was observed ( $p < 0.01$ ). This IMM-induced reduction in the soleus muscle mass was significantly improved in the EA group ( $p < 0.05$ ). To our knowledge, our findings show for the first time that EA partially prevents IMM-induced skeletal muscle atrophy. Thus, acupuncture can serve as an alternative non-pharmacological intervention that is feasible, versatile, and associated with little risk.



## Effects of 12-weeks walking programme on oxidative stress markers in older adults

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The purpose of this study was to investigate the effects of 12 weeks of supervised walking programme on oxidative stress and antioxidant capacity in older adults. Twenty-eight older adults (65–78 yr) were assigned into either control (C, N = 14) or exercise (Ex, N = 14) group. Exercise programme consisted of walking 30-60 min/session on 2 days of the week for 12 weeks. Blood samples were taken at baseline and immediately after 12 weeks. Fasting plasma reactive oxygen metabolites (d-ROMs) concentration, biological antioxidant potential (BAP) concentration, thioredoxin concentration, superoxide dismutase (SOD) activity and catalase (CAT) activity were measured. Plasma

d-ROMs concentrations were significantly decreased only in the Ex group after 12 weeks compared with the baseline values (mean±SD: 257.1±38.0 vs. 280.8±39.7 U.CARR, respectively, P = 0.025). Conversely, plasma BAP concentrations were significantly increased only in the Ex group after 12 weeks compared with the baseline values (mean±SD: 4999.6±500.5 vs. 4637.4 ±261.5 uM, respectively, P = 0.018). The results of this study suggest that 12 weeks of walking programme in older adults may attenuate basal oxidative stress and increase protection against oxidative stress by increasing antioxidant capacity.

## Whose Ethnic Dance is it?—The Vicissitudes of Modern Belly Dance

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Many studies have discussed the power of globalization in modeling the present landscape of ethnic culture. The performance of modern belly dance was mostly formed in the West since the late 19th century, and then became known to the world along with the current of globalization. Belly dance introduced to Taiwan in early 21th century and has soon been embraced all over the island. This study explores: (1) how Taiwanese people represent belly dance (2) the relationship between belly dancing representation and social context. Methodologies of literary analysis and participant observation are adopted. Two results are achieved: (1) Fusion is the most common belly dancing style in Taiwan. Especially, the

creation of a “Taiwanese-flavor belly dance” is encouraged by some main associations. Various local elements are mingled in belly dance performances. (2) Belly dance though as an imported dance without venerable cultural roots in Taiwan, the connection between belly dance and Taiwanese identity was made on media. Consequently, this study argues the logic behind the vicissitudes of global ethnic sports is the fluid among culture laundering, imaging, and attaching which contributes to the hybrid orientation and makes modern belly dance something composed of an ethnic shell with changing faces and contents.

## **The effects of low-intensity aerobic exercise on oxidised low-density lipoprotein and scavenger receptor expression in older adults**

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The purpose of this study was to examine the effect of low-intensity exercise on oxidised low-density lipoprotein (LDL) and its receptor expression in older adults. Twenty-eight older ( $\geq 60$  years) participants were recruited. Fourteen older adults were assigned to a 12-week supervised walking exercise intervention group (low-intensity exercise, 30-60 min/session on 2 days/week) and fourteen older adults were assigned to a control group (participants were advised to maintain their normal lifestyle during the study). Blood samples were collected at baseline and immediately after 12 weeks.

The results of this study showed that there are no significant changes in plasma oxidised LDL concentrations and CD36 expression in leukocyte in both groups. Circulating concentrations of serum high-density lipoprotein cholesterol were significantly increased in the exercise group ( $p = 0.05$  an interaction effect). These data demonstrate that low-intensity physical activity, at least in our study, did not downregulate oxidised LDL and its receptor expression (i.e. a scavenger receptor). However, regular physical activity is of great importance to improve a lipid profile.

## Changes in arousal associated with habitual physical activity in older adults

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The purpose of this study was to investigate the relationship between habitual physical activity ( PA ) and arousal in older adults. Twenty-eight older adults ( $70.6 \pm 3.8$  years) participated in the present study. PA was measured using an accelerometer/pedometer. Participants were divided on the basis of their daily step count into “Higher PA group” (more than 10,000 steps/day) and “Lower PA group”(less than 10,000 steps/day). Event-related potentials ( ERPs ) , including P3 and No-go P3, and spontaneous electroencephalogram were measured as indicators for cognitive function and arousal

while they performed a Go/Nogo task.

Compared to the lower PA group, the higher PA group exhibited larger Go- and No-go P3 amplitudes, and faster reaction time. The lower PA group exhibited increased relative power value of  $\alpha$  wave compared with the higher PA group. Further, a negative correlation existed between the relative power value of  $\alpha$  waves and physical activity level. These results suggest that habitual physical activity may enhance the arousal in older adults, and task performance and P3 amplitude were influenced by the changes in arousal.

**The role of eHealth literacy on effective eHealth promotion:  
The review for the concept and recent trends of eHealth Literacy**

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The present study reviewed the concept and recent trends of eHealth Literacy to promote eHealth effectively. MEDLINE and Wiley Online Library were searched for studies published in English before July 2011. “eHealth literacy” and “eHealth literacy Scale (eHEALS)” were used as key words. A total of 19 publications were identified and 12 publications met the inclusion criteria.

All reviewed publications introduced the concept of eHealth literacy defined by Norman et al. in 2006 as follows: the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem.

Applied studies of eHealth literacy have focused on the participants with specific characteristics (medical staff, parents whose children have life-threatening illness, HIV patient and older adults). However, these applied studies did not find the strong evidence on effects of eHealth literacy on health promotion in individuals and groups.

In Internet society, eHealth literacy would be important to utilize eHealth effectively and appropriately in Japan. Further studies are needed to clear the effectiveness of eHealth literacy on health status and health care among individuals and groups.

## Effect of Voluntary Exercise and Energy Restriction on Bone Mineral Density in Female Rat Model

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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 ( $E_2$ ), and luteinizing hormone (LH) levels in voluntary wheel running female rats. Fourteen female rats (8 wk old) were randomly assigned to two groups, running group (n=8) or sedentary group (n=6). 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, n=4) or Run-Restricted-fed (30 % energy restriction for

14-wk) group (RR group, n=4). Energy restriction with voluntary exercise decreased BMD in the RR group, the BMD was significantly lower than RC and sedentary groups ( $p<0.05$ ). Plasma  $E_2$  levels were significantly lower in the RR and RC groups than sedentary group ( $p<0.05$ ). Furthermore, LH level was markedly reduced in RR group compared with RC and sedentary groups ( $p<0.05$ ). The present study indicated that the long term energy restriction in voluntary wheel running induced bone loss in female rats with intact ovary. This may establish a foundation for osteoporosis for female athlete rat model caused by the dysfunction of reproductive system.

## **Patterns and socio-demographic correlates of meeting physical activity recommendations among normal-weight and overweight Japanese men**

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This study examined the patterns and socio-demographic factors associated with meeting physical activity (PA) recommendations (moderate-to-vigorous PA (MVPA) vs. walking) among normal-weight and overweight Japanese men. Data were analyzed for 1,420 men, who responded to an internet-based cross-sectional survey of answering the socio-demographic variables, BMI status and short version of the International Physical Activity Questionnaire. Chi square test and binary logistic regression analyses were utilized. Normal-weight men were significantly more likely to meet 150 minutes of MVPA than overweight men ( $P = 0.035$ ; 26.6% vs. 21.3%). However, there were no significant proportional differences in walking between two groups ( $P = 0.36$ ).

