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**JSPS-JSC Collaborative Symposium**  
**Cultivating UK-Japan Research Collaboration through Sports**

[Purpose] To explore how primary research translates to sports and in doing so develop UK-Japan collaborations across a wide range of fields

[Date] 18/12/2015

[Venue] Loughborough University London Campus

\* This event is also supported by The JSPS London network for Japanese Researchers Based in the UK (JBUK) and the JSPS Alumni Association of the UK and the Republic of Ireland

13:00 Opening remarks

Prof. James Skinner (MC) – Director, Institute for Sport Business, Loughborough University London  
Prof. Kunio Takeyasu – Director, JSPS London

13:10 Sport Science: KEYNOTE

“Research and Innovation in High Performance Sport: Innovations for Rio”  
Ms. Naomi Stenhouse – Head of Projects and Performance, The English Institute of Sport

13:40 Session ① Sports Medicine

“Mass Spectrometry – from Cardiovascular Disease to Sport Medicine”  
Prof. Toru Suzuki – Department of Cardiovascular Sciences, University of Leicester

14:00 Session ② Recovery

“Sports and Cryotherapy”  
Dr. Michiko Dohi – Medical Centre, Japan Institute of Sports Sciences, Japan Sport Council

14:20 Comfort Break

14:30 Session ③ Biomechanics

“Quantification of the Motion Generating Mechanism for Improving Sports Performance”  
Associate Prof. Sekiya Koike – Sports Technology Institute, Loughborough University/ University of Tsukuba

14:50 Session ④ Equipment Development

“Additive Manufacturing and 3D Printing in Sport”  
Dr. Ruth Goodridge – Assistant Professor, Faculty of Engineering, University of Nottingham

15:10 Poster presentation session

- a. “Three Patented Technologies of Kyoto University that Could Innovate Sports Scenes”  
Presenter: Professor Takashi Matsuura – Kyoto University, European Centre, London Office
- b. “A Review of Practices of Olympic and Paralympic Education in Japan- for TOKYO 2020”  
Presenter: Associate Professor Akiyo Miyazaki – School of Sport Exercise and Health Sciences, Loughborough University / University of Tsukuba
- c. “Transtibial Prosthetic Comfort: Can a Passive Thermally Dissipative Liner Solution Reduce Heat Related Issues?”  
Presenter: Mr. Rhys Williams – Institute of Biomedical Engineering, University College London
- d. “Gaze Shift Patterns During a Jump with Full Turn in Gymnasts”  
Presenter: Dr. Yusuke Sato – Sports Biomechanics and Motor Control Research Group, Loughborough University/ Nihon University
- e. “The Relationship Between Grip Size and Grip Firmness and Racket Head Speed in Tennis”  
Presenter: Mr. Jonas Christensen – Sports Technology Institute, Loughborough University
- f. “Cooling Improves Table Tennis Performance Amongst Elite Young Players”  
Presenter: Mr. Terun Desai – Department of Psychology and Sport Science, University of Hertfordshire
- g. “Monitoring of Acoustic Emissions from Knee Joints”  
Presenter: Mr. Ivan Vatolik – Faculty of Science, Engineering and Computing Kingston University London

15:30 Coffee Break



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- 15:50 Social Sciences around Sport: KEYNOTE  
“Evaluating Legacy of Mega-Sporting events: Lessons from London 2012 Meta-Evaluation”  
Prof. Ian Henry – Director, Centre for Olympic Studies and Research, Loughborough University
- 16:20 Session ⑤ Sport Economics  
“Economic and Social Benefits of Hosting Major Sports Events”  
Prof. Chris Gratton – Co-director of Sport Industry Research Centre, Sheffield Hallam University
- 16:35 Session ⑥ Sport Participation  
“Inspiration of Mega-Sporting Events for Sports Participation”  
Ms. Hiromi Nakamura – Researcher in London/ Section Chief, Department of Information & International Relations, Japan Sport Council
- 16:50 Session ⑦ Sport for Development and Peace  
“Sport for Development and Peace (SDP) and its public interest”  
Ms. Etsuko Yamada – Japan Sport Council / Programme Officer, United Nations Office on Sport for Development and Peace
- 17:05 Round Table Forum  
Prof. Ian Henry, Prof. Chris Gratton, Ms. Etsuko Yamada and Ms. Hiromi Nakamura
- 17:25 Closing remarks of Symposium  
Mr. Soichiro Sano – Deputy Director, JSC London
- 17:35 Group Photo
- 18:00 -19:00 Opening of Evening Reception and Poster Prize Announcement  
Dr. Ruth Goodridge – Chair of JSPS Alumni Association



