DAY 1: International Cooperation and Peace through Sport: Japan and the road to Tokyo 2020 Olympics

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Title	International Cooperation and Peace through Sport: Japan and the road to Tokyo 2020 Olympics
Abstract	Japan has a long history of involvement with the Olympic and sporting movements. It has made a significant contribution to the development of sport and physical education. However, until recently few organizations, institutions and individuals were involved in Japan in the field of the global sport movement, as well as in the Olympic and Paralympic movements. The Tokyo 1964 Olympics introduced new Japan to the world and significantly contributed to Japan's post-war transformation. This time, after more than fifty years, with the Tokyo 2020 Olympic and Paralympic Games what kind of message Japan is going to deliver to the world? Sport for Tomorrow (SFT) Programme is an initiative and commitment of the Japanese government for international contribution through sport targeting 'more than 10 million people in more than 100 countries, mainly developing nations' from 2014 to 2020. This programme was announced by Prime Minister Shinzo Abe during the Tokyo 2020 bid at the IOC Session in Buenos Aires in September 2013. Through this programme, Japan aims:

	a) to expand the values of Olympic and Paralympic movements to people of all generations; b) to promote international exchange and cooperation through sport; c) to foster international peace and development through sport; d) to improve the access to sport and physical education in developing countries; e) to train future sport leaders at the new international sport academies; f) to strengthen and promote sport for all; g) to promote the value of sport and develop sport integrity through global anti-doping activities and programmes. Japan this time using the opportunity of Tokyo 2020 Olympic and Paralympic Games aims to change the world for better through the power of sport. 1Biomedical Research Center Slovak Academy of Sciences, Bratislava, Slovakia; 2Institute of Pathological Physiology, Faculty of medicine, Comenius University, Bratislava, Slovakia; 3Faculty of Physical Education and Sports, Comenius University, Bratislava, Slovakia; 4 2nd Neurology department, Faculty of Medicine Comenius University & University Hospital Bratislava, Bratislava, Slovakia, 5 1st Neurology department, Faculty of Medicine Comenius University & University Hospital Bratislava; Bratislava, Slovakia Sedentary lifestyle substantially contributes to the increased risk of many chronic diseases, including metabolic, cardiovascular, oncologic and neurodegenerative diseases. This “diseasome of physical inactivity” is the most common cause of morbidity and mortality worldwide. On the other hand, regular physical exercise represents an efficient, physiological and readily available tool for prevention and treatment of chronic diseases. Mechanisms behind exercise-induced health benefits include favourable changes in body composition, increased physical fitness, improved whole-body energy & glucose metabolism, reduction in chronic-systemic inflammation as well as morphological and functional changes at a level of many tissues&organs, including the brain. Furthemore, a higher level of physical fitness, achieved/maintained by regular exercise, is a prerequisite for a better coping with different types of stressors&challenges, resulting in higher physical and psychological resilience. According to evidence, the adaptive response to exercise is orchestrated by

	bioactive molecules, released from contracting skeletal muscles and other organs during/after exercise. These bioactive molecules, collectively termed exerkines, represent important mediators of synchronized exercise-induced response. In our studies, we have observed improved motor&cognitive functions, muscle strength and physical fitness as well as selected metabolic parameters and skeletal muscle phenotypes in different patients' populations. Improvements in clinical and muscle phenotypes were associated with shifts in specific bioactive molecules, supporting their role in the adaptive response to exercise. The long-term follow-up of volunteers who exercise on regular basis in the Center of Physical Activity, BMC SAS, indicate sustainability of the supervised training programs and represents the translation of individualized exercise prescription towards clinical practice. Grant support: SAS–NSC Joint Research Cooperation grant 2013/17, VEGA 2/0107/18, APVV 15-0253

DAY 1: Gut microbiota characteristics and the use of probiotics in sports nutrition

Name	Hyon Park
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Title	Gut microbiota characteristics and the use of probiotics in sports nutrition
Abstract	For millions of years, humans and microorganisms have co-evolved with mutual sharing of benefits. Gut is the organ with the majority of microorganisms inhabited. Since Human Microbiome Project has initiated in 2010, many results indicate that human and microorganism are deeply related more than we thought. Gut microbiota is surely affected by exercise, diet, and environment which are the main factors related with health and performance. Very few studies on this topic are found until now. Comparison of the effects of aerobic or resistance exercise on athlete's gut microbiota, and the application of probiotics to athletes were performed. Results will be delivered at the presentation.

