601. Establishment and availability of an evaluation method of motion-direction detectability

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[Aims] In fast ball sports such as table tennis, the performance of athletes depends strongly on the accuracy and speed of visual information processing about the motion direction and velocity of a ball in space. Therefore, the detectability of motion direction of visual stimuli should be a good predictor of visuomotor ability and the underlying motion signal processing which fluctuate reflecting the current brain conditions on a moment-to-moment. Therefore, we established a motion-direction detection task and evaluated the availability. [Methods] Moving random dots were presented on the full screen of a liquid crystal (LC) display. The motion coherence of dots within a certain circular area (target) increased linearly to 100% for 8 sec in a direction among four directions (upward, downward, rightward, and leftward), and the target location and motion direction were varied randomly. The subjects were required to reply the detected motion direction using joystick as quickly as possible. The time to detect target was analyzed in relation to the performance of a visuomotor task conducted in our other paper (O-31-2F-02). [Results] The time to detect target was analyzed in relation to the performance of a visuomotor task conducted in our other paper (O-31-2F-02). [Conclusions] These results suggest that the newly-developed evaluation method for motion-direction detectability is a good measure of the suitability of brain state for visuomotor responses. 

Keywords: Motion-direction detectability, Visuomotor, Moving random dots

602. Relationship between physical competence and frequency of exercise outside of school among elementary school students

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[Aims] Although having enough time to exercise contributes to foster and maintain young children’s motor ability, psychological factors supporting frequent exercise outside of school have not been identified. [Methods] Participants included 961 elementary school students (478 boys and 483 girls, Mage = 9.50, SD = 1.68). The questionnaire consisted of a physical competence scale, and one question assessing the frequency of exercise outside of school: “How often do you exercise in one-week period?” [Results] The boys exercised more frequently than the girls did (p < .001). The girls in the upper (5th & 6th) grades and middle (3rd & 4th) grades exercised less frequently than those in the lower (1st & 2nd) grades did. Physical competence was correlated with frequent exercise outside of school (boys: r = .42, p < .001; girls: r = .36, p < .001). [Conclusion] Boys exercise more frequently than girls do, and girls have a lower level of physical competence as their grades in school increases. Physical competence may be a psychological factor supporting frequent exercise outside of school among elementary schoolchildren.

Keywords: physical competence, frequency of exercise outside of school, elementary school students

603. Task completion rate of continued autism’s aquatic exercise classes

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[Aims] The aim of this study is to clarify the changes in the participation rate and task completion rate by continued autism’s aquatic exercise classes. [Methods] A third-year junior high school student and a second-year senior high student participated in this study. An analysis was conducted of the FY 2010 and FY 2015 participation rate and staff-evaluated task completion rate in aquatic exercise classes. The task completion rate was evaluated based on a two-level assessment of whether all the classes and swimming tasks could be performed or not performed and the evaluation was conducted in the classes by the athletics staff. The participation rate and task completion rate for 2015 showed a higher value for both students compared to the year 2010. [Results & Discussion] There is a possibility that the regular feedback about the task completion evaluation associated with continued aquatic exercise classes enhanced the willingness to participate of the autistic students and their parents. This indicates that continued autism’s aquatic exercise classes were contributed to the enhancement of the participation rate and task completion rate and at the same time it also contributed to the empowerment of autistic individuals.

Keywords: continued autism’s aquatic exercise classes, task completion rate, participation rate