Furthermore, marital status (OR=1.37; 95% CI: 1.01 – 1.87), household income (OR=0.67; 95% CI: 0.41 – 0.96) and job status (OR=2.61; 95% CI: 1.55 – 4.37) were significantly associated with achieving recommended levels of PA among normal-weight men, whereas no significant socio-demographic correlates of meeting PA recommendations were found among overweight men. The results revealed that pattern and socio-demographic correlates of PA in overweight men are different from those in normal-weight men. This result suggests that developing specific strategies for PA intervention among overweight men would be needed. Socio-demographic correlates of PA might be more important for normal-weight than overweight men.

## **Effects of home-based rowing training using resistance tube on cardiorespiratory fitness and atherosclerosis index in elderly men**

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Our previous study showed that rowing training using rowing ergometer improved cardiorespiratory fitness (CRF) and atherosclerosis index (AI) in elderly men. The purpose of this study was to examine the effects of rowing training using resistance tube on CRF and AI. Twenty-one untrained elderly men (age; 71.0±3.6 years) participated in this study. Those in the training group (n=10) underwent the home-based rowing training by resistance tube three times a week for 3 months. VO<sub>2</sub>max was measured as an index of CRF, and AI was calculated from fasting total and HDL-cholesterol. No change was observed in VO<sub>2</sub>max among the training group because it

may be the exercise intensity was not high during training (60±6%HRmax). However, VO<sub>2</sub>max in the control group was decreased, and there was a slight difference in the change rate of VO<sub>2</sub>max between the two groups (control; -6.7±9.1 %, training; 1.0±9.4 %, p = 0.082). AI in the training group was tended to decrease (p=0.069) and there was a significant difference for the change rate of AI between the two groups (4.5±8.3%, -7.0±12.3%, p=0.02). These findings suggested that home-based rowing training using resistance tube may prevent from decreasing CRF and improve AI in elderly men, although its effect is less than training by rowing ergometer.



## **Effect of Body Weight Supported Walking on lower-limb muscle activities**

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The purpose of this study was to examine whether the body weight supported treadmill influences the lower muscle activity. We used a device called the G-trainer, created by Alter-G, Inc. to support body weight. Eight healthy young male subjects (age,  $23.0 \pm 1.4$  years; height,  $171.4 \pm 4.0$ cm; weight,  $68.8 \pm 6.7$ kg) participated in this study. Subjects walked on the treadmill (4km/h and 6km/h) at full weight bearing (100%), and with 25%, 50%, 75% body weight supported. Electromyography was used to monitor the gluteus maximus, rectus femoris, biceps femoris, tibialis anterior, medial gastrocnemius, and soleus. The duration time of stance phase and

one cycle was not significant difference depending on a change of the body weight supported, but as the body weight supported increased, the duration time of swing phase time expended. The EMG of the gluteus maximus, rectus femoris, medial gastrocnemius, and soleus decreased with increasing body weight supported. However, the EMG of the biceps femoris, tibialis anterior increased with increasing body weight supported. The result of this study suggested that gait might change compared with full weight bearing when there is too much body weight supported, so the optimal body weight supported is necessary.

## **Age-related Changes in the Muscle Thickness of the Deep and Superficial Abdominal Muscles**

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We investigated the age-related changes in the muscle thickness of the deep and superficial abdominal muscles. The subjects comprised 100 women who could walk unassisted or with a walking aid. All subjects were informed about our study and provided a written informed consent. They were classified into 5 groups based on age: from 20 to 24 years, 25 to 44, 45 to 64, 65 to 74 and 75 to 85. Muscle thicknesses of the right rectus abdominis (RA), external oblique (EO), internal oblique (IO), and transversus abdominis (TrA) were measured using ultrasonography. Differences in muscle thickness between the groups were examined

using ANOVA and post-hoc test. Significance was recognized at  $p < 0.05$ . The RA, EO and IO thickness share the same trend. There is a slight decrease of muscle thickness between 20 to 24 years and 25 to 44 years group. But from age 45, our study shows a significant drop of muscle thickness. The RA, EO and IO thickness in the subjects from 45 to 85 significantly decreased compared to that of the 20-24 years age group. On the other hand, as for the TrA thickness, a significant difference was found between only the youngest and oldest groups. Our results suggest that the TrA among abdominal muscles is the least affected by aging.

## **Mechanisms of nonalcoholic steatohepatitis improvement by exercise training**

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Nonalcoholic steatohepatitis (NASH) is considered to be the hepatic event of the metabolic syndrome.

In fact, it has been reported that high-fat diet and high-fructose water induced obese mice possess hepatic inflammation and fibrosis. Recently, it has been reported that macrophages and T-cells are associated with hepatic inflammation and fibrosis. Although exercise improves serum aminotransferase levels as markers of hepatic injury in patients with NASH, it remains unclear whether exercise training suppresses hepatic inflammation and fibrosis. In addition, it is not clear that alterations of macrophages and T-cells contribute to improvement of NASH by exercise training.

Male C57BL/6 mice (n=36) were divided into four groups; normal diet (ND) + control group, ND + exercise group, high-fat-diet and high-fructose-water (HFF) + control group, and HFF + exercise group. Exercised mice ran on a treadmill at 20 m/min for 60 min/day for 16 weeks. Mononuclear cells from liver were isolated and their populations were analyzed by using flowcytometer.

In HFF mice, exercise training decreased F4/80<sup>+</sup>/CD11b<sup>+</sup> (kuppfer) cells in liver. On the other hand, exercise training did not change CD8<sup>+</sup>/CD3<sup>+</sup> (cytotoxic T) cells and CD4<sup>+</sup>/CD3<sup>+</sup> (helper T) cells in liver. Exercise training reduced inflammatory macrophages in liver of obese mice.

## **Psychological, social, and environmental factors associated with utilization of senior center among older adults in Korea**

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Korea.

Recently, the importance of elderly health promotion using the senior center is more required to reduce the medical expenses for the aged. The purpose of the study was to examine the relationships between the psychological, social and environmental factors influencing the use of senior centers among older people in Korea. A questionnaire survey was conducted to two types of older adults who lived in Seoul in Korea: 262 older adults who used senior centers (3 places) and 156 older adults who did not use the centers. Our results showed clearly that the use of senior centers in Korea is affected by the higher self-efficacy (OR = 6.08; 95%CI: 3.31-12.32), higher perceived benefit (OR =

1.71; 95%CI: 1.16-4.36), lower perceived barriers (OR = 6.43; 95%CI: 3.07-11.45), higher family support (OR = 4.21; 95%CI: 2.02-8.77) and higher friend support (OR = 4.08; 95%CI: 2.38-7.81). The results also showed that the total travel time was between 15-29 minutes (OR = 2.84; 95%CI: 1.21-3.64) and less than 14 minutes (OR = 4.68; 95%CI: 3.41-8.41) were more likely to use the senior center compared with those of more than 30 minutes. In conclusion, our findings indicated that the senior center is an useful place where it contributes a long-term care prevention in Korean older adults.