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## **SYMPOSIUM PRESENTATION ABSTRACTS**



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## **Research and Innovation in High Performance Sport: Innovations for Rio**

Ms. Naomi Stenhouse, Head of Project and Performance, The English Institute of Sport

### **Abstract:**

The performance advantage of an innovative approach to both technique and equipment is well illustrated. Dick Fosbury in the high jump and Graham Obree in cycling are just two of the more well-known examples. Now the challenge is on to look at ways that British innovators can help us in our quest for medal success.

The EIS Research & Innovation team goal is to maximise performance gains for GB athletes through an innovative approach to delivering performance solutions. The team works with external consultants who have a passion for both innovation and GB success– harnessing the best of British expertise from the academic, industrial and commercial sectors.

With Rio 2016 less than a year away, this presentation will share insight into the process used and some of the challenges faced in looking for a performance edge through technology and equipment advances across Olympic and Paralympic Sports.

The presentation will outline

- Who/what the EIS Research & Innovation Team is
- What we do
- Process – how we prioritise our projects
- Challenges
- What is the athlete actually doing
- Case study·
- Equipment optimisation case study

### **Biography:**

Naomi has worked in elite sport for 15 years, in a variety of roles within the Performance Directorate at UK Sport and currently as Head of Projects and Performance Engineering at the English Institute of Sport. An engineering degree and a former life as an international netballer mean Naomi is well placed to translate between the sports and a GB wide network of engineering experts to seek out technology performance gains for athletes targeting medals in Rio and beyond.



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## **Mass spectrometry – from Cardiovascular Disease to Sport Medicine**

Professor Toru Suzuki, Department of Cardiovascular Sciences, University of Leicester

### **Abstract:**

Mass spectrometry is a technique that is used to identify qualitative and quantitative properties of analytes (e.g. metabolites, peptides). With applications ranging from use in identifying explosives to space exploration, it is one of the most advanced analytical techniques available today. It is also a common analytical technique used in sport medicine and in understanding pathogenic mechanisms of disease. In sport medicine, this technology is the mainstay of instrumentation for doping tests and played a powerful role in the London 2012 Olympic games. Equally, it is a powerful tool to understand molecular underpinnings of disease. As part of the Department of Cardiovascular Sciences at the University of Leicester, my research group has an interest in using mass spectrometry to understand pathophysiological mechanisms of disease ranging from the proteome to metabolome. In collaboration with Loughborough University, we have recently been awarded an MRC-sponsored study (molecular pathology node) to investigate whether exhaled volatile metabolites can be used to detect cardiorespiratory disease. As sports medicine is another field that our universities will be collaborating on through the National Centre for Sport and Exercise Medicine - East Midlands (NCSEM-EM) potential collaboration in this field using mass spectrometric approaches is also potentially viable.

### **Biography:**

Toru Suzuki is Professor/Chair of Cardiovascular Medicine at the University of Leicester and Honorary Consultant Cardiologist at Glenfield Hospital of the University Hospitals of Leicester NHS Trust. He was educated and trained at the University of Tokyo in Japan where he was based before moving to the United Kingdom in September 2014. He is an academic cardiologist with a research focus on cardiovascular disease, with a particular interest in aortic disease and in translational medicine. He is also an expert in biomarker development and discovery with a particular interest in mass spectrometry-based techniques in proteomics and metabolomics.



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## Sports and Cryotherapy

Dr. Michiko Dohi, Medical Centre, Japan Institute of Sports Sciences

### Abstract:

Recovery from fatigue by sports is important for the next performance in competitive sports athletes. Therefore a lot of recovery approaches are developed. Icing or cooling is one of the conventional and common recovery methods. Recently, cryotherapy for whole and local body using ultra low temperature (-110 to -140°C) is getting popular in sports for the purpose of recovery, pain-relieving and healing acceleration of sports injuries. The aim of this presentation is to introduce the mechanism and effectiveness of cryotherapy in sports by bibliographic consideration and our experiences with Japanese elite athletes.