604. Relationship between the Sit-and-Reach Test, Other of Flexibility Test, and General Joint Laxity Test

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[Aims] The factors affecting the relationship between the sit-and-reach tests (SRT), other flexibility test. Also general joint laxity (GJL) test (Tokyo Univ. method) were examined. [Methods] Subjects were 321 healthy male first-year college students (height 171.0±5.9 cm, weight 67.9±9.5 kg). The measurement items were as follows: for the flexibility test, finger vertebral distance (FVD) (up/down), trunk rotation, hip internal rotation, straight leg raise (SLR), heel buttock distance (HBD), and ankle dorsiflexion and for the GJL, (the wrist, elbow shoulder, knee, ankle, spine, and hip). The subjects were divided into high-value (Group H; 109 people) and low-value (Group L; 105 people) groups based on MS±0.5SD from the SRT. The relationship between SRT and each item was analyzed. First, the tests were compared based on the Mann-Whitney U-test; logistic regression analysis was then performed for items showing significant differences (p<0.05). [Results] Significant differences (p<0.01) were observed between Groups H and L for five flexibility factors (FVD, hip internal rotation, SLR, and trunk rotation) and three GJL items (the shoulder, spine, and ankle). Through the logistic regression analysis, the flexibility factors as SLR and FVD (under) and GJL of the spine were extracted. [Conclusions] SRT was affected by the flexibility factors SLR and FVD (under) and the GJL factor, the spine.

Keywords: Sit-and-Reach Distance, flexibility, general joint laxity
605. **Effect of muscle strength training and pole assisted walking aiming to keep or improve walking ability in middle and old aged people**

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[Aims] The aim of this study was to keep or improve walking ability in middle and old aged people. [Methods] Seventeen middle and old aged people did muscle strength training and pole assisted walking for six months in 2014 and 2015. Muscle strength training with a pole consists of 3 exercises (half squat, calf raise, and knee up). The contents of daily training were recorded. They were checked for balance ability, walking speed and leg muscle strength. Balance ability was measured by a one-leg standing duration test. Walking speed was measured by timing a 10m walk. Leg muscle strength was measured by the 2-step test. [Results] Subjects balance ability and leg muscle strength did not change significantly. On the other hand, their walking speed improved significantly (in 2014, 4.82±0.75sec to 4.40±0.57sec, p<0.05, in 2015, 4.63±0.66sec to 3.87±0.56sec, p<0.01). [Conclusions] These data suggest that the walking ability of middle and old aged people improved due to the muscle strength training and pole assisted walking. 

**Keywords:** walking ability, muscle strength training, pole assisted walking

606. **The difference between left and right hands in gripping strength during isometric and passive muscle force exertion**

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[Aims] Muscle force exertion includes active exertion with one’s own force and passive muscle force exertion to resist an external force. The former has been studied extensively as a standard measurement of muscle force; however, with the regards to the latter, few studies have been conducted on passive muscle force exerted to antagonize an external force. The purpose of the present study was to examine the difference in gripping strength between the dominant and non-dominant hands in isometric and passive muscle force exertion. [Methods] Study participants were 12 right-handed young men (age 20.7±1.8years, height 173.6±6.4cm, weight 74.6±8.4kg), and gripping strength was measured using a grip strength measurement device. Participants were asked to grip a fixed handle together with the gripping part of the measurement device, then a wire connected to the gripping part was wound using a motor, and measurement was completed when the participant could no longer maintain their grip. The maximum value measured was used as the passive gripping strength for evaluation. [Results] In isometric muscle force exertion, the maximum gripping strength was 50.0±4.9kg for the dominant hand, and 49.3±3.9kg for the non-dominant hand. With passive force, gripping strength was 57.8±7.8kg for the dominant hand, and 54.9±6.9kg for the non-dominant hand. [Conclusions] For both hands passive gripping strength was greater than the maximum isometric gripping strength (dominant hand: 1.16-fold, non-dominant hand: 1.12-fold). 

**Keywords:** muscle force exertion, active exertion, passive exertion

607. **Changes in UV and subjective micturition during water exercise**

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[Aims] The purpose of this study was to investigate the relationship of in water exercise to urine volume, subjective micturition, heart rate, rating of perceived exertion (RPE) and blood pressure during water exercise. [Methods] Eighty healthy males subjects volunteered for this study. This study consisted of two experimental conditions: the land trial and the water trial. The water level was set to the xiphoid. Measurement items were urine volume, subjective micturition, heart rate, RPE, blood pressure. The water temperature was 30 degrees Celsius. Both conditions began with 30 minutes in a sitting posture on land. Then, for the next 30 minutes, the water trial was performed water exercise while the land trial performed exercise. Finally, for the last 30 minutes, both conditions were back on land in a sitting posture. [Results] Urine volume and Subjective micturition after immersion in the water trial was higher than that of land trial (p<0.05). No significant differences were found in heart rate, RPE and blood pressure between the water trial and the land trial. [Conclusion] 1) Urine volume and subjective micturition increase through immersion in water. 2) Urine volume increases athletic strength during exercise more in water than on land. 