## **Effect of heavy resistance training on rectal temperature and polysomnograph during sleep**

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The purpose of the present study is to examine the effect of two consecutive days resistance training on sleep. Ten young males participated in the experiment consisting of three consecutive days. The first night was set for baseline night. Subsequent two nights were set as “Ex-1 day (second night)” and “Ex-2 day (third night)”, respectively. On the Ex-1 and Ex-2 day, the subjects performed two bouts of strenuous resistance training (morning and afternoon). The average of blood lactate level immediately

after exercise were 13.1 mmol/L (Ex-1 day) and 13.2 mmol/L (Ex-2 day). During sleep (bedtime from 23:00-07:00), electroencephalogram (EEG) and rectal temperature were continuously recorded. There were no significant differences in rectal temperature between three nights. We will add sleep stage scoring and will report the effect of two consecutive days of heavy resistance training on sleep.

## **Reliability and validity of the healthy eating literacy (HEL) scale among Japanese adults**

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The skills in finding and utilizing nutrition information (healthy eating literacy; HEL) are becoming important in maintaining and promoting health. The purpose of the present study was to examine the reliability and validity of the HEL scale among Japanese adults. The development of HEL scale was modified from the communicative and critical health literacy (HL) scale. The participants included 1252 Japanese male and female adults who responded to an Internet-based survey, which was conducted through a Japanese Internet research service organization. The survey was conducted in December 2010. The validity was examined construct validity and criterion-related validity. Construct validity was examined with confirmatory factor analysis.

Criterion-related validity was determined by examining the relationship between HEL and the stages of change. The reliability was evaluated by internal consistency (Cronbach's alpha coefficient) and 14-days test-retest (n=100). The good goodness-of-fit indices were obtained by the confirmatory factor analysis (GFI=0.988, AGFI=0.957, CFI=0.990, RMSEA=0.080). One-way independent ANOVA revealed that HEL was positively associated with the stages of change (F=19.7, p<0.001). Both internal consistency ( $\alpha = 0.87$ ) and Test-retest reliability (r=0.742, p<0.001) were good. This study developed the HEL scale and indicates that the scale has acceptable reliability and is valid to efficiently evaluate HEL among Japanese adults.

## Changes in cytokines and leucocyte activation after low- and moderate-intensity exercise during menstruation

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The aim of this study was to examine the influence of exercise intensity on cytokines and leucocyte activation during menstruation. Seven healthy sedentary females completed three separate trials: (1) a 60-min cycling at 100% anaerobic threshold (AT) (moderate-intensity), (2) a 60-min cycling at 75% AT (low-intensity) and (3) a resting state without exercise (control). Blood was sampled before, immediately after and 30 min after exercise. We measured the concentrations of plasma cytokines (interleukin (IL)-6 and IL-8) and markers of leucocyte activation (calprotectin and myeloperoxidase)

using ELISA.

Aerobic exercise during menstruation increased the circulating concentration of IL-6 ( $p < 0.05$ ) and calprotectin ( $p < 0.05$ ). Plasma IL-6 and calprotectin responses following exercise were greater after moderate-intensity than after low-intensity trials. A positive correlation was found between exercise-induced changes in IL-6 and calprotectin ( $r = 0.356$ ,  $p = 0.021$ ). These findings suggest the possibility that inflammation and leucocyte activation are more closely associated with exercise intensity at the exercise prescription level during menstruation.

## **Age Differences in the Relation of Perceived Neighborhood Environment to Walking among Chinese adult women in Beijing**

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Evidence from Western countries suggests that built environmental attributes can influence the physical activity participation in adults, but whether or not this is the case for Chinese is unknown. Also, the strength of the relationship of environment to physical activity may differ by age group. The present study examined age-related differences in associations between perceived neighborhood environment and walking in Chinese women dwelling in Beijing. Cross-sectional data were collected through an internet-based survey. Total of 737 women aged 30 to 59 years responded. All of them were then divided into three groups based on the age: aged from 30–39, from 40–49 and from 50–59. In addition to sociodemographic information, the

perceived neighborhood environment was measured by Neighborhood Environment Walkability Scale Questionnaire, and their walking time per week was collected through International Physical Activity Questionnaire. To measure relationship between perceived neighborhood environment and walking time, partial correlations were computed, adjusting for sociodemographics. Walking time was significantly related to residential density in aged 40-49 years, and land use mix-access, walking/cycling facilities, traffic safety variables in aged 50-59 years. The present study indicates that there would be differences in associations between neighborhood attributes by age-groups.



## **Relationship between anticipation and kinematic parameter in tennis serve with video: assessment using temporal occlusion paradigm**

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The aim of this study is to clarify the relationship between tennis server's kinematic pattern and receiver's anticipation performance by using multiple regression analysis with the racket parameter (explanatory variable) anticipated ball direction (dependent variable). 24 male (12 expert players and 12 novices) voluntarily participated in the experiment. Test serve was performed by a professional tennis player in the deuce side aiming at three targets on the service box (center, body and wide). The participants viewed 45 video clips of them in the three occluding condition: to the back-scratch position (T1), to one frame prior to the racket-ball contact (T2) and to the point after the racket-ball contact (T3) from the ready position.

The participants scored their anticipatory judgment of the ball direction on a visual analogue scale (VAS), respectively. In the condition at which the pre-contact information was available (T2), the percentage of correct responses of expert players were over chance level, while that of the novices were not. The result of multiple regression analysis, motion parameters of racket (angle and velocity) explained 12% of the estimation score of ball direction for expert players in the T2 condition. These results indicated that expert were able to pickup anticipatory cue before the racket-ball contact. The anticipatory cue is the information of the motion parameters of server's racket.

## **A study of muscle relaxation in intralimb multijoint movement**

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In human, it has been shown that muscle relaxation is an active process (Toma et al., 1999, 2000). That is, when we execute a contraction in one muscle and relaxation in another at the same time, we have to output orders of “different types” simultaneously. In the present experiments, we investigated whether the difficulty of actions change with the combination patterns of relaxation and contraction in muscles of the same limb (intralimb). Five subjects performed simultaneous muscle relaxation/contraction of the shoulder and wrist muscles in response to an audio signal as fast as possible. Before the start of the action, subjects maintained the flexed position of the shoulder and the extended position of the pronated wrist. Surface electromyographic (EMG) activities of deltoid muscle (DT) and extensor carpi radialis (ECR)

were recorded. Offset-time (OT) from audio signal and muscle-activity (MA) in the period from the OT to the completion of relaxation were calculated. The OT in DT during the shoulder relaxation and wrist contraction (Relaxation-Contraction: R-C) tended to be longer than that during the shoulder relaxation and wrist relaxation (R-R). The MA in DT muscle during the R-C was greater than that during the R-R. Similarly, the MA in ECR during the C-R was greater than that during the R-R. These results indicate that difficulty of motor control of two muscles in the same limb changes with the combination of relaxation and contraction. Moreover, our findings suggest that it is difficult to perform simultaneous relaxation in one muscle and contraction in another.

## **Impact and swing parameters for determining the kinetic energy of the batted ball in baseball**

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The purpose of this study was to investigate the contribution of impact location and various parameters describing bat swing, to the kinetic energy of the batted ball in baseball batting. Ten collegiate baseball players participated in this study. Each player performed 50 trials of free-batting, aiming at hitting a line-drive toward the center field. Behavior of the ball impact was recorded with two high-speed cameras. All trials in which the batted ball travelled toward the center field, including grounders, line-drives and fly balls, were used for the analysis. From the video-recordings, the impact location relative to the “sweet spot” was measured in bat-embedded coordinate system and various parameters describing the bat swing were measured. For

each subject, a step-wise multiple regression analysis was conducted to predict the kinetic energy of the batted ball from impact location and swing parameters. The results showed that the within-subject variance in the kinetic energy of the batted ball was accounted for by the impact location (63±9%) and the swing parameters (13±9%). Each component of impact location contributed differently among subjects -- the long-axis component ranged 18~64% and the short-axis component ranged 0~49%. These results suggest that the players should focus on making an accurate impact at the sweet spot of the bat for maximizing the kinetic energy of the batted ball.

