UNIVERSITY OF CALGARY

2017 Research Report

Human Performance Laboratory

Human Performance Laboratory

The Human Performance Laboratory (HPL) in the faculty of Kinesiology at the University of Calgary was founded in 1981 by Dr. Benno Nigg. In the now 37 years of its existence, the HPL has been involved in, and has organized, some exciting international events. We hosted an international contingent of leading sport scientists for the 1988 winter Olympic games. We provided support for these researchers, actively participated with our own projects, and built the infrastructure for some unique measurements, such as an in-house-developed force platform system to measure the take off forces in ski jumping.

Other highlights include the hosting of the 1999 conference of the International Society of Biomechanics (ISB) and the 2002 World Congress of Biomechanics (WCB), held in conjunction with the meetings of the Canadian and American Societies for Biomechanics. These events attracted thousands of researchers, provided a forum for international exchanges, and allowed us to showcase Calgary, the university, and of course the Human Performance Lab. Who could ever forget the Wartenweiler Memorial Lecture at the 1999 ISB conference, featuring the undisputed leader in muscle physiology/mechanics, Nobel Prize winner, Andrew Huxley. At the age of 82 he challenged us all in our thinking, and was likely the most active participant throughout the entire conference. Or Steven Chu, Nobel Prize winner in physics, who gave a memorable keynote address at the WCB 2002 conference, introducing us to LASER trapping of isolated molecules for the purposes of unraveling the mysteries of protein mechanics, which turned out to be crucial in my own research on "titin" properties.

However, and most importantly in my mind, international events, such as the Olympic games in Calgary, and hosting the premier international conferences in our field with thousands of participants from all parts of the globe, provide a common goal. It reminds us of what is important, everybody pulls in the same direction, and it brings out a collegiality, a generosity, a bond, that otherwise would not exist. Big events let us set aside the little quibbles and worries of everyday work and life. A bigger picture emerges, and everybody wants to help and be part of it.

In 2019, we will again be hosting the biggest and most important international scientific gathering of biomechanics researchers: the 27th Congress of the International Society of Biomechanics, in conjunction with the Conference of the American Society of Biomechanics (www.isb2019.com). The Conference will be held at the Calgary Convention centre from July 31st to Aug 4th, 2019. It is another opportunity for us to be host to the world, and we are embracing it. It is another opportunity for the HPL to pull on one string and produce that magic that happens when a big event has first priority, and all our mundane, every day worries disappear.

I cannot wait to welcome you all to ISB/ASB 2019, to Calgary, and to the HPL.

My big thanks and great appreciation go to all of you who have supported us in all our endeavors, the sensible endeavors and the crazy ones; you are our friends, colleagues, sponsors, the University of Calgary, and the Faculty of Kinesiology.

W. Herzog

Walter Herzog
Director

Highlights

Honor	Walter Herzog – Muybridge Career Award, International Society of Biomechanics
Honor	Walter Herzog – Geoffrey Dyson Career Award, International Society of Biomechanics in Sports
Appointed	W. Brent Edwards – Secretary General, International Society of Biomechanics
Appointed	David Hart - Co-Chair, Human Space Flight Consultation Committee, Canadian Space Agency
Appointed	Arthur Kuo - Tier I Canada Research Chair, Biomaterials – Neuromusculoskeletal Biomechanics
Award	Ziad Abusara – Meniscus Section Member Poster Award, Orthopaedic Research Society, San Diego, CA
Award	Michael Asmussen – Sport Performance Research Award Presented by Under Armour. 13th Biennial Footwear Biomechanics Symposium. Gold Coast, Australia
Award	Kyla Coates – M.Sc. Poster Award, Canadian Society for Exercise Physiology Annual Conference. Winnipeg, MN
Award	Carolyn Emery - Distinguished Achievement Award, Cumming School of Medicine. University of Calgary
Award	Reed Ferber –Teaching Award for Educational Leadership. University of Calgary
Award	Colin Firminger - Peter Cavanagh Award for Basic Research presented by Nike, 13th Biennial Footwear Biomechanics Symposium. Gold Coast, Australia
Award	Teja Klancic – Best Poster Award. Canadian Obesity Summit. Banff, AB
Award	Maurice Mohr – E.C. "Ned" Frederick Young Investigator Award, sponsored by Li-Ning. 13th Biennial Footwear Biomechanics Symposium. Gold Coast, Australia
Award	Robert Moore – Best Presentation Award, Research Revealed Undergraduate Research Symposium, University of Alberta. Edmonton, AB
Award	Heather Paul – American Society for Nutrition's Emerging Leader Competition Winner. Chicago, IL
Award	Najratun Pinky – Best Oral Presentation Award, Alberta Children's Hospital Research Institute. Calgary, AB
Award	Robin Souron – Young Investigator Award, Congrès International de l'Association des Chercheurs en Activité Physique et Sportive (ACAPS). Dijon, France

Ph.D.	Amanda Black - Supervisor: Dr. Carolyn Emery. Thesis: Sport-related concussion prevention and management and the role of concussion education
Ph.D.	Kelsey Collins – Supervisor: Dr. Walter Herzog. Thesis: Diet-induced obesity and musculoskeletal health: Studies in a rat model
Ph.D.	Robert John Holash, Supervisor: Dr. Brian MacIntosh. Thesis: Three dimensional stochastic computer model of the skeletal muscle half sarcomere
Ph.D.	Stefan Hoerzer – Supervisor: Dr. Benno Nigg. Thesis: Methodological Approaches to Identify Functional Groups in Running
Ph.D.	Matt Jordan – Supervisor: Dr. Walter Herzog. Thesis: Neuromuscular function and performance in alpine ski racers with anterior cruciate ligament reconstruction: a return to sport framework
Ph.D.	Sarah Kenny - Supervisor: Dr. Carolyn Emery. Thesis: Risk factors for injury in youth ballet dancers
Ph.D.	Dylan Kosbar - Supervisor: Dr. Reed Ferber. Thesis: The relationship between joint kinematics, the patterning of trunk accelerations to predict running-injury risk
Ph.D.	Heather Paul – Supervisor: Dr. Raylene Reimer. Thesis: Developmental programming of obesity and fatty liver disease in offspring exposed to maternal obesity and dietary intervention
Ph.D.	Krysta Powers – Supervisor: Dr. Walter Herzog. Thesis: A proposed mechanism for enhanced Titin-based force during Ca2+ - activation
Ph.D.	Robin Souron – Co-Supervisors: Dr. Thomas Lapole (University of Saint-Etienne, France), & Dr. Guillaume Millet. Thesis: Effects of chronic tendon vibration on muscle neuromechanical properties
M.Sc.	Amanda Chan - Supervisor: Dr. Tannin Schmidt. Thesis: Development and Characterization of Novel PRG4-Containing Contact Lens Biomaterials and Commercially Available Contact Lenses
M.Sc.	Doug Doyle-Baker - Supervisor: Dr. Guillaume Millet. Thesis: An innovative ergometer for measuring neuromuscular fatigue during and immediately after cycling exercise

M.Sc.	Anita Fung - Supervisor: Dr. Brent Edwards. Thesis: Experimental validation of finite element predicted bone strain in human metatarsals
M.Sc.	Shuyue Liu – Supervisor: Dr. Walter Herzog Thesis: The origin of force increase in actively stretched single muscle fibers
M.Sc.	AJ (Charles) Macauley - Supervisor: Dr. Reed Ferber. Thesis: Improving the reliability of kinematic data through real-time feedback training
M.Sc.	Mitchell George - Supervisor: Dr. Juan Murias. Thesis: Training status and not aging per se, determines the speed of the $\dot{V}O_2$ kinetics response
M.Sc.	Tatum Mitra – Co-Supervisors: Dr. Carolyn Emery & Dr. Brent Hagel. Thesis: Ski and Snowboard School Programs: A safety video intervention for behavioural changes, knowledge uptake and preventing injuries in school-aged children
M.Sc.	Colleen Nesbitt - Supervisor: Dr. Carolyn Emery. Thesis: Physical Activity and Adiposity in Adolescents with Juvenile Idiopathic Arthritis

General comments

Movement Science and Musculoskeletal Health

Tyler Cluff

Integrative Sensorimotor Neuroscience Laboratory

We are a newly established group in the Human Performance Laboratory. Our work is focused on the mechanistic, multidisciplinary study of human sensorimotor control and learning. We combine behavioural experiments with robotics, neurostimulation, medical imaging, and computational models to examine the function of the human sensory and motor systems. Our work is focused on understanding how basic aspects of sensory processing contribute to human motor control and learning. Ongoing projects in the lab focus on four topics: 1) the role of sensory feedback in the selection, planning, and control of voluntary movements, 2) basic principles of sensory processing and how they impact individual patterns of human motor behaviour, 3) probing the function of neural circuits that support motor behaviour, and 4) identifying how impairments in sensory and motor function caused by stroke and concussion influence sensorimotor control and learning. Through our basic science program and ongoing collaborations, we hope to generate tools that allow us to better assess, monitor and diagnose deficits in sensory and motor function.

Brent Edwards

Mechanical fatigue of load bearing biological tissue is an inevitable consequence of physical activity. Over time, habitual loading of the musculoskeletal system causes microdamage accumulation that reduces the overall quality of the tissue and leads to a reduction in stiffness and an increase in mechanical strain with continued loading. Without adequate tissue repair and adaptation, the evolution and accumulation of microdamage may eventually lead to musculoskeletal injury. Mechanical fatigue is believed to play a predominant role in the pathophysiology of musculoskeletal injuries such as bone stress fracture as well as Achilles and patellar tendinopathy. Our research combines biomechanical experimentation with advanced medical imaging and computational modeling to investigate tissue damage and fatigue in response to mechanical loading. Our unique approach allows us to estimate in vivo tissue mechanics in a non-invasive and subject-specific manner. The work in our group spans multiple dimensional scales, from basic experiments at the tissue-level that enhance our understanding of the mechanical fatigue process, to applied experiments at the whole-body level for the development of treatments and interventions to improve tissue quality and decrease injury risk.

Salvatore Federico

Continuum Mechanics is the study of matter at a length-scale at which the existence of the atomic structure can be neglected, and matter can be treated as continuous rather than discrete. Research in our group is devoted to the mathematical foundations of Continuum Mechanics and its applications to the Biomechanics of Soft Tissue.