DAY 1: Effect of Vitamin C on Glucose Metabolism in Diabetes Type 2 Patients

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Department	Department of Physiology, Faculty of Medicine, Khon Kaen University, Thailand
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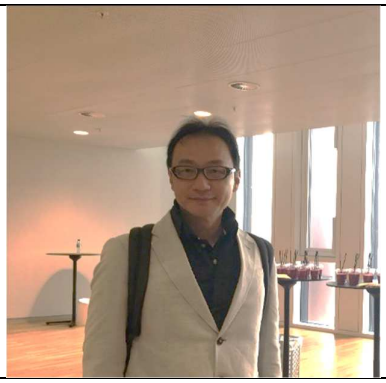
Title	Effect of Vitamin C on Glucose Metabolism in Diabetes Type 2 Patients
Abstract	Type 2 Diabetes mellitus (T2DM) is one of the major metabolic disorders associated with hyperglycemia. It is also characterized by oxidative stress, inflammation, and insulin resistance. The disease has poor outcome despite the best currently available treatments. Therefore, development of novel approaches to improve the outcome will be of great advantage. Up-to-date available oral hypoglycemic agents do not show obvious improvement in oxidative stress in these patients. Ascorbic acid (vitamin C) is an antioxidant vitamin which plays an important role in protecting free radical-induced damage. Most studies found lower plasma vitamin C concentrations in these patients. It was shown that these patients required greater vitamin C intake because DNA damage was higher compared with T2DM subjects with a similar degree of hyperglycaemia but with AA above the mean. Supplementation of vitamin C was shown to improve glycemic control by many previous studies. Daily 1000 mg vitamin C for six weeks significantly decreased fasting blood glucose (FBG) and hemoglobin A1c (HbA1c). Dakehale and coworkers

	(2011) also found the hypoglycemic effect in oral supplementation of vitamin C with metformin reverses ascorbic acid levels, reduces FBG, post prandial blood glucose, and improves HbA1c. Sargeant et al, (2000) found inverse association between plasma vitamin C and HbA1c. However, Bishop et al, 1985 did not find the difference. The lower dose of vitamin C in the study of Bishop may be a factor that attenuates the significant results. This may be explained by the fact that Vitamin C is structurally similar to monosaccharides and can replace some (including glucose) in many chemical reactions, thus might be effective for prevention of nonenzymatic glycosylation of protein. Furthermore, vitamin C which is antioxidant may attenuate the glycosylation of protein leading to decreased HbA1c. Precaution It should be aware that there may be false-positive tests for glucose using Benedict's reagent in Self-monitoring of blood glucose (SMBG) when vitamin C was present in urine at 250 mg/dl (14.3 mmol/l) or higher concentrations. In individuals with diabetes mellitus, consuming large quantities of vitamin C, this interference with standard coupled-enzyme-chromogen strip tests or Benedict's test could present a substantial problem in diagnosis and therapy of the disease. A simple anion exchange method of treating the urine was used to correct the false results.

DAY 1: Role of exercise and nutrition in metabolic aging



Name	Chia-Hua Kuo
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Title	Role of exercise and nutrition in metabolic aging
Abstract	After meal, approximately 85% of postprandial glucose is disposed into skeletal muscle. More than 90% of them will be used to synthesize glycogen and less than 10% will be metabolized into lactate. Elevated glucose in circulation will gradually return to normal in 2-3 h after meal. However, the time required for this glucose return to baseline increases with advancing aging and weight growth, occurred in paralleled with increased plasma insulin levels. This metabolic shift has been termed as "compensatory hyperinsulinemia", as a sign of insulin resistance. Plasma glucose will eventually increase when the hyperinsulinemia cannot effectively compensate the insulin resistance due to further aging and weight increases. High extracellular glucose level is currently recognized as the major cause of low-grade systemic inflammation, due to protein glycation. Such structural changes in extracellular proteins due to glycation attract innate immune attack, which in turn, increases oxidative stress. Protein oxidation (such as increased oxidized LDL) leads to further elevation in baseline inflammation. Insulin resistance has been shown to be the common origin of diabetes, heart attack, hypertension, stroke, and cancer. Therefore, improving muscle insulin sensitivity is the key for

	human survival. A recent study has demonstrated that increasing physical activity (from low to high) among adults aged above 50 y increases their lifespan, suggesting that exercise intensity plays a critical role for the benefit of exercise training. Aerobic based endurance training is effective to improve insulin sensitivity and glucose metabolism only for adults aged below 40 y. Strength training that often increases muscle damage remains effective training modality to improve insulin sensitivity for elderly. After age 70 y, muscle loss becomes a major concern for metabolic health and quality of life. Resistance training can improve muscle strength and mass only when meal is consumed immediately after training. A 2 h delay will kill the training effect. We must note that resistance training also causes muscle damage and acute inflammation. However, muscle regeneration during acute inflammation may be beneficial for tissue renewal against human aging.

DAY 1: Oxidative Stress and Toll-Like Receptors in Heart Failure

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Title	Oxidative Stress and Toll-Like Receptors in Heart Failure
Abstract	Earlier we and others have reported that in heart failure, subsequent to myocardial infarction (MI), there is an increase in tumor necrosis factor-α (TNF-α) and oxidative stress whereas there is a decrease in interleukin-10 (IL-10) and antioxidant reserve. An adaptive change to create an optimal balance between IL-10 and TNF-α cytokines has been suggested for a health heart. Toll-like receptor 4 (TLR4) promotes IL-10-mediated cardiac cell survival while TLR2 from the same family is detrimental. We examined the interactive role of TLR4 and TLR2 under stressful conditions including interleukin-10 knockout (IL-10-/-) mice and global ischemia/reperfusion (I/R) injury in rat hearts. Circulating and myocardial levels of TNF-α as well as apoptosis and fibrosis were higher in IL-10-/- hearts. Increase in TLR2 in IL-10-/- hearts indicated its negative regulation by IL-10. The ex-vivo I/R also caused a marked upregulation of TLR2 and