## Effect of continuous partial sleep deprivation on sport related performances

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In this study, we examined the effect of continuous sleep deprivation on sports related activities, PVT (Psychomotor Vigilance Test) and sleep quality by EEG. Subjects were six healthy young students. Shortened sleep time was determined as a half-length of regular sleep time examined by wrist actigram. After a night of regular sleep time condition (RSC), half hours sleep were taken for five nights (SDC: sleep deprivation condition).

There were no significant differences in exercise performances between RSC and SDC

nights. However PVT impaired on the third day. Sleep variables were significantly different in SDC as percentage of sleep stage 1 decreased and SWS percentage increased in the 3rd SD night ( $p < 0.05$ ), but not on the third to fifth night. These results indicate that five shortened night sleep didn't affect exercise performances. It may be because shortened sleep didn't much affect body physiology. While cognitive performance impaired on the third day. It may be because improved sleep quality compensated first two days' brain functions.

## The factor for legacies of the demonstration program on host communities

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The demonstration program, one of the sports events of the National Sports Festival in Japan, has been held by the municipalities of the hosting prefectures every year for the residents. In this program there have been many kinds of new sports events, such as Ground Golf, Indiacca, Petanque, and others. In the previous study, it became clear that there was some municipalities where the legacies in sports environment for residents continue to exist (22.1%) by hosting this program. However the reason was not clear why the legacies are generated and lasted. The purpose of this study was to examine the differences between the municipalities which

get- and lost- legacies and to identify factors in keeping legacies. At first, preliminary data were collected to classify the types of legacies. Telephone interview were conducted in municipalities which hosted the program from 1999 to 2008 (217cases). Next, we selected the representative municipalities and conducted interview and document survey with some stakeholders of the program to compare the differences. The results indicate that, in this particular case, the get-legacy municipality gain resident's support and acceptance and there is someone who has been involving in the program-related sports activities.

## **A cross-cultural study of dancesport in East Asia**

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The purpose of this study were to realize“how could Taiwan dancers accept west dance culture? ”“How should they identify their body to show out the pose? ”. Semi structured interview, literature collection and participant observation were be use in this study.

DanceSport is what we called Social Dance before. It's came from royal dance & Folk dance of West culture. 1924, Imperial Society of Teachers of Dancing (ISTD)<sup>1</sup> made 7 kinds of social dance (Waltz, Tango, Viennese Waltz, Slow Foxtrot, Quick Step, Rumba, Blues) in a system, and called those for Ballroom Dance (Beijing Sport University, 2004). 1950, W.D. C. began to hold Dancesport Festival at Black pool (Beijing Sport University, 2004).

Dancesport is an activity from west culture, but is very popular at Asia, especially on Taiwan,

Japan and China. Asia people take many time to practice, especially in china, although their grads on “Black Pool Dance Festival” always not well.

This study found when they start to dance, because of they like this exercise, they try their best to show out the pose with their bodies, but they don't understand the deeply meaning of all kind of dance.

The suggestion of this study is the grades of competition is not necessary relate to practice time, but the collective identity defines. While training, we have to not only focus on the personal movement (individual identity), but also the cultural issues (collective identity).

1: In Chinese, we also called this organization “England Royal Dance Association”.

## The comparative study of Japan and Taiwan baseball fan culture

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The purpose of this study was to understand the baseball fan cultures in both Japan and Taiwan. Baseball has been considered as the national sports both in Japan and Taiwan, this consequence was due to a long term historical and social incidents that together interwoven the baseball culture in these two nations today. Along with the development of professional baseball, Japan and Taiwan each foster rich fan culture, which can be seen as the embodiment of modern sport localization. Thus, this study would like to reconstruct and understand the social context of fan culture emerging, and its changes throughout the time, then to understand the cultural importance of baseball in people's lives. The theoretical framework of this study

mainly based on anthropologist Victor Turner's ritual theory, which includes a set of concept that called Liminoid and Liminality. I found that baseball game can be seen as a modern form of human ritualization, and this secular form of entertainment in modern society, thus carried sacredness for the fans, as religious rituals function in traditional society.

By observing the fan behaviors in Japan and Taiwan, I found that Japanese fans tend to be more united and more recognized with the local franchise. Taiwanese fans perform a polyphonic way of cheering which possess more individual characteristics. The nostalgia for past glories still lingers in the games in Taiwan.

## **Cyclic modulation of MEP in wrist muscles during rhythmic flexion-extension movements of the foot does not reflect the behavioral performance using the two limbs**

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Coordinated movement of two limbs in the same direction is easily performed whereas the movement in opposite direction is difficult (Swinnen, 2002). Moreover, coordinated movements of ipsilateral two limbs are more difficult than the movements of contralateral limbs (Kelso and Jeka, 1992). In favor of these properties, when a foot moves periodically, the excitability of the corticospinal tract for the resting wrist muscles on the ipsilateral side is modulated depending on the direction of the foot movement (Baldissera et al., 2002). The purpose of this study is to examine how the excitability is modulated, when the foot on the contralateral side is moved. Ten subjects performed rhythmic flexion-extension movements of the ipsilateral

(right) or contralateral (left) foot with their right wrist resting in a prone posture. Transcranial magnetic stimulation was delivered during flexion or extension phase of the foot movement to examine the corticospinal excitability by motor evoked potential (MEP). Electromyography was recorded from wrist extensor and flexor muscles. In both conditions, the MEP of the wrist extensor increased in the foot extension phase while the MEP of the wrist flexor increased in the foot flexion phase. There was no difference in the MEP modulation between ipsilateral and contralateral conditions. This does not correspond to the difficulties of the movement of two limbs.



**Influence of elongation of human gastrocnemii muscle-tendon units  
on soleus muscle-tendon unit behavior in vivo**

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It is known from animal studies that a skeletal muscle transmits tension to its surrounding tissues via connective tissue linkages. This suggests that a muscle is not mechanically independent. The purpose of this study was to investigate the influence of the elongation of human gastrocnemius muscle-tendon unit (MTU) on the soleus (SOL) MTU behavior in vivo. Seven healthy male subjects had their knees passively extended, bringing about elongation of the gastrocnemii MTUs. The trials were performed in two conditions in which the plantar flexor muscles were at rest (REST) and contracted at 20% of the maximal voluntary effort (ACTIVE). Elongation of each muscle in each trial was determined from the tendinous movements detected by ultrasonography. In ACTIVE, the shortening of distal tendinous tissues of SOL was not observed in spite of a decrease in SOL electromyographic activity. It is likely that the elongation of gastrocnemii MTUs in the proximal direction prevented the shortening of distal tendinous tissues of SOL. In REST, the movement of distal muscle tendon junction of gastrocnemius was not observed in spite of the elongation of gastrocnemii MTUs. In this case SOL MTUs appear to have provided resistance to the distal muscle tendon junction of gastrocnemius against stretch. The results of this study suggest that gastrocnemii and SOL MTUs affect each other on the muscle shapes change.