In particular, we are interested in modelling soft tissue accounting for its structural elements, i.e., collagen fibres, cells, non-fibrous extracellular matrix, and fluid. In the past years, we have worked on the modelling of the elastic properties of articular cartilage, as well as on the fluid-solid interactions occurring in the tissue.

Articular cartilage is the thin layer of connective tissue covering the end of bones in our joints: for the span of a lifetime, it provides stress redistribution and an extremely low-friction contact. When the tissue degenerates because of diseases such as osteoarthritis, it cannot perform its function properly and this results in pain, limitation of mobility, and ultimately a decrease in quality of life. Understanding the relationship between the tissue structure and its function, both in the healthy and in the diseased tissue, may shed light on the causes of the initiation of degeneration, and suggest possible treatments to prevent disease.

Reed Ferber

Dr. Ferber is a clinical biomechanist and his research is aimed at optimizing rehabilitation and predicting injuries. Overall, his group is engaged in two streams of research: clinical gait analysis and wearable sensors.

Our group has successfully established an international and growing research network currently consisting of 15 researchers and over 100 clinical partners. Each centre is linked to the world's largest research database of biomechanical gait and clinical data. The development of this network and research database has led to being one of only three research groups invited to join the MOBILIZE Center of Excellence at Stanford University. We are transforming the biomechanics research community by openly sharing data between laboratories, employing unique data science analysis methods, and growing our research networks.

Our wearable research is based on three challenges: (1) wearable sensors generate a profound amount of data that is largely ignored, (2) the information derived from these sensors is not placed within a contextual narrative, and (3) most sensors are designed for activity monitoring and not for healthcare. To address these challenges, Dr. Ferber leads the campus-wide Sensor Technology in Monitoring Movement (STiMM) research program after being selected by the Vice President –

Research as a transformative program that supports the University's Eyes High "Engineering Solutions for Health" research strategy.

Wayne Giles

My colleagues and I continue to work in areas of long standing interest involving Cellular Cardiac Electrophysiology and the Cell Physiology of the two principal cellular components of articular joints: Synovial fibroblasts and chondrocytes. Brief descriptions of these projects include:

a) Studies of the functional roles and potential relevance as drug targets for selected ionic currents in myocytes and fibroblasts/myofibroblasts from human atrium.

b) Evaluation of the possibility that multiscale mathematical modeling can be used to assess, predict, or rationalize antiarrhythmic drug or prodrug effects in the setting of atrial fibrillation.

c) Examination of the possibility that an important component of physiological function in the heart and in articular joints arises from or is strongly modulated by electrotonic or paracrine cell/cell interactions.

d) Multidisciplinary research into the possibility that electrophysiological principles can be used to identify the stem or progenitor cell populations within human atrial fibroblasts and human synovial fibroblasts and chondrocytes.

e) Detailed pharmacological and calcium regulome-based investigations of novel actions of autonomic co-transmitters on defined targets in the cardiovascular, cardiovascular and peripheral nervous systems.

David Hart

Our research program is quite broad, encompassing aspects of the molecular and cell biology of tendon repair, impact of obesity induction on joint integrity, preclinical models of muscle injury and recovery, preclinical models of osteoarthritis development and progression, and the use of mesenchymal stem cells for the repair of cartilage defects in both preclinical models and patients. The common theme relates to repair of compromised connective tissues to restore integrity and subsequently, mobility, using the tools of molecular and cell biology. These programs are accomplished via a network of collaborators both locally in Kinesiology and the McCaig Institute, nationally, and internationally.

Walter Herzog

Our research interests remain focused on the areas of (i) muscle properties and mechanisms of muscle contraction, (ii) joint biomechanics and osteoarthritis, and (iii) applied musculoskeletal research. In the area of muscle mechanics, we performed experiments using low angle x-ray diffraction to show that force depression is associated with an increased elongation of actin filaments and is produced with a decreased proportion of attached cross-bridges. We also showed that deactivation of isolated sarcomeres in a myofibril is associated with little sarcomere elongation and no loss in force, suggesting that titin provides a framework within activated sarcomeres that persists upon deactivation, a finding that, if shown in cardiac myofibrils, would revolutionize how we think about cardiac failure. In the area of joint biomechanics and osteoarthritis, we determined that joints in adolescents are protected better from degeneration than those of adults when rats are subjected to a high-fat/high-sucrose diet, and that obesity-induced knee joint osteoarthritis can be prevented effectively with moderate aerobic exercise and/or an oligofructose-based fibre supplementary diet. In our applied musculoskeletal research, we began pilot studies on the 3-dimensional kinematics and kinetics of the neck and vertebral artery during spinal manipulative treatments, continued our research on unraveling why cyclists use "inefficient" force application, and began research on the deterioration of the hamstring muscles following anterior cruciate ligament repair using a semitendinosus tendon graft.

Art Kuo

2017 was our first full year within the Human Performance Lab, and our focus was on finalizing our lab and Maker Space. We purchased a computer-controlled precision milling machine, 3D printer, and high-speed laser cutter, among other pieces of equipment and software. This equipment allows for rapid prototyping of rehabilitation devices such as intelligent prosthetic feet for lower limb amputees, or powered orthotic devices to assist persons with neural impairments. In-house manufacturing ability will also enhance other activities within the HPL, such as development of custom fixtures or assemblies that are necessary for many biomechanical experiments.

By leveraging new algorithms, wearable sensors for long-term data collection and instruments that emulate real-world conditions such as complex or uneven terrains, our lab is accelerating understanding of mobility impairments to find new rehabilitation technologies. For example, our research advances in neural control of muscles, sensorimotor integration of balance, energetics on walking, mobility of older and impaired individuals, and robot locomotion have led to improvements in the design of prosthetic limbs.

Benno M. Nigg & Sandro Nigg

Our group concentrates on topics that are health and performance related with special considerations for footwear, apparel, and equipment.

Athlete Assessment: With advancements in manufacturing techniques for footwear and apparel in the sporting goods industry, the ability to provide customized product solutions for individual athletes has become a reality. One of the most challenging questions facing the sporting goods industry is what product features should be matched with different sub groups of athletes. Our group attempts to address this question by embarking on large scale studies that attempt to align product preference and performance with subject characteristics spanning biomechanical, anthropometric, psychosocial, neurological, and sensitivity based variables.

Hardware Development: Biomechanical data collection devices like electrodes to quantify muscle activity, and inertial measurement units to quantify accelerations and angular velocities are mass produced for the general user. With a focus on sports like ice hockey and topics like fatigue, the mass produced nature of such devices yields compromised data when exposed to extreme conditions. Our group engineers new hardware to address these environmental challenges. Two examples are a new current amplifier for an electrode that is not susceptible to the effects of water accumulation (sweat) during long bouts of exercise, and an inertial measurement unit that is housed within the blade holder of an ice hockey skate.

Electro-Physiology: Muscles work in concert to control human movements such as walking, running or squatting. We are interested in understanding the muscle activity (motor control) while moving. This year, muscle synergies of the vastii muscles were studied while running. The new insight was that patterns of muscle activity repeated themselves during the run in a non-random way. The characteristics that distinguished the patterns were encoded in specific frequency bands which reflect individual physiological processes that are necessary to stabilize the movement. We concluded that predefined patterns of muscle activity were used during the run. The ability to work with intensity patterns of multiple muscle allows us to contribute as well to better understand the sport related movements and to improve medical assessments.

Ryan Peters

Together with Dr. Tyler Cluff in the Faculty of Kinesiology, earlier this year we established the Integrative Sensorimotor Neuroscience Laboratory. Our lab houses state-of-the-art wholebody kinematic and eye-tracking cameras, a KINARM exoskeleton robot, and a human electrophysiology suite for measuring the activity in single sensory and motor neurons, as well as sensorimotor regions of the brain in awake behaving participants. We combine human neurophysiology and neurostimulation techniques with computational modelling, medical imaging, and robotics in an integrative manner with the goal of advancing our understanding human motor control. Ongoing projects in the lab focus on three topics: (1) understanding how sensory feedback maps onto motor outputs via spinal reflexes during natural reaching and grasping behaviours, (2) investigating the precision of skin receptors in the neural coding of hand posture during haptic exploration, and (3) developing novel neurophysiological markers to supplement medical imaging in the assessment of acute stroke, and to serve as a benchmark for the efficacy of subsequent rehabilitation programs. Through a tight marriage of basic and clinical research, our laboratory is poised to become a world-leader in the study of human motor control, while successfully translating our findings from bench to bed-side.

Tannin Schmidt

The Schmidt Lab research interests in bioengineering lie within biomaterials, biomechanics, biotribology, and biochemistry. The overarching goal of my research program is to understand the fundamental mechanisms and properties of PRG4, also known as lubricin (a critical lubricating protein found throughout the human body, recently discovered to also have anti-inflammatory properties), at relevant biointerfaces and biomaterials, and to apply that knowledge to the development of PRG4-containing biotherapeutics and biomaterials.

The research program has 4 objectives: 1) elucidating the molecular basis of synovial fluid's articular cartilage boundary lubricating function, and providing the framework for development of PRG4-containing osteoarthritis biotherapeutics; 2) understanding PRG4's role on the ocular surface, and characterizing/developing novel PRG4-containing contact lens biomaterials and artificial tears for the treatment of dry eye disease; 3) assessing PRG4's potential as a boundary lubricant of biomaterials for a variety of other clinical applications, e.g. orthopaedic biomaterials; 4) examining PRG4's biological properties and its potential as a therapeutic treatment of a variety of inflammatory conditions, tissue adhesions, and cancer.

Knowledge generated from this multidisciplinary work could ultimately lead to the development of new cell, protein or tissue based biomaterials/biofluids that may: 1) halt or reverse the progressive loss of cartilage after an injury or with aging and arthritis; 2) provide a therapeutically effective treatment, in the form of artificial tears or novel contact lens biomaterials, for those who suffer from dry eye disease; 3) improved performance of clinical biomaterials; and 4) contribute to the effective treatment of inflammatory conditions, tissue adhesions, and cancer.

