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【1A-1】

Knee Flexor Strength and Morphology of the Semitendinosus Muscle after Anterior Cruciate Ligament Reconstruction

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The purpose of this study was to clarify the correlations between morphological changes in the semitendinosus (ST) muscle and knee flexor strength after anterior cruciate ligament (ACL) reconstruction. Isometric knee-flexion torque and MRI scans were evaluated for 24 patients who underwent ACL reconstruction using ST tendon, then relationship among measurements were analyzed. The patients were divided into three groups based on morphological characteristics of the ST muscle in the ACL reconstructed limb compared with those in the contralateral limb: the ST tendon was regenerated in group Ⅰ and Ⅱ, the ST muscle length stayed the same in group Ⅰ, but became shorter in group Ⅱ. While in group Ⅲ, no tendon regenerated and the ST muscle length shorted. In group Ⅱ and Ⅲ, significant deficits in isometric knee-flexion torque at 90° and atrophy of the ST muscle were observed ($P<0.05$). In group Ⅲ, isometric knee-flexion torque at 30° was also decreased ($P<0.05$). There were no significant changes in group Ⅰ. The results suggest that regeneration of the ST tendon and proximal shifting of the ST muscle is significantly correlated with knee flexor deficits, so maintenance of the morphology of the ST is important.

【1A-2】

A study on causal relationship between dominant region and offense-defense performance - Focusing on time of the ball take-

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In football, group sport skills have been only analyzed by an expert's visual confirmation method until now. Therefore, the development of quantitative evaluation method of group sport skills is a subject should be settled as soon as possible. Also, it has been considered that there is an important relationship group sport skills and player's spatial arrangement, various references have been made to the spatial arrangement in order to strengthen the team in the coaching field. Based on these backgrounds, the dominant region that divides field into area would be reached earlier by attacking team and defending team by state of player's spatial arrangement was used in this study to verify if there is a casual relationship between the dominant region and offense-defense performances, and confirm the validity as an index to develop the quantitative evaluation method of group sport skills. The result of comparisons of the dominant region between different offense-defense performances groups, a significant difference observed in some comparisons, the possibility was suggested that both of offense and defense performances have casual relationship with the dominant region. Consequently, the possibility was suggested that the group sport skills that were to be evaluated qualitatively so far could be evaluated quantitatively by the dominant region.

【1A-3】

Morphological profiles of the quadriceps femoris in varsity oarsmen and cyclists

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The purpose of this study was to examine the morphological profiles of four constituents (vastus lateralis, vastus medialis, vastus intermedius, and rectus femoris) of the quadriceps femoris in oarsmen and male cyclists through comparison with those of non-athletes. T1-weigheted magnetic resonance (MR) images of the thigh were obtained from 14 oarsmen, seven male cyclists, and 19 non-athlete men. From the MR images, serial anatomical cross-sectional areas were measured, and the volume of each muscle was determined. The muscle volume relative to body mass and the relative volumes of individual muscles to that of the total quadriceps femoris were calculated. The muscle volumes relative to body mass of the total quadriceps femoris, vastus lateralis, vastus medialis, and vastus intermedius of the oarsmen and cyclists were significantly larger than those of non-athletes, whereas that of the rectus femoris was comparable for the three groups. The relative volume of the rectus femoris to that of the total quadriceps femoris was significantly smaller in the oarsmen and cyclists than that of non-athletes. The present results indicate inferior muscular hypertrophy of the rectus femoris compared to the vasti in oarsmen and cyclists. This may be due to muscle-specific adaptation to the rowing and cycling exercises.

【1A-4】

Differences between left and right hand displacement of head up swimming on surf lifesavers

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At ocean, there is no course rope. So surf lifesavers use the head up motion during the front crawl. About this specific motion, it is not clear. The purpose of this study was to determine the differences between right and left hands displacement of head up swimming on surf lifesavers. Ten male surf lifesavers performed two 50m trials with 80% of their best performance velocity. Two underwater video cameras were used to capture the right and left hands in two strokes at 200Hz. Duration of the stroke, stroke length (SL), hand displacement were measured on left and right hands respectively. Duration of left hand was significantly shorter than that of right hand ($p<0.05$). Displacement of right hand showed significantly longer forward and more shallow than left hand ($p<0.05$). These findings indicate that lifesavers would do long glide motion for head-up after entering the water on right hand. On the other hand, after the entering of the left hand into the water, left hand catches the water immediately and begins the propulsive phase by pressing the arm back as well as down. Which means, left hand makes a propulsive force efficiently and the other hand makes head up easily glide motion.

【1A-5】

Effects of antioxidant supplementation on exercise-induced activation of signal transduction pathways in mice skeletal muscle

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Contracting skeletal muscles generate reactive oxygen species (ROS) and prolonged and intense exercise can result in oxidative damage to cellular constituents. On the other hand, it has been known that ROS activates the signaling kinases which regulate several skeletal muscle adaptations. However, the effects of antioxidant supplementation on exercise-induced activation of signal transduction pathways of skeletal muscle adaptation have not been clarified. The purpose of this study was to determine the effects of antioxidant supplementation on oxidative stress and exercise-induced activation of signal transduction pathways of mitochondrial biogenesis in mice skeletal muscle. C57BL mice were allocated into 3 groups; control (Con) group, exercise (Ex) group or antioxidant supplemented exercise (Ex+AO) group. The mice of Ex+AO group were administrated vitamin C and vitamin E for two weeks. The mice of the Ex and Ex+AO group were subjected to 25 m/min treadmill running for 90 min. After the exercise, muscle was dissected for the measurement of markers of oxidative stress. No significant changes in markers of oxidative stress and antioxidant capacity were observed following exercise and antioxidant supplementation at present. Other oxidative stress markers and signaling kinase activities will be measured and the obtained data will be reported in the symposium.

【1A-6】

The instance of subacromial impingement during front crawl swimming

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Shoulder pain is the most common problem in competitive swimming. The subacromial impingement is a proposed mechanism to explain shoulder pain experienced by swimmers. The purpose of the study was to determine the instances at which the subacromial structures were experiencing impingement during swimming. The subacromial structure was considered be impinged when glenohumeral joint configuration exhibited in front crawl exceeded the so called “boundary range of motion”, that is, the anatomical range of motion permitted to the individual’s glenohumeral joint. Nineteen members of men’s collegiate swimming team participated in the study. Each subject underwent two test sessions, a boundary range of motion measurement and a swimming motion measurement. A simplified kinematic model composed of right scapula, right humerus and thorax was used to describe the shoulder configuration. An electromagnetic tracking device was used to record the movements of the three segments by determining of the position and orientation of sensors. Three sequential Euler angles, representing horizontal abduction angle, elevation angle, and internal rotation angle, were used to express the glenohumeral joint configuration exhibited in two test sessions. The results showed that subacromial impingement occurred for 11.7 ± 10.8% of the stroke time. Subacromial impingement was observed in most subjects during the initial pull phase (n=12) and the second half of recovery phase (n=13)

【1A-7】

Impact characteristics for “the same-field and opposite-field hitting” in softball

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The purpose of this study was to examine the three-dimensional kinematic parameters of ball impact that determine the initial trajectory of the batted ball in the vertical (grounder, the line drive ball) and horizontal directions (toward same-field or opposite-field). Nineteen women’s collegiate softball players performed four “free-betting” trials with maximal effort to project the batted ball toward various directions; line drive toward same-field (LS), grounder toward same-field (GS), line drive toward opposite-field (LO), and grounder toward opposite-field (GO). Behavior of the ball impact was recorded with two high-speed cameras (1000fps). The projection angles of the bat on the horizontal plane (horizontal bat angle: 0 for the bat facing straight toward the center field), the vertical plane (vertical bat angle: 0 for the bat in horizontal orientation) and the angle from horizontal of the line of impact (line of impact angle) were determined at the ball impact. The horizontal bat angle was 21.1±5.0° for LS & GS and -17.2±8.0° for LO & GO. The vertical bat angle was 15.3±6.6° for LS & GS and 21.0±7.4°for LO & GO. The line of impact angle was 13.5±5.4° for line drive, -3.6±4.7° for grounder. The horizontal direction of the batted ball was highly correlated with the horizontal bat angle (R^2=0.95). For a given horizontal bat angle (-23~-17° for LO & GO and 17~23° for LS & GS), the horizontal direction of the batted ball were found to be significantly different between grounder and line-drive. This can be explained as follows: Assuming that the batter hits the lower part of the ball with a horizontally oriented bat (line of impact angle >0 & vertical bat angle =0), the batted ball must travel upward. If, however, this same ball impact is made with a tilted bat (the head positioned lower than the grip: vertical bat angle >0), the batted ball should travel upward and toward the opposite-field. These results indicate that the softball players do not only adjust the horizontal bat angle, but they also applied a strategy of adjusting the vertical bat angle and the line of impact angle, to hit the ball toward different directions.

【1A-8】

Abdominal breathing technique reduces fluid resistance force

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The purpose of this study was to examine if fluid resistance force that a towed swimmer was subjected to (called passive drag) could be altered by adopting different breathing techniques; chest breathing technique and abdominal breathing technique. Six male subjects participated in this study. Before experiment, each subject underwent multiple practice sessions to learn (a) the breathing techniques to inhale air by inflating the specified body part (chest for chest breathing and abdomen for abdominal breathing) and to maintain the inflated body configuration, (b) a technique of maintaining the lower back straight to configure a proper gliding position. A specialized towing machine (Torrent E-Rack Electronic Swim Power Trainer, Hector Engineering Inc., USA) was used to tow the subject with four different magnitudes of forces and to record time-series data of towing velocity for each trial. Subjects were towed via the harness attached around subject's shoulders after they inhaled a given volume of air. During each towing trial, the subject was asked to maintain the extended arms beside the trunk with chest or abdomen inflated. A portable periscope system was used to monitor the body movement and posture during each towing trial. A successful trial was defined as follows; (a) the subject moved straight through water at the depth between 0.3m and 0.8m water surface, (b) the subject maintained the low back straight, and (c) the specified body part was properly inflated. The trial was repeated for each subject until a successful trial was recorded. The steady-state velocity was determined for each trial as the average towing velocity over 3 seconds over which the towing velocity was near constant, and the drag coefficient was calculated. Results showed that the steady-state velocities were significantly faster with abdominal breathing technique (1.11±0.08~ 1.91±0.13 m/s) than with chest breathing technique (1.08±0.07~1.85±0.11 m/s) for all the towing forces ($p<0.05$). The drag coefficients were significantly lower with abdominal breathing technique (0.030 ±0.003) than chest breathing technique (0.032±0.003) ($p<0.05$). These results clearly indicate that abdominal breathing technique reduces the passive drag.