## **Does breathing technique affect the leg-sinking effect of buoyancy in horizontal aligned swimmer? : A preliminary report**

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The purpose of this study was to examine if the leg-sinking effect of buoyancy around the center of mass (CM) changes due to different breathing techniques -- chest breathing and abdominal breathing. Two competitive swimmers participated in this study. Each swimmer was asked to lie in the supine position on a hard wooden board and to take a deep breath with the two techniques. The positions of the CM and the center of buoyancy (CB) relative to the soles of the feet were determined with the so-called reaction board method (Hay, 1993). The determined positions of the CM and CB were expressed as the percentages of the stature. The

results showed that the CB ( $\bar{X}=62.5\%$ ) was located more cranial to CM ( $\bar{X}=61.2\%$ ) in both breathing techniques, indicating that the buoyant force generated a leg-sinking effect. With a full abdominal breathing, the CB and CM were located more caudal than with chest breathing by 0.8 % and 0.5%, respectively, which caused the CB-CM distance to be shorter by 0.3%. A shorter CB-CM distance results in a smaller leg-sinking effect of buoyancy around CM. The results of this study suggest that swimming with abdominal breathing should reduce the leg-sinking effect of buoyancy.

## A New Approach for Assessing Kinematics of Torso Twist in Baseball Batting

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The purpose of this study was to describe torso's sequential twisting with a three-segment torso model, and to evaluate the kinematics of torso twist in baseball batting. Nineteen male collegiate baseball batters (height:  $173.9 \pm 4.2$  cm, mass:  $70.5 \pm 6.5$  kg, age:  $19.1 \pm 0.9$  yr) performed a series of batting trials using a batting tee. Each subject was instructed to hit the ball towards the center field with the maximal effort. The performances were recorded with an optical motion capture system (VICON-MX). In the present study, the torso was divided into three segments (shoulder girdle, thorax and

pelvis) and the rotation angle of each segment was calculated for horizontal plane. The angular velocity of each segment was also calculated as the time derivatives of the rotation angle of each segment. The pelvis reached the peak angular velocity at  $0.078 \pm 0.016$  s before ball impact, and approximately 0.02 s later the shoulder girdle and thorax attained the peaks ( $1130 \pm 82$  °/s and  $1022 \pm 223$  °/s). For this result, the pelvis and thorax were found to move in a proximal-distal sequence, whereas the thorax and shoulder girdle did not demonstrate such patterns.

## Characteristics affecting the difference of physical activity level in female athletes

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Physical activity level (PAL), calculated divide total energy expenditure (TEE) by basal metabolic rate (BMR), is generally used as an indicator of physical activity. Although non-exercise activity thermogenesis affecting difference of PAL in ordinary people, the factor has been unclear, particularly in athletes. Accordingly we examined the characteristics affecting the difference of PAL among female athletes. Subjects were 75 female university athletes (made up as follows; swimming, rhythmic gymnastics, lacrosse, track and field events and judo). TEE measured by doubly labeled water method over seven days. Subjects

were asked to collect a urine sample once daily. Activity energy expenditure measured by two different ways; activity record and accelerometer method, during the same period as TEE measurements. We measured BMR with use of the Douglas bag method at early morning at the start of TEE measurements. Results of calculated PAL were swimming,: 2.45±0.41, rhythmic gymnastics: 2.65±0.47, lacrosse: 2.44±0.47, track and field events: 2.31±0.63 and judo: 2.12±0.29, respectively. PAL of rhythmic gymnastics was significant higher than judo. And PAL was greatly difference among intergroup of sport characteristics.

## **The analysis of movements in aerobic gymnastics to propose drills for beginners**

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Aerobic Gymnastics has not only been a popular form of physical training for the general public since the end of the 1980's, but also is a top-level competitive sport. A routine in the category of Individual Women is performed to music and composed of (1) aerobic movement patterns, (2) difficulty elements, (3) transitions and linking; the length of a routine is 1 min 30 sec±5 sec. Aerobic movement patterns require combinations of steps and arm movements, which is originate from traditional aerobic exercise. A routine should include '10 difficulty elements' at least one from the each of 4 element families: Dynamic strength, Static strength, Jumps/Leaps and Flexibility/Balance.

Transitions and linking connect two themes or sections of a routine. In Aerobic Gymnastics,

difficulty elements are essential to the results, because it is not only directly related to the difficulty score, but also can influence the execution score of the routine to some extent.

The final goal of my doctoral study is to propose effective drills of Aerobic Gymnastics for beginners. At first, I will extract basic movements of difficulty element, which most athletes have problems at the initial stage of practice. In addition, I will analyze the movements in top-ranking athletes and athletes of university team with the 3D motion analysis system. What's more, I will figure out the new drills to help beginners to master the movements well. Finally, I will apply the drills to the practice to check their effectiveness.

## **National Identity and sporting stereotypes in Modern Chinese Press Coverage of Foreign and Chinese Athletes**

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Modern media is a biased tool. In covering sporting athletes, media professionals are influenced by their own perceptions of stereotypes while enhancing or reflecting new stereotypes as well as providing first hand information revealing national identity.

The analysis of discursive models serves as an entry point for as a much larger discursive network which is geopolitical in scope, ideologically impacted and core-periphery influenced.

From Americans view of the Spanish word “gringo” and Westerners view the Japanese word “gaijin” to the Chinese view of “laowai”, foreigners in many countries are distinguished with a clear boundary from natives. So it is in China. How are foreign athletes covered in the Chinese media sport coverage and can we observe distinctions racially (white/ black/ yellow/ mixed etc.) and ethnically (Asian/ African/ European/ America etc.)? What is the story behind these stereotypes?

Both comprehensive newspapers and professional sports newspapers in China provide sports coverage and enjoy a stable readership. The sports newspaper Titan sports weekly took 57.9% share of all the sports newspapers available in China.

This research will be based on a content analysis of reports containing Chinese vs foreign athletes in the sports sections of New Sports, Titan Sport and People’s daily from 1949, the establishment of the PRC. At this time private ownership of newspapers was abolished and the media gradually turned into party organs. New Sport’s first issue was released in 1950 and the paper has witnessed the Chinese sports development from the beginning of the republic. Titan Sport was established in 1988 and is the classic example of successful Chinese sports newspaper. People’s daily is one of the Chinese Communist Party’s (CCP) leading mouthpiece; their reports are strictly controlled in accordance with CCP guidelines.

## The numbers of bacteria on the player's skin surface increase, in a basketball game

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The aim of this study was to examine variation in the number of bacteria on skin surface in a basketball game, especially *staphylococci*. Six healthy men participated in this study. Measurements were carried out before and after a basketball game. *Staphylococci* were harvested by pressed agar-based media against the skin surface on middle of chest and medial side of the forearm. After incubation, the total number of the black colony surrounding media got clouded (*staphylococcus aureus*) and other black colony (*coagulase-negative staphylococcus*) was expressed as the number of *staphylococci*, using the colony forming unit (CFU). The number of *staphylococci* significantly increased after the

game on chest (before game;  $66.5 \pm 90.2$  CFU, after game;  $199.5 \pm 155.5$  CFU,  $p < 0.05$ ) and forearm (before game;  $5.3 \pm 8.8$  CFU, after game;  $84.7 \pm 77.7$  CFU,  $p < 0.05$ ). There was no colony of *staphylococcus aureus* on chest and forearm before the game. However, the colonies of *staphylococcus aureus* were found on two players' chests (4 and 6 CFU) and one player's forearm (7 CFU) after the game. These results suggested that infectious risk on skin surface might increase after a basketball game. From a practical point of view, we recommend that athletes should keep their skin surface clean such as immediately taking a shower after the game.