	TNF-α as well as apoptotic and fibrotic signals. However, 40 min reperfusion with IL-10 in the I/R hearts, increased TLR4 expression. Increase in interleukin-1 receptor-associated kinase-M (IRAK-M) and IRAK-2 activity during I/R injury suggested their role in TLR2 signaling. Inclusion of IL-10 during reperfusion, downregulated the expression of IRAK-2, TRAIP and apoptotic signals, caspase 3 and Bax/Bclxl ratio. IL-10 reduced the TNF-α receptor-associated increase in apoptosis during IR. IL-10 stimulation through TLR4 signaling, dissociates IRAK-4 into IRAK-1 instead of IRAK-2 and may be an important therapeutic approach in the protection of heart health from I/R injury. (Supported by Canadian Institutes of Health Research and Research Manitoba.)

DAY 1: Carnosine, the putative enhancer of exercise-induced health benefits

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Title	Carnosine, the putative enhancer of exercise-induced health benefits
Abstract	Skeletal muscle carnosine increases in response to exercise training in athletes and this could contribute to exercise-induced adaptive response. Parkinson's disease (PD) is neurodegenerative disease with predominantly motor symptomatology, affecting skeletal muscle functional capacity. Our aim was to investigate the exercise-induced shifts in muscle carnosine content and function in PD patients and healthy elderly controls before and after the exercise intervention. Methods: The study population consisted of healthy elderly individuals (66.3±2.2yrs.; BMI, 27.0±3.9kg.m-2) and PD patients (62.9±6.6yrs.; BMI 28.5±5.1kg.m-2; Hoehn-Yahr scale 1-3). MDS-UPDRS was used to assess clinical state of PD patients. Motor functions (SFT), muscle strength (dynamometry), BMI, fat/fat free mass, waist circumference and cognitive functions were determined. Carnosine content was measured by 1H-MRS in m. gastrocnemius. Supervised aerobic-strength training (3x1h/week) was performed. Biopsy of m. vastus lateralis was taken before and after training and fiber type was determined. Results: Exercise training improved motor functions and muscle strength in all individuals, improving thus clinical state of PD patients. Training

	increased muscle carnosine content by 40% in healthy controls. Compared to controls, PD patients displayed higher levels of muscle carnosine prior to exercise intervention (~ 40%; $p<0,05$), and aerobic-strength training failed to induce any changes in muscle carnosine content of PD patients. Muscle carnosine was positively correlated with cognitive function ($p\leq0,01$ for all tests), specifically well with memory subscore of ACE-R ($p=0,006$) as well as with BMI, muscle mass and waist circumference ($p<0,01$), but not with fat mass. Carnosine content was positively associated with muscle strength ($p<0,001$) and type IIb & IIa fiber size ($p<0,05$). Parkinson's disease was associated with a shift towards higher type-IIb-fiber content and size, parameters which were not affected by the exercise training in PD patients. Conclusions: Regular exercise improved clinical state in PD patients and motor functions in both PD and control population and increased muscle carnosine in healthy elderly population, but not in the PD patients. Skeletal muscle of PD patients displayed an altered phenotype and a reduced capacity to adapt to a exercise training.

DAY 1: Significance of protein and amino acids in post-exercise period

Name	Hiroyuki Kato
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Title	Significance of protein and amino acids in post-exercise period
Abstract	Optimal recovery from exercise is essential for enhancing athletic performance and inducing training-induced adaptations. Following exercise, newly proteins are synthesized for remodeling tissues, and repairing damaged tissues. However, amino acids are utilized as an energy source during exercise. Given that the oxidative loss of amino acids (especially, essential amino acids) limits amino acid availability for the increased protein synthesis during recovery, they must be replaced through the diet. Thus, highly active and trained individuals are recommended to consume protein intakes greater than non-exercising individuals, to meet increased needs for amino acids. Although the protein requirements have been investigated by nitrogen balance technique, the method has some limitations which tends to underestimate the protein requirements. Recently, we have investigated protein requirements and rate-limiting amino acids in active populations through novel technique, indicator amino acid oxidation method. The studies showed the new implications for practical utilization of protein/amino acid. Amino acid has primary role as a building block, but also as a nutrient signals to stimulate protein synthesis. Especially, leucine is well known to

	increase protein synthesis through activating mTOR pathway. However, leucine alone decreases other essential amino acids in blood. Thus, leucine-enriched essential amino acids have beneficial role on muscle adaptation and muscle recovery after exercise. Leucine-enriched essential amino acids induces further increase in muscle protein synthesis compared with conventional essential amino acid mixture. Our recent reports suggested that leucine-enriched essential amino acids enhances the repair process from exercise-induced muscle damage.