**Keywords:** urine volume, subjective micturition, water exercise

608. **Repetitive Front-Back Steps Test: A Pilot Study on Agility Testing for Kendo Players**

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[Aim] We sought to evaluate the use of the repetitive front-back steps (FBs) test to assess agility in kendo players. [Methods] Thirty-six university students were divided into two groups according to their experience in kendo, 18 were experienced kendo practitioners (KEN group), and the other 18 had no experience in playing the sport (non-KEN group). All subjects performed 3 types of agility testing; 1) FBs tests (using different distances of 60, 80, and 100 cm respectively) for 20 seconds, 2) a repetitive side steps test which has been designated by the Ministry of Education, Culture, Sports, Science and Technology to measure physical fitness (featuring a distance of 100 cm), for 20 seconds, and 3) the Hexagon Drill (HD). In HD, subjects must jump over and back of each 60cm side of a hexagon, and timings are recorded for two full revolutions of the test. [Results] While KEN group scored higher (p < 0.1) in the 100 cm FBs test as compared to non-KEN group, no significant differences were found between the two groups’ performances in the remaining two agility tests. However, the time taken to move backwards during the 100 cm FBs test by KEN group is significantly faster (p < 0.05) than those of non-KEN group. [Conclusion] The 100 cm FBs test might be useful in assessing physical agility in kendo players. 

**Keywords:** agility, front-back steps, kendo
609. The preventive effect of exercise on post-stroke memory dysfunction

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[Aims] There are a lot of reports that daily exercise exerts the preventive effects on poststroke dysfunctions. The recovery of spatial memory function might be depend on the hippocampal level of brain-derived neurotrophic factor (BDNF). In this study, the preventive effects of exercise and participation of BDNF in poststroke memory function recovery were investigated. [Methods] After the running on a treadmill for 7 days, 3,000 particles of microspheres (MS) were injected via right internal carotid artery of rats to induce the mild stroke (Ex group). Non-exercise group (NE group) and sham operated group were also examined as control groups. The spatial memory function was evaluated by Morris water maze test that was performed at 8th day after MS injection. BDNF concentration in transected hippocampus were measured at 1, 4 days before and 4, 7 days after MS injection by ELISA. [Results] MS injected rat showed significantly impairment of spatial memory function. However, the Ex group showed significantly recovery of memory function in comparison with that of the NE group. BDNF concentration was elevated 1 day before and 4 days after MS injection in the Ex group. [Conclusion] These results suggest that the BDNF elevation in hippocampus by customary exercise might prevent the spatial memory dysfunction after stroke.

Keywords: exercise, BDNF, stroke

610. Does the fascial gliding occurs during Myofascial Release using the Transcutaneous Vacume?

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[Aims] Myofascial release (MFR) is a well-known treatment. Previous research has shown that MFR improves gliding function of muscle and fascia using ultrasound. We reported that transcutaneous vacuum treatment improves ROM and decreases pain similarly to MFR. No study has reported that transcutaneous vacuum improves the gliding function of muscle and fascia. [Methods] Four volunteers who had not undergone any previous orthopedic treatment for the lower legs participated in this study. Transcutaneous vacuum treatment was applied to both the left and right vastus lateralis muscle (at the center of the lateral thigh) of each participant. Deep fascial motion during treatment was measured by B-mode ultrasound. Measurement was performed at the deep fascia between the subcutaneous tissue and the superficial layer of vastus lateralis muscle, and between the vastus lateralis and the deep layer of vastus intermedius muscles according to a previous study (Ichikawa et al., 2015). [Results] Deep fascial motions during treatment of the superficial layer was 5.4±2.56 mm and the deep layer was 6.0±2.23, respectively. Ratio (%) for motion during knee joint passive flexion from 0 to 45 degree was 16.9±6.40 for the superficial layer, and 14.6±5.27 for the deep layer. [Conclusions] In this study, fascial gliding during transcutaneous vacuum was shown. Hence, transcutaneous vacuum provided mild myofascial stimulation without requiring articular movement. Transcutaneous vacuum treatment effectively improves gliding function.

