

## **Symposium 1: Tackling Childhood Obesity: The Role of Lipid Metabolism in Exercise**

### **Children's metabolism: Exercise and breakfast effects**

Dr. Keith Tolfrey

Senior Lecturer Paediatric Exercise Physiology

School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, UK

Mounting evidence indicates that strategies to increase the potential for fat oxidation could facilitate the management of obesity and insulin resistance, which are serious health problems in children and adolescents (young people). It is clear that exercise acutely up-regulates fat oxidation and improves insulin sensitivity, but the factors implicated in this relationship are not well understood in young people. This presentation will provide examples of recent research from Dr Keith Tolfrey's lab that examine how exercise characteristics can be manipulated to elevate fat oxidation most effectively and, secondly, examine the acute effect of breakfast glycaemic index (GI) and exercise postprandial glucose, insulin and fat oxidation in young people. The first study compared two different exercise protocols for estimating the intensity corresponding to maximal fat oxidation (Fatmax) in prepubertal children. A three-min incremental protocol was recommended for non-overweight young people to provide an estimation of Fatmax using a wide range of intensities. Subsequently, the effect of mixed breakfast meals containing high (HGI) and low (LGI) glycaemic index carbohydrates on glucose, insulin and fat oxidation in overweight and non-overweight girls was investigated. Breakfast GI did not affect fat oxidation during the postprandial rest period or subsequent exercise. However, the main finding was that the higher glycaemic response in HGI compared with LGI was more pronounced in the overweight girls, highlighting that strategies to reduce this response are required. Consequently, the last study presented examined the effect of treadmill Fatmax exercise performed 16 h prior to HGI breakfast consumption on glucose, insulin and fat oxidation in overweight and non-overweight girls. Fatmax exercise reduced the postprandial insulin response in the non-overweight, but not the overweight, girls. Fat oxidation was increased after exercise in both groups.

## **Childhood obesity and physical activity: A Singapore perspective**

Dr. Stephen F. Burns

Physical Education and Sports Science Academic Group,

Nanyang Technological University, Singapore

The prevalence of childhood obesity has increased in many developed countries in recent years. The long-term health implications of these population increases in childhood obesity are yet to emerge, but data suggest that obese youth have substantially worse cardiovascular and metabolic risk factors than their normal weight counterparts. In contrast with many countries, the prevalence of adolescent overweight in Singapore reportedly declined between 1992 and 2010. This was while adult obesity almost doubled over the same period. In a specific effort to target paediatric obesity, the 'Trim and Fit' (TAF) programme was introduced to Singapore schools from 1992-2007. The TAF programme involved nutritional education and increased physical activity for obese children and was successful in reducing the prevalence of childhood obesity from 14% in 1992 to 9.8% by 2002. This has since been superseded by the 'Holistic Health Framework' (HHF) and the childhood obesity rate remains around 10%. In addition, all schoolchildren undergo an annual fitness assessment under the 'National Physical Fitness Award' test. These early and sustained active interventions to combat childhood obesity appear to have gone some way toward keeping Singapore youth healthy.

While there have been targeted interventions in combating childhood obesity in Singapore, there is a need to question the success. In adults, the body mass index (BMI) is a well established method for determining the prevalence of obesity within a population and has allowed for international comparisons. In children, however, diagnosing obesity has been subjected to different approaches and tools among countries and even over time. In Singapore, changes in methodology may underestimate the prevalence of the obesity problem. Moreover, cross-sectional evidence suggests levels of physical activity – a strategy to prevent obesity - of Singapore schoolchildren mirror the low levels reported by many other developed nations.

In summary, this presentation will examine the factors that may have caused a successful reduction in childhood obesity in Singapore but also question whether the reduction is an artificial facet of the methodologies employed in measuring obesity.

## **Symposium 2: Active Children**

### **The importance of ‘Plays, Exercises, Sports, and Physical Education in Childhood’ -From viewpoints of theory of growth & development and biomechanics-**

Prof. Kiyomi Ueya

Teikyo University of Science, Japan

This presentation is towards not only you but also the parents of children, school teachers, sports instructors, the Ministry of education and culture and, Japanese society. A bipolarization is advancing in children—A child who likes physical activities and not, who likes a class of physical education or not, who has a good physical fitness or not, who has the good skills in sports activities or not, and so on. This tendency is not limited only in children, but also in the high school & university students. How is your country?

By the way, what are active children? Are active children important? If active children were important, what is its reason? The meaning of “Active” is “vigorous”, vitality”, “energetic” ,”healthy” and so on.

Is there any relationship between active children and active young or active adults ? Children become the young, adults, elderly, and in that means the importance of childhood is equivalent to their future’s importance. If a child who don’t like physical activities, who shows the lack of physical fitness (muscular strength, power, flexibility, agility, coordination, endurance et al), what kind of young or adult does this child become? It is thought that physical activities of plays, exercises, sports and physical education in a daily life of childhood may affect to their future’s life. In this presentation, a presenter would like to show the several movie demonstrations concerning “an importance of nervous system of childhood”, and the following topics are discussed.

1) Scammon’s Curves concerning growth & development from a birth to 20 years old. This curves show (1)General Type, (2)Nervous System Type, (3)Lymph Type, and (4)Reproduction Type, and among them nervous system(brain, spine, eyeball motion etc.) type is the most important related with the movements of plays, exercises, sports and school physical education in childhood. Childhood is a critical period for bringing up nervous system.

2) Understanding of definition and role of physical education in school, and a definition of “Health” in a constitution of WHO (World Health Organization) and their relationship. One of the definition of physical education is as follows “Physical education is a way of education through physical activities which are selected and carried on with full regard to a value of human growth, development and behavior, and in a constitution of WHO ( World health Organization) , health is as

follows “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. The importance of school physical education concerned children’s growth & development is, not only physical development but also mental, emotional, social, intellectual, social development.