### Biography:

Mar. 1991	Graduated from the Faculty of Medicine, Chiba University
Jun. 1991	Resident, Department of Radiology, Jikei University
Jan. 1994	Assistant, Department of Radiology, Jikei University
Aug. 1994	Scholar of French Government in Service Hospitalier Frederic Joliot, Committee of Atomic Energy
Jul. 1996	Assistant, Department above
Dec. 2002	Radiologist, Department of Sports Medicine, Japan Institute of Sports Sciences
Jan. 2004	Development Officer of Sports Medicine, Asian Football Confederation
Jan. 2006	Associated director, Department of Sports Medicine, Japan Institute of Sports Sciences
Oct. 2012~	Associated director, Medical Center, Japan Institute of Sports Sciences



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## **Quantification of the Motion Generating Mechanism for Improving Sports Performance**

Associate Professor Sekiya Koike, Sports Technology Institute, University of Loughborough/  
University of Tsukuba

### **Abstract:**

Since a human body consists of a large number of segments connected with joints, the mechanism of high speed swing motion would be non-intuitive due to an increase in the effects of nonlinear elements in multi-body dynamics. This presentation introduces examples of speed generation mechanisms in sports motions analysed by using an equation of human motion. With use of the equation, linear and angular accelerations of individual segments can be expressed by the sum of joint torque term, gravitational term, and motion-dependent term (M.D.T.). The contributions of joint torque term and the M.D.T. differ among sports motions; e.g. the joint torque term shows a large contribution in javelin throwing, and the M.D.T. is the largest contributor in the generation of head speed in tennis serve and baseball batting. In order to quantify the generating factors of the M.D.T., a recurrence formula is derived. With use of the recurrence formula, important joint torques and effective timings for exerting the joint torques can be quantified. In a baseball batting motion, as an example, the abduction torque of the grip-end side shoulder joint, at just after the middle of forward swing phase, contributes to obtaining a large head speed.

### **Biography:**

Associate professor, Faculty of Health and Sport Sciences, University of Tsukuba, Japan

Academic visitor at Sports Technology Institute, Wolfson School of Engineering,

Loughborough University (April, 2015 - March, 2016)

Academic background: PhD in engineering, Graduate Course in Mechanical Engineering,  
Tokyo Institute of Technology (March, 1995)

Academic Fields: Sports Biomechanics, Sports Technology, and Sports Engineering

Member of the Executive Committee for Division of Sports Engineering and Human  
Dynamics in Japanese Society of Mechanical Engineering

Member of the Executive Committee for Japanese Society of Biomechanics

Member of the Representative Assembly for Japanese Society of Physical Education



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## **Additive Manufacturing and 3D Printing in Sport**

Dr. Ruth Goodridge, Faculty of Engineering, University of Nottingham

### **Abstract:**

Additive Manufacturing and 3D-Printing have attracted much attention in recent years due to the advantages these technologies hold in the design and implementation of products. This presentation will examine some of the opportunities for using AM&3DP in sport and the research that is being undertaken to achieve this.

### **Biography:**

Dr Ruth Goodridge is an academic in the Additive Manufacturing & 3D-Printing Research Group at the University of Nottingham. She is an investigator in the EPSRC Centre for Innovative Manufacturing in Additive Manufacturing (CIMAM) and associated Centre for Doctoral Training (CDT) in Additive Manufacturing. With a background in Biomaterials and Bioengineering, Ruth has over 15 years experience in multidisciplinary research into Additive Manufacturing, in particular processing of new materials and healthcare applications.