DAY 1: Protein and amino acid supplements for sports training

Name	Miroslav Petr
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Title	Protein and amino acid supplements for sports training
Abstract	Nutrition influences nearly every process in body involved in energy production and recovery from exercise. The nutrients ingested during the period close to an exercise seem to be especially important. Changes in skeletal muscle after strength training are commonly discussed in the literature in connection with increased muscle protein synthesis (MPS) following exercise. The combination of exercise and feeding is more anabolic even $\geq$24 h beyond a single exercise bout, what underlines the importance of nutrient timing. Proteins feeding as a source of amino acids following the exercise plays another crucial factor for MPS, and thus for increasing muscle mass and strength. Moreover, it seems that available proteins effect MPS differently, the current research shows that milk proteins especially whey proteins have some advantages over other protein sources. A proper dosage of protein represents other important aspect of protein feeding after strength exercise. These relevant points mentioned above, supported by research, will be presented and discussed.

DAY 1: The present situation and future of the training for Chinese registered sports dietitians

Name	Jiao-Ying
Country	China
Department	CHINESE SPORTS NUTRITION AND FOOD SOCIETY-CIFST President Professsor
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Title	The present situation and future of the training for Chinese registered sports dietitians
Abstract	The China Sports Nutrition & Food Society started training work for sports dietitians since 2004. In the last 13 years, 303 sports dietitian courses were hosted for 6757 trainees. After graduate, as a fitness coach, private coaches, sports nutritionists, health consultant, sales staff of supplements they used the Sports nutrition knowledge to serve the customer and popularize scientific idea of sports nutrition. We have compiled a complete textbook, developed 13 kinds of tutorials in different levels and fields, established a perfect examination system, and set up a strong teacher team with 30 professors and 40 lecturers. Our goal for the future is to participate in the training of registered sports dietitians of the Asian Sports Health Nutrition Society to catch up with the training of registered sports dietitians in Australia and the United States.

DAY 1: Exercise Under Extreme Conditions

Name	Dr.Nigel Taylor
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Department	Centre for Human and Applied Physiology, School of Medicine, University of Wollongong,
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Title	Exercise Under Extreme Conditions
Abstract	Humans encounter a wide range of extreme states across chronological, physiological and pathophysiological spectra. In this presentation, the focus is upon young, healthy adults exercising in extreme environments, with emphases upon cardiovascular and thermal homoeostasis. The target audience is research students and early-career scientists. Four topics will be explored: the principles of physiological regulation; environmental extremes that disturb regulation; physiological accommodation and adaptation; and a worked example of regulatory failure. Physiological research is most beneficially directed towards increasing our understanding of mechanistic physiology, for only through understanding those mechanisms can effective engineering solutions be obtained. Thus, researchers must be conversant with homoeostasis, and the first topic will highlight the principles of physiological regulation. Some stressful states elevate physiological strain and challenge the regulation of blood pressure, blood volume, plasma osmolality and mean body temperature, either individually or simultaneously. Those interactions will be illustrated using endurance exercise, thermal stress and dehydration, first separately and then in combination. Thermal stress will also be used to illustrate how humans compensate (accommodate) for acute environmental exposures, and then to introduce the concept of thermal adaptation (Exchange Lecture 8). Finally, the combination of heavy exercise (work), thermal protective clothing and heat stress will be used to show how some environmental extremes can combine to produce a “perfect storm” of stresses, resulting is the failure to regulate on or more physiological variables. Regulatory failure elicits exercise intolerance, but which is the variable that actually “broke the camel’s back”?

DAY 1: Physiological adaptations to high-intensity interval training

Name	Futoshi Ogita
Country	Japan
Department	National Institute of Fitness and Sports
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Title	Physiological adaptations to high-intensity interval training
Abstract	In the last decade, considerable evidence was demonstrated that high-intensity interval training (HIIT) can induce similar or even superior physiological adaptations when compared to those for traditional endurance training, and thus, HIIT has been recognized as a very time-efficient training method. A pioneering study on HIIT was reported by Tabata and co-workers in 1996. This is the first-ever study that HIIT which consists of eight 20s bout at 170%VO2max with 20s rest between bout can increase not only anaerobic capacity but also VO2max. Currently, the most common model employed in low-volume HIIT studies would be the Wingate test, which consists ~six sessions of brief, repeated “all out” 30 s cycling efforts, interspersed with a short recovery (4-4.5min). Using this training protocol, Gibala and co-workers, revealed the beneficial effects of HIIT, such as enhanced glycolytic and oxidative enzyme activities, an increased resting glycogen content, a reduced rate of glycogen utilization and lactate production at a given exercise intensity, an increased capacity for skeletal muscle lipid oxidation, increased VO2max and anaerobic power, and improved exercise performance, and so on.