Keywords: myofascial release, transcutaneous vacuum, fascial gliding

611. Study on fitness test in wheelchair basketball athletes

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[Aims] The purpose of this study was to determine the relationship between the skill of the WCB player and selected fundamental factors for physical performance, such as chair skill test, trunk muscle strength, range of motion (ROM) in the shoulder, and new ship between the skill of the WCB player and selected fundamental factors. [Aim] This study aimed to examine the contributing factors to Star Excursion Balance Test.

Keywords: Wheelchair basketball, Fitness test, Medicine ball throw

612. Contributing factors to the reach distance of Star Excursion Balance Test

Shojo Nodu1, Masahiro Takemura1, Shinya Iwabuchi2, Shunpei Miyakawa1 (Univ. of Tsukuba, Tsukuba, Japan, 1Univ. of Tsukuba Hosp., Tsukuba, Japan)

[Aim] This study aimed to examine the contributing factors to Star Excursion Balance Test (SEBT) score. [Method] 29 healthy men completed weight-bearing-lunge test to measure ankle dorsiflexion range of motion (ADROM), isometric strength test for lower limb, static balance test and electromyography measurements. SEBT was performed 3 times for each directions: anterior (ANT), posteromedial (PM) and posterolateral (PL), and each reach distance was recorded. Path analysis was used to determine which Exogenous variables contributed to the reach distance of each direction of the SEBT; ANT, PM and PL directions. Exogenous variables included ADROM, isometric muscle strength, length of center of gravity, and muscle activities during the SEBT. Goodness of Fit Index was used to select which the path model fits. An alpha level of 0.05 was set for all statistical tests. [Results] The reach distance in ANT can be related to 54% of the following factors: the ADROM, the ankle plantar flexion strength, and the gastrocnemius muscle activity. In the same manner, PM: 54% from the tibialis anterior muscle activity, PL: 34% from the tibialis anterior muscle activity, the gluteus medius muscle activity. [Conclusions] This study suggested that ankle flexibility and muscle activity contributed to the SEBT score. Intervention for these factors would be required to confirm their selected contributing factors.

Keywords: Star Excursion Balance Test, Path analysis, Injury prevention

613. Interventional vacuum treatment improves Range of Motion and decreases pain similarly to transcutaneous vacuum

Iekie Takahashi1, Hiroshi Koshima2, Shoicy Yabuki1, Hikaru Kato2, Hiroshi Shishikura3

[Aim] Interventional vacuum treatment improves ROM and decreases pain similarly to transcutaneous vacuum. The purpose of this study was to investigate the vacuum treatment improves ROM and decreases pain similarly to transcutaneous vacuum.

Keywords: interventional vacuum, fascial motion, ADROM, SEBT, Exogenous variables, Path analysis.
613. Cognitive effects of head impacts in one game in collegiate american football players

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[Aims] Cognitive impairment is caused by repeated head impacts in Collision sports. However, it is not clear the effects of head impacts that influence a cognitive functions in a game. The aim of this study was to investigate the effects of head impact in the game in collegiate american football players. [Methods] 30 collegiate american football players participated in our study. We used Standardized Assessment of Concussion (SAC) and Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) which was recognized as cognitive performance test. Additionally, We measured it before season and before and after the game. The video analysis was used to count the number of head impacts. [Results] The score of SAC after the game did not show a significant change in comparison with that of before the game. However, the score of the ImPACT showed a tendency to decrease in Visual Memory (pre:83.7±12.3; post:80.1±12.7) and Impulse Control (pre:7.0±5.6; post:5.9±4.0). In addition, the score of Visual Memory in ImPACT tended to show the lower values. (t=-0.408; p=0.02). [Conclusions] Head impacts can be the factor which decrease the score of the cognitive performance test in a collegiate American football players.