Darren Stefanyshyn

The general research interests of our group focus on questions related to human locomotion, sport perfor¬mance and sport injury biomechanics. Our research extends to functional sport equipment with a goal of tun¬ing the properties of the equipment to specific athlete characteristics in order to maximize the athlete's performance and minimize the risk of injury. Performance research involves developing a basic understanding of the mechanics of human movement during various locomotor and athletic movements. The goal is to determine the mechanical factors dictating an athlete's performance and how performance can be improved by manipulating these particular factors. In 2017 we extended our industry work on identifying methods of matching sport equipment to individual athletes.

Injury research involves identifying potential injury factors such as global loading characteristics as¬sociated with ankle and knee sport related injuries as well as developing an understanding of the role played by equipment. This past year we gained valuable insight on the role of sport surface characteristics as well as shoe upper stiffness in lower extremity joint loading.

Joan Vickers

Neuro-Motor Psychology

Research from my lab investigates the neural, perceptual, and cognitive foundations of experts in sport, law enforcement, surgery, child development and other motor areas. Our main discoveries are the "the quiet eye" and "quiet eye training". Elite performers in these areas possess a unique ability to visually focus on a critical location in the task environment before a critical phase of the movement, which leads to superior motor performance when compared to those with lower skill levels. The quiet eye of elite performers is invariably earlier and longer than those with lower skill levels, indicating the use of superior control of the gaze, anticipation, and visual attention prior to a critical phase of the movement. Theoretically, the quiet eye represents the time needed to organize the neural networks underlying the planning and control of movements. Quiet eye training programs teach non-experts how to adopt the five quiet eye characteristics of elite performers (specific spatial location, early onset, before a critical movement phase, task specific offset, and a longer duration) resulting in significant improvements in motor performance when compared to traditional technical training. Notable events this year were the publication of papers in basketball, child development and ice hockey goaltending and safety. This year we also reopened our website and made available our Quiet Eye Solutions software free to researchers and their students (quieteyesolutions.com).

Exercise Physiology and Nutrition in Health and Sport

P. Tish K. Doyle-Baker
Applied Physiology and Prevention through Lifestyle and Exercise

Exercise interventions are a large part of our lab' focus. We try very hard to design our interventions using a 'treatment fidelity' approach. This means we consider how our intervention is delivered, the acceptance of it and lastly that it occurs in a real-life setting. These studies are time consuming and have a significant participant burden. The DB lab typically has a ongoing study during the fall or winter semesters with the majority of our work occurring in the summer. Here are two examples.

This past summer we completed the third year of the Kids Steps in the Summer at University Camps (KiSSUC) study. This setting involved kids attending summer camps across faculties (non-active camps) and through Active Living (active-camps). Kids that volunteered to be part of the study wore a wrist activity tracker to monitor their steps. We had a high degree of acceptance with the kids wearing the tracker (N=669) and based on our observations we are excited to see that some kids (not all) are encouraged to do opportunistic physical activities. Three interesting study results are that: 1) there was no difference in total steps taken by kids over a 24-hour period between year one, two or three; 2) in each year, kids met the Heart and Stroke daily step recommendations for children (12,000-16,000) and youth (11,000-12,000); and 3) the boys regardless of their age or the camp they attended took more steps (approximately 1500/day) than girls. This gender-based disparity in physical activity is a persistent finding in the literature. This means that we need to understand more completely the mechanism(s) underlying this difference. Future research should focus on this so that we can develop physical activity intervention strategies that improve girl's participation in daily physical activity.

We also completed this fall the second year of the HERS (Hormones effect on Riders) study. This research investigated progesterone and estrogen's impact on fat oxidation and peak power during submaximal cycling. Our participants were healthy athletes who volunteered for five weeks and during that time they completed a weekly: hormone profile (salivary), dietary record (self-report), a $\dot{V}O_2max$ and 30 second Wingate test and daily basal body temperature and heart rate variability measurements. Our results highlight that elevated estrogen is related to greater fat oxidation across workloads and this may have significance for optimizing training loads for female athletes.

The complexities of the menstrual

cycle are often identified as a major barrier to the inclusion of women as participants in sport and exercise research. Therefore, we are very proud of our research since female participants are under-represented in research studies.

Brian MacIntosh

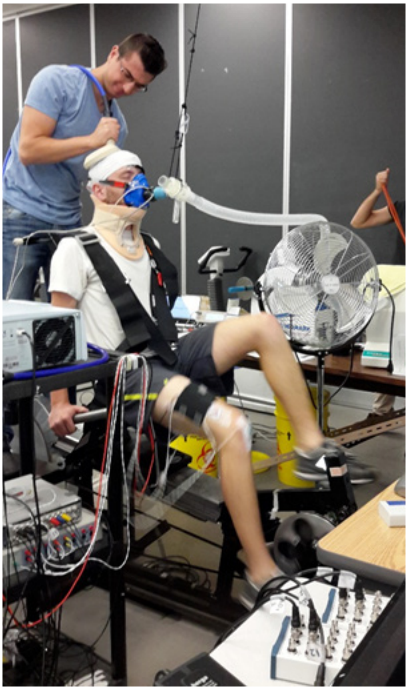
Applied Muscle Physiology Group

The central theme of research in my laboratory is the study of force modulation in skeletal muscle. This includes the study of force-velocity, force-frequency and force-length relationships, and the interactions of these with and without prior activity. Prior activity can be an acute modifier, as in potentiation or fatigue. Alternatively, prior activity can be a chronic modifier as in training, illness or disuse atrophy. A new theory of muscle fatigue has been proposed: that fatigue is a consequence of the elegant regulation of excitation-contraction coupling in skeletal muscle, to prevent depletion of ATP. This highly redundant regulatory mechanism operates at several levels, including the membrane, the triad and the contractile proteins. Recent work has evaluated the potential role of changes in calcium sensitivity at physiological temperature, contributing to muscle fatigue. A published review has advanced our understanding of economy of running and how this relates to the energy cost of individual muscle contractions. This work deals with calculation of the moment arm for plantar-flexion and tendon energy storage and return during running. We are continuing the work on warm-up and postactivation potentiation. A substantial advancement in the understanding of the slow component of oxygen uptake has been made in my lab. It is apparent that the slow component does not represent a rising energy cost of the exercise, but rather a slow switch from anaerobic to aerobic energy supply. Prior heavy exercise performed as a warm-up results in acceleration of the aerobic contributions to subsequent exercise and smaller anaerobic requirements. The slow component of oxygen uptake decreased because there is less anaerobic energy to substitute for. A structurally realistic computer model of a sarcomere has been created, and the impact of myofilaments at different sarcomere lengths on calcium diffusion has been evaluated. Work in my research group uses a number of approaches to study the contractile properties of skeletal muscle, including in vitro single intact or skinned fibers and fiber bundles, in situ whole muscle and intact human subjects performing in vivo with isolated muscle or muscle group contractions or performing whole body exercise.

Guillaume Millet

Neuro-Muscular Fatigue Laboratory (NMFL)

The Neuromuscular Fatigue Laboratory (NMFL) has flourished in 2017. The very intense activity of the group can, for instance, be evaluated from the 11 ethics applications that



Revisiting fatigue in hypoxia thanks to the innovative cycling ergometer developed in the NMFL and the use of transcranial magnetic stimulation.

have been approved last year. Yet the main outcome is without any doubt the intense publication activity (21 articles in international journals with peer review), most of these papers being published in the best journals in the field of Exercise Physiology (e.g. Med Sci Sports Exerc, Sports Med, J Appl Physiol, Eur J Appl Physiol) and neurophysiology (Front Neurosci, Neuroscience, J Neurol Sc) or in clinical journals (e.g. Neurophysiol Clin). Dr Guillaume Millet also published a book on ultra-marathon in both English and French. More importantly, while the research performed in the NMFL is well funded, the ratio between the outcomes and the funding is extremely high. The NMFL has contributed to the internationalization of the Faculty since the group has hold trainees or visiting students/professors from the following countries: Canada (3), Iran (3), Brazil (3), France (2), UK (2), and 1 from Spain, Italy, USA and Portugal. One of the main contribution has been the validation of an innovative ergometer that has allowed to revisit fatigue etiology (i) in hypoxia, (ii) after a 9-week training intervention and (iii) after exercises of different durations/intensities. It has also permitted to better understand fatigue experienced by cancer survivors and people with multiple sclerosis as well as aging population.

Juan Murias

Cardiovascular Exercise Physiology Group

I am interested in determining the effectiveness of exercise training programs for promoting health as well as for improving performance. The main goal of my research is related to the use of exercise training interventions as "medicine" to prevent or alleviate the detrimental effects of aging and disease on cardiovascular function. Although my laboratory examines both central and peripheral cardiovascular adaptations to exercise training, a current direction of my work is focusing on the vascular side of these adaptive responses. More specifically, I am interested in the role of the endothelium in the control and distribution of blood flow and the effects of endurance training exercise in preventing or alleviating the age-related reduction in endothelium-dependent vasodilation, and the associated limitation in O2 transport to the sites of metabolic need.

Some of the measures commonly assessed in my laboratory include: Breath-by-breath VO2 and near-infrared spectroscopy (NIRS) to estimate blood oxy- and deoxygenation within the area of NIRS "inspection". The use of this technique combined with measurements of VO2 can provide an estimate of the matching of muscle O2 delivery to O2 utilization. Additionally, Doppler Ultrasound is used to estimate blood flow, vascular conductance and flow mediated dilation responses at rest and during exercise, and to obtain morphological measures to derive the lumen-to-wall ratio in different arteries. Finally, a rat model is used for examining vascular responsiveness in different vessels throughout the vascular tree by means of an in vitro vessel myography technique.