	Furthermore, more recent studies demonstrated that HIIT as well as aerobic exercise also improves cardiovascular and metabolic risk factors, such as a decreased arterial stiffness, an increased vasodilative activity, an improvement of glucose tolerance and body composition, although HIIT is done with very low volume. Taken all, we conclude that HIIT is a very time-efficient strategy not only for improving exercise performance but also for health promotion. In the last decade, considerable evidence was demonstrated that high-intensity interval training (HIIT) can induce similar or even superior physiological adaptations when compared to those for traditional endurance training, and thus, HIIT has been recognized as a very time-efficient training method. A pioneering study on HIIT was reported by Tabata and co-workers in 1996. This is the first-ever study that HIIT which consists of eight 20s bout at 170%VO2max with 20s rest between bout can increase not only anaerobic capacity but also VO2max. Currently, the most common model employed in low-volume HIIT studies would be the Wingate test, which consists ~six sessions of brief, repeated "all out" 30 s cycling efforts, interspersed with a short recovery (4-4.5min). Using this training protocol, Gibala and co-workers, revealed the beneficial effects of HIIT, such as enhanced glycolytic and oxidative enzyme activities, an increased resting glycogen content, a reduced rate of glycogen utilization and lactate production at a given exercise intensity, an increased capacity for skeletal muscle lipid oxidation, increased VO2max and anaerobic power, and improved exercise performance, and so on. Furthermore, more recent studies demonstrated that HIIT as well as aerobic exercise also improves cardiovascular and metabolic risk factors, such as a decreased arterial stiffness, an increased vasodilative activity, an improvement of glucose tolerance and body composition, although HIIT is done with very low volume. Taken all, we conclude that HIIT is a very time-efficient strategy not only for improving exercise performance but also for health promotion.

DAY 1 : Pros and Cons of HIIT in my Experience

Name	Mr. Ekkawit Sawangphol
Country	Thailand
Department	-
E-mail	-
Title	Pros and Cons of HIIT in my Experience
Abstract	HI IT (High Intensity Interval Training) There are lots of methods to do physical exercises and doing sports practice, the trainer or exerciser should focus on the method which needs to be suitable with objective of each exercise such as efficiency and exerciser health conditions. The principle of neutral exercise should start from Low Intensity of each exercise and develop to Medium Intensity and upgrade to High Intensity when the exerciser physical conditioning is ready with the method and the figure of exercise. HI IT (High Intensity Interval Training) is well-known exercise method in present because there are many sources confirmed that MIIT method can burn fat very well in short period of exercise time. MIIT working out is also good for muscular stamina and Good for heart too. However, HIIT exercise is the exercise with high intensity level, Therefore, the exerciser should start carefully and have the efficiency basic stamina because the HIIT working out may not suitable for everyone. It might be risk to have injury or dengerous to exerciser's health. Therefore, to getting start HIIT exercise, the exerciser should start from Aerobic and strength conditioning then LIIT, MIIT and HIIT after all. Sometimes, you can said that HIIT is High Intensity Intermitent Training.

DAY 1: The role of glycogen synthase in metabolic regulation

Name	Jørgen Jensen
Country	Norway
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Title	The role of glycogen synthase in metabolic regulation
Abstract	Humans store carbohydrate as glycogen and skeletal muscles stores the majority (～500 g) Indeed, the liver stores glycogen (～100g) and play a central role in metabolic regulation. Food is supplied in larger meals, but the blood glucose concentration is kept within narrow limits to survive and stay healthy. Healthy persons remove blood glucose rapidly when glucose is in excess, but insulin-stimulated glucose disposal is reduced in insulin resistance and type 2 diabetes. The glycogen stores in skeletal muscles are limited because efficient feedback-mediated inhibition of glycogen synthase prevents accumulation. Exercise physiologists normally consider glycogen's main function as energy substrate. Glycogen is the main energy substrate during exercise intensity above 70% of maximal oxygen uptake (VO2max) and fatigue develops when the glycogen stores are depleted in the active muscles. After exercise, the rate of glycogen synthesis is increased to replete glycogen stores, and blood glucose is the substrate. Insulin-stimulated glycogen synthesis is elevated after exercise, which, from an evolutional point of view, will favour glycogen repletion and preparation for new "fight or flight" events. In the modern society, the reduced glycogen stores in skeletal muscles after exercise allows carbohydrates to be stored as muscle glycogen and prevents that glucose is channelled to de novo lipogenesis, which over time will causes ectopic fat accumulation and insulin resistance. The reduction of skeletal muscle glycogen after exercise allows healthy storage of carbohydrates after meals and prevents development of type 2 diabetes.

DAY 1: Local glycogen metabolism in skeletal muscle and the heart

Name	Joachim Nielsen
Country	Denmark
Department	-
E-mail	-
Title	Local glycogen metabolism in skeletal muscle and the heart
Abstract	I both skeletal muscle and the heart, glycogen (the storage form of glucose) plays a pivotal role as a fuel source during elevated energy requirements. If the endogenous stores of glycogen are depleted the function of the muscle cells is comprised. Using three different approaches, we have shown that the link between glycogen and impaired skeletal muscle function most likely originates from a connection between a specific storage of glycogen within myofibrils and sarcoplasmic reticulum calcium release. This was shown in mechanically skinned rat muscle fibers, isolated human SR vesicles, and intact mouse muscle fibers. Recently, we have shown that the subcellular distribution glycogen differs between skeletal muscle and the heart as characterized by a preferential storage of glycogen between and within the myofibrils in skeletal muscle, but in the periphery of the cardio myocytes (subsarcolemma) in the heart. Intriguingly, we have found that cardio-protection by ischemic preconditioning after ischemia/reperfusion is accompanied by a restoration of the subcellular distribution of glycogen towards a preferential storage in the subsarcolemmal space and decreased SR calcium leak. Collectively, these findings highlight the necessity to conduct detailed microscopic analyses in order to fully understand how glycogen turnover affects calcium homeostasis in different muscle types of the human body.