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## **Evaluating Legacy of Mega-Sporting events: Lessons from the London 2012 Meta-Evaluation**

Professor Ian Henry, Director of Centre for Olympic Studies and Research, Loughborough University

### **Abstract:**

Over recent editions of the Olympic Games there has been an increasing clamour for legacy evaluation of greater scope and precision, implicitly addressing the question of whether it is worthwhile to host the Games. Against this background in 2007 the Labour government of the day took the relatively bold step of commissioning a *meta-evaluation* of legacy outcomes for the London 2012 Games, evaluating the extent to which the government and other stakeholders were able to deliver on Olympic legacy promises. The use of meta-evaluation involves both the summary evaluation of all the available evaluations of Olympic projects and programmes (and thus is effectively an ‘evaluation of evaluations’), and a synthesis of findings from these evaluations. It was described at the time as being of the “utmost importance” and as being “the single largest and most comprehensive evaluation exercise commissioned in connection with the event.” (Gough, G., Martin, P., Grant Thornton & ECORYS 2012). The study conducted by Grant Thornton Associates in partnership with ECORYS, Loughborough University and Oxford Economics, is thus of interest in terms of both its findings and methodology to scholars and policy makers in the Olympic field.

This presentation will deal with four key elements relating meta-evaluation in general and its application in the 2012 context, namely:

- The London Games and Legacy Promises;
- Meta-evaluation as an approach to assessment of Games legacy / impact;
- Metasynthesis of the evidence supporting one exemplar of a legacy claim, that hosting the Games would result in higher levels of participation in sport. Here we will specifically addressing difficulties of measurement associated with surveys at the national level, and programme and project Level and their (in)compatibility; the partial availability of evaluations; the quality of available data; and the quality of the evaluation methodology.
- Realist evaluation and causal attribution in the achievement of, or failure to achieve, policy outcomes.

The presentation concludes with a discussion of the strengths and limitations of the meta-evaluation approach and of implications for the evaluation of legacy and impact for Tokyo 2020 and future editions of the Games.

### **Biography:**

Ian Henry is Professor of Leisure Management and Policy and Director of the Centre for Olympic Studies & Research in the School of Sport and Exercise Sciences. He graduated from the University of Stirling in 1975 with a degree in English and Philosophy before completing a masters degree in Recreation Management (1976) and a PhD (1987) both at Loughborough University. From 1976-1980 he worked in facility management and sports administration in local government, before taking up lectureships at Ilkley College in 1980, Leeds Polytechnic in 1987 and Loughborough in 1989.

In 2001 he was Visiting Professor at l'Université Aix-Marseille II (l'Université de la Méditerranée), in 2006 at Hitosubashi University, Tokyo, in 2007 at University of Technology, Sydney (at the School of Sport, Leisure, and Tourism and the Australian Olympic Studies Centre) and at Taiwan National Sports University in 2009.



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## **Economic and Social Benefits of Hosting Major Sports Events**

Professor Chris Gratton, Co-director, Sport Industry Research Centre, Sheffield Hallam University

### **Abstract:**

Many governments around the world have adopted national sports policies that specify that hosting major sports event is a major objective. A broad range of benefits has been suggested for both the country and the host city from staging major sports events including: economic impact, urban regeneration legacy benefits, sporting legacy benefits, tourism and image benefits, social and cultural benefits.

This presentation looks at a model of the economic and social benefits generated by major sports events such as the summer Olympics or the Football World Cup. It looks at the evidence on the size and nature of these benefits from recent major events.

### **Biography:**

Chris Gratton is Emeritus Professor of Sport Economics and Director of the Sport Industry Research Centre at Sheffield Hallam University. He currently has six academic books in print the latest of which is *The Global Economics of Sport* which was published in 2012. His main research interests are: the estimation of the economic benefits of hosting major sports events; the estimation of the economic importance of sport including the construction of sport satellite accounts; and the analysis and modelling of large sport participation surveys.



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## **Inspiration of Mega-Sporting Events for Sports Participation**

Ms. Hiromi Nakamura, Researcher in London/ Section Chief, Department of Information and International Relations, Japan Sport Council

### **Abstract:**

“The Demonstration Effect” of mega-sports events that should increase sports participation at grassroots level, has been claimed as one of the great benefits of being a host country. However, no country has ever been able to enjoy such an advantage in the long-term, including Great Britain who hosted London 2012, Glasgow 2014 and RWC 2015. As the name of England’s youth sports strategy so called of *Creating a Sporting Habit for Life* (2012) shows, it is a crucial political agenda to be achieved through their legacy plan.

Academics confirm that sporting people would become more active thanks to the inspirations from the games. However, how can we move those who don’t like sport and eventually change their lifestyle towards a more active way? As the risk of sedentary lifestyle draws global attentions today, the solution for the question would be worth millions. As expected, it’s not an easy task, requiring a holistic approach that addresses the bio-psycho-sociological aspects of human behaviors. As *The Lancet* eloquently maintained in its issue of July 2012 -- just before the opening of London 2012 – we seek a way for social revolution to challenge this tough mission.