【1A-9】

The relationship among muscle hardness, tonus and knee laxity

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Muscle tension is divided into muscle hardness which is determined by palpation of the body surface and stiffness which is the flexibility to the direction of the muscle fiber.

The purpose of this study was to examine the relationship among the muscle hardness , tonus and knee laxity.

Fourteen male college students participated in this study (age=21.9±1.8, height=171.8±3.4cm, weight=63.5±5.0 kg). Muscle hardness was measured with two types equipments; ultrasonography (EUB-7500; elastgraphy mode) and tissue hardness meter(NEUTONE). The measurement site of muscle hardness was rectus femoris (RF), vastus medialis (VM) and vastus lateral (VL). Muscle tonus was measured with the knee flexion angle in the prone position. We measured the anterior tibial translation as the knee laxity (KNEELAX 3). We analyzed these date with Pearson's product-moment correlation relationship. Statistic significance was set at $p < 0.05$.

There was a significant correlation between the muscle hardness on the RF with ultrasonography and the muscle tonus ($r = -0.555$, $p < 0.05$) and between the muscle hardness on the RF with NEUTONE and anterior tibial translation ($r = -0.627$, $p < 0.05$).

In conclusion, the muscle hardness on the RF has the relationship with the knee laxity and the muscle tonus.

【1A-10】

Comparison of rotational movement of runner about vertical axis between sidestep cutting and running along a curved path

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The purpose of this study was to compare the rotational movement of runner about vertical axis between sidestep cutting and running along a curved path. Ten healthy males performed 30º sidestep cutting (SC) and running along the curved path of 5m radius (RC) at the speed of 5±0.5 m/s. A motion capture system was used to record the whole body motion. The center of mass of whole body was estimated by using body segment inertial parameter reported by Ae (1992), and its velocity on horizontal plane was computed. Step angle was defined as the angular displacement of the horizontal velocity vector that took place within contact phase. Shoulder angle (Δθ) and pelvis angle (Δφ) were determined as the angular displacements of the line connecting the shoulders and the line connecting the ASIS, respectively, on the horizontal plane. No difference was found in step angle (SC: 16.4±2.8°, RC: 14.5±1.6°). This result indicates that there was no difference of the change in movement direction during contact phase between SC and RC. Δθ and Δφ were significantly larger in SC (44.0±10.0°, and 9.1±8.7°) than in RC (36.0±6.1° and 4.8±6.7°). These results indicate that the amount of change in orientation of body was larger in SC than in RC. The present study demonstrated that the rotational movement of body about vertical axis was different between sidestep cutting and running along a curved path while the same amount of change in movement direction occurred.

【1A-11】

Contribution of Visual Information about Ball Trajectory to Baseball Hitting Accuracy

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The latency period between visual perception and muscle contraction, called visuo-motor delay, is a limiting factor for the hitting a pitched baseball accurately. However, the actual relationship between baseball hitting accuracy and vision is unknown. We tested the hypothesis that the longer the batter is able to see an approaching ball, the more accurate their hitting will be. Baseball hitting accuracy for 11 collegiate batters was evaluated when their vision was occluded at different times [Condition A: occlusion from 150 ms after the ball release to the impact, Condition B: occlusion from 300 ms after the ball release to the impact, Condition C: No occlusion], in order to clarify the contribution of visual information as the pitch approaches the batter. Batters hit 36 fastballs launched from a pitching machine at 145 km/s. Batters were able to make contact with a launched ball most of the time even when their vision was occluded 150 ms after the ball release. In addition, there was no significant difference between the hitting accuracy for the Condition B and C. Therefore, visual information of ball flight trajectory before batters swing the bat to the pitch plays the most important role in the execution of accurate hitting.

【1B-2】

Effect of feedback on the accuracy of reaching movement

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The purpose of this study was to examine whether feedback influences the accuracy of reaching movement. Ten healthy adults took part as subjects in the experiment. During the experiment, the subject sat on the chair with the feet grounded on the floor. In order to determine each subject's perceived maximum reaching distance, subjects were asked to say "stop" when a target, which was slowly moving away from the subject has arrived at the distance. For the reaching target, two targets were placed with the distance of their maximum reaching distance and the direction of 45 degrees laterally away from their mid-line of the frontal plane. At first, subjects were instructed to see the target, then they tried to reach the target with closing eyes. The accuracy of reaching movement was evaluated by the mean and standard deviation (SD) (%) of distance between the target and the points where the reaching finished. In addition, normalized error and SD (%) were obtained by dividing the distances with the length between the target and the superior margin of the sternum. The result showed that there existed normalized SD of about 3% regardless of whether feedback of conclusion is used.

【1B-3】

ACL Injury Risk during Maturation in Female Basketball Players

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The purpose of this study was to investigate whether biomechanical risk factors of ACL injury increase during the adolescent growth spurt. Ninety-two female basketball players between 9 and 17 years old participated in the study. They were classified based on maturation stages: early pubertal, middle pubertal, late pubertal, and post pubertal. ACL injury risk was evaluated using an ACL injury risk nomogram, which consists of measurements of tibia length, weight, quadriceps/hamstring ratio, two-dimensional knee valgus motion and knee flexion range of motion during a drop vertical jump. ACL injury risk, knee valgus motion and knee flexion range of motion were compered among four subject groups. ACL injury risk was significantly lower in early pubertal group compared with other groups ($p<0.01$). Early pubertal group demonstrated smaller knee valgus motion than middle and post pubertal groups did ($p<0.05$). Similarly, knee flexion range of motion was greater in early pubertal group compared with late and post pubertal groups ($p<0.01$). The results of this study indicated that following rapid adolescent growth, knee valgus motion was increased and knee flexion range of motion was reduced significantly. These biomechanical factors, as well as a rapid increase of height and weight, contributed to increased ACL injury risk.

【1B-4】

Loading asymmetries in treadmill walking 6 months following anterior cruciate ligament reconstruction

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The purpose of this study was to examine gait patterns at different controlled walking speeds on the treadmill and to observe gait characteristics of subjects that may be caused by ACL reconstruction. We studied 7 subjects (2 men and 5 women) at 6 months following a double-bundle ACL reconstruction surgery. The subjects were asked to walk on a split-belt treadmill at 3 different walking speeds: fast, preferred, and slow. The ground reaction forces (vertical, Fz; anteroposterior, Fy; and mediolateral, Fx) were recorded with 2 force plates for both legs set in the split-belt treadmill. Force peaks in three force components (% Body Weight) and spatiotemporal parameters (swing, stance, and stride time) were analyzed in each walking speed. No significant side-to-side difference was observed for any spatiotemporal parameter regardless of walking speeds ($p > 0.05$). In contrast, although no difference was observed between limbs in the Fz, the Fy and Fx were statistically different for the reconstructed and non-reconstructed limbs at all speeds ($p < 0.05$). These results show that ACL reconstruction caused the side-to-side difference in the anteroposterior and mediolateral forces on walking 6 months following surgery, but no differences were observed on spatiotemporal parameters.

【1B-5】

Mechanism of “rolling”of baseball bat around long-axis during batting action

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During baseball batting, the bat initiates rotation around the long-axis before ball impact (BI) and, reportedly, its speed attains over 1000°/s at BI. This rotation is named “rolling.” The purpose of this study was to describe how the rolling was generated in baseball batting. Fifteen baseball players performed five trials of free-batting aiming at hitting the ball toward the center field. An electromagnetic tracking device (240Hz) was used to record three-dimensional orientation data of the bat during the performance. Rolling angular velocity (ω^{roll}) was determined from the recorded orientation data. The rolling may be generated by two mechanisms: The first is attributable to an increase in the magnitude of the angular momentum of the bat ($\Delta\omega_H$). The rolling angular velocity increases as the magnitude of the angular momentum vector increases, given that the long-axis of the bat is constant and not perpendicular to the angular momentum vector. The second mechanism is attributable to the change in the orientation of the long-axis of the bat ($\Delta\omega_u$). The rolling angular velocity increases as the angle between the long-axis of the bat and the angular momentum vector separates from 90°. This increases the rolling component of the angular momentum even if the angular momentum vector stays constant. The results showed that the ω^{roll} was 715 ± 193 °/s, consisting of $\Delta\omega_H$ =-4125 ± 2656 °/s and $\Delta\omega_u$ = 4809 ± 2729 °/s at BI. These results indicate clearly that changing orientation of the long-axis of the bat is the primary mechanism of generating the rolling during baseball batting.

【1B-6】

Perceptual performance of skilled tennis players: perception-action coupling and uncoupling

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Skilled tennis players can predict ball direction even before the opponent's racket-ball contact. Such a superior anticipatory performance depends on the visual information that is available from the essential kinematics of opponent's motion. Although the number of researches on perceptual expertise is rapidly increasing, little is known about perception-action coupling effect. This study was aimed to clarify perception-action coupling characteristics for the anticipatory performance of skilled tennis players. Eleven skilled tennis players were asked to response the serve direction to a live-action video clip of the model tennis server. The test motions for visual stimuli were performed by two professional tennis players who hit the serve in the deuce side aiming at two targets (center and wide). The test films were occluded when the foot of the participants touched one of two mat-switches (coupled condition) and when the finger of the participants touched the keyboard (uncoupled condition). The results showed that the reaction of the coupled condition started earlier than the uncoupled condition. This indicated that the coupled condition took a greater amount of time to response than the uncoupled condition. In conclusion, these findings suggest that skilled tennis players use different anticipatory strategy between coupled and uncoupled conditions.

【1B-7】

Probabilistic atlas of the shoulder range of motion in young adults: visualizing the combined range of elevation and horizontal ad/abduction angles

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The purpose of this study was to develop a probabilistic atlas of shoulder range of motion that could visualize the combined range of elevation and horizontal ad/abduction angles in young adults. Fifty-two healthy young adults participated in this study. Each subject was instructed to perform a series of shoulder movements for the dominant arm to determine the maximum horizontal ad/abduction for every given elevation angle and maximum elevation for each horizontal ad/abduction angles. An electromagnetic goniometer system was used to measure the shoulder joint configuration exhibited at every instant during the movements. The shoulder joint configuration was presented as the orientation of the plane on which the arm was elevated (called horizontal adduction angle θ) and the elevation angle φ. For each subject, the data sets for all shoulder configurations indicative of the maximal angles were plotted on a graph and the area endowed by the plots was defined as the shoulder ROM of the subject. The shoulder ROM of all subjects were overlaid on a single graph and transformed it into a multi-dimensional histogram. The probability of the distribution was determined by dividing the frequency for every given "window" of $\Delta\theta$ and $\Delta\varphi$ by the total number of participants. The probabilistic distribution represents the probability of attaining the given arm configuration; the probability of 1 indicates that all subjects were able to reach the shoulder configuration and the probability of 0 indicates that no subject was able to reach it. The probabilistic atlas was developed by color-coding the distribution and mapping it to a θ-φ graph.