DAY 1: Lactate as a product of glycogen and as a source of glycogen

Name	Hideo Hatta
Country	Japan
Department	The University of Tokyo
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Title	Lactate as a product of glycogen and as a source of glycogen
Abstract	Lactate is produced mainly from muscle glycogen during exercise. Muscle glycogenolysis often occurs excessively during high intensity exercise. The excessive glycogenolysis leads to a great deal of accumulation of lactate. Recent studies have found that lactate is the signal molecule to induce mitochondrial adaptation. We have found that increase in lactate by ip injection of lactate increases muscular PGC-1alpha mRNA leading to mitochondrial biogenesis. We think that lactate is a kind of index to show decrease of muscle glycogen and to initiate a response to prevent depletion of muscle glycogen. On the other hand, lactate is an oxidizable substrate. Lactate can be a main fuel during exercise. MCT (Monocarboxylate Transporter) play important roles for the distribution of lactate from working muscle. However, some portion of lactate can also be reconverted to glycogen during recovery from exercise. We found that endurance training with ingestion of lactate can activate glycogen resynthesis from lactate with increase in MCTs during recovery from exercise. We also found that increase in glycogenolysis results in increase in glycogen synthesis in incubated muscle. Our studies show tight relation between glycogen and lactate during and after exercise. The relation works to prevent depletion of muscle glycogen and to keep glycogen level normal during and after exercise.

DAY 1: Regulation of muscle regeneration by the immune system

Name	James G. Tidball
Country	USA
Department	
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Title	Regulation of muscle regeneration by the immune system
Abstract	Muscle damage caused by intense exercise or other acute trauma causes a rapid and stereotypical inflammatory response that is associated with muscle pain and reduced muscle function. Because of the association between muscle inflammation and muscle pain and dysfunction, many palliative remedies to muscle injury rely on reducing muscle inflammation. However, muscle inflammation following acute injury is actually a complex innate immune response through which specific populations of myeloid cells initially target and remove cellular debris caused by injury. Subsequently, M1 and M2 macrophages regulate the activation, proliferation and differentiation of muscle stem cells that are necessary for muscle regeneration. Finally, macrophages promote muscle growth, which leads to recovery of muscle mass and function to normal levels. Thus, non--specific, palliative interventions that broadly reduce muscle inflammation following injury may slow muscle growth and repair. In this presentation, evidence that myeloid-cell-derived molecules play key roles in coordinating muscle regeneration is presented, with an emphasis on the cytokines tumor necrosis factor (TNF) and interferon-gamma (IFNgg) and on the endocrine factor, Klotho.

DAY 1: Combined physical-cognitive training enhances postural performances during daily life tasks in older adults

Name	Sonia Sahli
Country	Tunisia
Department	-
E-mail	-
Title	Combined physical-cognitive training enhances postural performances during daily life tasks in older adults
Abstract	Introduction: Exercise is a key intervention for improving physical functions and delaying physical dependence in older adults. Physical-cognitive interventions seem promising to improve balance and gait performances and prevent falls in the elderly. Although these beneficial effects, it is still unclear whether these training modalities lead to more general non-specific adaptations that can be transferred to some measures reflecting every day abilities. Methods: Postural (center of pressure oscillations), physical (lower body strength, gait speed, functional mobility, dynamic balance) and cognitive (reaction time) performances; and postural performance during daily life tasks (walking while conversing on a phone and maintaining an upright posture while buttoning a shirt) in older adults (66.29±3.61 years) were measured in pre- and post-6-months physical and physical-cognitive interventions. Results: Both training modalities improve postural balance, mobility, attention and physical functions in older adults. Only simultaneous

	physical-cognitive training modality enhances performance in some tasks relative to every day abilities. It seems that, the efficient integration and coordination between two tasks resulting into task-coordination skills developpement acquired during this training modality is crucial for improving such performance. Three months of a detraining period, improvements were generally maintained for physical functions and attention and not for the daily life task postural performances. Conclusion: Physical-cognitive training seems to have an extended benefits transfer to some daily life tasks; and support the idea that it is advantageous to combine physical and cognitive training into clinical practice. To maintain these benefits, older adults should participate regularly in such training.