Raylene Reimer

Our research focuses on understanding how nutrition and the bacteria that live in our intestine (called gut microbiota) interact to affect our risk of developing chronic diseases such as obesity, type 2 diabetes and fatty liver disease. In collaboration with Dr. Walter Herzog we are making exciting new discoveries about how the gut microbiota play a role in osteoarthritis as well. Our research spans basic science in rodent models aimed at determining how the foods we eat affect our gut microbiota and how this affects our disease risk, all the way through to applied human clinical studies evaluating the effectiveness of novel dietary interventions. In our basic science work this year we are examining how artificial sweetener consumption during pregnancy affects the ability of the mother and the offspring to handle glucose which in turn contributes to increased body weight and body fat. We also showed this year how an artificial and a natural non-calorie sweetener alter the microbiota in pregnant rats and their offspring. We have been busy investigating how exposure to antibiotics early in life can predispose to obesity risk later in life. Our ongoing focus is to identify dietary factors that can be provided to pregnant women to reduce the risk of chronic disease transmission to their children. In 2017 we were also very involved in translating findings from our previous animal studies into four different human clinical studies. We are evaluating: 1) the effect of prebiotic fiber on liver health in patients with non-alcoholic fatty liver disease; 2) the effect of fiber-enriched snacks on gut microbiota in healthy adults; 3) the effect of prebiotic fiber supplement in children with type 1 diabetes; 4) how gut microbiota differ in youth with obsessive compulsive disorder compared to healthy control youth. Ultimately our goal is to design and evaluate new functional food products aimed at body weight management and optimal gut microbiota profiles.

Shearer

The Shearer research program employs knowledge of nutrition and metabolism to predict, detect, prevent and treat acute and chronic metabolic disease states. Specific interests include how diet and chronic disease alter nutrient handling and regulation. Experimental models span the cell to animal models and the whole organism. In 2017, work in the laboratory focused on three main areas as follows:

Diet in Neurological Disorders: Autism Spectrum Disorders (ASD) are estimated to affect 1 in 45 children. The identification of safe, effective therapies and biologic markers of disease severity represent key milestones for scientific discovery that promise to lead to better ASD outcomes. One such novel therapy is the ketogenic diet (KD). Our laboratory has established this may be due to differences in the gut microbiota that undergoes dramatic changes with the KD.

Mitochondrial Regualtion: Mitochondria are the power-house organelles of the cell responsible for energy production. Originally thought of as bean-shaped organelles, an influx of recent research has determined that mitochondria are actually highly dynamic, continuously joining through the process of fusion and dividing through the process of fission. Our laboratory is interested in how fission and fusion (collectively known as mitochondrial dynamics) change in inherited (mitochondrial disease and autism) and metabolic disease states such as type 2 diabetes and insulin resistance.

Energy Drinks, Functional Foods and Nutraceuticals: Energy drinks have become increasingly popular and the energy drink market has grown at record pace into a multi-billion dollar global industry. The Shearer laboratory has been involved in the study and legislation of caffeine containing energy drinks for over a decade. Other active areas of research include examination of novel foods, artificial sweeteners and their impact on metabolism.

Injury Prevention, Sport Medicine and Rehabilitation

Carolyn Emery, Sarah Kenny, Kati Pasanen & Kathryn Schneider

Sport Injury Prevention Research Centre

The Sport Injury Prevention Research Centre (SIPRC) in Faculty of Kinesiology, University of Calgary, is one of ten International Olympic Committee Research Centres for Injury and Illness Prevention in Sport (2009-2019).

Evaluation of prevention strategies in youth sport -The research focus in the SIPRC is on the identification of risk factors and evaluation of prevention strategies to reduce the burden of injuries and their consequences in youth sport. The Alberta Program in Youth Sport and Recreational Injury (2013-18 C Emery and B Hagel PIs) has supported research capacity in the evaluation of injury prevention strategies in youth with significant focus on trainee development and community engagement. We have not only informed national body checking policy change in reducing the risk and burden of concussion and injury >60% in youth ice hockey (Canada and USA) in Pee Wee (ages 11-12), but recent evaluation of policy disallowing body checking in non-elite Bantam (ages 13-14) has led to a similar reduction in injury (64%) and concussion (57%) risk. We also continue our research program in community sport (e.g., soccer, basketball) and junior high schools to evaluate implementation strategies which will maximize adherence and optimize the preventative effect of neuromuscular training warm-up programs. A 3-year cluster-RCT in junior high school physical education has demonstrated a protective effect of a neuromuscular training (NMT) warm-up program in reducing the risk of medical attention injuries >40%. In youth basketball (NBA-GE 2016-18 C Emery PI) we have validated the use of an adapted Oslo Sport Trauma Research Centre Overuse Injury Questionnaire in youth basketball to examine mechanisms (e.g., biomechanical, athlete load) and risk factors for Achilles and patellar tendinopathies. We are evaluating jump load using VERT wearable technology to inform load modification strategies in addition to evaluating a NMT warm-up strategy. We have built on our validated injury surveillance platform in youth sport to establish a novel web-based platform in schools "Surveillance in High Schools to Reduce Injuries and their Consequences in youth sport" (SHRed Injuries). The overall goal of Alberta Program in Youth Sport and Recreational Injury Prevention is to reduce the risk of injury in youth sport and recreation in Alberta 20% by 2020.

In primary prevention, we have four studies in collaboration with Finland (PROFITS, Soccer RCT, IFFloorball, FinBallet - K Pasanen PI) investigating risk factors, mechanisms and prevention of musculoskeletal injuries in youth team sports (basketball, floorball and soccer) and in professional ballet.

Our community partnership with Alberta Ballet continues with preseason screening and injury surveillance of all elite-level dancers to understand injury rates and risk factors across the dance season (2015-present S Kenny PI). Qualitative investigations have led to further appreciation for dancer's own perception of pain, injury, and social support, which evidence a 'culture of silence'. Internal training load is being evaluated in pre-professional dancers to later investigate associations between load and injury. Engagement with local private dance studios is underway to expand knowledge of injury risk across an adolescent recreational dance population. The formation of an International Consortium for the Prevention of Injury in Dancers (ICPID) has been initiated, where 11 experts from IOC research centres and the International Association for Dance Medicine and Science (IADMS) have come together to collaborate, combining research data across centres and to produce an updated consensus statement on dance-related injury. This international network of dance and sport epidemiologists, clinicians, and biostatisticians is the first of its kind.

Prevention of consequences of injury in youth sport - The SIPRC research program also focuses on the prevention of consequences of injury in youth sport. A CIHR funded longitudinal cohort study (2015-18 C Emery PI) examining predictors of early post-traumatic knee joint OA (PTOA) in youth (Pre-OA) has demonstrated that youth with a 3 to10-year intra-articular knee injury history have an increased risk of adiposity, reduced physical activity, poorer quality of life, poorer balance and strength, and MRI defined OA; compared to age, sex and sport matched controls. This is informing consensus on secondary prevention strategies to prevent PTOA. In SIPRC, our research team is also studying best practices to prevent, detect and manage sport-related concussions in a CIHR-funded 5-year longitudinal cohort study "Safe to Play". Over 1000 youth ice hockey players are being followed annually over 5 years (2013-2018) to examine neurological development using a variety of new diagnostic tools that identify specific impairments associated with concussions. Study tools under evaluation include outcomes of balance, neck function, vision, memory, nutrition, coping, social interaction, growth and development, biomarkers, and imaging. These tools will enable researchers and clinicians to select the best tests, predict who is at greatest risk, diagnose concussions precisely, target those needing treatment, and measure recovery.

Concussion - The SIPRC research team, in alignment with the Integrated Concussion Research Program at the University of Calgary, is also studying best practices to prevent, detect and manage sport-related concussions in a CIHR-funded 5-year longitudinal cohort study "Safe to Play". Over 1000 youth ice hockey players are being followed over 5 years (2013-2018) to examine neurological development using a variety of new diagnostic tools that identify specific impairments associated with concussions. Study tools under evaluation include outcomes of balance, neck function, vision, memory, nutrition, coping, social interaction, growth and development, biomarkers, and imaging. These tools will enable researchers and clinicians to select the best tests, predict who is at greatest risk, diagnose concussions precisely, target those needing treatment, and measure recovery. Clinical measurements established based on risk factors for concussion in youth ice hockey have informed the development and evaluation of an individually targeted prevention program for youth sport-related concussion. We have recently completed (Feb 2018) a pilot randomized controlled trial (RCT) evaluating the efficacy of a neuromuscular training sensorimotor training program in youth ice hockey players (Hotchkiss Brain Institute/Department of Clinical Neurosciences - K Schneider PI). To better understand the risk of concussion and risk factors for concussion in youth soccer, we have ongoing collaborative relationships with the Calgary Minor Soccer Association and have completed prospective injury surveaillance for the Outdoor 2017 season and have continued this into the current 2017-2018 indoor season (Schneider, Emery co-PIs). Additional collaborative work to evaluate the risk of concussion in youth volleyball is ongoing (Schneider, Emery co-PIs).

In addition to primary prevention of concussion, we are evaluating multifaceted concussion rehabilitation strategies, including cervical and vestibular rehabilitation focus, to reduce the risk of concussion recurrence and consequences of concussion (K Schneider PI). We are evaluating subsymptom threshold exercise on timing to return to play following concussion in a multi-site randomized controlled trial (Schneider, Emery, Ellis, Russel co-PIs). The focus of an international multi-site project (Calgary, Montreal, Israel, France) "SiMPly rehab: Seeing-Moving-Playing" is to evaluate the effect of early rehabilitation using visual, vestibular and visual processing techniques and technology in children, youth and adults (ERA-NET Neuron 2017-19 K Schneider, Gagnon I co-PIs).

Schneider K and Emery C are members of the Parachute's expert advisory committee on concussion, which has led to participation in the Canadian Sport Concussion Guidelines to harmonize concussion management and treatment across Canada. This was published in 2017 in alignment with the 5th International Consensus on Concussion in Sport held in Berlin 2016 (co-lead W Meeuwisse, K Schneider - member of the Scientific committee and expert panel, C Emery -expert panel leading systematic review and meta-analysis on Concussion Prevention in Sport). Collaborations with other IOC Centres include projects with Australian Centre for Research into Injury in Sport and its Prevention (ACRISP) and Amsterdam Collaboration on Health and Safety in Sports in injury prevention implementation evaluation (e.g., field hockey, school-based programs) and evaluating consequences of injury in athletes. More recently C Emery is co-leading an international network on methods and biostatistics in research in injury and illness prevention in sport (currently 15 members internationally) to inform biostatistical advances in our field.

In April 2017, SIPRC hosted the 2nd IOC Diploma in Sport Medicine Workshop. This 3-day practical workshop provided world-class teaching from physicians, physiotherapists and athletic therapists. This international workshop and was a collaboration between the University of Calgary Sport Injury Prevention Research Centre, Faculty of Kinesiology, Sport Medicine Centre, and local specialists.