【1B-8】

Key mechanical factors for accelerating the bat in baseball batting

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The purpose of this study was to determine a force-couple system exerted on the bat by the batter's hands and to identify key mechanical factor(s) for accelerating the bat in baseball batting. Seventeen male collegiate baseball players were asked to perform tee-batting. A motion capture system was used to determine three-dimensional coordinates of markers attached onto the bat and selected body landmarks. The inverse dynamics analysis procedure was applied to determine the resultant force (F) and resultant moment (M) exerting on the bat by the batter's hands and presented in a bat-embedded orthogonal coordinate system (x'-axis directed from the knob to the bat-head, z'-axis directed parallel to the angular velocity vector of the bat, y'-axis: cross-product of z'-axis and x'-axis). Furthermore the bat speed produced by each component of F (Fx', Fy', Fz'), z'-component of M (Mz') and the moment of F (FMz') were calculated, respectively, by integrating Fx', Fy', Fz', Mz' and FMz' and dividing each of them by an appropriate inertial parameter. The ratio between the speed of center of gravity of the bat (V_G) and the bat speed relative to V_G ($V_{H/G}$), the sum of which makes up the bat-head speed, was 5:5 at early period of swing phase and changed to 7:3 (23±1 m/s, 12±1 m/s respectively) at ball impact. V_G was generated primarily by Fx' in the negative direction and the contributions of Fx', Fy', and Fz' were 107, -4, -3% respectively. $V_{H/G}$ was generated primarily by Mz' in the positive direction and the contributions of Mz' and FMz' were 104, -4% respectively. These results suggest that the batters accelerate the bat-head mainly by pulling the bat along the long-axis toward the knob

【1B-9】

Acupuncture treatment improves spiral wire immobilization–induced skeletal muscle atrophy and reduces Ca^{2+} ATPase (SERCA1) expression

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Disuse of body parts owing to cast immobilization induces skeletal muscle atrophy; however, the underlying molecular mechanisms have not yet been fully elucidated. In a previous study, we evaluated a new immobilization procedure (spiral wire immobilization [SWI]) in which the ankle joint was covered with spiral steel wire, thus restricting plantar flexion of the foot, to determine whether acupuncture helps prevent skeletal muscle atrophy. After 2 weeks of SWI, muscle wet weight decreased significantly in the soleus ($p < 0.001$), plantaris ($p < 0.001$), and gastrocnemius ($p < 0.001$) muscles. However, this lost weight was significantly regained by manual acupuncture (MA; $p < 0.01$) and electroacupuncture (EA; $p < 0.001$) in the soleus muscle. The expression of the representative muscle-specific atrophic gene, atrogin-1, significantly increased in the soleus muscle ($p < 0.01$); however, EA significantly decreased the SWI-induced expression of this gene ($p < 0.05$). While investigating muscle contractile function, we found that sarcoplasmic reticulum Ca^{2+}ATPase (SERCA1) expression in the immobilized muscle increased significantly ($p < 0.001$). MA and EA significantly decreased this SWI-induced increase in the expression of SERCA1 ($p < 0.05$ and $p < 0.05$, respectively). Therefore, we conclude that SWI-induced skeletal muscle atrophy can be significantly improved by EA, and that muscle contractile function can be modified by acupuncture treatment.

【1B-10】

Gender-related difference in the foot structure as a lever system for children, adolescents and adults : A cross-sectional study

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The purpose of this study was to compare the mechanical advantage of the lever system of the foot scaled by body mass between both the sexes for different age groups. The subjects were consisted of 72 males and 47 females. These subjects were separated into four groups; 7-9 years, 10-12 years, 13-15 years and adult groups. The shortest distance between the talocrural joint axis and the line of action of the Achilles tendon force projected to the orthogonal plane of the talocrural joint axis was determined as the Achilles tendon moment arm by using the magnetic resonance images. The moment arm of the ground reaction force was determined from foot length and lower leg length by using the equation proposed by Trinkaus and Rhoads (1999). The mechanical advantage was calculated as the ratio of the Achilles tendon moment arm relative to the moment arm of the ground reaction force, and it was scaled by body mass. The mechanical advantage scaled by body mass was significantly smaller for girls than boys in 7-9 years, and the corresponding value was significantly greater for girls than boys in 13-15 years. Previous studies reported that the calcaneal apophysitis occurs frequently among 10-14 years adolescent, and its incidence was higher for boys than girls. The present result indicates that the greater load acts on the calcaneus during weight bearing for 13-15 years boys than the girls of the same age group. The current result, therefore, may explain one additional reason for the higher incidence of the calcaneal apophysitis in boys.

【1B-11】

Comparison of the Achilles tendon length change measured in two- and three-dimensions

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The Achilles tendon has a key role in the performance of human movements because its length change is associated with storage and release of elastic energy. Achilles tendon length and its change during ankle joint movement have been evaluated as the length between the proximal and distal ends in a two-dimensional (2D) plane in a three-dimensional (3D) space. However, this approach inevitably contains errors in two ways: curvature of the tendon and underestimation of the two-point length by 3D to 2D projection. The purpose of this study was to examine the extent of errors associated with the 2D measurement. Eight subjects were recruited for this study. After confirming the location of Achilles tendon from ultrasonographic images, reflective markers were attached on the skin over the Achilles tendon and 3D coordinates of markers were obtained from video camera images. The 3D Achilles tendon length was calculated as the sum of distances between adjacent markers. The 2D Achilles tendon length was calculated by projecting three dimensional coordinates of markers onto the sagittal plane of the lower leg and taking the distance between Achilles tendon ends in the projected plane. The Achilles tendon length was determined when the ankle joint was positioned at dorsiflexion 20° and at plantar flexion 20°, and its length change was calculated as the difference in Achilles tendon length between the two ankle joint positions. The length change of the Achilles tendon calculated in 2D (8.1 ± 3.2 mm) was significantly larger than that measured in 3D (4.1 ± 1.5 mm) ($p < 0.05$). This result clearly points to a substantial error involved in the evaluation of the Achilles tendon length change in previous studies (10-15 mm), and calls for a need to measure the Achilles tendon length in 3D.

【2A-1】

The influence of morning and evening endurance exercise on metabolic responses in young men

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We studied the influence of acute endurance exercise in the morning and evening on metabolic responses in young men. Our first study demonstrated that plasma interleukin-6 and adrenaline concentrations were significantly higher immediately after exercise in the evening trial than in the morning trial. Plasma adrenaline and serum growth hormone concentrations were also significantly higher immediately after exercise in the evening trial. Serum free fatty acid concentrations were significantly higher in the evening trial than in morning trial at 2 h after exercise. However, fat oxidation between both trials did not differ significantly (manuscript in preparation). The findings of acute endurance exercise by young men in the evening being more effective on lipolysis than that in the morning have led to the formulation of ideas for our further research in this area. We are currently conducting our second study examining the influence of exercise intensity in the morning and evening, if any, on metabolic responses in young men. This would help clarify whether exercise intensity in morning and evening exercise can be used to influence circadian rhythms of autonomic nervous and endocrine systems and reduce the potential risk of lipid metabolism in older adults.

【2A-2】

Relationship between cardiorespiratory fitness, visceral fat and cardiometabolic risk in Japanese elderly men

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Both low cardiorespiratory fitness (CRF) and high visceral fat (VF) are predictors of cardiometabolic diseases such as atherosclerosis and diabetes. However, it have not been fully examined which of these factors are a stronger predictor of cardiometabolic diseases especially in elderly people. The purpose of this study is to identify the effects of CRF and VF on cardiometabolic risk in Japanese elderly men. Thirty-eight men participated in this study (age: 65.0±6.7). CRF was measured by a maximal graded exercise test and quantified as maximal oxygen uptake ($\dot{V}O_2$max). VF area was measured by magnetic resonance imaging (MRI). We also measured Cardio Ankle Vascular Index (CAVI) and blood pressure as an index of atherosclerosis, and assessed HOMA-R as an index of insulin resistance. $\dot{V}O_2$max was negatively correlated with CAVI ($r=-0.498$, $p<0.01$) and systolic blood pressure (SBP) ($r=-0.330$, $p<0.05$), whereas no significant correlation was observed between VF and CAVI or SBP. In contrast, VF was strongly correlated with HOMA-R ($r=0.556$, $p<0.01$) although $\dot{V}O_2$max was not associated. These results suggest that the contributions of CRF and VF to a progression of atherosclerosis and insulin resistance are different respectively. We now are increasing sample size and measuring humoral factors that probably explain the present results.

【2A-3】

Muscle relaxation of the foot induces the increase of intracortical inhibition of hand muscles

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Muscle relaxation is an important factor to make good performances in sports, but the mechanism has not been well understood. The objective of this study was to clarify how the relaxation of one muscle influences on corticospinal excitability in other remote muscles by using single-pulse transcranial magnetic stimulation (TMS) (Ex.1). Contribution of short interval intracortical inhibition (SICI) was also analyzed with double-pulse TMS (Ex.2). Ten participants volitionally relaxed their right foot from dorsiflexed position in response to an auditory signal. Single (Ex.1) and double (Ex.2) TMS was given on the hand area of the left primary motor cortex at differenttime before and after the onset of the relaxation. Motor evoked potentials (MEPs) were recorded from their right extensor and flexor. In Ex.1, the MEP amplitudes of the hand muscles decreased just after the onset of the foot relaxation. Moreover, SICI in the hand area augmented just after the onset of foot relaxation in Ex.2. The result of Ex.2 suggested the decrease in MEP in response to single pulse TMS was produced in the cortical area. Our findings indicated that muscle relaxation of foot increases SICI and hence may assist in reducing cortical excitability in hand muscles.

【2A-4】

The constraint of mental simulation of multi-limb coordination

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Rhythmic multi-limb coordination is restricted by the various constraints. For instance, moving the two limbs in the opposite direction is much more difficult than the one in the same direction. The relative contribution of motor and cognitive processes in generating the constraint has not been well understood. Recently, we found the possibility that the cognitive process may play a major role. The purpose of the present study is to investigate the cognitive contribution by comparing physically executed and imagined coordinated movements. Subjects performed 10 cyclical coordination of hand and foot as fast as possible in physical execution and motor imagery. To estimate the performance of imagined coordination, we measured the duration of mentally simulated movements. Results showed that the imagery of opposite directional movement significantly took longer than the same directional movement, which is the same as observed for executed movements. It indicated that the constraint can be occurred only with cognitive process. Moreover, an additional experiment suggested that the experience or knowledge of the constraint in executed coordination would affect the constraint in mentally simulated movement. In any case, it is suggested that the constraint in multi-limb coordination should depend largely on cognitive process.