3) Instructions of sports and school physical education based on a theory of quantitative analysis. Quantitative analysis is to clear the relationship between results and causes of performance and its instructions are based on these relationships.

4) Quantitative equation of 「 $P=C \int E(M)$ 」 on the performances of human movements related by the late Japanese researcher, Dr. Ikai is very important. In this formula, P:Performance, E:Energy(Physical Resources), (M):Motivation, C:Cybernetics,  $\int$  : Integration symbol. In this equation, especially, C (concerning nervous system) is the most important function to bring up active children in childhood.

5) Importance of Understanding of Developmental-displacement, Developmental-velocity and Developmental -acceleration for children’s performances, like running, jumping, throwing a ball and so on.

6) Contribution of biomechanics to bring up active children. Biomechanics is composed from next three functions which are 1) to observe human movements, 2) to measure & to analyze human movements and 3) to instruct human movements based on the observation and measurement & analysis concerning human movements.

#### Suggestions and Conclusions in this presentation

1. Physical activities in childhood are important for children’s growth and development and for their future.

2. A correction of the a slight to physical education, sports and physical activities of parents of children, school teachers , a Society and the Ministry of Education and Culture of Japan should be changed.

3.The bringing up of the elementary school teachers who like physical education and have the good abilities of instructions of the curriculum and contents of physical education that they must instruct as a teacher.

4.Active Children are the children who have ‘physical health’, ‘mental health’, ‘emotional health’, ‘social health’, ‘intellectual health’, and ‘spiritual health’. These healthy are brought from proper physical activities in childhood.

## **Development of fundamental movement skills during childhood**

Prof. Reiko Sasaki

Institute of Physical Education, Keio University, Japan

How do children acquire movement in early childhood? During childhood, the acquisition of fundamental movement skills is developmentally sequenced. Motor behavior, including grasping, sitting, crawling, and walking, is believed to be acquired at a predetermined age, and motor development is perceived as a rigid, gradual unfolding of postures and movements attributed to the general process of maturation of the central nervous system.

It was recently found that children's basic competency of movement, including not only physical fitness but also motor coordination, is lesser than that of children in earlier times. It is very important for children to acquire and improve fundamental movement skills in their early childhood (e.g., the preschool period); to examine their development, for this, it is important to know a child's developmental status. Previous studies have indicated several variables for assessing children's development in movement by using product- and/or process-oriented motor skill assessments. Product-oriented motor skill assessments can be used to measure certain fitness parameters (such as strength and speed) as a part of the motor assessment, unlike process-oriented assessments that are concerned with the quality or technique of skill execution.

In this presentation, I will describe the developmental changes of certain fundamental movement skills such as locomotor skills, objective control, and rhythmical skills as a qualitative aspect. I will also discuss how the movement patterns change with increasing age. In addition, I will focus on the "temporal" aspect of movement in children.

Motor behavior is acquired through a range of active play experiences and structured programs. It has been suggested that motor performance does not improve linearly with age and that it is contingent on multiple internal and external factors such as biological, psychological, social, motivational, and cognitive factors. In this presentation, I will discuss some results of previous studies on the abovementioned relationship and factors.

## **Keynote Lecture 1: The Role of Exercise and Nutrition in Lifestyle-related Diseases**

Prof. Toshio Moritani

Graduate School of Human and Environmental Studies, Kyoto University, Japan

Japanese daily energy intake per person reached a peak value of 2,226 Kcal in 1975 and has since dramatically dropped to 1,902 Kcal in 2004 which is nearly identical to the value at immediate post World War II. However, since 1975 obesity has sharply increased despite this dramatic decline in energy intake. This may be, in part, the result of a “relative energy surplus” caused by a decline in energy expenditure far exceeding the decreased energy intake due to modern industrialization.

Bray (1990) has proposed the “MONA LISA” hypothesis, an acronym for Most Obesities kNown Are Low In Sympathetic Activity indicating that obesity is associated with a relative or absolute reduction in the activity of the thermogenic component of the sympathetic nervous system. It is now well recognized that “middle age obesity” is strongly associated with a depressed autonomic nervous system (ANS) activity and aging, particularly the sympathetic thermogenic responses to a high-fat diet and irregular food intake pattern.

Our series of studies have suggested a potential reversibility in ANS activity regulating fat metabolism and appetite control by regular exercise training in middle aged individuals and obese children with depressed ANS activity. In other words habitual exercise plays a vital role in enhancing not only fat and glucose metabolism, but also ANS activities in the prevention of obesity and appetite control. Recent studies have clearly indicated that exercising obese individuals have a much lower mortality rate and incidence of diseases than lean individuals with little or no exercise. A possible explanation could be the effects of exercise on immune functions and myocytokines in preventing and improving of lifestyle-related diseases.

Finally, our recent studies on functional muscle electrical stimulation on glucose utilization during hyperinsulinemic euglycemic clamp will be discussed together with the most recent topics on brain derived neurotrophic factors (BDNF) that appear to influence energy metabolism, appetite and aspects of neuro-cognitive function. These data strongly suggest that a lack of exercise as characterized by a sedentary lifestyle and an unhealthy diet may lead to accelerated ageing, diseases of the body and brain, and an overall decline in the quality of life.

**Symposium 3: A Direction of IOC Medical Commission**  
**-Disability Prevention and Rehabilitation-**

**Injury prevention in soccer - translating knowledge into practice**

Dr. Kathrin Steffen

Oslo Sports Trauma Research Center, Norwegian School of Sport Sciences, Oslo, Norway

Sport injuries are a significant health problem in children and adolescents. Though many well-designed intervention studies have been published in the peer-reviewed sports medicine literature, showing that injury risk can be reduced, the question that automatically should be raised is, why do sports injuries still happen? According to the literature, there are at least three possible answers to this question: there might be (1) a dissemination failure where the results (the effective intervention) have not reached the target audience, (2) a translation/adoption failure where the relevant information reached the key persons (eg, coaches and players), but is not understood by them and (3) a research relevance failure where the research findings are not directly relevant to the real-world scenario.