DAY 1: Electrolytes drink on repeated exhaustive exercises

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Title	Electrolytes drink on repeated exhaustive exercises
Abstract	-
CV	Position: Associate Professor Teaching Experience: Mahidol university: Medical Physiology, Exercise Physiology Chulalongkorn university: Exercise Physiology Khonkaen university: Exercise Physiology Srinakarinwirot university: Medical Physiology Thammasat university: Medical Physiology, Health Science Walailuk university: Physical Therapy University of Taipei, Taiwan: Visiting lecturer Research Interest: Cardiorespiratory adaptations to exercise Ergogenic aids Thermoregualtion Training - Human Thermoregulatory Research: University of Wollongong, Australia (2004) - Biomedical Instrument: Purdue University Indiana (2000) - Chest Physical Therapy: New York University (1983)

	- Spinal Orthosis: New York University (1983) - Lower Limb Prosthesis: New York University (1983) Professional Affiliation - President, Asia Nutrition Society for Sports and Health (ANSSH: 2018) - Deputy Chairman, The Sports Science Society of Thailand (1994- 2017) - Chief Academic Consultant, Rehabilitation Center, Bangkok hospital (1993) - Secretary, Thai without Big Belly (Thai Health Foundation, 1999, 2010) - Manager, Exercise is medicine Thailand (ACSM, 2013, 2017) - President Elected (Asian Nutrition Society for Sports and Health, 2018-) - Academic consultant for The Sports Authority of Thailand (2008) - Manager, Sports Science Professional Standard Committee, Thailand Professional Quality Institute (2014) PUBLICATIONS 22

DAY 1: Protein kinase G signaling in cardio-protection

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Title	Protein kinase G signaling in cardio-protection
Abstract	-
CV	Undergraduate Education Bs, Punjab Universi 1974 Graduate Education Phd, Kurukshetra Uni 1982 Ms, Allahabad Univ 1977 Affiliate Departments Physiology Biochemistry and Molecular Biology Emergency Medicine Research Expertise Myocardial ischemia/reperfusion, preconditioning, gene expression of heat stress proteins, free radicals in myocardial injury, signaling mechanisms in myocardial protection. Keywords & Interest Areas Publications PGH synthase and lipoxygenase generate superoxide in the presence of NADH or NADPH. RC Kukreja, HA Kontos, ML Hess, EF Ellis Circulation research 59 (6), 612-619

The oxygen free radical system: from equations through membrane-protein interactions to cardiovascular injury and protection
RC Kukreja, ML Hess
Cardiovascular Research 26 (7), 641-655
Phosphodiesterase-5 inhibitor sildenafil preconditions adult cardiac myocytes against necrosis and apoptosis Essential role of nitric oxide signaling
A Das, L Xi, RC Kukreja
Journal of Biological Chemistry 280 (13), 12944-12955
Phosphodiesterase-5 inhibition with sildenafil attenuates cardiomyocyte apoptosis and left ventricular dysfunction in a chronic model of doxorubicin cardiotoxicity
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Circulation 111 (13), 1601-1610
Sildenafil (Viagra) induces powerful cardioprotective effect via opening of mitochondrial KATP channels in rabbits
pR Ockaili, F Salloum, J Hawkins, RC Kukreja
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A Abbate, FN Salloum, E Vecile, A Das, NN Hoke, S Straino, ...
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R Bolli, WX Zhu, CJ Hartley, LH Michael, JE Repine, ML Hess, ...
Circulation 76 (2), 458-468

DAY 1: The future perspective of heart regeneration by stem cell transplantation for elderly

Name	Ren-Ke Li
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Department	Toronto General Hospital/Research Institute (UHN)
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Title	The future perspective of heart regeneration by stem cell transplantation for elderly
Abstract	-
CV	Dr. Ren-Ke Li, MD, PhD is a Professor of Medicine in the Department of Surgery, Division of Cardiac Surgery at the University of Toronto. Dr. Li is a Senior Scientist at the Toronto General Research Institute, University Health Network working in the field of stem cell transplantation and tissue engineering. Dr. Li is the Canada Research Chair in Cardiac Regeneration (Tier 1) of the Canadian Institutes of Health Research and was a Career Investigator of the Heart and Stroke Foundation of Canada. Dr. Li has been on the forefront in the field of cell transplantation and tissue engineering. In 1996, he published the first demonstration that cells transplanted into injured heart can form a muscle tissue, regenerated damaged hear, and improved heart function. Recently, his group has defined optimal cell types for transplantation, and described the optimal conditions under which the transplanted cells can achieve the most efficient repair. Currently, his research group is attempting to rejuvenate aged individual using young stem cells to improve repair and regenerative capacity of aged patients. He also developed a platform for targeted gene or regenerative factor delivery for targeted tissue/organ therapy. Dr. Li has published 206 peer-reviewed papers and his work has appeared in high impact journals including Journal of Clinical Investigation, Circulation, Circulation Research, Journal American College Cardiology, European Heart