【2A-5】

Coordinative control of equilibrium and posture in high leg kick

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The goal of this study was (1) to investigate whether Non-acrobatic (N-A) athletes have a more stable dynamic equilibrium than Novices do during single leg stance of high leg kick; and (2) to investigate whether or not the arm instruction is helpful to keep a stable posture between N-A athletes and Novices. Ten collegiate male players with at least 7 years sport experiences in baseball or track and field and ten college male students without any experience in intensive or long term training for any kinds of sports were asked to perform high leg kick. The movement was carried out in two conditions: with instruction of arm movement, and without. Participants performed with barefoot while their body motion was captured with an 8-camera motion analysis system (Motion Analysis Corp., Santa Rosa, CA). Forty-five markers were placed on the subject's bony landmarks. Based on the CoM-ankle inclination angle in Anterior/Posterior and Medial/Lateral direction (initial, peak and range value), the results showed that when arm instruction was given, the N-A athletes showed more stable dynamic equilibrium than Novices in single leg stance. According to the trunk angles and trunk inclination angles (initial, peak, range and area value, arm instruction was incapable of helping both groups to maintain a stable posture in single leg stance, and Novices seemed performed more hard than N-A athletes. We concluded that N-A athletes would be able to keep stable equilibrium in condition of coordinating arms than Novices in high leg kick, but no difference in posture control.

【2A-6】

Influence of birth weight and physical activity level on health related physical fitness in children

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Lower birth weight is associated with lower cardiorespiratory fitness (CRF) and muscular strength in later life. The aim of this study was to examine if physical activity could modify the associations of birth weight with CRF and muscular strength in children. The subjects included 535 elementary school children. Birth weight was reported according to *Maternal and Child Health Handbook* records. CRF was measured by a 20 meter shuttle run test and muscular strength was assessed by grip strength. Information on physical activity was obtained by a questionnaire filled by parents, which asks weekly time spent on habitual exercise activity. We calculated the time spent in exercise activity higher than 3 METs as moderate to vigorous physical activity (MVPA) and 6 METs as vigorous physical activity (VPA). Lower birth weight was associated with lower CRF ($p < 0.05$), after adjustment for sex, months of age, and current height and BMI. MVPA and VPA made little change in this association, however, VPA ($\beta = 0.24$) was a stronger predictor of CRF than birth weight ($\beta = 0.09$). Birth weight was not associated with muscular strength. This study suggests that the association of birth weight with CRF may not be modified by physical activity in childhood, however, VPA may have much more important role for development of CRF than an individual's low birth weight.

【2A-7】

Effects of free-living daily physical activity on the epidermal barrier in elderly

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The aim of this study was to examine the relationship between free-living daily physical activity and the epidermal physical barrier, especially moisture content of the stratum corneum in elderly individuals. A total of 63 healthy elderly volunteers (age 66–92 yr) participated in the study. To assess the physical activity, we used an electric pedometer (Kenz Lifecorder; Suzuken Co. Ltd., Nagoya, Japan). Participants were instructed to wear an electric pedometer for 14 consecutive days during all waking hours, except during bathing. We measured moisture content of the stratum corneum with moisture checker and transepidermal water loss (TEWL) with VapoMeter. Moisture content of the stratum corneum in old-old was significantly lower than that in young-old ($p < 0.05$). TEWL in old-old tended to be higher than that in young-old ($p = 0.061$). In young-old, there was a significant correlation between moisture content of the stratum corneum and steps per day ($r = -0.555$, $p < 0.05$). From practical point of view, we recommend that elderly people maintain their skin surface in good condition, for example, by using the moisturizing creams and the sunscreen.

【2A-8】

Effects of curcumin supplementation on exercise-induced oxidative stress in humans

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The purpose of this study was to investigate the effects of highly bioavailable curcumin supplementation on oxidative stress and antioxidant capacity in response to an acute endurance exercise in human. Ten participants, aged 26.8 ± 2.0 years (mean ± SE), completed 3 trials in a random order: (1) placebo (control), (2) single (only before exercise) curcumin supplementation, and (3) double (before and immediately after exercise) curcumin supplementation trials. Each participant received oral administration of 90 mg of curcumin or the placebo from the experimenter 2 h before exercise and immediately after exercise, depending on the trial. Each participant walked or ran at 65% of VO_{2max} on a treadmill for 60 min. Blood samples were collected pre-exercise, immediately after exercise, and 2 h after exercise. The concentrations of serum derivatives of reactive oxygen metabolites (d-ROMs) of oxidative stress marker measured immediately after exercise were significantly higher than pre-exercise values in the placebo trial ($P < 0.05$), but not in the single or double curcumin supplementation trials. Serum biological antioxidant potential and thioredoxin concentrations measured immediately after exercise were significantly elevated in the single and double curcumin supplementation trials compared with pre-exercise values ($P < 0.05$). These findings suggest that curcumin supplementation can attenuate exercise-induced oxidative stress by inducing the antioxidant capacity.

【2A-9】

A sportswear supporting core muscles induces both positive mood states and cognitive function following acute aerobic exercise

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This study examined if wearing a sportswear for a proper posture influences both mood states and cognitive function following aerobic exercise in young adults. Twenty-four adults were assigned to either the sportswear group (wearing a sportswear designed for core training) or the control group (wearing a normal T-shirt and shorts). Participants completed a 30 minutes of walking and/or jogging on the treadmill at intensity of 60 % of VO_{2max}, wearing either the sportswear or the T-shirt. After the treadmill exercise, they performed the Sternberg memory task (i.e., a working memory task), in which participants determined if the probe stimulus was presented in preceding memory items. We recorded cognitive performance and P3. Transient mood state following exercise was assessed using the Mood Check List short form 3. Participants in the sportswear group exhibited the greater response accuracy and the larger P3 amplitude compared to the control group. Feelings of pleasantness and relaxation in the sportswear group were higher than in the control group. It has been emphasized that stability of the trunk and pelvis plays a role in efficient running and walking. The sportswear designed to maintain ideal postures during aerobic exercise might facilitate beneficial effects of exercise on both working memory capacity and cognitive control of attention, resulting in pleasant feelings.

【2A-11】

Effect of neutrophil depletion on the exercise-induced angiogenesis in skeletal muscle

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Endurance exercise induces angiogenesis in skeletal muscle. However, the mechanism regulating exercise-induced angiogenesis in skeletal muscle is unclear. Recent studies have indicated neutrophils may play an important part in angiogenesis. This study aimed to clarify whether neutrophils modulate exercise-induced angiogenesis in skeletal muscle using RB6-8C5. Male C57BL/6J mice were divided into four groups: Sedentary (n=8), Sedentary with RB6-8C5 treated (n=8), Exercise (n=8), and Exercise with RB6-8C5 treated (n=8) groups. The exercise group mice were trained 60 min/day at speeds of 20m/min on a 10% gradient for 5 days. Depletion of neutrophils was accomplished by the administration of RB6-8C5. The mice were injected intraperitoneally with PBS or 0.1 mg RB6-8C5 at 3-day intervals beginning 1 day before training. Neutrophils were systemically depleted by intraperitoneal administration of RB6-8C5. CD31 mRNA, an endothelial specific maker, was increased in Exercise groups than in the Sedentary group ($p<0.05$). Moreover, the CD31 mRNA in the Exercise with RB6-8C5 treated group was increased than Exercise group ($p<0.01$). The vascular endothelial growth factor (VEGF) mRNA, an angiogenic growth factor, showed no significant changes by exercise. At present, we are investigating immunohistochemistry analysis to clarify skeletal muscle capillarization and VEGF localization.

【2B-1】

The relationship between rowing and Lumber Intervertebral Disk Degeneration in collegiate rowers

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The purpose of this study was to investigate relationship between rowing and Lumber Intervertebral Disk Degeneration in collegiate rowers.

Twelve collegiate rowers participated in the study. Six subjects (50%) have disk degeneration. All subjects performed 2000m rowing trial on ergometer. Changes in trunk flexion and knee extension were recorded at 10% and 80% of the trial. Surface markers were attached to body landmarks. Digital video camera was set up perpendicular to the plane of motion at a distance of 3m from the ergometer. Trunk flexion and knee extension angle of all subjects at 10% and 80% were analyzed using t-test. And these angles at 10% and 80% were compared disk degeneration group (DD group) to non- disk degeneration group (non-DD group), and analyzed 2way-anova.

Trunk flexion of all subjects significantly increased at 80% of the trial ($p<0.05$). Knee extension of all subjects significantly decreased at 80% of the trial ($p<0.05$). However, change patterning of these angles didn't differ among DD group and non-DD group.

Increasing trunk flexion, load to disc increase too. Consequently, the results suggest that long time ergometer training give rise to increase of load to disc.

【2B-2】

Establishment of cell culture system for analysis of exercise-induced immunoregulation

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The inflammatory responses of macrophages play an important role in pathogenesis of chronic diseases, including atherosclerosis and diabetes. On the other hand, chronic exercise decreases plasma concentrations of pro-inflammatory cytokines in diabetes patients. We have found that exercise training suppresses macrophage infiltration in adipose tissue in diet-induced obese mice. The several bioactive substances such as stress hormones and cytokines are induced during exercise, and might be involved in exercise-induced immunoregulation. Notably, stress hormone glucocorticoid inhibits the synthesis of pro-inflammatory cytokines in macrophages. However, the effect of stress hormone on the production of other bioactive substances such as reactive oxygen species (ROS) is unclear. To address these issues, the cell culture model for analysis of the exercise-induced immunoregulation is necessary. We use mouse macrophage cell line RAW cells to set up cell culture model of analysis for exercise-induced immunoregulation. We induce inflammatory cytokines by treatment with lipopolysaccharide (LPS), and induce glucocorticoid pathway with treatment of dexamethasone. Moreover, we investigate time-course and dose-dependency of pro-inflammatory cytokine production (IL-1β, IL-6 and TNF-α) and anti-inflammatory cytokine production (IL-10) by enzyme-linked immunosorbent assay (ELISA). In this symposium, we will report the results of production of TNF-α and IL-10 on LPS-stimulated RAW cells.