This presentation is addressing the importance of understanding the implementation context of successful injury prevention strategies. Examples are taken from Norwegian and Canadian community based soccer projects where a lower limb injury prevention warm-up program (11+) have been introduced to adolescent female soccer.

## **The WHO, WHAT, WHEN, WHERE of Knee Injury in Young Athletes: HOW we prevent it**

Dr. Greg Myer

Cincinnati Children's Hospital Medical Center, USA

Though specific subsets of athletes may be more susceptible to at risk knee positions during sports activities, the underlying causes for this increased susceptibility are not clearly defined. This course will synthesize in vivo, in vitro and computer simulated data to delineate the most likely mechanism(s) of ACL injury, and sequence the pathways which anatomical, hormonal and neuromuscular risk factors likely act synergistically to contribute to these “high risk” mechanisms. From these data, detailed neuromuscular “field” screening and training techniques will be presented that can be used to identify and target “high risk” athletes for the prevention of ACL injury.

### Learning Objectives:

- Synthesize in vivo, in vitro and computer simulated data to delineate the most likely mechanism(s) of ACL injury
- Sequence the pathways which anatomical, hormonal and neuromuscular risk factors likely act synergistically to contribute to these “high risk” mechanisms.
- Detail neuromuscular “field” screening techniques that can be used to identify “high risk” athletes
- Demonstrate techniques to target deficits in “high risk” athletes for the prevention of ACL injury.

## **Lumbar spine disorders in athletes and its prevention strategy**

Dr. Koji Kaneoka

Faculty of Sports Sciences, Waseda University, Japan

Low back pain (LBP) is a common symptom in athletes. LBP has various etiological factors in athletes, such as spondylolysis, lumbar facet pain, spinous process impingement, lumbar intervertebral disc (IVD) herniation, discogenic pain, sacroiliac joint disorder, and muscular pain.

When junior athletes with insufficiently matured laminar bones perform repetitive lumbar extension and rotational motions such as swinging a baseball bat, the stress force is concentrated at the pars interarticularis in the lamina and causes stress fractures (spondylolysis). Excessive extension and rotation motions also cause synovitis of the lumbar facet joint in adolescent athletes. LBP caused by these etiological factors is exaggerated during lumbar extension and in cases of excessive lumbar lordotic curvature.

Many studies have reported that excessive sports activity is a risk factor for lumbar IVD degeneration (dehydration of the nucleus pulposus), which causes discogenic LBP and IVD herniation. LBP caused by IVD disorders is exaggerated during lumbar flexion and in cases of decreased lumbar lordotic curvature. To prevent LBP in athletes, it is necessary to achieve lumbar stabilization and adequate spinal alignment.

**Lumbar stabilization:** Several recent studies have shown that the deep trunk muscles such as the transversus abdominis (TrA) and lumbar multifidus (MF) muscles contribute to maintaining lumbar stabilization, which decreases the stress on the lumbar spine during sports activities. A wide variety of lumbar stabilization exercises (LSEs) are performed in competitive sports; however, it is not clear which exercise is most effective for the deep trunk muscles. Therefore, we measured the deep trunk muscle EMG activities during some representative LSEs by using fine wire electrodes. We found that the TrA showed the greatest activity during the prone bridge posture with the elbow and toe touching the ground and the contralateral upper and lower extremities lifted, and the MF showed the greatest activity during the back bridge posture involving lifting of the lower extremity. These LSEs might help athletes in preventing LBP.

**Spinal alignment:** Lumbar lordotic curvature depends on the pelvic inclination angle; for example, when the pelvis inclines forward, the lumbar lordotic curvature increases and worsens the LBP caused by spondylolysis and facet synovitis. Therefore, to prevent LBP caused by these etiological factors, the pelvis should be inclined in the posterior direction, and for IVD disorders, the pelvis should be inclined in the anterior direction. The results of our wire EMG study showed that TrA activation causes posterior pelvic inclination and MF activation causes anterior pelvic inclination. Therefore, we think that the deep trunk muscles play an important role in controlling pelvic inclination and lumbar lordotic curvature.

## Young Investigator's Symposium A: Elite Athlete

### Achilles tendon stiffness and skeletal muscle energetics

Jared R Fletcher, Erik M Groves, Shane P Esau, Brian R MacIntosh

Human Performance Laboratory, Faculty of Kinesiology, University of Calgary, Calgary, AB, Canada

Recently, we observed a significant relationship ( $r^2=0.43$ ,  $p=0.02$ ) between the change in Achilles tendon (AT) stiffness and change in energy cost (EC) of running. It was concluded that AT stiffness and EC of running are labile and change together and that a higher AT stiffness is associated with a lower EC of running. During running, where very little pre-stretch of the medial gastrocnemius (MG) fascicles occurs, a stiff AT minimizes muscle fascicle shortening and/or shortening velocity. It was hypothesized that added compliance of the AT permitted extra shortening of the MG muscle fascicles during the contraction and this added shortening led to an increase in EC of contraction.

We then investigated the effects of muscle shortening on MG muscle energy requirement in a group of 19 trained runners. During 30 submaximal isometric (ISO) and isokinetic plantarflexions (KIN), MG fascicle length (FL) and shortening velocity were measured by ultrasound and EC of contraction was measured during blood flow occlusion using near-infrared spectroscopy. Compared to ISO, KIN resulted in significantly greater FL shortening ( $6.3\pm 1.9$  mm,  $p<0.001$ ), greater shortening velocity ( $1.6\pm 0.3$  FL $\cdot$ s $^{-1}$ ,  $p<0.001$ ) and greater EC of contraction ( $+19\pm 7\%$ ,  $p<0.01$ ), despite a lower mean torque ( $-19\pm 2\%$ ,  $p<0.001$ ) and lower mean impulse per contraction ( $-9.8\pm 1.6$  Nm $\cdot$ s,  $p<0.001$ ). Taken together, the energy required to maintain a given torque was greater in KIN compared to ISO ( $194\pm 38\%$ ). The energy required was also significantly related to the amount of shortening ( $r^2=0.2804$ ,  $p<0.001$ ) and the velocity of shortening ( $r^2=0.356$ ,  $p<0.001$ ). These results may explain the reported benefit of a stiff AT in reducing the EC of running since a stiff AT reduces the amount of fascicle shortening.

