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ABSTRACTS
(PLENARY AND INVITED SPEAKERS)
PLENARY SPEAKER: PROF STEPHEN RIEK I 28 SEPTEMBER 2016, 10.30 – 11.15 AM

Sensorimotor Adaptation: Lessons for Enhancing Skill Acquisition

It is through purposeful movement that we can interact with and impact the world around us. Take away the ability to control movement and survival becomes nearly impossible. A great deal of what we know about the cognitive and sensory processes carried out by the brain comes from the classic scientific paradigm of systematically manipulating input variables and measuring output variables, in this case movement. Using a sensorimotor integration paradigm allows us to understand brain mechanism of movement control and motor adaptation. In this presentation I will discuss our work examining sensorimotor adaptation and applications for skill acquisition in a variety of contexts including sporting and vocational domains.

PLENARY SPEAKER: DR TOBY MÜNDEL I 28 SEPTEMBER 2016, 14.00 – 14.45 PM

Beat the heat! Consequences of exercise in the tropics, and ways in which performance can be optimized

The climate in Malaysia, like many Asian countries, challenges the human body and can affect exercise performance and recovery in addition to increasing the risk of heat illness. Although greater strain is placed on the thermoregulatory system, there is also additional metabolic and cardiovascular ‘cost’. Fortunately, several strategies are effective in reducing the impact of such environmental heat stress. This talk will highlight the physiological and performance consequences of exercise in a tropical environment and interventions that have reduced the physiological (and perceptual) strain whilst proving ergogenic. Where possible and appropriate, direct application to athletes will be provided and a variety of populations considered (e.g. adult athletes including women, young athletes, athletes observing the holy month of Ramadan etc.).

PLENARY SPEAKER: PROFESSOR ZULQARNAIN MOHAMED I 29 SEPTEMBER 2016, 09.00 – 09.45 AM

Genetics and sports performance

Improving sports performance has been a subject that interests many, and the various efforts and strategies channelled toward achieving this goal has been met with amazement, awe, sometimes resentment as well as disbelief. A carefully designed physical exercise and training regime coupled with a specifically formulated diet and nutritional programme are the conventional areas of concern, whilst the increasing opportunity to employ state of the art computing technology in focused training and performance development has raised standards in competitive sports higher and higher.

It has already been established more than three decades ago that genetic components contribute substantially in sports performance. However, due to the complexity (and the interaction) of a wide range of factors contributing to athletic capabilities, determining the exact genetic key players has been a daunting efforts with questionable success. Recent advances in global gene analysis approaches, or genomics, promises to provide a clearer scenario and improve our understanding of genotype-phenotype correlations.

In this presentation I will provide an overview of the advances in understanding the contribution of genetics in sports performances thus far, as well as its limitations, challenges and opportunities.

PLENARY SPEAKER: ADJUNCT PROF ANDREW S. MCINTOSH I 29 SEPTEMBER 2016, 14.00 – 14.45 PM

Head injuries in Sports - Biomechanical Issues

Head injuries in sports are common and range in severity from minor superficial injuries to fatal injuries. Biomechanics is fundamental to understanding the mechanisms of head injuries in sport and developing solutions to prevent or reduce head injury. The talk will address studies of head impacts in sport covering in vivo instrumentation of athletes, video analyses, reconstructions and numerical simulations. These studies have been conducted in contact football, ice hockey and alpine sports, for example. The objectives of these studies will be considered with a focus on how these studies inform the development of protective headgear. Headgear, e.g. padded head guards in combat sports and helmets, is one method for preventing head injury or
reducing head injury severity. There is good evidence of the protective benefits of headgear in some sports and none in many sports. The evidence on headgear performance from epidemiological studies will be presented and placed in the context of the biomechanical performance of the headgear. The talk will address the importance of standards and rules in mandating headgear impact performance and protection. The talk will cover laboratory testing methods for research as well as certification and compliance testing. Finally, the important role of ergonomics human factors will be considered with regards to usability and acceptance of headgear in sport. Case studies of headgear will be presented to illustrate these issues.

**INVITED SPEAKER: DR. JAY-LEE NAIR I 28 SEPTEMBER 2016, 10.30 – 11.00 AM**

**Shaping our Future Olympians: Psychological Strategies that Help Young Athletes Sustain the Journey**

Psychological Strategies that Help Young Athletes Sustain the Journey The journey from youth athlete to Olympic competitor is both physically and psychologically demanding. In order to shape our future Olympians, we must first consider the psychological and motivational factors that can prevent attrition and maintain our young talent in sport. This talk will examine the social challenges in Asia our youth athlete’s face and present previous research on external and personal psychological factors that can make or break a young athlete’s healthy development. The presentation will highlight aspects of the sport climate, and child-parent and coach relationships that are important predictors of athletes’ performance anxiety, level of enjoyment, and confidence. Psychological strategies for helping young athletes thrive in their sport experience will be introduced, in particular a strengths-based approach to coaching will be discussed and its implications for coaches, practitioners, and policy makers in youth sport development.

**INVITED SPEAKER: ASSOC. PROF. DR. MOHAMAD SHARIFF A HAMID I 28 SEPTEMBER 2016, 14.45 – 15.15 PM**

**Accelerating soft tissues recovery: Platelet rich plasma (PRP) or stem cells?**

While majority of soft tissues injury responds well to conservative approach, it often requires significant recovery time and period of increased susceptibility for recurrent injury. In an attempt to hasten soft tissue recovery, various treatment alternatives are being explored by researches. These include hyperbaric oxygen therapy, sclerosing therapy, injection of various substances into the injured area including mixed traumeel (a homeopathic anti-inflammatory) and actovegin (protein-free extract from filtered calf blood), corticosteroids and local anaesthetic injection. Most of these alternatives lack clinical scientific evidence and their uses are still controversial. More recently, administration of biological substances has gained a lot of attention. Substances like autologous blood and blood products including autologous condition serum (ACS) and platelet-rich plasma (PRP) and stem cells are used for soft tissues (muscles, tendons and ligaments) injuries despite limited clinical evidence.

**INVITED SPEAKER: MS. TERESA WONG I 29 SEPTEMBER 2016, 11.15 – 11.45 AM**

**Hacking the Body for Performance**

Optimizing athletic performance demands mind-body integration that is both seamless and fluid. Yet, injuries, trauma, and even pain are often par for the course for the athlete on the punishing road to greatness. Despite mental determination, sometimes our bodies overrides our will and guards, blocks, or inhibits our movements in an unconscious effort to protect itself. In a battle between the coach and the athletes’ instinctive protective response, usually the protective response wins. In this talk we will discuss technologies that begin to address this and how they work.
ABSTRACTS

(FOR ‘ABSTRACT ONLY’ SUBMISSION TYPE)
Prevalence and Correlates of Equestrian Injuries in Malaysia: A Cross Sectional Study

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Despite the implicit risk of injuries in equestrian sports, the prevalence and patterns of injuries among equestrian athletes in Malaysia has so far not been examined. The objective of this study was to determine the prevalence of injuries; its patterns and correlates among horseback riders. An online survey was conducted to collect data for this cross-sectional study. Horseback riders aged above 18 years were included in the study by convenience sampling. Out of 169 participants; 93 were females and 76 were males. Correlation analysis was performed for multiple variables. The correlation of injuries to gender, age, level of experience, exercise habits and type of equestrian sport were determined. The prevalence is considered high with 85.8% of the participants reported symptoms in the past 12 months. The results concluded that perceived symptoms most frequently were reported in the upper extremities (43.4%) followed by lower extremities (40.7%), head (8.3%) and injuries of upper and lower back (3.4%). Female participants have higher prevalence of injury (55.03%) compared to males (42.60%). A significant association was found between gender and prevalence of injuries. 70.4% of the riders sustained soft tissue injuries. 55% of the injured were involved in recreational riding. The most common mechanism of injury was fall from horse. Sixty per cent of the injured riders did not seek medical attention after the injuries and physiotherapy consultation was even lower with 10.3%. This evaluation of trauma among riders indicates different patterns of injury, contributing to the growing body of literature in this field. The high prevalence of injuries and low rate of medical consultation emphasizes the need for safety education programs in Malaysia. Educational sessions should be held for riders regarding the nature of the horse, mechanisms of injuries, horse handling, and riding skills to host a safe equestrian activity.

Effect of an Intervention of Baton Dance™ Exercise Regime on Stress Score among Sedentary Young Adults

Mastura Johar¹, Mohamad Taufik Hidayat², and Rozita Abd Latif³

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³ Sport Science and Recreation Department, Universiti Teknologi Mara, Malaysia

The purpose of this investigation is to evaluate the effect of a 12-week of Baton Dance™ exercise regime in the treatment of stress score among overweight sedentary adults in Universiti Tenaga Nasional Malaysia. Baton Dance™ exercise program is a combination of aerobic dance activity, circuit training, and interval training that includes alternating of low and medium intensity of conditioning training with medium volume and low resistant of training with a short rest time suitable for sedentary and overweight individuals. Forty subjects between the ages of 25 to 55 years have had a diagnosis as sedentary, overweight and have a fitness score below the mean. Subjects were randomly assigned to a 12-week of either Baton Dance™ as a treatment group or an aerobics dance exercise as the control group. A pretest-posttest control research design was utilized. Both groups met for 50 minutes, three times a week for a total of 36 sessions. Statistical analysis included (group x time) paired t-test and independent sample t-test were used to determine between and within group mean differences. Results suggested that subjects in the Baton Dance™ exercise regime experienced positive improvement in stress scores which indicate: Physical Indicators (mean pre: 54.34 mean post: 53.86), Sleep Indicators (mean pre: 9.97 mean post: 9.59), Behavioral Indicators (mean pre: 29.14, mean post: 28.72), Emotional Indicators (mean pre: 52.28, mean post: 48.97), and Personal Habits (mean pre: 25.03, mean post: 23.79). All of the variability was associated with the treatment after the variability caused by individual differences was removed. Further to that, there was a significant different in the stress scores between the intervention and control groups after 12 weeks treatment. The results indicated that the intervention of Baton Dance™ exercise program had improved stress score, after 12 weeks of treatment and contributed to positive findings among overweight sedentary young adults.
Lumbar Kinematic Changes Following Two Hours of Functional Tasks Among Adults with Acute and Chronic Low Back Pain

Nancy G. J1,2, Devinder Kaur Ajit Singh1, Nor Azlin Mohd Nordin1, T.H Ha3, Sabarul Afian Mokhtar4, and Ann Moore5

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There is abundance of information regarding lumbar kinematic changes after static postures. However, changes in lumbar kinematics following functional tasks are unknown. The aim of this study was to compare the changes in lumbar kinematics following two hours functional tasks among adults with acute (ALBP) and chronic low back pain (CLBP). Forty-three adults with ALBP (n=22) and CLBP (n=21) were recruited from an outpatient physiotherapy department. Ethical approval was obtained from the Secretariat for research and ethics, Universiti Kebangsaan Malaysia and National Medical Research Register, Ministry of Health. The participants were required to perform tasks for two hours in a simulated home environment consisting of walking on flat surface, walking up and down the stairs, lifting a 3kg basket, and sit to stand/stand to sit at sofa and office chair. Range of motions (ROM), velocity, and accelerations were measured using inertial sensors attached at first lumbar and second sacrum vertebral spinous process while participants performing lumbar flexion, extension, lateral flexion and rotation to both sides in standing position before and after performing the tasks. Data was analysed using repeated measured ANOVA with age, gender and BMI as covariates. A significant main effect of time (p<0.05) was demonstrated in ROM (extension/left rotation) and angular velocity (flexion). Significant between group effect (p<0.05) was found in angular velocity (flexion, right/left lateral flexion and right/left rotation) and in angular acceleration (extension, right lateral flexion, and right/left rotation). Significant interaction effect between time and group (p<0.05) was found in left rotation of angular acceleration. The results indicated that 2 hours tasks affected lumbar kinematics. However, pattern of change in lumbar kinematics following tasks were inconsistent among the groups. These results may be due to the variability in the compensatory strategies depending on the type of impairments among adults with LBP.

Effect on 4 Weeks Education Program Using a Validated Booklet on Nutritional Status Among Malaysia National Cyclist

Mohd Izham bin Mohamad1,2, Nik Shanita S.2, Yeo Wee Kian1, and Mohd Ismail Mohd Nor3

1National Sports Institute of Malaysia
2The National University of Malaysia
3Taylor University, Malaysia

Sports performance is improved with optimal nutrition. However, scientific evidence shows that endurance athletes have inadequate nutritional intake compared to recommendations. This study employed an intervention design study to investigate the effects of the application of a validated booklet during nutrition education program on nutritional status among Malaysian national cyclist. Data collections were performed on eleven national cyclists undergone 4 weeks of general preparation phase. Nutrition education was primarily imparted using validated booklet developed based on recommendation and guideline for endurance cycling through a group session and structured one-to-one nutrition education session for 4 weeks. Anthropometry and dietary intake were assessed baseline and after 4 weeks of intervention. The general characteristics of cyclist were 18.6 ± 1.7 year olds, 62.9 ± 6.4 kg of body weight, 21.3 ± 1.5 kg.m⁻² of body mass index (BMI), 9.1 ± 1.9% body fat percentage, and 47.2 ± 8.8mm sum of seven skinfolds. During baseline, the mean total energy intake (TEI) was below the estimated total energy expenditure (TEE) (2860 ± 361 vs. 4000 kcal/day) and carbohydrates (CHO) intake was low in comparison with the recommendation for endurance cycling (5.3 ± 1.1 vs.7-12 g/kg bw). Protein (P) intake was slight higher than recommendation (1.8 ± 0.5 vs. 1.2-1.6 g/kg bw/day)
where total fat (TF) intake was at the maximum recommended value (35% vs. 20-35% of TEI). After 4 weeks of intervention, TEI (2860 ± 361 vs 3965 ± 363 kcal per day) and CHO intake (5.3 ± 1.1 vs 8.0 ± 1.0 g/kg bw) were improved (p<0.05). Body weight (62.9 ± 6.1 vs 61.4 ± 4.4 kg) and sum of seven skinfolds (47.2 ± 8.8 vs 44.0 ± 6.9 mm) were decreased (p<0.05). The results of this study suggested that nutritional education program using validated booklet as aids education program may lead to positive changes in dietary intake and body weight reduction according to recommendations of training and competition.

