



2020 Research Report



Human Performance Laboratory

It has been a long year. Restrictions, social distancing, wearing masks, research interrupted, courses cancelled, working from home. Like the rest of the world, life stopped for the Human Performance Lab from April to August 2020, and then recovered slowly, and as I am writing this note in the spring of 2021, we are almost back to normal. It took a special effort from all to keep trainees going and offer rich research experiences to the many undergraduate and foreign visiting students who had to work remotely for big parts of the year. The research associates of the lab were particularly resourceful, and I want to thank them all for their effort, inspiration, and flexibility. Above all, I want to thank Tim Leonard, who has looked after the HPL for more than 30 years. He was in the lab virtually every day during the pandemic, making sure we had dry ice and liquid nitrogen, the freezers were working, animals were fed and trained, collecting data for innumerable student projects, fixing the things that broke, and so much more. He provided the HPL with some much-needed normality, making sure everything worked at all times.

I worked mostly remotely from my weekend home in the Rocky Mountains, right next to the forest and wilderness, with bears and deer and elk and squirrels and cougars visiting daily. It is a quiet place, ideal for isolation in times of a pandemic. I must admit, I enjoyed the solitude, the quiet, the calm, the long days without interruptions. It provided for more time for the things I love: thinking, writing, skiing, reading, hiking, and relaxing with my favourite person. The days were flexible, and a routine evolved that was natural, peaceful, and highly productive. I will miss some aspects of this life when we “return to normal”.

However, I missed the traveling to far away, unknown places, attending scientific conferences, meeting friends and colleagues, and talking to the always young and energetic and eager students and trainees. Talking to the leaders in the world of science, learning first-hand of new techniques, surprising developments, facts destroyed, and knowledge emerge. There is nothing more invigorating than having a coffee, a beer, a dinner, after an exciting scientific session, and discuss the pros and cons, the good and the bad, agree, disagree, fight, come to conclusions, and plan the next set of experiments that will settle it once and forever.

What a privilege it is to be an academic scientist. A life that is made possible thanks to the generosity of our families, friends, and supporters of the HPL, the Faculty of Kinesiology and the University of Calgary. I would like to thank you all for your continued support and dedication in these uncertain times, and your undeterred belief that we can be global leaders in human health, wellness, and performance research.

Sincerely,

A handwritten signature in black ink, appearing to read "W. Herzog". The signature is fluid and cursive, with a long, sweeping tail that extends downwards and to the right.

Walter Herzog

Director

Highlights

- Honour Walter Herzog – Outstanding Reviewer, CIHR College of Reviewers, 2019 Fall Grant Competition
- Honour Carolyn Emery – Canada Research Chair (Tier 1) Concussion
- Appointed Kathryn Schneider – Co-Chair 6th International Consensus Conference on Concussion in Sport
- Appointed Kathryn Schneider – Executive committee, Canadian Concussion Network. Co-Lead Integrated Knowledge Translation Committee, Canadian Concussion Network
- Appointed Franziska Onasch – Student Representative, Canadian Society for Biomechanics
- Appointed Carolyn Emery – Co-lead Integrated Concussion Research Program, University of Calgary
- Appointed Carolyn Emery - Strategic Research Committee of the Canadian Physiotherapy Association
- Appointed Carolyn Emery – Chair Scientific Committee Sport Physiotherapy Canada Congress
- Appointed Salvatore Federico – Appointed member of the Canadian National Committee of the International Union of Theoretical and Applied Mechanics (CNC-IUTAM)
- Award Raylene Reimer – Killam Annual Professor
- Award Raylene Reimer – Human Performance Laboratory Faculty Award
- Award Walter Herzog – Award for “Excellence in Basic, Clinical, and Translational Science” from the Journal of Orthopaedic Research for best manuscript of 2020
- Award Fabian Hoitz – Supervisor: Benno Nigg, Alberta Innovates Graduate Student Scholarship for Data-Enabled Innovation, Alberta innovates Award
- Award Fabian Hoitz – Supervisor: Dr. Benno Nigg, Biomedical Engineering Academic Award, University of Calgary
- Award Sasa Cigoja – Dr. Benno Nigg Distinguished Faculty Achievement Award