## **Study on the wrestlers' specialized psychological features and adjustment methods**

Chang Xu

Sports Science College, Shanghai University of Sport, Shanghai, China

Started with the features of Greco-Roman and freestyle wrestlings, guided by cognitive psychology, motion control and sports physiology theory, based on technical research service upon all of the 151 Chinese wrestlers while having their intensified training, this study probes into the component factors of wrestlers' psychological features and sets up relevant mental ability-monitoring index by applying psychological measurement and adjustment methods. A scientific adjustment approach lasted for 24 weeks has been adopted in pursuit of enhancing wrestler's competitive mental ability, improving adversity coping strategy and lastly promoting technical and tactical performance.

Experimental results: The training results in abilities of esthesia pre-estimation, accurate response, attention allocation, competitive control and coping with adversity are perceived to have significant differences before and after training( $t=3.02$ ;  $t=3.32$ ;  $t=4.19$ ;  $t=-3.354$ ;  $t=-2.052$ ;  $P<0.01$ ). The results imply that there is a middle grade correlation between index of cognitive-anxiety state and Blood Urea(BU), Testosterone(T), Immunoglobulin G (IgG) and Immunoglobulin A(IgA) ( $r =-0.43$ ,  $r =-0.51$ ,  $r =0.51$ ,  $r =0.45$ ,  $P< 0.05$ ); middle grade correlation between degraded in the sense of accomplishment and Testosterone(T), ratio of Testosterone to Cortisol (T/C) ( $r =-0.49$ ,  $r =-0.51$ ,  $P < 0.05$ ). The correlativity between the wrestler's successful times of prime technical action and psychological monitoring index is analyzed. The results indicate that altitude grade correlation between the successful times of bridge or back lift-hold technical action and pre-estimation of time esthesia( $r =0.67$  ;  $r =0.65$ ,  $P< 0.01$ ); and middle grade correlation with the index of determination( $r =0.48$ ,  $r =0.49$ ,  $P< 0.05$ ); and middle grade correlation between the index of automatization and active mobilization and the successful times of technical action of circle shoulder and neck ( $r =0.47$ ,  $r =0.51$ ,  $P< 0.05$ ).

Conclusion: The mental ability of Greco-Roman wrestler consists of abilities of competitive control, coping with adversity, self-regulation, attention allocation, accurate response and esthesia pre-estimation. Wrestler's athletic abilities and the performance of technique and tactics are related. The enhancement of competitive abilities can obviously improve wrestlers' technical actions.

Competitive training can obviously improve abilities of esthesia pre-estimation, attention allocation and coping with adversity. Wrestler's psychological state and physiological state can interact with each other.

Mental regulating can effectively improve wrestler's psychological and physiological fettle of pre-competition. It ensures the performance of technique and tactics in competition.

## **Protection for eccentric exercise-induced muscle damage**

Trevor C. Chen<sup>1</sup>, Kazunori Nosaka<sup>2</sup>

<sup>1</sup> Department of Physical Education, National Chiayi University, Taiwan

<sup>2</sup> School of Exercise and Health Sciences, Edith Cowan University, Australia

Exercises consisting of eccentric contractions (ECC) result in muscle damage characterized by delayed onset muscle soreness and prolonged decreases in muscle function. It is important to note that the susceptibility of muscles to ECC-induced muscle damage (EIMD) is muscle dependent such that leg muscles are less susceptible to muscle damage when compared with arm muscles (Chen et al. *Eur J Appl Physiol.* 2011). EIMD occurs to when the volume or intensity of training is increased, or after a match/competition; however the extent of muscle damage in elite athletes is likely to be less compared with “untrained individuals,” because of protective effect conferred by training or previous experiences. This protective effect is referred to as the repeated bout effect. We have been reporting some interesting and important findings about the repeated bout effect better in the last five years.

1) The greatest protective adaptation was induced after the first maximal eccentric exercise (Max-ECC) bout, and subsequent bouts (2nd–4th) performed every 4 weeks produce little effect (Chen et al. *Eur J Appl Physiol.* 2009). 2) A submaximal ECC using a dumbbell of 40% maximal isometric strength (MVC) reduced the changes in indirect markers of muscle damage by 20%-60% after subsequent Max-ECC performed 2 week later (Chen et al. *J Appl Physiol.* 2007). 3) Four bouts of submaximal (40%) ECC performed every 2 week conferred a similar protective effect to one bout of Max-ECC that was performed 2 week later (Chen et al. *Med Sci Sports Exerc.* 2010). 4) A low-intensity ECC that did not change any indirect markers of muscle damage attenuated the magnitude of muscle damage induced by Max-ECC that was performed 2-14 days later, but the effects was attenuated between 7 and 14 days (Chen et al. *Eur J Appl Physiol.* in press). 5) 2 maximal isometric contractions at a long muscle length conferred potent protective effect against EIMD, and the effect was greater for 10 maximal isometric contractions (Chen et al. submitted). 6) A 8-week static stretching or proprioceptive neuromuscular facilitation training attenuated muscle damage induced by Max-ECC (Chen et al. *Med Sci Sports Exerc.* 2011).

These studies suggest that muscles have strong adaptive capability to EIMD. Thus, to minimize muscle damage, it is recommended to precondition muscles by flexibility training, isometric contractions at a long muscle length, or low-intensity ECC.