Pediatric rehabilitation and adapted physical activity and sport in youth - The Vi Riddell Pediatric Rehabilitation Research Program (Alberta Children's Hospital Foundation C Emery PI) is focused on rehabilitation in youth with cerebral palsy, joint injury and disease (e.g., juvenile idiopathic arthritis), and post-concussion. Further, this research program focuses on adapted youth physical activity and sport where we are evaluating adapted physical activity (PA) and sport opportunities in youth with neuromotor impairment to inform best practice for transition from rehabilitation to safe physical activity and sport engagement.

RCQOL scores and baseline MRI findings in full thickness rotator cuff tears. This study seeks to determine a correlation (or lack thereof) between baseline clinical findings (RCQOL scores) and baseline imaging findings (MRI results) in 40 patients with full thickness rotator cuff tears. (3) Multicenter Trial of the Sidus® Stem-Free Shoulder Arthroplasty System. This is a multi-centre trial for patients with advanced shoulder arthritis requiring hemiarthroplasty joint replacement that we are participating in. All patients are enrolled, have undergone surgery, and are currently in post-operative follow-up.

Dr. Rezansoff has continued his work with the STABILITY study, investigating the effect of the Lateral Extra-articular Tenodesis (LET) in conjunction with an ACL reconstruction. This is a multi-centered randomized control trial, and we are one of the sites. The study is wrapping up and we will end recruitment March 31, 2017.

Dr. Rezansoff has also been working with Dr. Roman Krawitz (along with Dr. Nick Mohtadi) on a stem cell study. This study aims to find the stem cell profile in knees of the young age population (under 30 y.o.) who are undergoing ACL reconstruction. We will be obtaining samples from 20 patients. We received a $10,000 grant from the McCaig to fund this study.

Public Engagement

Lectures & Speakers

Calgary Chapter of Canadian Association for Retired Persons. September 28, 2017.
Doyle-Baker, P. - *Why exercise is medicine for the older adult: High five!*

Creative Solutions Fund Raiser. March 2, 2017.
Doyle-Baker, P. *Traumatic Brain Injury* (TBI): *Surprising affects not just in sport*.

Calgary Board of Education Wellness Conference. April 2017.
Carolyn Emery - *Prevention and management of injury and concussion in youth sport*.

Public Symposium on Concussion, Ontario Brain Institute. March 2017.
Carolyn Emery - Concussion: *Prevention is the Best Medicine. Bruising Your Brain. What science and sport say about concussion.*

Calvin, Phoebe and Joan Snyder Institute for Chronic Diseases. February 2017.
Carolyn Emery - *Concussions. Mini-Medical School for the general public.*

Alberta CSEP – March 18, 2017
Brian MacIntosh – *Learn, Apply, Build*.

Hockey Calgary Annual General Meeting. June 21, 2017
Kathryn Schneider - *Concussions in youth ice hockey: An update on the evidence*.

Alberta Alpine Association Coaches Meeting. April 21, 2017
Kathryn Schneider – *Sport related concussion: An update on the evidence*.

Calgary Blizzard Soccer Club Coach and Manager Meeting. April 17, 2017
Kathryn Schneider – *Concussions and injuries in youth soccer.*

Calgary Rangers Soccer Club Coach and Manager Meeting. April 10, 2017
Kathryn Schneider – *Concussions and injuries in youth soccer.*

Workshops, Booths, Panels & Webinars

L'Ultra Conférence - Chambéry, France. December 14, 2017.
Guillaume Millet – *How to make a success of your* UTMB.

Conference as part of the Ultra-trail of Mont Blanc – ChamonixFrance. August 31, 2017.
Guillaume Millet - *How not to waste* 9 *months of preparation in a few hours*.

Radiation Oncology, Tom Baker Cancer Center – October 3, 2017.
Rosemary Twomey & Colin Lavigne - *Fatigue and Exercise after Treatment for Head and Neck Cancer*

Knowledge Translation Documents

Canadian Guideline on Concussion in Sport – Kathryn Schneider
Parachute Canada. [website]

Four Characteristics of a Good Concussion Clinic – Kathryn Schneider
Canadian Academy of Sport and Exercise Medicine. [website]

High Intensity Interval Training – Patricia Doyle-Baker
Family Health Online. [website]
Concussion Management: A *Toolkit for Physiotherapists* – Kathryn Schneider
Physiotherapy Alberta. [website]
SIT, HIT, FIT: *The science behind interval training* – Patricia Doyle-Baker
Alberta Fitness Leadership Certification Association. [website]
Statement on Concussion Baseline Testing in Canada– Kathryn Schneider
Parachute Canada. [website]

Media & Interviews

Study says minor hockey body-checking ban has led to fewer injuries. Carolyn Emery.
Globe and Mail. March 10, 2017. Allan Maki. [website]
A *body-checking ban in Canadian peewee hockey pays off*. Carolyn Emery.
Radio Canada International. March 13, 2017. Terry Haig. [website]
Researchers say peewee body checking ban has had results. Carolyn Emery.
Sportsnet. [website]
CBC Sports. March 10, 2017. [website].
Global News. March 11, 20178. Jenna Freeman. [website].
Calgary Herald. March 10, 2017 [website]
CTV News. March 10, 2017. [website]
Improving Health Care with Wearable Tech! - Reed Ferber
Breakfast Television Calgary. November 2017.
How to Increase Your Marathon Training Mileage Without Burning Out - Reed Ferber
SELF Magazine. October 2017.
Usain Bolt and Andre De Grasse: *Hamstring injuries explained* – Reed Ferber
The Conversation. August 2017.
'I'*m Not Built for Running*' *Is a Myth We Need to Stop Perpetuating* – Reed Ferber
SELF Magazine. August 2017.
That moment you realize you can't work out like you used to – Reed Ferber
Los Angeles Times. May 2017.
4 *Beginner Running Injuries That Are Totally Normal and How to Fix Them* – Reed Ferber
SELF Magazine. April 2017.
How the new run3 system allows you to run without risk – Reed Ferber
Calgary Journal. April 2017.
Are knee replacements are the best way to treat knee pain? – Reed Ferber
QR77 Radio. April 2017.
Reed Ferber is the Guy Researching How to Keep Runners Injury-Free – Reed Ferber
Avenue Magazine. March 2017.

New technology for diagnosing running injuries easily – Reed Ferber
QR77 Radio. January 2017.
CityTV Breakfast Television. January 2017.

Kinesiology Researcher Creates New Generation of Smart Prosthetics– Art Kuo
News Talk 770 Radio. June 1, 2017.

Smart prosthetics aim to improve mobility for stroke patients, amputees – Art Kuo
CBC Calgary. June 19, 2017. [website]

The final preparation of the Grand Raid of Reunion – Guillaume Millet
Le 19H00, Antenne Réunion, October 14, 2017.

Sleep Banking and Performance – Guillaume Millet
770 News, January 3, 2017
The Globe and Mail. February 24, 2017. Alex Hutchinson.

Neuromuscular Fatigue in Ultramarathons - Guillaume Millet
Science of Ultra. November. Shawn Bearden.

The UTMB, *is a Party* – Guillaume Millet
Lyon capitale. August 29. 2017. G Lamy.

The UTMB *is open to everyone* – Guillaume Millet.
Le Progrès. August 23, 2017. T Séauve.

Soon all super centenarians? – Guillaume Millet.
Le Parisien. January 5, 2017. Vincent Mongaillard.

Prebiotics: *one more tool to help weight loss & manage diabetes* – Raylene Reimer
BlackDoctor.org, November24, 2017. Constance Brown-Riggs.

Watching more than your weight – Raylene Reimer
Apple Magazine, Ocotber 26, 2017. Jacqueline Louie.

Myths and misinformation about obesity - Raylene Reimer
EveryBody Matters, Telefilm Documentary (Canada and Australia), Part II. August 28, 2017. Scott Allan.

Prebiotic treatment for obesity in children - Raylene Reimer
Sunday Express UK, June 16, 2017. Lucy Johnston.
CBC Radio Quirks & Quarks, June 14, 2017. Amina Zafar.
MedicalResearch.com. June 9, 2017. Marie Benz:
AM 770 Radio, June 8, 2017. Peter Watts.
CBC Radio,June 7, 2017l. Shannon Scott.
Freelance Writer, June 6, 2017. Christine Yu.

Pulse fiber supplementation and the metabolic syndrome - Raylene Reimer
Alberta Pulse Growers Commission. May 11, 2017. Kieran Brett.

Novartis to strengthen R&D *pipeline by in-licensing* ECF843 *for ophthalmic indications* – Tannin Schmidt
Novartis. April 2017. [website]

PR Newswire. [website]
Biospace. [website]
EndPoints News. [website]

Harvard takes an interest in B.C. minor hockey league's concussion testing program – Kathryn Schneider
The Globe and Mail. October 17, 2017. Allan Maki.

How to avoid, recognize and treat concussion in sport – Kathryn Schneider
National Post. September 6, 2017. [website]
The Conversation. September 5, 2017. [website]

Concussion: primary, secondary and tertiary prevention – Kathryn Schneider
BJSM Podcast. May 26, 2017. Liam West. [website]

Rest and Exercise following concussion – Kathryn Schneider
News 770 Live. May 9, 2017. Angela Kokott.
Global News. May 3, 2017. Heather Yourex-West. [website]
CBC News. May 3, 2017.
CBC News Calgary. May 3, 2017.

Preventing, treating sport-related concussions: New Consensus – Kathryn Schneider
Science Daily. April 27, 2017. Riley Brandt [website]

Canadian youth hockey injuries cut in half after national policy change – Kathryn Schneider
Reuters. March 21, 2017. Carolyn Crist. [website]

Body checking ban means fewer injuries in Pee Wee Hockey – Kathryn Schneider
Am 770 Afternoons with Bob Breakenridge. March 13, 2017
CTV News The National. March 11, 2017. [website]
Global News. March 11, 2017. [website]

Calgary Study says Look-up line is a distraction for players – Joan Vickers
CBC Calgary. August 29, 2017. [website]
Calgary Herald. August 29,2017. [website]
Calgary Sun. August 29, 2017.
660 News. August 29, 2017. [website]
Global News. August 29, 2017. [website]
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The Telegram. August 29, 2017.
TSN. August 29, 2017. [website]
Yahoo News. August 29, 2017. [website]
Canadian Press. August 29, 2017. [website]
CTV News Calgary. August 29, 2017. [website]
Toronto Star. August 29, 2017. [website]
Toronto Sun. August 29, 2017. [website]

Group Hosting & Tours

HYRS - 24 students with the Heritage Youth Researchers Summer program visited the HPL in August of 2016. They visted eight different stations, presented by various groups in the HPL.