Highlights

- Award Dana Hunter – 2020 Alberta SPOR Graduate Studentship
- Ph.D. Kotaybah Hashlamoun – Supervisor: Dr. Salvatore Federico. Thesis: On the Permeability and Diffusivity of Articular Cartilage.
- Ph.D. Seong-won Han – Supervisor: Dr. Walter Herzog. Thesis: Changes in patellofemoral joint mechanics in the presence of quadriceps muscle imbalance
- Ph.D. Kevin Boldt – Supervisor: Dr. Walter Herzog. Thesis: Exercise and dietary interventions in a rat model of cardiac adaptation
- Ph.D. Lindsay Gorrell – Supervisor: Dr. Walter Herzog. Thesis: Musculoskeletal biomechanical and electromyographical responses associated with spinal manipulation
- Ph.D. Sasa Cigoja – Supervisor: Dr. Benno Nigg; Co-supervisor: Dr. Brent Edwards: Thesis: Shoe bending stiffness and muscle-tendon unit function in running
- Ph.D. Lindsay Loundagin – Supervisor: Dr. Brent Edwards: Thesis: The influence of intracortical microarchitecture on the mechanical fatigue behavior of human bone
- Ph.D. Lauren Miutz – Co-Supervisors Dr. Jonathan Smirl and Dr. Carolyn Emery
- Ph.D. Heather Shepherd – Co-Supervisors Dr. Amanda Black and Dr. Carolyn Emery
- M.Sc. Anneke Winegarden – Supervisor: Dr. Patricia Doyle-Baker. Thesis Title: 3km Track Time Trial Performance in Cross-Country Skiers after a HIIT Session
- M.Sc. Keenan MacDougal – Supervisor: Dr. Brian MacIntosh. Thesis: Additional in-series compliance does not affect the length dependence of activation in rat medial gastrocnemius.
- M.Sc. Nathaniel Morris – Supervisor: Dr. Walter Herzog. Thesis: Neuromuscular deficits following anterior cruciate ligament reconstruction with hamstring autograft: implications for rehabilitation and return to sport testing

Highlights

- M.Sc. Thomas Tripp — Supervisor: Dr. Martin MacInnis. Thesis: Ryanodine receptor modifications following sprint interval exercise: Time course and fibre-specific responses in human skeletal muscle
- M.Sc. Larissa Taddei — Supervisor Dr. Kati Pasanen. Thesis: The Influence of Peer-to-Peer Learning via Technology on Youth Soccer Coaches' Neuromuscular Training Warm-up Exercise Error Detection
- M.Sc. Corson Johnstone — Supervisor: Dr. Kathryn Schneider. Thesis: Heat, Cold and Pressure Pain Thresholds following a sport-related concussion.
- M.Sc. Joel Burma — Supervisor: Dr. Kathryn Schneider, Co-supervisor: Dr. Jeff Dunn. Thesis: The effect of high-intensity exertion on Sport Concussion Assessment Tool 5 (SCAT5) subcomponent scores in varsity contact and collision sport athletes
- M.Sc. Michael Esposito — Supervisor: Dr. Darren Stefanyshyn. Thesis: Effects of midsole cushioning stiffness on Achilles tendon stretch during running
- M.Sc. Pratham Singh — Supervisor: Dr. Darren Stefanyshyn. Thesis: Determining speed and stride length using an ultrawide bandwidth local positioning system equipped with an inertial measurement unit
- M.Sc. Isla Shill — Supervisor: Carolyn Emery. Thesis: Injuries in Canadian female high school rugby and coach perceptions of injury prevention: Informing an injury prevention implementation strategy



General Comments

Movement Science and Musculoskeletal Health

TYLER CLUFF

INTEGRATIVE SENSORIMOTOR
NEUROSCIENCE LABORATORY

The Integrative Sensorimotor Neuroscience Laboratory is a growing group in the Human Performance Laboratory. Their work focuses on the mechanistic, multidisciplinary study of human sensorimotor control and learning and understanding how basic aspects of sensory processing contribute. The group combines behavioural experiments with robotics, neurostimulation, medical imaging and computational models to examine the function of the human sensory and motor systems. 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. With ongoing collaborations, the Integrative Sensorimotor Neuroscience Laboratory hopes to generate tools that allow bet-

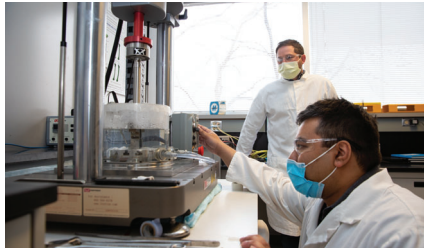
ter assessment, monitoring and diagnoses of deficits in sensory and motor function.