**Whole-body action-perception coordination dynamics:  
A study of skilled street dancers and non-dancers**

Akito Miura<sup>1,2</sup>, Kazutoshi Kudo<sup>1</sup>, Kimitaka Nakazawa<sup>1</sup>

<sup>1</sup> Graduate School of Arts and Sciences, The University of Tokyo, Japan

<sup>2</sup> Japan Society for the Promotion of Science, Japan

The aim of this study was to investigate whether whole-body action-perception coordination is governed by dynamical organizing principles using basic street dance movement. In experiment 1, 9 skilled street dancers including 1 international champion (dancers) and 9 novices (non-dancers) performed 2 movement patterns: knee-flexion-on-the-beat (down movement) and knee-extension-on-the-beat (up movement) in the standing position, and they did not intervene in the pattern change. The beat rate increased/decreased between 60 and 220 beats per minute (bpm) in steps of 20 bpm. The relative phase between knee movements and the beat were calculated. In the ascending beat rate condition of the up movement, phase transition from up movement to down occurred at averages of 125 bpm in non-dancers and 166 bpm in dancers. Hysteresis effect was also observed. In experiment 2, 8 dancers including 1 international champion and 9 non-dancers performed down and up movements over a wide range of frequencies, and had an intention to keep the prescribed coordination pattern. The beat rate is 40 to 180 bpm in steps of 20 bpm, and 1 beat rate was used in each trial. As a result, non-dancers showed unintentional replacement of up movement by down movement at high movement frequencies. On the contrary, dancers could resist the unintentional replacement of up movement by down movement at high movement frequencies. These results suggest that whole-body action-perception pattern formation is governed by general dynamical principles, and that motor learning of whole-body action-perception coordination is construed as overcoming intrinsic constraints imposed on the coordinated movement.

## **Impact parameters determining the direction of the batted ball in opposite-field hitting**

Shuji Kidokoro<sup>1</sup>, Shoji Konda<sup>2</sup>, Taku Wakahara<sup>2</sup>, Toshimasa Yanai<sup>2</sup>

<sup>1</sup>Graduate School of Sport Sciences, Waseda University, Japan

<sup>2</sup> Faculty of Sport Sciences, Waseda University, Japan

A baseball field can be divided into three equal areas; same, center and opposite fields. The batter's ability to hit the ball to the opposite-field is an important skill, and there are several situations that require the batter to hit the ball towards the opposite-field, notably the hit-and-run or productive out play. Effective batting skills necessary for hitting the ball to the opposite-field, however, are not understood completely. The purpose of this study was to examine the kinematic parameters of ball impact that determine the initial velocity of the batted ball in opposite-field hitting.

Sixteen collegiate baseball players participated in this study. Each player performed ten trials of opposite-field hitting with maximal effort. Behavior of the ball impact was recorded with three high-speed cameras (1000 fps). All trials in which the batted ball travelled toward the opposite-field, and the flight distance of 40 m or longer, were used for the analysis. The horizontal bat angle was defined as the angle between the center line of the field and the long axis of the bat projected onto the horizontal plane at the instant of impact. Similarly, the vertical bat angle was defined as a downward angle of the long axis of the bat.

The horizontal component of the initial velocity of the batted ball was directed to the opposite field by  $24.3 \pm 8.4$  degrees from the center line of the field. The horizontal bat angle was  $7.7 \pm 7.6$  degrees towards the catcher. These results indicate that the angle of reflection (approx.  $16.6^\circ$ ) was larger than the angle of incidence (approx.  $7.7^\circ$ ). The bat head was located at a lower position than the grip end and the vertical bat angle was  $27.9 \pm 6.0$  degrees. Mechanically, this vertical angulation of the bat could cause, by itself, the batted ball to travel towards the opposite field if the ball is impacted to the upper half of the bat. The initial velocity of the batted ball in opposite-field hitting was determined by a combined contribution of the horizontal bat angle and the vertical bat angle at the instant of impact.

## **Young Investigator's Symposium B: Education and Media**

### **Exploring the National Identities of England's Sporting Heroines**

Alison Bowes, Alan Bairner

School of Sport, Health and Exercise Sciences, Loughborough University, UK

Media analysis has long been used to explore concepts of national identity within sport; Michael Billig (1995) in particular highlights the role of the national sporting press in 'national flagging', using terms such as 'we' and 'us' to link the national sports teams to national populations. As such, the sporting pages actively define, redefine and repeat national stereotypes. However, in England these are distinctly masculine. What about England's national heroines of sport?

Following interviews with England's sporting women, this research also utilizes the use of media texts in analyzing the concept of national identity within England, and subsequently critiques it. The critique stems from the overuse of media analysis in research on national identity, coupled with the lack of visibility of national sporting heroines in the English popular press. As such, alongside a discussion of media, I present extracts from interviews conducted with England's sporting women on their experiences, subsequently allowing the women to become active participants in the exploration of the complexity of national identity.

## **Understanding coach education and learning**

Anna Stodter, Chris Cushion

School of Sport, Health and Exercise Sciences, Loughborough University, UK

Sport coaches' significance in athlete skill development has sparked recent interest in improving the quality of coach education. Nevertheless, only one study has directly assessed the impact of a coaching course on an attendee's knowledge and practice (Gilbert & Trudel, 1999), while most of the limited research on how coaches learn relies on cross-sectional 'opinionnaires'.

This research improves on existing approaches by tracking groups of coaches through their education on an English National Governing Body coaching course. It aims to evaluate course operation and wider coach learning using multiple methods including participant observation, questionnaires, and 'think aloud' stimulated recall interviews.

Observations and semi-structured interviews indicated that the NGB coach education course centred mostly on group work and participation in practical sessions as an athlete. Candidates varied in engagement, yet particularly valued practical coaching experience and tutor feedback. Coaches adopted the language of the course, and reported learning around different intervention styles and practice structures. Further findings on the structure, design and delivery of the course will be presented, with reference to adult learning principles. This will be linked to candidates' changing cognitive processes and coaching behaviours over time.