## **The relationship between body weight gain and prevalence of metabolic syndrome risks in collegiate American football players**

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The purpose of the study was to examine whether the body weight gain in accordance with years of experience influence the prevalence of metabolic syndrome risks in collegiate American football players. 43 collegiate American football players were divided into 4 groups based on their years of experience in playing American football (0:non-experienced, 1:1<sup>st</sup> year, 2:2<sup>nd</sup> year, and 3:3<sup>rd</sup> year players). Body composition was measured by DXA and the criteria for metabolic syndrome were also analyzed. The average body weight was significantly larger in all three experienced groups compared to non-experienced group. Compared to 1<sup>st</sup> year group, the body weight was significantly larger in 2<sup>nd</sup> year group (0:72.4±6.1, 1:75.6±9.4,

2:89.5±11.9, and 3:84.5±10.9kg). The significant difference in average waist circumference between non-experienced and 2<sup>nd</sup> year groups was observed (0:78.3±5.9, 1:82.0±7.2, 2:89.3±9.9, and 3:86.0±7.0cm). The average systolic blood pressure of 4 groups were 0:118.5±8.1, 1:116.4±10.5, 2:129.2±9.2, and 3:132.6±5.2mmHg with having significant differences between all the groups except for between non-experienced and 1<sup>st</sup> year group, and 2<sup>nd</sup> and 3<sup>rd</sup> year groups. In conclusion, the significant body weight gain during the 1<sup>st</sup> year may influence the prevalence of metabolic syndrome risks among collegiate American football players especially for non-experienced players.



## Heart-capturing (Delight) scene in watching sport

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We examined the relationships between some variables (gender, age, frequency of attendance, and loyalty to favorite team) and delight scenes to verify the characteristics of delight in more detail. The survey involved three games and the participants were 1434 spectators. As a result, it was found that the scores of delight scenes in females were significantly higher than those in males were in almost every scene ( $p < .05$ ). Regarding the other three variables (age, frequency of attendance, and loyalty to favorite team), loyalty to the team and delight scenes were moderately correlated ( $r = .319-.464$ ,  $p$

$< .01$ ) and frequency of attendance and delight scenes were weakly correlated ( $r = .226-.360$ ,  $p < .01$ ). Moreover, it was verified that four aspects of exciting scenes positively influenced loyalty to the favorite team; in particular, *sympathy/togetherness* and *dramatic scenes* significantly influenced loyalty in all three games. Our findings indicate sports teams should develop some strategies for spectators to feel *sympathy/togetherness* at a stadium and sport leagues should apply these to balance the strength of each team and make games more exciting.

## **The Relationship between Change in Perceived Motivational Climate and Change in Goal Orientations among Japanese Ice Hockey Players in the Season**

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Goal orientation is one of the most important factors for coaches to promote athletes' skill development and participation in practice. The purpose of this study was to examine the relationship between the change in perceived motivational climate created by coaches and the change in goal orientations over time among Japanese high school ice hockey players. One hundred and forty-six players completed a series of surveys two times over the course of their athletic season. Results indicated that the change in task-involving climate positively was associated with the change in task orientation over the course of the season. The changes in

both task-involving climate and ego-involving climate positively were associated with change in ego orientation over time. These results demonstrated that the task-involving climate created by coaches may influence not only players' task goal orientations but also their ego orientation in Japanese youth sport setting. On the other hand, the ego-involving climate created by coaches may influence players' ego goal orientations. Therefore, Japanese youth sport coaches could change players' goal orientation by creating task-involving climate. Additionally, creating ego-involving climate may be not important for players' goal orientations.

## **Differences in the whole body rotation mechanism between sidestep cutting and curvilinear-running**

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The purpose of this study was to compare the rotational aspect of whole body motion between the sidestep cutting and the curvilinear-running. Ten healthy male subjects performed sidestep cutting, curvilinear-running and straight running (SC, CR and SR) at the speed of  $5 \pm 0.5$  m/s. For SC, the subjects were instructed to run straight before changing the direction sharply in one step. The amount of change in step direction was set at  $30^\circ$  for both SC and CR. A motion capture system was used to record the whole body motion. The angular momentum of whole body about the vertical axis passing through the center of mass was determined by the method described by Dapena (1978), and was normalized by the subject's body mass and square of height

(reported in units of  $10^{-3}\text{s}^{-1}$ ). The angular momentum immediately before touch-down was significantly larger in SC and CR ( $2.7 \pm 2.8$  and  $4.7 \pm 3.5$ , respectively) than in SR ( $-4.0 \pm 1.8$ ). Immediately after the take-off, the angular momentum was significantly larger in CR ( $6.5 \pm 3.5$ ) than in SC and SR ( $3.2 \pm 3.7$  and  $2.7 \pm 1.7$ , respectively), but no difference was found between SC and SR. These results indicate that (a) the given momentum of body rotation was maintained throughout the curvilinear-running whereas (b) a certain amount of momentum of body rotation was generated during the straight approach run and eliminated before the take-off for the sidestep cutting.

## **Difference in knee joint mechanics during cutting with and without a lacrosse stick**

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Women's lacrosse is associated with a higher incidence of anterior cruciate ligament (ACL) injuries than other women's sport, and a lacrosse game is running, jumping and cutting movement while holding a lacrosse stick. The aim of this study was to compare the difference in the peak knee valgus angle and the peak knee valgus moment during cutting with and without a lacrosse stick. Nine women's collegiate lacrosse players (mean age, 20.0 years; lacrosse experience, 24 months) participated in this study. An 8-camera motion analysis system and a force plate were used to record the three-dimensional marker positions and the ground reaction forces

during cutting. The subjects were instructed to run for a distance of 4–5 m and then land their right foot on a force plate followed by a change in their direction to the left to cut an angle of 45°. There were no significant differences in the peak knee valgus angle ( $11.8 \pm 6.3^\circ$  vs.  $11.8 \pm 6.0^\circ$ ,  $P = 0.998$ ) and the peak knee valgus moment ( $0.78 \pm 0.29$  vs.  $0.80 \pm 0.40$  Nm/(kg\*h),  $P = 0.819$ ) for cutting with and without a lacrosse stick. It is demonstrated that the cutting with a lacrosse stick did not influence the peak knee valgus angle and the peak knee valgus moment as compared to cutting without a lacrosse stick in women lacrosse players.

## Association between stages of change for healthy eating behavior and nutritional knowledge among collegiate athletes

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The purpose of the present study was to examine the association between stages of change (SOC) for healthy eating behavior and nutritional knowledge among collegiate athletes. The cross-sectional survey was conducted for 270 participants from 14 athletic clubs aged 18 to 22 years in Waseda university. Participants answered from each below stage, Precontemplation (PC), contemplation (C), preparation (P), action (A), maintenance (M), and answered to the nutritional knowledge questionnaire which consisted of 26 of general nutrition knowledge and 35 of sport nutrition knowledge questions. The score range was 0 to

61 (correct / incorrect answer; 1 or 0 points). Descriptive statistics were reported for demographic variables and nutritional knowledge score. Independent *t*-test was utilized to examine the differences in the scores between genders. The differences in scores among stages were examined by one-way analysis of variance. Mean age  $\pm$ SD was 19.81 $\pm$ 0.96 years. Total of 68.0% was male. Mean nutritional knowledge score was 29.3 $\pm$ 8.3 in total. The scores in female (31.6 $\pm$ 7.2) was significantly higher than those in male [28.2 $\pm$ 8.5;  $t(268) = -3.13, p < .01$ ]. However, there was no significant differences in the scores among the stages [ $F(4, 265) = 0.38, p = .821$ ].