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. This leads to a reduction in stiffness and an increase in mechanical strain. Without adequate tissue repair, the evolution and accumulation of microdamage may lead to musculoskeletal injury. Mechanical fatigue is believed to play a predominant role in the pathophysiology of musculoskeletal injuries such as bone stress fracture and achilles and patellar tendinopathy. The research group lead by Dr. Brent Edwards combines biomechanical experimentation with advanced medical imaging and computational modelling to investigate tissue damage and fatigue in response to mechanical loading. This unique approach allows them to estimate in vivo tissue mechanics in a non-invasive and subject-specific manner. Their work spans dimensional scales, from basic experiments at the tissue-level that enhance understanding of the mechanical fatigue process, to applied experiments at the whole-body level for the

General Comments

development of treatments and interventions to improve tissue quality and decrease risk of injury.



SALVATORE FEDERICO

CONTINUUM
BIOMECHANICS GROUP

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. Most phenomena of structural rearrangement in a biological tissue can be described under the umbrella of growth and remodelling. Structural damage is what can initiate injury and disease.

A main theme is the modelling of articular cartilage. 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, remodelling and damage processes may shed light on the causes of the initiation of degeneration, and suggest possible treatments to prevent disease.

REED FERBER

RUNNING INJURY CLINIC

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.

The group has successfully established an international and growing gait analysis research network currently consisting of 15 researchers and over 125 clinical partners. Each centre is linked to the world's largest research database of biomechanical gait and clinical data. They are transforming the biomechanics research community by openly

General Comments

sharing data between laboratories, employing unique data science analysis methods and growing their research network.

The Running Injury Clinic's 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 health-care. To address these challenges, Dr. Ferber leads the NSERC Wearable Technology Research and Collaboration (We-TRAC) training program, which builds on being selected by the Vice President – Research to lead the Sensor Technology in Monitoring Movement (STiMM) research program supporting the University's Eyes High "Engineering Solutions for Health" research strategy.



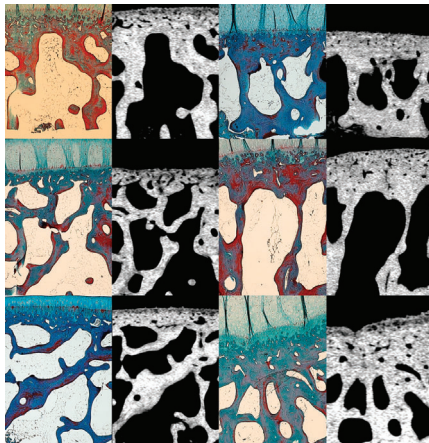
WALTER HERZOG

This past year, Walter Herzog was on administrative leave and used the opportunity to teach, do research and help in the internationalization process of the Federal University of Santa Catarina, Brazil. Two emotions from this experience prevailed: (1) the eagerness of Brazilian students to learn, resulting in hour-long discussions following the formal class hours and (2) the ability of students and faculty members to do excellent research with little or no financial support. At the University of Calgary, five trainees (three postdoctoral fellows, three PhD and one MSc student) finished their research training with him successfully this past year and were able to obtain a faculty position, postdoctoral positions, and employment, respectively.

In the area of muscle mechanics, the Herzog group found the surprising result that the residual force enhancement property was present in muscles whose fibres shortened during contraction, an unexplainable result in the current thinking of muscle mechanics. In the area of joint biomechanics and osteoarthritis they then demonstrated that not only aerobic exercise, but also strength training, is a powerful strategy for preventing knee osteoarthritis in subjects with obesity-related metabolic syndrome. Finally, in their ap-

General Comments

plied research, the group initiated a clinical collaboration and obtained two small pilot grants, allowing them to test alternative approaches in preserving/restoring muscle function in children with Cerebral Palsy.