More rigorous, mixed methodologies like the one used in this study are required to allow convincing conclusions about the mechanisms of coach learning and its impact on practice. Inferences are intended to guide future programme improvements, with the ultimate aim of producing more effective coaches to play positive roles in youth athlete development.

## **An overview of sport pedagogy in people's republic of China**

Shi-hong Li

Department of physical education and training, Shanghai University of Sport, China

Sport Pedagogy is originated in the Federal Republic of Germany in the 1960's. With the development of academic exchanges between PRC and Germany, Sport pedagogy developed from the 1980's in PRC, which has made some valuable research achievements and has formed its own characteristics through the efforts of researchers in nearly thirty years.

This article tries to put the achievements in this field in on the map from four points: the basic concept, research object, research content and research method.

The first, as for basic concept, researchers generally consider sport pedagogy is the discipline which researches the educational process during physical activity.

The second, as for research object, researchers generally consider sport pedagogy is the discipline which mainly concern physical education in school.

The third, as for research content, researchers generally consider sport pedagogy is the discipline which should involve two aspects: one is introduction which include the social context of sport pedagogy, nature of sport pedagogy and so on; the other is the discussion, which main concern the issues of physical education in school that involves teachers, students, curriculum reformed,etc).

The fourth, as for research method, researchers generally consider sport pedagogy is the discipline which should use multi-disciplinary research methods that not only empirical research methods limited, but also humanities research methods extended in the process of research.

**Reception and effects of mass-mediated sport:  
An analysis and multi-methodological approach**

Christian von Sikorski<sup>1,2</sup>

<sup>1</sup>Research fellow at the Graduate School of *Media, Mind, and Movement*

<sup>2</sup>Researcher, Institute of Communication and Media Research German Sports University,  
Cologne, Germany

Over the last decades, communication research strongly focused on news journalism and only rarely considered sports communications and especially its effects on recipients (Schierl, 2011). Firstly – focusing on the recipient – the motivations and possible gratifications of a recipient's media sports reception will be explored. Recipients' strong demand for mediated sports shall be analyzed from both an entertainment theoretical and social-psychological perspective.

With the help of entertainment theory, recipients' media sports reception will be conceptualized as pleasurable/enjoying (Raney & Depalma, 2006), while presuming a specific (triadic) fitting for experiencing sports-entertainment (Früh, 2002).

From a social-psychological perspective, sports stars' relevance for the reception process and the aspects of identification, orientation, integration, and para-social interaction/relation (Schierl, 2009) will be observed.

Secondly, the effects of sports, respectively of sports communications on recipients will be empirically analyzed on the basis of experimental research data. With the help of different methodological approaches (e.g. eye-tracking/subliminal priming), it will be shown what effects the concept of sports has on a recipient's person perception. Furthermore, the effects of sports stars on a recipient's decision behavior in media reception will be analyzed.

Moreover it will be shown what effects different sports endorsers displayed in a print advertising have on a recipient's information processing and eye-movements (von Sikorski, Oberhäuser & Möller, 2010).

Furthermore, it will be observed how (visual) news frames affect recipients' attitudes towards athletes (von Sikorski et al., 2012; von Sikorski & Schierl, 2011) and the recipients' understanding and importance considerations regarding a certain sports news issue at stake.

## **The historical research on Chinese university's top sport**

Zhen Guo<sup>1</sup>, Hidenori Tomozoe<sup>2</sup>, Teruya Watanabe<sup>2</sup>

<sup>1</sup> Graduate of Sport Sciences, Waseda University, Japan

<sup>2</sup> Faculty of Sport Sciences, Waseda University, Japan

This paper applies historical literature method to study Chinese university's top sport. During different Chinese politics system, top sport at colleges or universities has different expressional status. From the late Qing to the Republic of China, some Christian colleges or universities built kinds of sport club, which introduced the western world's sport into China. Meanwhile, some national and private universities imitated Christian university to build sport club. Chinese athletes who were almost students at universities took part in the world competition games such as the Far Eastern Championship Games and the Olympics Games. After the foundation of the People's Republic of China, government established special bureaucracy to administrate sport, 'whole country support for the top sport system' was gradually formed. Although Chinese university's top sport club started building at certain universities through series official documents, university's top sport became into subordinate, it would lose some values that we could not understand why it existence because it could not reflect high level sport.

The paper's conclusions are that: a) sports were introduced into China through the Christian school, guided the development of Chinese sport in the late Qing. b) university's sport reflected national highest athletics level in the Republic of China. It was also the main force in kinds of Games. c) 'whole country support for the top sport system' represented Chinese top sport in the People's Republic of China. The concept of university's top sport became ambiguous, how to explain it was a difficult problem.

## **National identity and sporting stereotypes in Chinese press coverage of Chinese versus foreign athletes**

Yiyin Ding<sup>1</sup>, Lee Thompson<sup>2</sup>

<sup>1</sup> Graduate of Sport Sciences, Waseda University, Japan

<sup>2</sup> Faculty of Sport Sciences, Waseda University, Japan

“Nation” carries the meaning of being born and by extension a group united by common origins. Diverse discussions have explored geographical, linguistic, biological, traditional and cultural aspects of the definition of “origins.”

Based on past research orientations this research proposes the following hypotheses: Modern sports discursive networks -especially coverage of foreign and Chinese athletes express interpretations of the relative economic and political status of modern China in the world and her relations with other countries and regions.

To test the above hypothesis, this research intends to conduct a content analysis of news reports concerning Chinese and foreign athletes carried by major printed sources in China including: Titan Sport and the People’s Daily. Titan Sport is the best selling privately owned sports newspaper and the People’s Daily is one of the Chinese Communist Party’s (CCP) leading mouthpieces.