### **Biography:**

Hiromi has studied US foreign policies and its congressional decision-making process in Japan and America. She joined the Japan Institute of Sports Sciences, a division of the Japan Sport Council, in July 2010, then was transferred to its London office in August 2011. Since then, she has been responsible for the research at JSC on youth and community sports policies of Europe.

Hiromi is originally from Nishinomiya, Hyogo, Japan, where she was dreaming to be an Olympic swimmer. Now she lives in London and enjoys reading, hiking and travelling.



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## **Sport for Development and Peace (SDP) and its Public Interest**

Ms. Etsuko Yamada – Japan Sport Council / Programme Officer, United Nations Office on Sport for Development and Peace

### **Abstract:**

“Sport for Tomorrow”, a Japanese governmental programme towards the Tokyo 2020 Olympic and Paralympic Games, was launched in 2014 to promote the values of sport and the Olympic and Paralympic movement. In order to integrate Sport for Development and Peace (SDP) into national policy, firm rationale and evidence-based approach are required. Changes and results created through SDP activities can be seen in various forms at different levels: at individual, organizational and societal levels. For example, they can be the acquisition of life skills such as teamwork and respect; the reduction in gender stereotypes; the improvement of organizational capacity; the promotion of human rights; or the adoption of a resolution by the United Nations General Assembly.

The assessment of a programme is subject to the conditions at which point, at which level, for whom and by which indicators it is evaluated. The outputs, outcomes, impacts and legacy of a SDP programme should be defined clearly from the outset, the objectives need to be broken down into those measurable performance indicators as concretely as possible, and not only product or service but also process should be monitored and evaluated, which serves to show the public interest of and accountability for SDP.

### **Biography:**

Ms. Yamada earned a Masters of Public Policy at the Graduate School of Law, Tohoku University in Japan. After working for Lionbridge Global Sourcing Solutions Limited as an Internet Assessor, she joined the Japan Sport Council (JSC) in 2009. Until the London Olympics, she was engaged in a national project as an Intelligence Analyst to win more medals utilizing sport science, medicine and intelligence and worked closely with the Japanese Canoe Sprint team. A wide variety of information from sport policy to scientific evidence has been collected and analyzed. Ms. Yamada has been seconded from the United Nations Office on Sport for Development and Peace (UNOSDP) by the Japanese government, through JSC, since January 2014.



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## **POSTER SESSION ABSTRACTS**



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## **Three Patented Technologies of Kyoto University that Could Innovate Sports Scenes**

**Presenter:** Professor Takashi Matsuura, Kyoto University, European Centre, London Office

### **Abstract:**

Three patented technologies of Kyoto University are proposed to innovate sport scenes. “Human behaviour prediction” uses the time-dependent Relatedness concept, which you can try through “OMOLINK.JP” for assisting your favourite-choice. This has potential to give precautions for players and coaches in advance of the game, based not only on conventional statistics but also on dynamic conditions of players, pitch, weather, etc. “Cellulose nanofiber” composites are innovative materials for sporting goods that are strong, light-weight, applicable to plastics, rubber, fabrics, etc. “PUSH PROJECT” box is in use for cardiopulmonary resuscitation training as a lifesaving technique useful in heart attack, near drowning, etc.

## **A Review of Practices of Olympic and Paralympic Education in Japan- for TOKYO 2020**

**Presenter:** Associate Professor Akiyo Miyazaki, School of Sport Exercise and Health Sciences, Loughborough University / University of Tsukuba

### **Abstract:**

After the successful bidding for the Olympic and Paralympic Games 2020 in Tokyo, many trials of Olympic Education programmes have been started in Japan. For example the Japanese government (MEXT) has established the council of advisers in February 2015 and started ‘the Research and Study project’ of the Olympic and Paralympic Movement. Meanwhile, Tokyo Metropolitan Government has assigned 600 schools as the model schools to take part in this project in 2015. Furthermore, the Centre for Olympic Research and Education (CORE) created many model programs of Olympic Education to be taught in their attached schools. Thus relevant organizations have started spreading Olympic and Paralympic Education all over the country.