Notre Dame High School Tour – Cluff Group - Novel Robotic Technologies to Measure Sensory and Motor Function of the Upper Limb

Shad Valley - 64 students in the Shad Valley program visited the HPL in July of 2017. Each student visited 3 in depth stations and 4 short stations, presented by various groups in the HPL.

Operation Minerva – Herzog Group - a one day workshop for young women in Grade 7&8.

Mini-U – *Herzog Group* – youth in Mini-U summer camps visited the HPL each week for 8 weeks over the summer.

Visiting Delegation for Surgut State University – Herzog Group - HPL tour for visiting delegation, including the Rector and Vice Rectors of Surgut State University (SSU), senior officials from the World Bank and an interpreter.

Connect Charter School – Nigg and Reimer Groups – 100 grade eight students visited the Human Performance Laboratory and visited seven stations learning about various aspects of biomechanics research.

Patents & Licenses

Lens-attached tissue cell pressurization device, Patent number 10-1611178, Republic of Korea, issued in 2016, inventors: Han, Sang Kuy; Herzog, Walter; Shin, Hyun Jon

Lens-attached tissue cell pressurization device, Patent number 15511704, United States, pending, filed 03/16/17, inventors: Han, Sang Kuy; Herzog, Walter; Shin, Hyun Jong

Tissue pressure device for 3D image measuring, Patent number 10-2016-0142841, Republic of Korea, pensing, filed 10/31/2016, inventors: Han, sang Kuy; Herzog, Walter

License Tannin Schmidt – PR Newswire "Lubris Announces Out licensing Of Its Proprietary Recombinant Human Lubricin For Use In Ophthalmology To Major Pharma Company", [website]

Acknowledgements

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adidas AG
adidas International
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Alberta Basketball
Alberta Bone and Joint Strategic Clinical Network
Alberta Center for Child, Family & Community Research
Alberta Children's Hospital
Alberta Children's Hospital Foundation
Alberta Children's Hospital Research Institute (ACHRI)
Alberta College and Association of Chiropractors
Alberta Economic Development and Trade
Alberta Health Outcomes Improvement Fund
Alberta Health Services
Alberta Health Services - Bone and Joint Health Strategic Clinical Network
Alberta High School Athletics
Alberta Injury Prevention Centre
Alberta Innovates
Alberta Innovates – Health Solutions (AIHS)
Alberta Innovates – Technology Futures
Alberta Maternal Newborn Child & Youth Strategic Clinical Network
Allan Markin Graduate Scholarship
Arthritis Society
Arthrtis Research UK
Banff Alpine Racers
Benno Nigg Chair in Biomechanics, Longevity, and Aging
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Biomechanigg Research Inc.
Biomechanigg Sport & Health Research Inc.
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Canadian Academy of Sport & Exercise Medicine
Canadian Cancer Society Research Institute
Canadian Chiropractic Research Foundation
Canadian Institutes of Health Research (CIHR)
Canadian Physiotherapy Association
Canadian Soccer Associateion
CAPES – Coordenação de Aperfeiçoamento de Pessoal de Nível Superior
CIHR – Canada Research Chair Program
CIHR - Frederick Banting and Charles Best Canada Graduate Scholarships
CIHR - Institute for Musculoskeletal Health and Arthritis
CIHR - Project Scheme
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Government of Alberta
Harvest Half Marathon Society
Hockey Calgary
Hockey Canada
Hotchkiss Brain Institute
Idea Village
i-generator Science + Innovation
InovoBiologic Inc.
Integrated Concussion Research Program
International Olympic Committee (IOC)
International Olympic Committee Medical Commission (IOC-MC)
International Paralympic Committee
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J. B. Hyne Research Innovation Award
Japanese Society for the Promotion of Science
Killam Fellowship – Canada Council for the Arts
Killam Foundation
Markin Undergraduate Student Research Program (USRP)
McCaig Institute for Bone and Joint Health
MITACS
National Basketball Association (NBA)
National Football League
Natural Sciences and Engineering Research Council of Canada (NSERC)
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NSERC - Discovery Grant Program
NSERC - Engage Grant Program
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Osteoarthritis Research Society International
Own the Podium
Parachute
Public Health Agency of Canada
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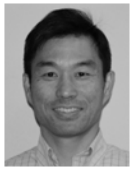
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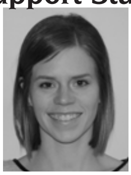
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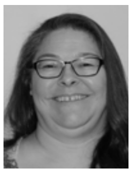
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Exercise Phys. Tech.


Weir, Jamie
Exercise Phys. Tech.

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Aktary, Michelle


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Blote, Karen


Childs, Tanya


Cooke, Emily


Eller, Lindsay


Esau, Shane


Hubka, Tate


Hasselaar, Charley


Jinha, Azim


Killick, Anthony

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Kondo, Colleen


Kozak, Stacy


Krolikowski, Maciek


Küpper, Jessica


Lee, Kristine


Lobos, Stacy


Loos, Lisa


Madden, Ryan

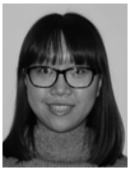

Nasuti, Gabriella


Nguyen, Hoa


Nicolucci, Alissa


Sawatsky, Andrew


Seerattan, Ruth


Shi, Qian


Sick, Stacy


Spencer, Nicole


van den Berg, Carla


van Rassal, Cody


Varughese, Joel


Vienneau, Jordyn


Virani, Shane

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Alarifi, Abdulaziz
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Baggaley, Michael
Kinesiology **


Befus, Kimberly
Kinesiology **

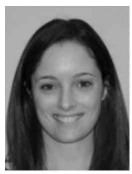

Bertoli, Josefina
Kinesiology **


Bigg, Jessica
Kinesiology **


Boldt, Kevin
Kinesiology *


Bruce, Olivia
Kinesiology *


Bulat, Muge
Kinesiology **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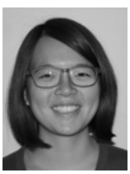
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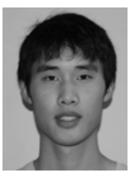
Biomedical Eng. *


Chen, Alexander
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Chleilat, Fatima
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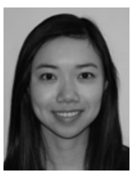
Cho, Nicole
Kinesiology **


Cigoja, Sasa
Kinesiology *


Clermont, Christian
Kinesiology **

Members of the RJC


Coates, Kyla
Kinesiology *


Codd, Chevonne
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Collins, Kelsey
Kinesiology **


Crack, Laura
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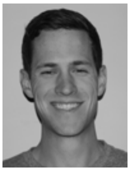
Dai, Xu
Biomedical Eng.**


Darici, Osman
Kinesiology **


Das, Nabangshu
Biomedical Eng. **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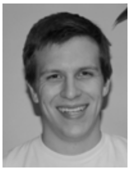
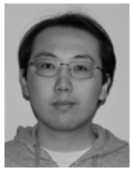

Eliason, Paul
Kinesiology **


Firminger, Colin
Biomedi. Eng. **


Fu, Xiao-Yu
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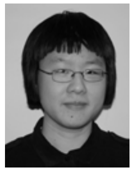
Fung, Anita
Biomedical Eng. *


Gallinger, Tessa
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Gamble, Alexander
Kinesiology **


Geck, Lisa
Kinesiology *


George, Mitchell
Kinesiology *


Gorrell, Lindsey
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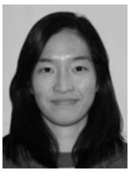
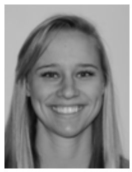
Goudie, Luke
Biomedical Eng. *


Grewal, Eshleen
Kinesiology *


Han, Seong-won
Kinesiology **


Hashlamonn, Kotaybah
Biomed. Eng. **


Hoerzer, Stefan
Kinesiology **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Kinesiology *


Innetta, Danilo
Kinesiology **


Janzen, Leticia
Kinesiology *


Kashluba, Kayla
Kinesiology *


Kenny, Sarah
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Kinesiology **


Kronlund, Liam
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Kobsar, Dylan
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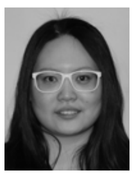
Liu, Shuyue
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Members of the RJC


Loundagin, Lindsay
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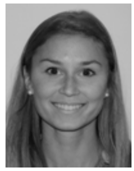
Nettleton, Jodi
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Biomed. Eng. **


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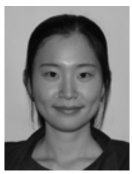
Ryu, Hansol
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Sarkar, Anusi
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Kinesiology **


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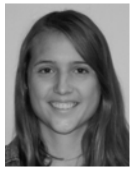
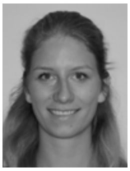

Angerstorfer, Johanna


Aslanzadeh, Fatemeh


Azevedo, Rafael


Behling, Anja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Hoepfl, Tanja

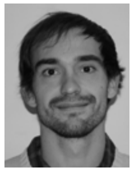

Hoitz, Fabian


Kherzy, David


Kirchhuebel, Hannah


Kooijman, Lars


Kranenburg, Elske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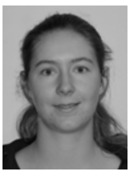
Mauracher, Marita


Maurus, Philipp


Mayerhoffer, Patrick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Milioni, Fabio

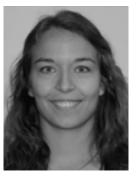

Oranchuk, Dustin


Ortes, Faruk


Pol, Quita


Ruefenacht, Sarah


Sarramea, Pierre


Schoen, Tanja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Ullrich, Martin