This research intends to search for related sport articles and/or headlines containing the word “强/强大” (pingyin: qiang da, meaning strong, powerful, energetic in Chinese) in these printed sources. “Qiang da” is one of the most frequently used expressions in Chinese and always meant to show power and dominance. It is commonly used when comparing two opponents. Through my observation of sports coverage concerning Chinese and foreign athletes this term appears to be used more often in relation to foreign athletes. This research will also analysis other possible variables and discusses possible orientations in these selected news coverage.

## **Young Investigator's Symposium C: Sport and Brain**

### **EEG gamma oscillations during sensorimotor performance in athletes and non-athletes**

Andreas Mierau, Matthias Hannemann, Thorben Hülsdünker, Julia Mierau, Strüder, Heiko K  
Institute of Movement and Neurosciences, German Sport University, Cologne, Germany

Athletes can achieve striking sensorimotor skills after years of extensive training. So far, only little is known about the mechanisms underlying such skilled performance. Recent studies focused on alpha (about 8-12 Hz) and beta (about 14-30 Hz) rhythms of the EEG during sensorimotor task execution in athletes and non-athletes. It was suggested that alpha power is related to sensorimotor performance in athletes. In addition, athletes showed less cortical activation during task performance than non-athletes which was interpreted as “neural efficiency”. However, the available literature provides strong evidence that motor behavior is characterized not only by changes in alpha and beta but also in gamma power. Therefore, the present study focused on the power in the gamma-1 (30-35 Hz) and gamma-2 (35-40 Hz) frequency bands over the primary sensorimotor cortex contralateral to the right arm/hand (electrode C3) during air pistol shooting in athletes and non-athletes for high and low scores, respectively. As expected, athletes performed significantly better on the task compared to non-athletes (mean values for high/low scores: athletes 9.9/6.8; non-athletes 9.1/3.1). Both, gamma-1 and gamma-2 power were significantly lower in athletes compared to non-athletes. Furthermore, gamma-1 power was significantly lower in high scores compared to low scores in the time periods -1000 to -500 ms and -500 to 0 ms prior to the shot. Our findings suggest that gamma oscillations of the primary sensorimotor cortex are related to sensorimotor performance.

## **Yoga for Cancer Survivors**

Mackenzie MJ<sup>1</sup>, Wurz AJ<sup>1</sup>, Wytsma K<sup>1</sup>, Krenz KA<sup>1</sup>, Culos-Reed SN<sup>1, 2, 3</sup>

<sup>1</sup> Faculty of Kinesiology, University of Calgary, Calgary, AB, Canada

<sup>2</sup> Department of Oncology, Faculty of Medicine, University of Calgary, Calgary, AB, Canada

<sup>3</sup> Department of Psychosocial Resources, Tom Baker Cancer Centre, Canada

Research has shown numerous physical and psychological benefits of an active lifestyle for cancer survivors. Preliminary Yoga research supports the utility of Yoga for cancer survivors. Yoga Thrive is a research-based community program for cancer survivors and support persons. To date, over 300 participants in Calgary and 100 in rural Alberta have enrolled in the program. Participants report significant benefits in quality of life, psychosocial, physical and symptom indices. To ensure Yoga Thrive is delivered efficiently with maximal potential benefits to participants, our research team has evaluated the program since 2002 and continues to examine novel research questions.

Emerging research from our lab explores the psychological and physiological mechanisms by which benefits from Yoga practice are accrued. Preliminary findings from our current studies suggest 1) significant changes from baseline for measures of affective valence, arousal, associative attention, perceived exertion, heart rate and parasympathetic activity throughout a single Yoga session; 2) participant affective valence and associative attention improve consistently pre-post Yoga class and over time (seven-week Yoga intervention); 3) participation in an ongoing community-based Yoga program significantly improves indices of mood, affect, stress symptoms, facets of mindfulness, functional quality of life and fatigue.

Before Yoga can be broadly applied within psychosocial oncology, carefully designed research that evaluates not only the efficacy of Yoga in oncology settings but also posits potential mechanisms of action underlying these interventions is required. Ongoing studies address this research gap, providing a foundation to more fully explore the applications and benefits of Yoga for cancer survivors.

## Neurofeedback Training Effects on Sport Performance

Ling-Chun Chen<sup>1</sup>, Chung-Ju Huang<sup>2</sup>, Tsung-Min Hung<sup>1</sup>

<sup>1</sup> Department of Physical Education, National Taiwan Normal University, Taiwan

<sup>2</sup> Graduate Institute of Sports Pedagogy, Taipei Physical Education College, Taiwan

Neurofeedback training (NFT) is able to enhance performance in athletes (Hammond, 2007). First the relationship between specific cortex activity and peak performance must be indentified, and then there is further individual training to mirror ideal cortical activity.

Based on previous reports in which marksmen exhibited an increase in T3  $\alpha$  activity during the preparatory period of shooting, Landers et al., (1991) found that T3 slow wave training enhanced performance. Lin (2004) replicated these results, finding that archery performance improved after six sessions of NFT on T3 $\alpha$ . Adding to these two studies that showed only change in motor performance and not in EEG, Wang (2006) found change in the expected direction for both motor performance and EEG after 16 sessions of NFT on T3  $\alpha$ .

It seems that NFT helps athletes control cortical activity to improve performance. However, a personalized approach which considers task demands and individual needs would be keeping in line with the trend of personalized medicine in clinical treatment.

Arn et al. (2007) found that each individuals exhibit different EEG profiles for successful vs. unsuccessful golf putting, with most participants improving in performance after NFT for their personalized EEG profile. However, carry-over effects from the reversal designs of the study limit the power of explanation.

Huang (2010) and Kao (2011) adopted a single-subject multiple baseline design to investigate whether Cz  $\alpha$ ERD and Fm  $\theta$  NFT works in golf putting. The results demonstrated that NFT was effective on improving putting performance, but the way in which it impacts cortical activity is still unknown.