【2B-3】

Effect of 3 day sleep restriction on physical functions

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The purpose of this study is to examine how sleep restriction affect energy expenditure, body temperature and endocrine system. Subjects were 6 healthy young males. Experiment was performed in two conditions (normal sleep condition: NSC, shortened sleep condition: SSC). In the NSC, 7h sleep was taken for 4 nights. In the SSC, subjects took 3.5h sleep for 3 nights following one recovery night sleep. Energy expenditure was measured by a respiratory chamber. In both conditions, energy expenditure and core body temperature continually measured for 48h (3^{rd}, 4^{th}, 5^{th} experimental day). Blood was sampled twice on 4^{th}, 5^{th} day in the morning. Overnight polysomnography was examined 3^{rd}, 4^{th} nights' sleep quality. Psychomotor Vigilance Test (PVT) was examined every 2h on 4^{th}, 5^{th} day in the NSC and SSC. Time of sleep onset latency was shortened on 3^{rd} experimental night. Slow wave sleep tended to increase on 3^{rd} night. There was no significant difference in energy expenditure. Body temperature slightly reduced but not significantly after continuous sleep restriction. These results indicate that continuous sleep restriction slightly affect physical functions. Though there was no significant difference in energy expenditure, average value tended to decrease after sleep restriction.

【2B-4】

Physical training does not decrease moderate-to-vigorous intensity lifestyle physical activity in female lacrosse players

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We examined whether physical training days are associated with smaller amount of high-intensity lifestyle physical activity (PA) than non-training days in athletes. Twelve female lacrosse players were participated in this study. The subjects wore a tri-axial accelerometer during lifestyle PA, in waking hours except while training period or bathing, over 8 consecutive days to compare the daily distributions of duration (minutes) and the amount (METs・h) of lifestyle PA in each intensity category between training days and non-training days. Although lifestyle PA duration was shorter in training days than in non-training days (708±101 min vs. 911±73 min, respectively), sleep duration was not different between training and non-training days. There were no significant differences in proportions of duration and the amount of each intensity lifestyle PA to total lifestyle PA. Mean intensity of moderate-to-vigorous intensity PA (MVPA) (both 3.7METs) and step counts during lifestyle PA (846±117 steps/hours vs. 747±196 steps/hours, respectively) were similar in training and non-training days. These results suggest that physical training did not decrease intensity and daily distribution of MVPA, and not increase daily distribution of low-intensity PA in lifestyle PA. However, we may need to consider substantial day-to-day variability in the amount of PA in female athletes.

【2B-5】

Functional loci of response sequence complexity and movement duration during motor programming

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The purpose of this study was to reveal the functional loci of two movement parameters, namely, response sequence complexity and movement duration, when they were organized by the central motor program. Twenty-two college students (twelve female, all right handed, mean age: 24.4±2.3yrs) participated in this study. Participants performed a choice reaction time task, in which they responded to the letters *L* and *R* by tapping their left and right fingers, respectively, with different response sequences complexity and movement duration. We determined the onset of lateralized readiness potential (LRP) with both the absolute criterion technique and the regression-based method after applying the jackknife procedure to LRPs. Both response sequence complexity and movement duration yielded main effects on reaction time (RT), showing longer RTs in the more complex and longer-duration conditions. No interaction was obtained. The onsets of stimulus-locked LRP did not differ among conditions. However, significant main effects of both response sequence complexity and movement duration were found on the EMG-locked LRP onsets, showing longer latencies in the more complex and longer-duration conditions. Behavioral data indicated the existence of two independent stages associated with response sequence complexity and movement duration according to the additive factor method logic. Electrophysiological results suggest the motoric loci of both factors that temporally overlap each other.

【2B-6】

Appetite scores in the morning are associated with subsequent sedentary behavior.

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Sedentary behavior may be associated with obesity. In animal studies, appetite-regulating hormones influence spontaneous physical activity (PA), whereas in humans, there is no evidence for such an influence. The purpose of this study was to investigate whether appetite conditions in the morning are related to subsequent PA, in particular, sedentary behavior. This was a randomized crossover study. Nine healthy young male participants performed two exercise sessions (continuous and intermittent exercise) in a respiratory chamber. Participants used a stationary cycling ergometer continuously for 40 and then 45 minutes in the continuous exercise trial, and for 5 minutes every 30 minutes 17 times in the intermittent exercise trial. Participants wore a tri-axial accelerometer on their waist. Subjective appetite scores (i.e. hunger) were obtained just after awakening under fasting conditions with a 100 mm visual analog scales. Plasma concentrations of leptin and acylated ghrelin were obtained after appetite scores were recorded. In the continuous exercise trial, higher hunger scores were associated with higher accumulated consecutive minutes with metabolic equivalents (METs) ≤ 1.2 or METs ≤ 1.5. In the intermittent exercise trial, higher hunger scores were associated with higher accumulated consecutive minutes with METs ≤ 1.2, but not METs ≤ 1.5. There was no relationship between plasma concentrations of appetite-regulating hormones and any parameter of sedentary behavior. The present study, therefore, suggests that desire of food intake may influence sedentary behavior irrespective of exercise loaded.

【2B-7】

Influence of intentional body weight gain on resting energy expenditure in male power athletes

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The purpose of this study was to examine the influence of body weight and compositional change on resting energy expenditure (REE) in male power athletes.

Subjects were eighteen college male American football players. REE was measured by indirect calorimetry and body composition was measure by dual-energy X-ray absorptiometry. T-test was used for comparisons between measurements taken at the baseline and after the weight gain.

Baseline value (⊿between baseline and after the weight gain) for body weight (BW), % body fat, fat mass (FM), and fat-free mass (FFM) were 72.8±9.5 kg (⊿8.0kg), 13.9±3.5 % (⊿2.9%), 10.3±3.8 kg（⊿3.5kg）, and 62.5±2.9kg (⊿4.5kg) respectively. Average REE at baseline was 1697 ± 194 kcal (⊿105kcal) and REE/FFM ratio was 27.2 ± 1.3kcal/kg/day (⊿ -0.5kcal/kg/day). The reason for the negative correlation between ⊿FFM and ⊿REE/FFM ($r=0.552$, $p<0.05$) was possibly related to the lowered ⊿REE/FFM ratio with athletes who gained more FM or % body fat. ⊿FM/⊿BW was significantly negatively correlated with ⊿ REE ($r=0.448$, $p<0.05$).

Based on these results, it is suggested that when excessive FM is gained, REE/FFM ratio decreases and may lead to lower increase in absolute REE.

【2B-8】

Effects of exercise training on endothelial progenitor stem cells in middle-aged men with visceral obesity

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This study was to investigate the effects of a 10-month exercise program on visceral fat and circulating CD34+ stem cells in middle-aged men with visceral obesity. We recruited 45 middle-aged men (age: 40 – 50 years) with visceral obesity. A CT-determined visceral-to-subcutaneous fat ratio of ≥ 4.0 was defined as the subjects with visceral obesity The subjects were randomly assigned to 1 of 3 groups: (1) control (n = 15), (2) aerobic exercise (n = 15), or (3) combined (i.e., aerobic exercise + resistance exercise; n = 15). The frequency of exercise for the combined exercise and aerobic exercise groups was 3 times per week (e.g., Monday, Wednesday, and Friday). Each 60-minute exercise program included 10 minutes of warm-up and cool-down activities. Two-factor ANOVA revealed significant interactions (group × time) for circulating CD34+ stem cells, plasma vascular endothelial growth factor and abdominal visceral fat tissue volume (P = 0.010; P = 0.001; P = 0.034, respectively). Within-group analysis showed that CD34+ stem cells and plasma vascular endothelial growth factor were significantly higher than baseline values in the aerobic exercise group after 10-month (P = 0.034; P = 0.021, respectively). The results of this study demonstrated that aerobic exercise program may be an effective intervention strategy for improving vascular repair and visceral fat, leading to improved cardiovascular health in middle-aged men with visceral obesity.

【2B-9】

Does a single nucleotide polymorphism in 3'-untranslated region of CNTFR modify micro RNA binding?

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We have previously demonstrated that the C-to-T polymorphism (rs41274853) in the 3'-untranslated region (3'-UTR) of the ciliary neurotrophic factor receptor (CNTFR) gene was associated with elite sprint/power athlete status. Micro RNAs (miRNAs) are small non-coding RNAs and post-transcriptionally regulate protein expression by binding to the 3'-UTR of target mRNAs. We searched for miRNA binding sites using the TargetScan software and found that miR-675-5p potentially targets the polymorphic site within the CNTFR 3'-UTR. We thus attempted to investigate whether the polymorphism (C to T) changes miR-675-5p binding to the site and CNTFR expression. The 616-bp DNA fragment corresponding to the CNTFR 3'-UTR was PCR-amplified, to which the polymorphism and mutations within the seed sequence of the potential miR-675-5p binding site were introduced. After inserting the DNA fragments into the downstream of firefly luciferase cDNA, reporter genes containing C or T at the polymorphic site or the mutated seed sequence were constructed. Each reporter construct was transfected into C2C12 myoblast cells with a miR-675-5p or negative control precursor along with *Renilla* luciferase expression plasmid. Luciferase reporter assays revealed that miR-675-5p regulates CNTFR expression by binding to this site. We are currently studying whether miR-675-5p binding to the CNTFR 3'-UTR could be altered by the rs41274853 polymorphism.

【2B-10】

Effect of fasting condition on thermal preference and heat-escape/cold-seeking behavior in mice.

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The aim of the present study was to evaluate the role of behavioral thermoregulation in cold tolerance / intolerance and thermal preference which may be effected by fasting condition. Mice housed with or without food for 24 hours (Fed and Fast groups, n=20 each) were used. A body temperature (T_b) measurement device was implanted in the mice, and were placed in a box with 5 Peltier boards at the bottom. During the experiment we first set all board's temperature at 28°C for 60 min to come down the mice. Than the system will changed to one of three different experiment settings for 90 min: a) passive temperature exposure, board temperatures of 20°C or 28°C; b) an operant-behavior setting: each board was set at 20°C and the right-end of the board was changed to 39°C within 60 sec only when the mouse moved to the left of the board; and c) a thermal mosaic setting: each board was set at either 15°C, 22°C, 28°C, 35°C, or 39°C with a 6-min interval. We analyzed the behavioral responses, body core temperature. In the result, we set the last 30 min during the come down stage as baseline value. In experiment "a", T_b changes from the baseline value were higher in the Fast group than in the Fed group. In experiment "b", the Fast group showed significant higher operant counts than the Fed group(23 ± 2 in the Fed group and 30 ± 4 in the Fast group, respectively). In experiment "c", the Fast group preferred higher temperatures than the Fed group (33.5 ± 0.8°C in the Fed group and 35.2 ± 0.3°C in the Fast group, respectively). Fasting condition may alter thermal preference and behavioral responses in cold.

【3A-1】

A New Miraculous Revitalization on Japan? Comparative Analysis of Tokyo 1964 Olympic Games and Bidding for 2020

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In August 2010, *Sports Founding Strategy* was issued in Japan. It bases on the Tokyo 1964 Olympic Games which promoted the revitalization of modern Japan. In July 2011, Tokyo announced to bid for the 2020 Olympic Games again. According to the theory of Social Phenomenology that: 'role human awareness plays in the production of social action, social situations and social worlds'. It is useful for us to understand the reciprocal interactions between the Olympic Games and Japan's revitalization.