ID#146

Development of Interactive Sports Nutrition Mobile Application Software (NutriSportEx™) for Malaysian National Athletes and Physically Active Individuals

B.S. Pushpa1, S.Nik Shanita1, M.Mohamad Izham2, A.H.A. Rahman1, B.K. Poh1, W.K. Yeo2, H. Sareena Hanim3, Y.T. Chan1, and A.T. Ruzita1

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Nutritional education tool in the form of mobile application can assist in delivery of effective and convenient sports nutrition education. The aim of this study is to develop and validate interactive mobile application software called NutriSportEx™ for national athletes and physically active individuals. This study comprised of two phases: Phase I was the development of the mobile app prototype, and phase II is validation of the mobile app developed. This presentation will report only the first phase of this project. The prototype is developed by customising the calorie specification and dietary intake details according to serving size of local Malaysian foods. Additionally, this app can work offline and have features such as energy requirement, total food intake, nutrient analysis and food excel. NutriSportEx™ calculates total energy requirement based on user’s weight. Actual energy and nutrient intakes is estimated from user’s dietary intake profile. NutriSportEx™ tabulates dietary intake and generates a nutritional analysis report in the form of infographics. This report is generated as mean of the best three calorie intakes in a week and covers details such as energy intake, macro- and micro-nutrients. Useful tips related to sports nutrition guidelines for training or competition pops up whenever the user access NutriSportEx™. The food excel feature covers additional information such as dietary guidelines, food guide pyramid and food planning (sample meal set for 2400 and 3200 kcal). NutriSportEx™ is convenient as it is easy to access as a mobile-based application. Since it contains nutrient details of local Malaysian food it will be a value added feature in comparison with existing mobile apps. Therefore, NutriSportEx™ will be a useful personal digital nutritional guide for national athletes and active individuals.

ID#148

Kayak Exergaming for Individuals with Spinal Cord Injury

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Exergaming is a video-gaming experience that requires bodily movements from the user to produce in-game effects mimicking sports play. In individuals with spinal cord injury (SCI), exergaming in a sitting position requires use of bilateral upper limbs in order to produce higher exercise intensities. However, exergaming sports that incorporate use of bilateral upper limbs feasible in sitting position were scarce, because of this, the authors modified a Kayak video-game from London 2012 (Sega Games Co., Tokyo, Japan) using two Sony Move® controllers fitted into a sensor embedded Kayak paddle designed by the authors. This modified Kayak paddle was pilot tested by the authors and allows the game to read the controllers into mimicking actual kayaking movements. Four participants with SCI were recruited, where they played for 10 min continuously in sitting
position. Data are presented as mean (standard deviation). The mean participant age was 26y (7) and time since injury 17 y (1). Kayak exergaming, achieved moderate exercise intensities with metabolic equivalent (MET): 3.75 (0.2); heart rate (HR): 130 (28) b•min⁻¹; rating of perceived exertion (RPE): 7.2 (1.2), oxygen consumption (VO₂): 13 (8) ml•min⁻¹•kg⁻¹ and 785(45) ml•min⁻¹. Their physiological response values at rest in supine position were MET: 1.3 (0.1), HR: 70 (11) b•min⁻¹; VO₂: 4.7 (0.4) ml•min⁻¹•kg⁻¹ and 278 (48) ml•min⁻¹. The adapted Kayak exergaming produced “dose potent” exercise intensity according to recommended exercise guidelines proposed by American College of Sports Medicine, American Heart Association and SCI Action Canada.

Effects of Resistance Training On Lower Body Performance Capacity of Synchronized Swimmers

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During swimming the body muscles work differently as compared to physical activity on land. There are no impact forces because of hydrostatic microgravity, resulting in a minimal contribution of the stretch-shortening cycle during aquatic exercise. Thus, concentric muscle actions predominate during swimming. The aim of this study was to examined the effects of two days per week x seven weeks (2 days/week x 7 weeks) strength training on the lower-body performance capacities of synchronized swimmers. A total of 10 trained synchronized swimmers (age = 17.3 ± 3.3 years old, weight = 51.0 ± 5.4 kg, height = 159.0 ± 3.7 cm) were recruited. The athletes were monitored across the general preparation phase, which was divided into six weeks of progressive overload training and one week of exponential tapering (lower body multi joints strength exercise, 75-80% 1RM, 6-12 reps). One repetition maximum strength and jump performance for lower extensors were assessed before and after training. The periodized training plan improved squat jump peak force (P < 0.05) but not countermovement jump peak force. In addition, no significant improvements in lower body maximum strength, squat and countermovement jump and anthropometric measures were shown after training. Improvements in lower body concentric force production were observed after the seven weeks of strength training was shown. The greater the force production during swim, the greater propulsion. Although these improvements could potentially result in better swim performance, further research is required to confirm.

The Creative Application of Concentration Grid in Sports Psychology Setting

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Numerous previous studies addressed the effectiveness of Harris and Harris' (1984) concentration grid exercise in enhancing concentration (e.g. Gill, 2000; Greenlees et al., 2006). In this applied study, besides acknowledging the properties in enhancing concentration, the application of the concentration grid exercise emphasized on identifying the athletes’ competency in handling distraction, goal-settings and predicting performance. A total of 12 national athletes were required to predict how long it would take for them to complete an electronic version of the concentration grid exercise (“predicted time”), before assigned to conduct the task electronically on their respective handsets. The completion time (“actual time”) was being recorded. The athlete’s perceived rating of their goal-setting competency was also being obtained. This particular procedure was repeated 5 times throughout the process (set 1 till set 5). During set 2 and set 4, the athletes were exposed to distracting stimuli, i.e. turning off the light for 10 seconds and listening to nursery rhyme. After 5 repetitions, the athletes improved their timing from M=45.42 (SD=7.82) to M=38.50 (SD=6.39) and enhanced their perceived rating of goal-setting competency from M=19.84 (SD=3.15) to M=23.91 (SD=1.50). During both distractions phase (during set 2 and set 4), 75% of the athletes’ actual timing was significantly higher than their predicted timing. Despite without
the occurrence of any distracting stimuli in the 3rd set, 66.67% of the athletes required more time to complete the concentration grid exercise. The promising results of this study may represent a preliminary examination of the relationship of the concentration grid with the athletes’ goal-setting and predicting performance competency. Nevertheless, the impact of this study and the use of concentration grid exercise in applied sport psychology should be treated with some caution due to the lack of support by firm theoretical underpinnings and/or empirical research evidence.

ID#156

The Effects of Wearing Textured Insoles and Clinical Compression Socks on Accuracy in Kicking a Football

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Textured insoles and clinical compression socks can enhance somatosensory feedback and improve perceptual motor performance. The purpose of this study was to observe the effects of wearing textured insoles and clinical compression socks on the organisation of a lower limb interceptive action in developing athletes of different skill levels in association football. This study sought to understand whether wearing textured insoles and clinical compression socks could shape kicking performance through enhancing somatosensory feedback. Six skilled and six less-skilled football players (15.42 ± 0.95 years) performed 20 instep kicks with maximum velocity while attempting to hit a target. This task was performed under four randomly organised insoles and sock conditions: a) Smooth Socks with Smooth Insoles (SSSI); b) Smooth Socks with Textured Insoles (SSTI); c) Clinical Compression Socks with Smooth Insoles (CSSI); and d) Clinical Compression Socks with Textured Insoles (CSTI). Reflective markers were placed on key anatomical locations and the ball to facilitate three-dimensional (3D) movement recording and analysis. Although there was no significant difference in performance accuracy between the four insoles/sock conditions, significant Group*Insoles/Socks interactions were found for variability in key performance variables such as accuracy of kicking performance, joint range of motion, foot velocity and initial ball velocity. Using textured insoles and clinical compression socks in football shoes seemed to enhance perception of information from the lower leg and led to positive trends towards enhanced kicking accuracy among skilled and less skilled participants. With the additional haptic information received from the foot, significant changes in kicking kinematics (e.g., initial ball velocity) were observed, especially in skilled participants. Future investigations on the role of textured insole and clinical compression socks on the supporting leg during kicking could also contribute knowledge on enhanced somatosensory feedback in assisting skill performance in association football.

ID#160

Does Additional Surface on Force Plate Will Influence the Ground Reaction Force?

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In order to create analysis environment that is similar to the real situation, researchers installed sports surface material on the force plate when analyzing kinetics variables. This study compares the vertical ground reaction force (Fz) exerted from walking and running movement that are performed on two different force plate setting. A total of 5 skilled male futsal players were recruited in this study. Each of the players wore an identical futsal shoes and were requested to perform walking and running movement on force plate platform. In the first setting, the players performed the tasks directly in contact with the force plate surface. In the second setting, the players performed the tasks on a force plate surface that was covered with a futsal court surface. The force of the peak heal strike and the peak fore foot strike of all tasks were recorded and analyzed. Independent t-test results indicated that that there is no significant difference between the peak heel strike and peak fore foot
strike in walking and running tasks, with or without the additional futsal court surface on the force plate platform. Further analysis was performed on the collected data on the ratio of the heel-fore foot strike during all tasks. Results shows that there is a significant difference between the ratio of the heel-fore foot strike during walking directly on force plate surface and walking on the force plate with additional surface on it. It is suspected that significant difference on the ratio of the heel-fore foot strike during walking is influenced by deviation of the data. Other than that, no evidence showing the significance of adding additional surface onto the force plate when conducting study related to walking and running. It is suggested to increase the number of trials and to investigate on other type of flooring materials to strengthen the study outcome.

ID#163

Quadriceps Angle Difference in Men Following Anterior Cruciate Ligament Reconstruction (ACLR) Surgery

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Excessive quadriceps angle (Q angle) may increase the risk of anterior cruciate ligament (ACL) injury; and information regarding Q angle differences following ACL reconstruction (ACLR) is limited. Knowledge about this is important among clinician to assess and treat lower limb malalignment. This study aims to determine and compare mean Q angles between men following ACLR and matched healthy men. This was a case control study conducted among 28 males (14 patients, four months following ACLR and 14 healthy individuals, matched according to age, height and body mass index). Patient following ACLR were recruited from an orthopaedic clinic of a university hospital. The measurements of Q angle were performed by a single investigator using conventional goniometry method in supine lying with the quadriceps in relaxed position. Mann-Whitney U test was used to analyse differences in Q angle between the post-ACLR and healthy individuals. No significant difference between groups was observed for age, height and BMI (p> 0.5). The mean Q angle for males post ACLR was 15.85º and 16.21º for ACLR knee and non-injured knee, respectively. Significant difference was found in Q angle of ACLR (Mdn= 15º, IQR= 15º-17.25º) and matched healthy knee (Mdn= 15º, IQR= 12º-15º) with p<0.05. Comparison between non-injured knee of males post ACLR (Mdn= 15.5º, IQR= 13.75º-18.50º) and matched healthy males' contralateral knee (Mdn= 15º, IQR= 14.75º-15º) showed a non-significant result with p=0.35. ACLR patients showed greater Q angle in their injured knee in comparison to healthy. This study suggests that the difference of Q angle may due to differences that exist between individuals. Excessive Q angle of ACLR knee may predispose this individual to ACL re-injury; further studies that look into the effect of Q angle alteration on lower limb asymmetry in post-ACLR patient are needed.

ID#179

Gender Differences in Biomechanical Markers of Anterior Cruciate Ligament Injury Risk during Simulated Soccer Match-play

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In soccer, female players present a higher incidence of non-contact anterior cruciate ligament (ACL) injuries compared to male players. Most injuries occur in the latter stages of match-play, which may be attributed to match related fatigue. This study aimed to compare the biomechanical markers of ACL injury risk between males and females during simulated soccer match-play. Thirty (15 males and 15 females) recreational soccer players completed a 45-min multi-directional overground match-play simulation. Prior to exercise (T0), at half-time (T60) and 15-min post-simulation (T90) participants performed five trials of anticipated 45º side cutting
A two-way mixed design ANOVA was used to identify significant differences between gender and over time, with $\alpha=0.05$. The peak knee abduction moments during weight acceptance were significantly greater in females at all times compared to males ($T_0 = 1.18 \pm 0.66$ vs $0.38 \pm 0.45$ N.m.kg$^{-1}$; $T_{45} = 1.33 \pm 0.77$ vs $0.37 \pm 0.46$ N.m.kg$^{-1}$; $T_{60} = 1.24 \pm 0.74$ vs $0.32 \pm 0.49$ N.m.kg$^{-1}$). In both groups, the knee joint at initial contact was significantly more extended at half-time and 15 min post-simulation (Female, $T_0 = 16.6 \pm 4.9^\circ$, $T_{45} = 14.5 \pm 4.2^\circ$, $T_{60} = 13.7 \pm 4.1^\circ$; Male, $T_0 = 15.2 \pm 5.7^\circ$, $T_{45} = 13.3 \pm 4.8^\circ$, $T_{60} = 13.1 \pm 4.5^\circ$). Greater peak knee abduction moments during side cutting in females may contribute to a higher prevalence of ACL injury compared to males, supporting epidemiological observations. The more extended knee at initial contact after 45-min of simulated match-play could also indicate a greater risk of ACL injury during the latter stage of first halves of match-play, in both genders. Future studies are needed to explore the need for gender specific injury prevention strategies that can offset increased risk of ACL injury due to match-play.