Keywords : american football, cognitive function, head impacts

614. Myofascial Release using the Transcutaneous Vacuum

Tomonari Shibutani\textsuperscript{1}, Hiroshi Ueno\textsuperscript{2}, Mitsuharu Kaya\textsuperscript{1}, Masanori Takemura\textsuperscript{3}, Tetsuya Nakao\textsuperscript{4}, Yoichiro Yamashita\textsuperscript{5}, Junzo Tsujita\textsuperscript{6} (Hyogo Univ. of Health Sci., Jcraft, IchibashiCL, KUHS, Inst. SHMS)

[Aims] Myofascial release (MFR) is a well-known treatment of gliding function of fascia. Transcutaneous vacuum treatment also affects gliding function of fascia. Skin vacuum absorption using the small nozzle attracted subcutaneous fascia and muscle through skin. In addition, when the nozzle was moved on the skin, the fascia and muscle were directly stretched with improved flexibility. Hence, transcutaneous vacuum treatment improves joint flexibility. This study aimed to determine the effects of transcutaneous vacuum treatment on improvement of shoulder joint ROM. [Methods] Twelve volunteers who had not undergone any previous orthopedic treatment for the shoulder joint (age:22-50) participated in this study. Two experimental conditions were investigated, upper back muscle of each participant with a 1-week interval between tests; transcutaneous vacuum treatment for 4 minutes with no treatment. Shoulder joint ROM was measured both before and after treatment using the modified shoulder reach flexibility test (TDD). Data were statistically evaluated using two-way ANOVA and post hoc test. [Results] Changes before and after TTD (mean±SD;cm) were 9.07±7.54 to 6.83±7.42 (treatment) and 8.57±8.31 to 7.88±8.28 (rest condition). Interaction between the two groups was significant (F(1,11)=33.99, p<0.001). Post treatment was significantly smaller than pre treatment for the transcutaneous vacuum treatment (F(1,11)=20.44, p=0.0035). [Conclusions] In this study, transcutaneous vacuum treatment improved shoulder joint ROM.

Keywords : myofascial release, transcutaneous vacuum, shoulder reach flexibility test

615. The difference between normal and elastic shoelace on pressure of the planar and dorsal foot

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[Aim] To clarify the difference between the normal and elastic shoe-lace on pressure levels of both the planar and dorsal foot. [Method] CATERPYRUN (TWINS Co., Ltd) was used as an elastic shoe-lace in this study. 20 healthy males were divided into 4 groups according to the type and tightness of the shoe-laces they have used; normal shoe-lace, ordinal tightness (group NO), normal shoe-lace, tight (group NT), elastic shoe-lace, ordinal tightness (group EO), elastic shoe-lace, tight (group ET). Plantar pressure (divided into 3 areas; overall, forehead, hind-foot), dorsal foot pressure, and sole contact surface to the ground were evaluated. All subjects completed their measurements in a sitting position, standing, standing on one’s left leg, standing on toes, walking and jogging. In all analyses, P<0.05 values were considered as statistically significant. [Result] Plantar pressure was significantly lower in the EO compared to the NO in standing position (3.14±3.56 Pa). By walking and jogging, sole contact surface and the dorsal foot pressure were significantly higher in the EO compared to the NO. [Conclusion] Using an elastic shoe-lace decreases the plantar pressure in standing position and increases the sole contact surface, leading to an increase in the dorsal foot pressure by walking and jogging, especially in the mid-stage phase.