Therefore, through analysis I consider that although the two applications were in different epochs and distinct contexts, they have the common features by reliant on the Games promoting social reconstruction, inspiring national morale and pursuing social peace. In addition, in spite of each application was unique, and especially the social formation of modern Japan gradually inclines to be mature, but as the transformative international power, the Olympic Games inevitably will produce more far-reaching impacts at national levels in the future. Accordingly, I believe that the compelling dream of bidding for 2020 will bring about a new hope for the national certainly and promote Japan to achieve the positive change finally.

Notes

1. Ashley Crossman, *Social Phenomenology.* Source available at http://sociology.about.com/od/Sociological-Theory/a/Social-Phenomenology.htm

【3A-2】

A consideration of the argument about the position of body formation in P.E.： With focus on the “Nakamura-Enda argument”

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The purpose of this study is to consider the problem which includes the “Nakamura-Enda argument” for acquiring the viewpoint to clarify the position of body formation in P.E.

The “Nakamura-Enda argument” started with a confliction about the purpose of P.E. in 1980’s between Toshio Nakamura and Yoshihide Enda. Nakamura insisted that the purpose of P.E. was establishment of “sports right”. On the other hand, Enda pointed out that the purpose of P.E. was body formation, and he criticized Nakamura who didn’t think body formation was the purpose in P.E.

This confliction caused the “Nakamura-Enda argument”. Then, this study explored each of the evidences on their points of view.

As a result, this study showed that there was the confliction between “the educational rights of government” and “the educational rights of nation” under the “Nakamura-Enda argument”. This confliction was one of the important issues in study of education after World War 2 in Japan. Therefore, it shows that “Nakamura-Enda argument” is the trigger to think about “What the P.E. is.”

【3A-3】

Prevalence, purposes and perceived effectiveness of complementary and alternative medicine use in a hypertension population: A questionnaire survey

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Complementary and alternative medicine (CAM) is common in patients with hypertension. The study aimed to determine the prevalence and type of CAM use, the purposes for using CAM and perceived effectiveness in individuals with hypertension in a community in Beijing, China. In total, 318 participants participated in this cross-sectional survey. Prevalence and patterns of CAM use, the use of CAM specifically for treatment of hypertension or other conditions, and perceived effectiveness of CAM was analyzed. CAM use in the last 12 months was reported by 236 (74.2%) participants. Only 13.1% of

CAM users reported using CAM to treat hypertension. CAM users did not differ statistically from non-CAM users by age, marital status, health status, duration of hypertension, income or education. Being female predicted a higher prevalence of CAM use (OR 1.82, 95% CI 1.09, 3.11). Family/relatives, doctors and patients themselves are the three main information sources for CAM. More than 70% of response can perceive the effectiveness of alternative medicine, mind-body medicine and manipulative/body based therapies. Almost three quarters (74.2%) of the respondents used CAM, but majority of CAM is used for treating or preventing other conditions and promoting general health. The use of CAM should be further fully studied in China.

【3A-4】

The monetary value of elite sport success in Japan estimated through contingent valuation method

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Elite sport investment is usually justified on the basis that elite sport success has a wide range of social-psychological benefits among the population. However, the insufficient evidence about these positive effects make difficult to show the validity to 'alternative voices' against the elite sport funding. The purpose of the present study was to estimate the monetary value of elite sport success in Japan by using the contingent valuation method (CVM) addressing the problems in sport management literatures. Based on a national-wide internet survey, data was collected from n=850 stratified randomly selected Japanese. Respondents were asked to state their willingness-to-pay for elite sport policy which aims Japan being ranked top-five in total number of gold medals in summer Olympics and top-ten in winter, which is the official target of 'The Sport Basic Plan', using double-bounded dichotomous choice. The result revealed that median WTP was 405 JPY with a certain amount of validity, which was calculated from the whole population as 42.2 billion JPY. Our results suggest that Japanese believed that social-psychological benefits generated by the elite sport policy exceeded the government elite sport budget (about 16 billion). It leads to a recommendation for policy makers to take this result into account when developing a national elite sport strategy.

【3A-5】

Focused interview on school-aged children's mental health and active play in Japan

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Active play is vital for physical and mental well-being in children. The purpose of this study was to understand the factors underlying these problems.

Focus groups were conducted with 20 teachers from a primary school in Japan. The participants discussed the following: (1) current mental health issues; (2) content of children's active play; (3) motivating factors; (4) barrier and facilitate factors. All focus groups were audiotaped and the discussions transcribed verbatim. Data were analyzed using thematic approach.

It was noted that children are less interested in playing outdoors because of many sedentary activities. Teachers reported that children prefer outdoors and are motivated to participate only if play is fun and in safe environment. However, many factors restrict children from that, including not knowing what games to play, having no partner, and poor communication skills. Teachers also suggested that children needed to experience the joy of active play with friends and family.

The focus groups conducted with teachers provided information about limited and facilitated factors of children's active play. In future research, we will conduct a focus group with children to add to the present information before designing effective interventions to enhance active play for the mental well-being of children.

【3A-6】

Motives of Sport Spectators ---A Case Study of Chinese Super League

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The main purpose of this study was to generalize the Motives of Sport Spectator Scale to Chinese professional football (Chinese Super League, CSL) spectators. Based on the previous studies, 13 motives with 41 items were selected for the final version of the questionnaire, including Aesthetics, Drama, Achievement, Support the City, Sport Interest, Escape, Knowledge, Team Attachment, Entertainment, Family Bonding, Interest in Player, the Wholesome Environment, and Socialization. Data were collected in China on 6th Oct., 2012 and 20th Oct., 2012 in Shanghai. The 478 qualified questionnaires were divided into 2 groups, group1 (N=239) and group2 (N=239). Confirmatory Factor Analysis (CFA) was conducted using data from group1 to purify the scale. According to some reasonable statistical criterions and the meanings of each item, 'Socialization' was divided into 'Socialize with others' and 'Bonding with friends'; 'Aesthetics' and other 7items from 6 motives were eliminated; 'Team attachment' was moved out of the category of motives. Therefore, the final model contains 12 motives with 28 items. Using data from group2, CFA was conducted again. The results showed that the revised model had a better model fit indices (CFI=.916; IFI=.919; RMSEA=.060). Finally, according to a Multiple Liner Regression, Achievement and the Wholesome Environment could explain 33.6% of the dependent variable---future attention. Suggestions and implications for sport managers and marketers were discussed at the end of this study.

【3A-7】

Reconstructing and Advancing Physical Culture in China between 1950s and 1970s

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China began following the Soviet Union in physical culture in 1950s, especially the management and training system of sport. A new system of physical culture was formed under the guidance of the national policy in the end of 1970s with frequent political movements. The reconstruction and development of physical culture in China, from 1950s to the late 1970s, were shown in the following aspects. First, the nature and the purpose of physical culture underwent a transformation during this period. The strategy of "national sport (*guomin tiyu*)" was proposed in the early years of 1950s, which became that of "combining popularization and raising of standards in physical culture" in the late 1950s and 1960s. Then the guiding strategy for sport was "focusing on raising of standards in sport" in 1970s. Second, for physical culture population, it no longer relied upon the schools, but spread each industries system such as locomotive, textile industry, mining industry. Accordingly, physical culture were implemented in factories, troops, and villages. Third, as to sport management, the organizing system that had been based upon work part-timely and loosely was replaced by governmentally and intensively. Finally, physical culture became the need of the nation reflect that the function of physical culture changed that the individual conception of body was supplanted by the conception of body with the national consciousness.

【3A-9】

The elderly members' attitude toward of Community Sport Club

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To decrease the difficulty of accessibility for sport, providing sport facilities for citizens in each community becomes an urgent issue. The main goal of this kind community sport clubs is to create a sport environment which is available for the participants of any age, gender, and disability. Community sport clubs put much more emphasis on the elderly's needs because of huge increasing population of the elderly as well. Therefore, the purposes of this study are to examine how the sport clubs facilitate senior sport in community; and to analyze how the senior members utilize sport clubs. In this study, Nerima District in Tokyo is the main study site. 439 participants from 7 sport clubs in Nerima were selected as the sample. The methods of this study included questionnaire and fieldwork observation. ANOVA was used to detect significant difference among age group. The Pearson-product moment correlations were analyzed to examine the relationships between factors of sport benefits, sport environment, and sport management. The results showed a significant positive correlation between sport benefits and sport environment (r=.72, p<.01), and sport management (r=.73, p<.01). Secondly, the results of the ANOVA indicated a significant effect and group differences in age group, $F(3,427) = 2.66$, p<.05. The Scheffe test showed that super-old group had higher scores of attitude toward sport club than other groups.

【3A-10】

Multilevel correlates of school-based physical activity among Japanese adolescent girls

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To examine the cross-sectional direct and indirect effects of multilevel factors at the individual, social and environmental level on school-based physical activity (PA) among Japanese adolescent girls. Junior high school girls (N = 344) were invited to complete self-report measures of age, grade, weight, height, self-efficacy, social support from family, friends and teachers, perceptions of school physical environment (equipment, facilities and safety) and average minutes per week of PA during lunch time and after-school hours occurring at school. Structural equation modeling analyses controlling for age were performed to examine the effects of body mass index (BMI), self-efficacy, social support and school physical environmental variables on lunchtime and after-school PA. During lunch time: equipment and friend support directly affected PA; facilities, safety, and self-efficacy were indirectly associated with PA through friend support. During after-school hours: both family and friend support directly affected PA. Safety, facilities and self-efficacy exhibited indirect effects on PA through family or friend support. However, there were no significant associations between equipment and after-school PA. Regardless of contexts, BMI had neither direct nor indirect effects on PA. Findings encourage the future development of effective interventions to promote physical activity through family and friend support.

【3A-11】

The relationship between coach's leadership behavior and athlete's perceived motivational climate across the athletic season

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This study aimed to examine the relationship between coach's leadership behavior and athlete's perception of motivational climate created by coaches. One hundred and forty-six players completed surveys twice (T1 and T2) over the course of the athletic season. The research items included 1) background information (e.g., age, position and years of ice hockey experience), 2) coaches' leadership behavior (performance and maintenance), and 3) motivational climate (task-involving and ego-involving). Hierarchical regression analyses were conducted to test the hypotheses related to whether coach's leadership behavior predicted athlete's perceived motivational climate. In the analyses, performance and maintenance function of leadership behavior at T1 were entered in the first step. In addition, motivational climate at T1 were also entered as independent variable to control for its effect. Subsequently, both functions at T2 were entered in the second step of the analyses. Results indicated that the performance function ($\beta = .33$, $p < .001$) and the maintenance function ($\beta = .19$, $p < .05$) were significant predictors of the task-involving climate. The regression analysis predicting the ego-involving climate indicated that the performance function was not associated with ego-involving climate, while the maintenance function ($\beta = -.19$, $p < .05$) negatively was associated with this climate. These results demonstrated that both functions may influence athlete's perception of task-involving climate. Additionally, maintenance function may contain ego-involving climate. Therefore, Japanese youth sport ice hockey coaches could create motivational climate by utilizing their leadership behavior.