**ID#184**

**Acute Effect of High Intensity Interval Training versus Moderate Intensity Continuous Training on Blood Pressure in Hypertensive Patients**

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Currently, there is an interest in exercise as a treatment against hypertension. Regular exercise resulted post exercise hypotension (PEH). However, the optimal exercise intensity needed to evoke greater PEH is remaining unclear. Therefore, the aim of this study was to compare high intensity interval training (HIIT) and moderate intensity continuous training (MICT) on reduction of systolic blood pressure (SBP) and diastolic blood pressure (DBP) in hypertensive patients. Seven hypertensive patients were randomized into HIIT (n=3) and MICT (n=4). Patients participated in a three months supervised aerobic exercise program for three times a week. Each patient performed thirty-six sessions and exercise volume for each session in average was 250 kcal for both exercise groups. Exercise intensity for HIIT was $\geq$85% heart rate reserved (HRR) and 40 to 60% HRR for MICT. SBP and DBP were monitored pre-exercise and post-exercise after 5 minutes of exercise for each session. There was a significant difference on effect of SBP between HIIT and MICT ($F, 1, 252 = 64.67, p<0.001$). The mean of HIIT showed the highest reduction of SBP from $134.05 \pm 10.46$ mmHg to $116.77 \pm 12.52$ mmHg with percentage of changes was 13% compared to MICT from $126.84 \pm 12.80$ mmHg to $121.54 \pm 12.33$ mmHg with percentage of changes was 4%. There was a significant difference on effect of DBP between HIIT and MICT ($F, 1, 252 = 33.56, p<0.001$). The mean of HIIT showed the highest reduction of DBP from $82.21 \pm 6.53$ mmHg to $77.93 \pm 5.90$ mmHg with percentage of changes was 5% compared to MICT from $82.15 \pm 6.46$ mmHg to $82.71 \pm 6.47$ mmHg with percentage of changes was 1%. The magnitude of reduction during aerobic exercise in SBP and DBP was observed greater after HIIT compared to MICT.

**ID#187**

**Effect of Different Knee Sleeves on Balance and Risk of Fall in Early Knee Osteoarthritis (KOA): Preliminary Results of a Randomized Trial**

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Balance is essential for functional performance. People with KOA display impairment in knee joint proprioception. Knee sleeve is widely used in KOA but understanding of its biomechanical and clinical effects is lacking due to paucity of evidence. This pre-post study aims to compare the short-term effects of different knee sleeves on postural stability and patient-reported outcomes in early symptomatic KOA.16 patients from a
hospital, aged from 30 to 60 years old, fulfilling American College of Rheumatology criteria of stages I-II were recruited for the study. They were randomized to either knee sleeve with or without patella cutout. Repeated outcome measurements were obtained immediately before and immediately after use. Stability index (SI) was measured using Biodex Balance System. Three tests were assigned for each session: Postural Stability Test (PST), Fall Risk Test (FRT) and Athlete Single Leg Test (ASL). Pain, stiffness and difficulty performing daily activities were recorded using WOMAC score. Pre-post scores and between group differences were analyzed using paired t-test and two sample t-test, respectively. 16 subjects (14 Females), age of 48.1 ± 9.0 years with BMI of 28.2 ± 5.7kg/m² have participated in the study. The results revealed that overall stability index (OSI) was improved but no significant difference were detected for static and dynamic PST on both sleeves (Static: p=.699; Dynamic: p=.145) after the immediate usage of both sleeves. For FRT, significant difference was detected for pre-post OSI scores (p=.012) but not for between group difference (p=.835). Pain is reduced without significant (p=.143) in sleeved condition and no significant between group (p=.353). The finding of this study demonstrated that KOA patients wearing knee sleeves could experience increased balance ability in both static and dynamic conditions. Our result justifies the need for a study with larger sample size and longer duration of intervention for better results.

ID#200

An Analysis of Handball Kinematics Parameters in Jump Shot and Stand Shot

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Throwing towards goals was important in handball to increase the scoring rate. In these study, kinematics analysis was used to identify the changes occur in human movement during jump shot and stand shot. This study defines the correlation of ball velocity to kinematic movement in jump shot and stand shot. In addition, this study done to identify the significant different of ball velocity and accuracy between jump shot and stand shot and the significant different of kinematic movement between jump shot and stand shot. A total of 8 (n=8) handball players with ages of 20.6 ± 1.6, height is 1.77m ± 0.5 and weights are 74.6kg ± 13.5 contributes in this study. All players will make 10 shots for each shot (Stand and Jump). The results showed that high correlation between ball velocity to hip internal rotation (r=.93; p=.01), thorax internal rotation (r=.88; p=.01) and humerus internal rotation (r=.90; p=.01) in jump shot. Moreover, it showed that there is a significant correlation between ball velocity to hip internal rotation (r=.99; p=.01) and thorax internal rotation (r=.98; p=.01) in stand shot. There is high correlation in humerus internal rotation (r=.64; p=.08). Negative correlation showed on hip bending angle (r=-.72; p=.04) in stand shot. Furthermore, there is a significant different in ball velocity between jump shot and stand shot (p=.01; p< .05) and no significant different showed in shot accuracy between jump shot and stand shot (p=.19; p> .05). Consequently, Hip rotations between jump shot and stand shot showed significant difference (p=.01; p< .05). Hence, ball velocity showed in stand shot is higher than jump shot because of hip rotations presented a major role of torque occur in increasing ball velocity for jump shot and stand shot. Therefore, the torque occurs from the hip rotation will lead the thorax and humerus to move simultaneously in increasing the ball velocity.

ID#201

An Analysis of Kinematic Parameters in Throwing Ball Speed Between Men and Women in University Handball Players

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The purpose of this study was to investigate the correlation between kinematic parameters on ball speed with different gender. There were 14 athletes participated in this study and was divided into their gender (men=7 & women=7). The results showed strong relationship with highly significant different between ball speed to Shoulder angle (r=.825, p=.001), Trunk flexion (r=.916, p=.001) and distance between leg during throw (r=.926, p=.001) with r>0.7, p<0.05. However, less correlation showed in Elbow angle (r= -.088, p=.766) and less
correlation in Trunk abduction angle (r = .216, p = .459) with r<0.3 and p>0.05. In conclusion, the parameters of elbow angle, shoulder angle, trunk flexion, trunk abduction angle and distance between legs during throw can affect the performance of ball speed. Moreover, the results showed that men performed better than woman. Collectively, there is a relationship between men and women in kinematic parameters (Shoulder angle, Trunk flexion, Distance between leg during throw) to increase the ball speed in throwing.

ID#202

Preparticipation Medical Evaluation of Malaysian Athletes for the 18th ASEAN University Games 2016- Reiterating the Importance of Cardiovascular Screening

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Sudden cardiac death remains the leading cause of death among athletes during sports. Contemporary standards of identifying normal physiological cardiac adaptations and remodeling from regular athletic training based on certain ECG alterations have been clearly defined by the ‘Seattle Criteria’ in 2012. It is notable that the introduction of compulsory preparticipation examination (PPE) in Italy has significantly reduced incidence of sudden cardiac death among competitive athletes. In Malaysia however, awareness amongst athletes on the importance of PPE is still inadequate. This study aims to stratify cardiovascular risk factors of Malaysian university athletes based on clinical examination and screening electrocardiogram (ECG). All 218 Malaysian athletes competing in the 18th ASEAN University Games were requested to attend formal medical PPE prior to the games. Focused cardiovascular, respiratory, musculoskeletal, abdominal examination, and a screening ECG was performed. Participating sport include fencing (13 athletes), shooting (15), football (29), athletics (49), basketball (32), rugby (18), badminton (17), petanque (11), ping pong (15) and silat (19). Preliminary data was organized into an Excel spreadsheet for analysis. Overall, 113 athletes (51.8%) attended and completed the PPE. The highest percentages of athletes screened were from shooting (80%), whilst the lowest were from the basketball team (18.8%). 4 abnormal cases were identified based on screening ECG – 3 were subsequently given clearance to compete after undergoing further investigations whilst 1 was withdrawn from the games due to Wolff-Parkinson-White (WPW) syndrome, of which necessitated more extensive evaluation. A significant proportion of Malaysian athletes are still unaware of the importance of PPE, judging from the poor completion rate. Time constraints and overlapping commitments are probable contributory factors. Implementing compulsory preparticipation screening initiatives alongside health-in-sports education among coaches and junior athletes may allow for early identification of asymptomatic individuals, and thus reduce incidence of sudden cardiac death.

ID#207

Awareness of Stroke Risk Factors and Warning Signs among University Staff: A Cross Sectional Study

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Stroke is largely preventable. Effective stroke prevention depends on the ability to recognize risk factors and early warning signs of stroke. Under the rule ‘time is brain’, morbidity and mortality following a brain attack can be significantly reduced if emergency care is given on time. This depends on how quickly the patient is brought to hospital after the brain attack and this in turn depends on how promptly family members are able to recognise the warning signs of stroke. The aim of this study was to investigate awareness and perception of risk factors and warning signs of stroke among non-medical university staff. Based on the power calculation, 49 participants were recruited in the study using convenient sampling method from 3 campuses (Petaling Jaya, Sungai Long, Setapak) of Universiti Tunku Abdul Rahman. Participants were given self-developed questionnaire on stroke awareness and risk factors and asked to return the forms immediately after answering the questions. Cronbach’s alpha was used to determine the reliability of the questionnaire and its score was .72. 29 respondents (59.18%) were having low awareness of stroke risk factors, 15 respondents (30.61%) had moderate
awareness and 4 respondents (8.16%) had high awareness while there was 1 respondent (2.04%) who had no awareness of stroke risk factors at all. Most of the respondents (36, 73.47%) were having low awareness of stroke warning signs, 11 respondents (22.45%) had moderate awareness. There was 1 respondent (2.04%) each in no awareness and high awareness level category. Generally, the awareness level on stroke risk factors and warning signs are low among Universiti Tunku Abdul Rahman staff indicating that general public could be even less aware of the facts of stroke. Education and awareness campaigns on stroke should be held in order to improve the awareness at all levels.

**ID#214**

**Recovery Nutrition Knowledge among Client of Juz Reward Station (JRS) and Their Satisfaction Towards JRS Service in National Sports Institute of Malaysia**

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Juz Reward Station (JRS) provide recovery drinks for athletes after training at the National Sports Institute of Malaysia. Two factors that will influence the usage of JRS service, Recovery Nutrition Knowledge (RNK) and the satisfaction level among JRS clients (n=250) were being investigated. Subjects were recruited at the JRS by stratified random sampling according to sports category, which are team (n=48), power and endurance (n=64), skill (n=27), racquet (n=77) and combat (n=34) sports. Questionnaire consisting of four satisfactions and ten RNK questions were answered by subject directly at the JRS. RNK was scored by percentage while satisfaction rate by Likert scale range 1 to 5 (satisfaction drop by ascending order). Results of median RNK score was 70.0 (60.0-90.0%). Female subjects score significantly (p<0.01) higher RNK (80.0%; 70.0-90.0%) than male subjects (70.0%; 60.0-90.0%). There was significant but weak correlation between RNK and age \([r=0.174, p<0.01]\). RNK score by sport categories were: team sports (70.0%; 60.0-87.5%), skill sports (80.0%; 70.0-80.0%), combat sports (70.0%;50.0-90.0%), racquet sports (80.0%; 60.0-90.0%), power and endurance sports (80%;70-90%). However, there was no significant RNK score difference between sports categories. The overall client satisfaction levels of JRS service for juice was 2(1.7-2.7), staffs 1.2(1-2) and surroundings 1(1-2) since receiving JRS service. Median RNK score for all sport categories were good except for team and combat sports due to the higher contribution of male subjects. RNK score for combat sports range from lowest to highest among all, which required level specific of recovery nutrition education. Subjects were most satisfied towards surrounding area, satisfied to the juice and staff service. In conclusion, RNK of male especially from team and combat sports need to be given attention in order for them to better utilize the service from JRS. Subjects have no satisfaction issue towards JRS service.

**ID#222**

**Quantifying Internal Load during Competitive Badminton Matches: A Comparison of Subjective and Objective Methods**

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Session ratings of perceived exertion (sRPE) has been postulated to be a valid tool to assess internal load in a variety of sports, during both training and competition, as well as during different types of training. However, to date, the validity of this sRPE method has not been established in the sport of badminton, especially during competitive elite level matches. As such, this study was aimed to quantify the competitive badminton matches load (ML) and to examine the relationship between sRPE method and objective heart-rate (HR)-based method (Edwards' TL) during competitive badminton matches. Twenty eight (13 males, 15 females) elite Malaysian national badminton athletes were recruited to participate in this study. Data were collected during all matches (n=108) competed by the participants during one of the major tournaments. HR was recorded continuously during the matches, while sRPE was collected within 30 minutes upon completion of these matches. ML was
calculated using the sRPE method (Foster et al., 2001) and involved multiplying the match duration by the associated RPE. Edwards’ TL was set as a criterion measure where heart rate was divided by relative coefficient of each zone. Pearson product moment correlation coefficient was used to evaluate the correlation between two methods for assessing ML. The session RPE (193.2 ± 98.2 Arbitrary Unit) and Edwards’ TL (88.7 ± 40.0 Arbitrary Unit) was significant correlated (r = 0.81, p< 0.01). Our findings suggest that the sRPE method provides a valid yet simple and practical option for coaches to quantify ML during competitive badminton matches.

ID#227

Development of a Lifelike Prosthesis Terminal Device with Sensory Feedback

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The primary purpose of an upper limb prosthetic is to mimic both the appearance and function of the normal hand. Most of upper limb amputees in Malaysia are using either body powered or cosmetic hand prosthesis. Body powered and cosmetic hand sacrifice either the natural appearance or functionality. Cosmetic hand are passive which has no function meanwhile body powered prosthesis are able to do pick and drop activities by straining their muscle to operate the hook but it does not look like a real hand. Recent years, developer working on the development of myoelectric prosthesis that utilises electromyography (EMG) signal to serve both purpose of artificial limb equally without sacrificing appearance for functionality. Unfortunately, this prosthesis also has its drawbacks. We can send signal to the prosthesis terminal device by contracting remaining muscle on the residual limb, but the prosthesis does not send the signal back. Therefore without noticing it, the user can exert too much force and accidently can squeeze an object. In this project we would like to develop a lifelike upper limb terminal device with sensory feedback that are capable to control amount of grasping force while holding object. This newly develop prosthesis consist of electric terminal device controlled by electromyography signal with the use of electrode and microcontroller. Active muscle on amputee residual limb help to activate the terminal device. Force sensor that detects the force given by the terminal device to the object are incorporates into the system. By having this kind of prosthetic terminal device, user are able to control delicate and fragile object without having fear of damaging them as the sensor at the finger pad will inform the controller to stop pinching when the force applied exceed the programmed threshold value.