Keywords : elastic shoe-lace, plantar pressure, dorsal foot pressure

616. CPA (cardiopulmonary arrest) measures immediately after the start of city marathons

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Purpose: A case of cardiopulmonary arrest (CPA) occurring directly after a small-scale City Marathon began was reported at our 70th conference. Out of seven CPA cases (from 540,000 participants over 10 years) that we studied, two incidents occurred immediately after the start of the marathon and were cases of latent heart disease. Subjects: A medical check was held directly before the start of a 20.50km marathon in May 2016 (488 participants). The event staff took a BLS (basic life support) course beforehand. Results: During the medical check, 18% of the participants (90/488) underwent blood pressure measurements, of which 21% showed high blood pressure (140/90 mmHg or higher). Hb was tested in 22% (81/488) of the participants. The average was 14.1g/dl in men and 12.0g/dl in women, and 19% of the men and 35% of the women were found to be anemic. Lung age measurements were taken in 9% (44/488) of the participants These measurements showed that 66% had a lung age higher than their actual age. Of the 4% (20/488) of the participants who underwent autonomic function testing, abnormalities were found in 60% of the participants (6 points or less using a Kiritu Meijin autonomic reflex orthostatic tolerance test. Conclusion: Medical checks directly before city health marathons are critical in preventing CPA incidents occurring directly after the start of the marathon. The results also suggest the necessity of real-time WBGT monitoring and a BLS course for staff members.

Keywords : Medical Check, cardiopulmonary arrest, marathon
617. The Role of Humanoid Robots in Long-Term Preventative Care Exercises

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The proliferation of humanoid robots equipped with artificial intelligence (AI) in recent years is expected to contribute to preventive care exercises and more. In this study, we examined the possibility of how exactly humanoid robots can make such contributions in health care. The subjects were 17 participants in a local elderly exercise program in 2014 that was carried out free of charge, while the control group was 19 people in the same classroom in 2015, both under the guidance of a humanoid robot. Of the 17 participants in the first group, 2 dropped out while the remaining 15 participated through the last round, for a participation rate of 83.5%. The sessions were performed 72 times over a period of six months and we measured the physical strength of each participant before and after the intervention, with tests covering grip strength, standing eye-openings on one leg, 10m obstacle walking, and 2 stride. Improvements were observed although the significant difference is not in the TUGet.

Keywords: Humanoid robot, Nursing prevention, Exercise program

618. Challenges of developing an information management system and immediate feedback at practical setting

Akino Yamamoto1, Masaru Ito1, Jingho Hong1, Yasuaki Okawa1, Koki Gomi1, Aiko Sekigushi1, Kenji Kokatsu1, Sayaka Yasui1, Taichi Ooshita1, Akira Ito1, Atsuro Okano1, Hajime Kato1 (Tokyo Univ. Inst. of Sports Sci. & Med.)

[Aims] In order to measure improvement of athletic performance, it’s imperative to track individual condition correctly and apply a proper program based on those information. Therefore, a database for injury tracking and for performance is needed. However, typical injury tracking systems tend to be difficult and complicated to manage and analyze. The purpose of this study is to develop a database that simply manage information at practical setting. [Method] To host a company information session and order for developing a database system. During the session, purpose, method, data items, and functions were explained. [Result] There was no database offered that met budget and delivery date. By meeting all demands from staff, many of them became optional functions that cost tends to easily surpass budget. Therefore, Web based survey was considered and utilized. ipad was used to input data and all data was output in Microsoft Excel. They were analyzed next day and sent to staff with feedback. [Conclusion] The main merit of ordering database for professional companies was to receive a database likely able to process complexed information that synchronizes with other database. On the other hand, the demerit would be a high cost. Although, when database becomes significantly large and complexed, hand-made database might not be ideal. However, in the aspect of simple information management system for daily information tracking from practical setting, it is still reasonable for cost and most of practitioners demands.

Keywords: information management system, practical setting, database

619. The effect of oral contraceptives on athletic performance

Mariko Nakamura1, Sayaka Nose1, Michiko Dohi1 (Japan Institute of Sports Sciences)