【3A-12】

Pro-environmental behavior of sports participants –Focus on trail running participants–

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This study aims to examine the association of participation in outdoor recreational activity with the pro-environmental behavior exhibited by participants. Particular attention was paid to the difference in pro-environmental behavior exhibited by those with high and low involvement in outdoor recreational activities. Previous studies have clarified the relationship between outdoor recreational participation and environmentalism (Theodori et al., 1998; Tarrant & Green, 1999; Thapa, 2010), and also recreation involvement and environmental behavior (Lee, 2011).

To achieve the objective of this study, the participants of trail running were observed and respondents were classified into two groups based on their involvement in trail running. A t-test was then conducted to analyze the results.

Recreation involvement was divided into three factors—attraction, self-expression, and centrality. The result of this analysis showed the difference between high- and low-involvement groups except attraction factor (attraction: $t(150) = -1.95$, n.s.; self-expression: $t(150) = -3.99$, $p < .001$; centrality: $t(150) = -4.08$, $p < .001$). The pro-environmental behavior score of high-involvement participants was higher than that of the low-involvement participants, which indicates that high-involvement-trail-running participants exhibit more pro-environmental behavior. This demonstrates that as the involvement of participants heightens, their environmental consciousness also builds up.

【3B-1】

Expected Qualification for External Coaches in School-based Extracurricular Sport Activities

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Introduction: Promoting engagement of external coaches in school-based extracurricular sports activity (SBECSA) is valuable to activate SBECSA. However, there were some reports that external coaches caused problems in SBECSA such as self-serving way of practice, extorting money from team members, and valuing only winning. To promote engagement of good external coaches in SBECSA, it would be an effective to clarify how external coaches are appropriate for SBECSA. In spite of such a situation, there are few studies to clarify the expected qualification for external coaches.

Purpose: The purpose of the present study was to clarify expected qualifications of external coaches among full-time school teachers.

Methods: Personal semi-structured interviews were conducted to 22 teachers aged 24 to 58 who worked in either a public junior high school or a public high school. Interview data were analyzed using the KJ method.

Results: Interview data were categorized into following five large categories: (1) humanity (e.g. character, abidance by rules, educational thinking), (2) ability (e.g. credentials, technical coaching, experience), (3) cooperativeness (e.g. communication skill, support of SBECSA teachers), (4) attributions (e.g. age, occupation), (5) trust (e.g. acquaintances, selection by SBECSA teacher).

Conclusion: In addition to technical coaching which is a well-known qualification, humanity, cooperativeness, and trust would be key requirements for being recruited as an external coach.

【3B-2】

Perceived Benefits and Walking for Specific Purposes among Middle-aged Japanese

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Purpose: This research aimed to examine the relationship between perceived benefits such as health and socialisation and walking for specific purposes among middle-aged people. Methods: 2949 aged between 40 and 64 completed a self-reported questionnaire consisted of Perceived Benefits for Walking Scale (PBWS) and Walking Behaviour Assessment Scale (WBAS). PBWS gauges seven benefits regarding walking behaviour. WBAS measures frequencies and durations of walking in different purposes such as transportation and exercise. Respondents were categorised by walking time (<150min/week or >150min/week) and perceived benefits (people who perceived benefits or those who do not). In order to identify the relationship between walking behaviour for specific purposes and its related benefits, **binary** logistic regression was used after the adjustment of potential confounders. Results: Regarding walking for transportation purpose, “economic and environmental benefits” and “Fulfil leisure time” were positively associated: odd ratios (95% CI) were 1.45 (1.22-1.72) and 1.24 (1.02-1.72) respectively. “Positive mind-setting” was significantly correlated with walking for exercise whereas “social connection” was negatively associated: odd ratios (95% CI) were 1.52(1.21-2.06) and 0.69 (0.53-0.89) respectively. Conclusion: The perceived benefits differed by walking purposes among middle-aged group. Highlighting these identified benefits might be effective in increasing the likelihood of walking behaviour.

【3B-3】

The relationship between club performance and wage in J-League by Panel analysis

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The purpose of this study was to examine the relationship between club performance and wage in Japanese professional football clubs(J-LEAGUE club). They make much of winning than financial success. The literature shows that the club performance and wage are correlated. This paper examines, the relationship between club performance and wage in the J.LEAGUE clubs by making use of analyzing the panel data from 2005 to 2010 that forcus fixed and time effect. And we estimated the order of J-League 2011 season from a provided estimation. As a result, fixed effect model and two-way fixed effect model were selected. This implied that there were differences among each club in regional areas and fan characteristic. It was shown that wage and attendance per game had significant influence on club performance. And provided estimation was able to predict the order of half clubs. It was Kashiwa Reysol, Vegalta Sendai, Tokushima Vortis, Tokyo Verdy and Consadore Sapporo to have performed effective investment from estimation.

【3B-4】

Effective incentive for exercise for each stage of change

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Background: Physical inactivity remains a public health problem in Japan. Recently, many the local governments start incentive system for good health habitants including exercise. The approach for physical activity is needed to consider Trans theoretical Model. But, there is not how incentive effectively promotes exercise for each stage. The purpose of this study reveals that better increasing physical activity incentive contents for each the stage.

Method: The participants were 1,290 Japanese adults (40-69) collected from registrants of Japanese social research company by an internet questionnaire.

Measured variables included the stages of change for exercise, the point of motivate by each incentives (money, goods coupon, travel coupon, foods, health goods, exercise goods, community facility thicket, exercise facility thicket, donation), considerable amount of money when start and continue exercise.

Result: The higher stage of exercise is more motivated by each incentive when start and continued exercise. And, each incentive differently motivate when start and continued exercise. The more popular incentive contents are money, item and trip coupon. Cumulative frequency of considerable amount of money is higher in lower stage when start and continue exercise.

Conclusion: Effective incentive contents are money, item and trip coupon. Cumulative frequency of considerable amount of money is higher in lower stage when start and continue exercise.

【3B-5】

Boost the Korean Wrestling Development of the Korean Minority Nationality Region in Yanbian of China by Tourist-Oriented Method - a field investigation on females' participating in wrestling of the Korean minority nationality

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Korean Autonomous Prefecture of Yanbian is the only the Korean autonomous area which takes prefecture as a unit. The relevant activities to the Korean minority nationality enjoy more advanced development than other regions due to the dense population of the Korean minority nationality. Collect the first-hand information of wrestling there through field investigation and prepare for the following case study.

【3B-6】

Ethics of Collective Responsibility in Japan's High School Baseball

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In this study, we focus on a discussion of whether collective responsibility in high school baseball is right or wrong, analyzing the point at issue from the viewpoint of communitarianism and aiming to provide a new viewpoint for the argument. We selected the obligation concept as a concrete perspective for our analysis and used it to examine the point at issue.

The crucial issue was whether a person who is a member of a baseball club should take responsibility for the actions of other members of the same baseball club.

First, we reviewed criticism of communitarianism to moral individualism. Second, we clarified the obligation concept as defined by Sandel, who is a representative of the communitarian viewpoint. Finally, we used that concept to frame the issue mentioned above.

As a result, we propose that members of a baseball club have obligations of solidarity toward one another in terms of their communities, which in this case are both the baseball club and the school.

【3B-7】

The Concept Reconstructed of National Union and Social Harmony in the 9th National Traditional Games of Ethnic Minorities of China-A Sport Anthroplogy Study.

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Besides Han Groups(漢族),there are also 55 minority groups in China, which has multicultural and complex national culture. In order to protect and promote minority ethnic sport culture, the National Ethnic Games was initially launched in 1953, it was being held for 9 times until 2011. Equality, Unity, Struggle, mutual savings and Harmony are important concept to maintain national relationship in China, ethnic sport policy is an epitome of national policy in China, besides, how those policies infect the identity of ethnic minority groups is also an important issue of Anthropology. Thus, the purposes of this study are as following 2 points. First, what's the main spirit of the 9th Games? Secondly, how the China governments practice national union and social harmony during the Game? The main target in this study is focus on the 9th Games, field work, literature collection and interview were be used in this study. This study found that the Game spirit refers to Equality, Unity, Struggle and Advance, then, displays those concept opening/closing ceremony, Game's song and the symbolism meaning of the Game Mascot and emblem. Therefore, harmony and union are important concept of communist manifesto in China; China government also practiced unity and harmony during the National Traditional Games. Sport played a significant role in every country. Traditional ethnic sport is not only a sport, but also as a cultural tool of the China universal ideological state apparatuses.

【3B-8】

Motorcycle sports and cultural identity of East Asia: A case study of Asia road racing championship

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This study intends to investigate the potential power connection and cultural paradigm shift between Asia countries within motorcycle racing events. In discussing the relationship between society, identity and sports, MacClancy(1996) believes, by studying their sports, and the meanings attached to them, we can learn much about the production and reproduction of community identities. Motorcycle and scooter largely served as main means of transportation in numerous developing countries in East Asia, this phenomenon also reflects on the attitude and features of motorcycle sports among each country, and how they identity themselves within this sports. Within Asia Road Racing Championship (ARRC), different categories of racing bikes may exemplify the cultural background of competitors and influences from domestic or international organizations. In sum, different cultural and economic forces along with cross national relationship from manufactures, racing organizers, sponsors and teams, thus together interweave the current scenario of motorcycle industry and cultures in East Asia.

【3B-9】

The metamorphosis of “the sick man of the East Asia” in the world of Sports: Judging the bodily discourse in the Chinese Olympics’ Press Coverage of Foreign and Chinese Athletes in 1984-2012

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The purpose of this research is to conduct content analysis of bodily-related discourse in the Chinese Olympics’ press coverage of Chinese athletes and foreign athletes to test the hypotheses that the growing success of Chinese participation in modern Olympics has reshaped the Chinese body perception; and sports-news discourse expresses the perceived economic and political status of modern China in the world and her relations with other countries and regions.