ID#232

Smoking Habit among Malaysian Adolescent Athletes

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Cigarette smoking has been reported to affect athletes’ physical fitness and decrease their performance. The purpose of the study was to examine the percentage of cigarette smoking among Malaysian athletes using breath carbon monoxide (BCO) assessment, and to determine the contributing factors and their level of awareness on adverse effect of smoking using a self-report questionnaire. Assessments were done during a national sports competition involving 654 athletes of all events. Athletes provided two breath samples using the piCO³ meter with 2 minute interval in between samples. The cut-off point to identify smoking status was set at >6 ppm. Athletes identified as smoker were given a questionnaire for ‘Smokers’, which was a 20-item survey that contained details on their demographic background and smoking habit. Data analysis was done using SPSS 21. Prevalence of cigarette smoking in adolescent athletes was 9.33% (n=61), and the starting age is 14.82±2.11 years. BCO reading for smoker athletes was 9.67 ppm. Peers, family members and coaches were reported as the highest contributing factors to athletes’ smoking habit. Athletes acknowledged cigarette smoking as harmful to their health. Most of smoker athletes wanted to quit smoking and ‘Wasting money’ was reported as the highest concern for this cause. The idea that participating in sports reduces high-risk behaviour such as smoking is not practical as mixed results has been reported regarding this notion. Adolescent athletes regularly spend most of their time at training venue after school hours hence; the finding of coaches as one of
the determinants for athletes’ smoking habit is predictable. Interestingly, athletes did not perceive health as a priority for them to avoid smoking. Future studies should include intervention that targets both smokers and their determinants, utilising a holistic approach to increase the probability of successful smoking cessation and long-term abstinence.

ID#236

Biochemical Response of World-class Wushu Athletes during A Pre-competition Training Phase: A Case Study

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Biochemical monitoring of training in athletes is a means of evaluating the effectiveness of prescribed training stimulus for desirable physiological adaptation. This case study reports the biochemical changes of elite wushu athletes during a 4-week competition phase leading up to world championship. Two male (mean±SD age 22.5±3.5 years) and two female (23.5±0.7 years) national elite wushu athletes, specialized in Nan Quan and Taiji Quan, participated in this study. Fasted blood sample was obtained after a rest day in the morning on three separate occasions: Week-1 (the beginning of an intensified training), Week-2 (after a week of intensified training), and Week-4 (after another week of intensified training and a further week of moderate intensity training). Frequency and intensity of training were similar for all athletes. Blood samples were analyzed for hemoglobin and serum concentration of creatine kinase, testosterone (T), cortisol (C), and T/C ratio. We observed a higher (P<0.05) hemoglobin level in Nan Quan athletes when compared to their Taiji Quan counterparts, regardless of gender. There were no significant changes in serum creatine kinase throughout the course of study. Male athletes displayed a higher (P<0.01) serum testosterone level when compared to their female counterpart, regardless of the events. Hence, T/C ratio in male athletes was higher (P<0.01) than female athletes during this training phase. Serum cortisol level increased at Week-2 in all but one athlete, whereas serum cortisol level was lower in male than female athletes. Serum cortisol level returned to baseline level at Week-4 in all athletes. An increased serum cortisol level could be an indication of an increase in anabolic/androgenic activity in the athlete in response to the training stimulus. Tracking the biochemical changes in elite athletes could be of value to the coaches in planning the training and preparation for the major competitions.

ID#241

The Effect of Acute Administration of Hydrogen-rich Water on Incremental Treadmill Running Performance

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Recent evidence suggested that consumption of hydrogen-rich water could be beneficial in mitigating exercise-induced metabolic acidosis and muscular fatigue. However, we are not aware of any experimental study that investigates the ergogenic effect of hydrogen-rich water on endurance exercise performance. We hypothesized that oral administration of hydrogen-rich water would enhance running performance during submaximal treadmill running and maximal incremental running to exhaustion in well-trained runners. Using a randomized, double-blind, crossover design, eleven male runners/triathletes (34.7±4.5 years old) ingested either 280 mL of hydrogen-rich water or a placebo, each before completing six four-minute running at submaximal speeds and maximal incremental running test. The submaximal run started at 6 km.h⁻¹ and 0% grade, with the treadmill speed increased by 2 km.h⁻¹ every four minutes. After ~15 minutes of recovery, subjects performed maximal incremental running to exhaustion at 12 km.h⁻¹ and 0% grade, with the grade increased by 2% every two minutes. Oxygen uptake, heart rate, and rating of perceived exertion (RPE) were recorded; and blood samples
were collected at the end of each submaximal stage, immediately and 5 minutes post maximal incremental test. Cardiorespiratory responses, RPE, blood gas indices (pH, pCO₂, pO₂, and HCO₃⁻), blood lactate and glucose were not significantly different at each submaximal running speed between the hydrogen-rich water and placebo trials. We also observed no statistical difference in VO₂max (56.1±4.2 vs. 56.4±4.5 mL·kg⁻¹·min⁻¹), HRmax (185±8 vs. 185±8 beat·min⁻¹), RPE (19±1 vs. 19±1) and running time to exhaustion (578±110 vs. 586±103 s) in the subjects between the trials. Our data suggest that a single dose of 280-mL hydrogen-rich water consumed before the endurance events of 15 to 30 minutes might not be sufficiently ergogenic in well-trained athletes. Further studies are warranted to investigate the effect of long-term consumption of hydrogen-rich water on exercise performance.

ID#244

Acute Effect of Plyometric Based Postactivation Potentiation on Sprint Performance in Recreationally Trained Soccer Players

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Postactivation potentiation (PAP) is related with acute and temporary explosive (sprint, jumps) performance enhancement which commonly occurs after heavy resistance exercises, which may not be feasible to conduct in field setting. Recently, plyometric based exercises that induces PAP (P-PAP) have been shown to improve subsequent performance in elite soccer players. However, whether similar improvement can be seen in recreationally trained soccer players remain unknown. The purpose of this study was to investigate the acute effect of P-PAP exposure on 10-m sprint performance in recreationally trained soccer players. In a repeated measure study design, twenty (n = 20) male recreational soccer players performed two 10-m sprints at baseline and at 1, 3 and 5 min after P-PAP exercise. All participants performed 3 sets of 10 repetitions ankle hops, 3 sets of 5 repetitions hurdle hops and 5 repetitions of 50-cm drop jumps, as P-PAP exercise with 30 seconds rest interval between sets. A one-way repeated measure ANOVA with sprint times as independent variables was used to identify significant differences over time, with α=0.05. No significant effect was observed after P-PAP over time (Pre = 1.521 ± 0.088 seconds, 1 min = 1.514 ± 0.082 seconds, 3 min = 1.503 ± 0.085 seconds, 5 min = 1.512 ± 0.084 seconds). Although improvement in sprint performance after an acute P-PAP exposure was found in elite soccer players, our findings suggest that P-PAP does not contribute to a positive 10-m sprint performance in recreationally trained players. The effectiveness of this acute intervention towards subsequent sprint performance in recreationally trained players therefore remains inconclusive and deserves further investigation. To evaluate potential sprint performance enhancement, future studies are needed to explore the effect of a long term P-PAP exposure and combine plyometric and heavy weight training exercise.

ID#247

Effectiveness of Mindfulness-Acceptance-Commitment Approach among Table Tennis Sub-elite Athletes

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Mindfulness has been associated with success in sport and consists of a number of skills which can be learned. This study explored mindfulness by investigating the Mindfulness-Acceptance-Commitment (MAC) approach on mindfulness awareness and stress levels of Malaysian table tennis sub-elite athletes. The MAC approach has been developed to improve mindfulness awareness as well as reduce stress levels among athletes, both of which may further support traditional psychological skills training on sport performance. A total of seven national table-tennis sub-elite athletes participated in this study. Participants completed two inventories, namely, the Mindful Attention Awareness Scale (MAAS) and Perceived Stress Scale (PSS), during the baseline data collection. Subsequently, participants attended six weeks of intervention training (one session per week).
incorporating the MAC approach. Throughout the intervention weeks and during post-intervention, participants completed the MAAS and PSS. In order to determine the effectiveness of intervention, graphical analysis was performed to aid the visual analysis. The descriptive results showed that there were improvements in mindfulness awareness ranging from the lowest (score-2) to the highest (score-13), while PSS showed trivial reduction (lowest 1 and highest 2) on athletes’ stress level after two intervention sessions of the MAC program. In conclusion, it was suggested that the MAC program can improve mindfulness awareness and reduce the stress levels of sub-elite athletes as early as after the second intervention session.

Effects of Therapeutic Eccentric Exercise on Pain and Grip Strength in Persons with Lateral Epicondylitis: A Randomized Controlled Trial

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Lateral epicondylitis produces a heavy burden of workdays lost and results in residual impairments. Though different treatment methods for lateral epicondylitis are available, majority of the studies reported inconsistent results and no therapeutic modality seems to stand out or alter the natural history of the disease. Eccentric exercise program increases the strength of the tendon by gradually overloading it to promote an increase in tensile strength. The purpose of this study was to investigate the effects of therapeutic eccentric exercises on pain and grip strength in subjects diagnosed with lateral epicondylitis. Twenty-four subjects (11 men and 13 women) with lateral epicondylitis were enrolled, randomized, and subdivided into 2 groups - an experimental group of 12 participants (55 ± 2.12 years) and a control group of 12 participants with lateral epicondylitis (53 ± 2.27 years). They were evaluated at baseline and after 4 weeks of treatment. Control group received standard physical therapy and participants of the experimental group were subjected to therapeutic eccentric exercises along with standard physical therapy. Outcome measures included Visual Analogue Scale and Grip Strength. By the end of the trial period, the experimental group showed a significant improvement in scores of Visual Analogue Scale (t = 9.9469) and the grip strength (t=26.90). The results indicated that therapeutic eccentric exercise is more effective in reducing pain and improving grip strength in persons with lateral epicondylitis than standard physical therapy. The findings suggest that therapeutic eccentric exercise should be considered in the management of persons with lateral epicondylitis.

Case Study on Peroneus Longus Myomuscle Response and changes in Walking Gait for Sports persons with Repeated Functional Ankle Instability

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The athletes who have encountered repeated functional ankle instability exhibits excessive foot inversion during the various phases of gait than non-injured ankle. In gait, from heel strike to toe off the inversion ankle movement of foot is opposed or controlled by eccentric function of peroneus muscle that maintains the ankle stability. As such, the purpose of the study was to investigate the response of peroneus longus muscle activation pattern during gait cycle by applying neurodynamic technique. Two cases with repeated functional ankle instability were tested by using (Noraxon Myo-Muscle) surface electromyography (sEMG) during the gait on an Instrumented myo-pressure treadmill. The injured and non-injured leg gait parameters of the peroneus longus muscle sEMG were measured during initial contact (IC), mid-stance (MS) and toe off (TO) phases of gait within one week of the occurrence of repeated ankle injury (pre-test) and after four weeks of rehabilitation (post-test). The mean value of peroneus longus muscle activation (µV) of pre and post intervention shows decrease in sEMG response of injured leg IC = 23.5 & 17.5, MS = 43.5 & 20 and TO = 36.5 & 23, and in non-injured leg IC
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Whereas, increase in spatial gait parameters of injured leg stance phase = 71.3 & 75.5%, loading response =20.5 & 22.5%, step length = 36 & 38.5cm compared to non-injured stance phase = 70.35 & 70.5%, loading response =21.35 & 24.5%, step length = 35& 39cm and also changes in the force parameters of injured leg $540.5$ & $576.5N$ compare to non-injured side $528.5$ & $555N$ after the rehabilitation. In repeated ankle injured athletes, muscle latency response were longer in initial contact, mid-stance and toe off phase compared with non-injured ankle. The muscle response shown in injured ankle, delays the peroneal reaction time to control ankle stability during the gait. The four week post intervention measurement exhibited significant shorter muscle response, and increase in the percentage of gait parameters; and that ascertains the effect of systematic and controlled neuro dynamic rehabilitation programme for repeated functional ankle instability.

ID#254

**Body Composition of Malaysian National Women Hockey Players: A Comparison Between Different Playing Positions**

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Athletes playing in a position with greater demand in physical fitness tend to have lower body weights and fat percentages. This aim of this study was to identify differences in body composition between playing positions among women national hockey players. An anthropometric body composition assessment was carried out on 48 national (29 senior, 19 development) women hockey players (outfielders: 16 forwards, 10 midfielders, 14 defenders, 7 goalkeepers) aged 22.6±3.9 years old. Weight to 0.1kg and sum of seven skinfolds (SUM7) were assessed by ISAK level 1 certified anthropometrists based on the ISAK protocol. The average weight and SUM7 of the players were 55.6±6.8kg and 96.9±35.0mm respectively. Significant differences (p<0.05) in weight were found between the goalkeeper (63.8±9.1kg) and all outfielders (forwards, 53.2±5.6kg; midfielders, 53.2±4.8kg; defenders, 56.1±5.1kg). No significant differences in weight were seen between the outfielders. Goalkeepers (124.3±45.7mm) were also found to have a significantly higher (p<0.05) SUM7 than the forwards (81.7±24.4mm). No significant differences in SUM7 were seen between the goalkeeper and the other positions (midfielders 93.8±30.8mm, defenders 102.4±36.0mm) or between outfielders. The goalkeepers and defenders showed a trend of higher weight and SUM7 compared to the other outfielders. Goalkeepers are heaviest and have the highest SUM7, because they undergo different training that is less focused on aerobic and anaerobic systems compared to the outfielders. However, SUM7 and weight between the outfielders were found to be insignificant. To conclude, women national hockey players only need to be grouped into goalkeepers and outfielders in terms of playing position for body composition target setting and other nutritional services.