## **Acute effects of pre-batting warm-up with weighted bat on the bat swing speed and preciseness (progress report)**

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It is common for baseball batters to conduct warm-up with weighted bat (WWB) in the on-deck circle. However, the effect of WWB on bat swing preciseness and time dependent change of bat swing speed is still unclear. The main purpose of this study is to clarify the effects of WWB on bat swing speed and preciseness. Twenty-three college baseball field players participated in this study. The subjects took five hits off the baseball tee before and after WWB or game-bat swings (as a control). Rest interval between the warm-ups and post-warm-up trials were 45 s. Subjects took each hit in every 15 s. Two high speed digital

video cameras recorded hitting motion in the period between 75 ms before and 75 ms after ball-bat impact. Two reflective markers on the bat (near the grip and the top) and ball center were digitized with motion analysis software in order to calculate bat swing speed and ball-bat distance at the moment of impact. Statistical analysis will be performed on 1) the average bat swing speed before and after the two types of warm-ups and 2) average and standard deviation of ball-bat distance before and after these warm-ups by using repeated measures of analysis of variance.

## **Difference of the activation level measured by twitch interpolation technique between plantar flexor and adductor pollicis muscles**

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Twitch interpolation technique is a method to confirm the activation level during voluntary contraction. Specifically, if the electrical stimulation is imposed during voluntary contraction at a submaximal activation level, additional force is recorded because the muscle fibers which are not activated during voluntary contraction are activated. This technique is widely used to confirm whether or not a muscle is completely activated during voluntary contraction. However, it has not been examined why the activation level measured by the twitch interpolation technique is different between muscles. Therefore, the purpose of this study was to compare the difference of the activation level measured by twitch interpolation technique between plantar flexor and adductor pollicis. Eleven subjects performed plantar flexion and

thumb adduction of the hand, at an intensity of 20, 40, 60, 80 and 100% of the maximal voluntary contraction (MVC). During each contraction, electrical stimulation was imposed during voluntary contraction to calculate the activation level with twitch interpolation technique. As a result, in plantar flexion, the calculated activation level became significantly higher as the contraction level became higher. On the other hand, in thumb adduction, although the calculated activation level became significantly higher up to 80%MVC, it was not different between 80% and 100%MVC. These results could be caused by the differences of the force regulation strategy (i.e. recruitment of the muscle fibers and firing frequency) between these muscles.

## **A study on the lifestyle of the new endurance sports participants –Focus on triathlon participants-**

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The purpose of this study is to examine the effect of sport specialization in the lifestyle of the new endurance sports participants. In 2010, a research was conducted for the purpose of examining the lifestyle of the participants of new endurance sports. The results clarified that there were eight factors in the lifestyle scale. In addition, the result of the lifestyle segmentation for the participants showed that their lifestyle might change because of their attitude toward sports. Thus, the present study uses the concept of sport specialization to examine the change in the lifestyles. Since specialization indicates the participants' sport experience and their behavioral pattern toward sports, specialization

is used as a variable that influences participants' lifestyle change. In this study, a questionnaire survey will be administered to the participants of triathlon competitions held in September 2011. There are two hypotheses: (1) specialization affects the participants' lifestyle, and the lifestyle of participants is different in conjunction with the level of specialization, (2) in particular, the level of specialization causes a difference in the value of the pro-environmental behavior factor. Clarifying changes in the lifestyle helps in understanding the participants and in designing efficient marketing strategies to continue the development of new endurance sports.



**Mitochondrial DNA variations associated with elite Japanese athlete status:  
evidence from analysis of 185 complete mitochondrial DNA sequences**

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Many lines of evidence suggest the relationship between mitochondrial genome and elite athletic performance. However, the mitochondrial DNA (mtDNA) variations directly responsible for this relationship remain unidentified. The purpose of the present study was to test all common mtDNA variations (minor allele frequency > 0.05) for association with elite Japanese athlete status. Subjects comprised 185 elite Japanese athletes who had represented Japan at international competitions (i.e., 100 endurance/middle-power athletes: EMA; 85 sprint/power athletes: SPA) and 672 Japanese controls (CON). The entire mtDNA sequences (16,569-bp) were analyzed by direct sequencing. Nucleotide variations were detected at 1491 sites in the entire mtDNA sequences. The 134/1491 variations were common (>0.05), and frequency differences of these common variations were

examined between EMA and CON, between SPA and CON. The EMA displayed excess of 5 polymorphisms [m.152T>C, m.4343A>G, m.11215C>T, m.15518C>T, and m.15874A>G] and dearth of m.16140T>C polymorphism compared with CON, whereas SPA displayed excess of m.204T>C polymorphism and dearth of 4 polymorphisms [m.4833A>G, m.5108T>C, m.14569G>A, and m.16278C>T] compared with CON ( $P<0.05$ ). Furthermore, the frequencies of three length polymorphisms [m.514 (CA)<sub>n</sub> repeat ( $n\geq 5$ ), poly-C stretch at m.568-573 ( $C\geq 7$ ), and m.8272-8289 9-bp deletion] differed significantly between EMA and CON ( $P<0.05$ ). Functional studies are now warranted to investigate the underlying mechanisms of the presently reported associations between polymorphisms in the mtDNA and elite athletic performance.

**Increased daily-activity alters thermal perception and behavioral thermoregulation in mice: exercise may induce neuropsychological adaptation to heat**

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The aim of this study is to know whether physical activity affects animal's behavioral responses during heat with osmotic stimulus. Male ICR mice (2-4 mo, age) were divided into two groups: one group had free access to running wheel for 8 weeks (WR, n=20) and the other not (NWR, n=20). After subcutaneous injection (1 ml/100 g of body weight) of either isotonic- (154 mM, IS) or hypertonic- saline (2,500 mM, HS), each mouse was placed in a behavior box with 5 peltier boards at the bottom, where a) thermal mosaic (temperature of each board was randomly chosen among set at 15°C, 22°C, 28°C, 35°C, or 39°C and was changed each 6 min) or b) operant

behavior available (the temperature of each board was set at 39°C; right-end board temperature was changed to 20°C for 60 seconds when a mouse moved to left-first two boards). In the results, WR group had significant operant behavioral responses than NWR group during osmotic stimulus in the heat (2 times higher than NWR) and prefer lower temperature (32.8°C vs 34.8°C in average). These results indicate that physical activity may improve behavioral thermoregulation in dehydrated mice in the heat. In particular, physical activity may lower the thermal preference.

## Proximal and distal factors on knee joint kinetics during running

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The knee abduction impulse has been reported as the kinetic risk factor of running injuries at the knee. The purpose of this study was to examine the relationships among the knee abduction impulse, the step width and lower extremity joint angles during running. Seventy runners (54 males and 16 females) participated in this study. Subjects ran along a 25m runway at a speed of 4 m/s. Three-dimensional reflective marker positions and ground reaction forces were simultaneously recorded with a motion analysis system and a force plate. The stepwise multiple regression analysis revealed that the knee abduction impulse could be predicted by

the peak rearfoot eversion angle, peak calcaneal eversion angle and step width in order of strength of standardized partial correlation coefficients (adjusted  $r^2 = 0.682$ ). The step width was correlated with the impulse of mediolateral ground reaction force and the peak rearfoot eversion angle ( $r = 0.780$ ,  $p < 0.001$ ). In addition, the peak knee abduction angle was negatively correlated with the peak rearfoot eversion angle ( $r = -0.724$ ,  $p < 0.001$ ). These results suggest that the knee abduction impulse was affected by foot and ankle joint motions and step width, possibly by increasing the lever arm of the ground reaction force around the knee joint center.