Based on these findings, future studies examining the efficacy of NFT on motor performance should strive to: a) clarify the independence of training effects: whether only the trained site should be changed or might other sites be affected, b) examine the difference between NFT responders and non-responders to see if it is due to training protocol or participants' characteristics, c) develop various protocols to match different sports and tasks, and d) understand the benefits of NFT in comparison to other training techniques.

## **Effect of somatosensory inputs on the spinal reflex excitability during walking**

Tsuyoshi Nakajima<sup>1,2</sup>, Kiyotaka Kamibayashi<sup>3</sup>, Kimitaka Nakazawa<sup>4</sup>

<sup>1</sup> Japan Society for the promotion of Science

<sup>2</sup> Department of Rehabilitation for the Movement Functions, Research Institute, National  
Rehabilitation Center for Persons with Disabilities, Japan

<sup>3</sup> Graduate School of Systems and Information Engineering, University of Tsukuba, Japan

<sup>4</sup> Graduate school of Arts and Sciences, The University of Tokyo, Japan

Spinal reflexes are known to be strongly modulated in a phase- and task-dependent manner during walking in both human and cat. However, it is not clear whether afferent feedback from leg plays a more important role in regulating this modulation in the leg and arm muscles. Therefore, this symposium mainly describes the recent findings concerning the effect of somatosensory inputs on the excitability of cutaneous reflex and H-reflex pathways during robotic-assisted stepping using Lokomat®. In addition, short-term plasticity of the spinal reflex circuits after 30 min passive stepping is mentioned. As a conclusion remarks with these findings, the implication of locomotor rehabilitation for individuals with spinal cord injury is also discussed.

## **The effects of exercise on cognitive function**

Seongryu Bae<sup>1</sup>, Hiroaki Masaki<sup>2</sup>

<sup>1</sup>Graduate School of Sport Sciences, Waseda University, Japan

<sup>2</sup>Faculty of Sport Sciences, Waseda University, Japan

Recent electrophysiological studies using event-related potentials (ERPs) suggested that physical activity have a favorable influence on cognitive function. We will introduce the studies that investigated the effects of acute exercise and regular physical activity on cognitive function in young and older adults.

In study 1, we investigated the effects of acute aerobic exercise on the executive control in 30 young adults ( $21.3 \pm 1.3$  years). Participants performed a task switching paradigms which involve switching between two different tasks, after 30 minutes moderate exercise on a treadmill and a seated rest respectively. Reaction time, response accuracy, P3 latency, and P3 amplitude were measured as indicators for executive control. Results showed smaller switching costs on reaction time and P3 latency for the exercise condition relative to the seated rest condition. P3 amplitude was larger for the exercise condition than the seated rest condition. These findings suggest that acute aerobic exercise might facilitate executive control including working memory and mental flexibility. In Study 2, we investigated the relationship between daily physical activity and response inhibition control in 28 older adults ( $70.6 \pm 3.8$  years). Daily physical activity (PA) was measured using an accelerometer. Participants were divided on the basis of their step count into “Higher PA group” and “Lower PA group”. Cognitive function was evaluated by reaction time and NoGo-P3 amplitude while they performed a Go/NoGo task. The results indicated that the Higher PA group exhibited shorter reaction time on Go trials, relative to the Lower PA group. NoGo-P3 amplitude was larger in the Higher PA group compared to the Lower PA group. These findings suggest that daily PA should help prevent age-related declines in response inhibition control.

## **The factors of the constraint on multi-limb coordinated movement.**

Kento Nakagawa<sup>1</sup>, Tetsuro Muraoka<sup>2</sup>, Kazuyuki Kanosue<sup>3</sup>

<sup>1</sup>Graduate School of Sport Sciences, Waseda University, Japan

<sup>2</sup>College of Economics, Nihon University, Japan

<sup>3</sup>Faculty of Sport Sciences, Waseda University, Japan

In various situations in daily life as well as in sports, humans perform complex actions that require the coordination of multi-limb movements. Previous studies have shown that difficulty appears when two limbs are moved simultaneously in “different” directions, whereas the difficulty almost never appears when movements are in the same direction. Additionally, the difficulty depends on the combination of two limbs. To investigate the factors involved in these constraints of multi-limb movement, we compared performances between the movements of two limbs actively-moved by the subject, and the movements of one limb actively-moved by a subject and of another limb passively-moved by an experimenter. In both conditions, movements in the same and opposite directions were executed. When one limb was passively moved, actively moving another limb in the same direction as that of the passively moved limb was easy, whereas moving in the opposite direction was difficult. These results suggest that perception of the feedback information from two limbs would be the critical factor for the constraint. Additionally, when two limbs are moved actively, difficulty of the movements changes depending on the combination of limbs. But the difficulty becomes almost the same in any combination of two limbs when one limb is moved passively. This suggests that the neural mechanisms of voluntary coordinated movement differ substantially depending on the combination of two limbs.

## **Keynote Lecture 2: The role of newspapers in the development of the championship system in Sumo, 1885-1909...and who cares?**

Prof. Lee Thompson

Faculty of Sport Sciences, Waseda University, Japan

The symbiotic development of sports and the media from the late 19th century onward has been widely demonstrated. It is perhaps less well known that such so-called “traditional” sports as Japanese sumo also developed in close relationship with the media. Sumo was regularly performed for paying customers in the large cities of Japan from at least the 17th century, and the current organization has its roots in the mid-18th century. However, these performances were not organized to determine an individual champion based on record. From the late 19th century, newspapers began to recognize individual wrestlers for their achievement in the periodic tournaments. Initially wrestlers were awarded prizes for going undefeated over the course of a tournament. The criteria for the awards were gradually changed to produce an individual champion. This presentation will examine the development of the championship system in sumo and the role played by newspapers therein.

In addition, this presentation will also attempt to respond to the venue--wherein many in the audience, while studying in Japan, will be presenting their future research, often conducted on yet a third country, in English, their second language--by addressing the general question of presenting research conducted on one society (and language) to yet another.