ID#301

**The Effectiveness of Pedometer-Based Walking Intervention In Community-Dwelling Adults**

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Recent evidence have shown that pedometers are an effective motivational tool to promote physical activity. The aim of this study was to study the effectiveness of a 10-week, pedometer-based walking intervention in increasing knowledge, attitude and practice, and improving health-related outcomes in a sample of suburban community-dwelling adults not meeting current physical activity recommendations. A convenience sample of 34 subjects (46 ± 8 years, 21-60 years) were recruited. Subjects were instructed to achieve 10,000 steps daily or at least on some days of the week for 10 weeks, in addition to attending health talks and weekly exercise classes. Physical activity and sitting time using International Physical Activity Questionnaire (IPAQ-S), knowledge, attitude and practice (KAP) on physical activity using a validated questionnaire, as well as body weight, blood pressure, fasting glucose and body mass index (BMI) were evaluated at baseline and following
the 10-week intervention. Comparison of pre- and post-intervention findings was used to assess the effectiveness of the intervention. The average daily steps recorded during the intervention was 9350 ± 2375 steps per/day. Mean daily steps increased from 8478 ± 2635 to 10,326 ± 3437 steps per/day in Week 1 and Week 10 respectively (p=0.003). The intervention led to increases in KAP scores compared to baseline (p<0.001). Subjects self-reportedly spent more time in heavy (p=0.002) and moderate (p=0.001) physical activities following the intervention compared to baseline. There was also a 21% reduction in the time spent in sitting post-intervention. On average, there was a reduction of 0.8kg in body weight (p=0.010), as well as improvements in BMI (p=0.008), fasting blood glucose (p=0.029) and systolic blood pressure (p=0.008) compared to baseline. The findings of this study demonstrated that a goal-driven, pedometer-based walking intervention for 10-weeks was effective in increasing physical activity and improving health outcomes in suburban community individuals.

ID#303

Visual Function Among Junior Athletes in Malaysia

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Athletes who are able to process visual information in a shorter time will gain competitive advantage against their opponents, however, no specific visual function assessment has been conducted in Malaysia as a routine. It is crucial for athletes to have an effective visual system to maintain a clear and comfortable vision; for optimizing sports performance among athletes. The basic components in vision for athletes to perform effectively and comfortably are visual acuity, accommodation function, vergence function, and oculomotor skills. Studies have proved that athletic performance may decline with reduced visual function. Therefore, this study aims to investigate the visual function of junior athletes in Malaysia. A total of 121 junior athletes (57 males, 64 females), aged between 13 to 17 years old participated in the study. All visual function assessments were conducted according to the standard optometric practice. Means for monocular visual acuity (VA) of the right eye was 0.04 ± 0.06 logMAR, left eye VA 0.04 ± 0.06 logMAR, and binocular VA 0.02 ± 0.06 logMAR. Potential accommodative weakness was found in 26.45% of the junior athletes; with 22.31% had reduced amplitude of accommodation, 7.44% had accommodation insufficiency and reduced positive relative accommodation respectively, and 3.31% had ill-sustained accommodation. Reduced fusional vergence was detected in 88.43% of the junior athletes, where 52.89% esophoria, 47.93% vergence infacility, 26.45% convergence excess, and 11.57% with fusional vergence dysfunctions. Majority of the junior athletes examined face visual function anomalies that are unresolved. Therefore, early detection of visual function anomalies, as well as management, could warrant a good sporting performance among junior athletes.

ID#304

The Influence of Compression Stocking on Jumping Performance

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A compression stocking is a garment that is used to enhance the performance of athlete. However, evidence of compression stocking effectiveness are mixed, with some researchers suggests that the stocking can enhance performance while others dispute the finding. This research investigated the effect of wearing customized compression stocking on jumping performance. Fourteen active and healthy male and female subjects (7 male and 7 female) were selected for the study. They were scanned by using a three dimensional [TC]2 NX12 body scanner. Then, a compression stocking was constructed using computational method. The stocking were designed to exert 37.5 mmHg at the ankle and gradually reduce to 22 mmHg at knee. In experiments, kinematics
data were collected using 5 Oqus cameras sampling at 120 Hz. 15 numbers of passive-reflective markers were placed on subject’s both lower limbs. Subjects were asked to jump three times with and without the compression stockings. Three output parameters were analysed to understand the effect of wearing compression stockings on athlete’s jumping performances. They are knee powers, geometric entropy and ratio of maximum vertical over maximum travelled jumping distance. The results showed that there is no significant differences between wearing and not wearing compression stocking (p<0.05) on knee power for male athletes. However, for the female athlete, there is a significant difference between wearing and not wearing compression stocking (p<0.05) on knee power. In geometric entropy and ratio of maximum vertical over maximum travelled jumping distance, there is a difference value between male and female. Nevertheless, there is no significant different (p<0.05) between wearing and not wearing compression stocking on knee power for male athlete. Thus, consequently there is less difference between wearing and not wearing compression stocking on knee power of male athlete. However, for female athlete, since by wearing the compression stocking will reduce their muscle movement, thus it will increase their knee power. Perhaps it also relate to the perception of the athlete since their feel more comfortable to jump when their muscle are grip.

ID#305

Development of FPGA Based Intelligent Instrumented Shoe Insole Measurement System

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An abnormal gait caused by stroke or other pathological reasons can greatly impact the life of an individual. Being able to measure and analyze the gait is often critical for rehabilitation. Motion analysis labs and many current methods of gait analysis are expensive and inaccessible to most individuals. The low-cost, wearable, and user friendly insole based gait analysis system which can calculate the pressure of human feet or kinetic measurement of gait was made by using the low-cost Force Sensing Resistor (FSR). This study described the system design and its pressure calibration process of one insole. The system was created by using the implementation of Field Programmable Gate Array (FPGA) and Force Sensing Resistor (FSR) sensor. Field Programmable Gate Array (FPGA) was used as a main element in this system as to continue the conversion by using the Verilog HDL code. FSR sensor calibration process was done by using weighted metal ranging from 20g to 1020g. Data from the tests were analyzed to determine the pressure. The results showed that there was increasing pressure when the weight or force was given on the insole. FSR sensor would start to detect the pressure when a weight more than 100g was given onto the sensing area. Based on plotted data, it was discovered that the pressure versus mass was a non-linear component or logarithmic trend. Overall, the system was completely tested and final result gained by pressing the active area of FSR sensor. The process of calibration for the FSR sensor was also done to determine the linearity of the sensor. FSR will only measure weight at the range of 100g to 10kg, otherwise it would not detect the pressure. By calibrating the FSR sensor, the system is ready to measure the pressure forcing on the insole.
ABSTRACTS

(FOR ‘FULL PAPER’ SUBMISSION TYPE)

All the abstracts in this section are abstracts from full paper submissions which will be published as part of the IFMBE proceedings series by Springer (http://www.springer.com/series/7403) if it is accepted in a peer reviewing process. The IFMBE Proceedings series is an official publication of the International Federation for Medical and Biological Engineering. IFMBE Proceedings are indexed by Google scholar, Thomson Reuters and Scopus index many volumes in their ISI Proceedings and the Scopus database, respectively.
DietScore™: Sports Nutrition-based Mobile Application for Athletes and Active Individuals

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Sports nutrition has been proven to contribute directly to athletes' performance. To help athletes improve their eating habits, sports nutritionists and dietitians need accurate information and feedback. In this paper, the framework of a sports nutrition app known as DietScore™ provides a reliable solution. Development of the tool was done by customizing energy requirement of athletes, types, duration and intensity of training and specific macro- and micro-nutrient needs based on local foods. Additionally, athletes would be able to plan their menu for the following day, which improves their knowledge on daily food intake. These daily activity data are stored in local database in offline mode and later synchronized by mobile app, which also serves as a Knowledge Management System on Sports Nutrition. DietScore™ could expand into public domain to increase its social and economic impact. It provides a useful and effective platform, which acts as virtual sports nutrition counselor for both athletes and sports nutritionists/dietitians. With the application of local foods content, DietScore™ will be unique as the first sports nutrition utility tool in the market.

Keywords — sports nutrition, athlete, mobile app.

Physical and Physiological Attributes Towards Precision Sports Performance

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Physical and physiological attributes have received limited attention in predicting precision sport performance. However, there were few studies showed correlation between both attributes and performance in precision sports. Thus, greater physical and physiological characteristics might contribute the success in precision sport. 26 athletes (10 males and 16 females) from archery, shooting, and tenpin bowling was recruited. The measured variables were body composition, muscular strength, flexibility, speed, agility, power, and cardiovascular endurance. The multivariate data analysis was performed using Unscrambler® X software. The Principal Component Analysis (PCA) showed bowlers were physical and physiological different from archers and shooters. For male athletes, two factors were extracted involving lower body attributes and anthropometry. As for female athletes, anti-correlated variables were found in one of the two extracted factors. The prediction modes were developed by the partial least squares (PLS) regression. The value obtained showed deviation for most references of performance score. In conclusion, each sport has its own explainable physical and physiological attributes as compared to other sports. The physical and physiological attributes could predict performance in precision sports athletes by using multivariate analysis. However, further refinement of the model is needed to predict it more precise.

Keywords — archery, shooting, tenpin bowling, sports performance, multivariate data analysis
**The Effects of Rest Interval on Electromyographic Signal on Upper Limb Muscle during Contraction**

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In this paper, the Electromyographic (EMG) signal was investigated on the Biceps Brachii muscle during dynamic contraction with two different rest intervals between trials. The EMG signal was recorded from 10 healthy right arm-dominant young subjects during load lifting task with a standard 3-kg dumbbell for 10 seconds. Root mean square (RMS) has been used to identify the muscle function. The resting period was 2- and 5-minutes between each trial. The statistical analysis techniques included in the study were i) linear regression to examine the relationship between the EMG amplitude and the endurance time, ii) repeated measures ANOVA to assess differences among the different trials and iii) the coefficient of variation (CoV) to investigate the steadiness of the EMG activation. Results show that EMG signal is more active after 5 minutes rest period compare to 2-minutes gap. On the other hand, EMG signals were steady during 2-minutes rest (7.59%) compare to 5-minutes resting interval (16.14%). Results suggest that moderate interval between each trial is better to identify the muscle activity compare to a very short interval. The findings of this study can be used to improve the current understanding of the mechanics and muscle functions of the upper limb muscle of individuals during contraction which may prevent from muscle fatigue.

**Keywords**— EMG, RMS, rest interval, muscle, contraction.

**Comparison between Stair Climbing and 1 Mile Walking in Relation to Cardiorespiratory Fitness among Sedentary Adults**

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The worldwide epidemic of physical inactivity is rising significantly and the main cause is sedentary lifestyle. Purpose of this study was to evaluate the effectiveness of stair climbing and 1 mile walking in relation to cardiorespiratory response and to estimate the VO₂max and Physical Fitness Index (PFI). PAR-Q and IPAQ were used to assess the level of physical activity and sedentary status of participants. 37 participants were initially assessed for their maximal oxygen uptake (VO₂ max) and physical fitness index (PFI) using modified Harvard step test after randomly assigning them into 3 groups. Only 34 participants completed the study; 12 Full stair climbing, 11 half stair climbing and 11 one mile walking. Full stair climbing group ascended 7 stories of 154 steps, each step 17.5cm in height (vertical distance =27m), whereas half stair climbing group ascended 3.5 story of 77 steps (vertical distance =13.5m) and 1 mile walk group walked for 1 mile on treadmill without any inclination. VO₂max, PFI, heart rate recovery and rate of perceived exertion were measured at baseline and at the end of week 4. Repeated measures 2 way ANOVA was used to find the differences between 3 groups. Full stair climbing group showed increase in VO₂ max and 1 mile walking group exhibited improvement in HRR. 1 mile walking group and full stair climbing groups exhibited improvement in cardiorespiratory fitness. Full stair climbing group took less than 2 minutes and 1 mile walking group took 11 to 14 minutes to complete the exercise, hence one can opt to perform either stair climbing or walking depending on their preference to improve cardiorespiratory fitness.

**Keywords:** VO₂ max, physical fitness index, heart rate recovery, stair climbing, walk
Moderation of Attitude in the Relationship Between Participation in Competitive Sports and Academic Performance of Undergraduate Student Athletes in Saudi Arabia

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This study aims to investigate how the attitude of undergraduate student-athletes moderates the relationship between competitive sports participation (CSP) and academic performance (AP). In this study, a type of attitudes was taken into consideration namely academic performance attitude (APT). A total of 102 undergraduate student athletes from 3 academic institutions in the Eastern Region of Kingdom of Saudi Arabia (KSA) were selected as subjects. Instruments used were Survey of Study Habits & Attitudes (SSHA) by Brown and Holtzman (1954) to obtain the data on APT. The instrument was back-translated to the Arabic language in order to improve its comprehensiveness. Data on sports participation and academic performance were obtained by directly enquire the participants about their grade point average (GPA) and the frequency of their CSP in a self-developed questionnaire. The results showed that APT significantly alters the effect of CSP on AP, because the β value of the effect of CSP on AP was greater than the β value of the effect of CSP and APT on AP. Because β value shows the strength of the influence, it can be concluded that the actual strength of the CSP is not as strong as when it is combined with APT. In other words, APT moderates the influence of CSP on AP. The moderation effect occurs due to the regulation of Saudi Universities Sports Federation (SUSF) that only student-athletes with high academic scores can participate in competitive sports. Without such a regulation, APT might not be correlated to the AP because some students might pay more focus on CSP and less on AP. It can be concluded that the regulation helped student-athletes in KSA to improve their AP without sacrificing their CSP and vice versa.

Keywords— Attitude, Competitive Sports, Sports Participation, academic performance

The Instantaneous Effects of Generic Foot Arch Support Insoles on Centre of Foot Pressure in Various Modes of Static Balance

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The purpose of this study was to investigate the effects of generic foot arch support insoles on the center of foot pressure in Double-Legs-Stance, Single-Right-Leg-Stance, Single-Left-Leg-Stance, Right-Tandem-Stance and Left-Tandem-Stance. Ten healthy adults (male=5, female=5) were recruited in this study. Subjects were tested with no insole (Insole-A) and three different design of insoles (Insole-B, C and D) in each type of standing mode. A pressure mapping sensor (25Hz) with 25 sensel per square inch spatial resolution and pressure measurement system software were used to collect the center of pressure movements. A non-parametric Friedman test with Wilcoxon signed-ranks post-hoc test were used to analyze the significant effects of the insole. There was significant differences in anteroposterior travelled distance across insole support types, \( \chi^2(3, N=10) = 9.120, p < 0.05 \) for Double-Leg-Stance. However post-hoc test indicates that no significant difference in between any paired of insoles. Significant differences were found in anteroposterior peak velocity across insole support types for Single-Right-Leg-Stance, \( \chi^2(3, N=10) = 8.567, p < 0.05 \). Post-hoc test indicates that there is a significant difference in anteroposterior peak velocity for the Insole-C and Insole-B, \( z = -2.550, p < 0.05 \), with lower peak velocity of center of pressure shift in Insole-C. There were no significant differences found in Single-Left-Leg-Stance and Right-Tandem-Stance across all types of insole support. The results of the Friedman test indicate that no significant differences exist in Right-Tandem-Stance across all types of insole sup-port. There were significant differences in mediolateral range, mediolateral travelled distance and mediolateral position standard deviation across insole support types with chi square, \( \chi^2(3, N=10) = 9.0, \chi^2(3, N=10) = 9.12, \chi^2(3, N=10) = 9.567 \).
301x50 $26 = 8.04, p < 0.05$ respectively for Left-Tandem-Stance. This study concludes that the generic foot arch support insoles have no significant positive instantaneous effects on center of pressure measurement.