	Journal. Dr. Li has been invited to contribute several commentaries and viewpoint articles and is an international opinion leader in his field. Publications • Sun Z, Wu J, Li SH, Zhang Y, Xaymardan M, Wen XY, Weisel RD, Keating A, Li R-K. Uterine-derived stem cells reconstitute the bone marrow of irradiated mice. Stem Cells Dev. 2015 Apr 15;24(8):938-47. • Guo J, Zhang Y, Mihic A, Li SH, SunZ, Shao Z, Wu J, Weisel RD, Li R-K. A secreted protein (Canopy 2, CNPY2) enhances angiogenesis and promotes smooth muscle cell migration and proliferation. Cardiovascular Research. 2015 Mar 1:105(3):383-93. • Hatta K, Guo J, Ludke A, Dhingra S, Singh K, Huang ML, Weisel RD, Li R-K. Expression of CNPY2 in mouse tissues: Quantification and localization. PLoS One. 2014 Nov 13;13;9(11):e111370. • Witty A, Mihic A, Tam R, Fisher S, Mikryukov A, Shoichet M, Li R-K, Kattman S. The generation of the epicardial lineage from human pluripotent stem cells. Nature Biotechnology. 2014 Jul 25;32(10):1026-35. • Sun X, Momen A, Wu J, Noyan H, Li R-K, Von Harsdorf R, Husain M. p27 protein protects metabolically stressed cardiomyocytes from apoptosis by promoting autophagy. J Biol Chem. 2014 Jun 13;289(24):16924-16935. • Zhang L, Chen X, Sharma P, Moon M, Sheftel AD, Dawood F, Nghiem MP, Wu J, Li R-K, Gramolini AO, Sorensen PH, Penninger JM, Brumell JH, Liu PP. HACE1-dependent protein degradation provides cardiac protection in response to haemodynamic stress. Nature Communications. 2014 Mar 11;5:3430. • Mihic A, Li J, Miyagi Y, Gagliardi M, Li SH, Zu J, Weisel RD, Keller G, Li R-K. The effect of cyclic stretch of maturation and 3D tissue formation of human embryonic stem cell-derived cardiomyocytes. Biomaterials. 2014 Mar 1;35(9):2798-808. • Yan P, Chen KJ, Wu J, Sun L, Sung HW, Weisel RD, Xie J, Li R-K. The use of MMP2 antibody-conjugated cationic microbubble to target the ischemic myocardium, enhance Timp3 gene transfection and improve cardiac function. Biomaterials. 2014 Jan 1;35(3):1063-73. • Wang YS, Li SH, Guo J, Mihic A, Wu J, Sun L, Davis K, Weisel RD, Li R-K. Role of miR-145 in cardiac myofibroblast differentiation. Journal of Molecular and Cellular Cardiology. 2014 Jan 1;66:94-105. • Dhingra S, Li P, Huang XP, Guo J, Wu J, Mihic A, Li SH, Zang WF, Shen D, Weisel RD, Singal PK, Li R-K. Preserving prostaglandin E2 level prevents rejection of implanted allogeneic mesenchymal stem cells and restores postinfarction ventricular function. Circulation. 2013 Sep 10;128(11 Suppl 1):S69-78.

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DAY 1: Sodium hydrogen exchange in cardiovascular adaptation in hereditary cardiomyopathy

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Title	Sodium hydrogen exchange in cardiovascular adaptation in hereditary cardiomyopathy
Abstract	Cardiomyopathy is defined as a cardiac muscle disease that is characterized by necrosis, followed by hypertrophy associated with a progressive development of heart failure, which eventually leads to premature sudden death. Hereditary cardiomyopathy in the hamster, more specifically the UM-X7.1 colony, provides a unique possibility for studying the pathology and clinical course of primary congestive cardiomyopathies. Using this animal model, the first cardiac remodeling can be detected during the development of hypertrophy and heart failure is an intracellular sodium overload that is followed by an intracellular calcium overload. This remodeling is associated with an increase of density and activity of the sodium hydrogen exchanger, NHE-1. This took place in both the cardiac and vascular systems and led to hypertrophy, heart failure and eventually premature death. Blockade of NHE1 prevented and blocked remodeling of the cardiovascular system and prevented early death. In conclusion, remodeling of the heart leading to hypertrophy and heart failure can be overcome by treatment with NHE-1 inhibitors and the prevention of abnormal sodium homeostasis. This work is supported by the Canadian Institutes of Health Research (CIHR).

DAY 1: Maximizing the role of hydration on endurance performance

Name	Jason Kai-Wei LEE
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Title	Maximizing the role of hydration on endurance performance
Abstract	Exercising in the heat often results in an excessive increase in body core temperature, which can be detrimental to health and endurance performance. Fluid ingestion has been shown to be effective in improving endurance performance especially in warm and hot environments. Pre-exercise hydration status may determine the impact of hydration during exercise. The degrading effects of dehydration are often less pronounced, if any, when individuals commenced euhydrated. The impact of fluid provision on physiological responses and performance may therefore be dependent on hydration status. Research in recent years has shifted toward the optimum temperature at which drinks should be ingested. The ingestion of cold drinks can reduce body core temperature before exercise but less so during exercise. Manipulating the specific heat capacity of a solution can further induce a greater heat sink. Ingestion of ice slurry exploits the additional energy required to convert the solution from ice to water (enthalpy of fusion). There is growing evidence to suggest that ingesting ice slurry is an effective and practical strategy to prevent excessive rise of body core temperature and improves endurance performance.