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Völkel , Richard

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Darling, Eric
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Dukelow, Sean
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Elsaid, Khaled
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Englund, Mike
Esser, Michael
Ezzat, Allison
Finch, Caroline
Fontana, Federico
Freemont, Pierre
Froyd, Christian
Fuller, Colm
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Goulet, Claude
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Guskiewicz, Kevin
Hagel, Brent
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Horvais, Nicolas
Hunter, David
Hutchison, Jamie
Jaremko, Jacob
Jay, Gregory
Jordan, Matt
Jubeau, Marc
Katz-Leurer, Michal
Kerherve, Hugo
Kirkwook, Michael
Kirton, Adam
Koga, Shunsaku
Korhonen, Staffmi
Kraus, Virginia
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Legg, David
Lloyd, David
Lohmander, Stefan
Luyten, Frank
MacDonald, Kerry
Macpherson, Alison
Makdissi, Michael
Manske, Sarah
Marshall, Deborah
Martinuzzi, Robero
McCrea, Michael
McCrory, Paul
Millet, Gregoire
Mish, Sandra
Mobisheri, Ali
Mohtadi, Nicholas
Mosher, Dianne
Mrazik, Martin
Mrklas, Kelly
Mychasiuk, Richelle
Myklebust, Grethe
Nadeau, Luc
Nettel-Aguirre, Alberto
Nishikawa, Kiisa
Noel, Melanie
Phillips, Aaron
Pike, Ian
Pinky, Najratum
Pogliaghi, Silivia
Powers, Geoff
Proctor, David
Putukian, Margot
Ramage, Barbara
Reed, Nick
Register-Mihalik, Johna
Risberg, May-Arna
Robu, Ion
Roos, Ewa
Rouhi, Gholamreza
Runhaar, Jos
Rupp, Thomas
Russell, Kelly
Samozino, Pierre
Schappacher, Gudrun
Schwellnus, Martin
Seiberi, Wolfgang
Shrier, Ian
Smirl, Jon
Snyder-Mackler, Lynn
Stokes, Maria
Tator, Charles
Tomazin, Katja
Turgeon, Alexis
Turner, Michael
Twilt, Marinka
Ursulak, Gina
van Donkelaar, Paul
VanMechelen, Willem
Verges, Samual
Verhagen, Evert
Verschuren, Olaf
Walker, Richard
Webborn, Nick
Whatman, Chris
Whitaker, Jackie
Wiart, Lesley
Willick, Stuart
Woodhouse, Linda
Yeates, Keith
Zemek, Rogerio
Zia, Yang
Zignoli, Andrea
Zwicker, Jennifer

Publications

Aboodarda, S.J., Šambaher, N., Millet, G.Y., Behm, D.G., 2017. Knee extensors neuromuscular fatigue changes the corticospinal pathway excitability in biceps brachii muscle. Neuroscience, 340: 477-486.

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Keynote & invited lectures

Cluff T. Tradeoffs in optimal control capture systematic differences in human motor control and learning strategies. Society for Neuroscience Minisymposium. Washington, DC. November 12, 2017.

Doyle-Baker P. Training L.A.B. 2017. SIT, HIT, FIT: the science behind interval training. Provincial Fitness Unit of Alberta. MRU, Calgary, AB. September 16, 2017.

Doyle-Baker P. Muscle fragility and strength importance in bone health. Alberta Health Services: Practice Wise presentations. Calgary, AB. August 24, 2017.

Doyle-Baker P. Why exercise is medicine for the older adult: High five! CSEP-CEP Professional Development Day- Winsport. Calgary, AB. June 24, 2017.

Doyle-Baker P. Helping older clients be young: the art and science of Gerokinesiology and Wile E Coyote: the living, breathing synonym for cortisol. Fit Rendezvous Conference. Calgary, AB. May 27, 2017.

Edwards WB. Weighting the importance of loading magnitude and loading cycles using cumulative damage theory. 2017 American College of Sports Medicine Annual Meeting and World Congress on Exercise is Medicine®. Denver, Colorado. May, 2017.

Emery CA. Preventing Injuries and their consequences in youth sport: Research informing best practice and policy. Sports Medicine New Zealand Conference. Hamilton, NZ. October 2017. (Keynote)

Emery CA. Moving Upstream towards Injury Prevention. American Academy of Orthopaedic Manual Physical Therapy. Salt Lake City, Utah. October 2017. (Keynote)

Emery CA. Evidence-informed practice in injury prevention in youth soccer. Southampton Football Club and University of Southampton Football Consortium. Southampton, UK. October 2017. (Keynote)

Emery CA. Injury prevention in youth sport and recreation: informing practice and policy. British Association of Sport and Exercise medicine. Bath, UK. October 2017. (Keynote)

Emery CA. Preventing joint injury to prevent early OA. OARSI 2017 World Congress. Las Vegas, USA. April 2017.

Emery CA. The public health burden and evidence for prevention of injury in youth sport and recreation. IOC World Conference: Prevention of Injury & Illness in Sport. Monaco. March 2017.

Emery CA. Randomized controlled trials – the only evidence that should inform practice and policy for injury prevention in sport. IOC World Conference: Prevention of Injury & Illness in Sport. Monaco. March 2017.

Emery CA. Primary Prevention: Strategies to reduce the risk of concussion in pediatric sport participants? IOC World Conference: Prevention of Injury & Illness in Sport. Monaco. March 2017.

Emery CA. Implementing Rule Change. Gfeller Symposium on Concussion. University of North Carolina. Chapel Hill, NC, USA. March 2017.

Federico S. Continuum Mechanics: series of lectures (30 hours) at the Department of Engineering. Università di Messina, Italy. May 2-25, 2017.

Federico S. Differential Geometry in Continuum Mechanics: series of lectures (10 hours) at the Department of Mathematics. Università di Messina, Italy. May 2-25, 2017.

Federico S. Balance Equations and Thermodynamics in Continuum Mechanics. Department of Energy Conversion Science. Kyoto University, Japan. June 2, 2017.

Federico S. Magnetostriction in Ferromagnets: Tensor Representation. Department of Energy Conversion Science. Kyoto University, Japan. December 22, 2017.

Ferber R. Evidence-Informed Approach to Treat Running-Related Injuries. Canada West University Athletics Association (CWUAA) Medical Committee 2017 meeting. Calgary, Canada. December 2017.

Herzog W. Basic muscle mechanics: from single sarcomeres to whole muscle function in health and disease. European Society for Movement Analysis in Adults and Children (ESMAC). Trondheim, Norway. September 6-9, 2017. (Keynote)

Herzog W. Reflections on muscle: of intuition, truth, serendipity and paradigms. (Muybridge Award Lecture) XXVII Congress of the International Society of Biomechanics. Brisbane, Australia. July 23-27, 2017. (Keynote)

Herzog W. Do we need a new paradigm for muscle contraction? 23rd Congress of the European Society of Biomechanics. Seville, Spain. July 2-5, 2017. (Keynote)

Herzog W. From medals to muscles to molecules and back again. (Dyson Award Lecture) 35th International Conference on Biomechanics in Sport. Cologne, Germany. June 14-18, 2017. (Keynote)

Herzog W. Muscle Mechanics made in Brazil. 17th Congress of the Brazilian Society of Biomechanics. Porto Alegre, Brazil. May 8-11, 2017. (Keynote)

Herzog W. The role of muscles in musculoskeletal health. Applied Neuromechanics Congress. Porto Alegre, Brazil. May 8-11, 2017. (Keynote)

Herzog W. Optimizing sport performance through muscle mechanics. 9th Conference of the Swiss Society for Sport Science. Zurich, Switzerland. Feb 9-10, 2017. (Keynote)

Herzog W. Residual force enhancement in skeletal muscles: facts and fancy. 46th European Muscle Conference. Potsdam, Germany. September 19-22, 2017.

Herzog W. The distribution problem in biomechanics. 41st Annual Meeting of the American Society of Biomechanics. Boulder, CO, USA. August 8-11, 2017.

Herzog W. Residual force enhancement: neglected property in sport and health. European Conference of Sport Science. Essen, Germany. July 5-8, 2017.

Herzog W. Musculoskeletal imaging using confocal and multi-photon excitation microscopy. Orthopedic Research Society Congress. San Diego CA, USA. March 19-22, 2017.

Herzog W. Titin: Unheralded giant of muscle contraction. European Mechanics Society Colloquium on Advanced Experimental Methods in Tissue Biomechanics. Burg Warberg, Germany. February 12 -16, 2017.

Kuo AD. Human inspired robots, robot inspired humans. Dynamic Walking Workshop, Aland, Finland. June 4, 2017. (Keynote)

Kuo AD. Human inspired robots, robot inspired humans. Workshop on Bio-Robotics. Imperial College, London, United Kingdom. August 29, 2017.

Kuo AD. Apoplexic Now: Biomechanics of Human Locomotion in the Lab and in the Wild. Mechanical Engineering Departmental Seminar. Cornell University, New York, USA. September 19-24, 2017.

MacIntosh BR. Where you come from will determine what you see: a fresh look at the slow component of oxygen uptake. Karolinska Institute, Deptartment of Physiology and Pharmacology. Stockholm Sweden. June, 2017.

MacIntosh, BR. Skeletal muscle energetics and tendon stiffness: implications for energy cost of running. European College of Sport Science, Bochum, Germany. July, 2017.

Millet GY. Ultra-trail, exercice physique et sommeil. Le Congrès du Sommeil®, Marseille, November 24, 2017.

Millet GY. Does neuromuscular fatigue directly influence performance in ultra-marathon? Canadian Society for Exercise Physiology General Annual Meeting. Winnipeg, MN. October 25-28, 2017.

Millet GY. Physiologie de l'ultra trail : performance et fatigue. 2ème Congrès de la SRMKS / SMSOI, Saint-Pierre (Ile de la Réunion), France. October 14, 2017.

Millet GY. Intérêts de la force dans les sports d'endurance et d'ultra-endurance : Données scientifiques. Conférence à l'INSEP. Paris, France. October 22, 2017..

Millet GY. Fatigue and Efficiency during Endurance Exercise. Optimizing Performance during Long Endurance Events Symposium, American College of Sports Medicine's 64th Annual Meeting, Denver, CO, USA. May 30- June 3, 2017.