## **Transtibial Prosthetic Comfort: Can a Passive Thermally Dissipative Liner Solution Reduce Heat Related Issues?**

**Presenter:** Mr. Rhys Williams, Institute of Biomedical Engineering, University College London

### **Abstract:**

It is common for users of lower limb prostheses to report dissatisfaction with replacement limbs due to thermal discomfort. This problem occurs because the designs and materials used in prosthetics are conducive to heat and sweat build up in the liner-limb interface. Even light physical exertion and thermoregulation can result in an interfacial microclimate that can lead to skin degradation and subsequent cessation of prosthesis usage. In response to this, two potential ‘mini’ thermally dissipative liner designs have been prototyped and experimentally interrogated. Ultimately, it appears that a completely passive solution to this problem may not exist using current materials, but active solutions that harness mechanical ambulatory forces are a suggested direction for future research.

## **Gaze Shift Patterns During a Jump with Full Turn in Gymnasts**

**Presenter:** Dr. Yusuke Sato, Sports Biomechanics and Motor Control Research Group, Loughborough University/ Nihon University

### **Abstract:**

How do gymnasts use their vision to control their movements in the air? The aim of this study was to clarify the gaze shift patterns during a jump with full turn (360°) in gymnasts.



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Participants were male, skilled gymnasts. They performed the jump, during which gaze was determined by combining eye and head movement data. We classified research into two gaze shift patterns based on gaze data. In the one pattern, gymnasts stabilized their gaze before takeoff and during landing. In the other pattern, additional gaze stabilization developed during rotation. Each pattern might have different effects on regulation of movement.

### **The Relationship Between Grip Size and Grip Firmness and Racket Head Speed in Tennis**

**Presenter:** Mr. Jonas Christensen, Sports Technology Institute, Loughborough University

**Abstract:**

This study examined the effects of changing grip size and grip firmness on the geometric contribution of angular velocity (GCAV) during a topspin forehand. Tekscan 9811 pressure sensors were used to examine pressure on racket handles. Upper body kinematic data was obtained by using the Vicon motion capture system. This study managed to quantify the GCAV in a topspin forehand, with respect to changing of grip size and grip pressure in an elite male tennis player; - so proposed a new methodology to improve racket/player fit.

### **Cooling Improves Table Tennis Performance amongst Elite Young Players**

**Presenter:** Mr. Terun Desai, Department of Psychology and Sport Science, University of Hertfordshire

**Abstract:**

This study examined effects of thermoregulation and neck cooling during a simulated table tennis-specific protocol. Eight elite young male players (age 16  $\pm$ 2 years) completed the protocol with (ICE) and without (CON) cooling. Hitting accuracy at two targets across three exercise bouts determined performance. Skin and aural temperatures, heart rate, rating of perceived exertion, thermal sensation (TS) and Stroop tests were measured. Total performance scores significantly improved by 16  $\pm$ 12 shots, during ICE compared to CON (P=0.006). TS significantly decreased with cooling (P=0.03). Neck cooling potentially impacted the central governor by lowering TS and consequently perceived fatigue, thus improving performance.

### **Monitoring of Acoustic Emissions from Knee Joints**

**Presenter:** Mr. Ivan Vatolik, Faculty of Science, Engineering and Computing Kingston University London

**Abstract:**

Several studies have investigated the effects of different types of exercise on the knee cartilage and found that the cartilage undergoes significant changes in volume during exercise (Kessler et al., 2008; Eckstein et al., 2005). It has also been reported that the cartilage, due to its viscoelastic properties, returns back to its natural static state within 90 minutes of exercising.

Since the viscoelasticity is temperature dependent, studying the cartilage recovery patterns under a variety of conditions would be beneficial to the medical, athletic and scientific community. In addition, acoustic emission has recently proven to be a valuable tool in identifying knee osteoarthritis (cartilage degeneration) (Shark et al. 2010); therefore it could potentially be an inexpensive, accessible and portable tool to monitor cartilage deformation and its recovery after a variety of exercises under different load conditions. We report here recent work on the development of a system for the detection, monitoring and analysis of acoustic emissions from knee joints, with a view to using these for the early detection of the symptoms of osteoarthritis in sportspeople.