[Aims] Although the prevalence of dysmenorrhea and premenstrual syndrome in Japanese elite female athletes is 25.6% and 70.3%, respectively, the percentage of women who take the oral contraceptives (OC)-low dose estrogen progestin (LEP) for treatment of these conditions is low (2%). One concern is whether OC-LEP might have adverse effects on athletic performance. The purpose of this study was to examine the effect of OC-LEP on athletic performance. [Methods] Fourteen female athletes were recruited. All subjects were examined during the follicular (F) phase, luteal (L) phase, OC-LEP phase and withdrawal-bleeding (W) phase. During the natural menstrual cycle of these women, they began taking OC-LEP. Body composition was measured during all phases. Multiple jump tests, isokinetic knee strength (using BIODEX), lactate curve test, VO2max test, and the Wingate test were performed during all the phases. [Results] There were no changes in body composition, jumping height, the peak torque of knee extensor and flexor muscles, and maximal oxygen uptake while taking OC-LEP. Maximum lactate concentration after exercise increased more during OC-LEP and W phases than during the F and L phases (P < 0.05). [Conclusions] These results suggest that athletic performance did not change with the use of OC-LEP. Thus, OC-LEP is a possible treatment option for condition adjustment for female athletes. However, as for the effect of taking OC-LEP on lactate metabolism, it is necessary to examine athletic event-specific factors in the future.

Keywords: female, athletes, conditioning

620. Autonomic nervous response of (50 Km and 20 Km) marathon runners

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[Introduction] The autonomic nervous system (ANS) is in a constant state of change, working to maintain a balance between the sympathetic and parasympathetic nervous systems. Functional decline of the ANS has a variety of effects on the body. In the present study, we studied these effects during a marathon, which was held on May 8, 2016, comparing ANS responses before and after running the marathon. [Methods] The participants were eight marathon runners (six men, two women; ages 47-70 years), whose nervous functions were measured before and after the marathon. We used the "Kirisu-Meijin" automatic nerve function inspection device, which display an overall score for ANS activity (0-10). The present study assessed these overall scores and also the changes over time for each participant. [Results] The overall scores for ANS activity were significantly lower following the marathon, compared to before running (before: 6.6 ± 0.83, after: 4.6 ± 0.10; P <0.01). At the 69th annual meeting, a middle-aged woman with extremely poor ANS functioning was presented. [Conclusions] Comparisons of ANS functioning before and after the marathon, indicated that all eight participants experienced declines in ANS functioning after running. The present study confirmed that ANS assessments allow individuals to understand functions that they would be otherwise unable to recognize. This information is a useful tool for assessing the effects of conditioning.

Keywords: marathon, autonomic nervous system, conditioning
621. The relevance of FMS scores and injury risk in university baseball players

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[Aims] The Functional Movement Screen (FMS) is a comprehensive exam that assesses quality of fundamental movement patterns to identify an individual’s limitations or asymmetries. Scores on the FMS are said to be closely associated with the sports injury rate. However, reports focused solely on athletes in Japan are scarce as most related research is conducted by foreign institutes. This study investigated the relevance of FMS among university baseball players by tracking the FMS scores and number of injuries experienced by a group of first-year players on a university baseball team over a period of two years.

[Methods] The subjects included 13 players who joined the team as freshman in the first year of the study and 26 players who joined in the second year as freshman. FMS scores were compared between the two groups of members using the Mann-Whitney U test. As a statistical measure of injuries, we tracked the number of players who sustained an injury that would prevent them from participating in a practice session or game during the team’s spring training camp and subsequent competition season in each year.

[Results] The average FMS score for new team members in the second year group was significantly higher (p<0.05) at 17.7±1.5 than that of the first year group, which averaged 15.6±2.1. In addition, the number of injured players decreased from three among first year group to none in second year group.

[Conclusions] This study’s results indicated that conditioning based on FMS is effective for injury prevention among university baseball players.

Keywords: Functional Movement Screen, University baseball players, Sports injury

622. Survey of muscle cramp to focus on muscular function in university tennis players

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[Aims] 1) To survey of situation, region and medical history of muscle cramps in university tennis players. 2) To research of muscular function and the function of physical strength between the university tennis players whether have medical history of muscle cramps or not. [Methods] 1) Questionnaire survey to 283 tennis players in 7 university, the response rate was 82%. 44 survey components were about information of players, training and muscle cramps. X²-test was performed between the 7 university tennis players whether they have medical history of muscle cramps or not. 2) Physical fitness test to 16 tennis players in T university. Test components were 26 components based on the test conducted by Japan Tennis Association. Independent-t test was performed between the T university tennis players weather they have medical history of medical cramps or not. [Results] 1) The most common region of muscle cramps is the posterior lower thigh and followed by the thigh. 2) The players who have medical history of muscle cramps got a high score in medicine ball throw, Yo-Yo test level 2 and the peak torque of the knee joint extension with high speed better than the players who don’t have them (p<0.05). [Conclusions] There is a possibility that the players who have higher athletic performance and the peak torque of the knee joint extension with high speed tend to develop muscle cramps in the posterior lower thigh and the thigh.