Murias J. Laboratory-derived versus self-selected determination of critical intensities of exercise University of Verona PhD Program Symposium. Verona, Italy. December 12, 2017.

Murias J. Laboratory-derived versus self-selected determination of critical intensities of exercise. CSEP Annual Meeting 2017. Victoria, B.C. October 25-28, 2017.

Murias J. Lecturer, Sports Physiology course (6 lectures – 12 hours). Department of Neurological and Movement Sciences, University of Verona. Verona, Italy. May 2017.

Nigg B. The small muscles crossing the ankle joint. Langer Conference. Manchester, UK. June 23, 2017. (Keynote)

Nigg B. Running Redefined. Langer Conference. Manchester, UK. June 24, 2017. (Keynote)

Nigg B. Running Injuries - a Paradigm Shift. Connect Conference. Ulm, Germany. March 18, 2017. (Keynote)

Reimer RA. Can your gut microbiota help you eat less and improve your metabolism? Why chicory root prebiotics fibers are important in the fight against obesity. Food & Nutrition Conference and Expo. Chicago, IL. USA. October 22, 2017.

Reimer RA. Obesity and fatty liver disease: new hope for therapies based on diet and gut microbiota. Nestle Research Centre. Lausanne, Switzerland. May 3, 2017.

Reimer RA. Manipulating the gut microbiota across the lifespan: impact on chronic disease. Université Catholique de Louvain. Brussels, Belgium. April 25, 2017.

Reimer RA. Metabolic disease and the gut microbiome. Bio-Rad. Hercules, CA, USA. March 15, 2017.

Schneider K. What about the girls? An update on concussion in sport: What do we know and where do we need to go? Concussion in Women and Girls Conference. Toronto, ON. September 23, 2017. (Keynote)

Schneider K. An Update from Berlin: A summary of the evidence from the 5th International Consensus Conference on Concussion in Sport. Concussion Protocol Harmonization Project: Stakeholder Event. Ottawa, ON. May 8, 2017. (Keynote)

Schneider K. An Update on Concussion and rehabilitation. See the Line, University of Western Ontario. London, ON. August 2017. (Keynote)

Schneider K. An update on the evidence – the 5th International Consensus on Concussion in Sport. Sport Physiotherapy Canada Concussion Symposium. Ottawa, ON. Nov 25, 2017.

Schneider K. 5th International Consensus Statement on Concussion in Sport. International Initiative for Traumatic Brain Injury (InTBIR). Bethesda, MD, USA. October 30, 2017.

Schneider K. An Update from Berlin: A Summary of the evidence from the 5th international Consensus Conference on Concussion in Sport. Alberta Sport Leadership Conference. Banff, AB. April 28, 2017.

Schneider K. Prevention of Concussion in Sport. Major League Soccer (MLS)/ US Soccer/National Women's Soccer League (NWSL) Concussion Meetings. New York, NY, USA. April 3, 4, 2017.

Schneider K. Concussion Prevention: A cervical spine and vestibular approach. International Olympic Committee World Congress on Illness and Injury Prevention in Sport meetings. Monte Carlo, Monaco. March 16-18, 2017.

Total number of invited lectures = 109

Official research related functions

Tyler Cluff

Grant Reviewer

- The Research Foundation Flanders, external reviewer - postdoctoral fellowship competition

Conference Organizer

- Social Chair, Society for Neuroscience
- Organizer, Society for Neuroscience, Minisymposium

Membership

- Society for Neuroscience, Society for the Neural Control of Movement

P. Tish Doyle-Baker

Editorial/Advisory Board Member

- Gray Family Eau Claire YMCA Calgary, Alberta
- Vice President -Sport Science Association of Alberta
- International Journal of Kinesiology and Sport Science
- Annals of Applied Sport Science

Committees

- Co-Chair, Alberta Cancer Prevention Legacy Fund -Physical Activity Group
- World Federation of Public Health Association; Global Health Equity & Digital Technology Working Group

Grant Reviewer

- The J. Willliam Fulbright Commission -Czech Republic
- Adverse Event Committee (CIHR), Saskatchewan
- CIHR Expert Panel- Foundation Grants

Conference Organizer

- Co-Chair, Walk 21 Conference Committee, Pre-Conference Sessions, Calgary AB.
- Exercise Perspectives Conference Organizing Committee, AB.

Brent Edwards

Editorial/Advisory Board Member

- Parachute Canada Scientific Advisory Board
- Scientific Reports

Grant Reviewer

- CIHR Project Grants, Clinical Investigation B2 (CB2) Committee
- External Reviewer, NSERC Discovery Grants

Board Member

- Secretary General (Appointed), International Society of Biomechanics,

Conference Organizer

- Organizing Committee, ISB 2019

Official research related functions

Carolyn Emery

Grant Reviewer

- Canada Foundation for Innovation
- Canadian Institute of Health Research (CIHR) Musculoskeletal Catalyst Grant

Committees

- Osteoarthritis Research Society International Scientific
- Medical and Scientific Committees, International Olympic Committee
- Parachute Canada Concussion Awareness Advisory Committee
- Royal Society of Canada (New Scholar)
- Research Session Chair, Canadian Academy for Sport and Exercise Medicine (CASEM)
- Chair Abstract Review - Injury Prevention, CASEM
- Chair, Pediatric Rehabilitation Alberta Children's Hospital Foundation (ACHF)
- Director Vi Riddell Pediatric Rehabilitation Research Program, ACHF
- Bone and Joint Canada – Steering Committee
- Parachute Concussion Awareness and Education Committee
- Regional Network Lead, Canadian Academy of Health Sciences

Salvatore Federico

Editorial/Advisory Board Member

- Mathematics and Mechanics of Solids

Board Member

- President Elect, Canadian Society for Biomechanics (2016-2018)

Reed Ferber

Editorial/Advisory Board Member

- Biotricity Inc., Redwood City CA
- Fitbit Inc., San Francisco, CA, USA
- Prosthetics and Orthotics International
- Journal of Sport Rehabilitation
- Journal of Athletic Training

Giles

Editorial/Advisory Board Member

- Circulation Research (1994 – 2018)
- Journal of Molecular and Cellular Cardiology (2007 – 2018)
- Experimental Physiology (2008 – 2017)
- Journal of Physiology (2013 – 2017)
- The Faculty of 1000, Section Head, Circulation
- • Cardiovascular Physiology (2004 – 2018)
- Nora Eccles Harrison Centre for Cardiovascular Research and Education

Board Member

- Brenda-Strafford Foundation for Seniors Care

Membership

- Biophysical Society, Senior Member
- Physiological Society, Foreign Member
- American Physiological Society
- Heart Rhythm Society

Committees

- Alberta Diabetes Institute
- Johnson and Johnson Research Fund

Hart

Editorial/Advisory Board Member

- Scientific Director, AHS Bone & Joint Health Strategic Clinical Network

Membership

- Canadian Academy of Health Sciences, Standing Committee on Assessments

Walter Herzog

Editor

- Co-Editor in Chief, Journal of Sport and Health Science
- Associate Editor - Exercise and Sports Science Reviews
- Associate Editor - IEEE Transactions in Neural Systems and Rehabilitation Engineering

Conference Organizer

- Chair, Organizing Committee, ISB 2019

Member

- Royal Society of Canada, FellowEuropean Society of Biomechanics

Arthur Kuo

Committees

- Founder and Steering Committee Chair, Dynamic Walking Conference Series, 2006-present

Conference Organizer

- Organizing Committee, ISB 2019

Guillaume Millet

Grant Reviewer

- AFM-TELETHON (France), Trampoline Grant
- Fonds de Recherche en Santé Respiratoire Fondation du Souffle (France)
- Natural Sciences and Engineering Research Council of Canada

Official research related functions

Benno Nigg

Editorial/Advisory Board

- Footwear Science

Board Member

- Center for Sport Science and Sport Medicine Berlin (CSSB)
- Friedrich-Alexander University, Erlangen, Germany

Conference Organizer

- Organizing Committee, ISB 2019

Ryan Peters

Membership

- International Foot and Ankle Biomechanics Congress (2018 to present)
- International Society for Posture and Gait Research (2013 to present)
- Society for Neuroscience (2009 to present).
- Canadian Association for Neuroscience (2008 to 2011)

Raylene Reimer

Editor

- Associate Editor, Applied Physiology, Nutrition and Metabolism

Committees

- Strategic Clinical Network Research and Innovation Advisory Committee (Diabetes, Obesity and Nutrition)

Conference Organization

- Organizing Committee, 2018 Conference on Recent Advances in Preventing and Managing Child and Adolescent Obesity

Grant Reviewer

- CIHR Banting Postdoctoral Fellowships National Selection Committee (2017-2020)

Membership

- Executive Member, Canadian Obesity Network, Calgary Chapter

Tannin Schmidt

Grants Reviewer

- Arthritis Society, Strategic Operating Grant
- CIHR, Project Grants, Stage 1 & Stage 2 Review, 2017
- European Research Council, Advanced Grant Program, External Reviewer, 2017

Kathryn Schneider

Editorial/Advisory Boards

- Parachute Canada Expert Advisory group on Concussion (January 2016-present)

- Federal Working Group on Concussion in Sport, Canadian Concussion Collaborative Representative, Spring 2016 – present

CONFERENCE ORGANIZER

- 5th International Consensus Conference on Concussion in Sport (Berlin, October 2016), Scientific Committee Member

COMMITTEES

- Sport Physiotherapy Canada Concussion Committee Member, 2016-present
- Co-Chair, Persistent/Chronic Subcommittee - NINDS CDE Sport-related concussion June 2016-present
- Calgary Minor Soccer Association, Sport Concussion Committee, June 2015-present
- International Concussion and Head Injury Research Foundation (ICHIRF) Scientific Committee Member, July 2015-present
- Canadian Concussion Collaborative, Representative for the Canadian Physiotherapy Association, June 2015-present
- Federal Provincial/Territorial Working Group on Concussion in Sport

DARREN STEFANYSHYN

EDITOR

- Associate Editor, Footwear Science

EDITORIAL/ADVISORY BOARD MEMBER

- European Journal of Sport Science

CONFERENCE ORGANIZER

- Organizing Committee, ISB 2019


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