**Keywords**— balance, body sway, centre of pressure, insole, stability.

**ID#177**

**Hadamard Transform Based PAPR Reduction for Telemedicine Applications Utilized for Epilepsy Classification**

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A set of long term associated neurological disorders which is characterized by seizures is epilepsy. Because of the abnormal electrical activities occurring in the brain, the occurrence of epileptic seizures become prominent. In epilepsy research, convulsions too are sometimes related to epileptic seizures. So to investigate and understand the brain’s electrical activity, recording the scalp is important and that can be done with the help of Electroencephalograph (EEG). The time consumption with the long term measurements is enormous and so reviewing it becomes quite a hectic task. So the need for an automatic detection of seizures is required. As the long term measurements produce a huge amount of data, it would be pretty difficult to process and so with the help of Independent Component Analysis (ICA), the dimensions of the data are reduced. Then it is transmitted via a Space Time Block Coded Multiple Input Single Output (2 x 1) Orthogonal Frequency Division Multiplexing (STBC MISO-OFDM) System. As the system has a high Peak to Average Power Ratio (PAPR), it is reduced with the help of Hadamard Based PAPR Reduction and then at the receiver the Bit Error Rate (BER) is computed. Also at the receiver side, the classifier employed is Linear Kernel Support Vector Machines (L-SVM). Finally the epilepsy risk level classification from EEG Signals is measured in terms in Specificity, Sensitivity, Accuracy, Time Delay and Quality Values.

**Keywords**— EEG, epilepsy, PAPR, STBC MISO-OFDM, L-SV

**ID#178**

**Artificial Intelligence Techniques used for Wheeze Sounds Analysis: Review**

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Wheezes are acoustic, adventitious, continues and high pitch pulmonary sounds produce due to airway obstruction, these sounds mostly exist in pneumonia and asthma patients. Artificial intelligence techniques have been extensively used for wheeze sound analysis to diagnose patient. The available literature has not yet been reviewed. In this article most recent and relevant 12 studies, from different databases related to artificial inelegance techniques for wheeze detection has been selected for detailed review. It has been noticed that now trend is going to increase in this area, for personal assistance and continues monitoring of patient health. The literature reveals that 1) wheezes signals have enough information for the classification of patients according to disease severity level and type of disease, 2) significant work is required for identification of severity level of airway obstruction and pathology differentiation.

**Keywords**— wheeze, wheeze sounds, respiratory sounds, airway obstruction, wheeze analysis
PCA Based Selective Mapping Technique for Reduced PAPR Implemented for Distributed Wireless Patient Monitoring Epilepsy Classification System

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To assess the neurological conditions, non-invasive techniques for recording activities of the brain are used widely. The recording of the brain activity helps us to understand the brain functions properly. The scalp Electroencephalography (EEG) recordings act as a fundamental tool to trace the pathological brain activity and so it is used widely to treat the patients affected with epilepsy. Since the recordings of the EEG are quite long and hectic to process, Linear Graph Embedding (LGE) is used to reduce the dimensions of the EEG data in this paper. It is then transmitted to the Space Time Trellis Coded Multiple Input Multiple Output Orthogonal Frequency Division Multiplexing (STTC MIMO OFDM) System. Since the system suffers from a high PAPR, Principal Component Analysis Based Selective Mapping Technique (PCA-SLM) is used to reduce the PAPR. At the receiver the Gaussian Kernel Based Support Vector Machine (GK-SVM) is employed to act as a post classifier to classify the epilepsy risk levels from EEG signals. Along with the classification results, the Bit Error Rate (BER) is also analyzed in the receiver. The performance metrics here are Specificity, Sensitivity, Time Delay, Quality Values, Accuracy and Performance Index.

Keywords— epilepsy, EEG, LGE, STTC MIMO-OFDM, PAPR, PCA-SLM, GK-SVM, BER

ID#181

Kinematics Analysis of a 3DoF Lower Limb Exoskeleton for Gait Rehabilitation: A Preliminary Investigation

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Robotics have been engaged to address the shortcomings of conventional rehabilitation therapy as well as the ever increasing demand for rehabilitation services. This paper presents the kinematics of a 3DoF lower limb exoskeleton restricted to the sagittal plane. The Denavit-Hartenberg representation, as well as the geometrical solution approach, are employed to obtain the forward and inverse kinematics of the exoskeleton, respectively. A simulation study is performed to validate the proposed model. Three case study with different exoskeleton movement is used to validate the developed exoskeleton model. The sinusoidal inputs are given to the exoskeleton joint angles to observe its position and orientation behavior. The forward kinematics result suggests that the model is able to simulate the behavior of the lower limb movement along the sagittal plane as unity is achieved for the total magnitude vector along all vector orientation. Furthermore, it was also observed that the position vector has coupling effect when the exoskeleton joint angles are manipulated.

Keywords— Exoskeleton kinematics, exoskeleton forward kinematics, exoskeleton inverse kinematics, exoskeleton D-H representation, lower limb kinematics

ID#186

The Effect of Single Bout of 15 Minutes of 15 degree Celsius Cold Water Immersion on Delayed-Onset Muscle Soreness Indicators

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The aim of this study is to investigate the effectiveness of a single bout of 15 minutes Cold Water Immersion (CWI) to alleviate DOMS symptoms following the plyometric exercise protocol. Sixteen physically healthy young
males with the mean age of 21.6±2.3 years old, weight of 65.7±13.1 kg, height of 170.5±6.9 cm, BMI 22.4±3.3 kg.m⁻¹ and fat percentage 20.5±6.2% were required to complete 10 x 10 counter-movement jumps (CMJ) to induce muscle damage. They were randomly assigned into control group (n = 8) and CWI group (n = 8). The CWI group was given a single bout of 15 minutes lower limb of CWI therapy at 15°C following damage-inducing exercise with room temperature was maintained at 16°C. Indicators of DOMS such as perceived muscle soreness, maximal voluntary contraction, range of motion (ROM), thigh circumference, creatine kinase (CK) and lactate dehydrogenase (LDH) were assessed prior to the commencement of CMJ, immediately after the jumps and at 24, 48, 72 and 96 hours post CMJ. The results of mixed-factorial ANOVA revealed a significant (p < 0.05) interaction between groups across the experimental sessions in perceived muscle soreness, ROM and LDH for participants in the CWI group. In conclusion, a single bout of CWI at 15°C for 15 minutes is effective to elicit beneficial effects in some DOMS indicators.

**Keywords**— DOMS, muscle damage, cold water immersion

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**ID#191**

**Parameter Measurement Systems to Evaluate Performance of Archers**

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Postural stability, attention level of the archer and particularly the vibrations of the bow itself plays a prominent role in determining the athlete performance. An approach that can provide accurate parameter measurement systems for the coaches and relatively easy to interpret system was proposed. Three type of the archer parameters were included for data monitoring sensors. Attention level can be measured using EEG sensor, centre of mass linked to the postural stability can be measured by foot pressure sensor, and the bow vibrations in three-axis will be measured by the vibrations sensors placed directly on the bow. Several amateur archers participated for 2 sessions and divided into 2 group. The systems were developed using Arduino and Python environments. 3 types of data were observed using vibration sensor mounted at bow, pressure plate, and EEG sensors. Participants completed a pre-test to obtain a baseline for their parameter and second system test run that focused on testing the systems reliability. Both group show observable average differences of parameter level between them, suggesting this system does provide better overview of their parameter data rather than only relying on coach observation. The same test was repeated 2 times to test the system reliability. Differences between 2 groups still observable based on the average parameter result and this suggest that the system can provide reliable reading over time. The average level of parameter data observed were quite significant. The results indicated that the systems can quantify the parameter of 2 different level of archers. By using this kind of systems, coach can directly observe the statistical data in real time with better estimation using the sensor systems. Coach can have a better and more concise understanding of each archer individual parameter that correlates with their performances in making better training decisions.

**Keywords**— Archery, Graphical User Interface, Microcontroller, Wireless sensor, Monitoring System

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**ID#192**

**Conceptual Design of Orthosis for Clubfoot Model Developed Using Image Reconstruction Techniques**

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Clubfoot is one of the most common deformities distributed worldwide in the ratio of 1to 2 per live births. The subjects with clubfoot have their foot twisted at the ankle which makes them walk on the lateral surface of the
foot. This study involves the design of an orthosis, which is an externally applied device that regulates the musculoskeletal functions of the foot. An infant with clubfoot deformity is selected for this study. Computed tomography (CT) images of the clubfoot with 1 mm slice thickness were captured and fed in MIMICS, an image processing software, where in 3D clubfoot model was developed. Rapid prototyping (RP) model of the clubfoot was prepared using Stratasys FORTUS 360mc. This prototype is taken as reference for designing the orthosis for clubfoot treatment. Considering, the level of deformity, its nature, bean ratio, and age of the subject different conceptual models are developed. The deep heel cup (Model I) orthosis, provides required support for the heel to regulate bone growth and to counteract unbalanced forces. Spiral encloser (Model II) orthosis is supported from the thigh and wounds around the tibia to promote bone growth in the required profile. A mechanical orthosis (Model III) with adjustable supports was developed to cater subject to attain normal posture. Considering the complex profile of the foot and orthosis assembly, Solid 45 – tetrahedral elements are used for meshing. By applying necessary material properties and loading conditions, the structural analysis of the assembly was performed to predict the stress distribution and the pattern of bone growth. The finite element analysis on mechanical orthosis (Model III) shows a maximum displacement of 1.45 mm and the maximum stress of 0.79 N/mm². This study can be further extended by manufacturing and testing the orthosis on different subjects.

**Keywords** — clubfoot, orthosis, image reconstruction, rapid prototyping.

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**ID#193**

### The Control of an Upper-Limb Exoskeleton by Means of a Particle Swarm Optimised Active Force Control for Motor Recovery

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The modelling and control of a two degree of freedom upper extremity exoskeleton for motor recovery is presented in this paper. The dynamic modelling of the upper arm and the forearm for both the anthropometric based human upper limb as well as the exoskeleton was attained via the Euler-Lagrange formulation. A proportional-derivative (PD) architecture is employed to assess its effectiveness in performing joint-space control objectives namely the forward adduction/abduction on the shoulder joint and the flexion/extension of the elbow joint. An intelligent active force control (AFC) optimised by means of the Particle Swarm Optimisation (PSO) algorithm is also integrated into the aforesaid controller to examine its efficacy in compensating disturbances. It was established from the simulation study that the PD-PSO-AFC performed notably well in catering the disturbances introduced to the system whilst maintaining its excellent tracking performance as compared to its pure classical PD counterpart.

**Keywords** — active force control, particle swarm optimisation, robust, rehabilitation, trajectory tracking control.

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**ID#194**

### A Depth Image Approach to Classify Daily Activities of Human Life for Fall Detection Based on Height and Velocity of the Subject

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Human fall detection systems can be categorized according to the approaches used such as some sort of wearable devices, ambient based devices or non-invasive vision based devices using live cameras. Wearable and
ambient based devices are very often rejected by users due to the high false alarm and difficulties in carrying them during their daily life activities. This work proposes a fall detection system using depth information from Microsoft Kinect sensor. Classification of human fall from other activities of daily life is accomplished using height and velocity of the subject extracted from the depth information. Results of the simulated activities showed that the proposed system is able to gain an accuracy of 93.75% with 100% sensitivity and a specificity of 92.5%.

Keywords — human fall, Kinect sensor, depth images, non-invasive, depth sensor.

ID#198

Relationship Between Electromyostimulation and Free Weight Exercises in Multiple Repetition Maximum Strength Test

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Electromyostimulation (EMS) is a training that uses electrical current to stimulate muscle contraction. The progression of EMS training is similar with principles of resistance training which are based on the parameters such as pulse frequency, electrical pulse, duration of rest, duration of contraction, the number of repetitions and the intensity (Hz) used. Rate perceived exertion (RPE) scale was used in monitoring the loading along the duration of EMS training while the percentage of repetition maximum (%RM) is globally use in monitoring loading of resistance training (RT). Since the unit of measurement for loading is different, therefore this study seek to find the relationship between multiple repetition maximum electrical pulses in EMS (miliAmpere-mA) and multiple repetition maximum lift (Kilogram-Kg) in free weight strength test. Methods: A total of 10 recreational athlete (age: 22±0.77, height: 155.6±0.92, weight: 51.6±1.02, %BF: 21.3±1.10) volunteered to participate in strength testing. Multiple RM (1, 3, 5, 7, 9) was used to measure chest press and squat strength using National Strength Conditioning Association procedure. Data from the tests were analysed using Pearson Correlation. Results: There is significant positive strong relationship p<.01 between EMS and load lift for chest press (1RM; r = .96, 3RM; r = .86, 5RM; r = .91, 7RM; r = .93; 9RM; r = .94) and squat (1RM; r = .83, 3RM; r = .88, 5RM; r = .93, 7RM; r = .92, 9RM; r = .81). Discussion: The results indicate that both measurements were highly correlated between mA and Kg along the nine repetitions maximum strength test. Furthermore, it showed that both measurements can be applied in training to increase muscular strength.