Keywords: muscle cramps, muscular function, university tennis player

623. The effect of anti-oxidant ability and anti-inflammatory by mineral cream

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[Methods] ICR mice were used in this experiment and this experiment was approved by the Ethics Committee in Hoshi University. Both cream and basis cream were applied to the foot bottom of each mice respectively for 1- or 4-weeks every day. We used Von Frey test to analyze the measurement of pain stimulation, it was applied from the underside of the mesh to the plantar surface of the mouse’s front- and hind- paw. The mice were responded by flicking its paw away from the stimulus. Reaction time showed that it resisted a pain. Moreover, we measured the antioxidant ability, Biological Antioxidant Potential test and Diaconon-Reactive Oxygen Metabolites test with a free radical analysis device. [Results] There was a pain reduction effect in mice for 4-week mineral cream treatment, but was no effect for 1-week treatment in mice. No significant differences of the antioxidant ability were observed with the treatment of this mineral cream used in this study. [Conclusion] Suggest that the mineral cream is expected to inhibit pain when treating more than 4 weeks or using several times during one day and this mineral cream can exert its effect as an anti-muscular pain in the field of sports medicine or science.

Keywords: Pain, mouse, anti-oxidant ability

624. Ultrasound imaging of scapular muscles thickness assessment: technical reliability

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[Aim] The aim of this study was to confirm intra-rater reliability for measuring the thickness of the scapular muscles using rehabilitative ultrasound imaging (RUSI).

[Methods] Six male volunteers joined in the study which measured the thickness of serratus anterior (SA), rhomboid major (RM) and lower trapezius (LT) muscles using the RUSI. Probes were placed on two different points for each muscle; P1 and P2. Intra-rater reliability was evaluated using interclass correlation coefficients (ICCs) at each point on different days.

[Results] The ICC (1.1) for the SA and RM at the P1 and P2 were highly repeatable (SA; P1=0.97, P2=0.97, RM; P1=0.97, P2=0.94), although the ICC (1.1) for the LT were moderately repeatable (LT; P1=0.62 , P2=0.97). On the other hand, the intra-rater reliability on different days for the SA and RM were highly repeatable, SA; ICC (1, 2)=0.82(P1), 0.85(P2), and RM; ICC(1,2) =0.85(P1), and 0.86(P2). However intra-rater reliability for LT were low; ICC(1,2)=0.28 (P1) and 0.41(P2).

[Conclusions] In this study, the measurements of thickness for the SA and RM muscles were highly repeatable both on the day and on the different days. However the LT measurements were not reliable at the two different measurement points.

Keywords: ultrasound, scapular muscles, reliability
The sports characteristics of fundamental physical fitness of Paralympic athletes

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[Aims] The aim of this study is to determine the sports characteristics of fundamental physical fitness of Paralympic athletes. [Methods] Forty hundred fifty seven Paralympic certified athletes (308 men and 149 women) belong to each 29 national federation participated in this study. The measurements were grip strength (strength), long jump distance, vertical jump, medicine ball throw (anaerobic power), seated forward bend, shoulder flexibility (flexibility), whole body or button-press reaction time with auditory or visual tasks (agility), and 20 m shuttle run, wheelchair 5 minutes run (endurance). [Results] Wheelchair basketball, para-cycling, track and field, and alpine skiing were higher both strength and anaerobic power than the other sports, whereas wheelchair basketball, wheelchair tennis, track and field, alpine skiing, and cross-country skiing were higher endurance capacity among the all sports. Although badminton and blind soccer showed faster auditory reaction time, both reaction times was slightly different across the all sports. [Conclusion] The fundamental physical fitness reflected sports characteristics for Paralympic athletes.

Keywords: Paralympic, physical fitness, disability