**Biomechanical approach for measuring field sports performance from video sequences: A case report in 4 defensive soccer scenes using model-based image-matching technique**

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The purpose of this case study was to examine the movement in actual game situations using model-based image-matching technique. We recorded some soccer games. From these video recording, four defensive scenes which was responding to the dribble attacking around the vital area were selected to analyze. All subjects conducted changing direction so as to react and keep up to the attacking players. Two of its four scenes were defined as the cases of successful because defensive player made shut down the dribble attacking, while the other two were defined as failure cases. The parameters to compare with successful and failure scene were ground contact time, center of mass (COM)

height, trunk, hip, knee kinematics and vertical ground-reaction force during direction change. Players who conducted direction change in shorter ground contact time and smaller COM displacement could make shut down the dribble attacking. These players were smaller flexion angles and bigger vertical ground reaction force at the lowest point of COM compared with player in failure cases. These parameters would be one of the points of assessment related to performance in 1 on 1 situation. Therefore, soccer coaches should check the body posture and movement of players when they encounter the 1 on 1 situation.

## **The difference in ball flight trajectory between four-seam fastball and two-seam fastball thrown by baseball pitchers**

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In this study, we investigated the difference in the flight trajectory between four-seam and two-seam fastballs pitched by baseball pitchers. Six collegiate pitchers threw three four-seam fastballs and three two-seam fastballs. Four high-speed video cameras were used to record the position and the orientation of the pitched ball. The three-dimensional coordinates of the trajectory of the ball were obtained with the DLT algorithm. In addition, we defined  $\Delta Z$  and  $\Delta X$  for each pitch, as the difference between the arrival position of the actual trajectory and its assumed trajectory with free fall. The orientation of ball spin axis and spin rate were obtained using a custom-made apparatus. We decomposed the spin parameter, the ratio of ball speed and

spin rate, to vertical component of the ball coordinate system ( $Sp_{ver}$ ).

The results showed that four-seam fastballs had a greater  $\Delta Z$  than two-seam fastballs. On the contrary,  $\Delta X$  was greater in two-seam fastballs than in four-seam fastballs.  $\Delta Z$  of each pitch were correlated with the  $Sp_{ver}$ . However, no statistical difference between the two types of fastballs was found in the slope and y-intercept of the regression line representing the relation between the  $Sp_{ver}$  and  $\Delta Z$ . These results suggest that the difference in the  $\Delta Z$  between two types of fastballs was attributable to the difference in the spin rate and/or the orientation of the spin axis, and not to the difference in the orientation of the seam itself.

## **Leukocyte counts are influenced by menstrual cycle and carbohydrate ingestion in women during prolonged exercise in a hot environment**

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The purpose of this study was to examine whether menstrual cycle and carbohydrate ingestion affect the circulating leukocyte counts during a prolonged exercise in a hot environment. Six healthy women with regular menstrual cycles completed total of four trials which consists of 90 min of cycling exercise at the intensity of their 50% VO<sub>2</sub>peak with the performance test afterwards in a hot environment. Each trial was performed either with the ingestion of carbohydrate drink or the placebo drink pre and during exercise at their follicular phase (FP) and luteal phase (LP), respectively. The data of the concentration of expired gas, heart rate, and rectal temperature were collected during the

exercise. Blood samples were taken before and after exercise and every 30 min during exercise. The results in this study were that 1) menstrual cycle affected the leukocyte counts during prolonged exercise in a hot environment, about 37% higher in LP as contrast with in FP at 90th min of exercise, 2) ingestion of carbohydrate drink during exercise suppressed the acute increase of leukocyte and diminished the difference in increase of leukocyte counts between FP and LP, 3) the effects of menstrual cycle and ingesting carbohydrate drink in the response of leukocyte during prolonged exercise was associated with the substrate metabolism in each trial.

**Hamstring muscle activation properties during running  
- A study using the time-frequency analysis -**

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The purpose of this study was to investigate whether there are characteristic features of the EMG intensity and frequency content of the hamstring muscles during running at different speeds using the time-frequency analysis. Six healthy young male track and field athletes (20.2 ± 1.2 years) performed treadmill running at 50%, 75%, and 95% of their maximum velocity. The surface electromyographic activities of the biceps femoris (BF) and semitendinosus (ST) muscles were recorded. A time-frequency pattern for each running gait cycle was generated using the continuous wavelet transform. The total spectrum intensity and instantaneous mean frequency (IMNF) were calculated at each divided phase of a running gait cycle.

A different intensity pattern was observed in the BF and ST muscles within single gait cycle. Significantly higher intensity of the BF muscle activation was observed during the stance and late swing phases, while that of the ST muscle was significantly higher during the late swing phase at 50% and 75%max running, however, there was no significant difference between phases at 95%max running. Significant differences in the IMNF were not found between each phase. The results indicate that the functional demand would be different between respective hamstring muscles during running and that these activation patterns varied with changes in running speed.

## **Contribution of upper- and lower-limb to propulsive force during V2 skate in cross-country skiing**

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The purpose of this study determined the contribution of upper- and lower-limb to propulsive force during V2 skate technique in cross-country skiing. Six elite cross-country skiers performed 6.0 m/s speed over a 100-m flat snow section using the V2 skate technique. Pole and planter forces and cycle characteristics were analyzed. Three-dimensional videography determines the orientations of the poles and skis in order to resolve the resultant poling and skating forces into three components. The peak

force of poling and skating were  $100 \pm 20$  N,  $202 \pm 48$  N, respectively. The averaged force of poling and skating were  $63 \pm 12$  N,  $106 \pm 18$  N, respectively. The ratios of contribution of lower-limb (push off of each side leg) to upper-limb (poling of both arms) were 101 % (in peak force) and 84 % (in averaged force). Those results suggested that upper- and lower-limb movements were contributed to achieve similar forces.



**Brain activities during motor imagery of an action with an object:  
a functional magnetic resonance imaging study**

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We have demonstrated that corticospinal excitability was increased by passively touching the object during motor imagery (Mizuguchi et al. 2009). In the present study, we investigated brain activities during motor imagery with and without passively touching the object using a functional magnetic resonance imaging (fMRI). Nineteen healthy volunteers participated in this study. Three types of tasks were conducted; (1) ‘Ball + Imagery’ condition (2) ‘Imagery’ condition, and (3) ‘Ball’ condition. Subjects were asked (/not) to imagine squeezing a ball (7cm diameter) with or without touching the ball. All images were acquired using a 1.5 T MR scanner. Blood oxygen level-dependent (BOLD) contrast functional images were acquired, and data were analyzed with Statistical Parametric Mapping (SPM8).

Regions activated by the ‘Ball + Imagery’ condition were located in the left dorsolateral prefrontal cortex (DLPFC), supplemental motor areas (SMA), inferior parietal lobule (IPL), superior parietal lobule (SPL), insula, cerebellum and basal nucleus. Conjunction analysis for common regions activated during the ‘Ball + Imagery’ and the ‘Imagery’ revealed significant activation in the DLPFC, ventrolateral prefrontal cortex, premotor cortex, insula, cerebellum and basal nucleus. In subtraction analysis, significant activation during the ‘Ball + Imagery’ minus the ‘Imagery’ is indicated in the left precuneus, and in the right DLPFC. Our studies indicated the neural networks responsible for motor imagery with and without touching an object.