The content analysis searched for related sport articles and/or headlines containing the Chinese characters for body ‘身 (pinyin: Shen) /‘体’ (pinyin: Ti) during the eight summer Olympics that China has taken part in since 1984 in Chinese newspapers: *Titan Sport* and the *People’s Daily*. The result was coded into Chinese and foreign athletes groups, and the greater—than”(>) mark was addressed to athletes (teams) with positive bodily characteristics, or negative bodily characteristics are attributed to the opponent(s). Further comparisons were made between Chinese and major opponents from East Asia and West (namely European and North American athletes). This research will interpret the hidden message behind the bodily representation, and look at other interesting findings including discussions of celebrity body culture of Yao Ming and Liu Xiang.

【3B-10】

Research into Spectators of the Japan Women's National Football Team Matches: Using the Points of Attachments Index (PAI)

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The purpose of this study was to examine where spectators who attend matches felt a "point of attachment" (player, team, coach, Japan, women's sport, football) in the stadium while watching a football match. We conducted a questionnaire survey, the respondents of which were stadium spectators at Nadeshiko Japan matches. We implemented the survey during two Kirin Challenge Cup matches (n = 607). A multiple regression analysis was conducted to predict the relationship between the point of attachment and attendance intention. We found that attachment to the team and football had a significant effect on attendance intentions as a whole. On the other hand, there were some differences amongst categories, such as gender and age. For example, in addition to team and football attachments, an attachment to the players and Japan also had a significant effect on the attendance intention on the man/senior categories (R^2 = .39), and an attachment to the coach had a significant effect on the women/senior categories (R^2 = .29). Therefore, we need to formulate strategies to stimulate spectators' attachment as per each category. This study is significant because it focuses on the spectators' psyche with respect to women's sports, which, until now, has rarely been a focus of research.

【3B-12】

Associations of knee pain and low back pain with health-related quality of life among Japanese older adults

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The present study aimed to examine combined associations of knee pain and low back pain with health-related quality of life (HRQOL) among Japanese older adults. Data was collected on perceived knee pain and low back pain, HRQOL (Medical Outcomes Survey Short Form-8 questionnaire) and sociodemographic variables from 28,528 older adults (mean age: 73.8 ± 6.3 years) in 2011. Respondents were categorized into four knee/ low back pain categories: Neither knee nor low back pain, knee pain only, low back pain only, and both knee and low back pain. Multivariate analyses of covariance were utilized.The prevalence of knee pain only, low back pain only, and both knee and low back pain was 20.8%, 11.2% and 41.9%. After adjusting for covariates, older adults who perceived both knee and low back pain had significantly lower scores on all dimensions of HRQOL than the other groups. Furthermore, significant lower scores in the dimensions of bodily pain, general health, vitality, mental health, (mental component summary were found in the older adults with low back pain only than those with knee pain only. The results suggest that developing the pain coping strategies centering on lower back might be prioritized to improve their HRQOL efficiently.

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Aerobic fitness and cognitive control strategy in preadolescent children

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This study aimed to provide new insight into the association between aerobic fitness and cognitive control using neuroelectric and behavioral measures of action monitoring in preadolescent children. Higher-fit and lower-fit children performed a modified flanker task, while task performance and the error-related negativity (ERN) were assessed. We used two task conditions, in which the proportion of congruent and incongruent trials varied: mostly congruent (MC: 70% congruent, 30% incongruent) and mostly incongruent (MI: 30% congruent, 70% incongruent). Analyses revealed no significant fitness differences between groups on task performance measures. Neuroelectric data indicated that higher-fit children had smaller ERN amplitude for the MI condition relative to the MC condition, whereas lower-fit children exhibited no change in ERN amplitude between the MC and MI conditions. The decreased ERN amplitude for the MI condition in higher-fit children might reflect a strategic shift from bottom-up reactive control to top-down proactive control. In contrast, lower-fit children might be unable to enact this strategy shift, as reflected by a lack of change in ERN amplitude between the MC and MI conditions. These preliminary findings suggest that greater aerobic fitness is associated with an increased ability to modulate the neural network underlying cognitive control strategy.

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Using Baseball to Reconstruct the Impression of Taiwan Aborigines During the Japanese Ruling Period (1895-1945)

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After Taiwan became the first colony of Japan, the aborigines of Taiwan were regarded as the Barbarians or uncivilized persons by Japanese. This paper would like to discuss that how we can use the baseball movement to change Japanese's negative views to Taiwan Aborigines.

Research Conclusion:

In 1925, as a result of the Aborigine's Policy to aborigines by way of baseball, Nokodan had competed with lots of Japanese baseball teams from the east of Taiwan to the west and the mainland of Japan. Although this process brought an impression of civilization, but was just a flash in the pan.

From then on, three Aborigines athletes who experienced the Aborigine's Policy to aborigines by way of baseball, were invited to join the school team by HEIAN junior school in 1926. They were delegated by Kyoto to attend the Koshien Game every year, and won the runner-up in 1928.

Through analyzing the historical documents, we can understand that they can gave the positive report to the technological and spiritual culture which were showed by Aborigines in the games. Accordingly, through the body shows of baseball movement and relative reports I maintain that the Aborigines athletes have become the "wordless actors of civilization".

The same equation can be used for both sexes to predict resting energy expenditure in Japanese athletes

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The resting energy expenditure (REE) prediction equation of Taguchi et al. was developed based on Japanese female athletes. The aim of the present study was to examine whether the same equation can be used to predict REE of male athletes. Sixty collegiate male athletes were participated in this study (height 174.2±5.7cm, body weight (BW) 80.3±11.5kg, and fat-free mass (FFM) 67.2±7.1kg). REE was measured by indirect calorimetry using dougras bag tequnique, and body composition was estimated by dual energy X-ray absorptiometry. The predicted REE was calculated from two equations based on FFM. When compared with measured REE, predicted REE from the equation of Taguchi et al. (REE (kcal/day) = 26.9 x FFM (kg) + 36) was not significantly different. Whereas, predicted REE based on the equation published by Japan Institute of Sports Sciences was significantly different from measured REE. There is a high correlation between measured REE and predicted REE from equation of Taguchi et al. ($r=0.76$, $p<0.001$). Bland-Altman analysis of equation of Taguchi et al. did not show any systematic error.

In conclusion, the equation of Taguchi et al. can be used to predict REE not only for female athletes, but also for male athletes.

Effects of flexibility levels on stretching exercise- induced reduction in arterial stiffness.

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Poor flexibility is associated with arterial stiffening. Currently, it is unknown whether arterial stiffness is reduced after one bout of stretching exercise, and moreover whether the effects of stretching exercise is affected by flexibility levels. The purpose of this study was to determine the effects of flexibility levels on changes in arterial stiffness induced by stretching exercise. Twenty healthy adults (age 24 ± 1 yrs, 10 men and 10 women) participated in this study. Subjects were divided into either poor- or high-flexibility groups on the basis of a sit-and-reach test. Arterial stiffness (baPWV; brachial-ankle pulse wave velocity), systolic blood pressure and heart rate were measured before and immediately after the stretching exercise as well as 15, 30, 45, and 60 minutes after the stretching exercise. The baPWV significantly decreased at 45 minutes after stretching exercise ($P<0.05$). Although systolic blood pressure increased and heart rate decreased after stretching exercise in both groups, changed these parameters to baseline levels within 30 min after stretching exercise ($P<0.05$ in both). The trends of changed parameter in both groups responded in a similar fashion to stretching exercise (no group - by -time interaction was detected). These results suggest that stretching exercise acutely decreases arterial stiffness regardless of flexibility levels.

Age-related visual functions affecting postural control: a comparative study of young adults and the elderly

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Objective: The purpose of this study was to identify which changes in visual system function, important for posture and balance control, contribute to the decline in stability that is observed with age.

Method: This study was composed of an elderly group (mean age: 67.75±6.11 years) and a young adult group (mean age: 19.14±0.53 years) with 14 participants in each group. Participants were fitted with an EMR-8B head mounted eye tracker (EMR), which consisted of a field lens (NAC Image Technology). To control for gaze during posturography testing, a plain white screen was fitted onto the moveable visual surround. Elderly and young adult groups were compared using a one-tailed t-test with SPSS for Windows (ver. 15).

Results: After gathering and analyzing Equi-test and vision data, a significant difference between groups was found for postural sway, fixation point duration, convergence angle, and percent eye movement velocity（$p < 0.05$）.

Conclusion: Our study demonstrates that age-related changes in visual function influence postural control. We observed that elderly participants changed their visual line more frequently compared to young participants. Furthermore, the onset of moving velocity was delayed in the elderly adult group, reflecting a loss in the time needed to collect appropriate information required for postural control. Further studies are needed to clarify the relationship between visual and physical functions.

Objective measures of neighborhood environment and physical activity among Japanese adults

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Background: Understanding the factors that encourage individuals to engage in physical activity is important for promoting population-based physical activity. One approach suggests that physical activity is influenced by the environmental factors. For the promotion of population-based physical activity, understanding the long-term effects of environment on health behavior is important. Purpose: The purpose of the present study was to examine the relationship between objective measures of environment and physical activity among Japanese adults. Methods: The present study was a population-based cross-sectional study. The sample included 500 Japanese adults who lived in Japan. Objective environmental variables were assessed using Geographic Information System (GIS). The GIS will be utilized to assess the residential density, access to public transport, length of sidewalk, and access to parks within the 800m radius from each participant's home. Physical activity was measured using accelerometer for seven consecutive days. The self-administered questionnaire survey which included questions on sociodemographic status such as gender, age, educational attainment (graduate school or university, 2-years university, high or junior high school), employment status (office worker, student, housewife, part-time worker, unemployed), marital status (married, unmarried), household income (<3,000,000, <5,000,000, <7,000,000, <10,000,000, ≥10,000,000 yen), and body mass index) was conducted by mail. Logistic regression analyses are conducted to examine the independent relationships between each environmental variable and physical activity. At present, the researchers are gathering data.

Relationship between self-reported history of the head impact and the performance on cognitive tests of sports-related concussion in high school rugby football players

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This study examined the relationship between self-reported history related to the head impact including a concussion and the performance on cognitive tests in high school rugby football players.

108 high school rugby football players (age: 16.9 ± 0.9 years, height: 171.6 ± 6.0 cm, weight: 71.4 ± 12.4 kg) participated the cognitive tests of sports-related concussion and answered concussion history questionnaire before the start of the autumn season. The test battery of sports-related concussion included the Sport Concussion Assessment Tool 2 (SCAT2) and CogSport (CogState Ltd, Melbourne, Victoria, Australia). There was no significant correlation between CogSport and SCAT-2 at the preseason baseline. The CogSport score of participants who reported head impact events more than once was significantly lower than those who had no head impact history ($p < .05$). These results suggested that it should be used for the evaluation of sports-related concussion by not only SCAT-2, but also computerized neuropsychological test such as CogSport. And there was a possibility to delay the reaction time on CogSport for history of the head impact at the start of the season.