Keywords – electromyostimulation, strength, intensity, repetition maximum

ID#199

Effect of the Long Term 'Training and Competitive' Cycle on Urinary Protein and Creatinine in Elite Male Triathletes in Malaysia – A Pilot Study

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Strenuous exercise may cause DNA, skeletal muscle as well as renal damage. Triathletes experience strenuous muscular activity both during competition and training. Studies have shown changes in renal function after competition which returns to normal after few days. However, these finding have only focused on a single event. There is no literature studying the cumulative effect of “training and competition” cycles over a season of triathlon competitions. The objective of this study was to evaluate the cumulative effect of “training and
competition” on renal function in elite male triathletes using urine protein and creatinine. Methods: Seven male elite triathletes were recruited for the study. They were on a standardized training regimen and competed in at least one endurance event every month for the past 3-4 years. They were followed up for nine months. Urine samples were collected at the beginning (Phase 1) and at the end of the triathlon season (Phase 2). Urine protein and creatinine levels were estimated using spectrophotometric methods and compared with a Student’s t test (p<0.05 was considered significant). The urine protein was 5.26 ± 3.99 mg/dl and 11.48 ± 6.87 mg/dl and urine creatinine was 11.67 ± 5.16 mmol/L and 19.09 ± 7.15 mmol/L for phase 1 and phase 2 respectively. There was a statistically significant difference in urine protein and creatinine (p<0.05) between phase 1 and phase 2. Urine protein and creatinine are considered markers of renal function. Our results show that at the end of the “training and competition” cycle of an elite triathlete, there is two-fold increase in urinary protein and creatinine. This finding provides evidence to the cumulative effect of training and competition over a period of 9 months.

Keywords — DNA damage, triathlon, urinary protein, urinary creatinine

ID#203

Design and Development of a Virtual Reality Based Track Cycling Simulator

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Malaysia Track cycling team has achieved great achievement for the past few years. However, the athlete still facing difficulty of training in this country as we are lack of training facilities. This paper consist of the design and development of a virtual reality based track cycling simulator to provide a cost saving and portable training facilities for the track cycling athlete and potential athletes. The virtual reality system allows the cyclist to immerse in the virtual environment based on real velodrome track.

Keywords — virtual reality, track cycling, bicycle simulator.

ID#205

Classification of Respiratory Sounds in Smokers and Non-smokers using k-NN Classifier

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Respiratory sounds contain significant information on physiology and pathology of the lung and the airways. Its analysis provides vital information of the present condition of the lungs. Pulmonary disease is a major cause of ill-health throughout the world. The frequency spectrum and the amplitude of sound, i.e. tracheal or lung sounds without adventitious sound components (wheeze), may reflect airway dimension and other their pathologic changes (airways obstruction). Wheezes may have acoustics features indicating not only the presence of abnormality in the respiratory system but also the severity and locations of airway obstruction most frequently found in asthma and also found in smoker but not all smokers have airway obstruction. The significance of this study is to develop a classification system to distinguish between normal and smoker from respiratory sounds. 15 smokers and 15 non-smokers are recruited to collect respiratory sounds using Wireless Digital Stethoscope. The performance analysis of the K-Nearest Neighbor (k-NN) classifier, which uses entropy as the suitable feature, revealed that the classification accuracy on non-smokers and smokers are 89.33% and 78.67% respectively.

Keywords — respiratory sounds, airways obstruction, Fourier Transform, K-Nearest Neighbor
Electromyography (EMG) is the recording about the electrical activity of muscle tissue. EMG measures the electrical signal that generated from the muscles during contraction or relaxation action. It has been used in various fields such as medical diagnosis and engineering applications. In this research, EMG signals were recorded from three forearm muscles to analyze and classify forearm muscles activities during gripping. EMG signals were measured from the subjects by applying three different values of grip force. Features such as root mean square, mean absolute value, standard deviation and variances are extracted from the acquired EMG signals. The values of these features were used for the classification in different level of grip strength. The results show that EMG signals' amplitude and frequency from the forearm muscles increased due to the increase of grip strength and different levels of grip force can be classified from the three forearm muscles' activities.

Keywords — electromyography, hand grip, feature extraction, classification

Posture stability and consistency is one of the important factors in shooting. The study aims to investigate the correlation between the stability parameters and score for air rifle and air pistol shooters. It also explores and compare the dominant inter variable correlation among pistol and rifle shooters. 11 Malaysian shooting athletes (6 air rifle and 5 air pistol) participated in the study. The data were collected (Male athletes fired 60 competition shots in 75 minutes while female athletes fired 40 competition shots within 50 minutes) during training. Scoring value was obtained from electronic scoring system and Scatt system. Simultaneously, Tekscan pressure insoles were used to collect data from all athletes. Dependent variables such as body weight distribution percentage, anterior-posterior displacement velocity and medial-lateral displacement velocity were extracted for analysis from all shots. Bivariate correlation analyses were applied. Overall, there were no strong correlations between investigated variables with score for both air pistol and rifle athletes. The highest correlation value for air pistol shooters was found between anterior-posterior displacement velocity of right feet and medial-lateral displacement velocity of left feet (r = 0.948). Meanwhile, air rifle shooters exhibit the highest correlation value between the medial-lateral displacement velocity and anterior-posterior displacement velocity of left feet (r = 0.991). The scores obtained by shooter are not highly influenced by the body weight distribution percentage and centre of pressure displacement velocity. The air pistol shooters display a higher number of strongly correlated variables than air rifle shooters. Inter-relationship between the variables existed for pistol shooters where displacement velocity in right feet influenced the displacement velocity in left feet and vice versa.

Keywords — shooting, body weight, pressure, rifle, pistol
Effect of *Eurycoma longifolia* jack extract on lipolysis in collegiate athletes: Pilot study

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Studies have shown that usage of EL could promote lipid lowering and improvement in muscle strength. In view of that, lipid mobilization and utilizations would be the main mechanisms involved. The purpose of the investigation was to determine whether acute consumption of *Eurycoma longifolia* Jack extract would influence lipolysis among athletes. Ten male athletes were randomly assigned either to *Eurycoma longifolia* Jack group (EL, n = 5) or placebo group (PG, n = 5). Athletes from both groups ingested 1.7 mg/kg of body weight of either EL or PG for three days prior to the treadmill exercise test (65% of VO₂max) for an hour. Plasma free fatty acid (FFA), glycerol and triglycerides (TG) levels were measured at pre-exercise and post-exercise on days 0 and 3. Plasma FFA in EL group was significantly lower than that in PG after 3 days (p < 0.05), and plasma glycerol level was significantly increased in EL compared to PG (p < 0.05). The results of this study suggest that EL supplementation could promote fat lipolysis, resulting towards better energy yield. Therefore, EL can be considered as an ergogenic aid to improve performances and to boost energy production.

*Keywords* — athletes, *Eurycoma longifolia* Jack, exercise, fat, lipolysis

Anthropometric Profiles of Malaysian Elite Swimmers

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This study was aim to compare the anthropometric profiles of Malaysian state and national swimmers, compare the basic physical characteristics with world class swimmers, compare the world class data of 1991 with more recent international swimmer data. Sixty-three state swimmers (25 females, 38 males) and 18 national swimmers (10 females, 8 males) were assessed. The national swimmers were compared with 401 world class swimmers from the 1991 Perth World Championships and other recent international data. Anthropometric profiles for Malaysian swimmers were collected according to the standardized ISAK protocol. Somatotype was derived by anthropometric variables according to Heath-Carter somatotype scale. State swimmers were younger, lighter, shorter and smaller on girth measurements compared to national swimmers. World class swimmers were older, heavier, taller (p<0.01) and possessed greater humerus breadth (p<0.05) compared to Malaysian national swimmers. Malaysian swimmers were consistently shorter and lighter compared to other international swimmers. Malaysian male swimmers had a similar ecto-mesomorphic somatotype (2-5-3) when compared to world class athletes; however, female national swimmers had higher endomorphy ratings (p<0.05) than world class swimmers. This study identified key anthropometric characteristics (greater weight, height, and limb girth) which may be beneficial to swimming performance and should be emphasized in talent identification programs.

*Keywords* — swimmer, anthropometry, somatotype, talent identification
Effects of Toe-out and Toe-in Gait with Varying Walking Speeds on Knee Adduction Moment and Mechanical Work Done—A Pilot Study

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Knee joint is subjected to loads during activities of daily living. Higher loads can cause deterioration of the joint and malalignment. Toe-in and toe-out gait are among the techniques that modify the posture in order to minimize these loads. Several studies have reported their effects in reducing knee joint load. No effects of these techniques, however, have been reported with varying walking speeds on knee adduction moment (KAM) and mechanical work done at lower limb joints. The aim of this study was to investigate the effects of self-selected toeing-in and toeing-out with self-selected normal, slow and fast walking speeds on first and second peaks of KAM, individual lower limb joints mechanical work and total lower limb mechanical work done during level walking. A pilot study was conducted using cinematographic gait analysis of 5 healthy young adults (age: 28 years; weight: 58.3 kg; height: 1.6 m) walking at self-selected normal, slow and fast walking speeds for each of the three foot positions: straight (natural), toe-out and toe-in. Repeated measures ANOVA (p < 0.05) was applied with pairwise comparison to find the differences between groups. The results showed that there are significant effects of changing foot progression angle on knee joint loads and on positive and negative muscle work done. Also, the analyses showed that walking speed has a prominent influence on the relationship of foot progression with knee joint load and with mechanical work. Therefore, it is suggested that walking speed should also be considered while prescribing toe-out and toe-in gait. Further researches with a broader spectrum of walking speeds may identify the optimal speed for each foot position.

Keywords— Knee adduction moment, work done, toe-out, toe-in, walking speed

The Effects of Varying Level of Glucose and Fructose on Brain Activation During Mouth Rinse

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Mouth rinsing a carbohydrate (CHO) solution has been shown to activate receptors within the oral cavity that is related to reward and pleasure centres of the brain. This brain activation is linked to enhance endurance exercise performance. However, it remains unclear, whether the caloric content or the level of sweetness of a solution may influence the level of brain activation during mouth rinse. Therefore, the aim of this study was to examine the effects of varying level of caloric content made up from glucose and fructose on brain activation during mouth rinse. Eleven healthy male participants (Age: 21 ± 2 years; stature: 168 ± 7 cm; body mass: 61.4 ± 6.4 kg; and peak rate of oxygen consumption (VO₂ max): 51.3 ± 2.2 ml.kg.min⁻¹) volunteered to participate in this study. Participants were randomly assigned to perform 6 trials of mouth rinsing. During each trial, participants were asked to rinse a CHO solution for 10 seconds while fMRI was performed. Three sets of caloric-content solutions were prepared. The first set of caloric-content was at 19 kcal/g consisting 6% of glucose and 5.3% of fructose. The second set was 59 kcal/g consists of 18% of glucose and 15.9% of fructose and the last set was 79 kcal/g consists of 24% of glucose and 21.2% of fructose. The neuroimaging results showed that there was no clear trend on brain activation when rinsing with high caloric content of the CHO solution. However, when rinsing a sweeter solution of fructose, a larger magnitude of the insula/frontal operculum region of the brain was activated. The current observation suggests that the level of sweetness and not the caloric-contents potentially be the main determinant of brain activation.

Keywords— mouth rinsing, caloric-contents, brain
Entropy Based PAPR Reduction for STTC System Utilized for Classification of Epilepsy from EEG Signals Using PSD and SVM

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Epilepsy is one of the major disorders of the brain that affect the nervous system and is characterized by the recurrent seizures. The day to day life of the patient is severely disturbed because of the abrupt and unpredictable nature of the epileptic seizures. An investigative technique which provides comprehensive information about the classification, analysis and diagnosis of brain conditions is Electroencephalography (EEG). The useful information about the different diseases affecting the brain especially epilepsy is given by the frequency and energy content of this signal. As the recordings made from the EEG are quite large and difficult to process, Power Spectral Density (PSD) is employed here to reduce the dimensions of the entire data. Then the dimensionally reduced EEG data is transmitted through the Space Time Trellis Coded Multiple Input Multiple Output Orthogonal Frequency Division Multiplexing (STTC MIMO OFDM) system. As the system suffers a high Peak to Average Power Ratio (PAPR), entropy based Partial Transmit Scheme (E-PTS) is proposed to reduce the PAPR and Bit Error Rate (BER) is analyzed in the receiver side. Also at the receiver side, Radial Basis Function Kernel Based Support Vector Machine (SVM) is employed to classify the epilepsy from EEG signals. The performance metrics analyzed here are Specificity, Sensitivity, Time Delay, Quality Value, Accuracy, Performance Index, PAPR and BER.

Keywords— PSD, epilepsy, EEG, PAPR, E-PTS

Carbohydrate Mouth Rinse Enhances Time to Exhaustion Running Performance in Dehydrated Subjects

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Mouth rinsing a carbohydrate (CHO) solution has been shown to effectively enhance endurance performance by stimulating areas of the brain that relates to arousal and motivation. It remains unclear whether the effectiveness of CHO mouth rinsing is influenced by the level of hydration. Therefore, this study was conducted to examine the effect of mouth rinsing a CHO solution on running performance among dehydrated subjects. Twelve well-trained subjects (age: 21 ± 1 years; stature: 170.8 ± 3.5 cm; weight, 58.5 ± 3.5 kg; VO2max: 58.3 ± 3.3 mL.kg⁻¹.min⁻¹) while in a dehydrated state (2% body weight deficit), completed two submaximal running exercise at an intensity 70% VO2max until exhaustion. During the run, participants had mouth rinsed 25 mL of either a 6% CHO solution or placebo (PLA) at every 15 min intervals. Plasma glucose (Pglu), plasma lactate (Plac) as well as other psychological measures were sampled intermittently during exercise. Gas exchange, the perceived exertion (RER), heart rate (HR), mean skin temperature (Tsk) and rectal temperature (Tr) were recorded during trials. The running time to exhaustion was significantly (p = 0.000) shorter when mouth rinsing a PLA (76.8 ± 3.9 min) solution compared with CHO (81.2 ± 4.1 min). There was no significant main effect on metabolic, psychological, thermoregulatory and cardiovascular variables between the two trails. This study demonstrated that participants in a dehydrated state were able to enhance their performance when mouth rinsing a CHO solution as compared with PLA.

Keywords - oral sensing, endurance capacity, dehydration, running, carbohydrate
The Effects of Releasing Ankle Joint on Pedal Force and Power Production During Electrically Stimulated Cycling in Paraplegic Individuals: A Pilot Study

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Previous research has investigated functional electrical stimulation (FES) cycle force and power output (PO) from the perspective of knee and hip joint biomechanics. However, ankle-foot biomechanics and, in particular, the effect of releasing the ankle joint on cycle pedal force and PO during FES cycling in paraplegics has not been widely explored. Therefore, the purpose of this study is to determine whether releasing the ankle joint might influence the peak pedal force and PO during FES cycling in paraplegics. Three complete paraplegics (C7 – T4) participated in this study. All participants performed two sessions of cycling in randomized order. Session 1 and 2 required the participants to cycle in fixed and free-ankle setup, respectively. For each session, the participants performed two sub-sessions of FES cycling. During sub-session 1, the muscles stimulated were upper leg muscles [quadriceps (QUAD) and hamstrings (HAM)]. In sub-session 2, both upper and lower leg muscles [QUAD, HAM, tibialis anterior (TA) and triceps surae (TS)] were stimulated. The normalized peak pedal force and PO of each condition were analyzed. Overall, the normalized peak pedal force and PO during fixed-ankle FES cycling is higher than free-ankle FES cycling. Stimulation of both upper and lower leg muscles during FES cycling provided higher normalized peak pedal force and PO compared to the upper leg muscles stimulated alone. The present pilot study revealed that fixed-ankle FES cycling produced higher normalized peak pedal force and PO than free-ankle FES cycling. Future work involving more paraplegics will be investigated. This finding might serve as a reference for future rehabilitative cycling protocols.

Keywords — functional electrical stimulation, spinal cord injury, cycling, ankle movement, rehabilitation exercise.

Effect of High and Low Carbohydrate Meals on Sustained Maximum Voluntary Contraction (MVC) after Prolonged Exercise

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Fatigue is a natural physiological phenomenon where the body’s capability to do work is reduced, and in general carbohydrate (CHO) depletion has been attributed to the aetiology of this condition. However, its composition in iso-caloric meals has never been investigated on capacity of sustained force production following a prolonged exercise. The aim of this study was to investigate the effects of high and low CHO meals on sustained maximal voluntary contraction (MVC) capability after a 90-minute run. Ten (n=10) moderately trained runners (age: 25±3.7 years, and VO2max: 51.42±4.78 ml/min/kg) were prescribed, in a cross-over, randomised, and double blind design, either one of these iso-caloric meals: high CHO meal (1.5 g/kg body weight), or a low CHO meal (0.8 g/kg body weight) prior to the 90-minute run at 65% of VO2max. A 90-second sustained MVC was measured before and after the run (represented at 30, 60, and 90 seconds respectively). MVC dropped significantly (p<0.01) after the prolonged running exercise in both groups. The difference in the sustained MVC was significant between the two groups at all time points (p<0.01). While both groups completed the 90-minute running task successfully, the high CHO meal allowed a higher sustained force production (MVC) post-exercise, suggesting physiological changes that allows better neuromuscular functions. Theoretically, several factors could be attributed to this phenomenon, such as preservation of fuel source, and/or alteration of brain neurotransmitter concentrations that affect neural drive.

Keywords — muscular force, carbohydrate, sports nutrition
Different Instructional Methods Affect the Acquisition and Performance of Sport Stacking

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Sport stacking has gained increasing attention from all walks of life, including students, parents, teachers, physical educators, coaches and other practitioners with the emergence of evidence that it is able to facilitate cognitive, physical or perceptual motor skills. However, little is known about how to improve the acquisition and learning of the sport stacking skill. As such, the purpose of this study was to determine the best type of instructional methods (demonstration only and a combination of demonstration with verbal instructions) on the performance of sport stacking in novices. Thirty participants were recruited to participate in this study and were randomly assigned into the demonstration group (DG) or combination of demonstration and verbal instructions group (DVIG). Participants were shown a short video on how to perform sport stacking, whereby DG watched the demonstration with a muted sound, while DVIG watched the video with sound. Following that, participants were given the chance to practice for 15 minutes before completing three trials of the sport stacking cycle whereby total time (seconds) was recorded. The independent sample t-test was used to compare the means of DG with DVIG. The findings indicated that there were no differences between the two experimental groups (p = 0.681). It appeared that presenting information by way of demonstration or a combination of demonstration and verbal instructions were two possible ways to deliver information concerning how to perform sport stacking for novices. Discussions are presented from the viewpoint of demonstrations providing sufficient and relevant information as well as from the standpoint of verbal instructions being redundant for the learning of sport stacking skills.

Keywords— demonstration, observational practice, verbal instructions, cup stacking, speed stacking

Monitoring the Walking Pattern of Lower Limb Prosthetic Users Using Mobile Accelerometer Apps

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Physical activities are any movement that required muscles to work and consequently use more energy as compared to resting. Physical activities are the best parameter in determining a person health. This is especially important for the health of lower limb prosthetic users who are in progress of restoring their walking and standing ability by wearing the prosthetic leg. The objective of this study is to develop an accelerometer apps that can identify the walking pattern of lower limb prosthetic users. The Smartphone accelerometer application function is to detect and to collect acceleration data while user’s performing physical activities such as walking on flat surface. As a results an accelerometer application on android smartphone has been developed. The magnitude of acceleration data from the accelerometer are used to identify three participants; normal, transtibial and transfemoral prosthetic users walking patterns.

Keywords— accelerometer apps, prosthetic user
Diet and Bone Status in Eumenorrheic Female Athletes

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Various risk factors for low bone mass density (BMD) have been reported, such as diet restriction, unbalance body composition and menstrual irregularities. This is apparent in female athletes who have a tendency to seek for a low body weight by adopting chronic energy deficits (low calories intake or malnutrition) practices. The aim of this study was to determine the relationship between energy intake, nutrient consumption amount, energy availability, body weight with BMD status.

Eighty-five moderately trained female athletes aged 18–29 years took part in this study. Body fat percentage and BMD were measured using the Tanita Weighing Scale and 200-CM Furuno Ultrasound bone densitometer, respectively. Data on physical activity, menstrual cycle status, and eating attitude were obtained using questionnaires. Dietary variables were assessed from a prospective combination of 24-hour diet recall and 3-day food diary of macronutrients and micronutrients.

Results showed that more than half (53%) of the female athletes have low BMD, with z-scores ranging between -2.00 and -0.03 (below the normal range). The mean (SD) of energy intake of female athletes was 1291 (304) kcal/day which is below than recommended nutrient intake (RNI). Similarly minerals (Calcium and Phosphorus) intake did not achieve the RNI. Low energy intake was significantly (p≤0.05) correlated with low eating attitude score (EAT-26). Pearson Correlation also showed that low BMD was significantly associated with low body weight. The common factors of low BMD among eumenorrheic athletes are an insufficient intake of energy intake and bone building nutrients (Calcium, Vitamins D, Vitamin C and Zinc). Higher BMD could be achieved through actively encouraging high-risk group of athletes to focus on good dieting practice.

Keywords— Energy intake, nutrient, exercise, physical activity

Does Imagery Facilitate a Reduction in Movement Variability in a Targeting Task?

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It is widely accepted that imagery is an effective strategy for improving skilled performance, motivation and rehabilitation of sports injuries. Previous empirical studies showed the decrease in variability contributed to a consistency of movement which led to performance improvement. However, there are no studies examining the role of visual imagery in movement variability during target aiming task. Thus, the objective of this study was to discover the possible moderating role of imagery on movement variability at the start point of a target aiming task. It was hypothesized that visual imagery perspectives would produce significantly more consistent movement pattern than a control group. Thirty-six participants that passed the Vividness of Movement Imagery Questionnaire-2 for imagery ability screening were randomly assigned to three groups; External Visual Imagery (EVI), Internal Visual Imagery (IVI) and a control group. In a seated position, with their elbow bent at 90 degrees, participants performed a no-vision pullback aiming task on a sliding track. The movement was tracked by an 8 camera 3D motion capture system. Both imagery groups received the relevant imagery script between blocks from the second block onwards, while the control group answered a set of math questions during the break. The Two-way Mixed ANOVA were conducted to examine the main effect and interaction for the dependent variable (p<.05). Movement variability was not significantly different between external visual imagery, internal visual imagery, and control groups. However, there was a visible reduction in variability. The results of this study suggested that imagery does not give a direct effect on the consistency of the movement patterns in a repeated task. Instead, the increase in consistency of movement possibly stems from the learning effect of continuous practice.

Keywords— Visual imagery, movement variability, consistency
Reliability of a Pendulum Apparatus Designed to Test the Taekwondo Electronic Body Protector

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The sport of Taekwondo has advocated the use of the Protector and Scoring System (PSS) in all of its major competitions to help reduce scoring errors from human judges. The main purpose of this study is to determine the reliability of a custom built mechanical pendulum apparatus designed to test the effectiveness of the PSS. To determine the apparatus reliability, an accelerometer was placed at the end of the pendulum to record the peak acceleration of the pendulum in the Y axis. Two sets of data, consisting of 50 trials each were collected on separate days, using two different testers but using the same exact hardware settings. It was found that there was no significant difference between the two sets of data (p > 0.05). The standard error of the apparatus was similar for both sets at 0.002ms\(^2\). The Bland-Altman plot showed evenly distributed points in the scatterplot graph which indicates that the two sets of data are in agreement together with the linear regression analysis. The data from this study suggest that the custom built apparatus is a reliable instrument. The peak acceleration of the pendulum for each trial was highly consistent. Thus, the apparatus should be able to serve its purpose of measuring the reliability and accuracy of the Taekwondo electronic body protector scoring system.

Keywords – reliability, pendulum, PSS, Taekwondo

Comparison of Vertical Jump Height Using the Force Platform and the Vertec

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Vertical jump height is often being measured in many ways to evaluate the ability of an individual to jump, which leads to an estimation of lower limb muscle power. The various jump tests and apparatus each have their advantages and disadvantages. The main purpose of this study was to compare and explore the relationship between the two more popular test apparatus - the force platform and the Vertec. Sixty-nine university students, 32 females and 37 males between the ages of 20 to 23 (mean 22.01 years ±0.66) were recruited to participate in this study. They were required to perform countermovement jumps on the force platform and also using the Vertec. Both jump tests were run on the same day, with a 1-minute interval between test apparatus. Results showed that the jump height values obtained from the force platform were significantly lower compared to jumping with the Vertec. The mean jump height for the force platform was 0.36m ±0.94 and for the Vertec was 0.55m ±0.12. Although the mean jump height differs significantly, both the force platform and Vertec displayed a significant correlation (r =0.826, p<0.01). It was concluded that both devices are suitable to be used to measure jump height because participants who obtained a high jump height at the Vertec also obtained a high jump height value on the force platform. The only difference between both devices is the presence of a target of achievement.

Keywords — jump height, Vertec, force platform, countermovement jump
**ID#302**

**Fabric-based Sensor for Applications in Biomechanical Pressure Measurement**

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Wearable pressure sensor is an important element in human gait and biomechanical investigations. Many studies have been carried out to ensure its reliability and comfort to the user even when the sensor has to operate under extreme conditions such as under uneven surface with high curvature area, high humidity environment, and wide range of dynamic pressure. However, the existing pressure sensors that could endure such extreme conditions are usually involving complex fabrication process and often incur high cost of materials. Therefore, in this paper we present a novel pressure sensor made of low cost fabric with simple fabrication process. The sensor is constructed from a conductive fabric using piezoresistive technique. A unit area of our pressure sensor is made of a thin layer of piezoresistive material and it is placed in between two layers of conductive fabrics. To vary sensitivity and to cater wide range of pressure, our proposed sensor uses special mesh layers which are placed in between the piezoresistive layer and the conductive layers. This way, wide range of dynamic pressure can be captured. To test the proposed sensor, fifteen units of pressure sensors have been designed with variety of mesh layering techniques. These sensors are tested using 0-10 kg load and their resulting resistance versus load profiles are analyzed graphically. Our experimental results on the resistance versus pressure response show a similar trend as compared with the existing popular pressure sensor such as flexiforce. Since the performance of our sensor can be tailored to exhibits the performance of the exiting commercial sensors therefore the proposed technique can be an alternative affordable solution to that of the existing expensive sensors. The proposed sensor is advantageous because it can be easily customized thus it can be useful for human gait and biomechanical studies.

*Keywords*— pressure sensor, wearable sensor, biomechanics, piezoresistive.

**ID#307**

**A Pilot Study on Physical Performance Measures: What is Better for Knee Osteoarthritis Patients, Orthosis or Gait Modifications?**

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Knee osteoarthritis (kOA) is the most commonly occurring type of osteoarthritis in the world and one of the key contributors to global burden of disease significantly affects the physical functionality of the patient. The two conservative techniques of kOA include orthoses (knee braces and wedged insoles) and gait modification techniques (toe-in and toe-out gait). Previous studies assessing these two types of techniques do not present a comparison between their effects on physical functionality of the patient. Five OARSI (Osteoarthritis Research Society International) recommended performance-based tests to measure physical function of kOA patients which were; (1) 30sec chair stand test, (2) 40m fast-paced walk test, (3) stair climb test, (4) time-up-and-go (TUG) test, and (5) 6min walk test were applied randomly on a total of 5 kOA patients (Age: 59.2 ± 11.09 years, BMI: 25.94 ± 3.77 kg/m², Kellgren-Lawrence Grades 1 to 4). The test conditions included normal gait, toe-out gait, toe-in gait, use of laterally wedged insoles and use of knee brace. The study was a single visit study assessing immediate effects, however, patients were given enough time and training to get used to the interventions. Data from the tests were analyzed using Repeated-Measures ANOVA. No significant differences were observed among the five test conditions for 30sec chair stand test, 40m fast-paced walk test, TUG test and 6min walk test (p > 0.05). Pairwise comparison showed that toe-out differed significantly from toe-in (p = 0.042), insoles (p = 0.037), and brace (p = 0.011) while toe-in differed significantly from toe-out (p = 0.042), insoles (p = 0.035) and brace (p = 0.012). Conclusions: In general, orthoses and gait modifications seemed to have similar physical performance measures for kOA patients. The results however, indicated that gait...
modifications are affecting stair ascent of the kOA patients differently as compared to orthoses. Larger sample size may reveal a more accurate influence of the test conditions used in this study.

Keywords— Physical performance tests, toe out gait, toe in gait, knee brace, later wedged insoles