ART KUO

Dr. Arthur Kuo's laboratory studies the biomechanics, energetics and neural control of human movement. They develop computational models of the human body dynamics and apply them to simulations and analyses of locomotion and upper extremity reaching movements. They also perform experiments to test model predictions of stability, motion trajectories and energy expenditure. Ongoing projects include studies of human walking on uneven terrain, use of inertial measurement units to record locomotion in the real world, energetics of human reaching and

modeling of neural central pattern generators for locomotion. These projects are intended to reveal basic mechanisms of locomotion and other movements, with applicability to neural rehabilitation and diagnosis of movement impairments.

BENNO M. NIGG & SANDRO NIGG

The Nigg group concentrates on locomotion topics that are health and performance related with special considerations for footwear, apparel and equipment. This last year, (1) significant progress was made in understanding of the influence of lower limb work distribution and footwear design 2) machine learning tools to develop virtual coaching apps were developed and 3) a new concept, the teeter-totter mechanism, to better understand running performance was proposed.

Lower Limb Work Distribution: Running performance decreases throughout a long-distance run. This performance decrease may be due to a decrease in ankle joint work as the run progresses. As a result, knee and hip joint work increases. This year it was demonstrated that work performed by the foot increases throughout a run, which may also reduce long-distance running performance. The application of carbon fibre plates in shoes reduces the work performed by foot joints.

General Comments

Furthermore, carbon fibre shoes enable runners to maintain a similar amount of ankle joint work longer in a run. In total, shoes with carbon fibre plates may allow runners to maintain performance throughout a long duration run.

Machine Learning and Virtual Coaching: Technological advancements have allowed researchers to collect “on the field” data and provide real time feedback to athletes. In this environment, algorithms were developed which can detect movements of interest and technique level can be automatically distinguished, providing feedback to athletes on their skill level. This year, this process was further automated from an evaluation system to a virtual coaching system by providing specific task feedback (e.g. slow down wrist flexion at ball release) aimed at improving the technique. The results are single sensor solutions that not only provide feedback on an athlete’s skill level, but also deliver specific coaching cues on how to improve their technique.

Teeter-Totter Mechanism: Recent new running shoe developments (e.g. Nike VaporFly) have improved long-distance running performance, as illustrated by many new world records. The new shoes include new materials and unique midsole geometries. However, there is no agreement about the mechanisms

responsible for the new record performances. Adding to this discussion, we have proposed that a teeter-totter mechanism is responsible for this improvement in running performance. We are now working on providing experimental evidence that this teeter-totter mechanism is the functional explanation of the effectiveness of these new shoes.

RYAN PETERS

INTEGRATIVE SENSORIMOTOR
NEUROSCIENCE LABORATORY

Dr. Ryan Peters’ research group investigates the neural basis of human movement using a variety of physiological, behavioural and computational techniques in concert. There are both basic and applied streams of research ongoing in the lab.

Within the basic science stream, Dr. Peters’ research group studies the complex interaction between sensory and motor neurons during voluntary movement. They specialize in microneurography, the only method for directly recording the activity of human somatosensory neurons (muscle spindles, Golgi tendon organs, skin and joint receptors). Currently, they are focused on the functional properties of the muscle spindle’s fusimotor system, which remains poorly understood to-date, particularly in humans.

General Comments

Within the applied research stream, they are translating basic science into the development of new vibration-emitting wearable technologies for remote neurological assessments, monitoring and therapeutics. Healthy older adults and individuals suffering from neurological disorders (e.g., peripheral neuropathy) experience a decline in somatosensory function which is associated with impairments in manual dexterity and balance. Standard clinical tests of neuropathy are arduous for clinicians and are not well-controlled – vibration-emitting wearable technologies offer a promising alternative approach. The new wearable technologies developed in the Dr. Peters' lab enable frequent and accurate assessments of neurological function to be performed outside of the clinical setting, which may free up valuable clinician time and improve the quality of patient care.



DARREN STEFANYSHYN

The general research interests of Dr. Stefanyshyn's group focus on questions related to human locomotion, sport performance and sport injury biomechanics. Their research extends to functional sport equipment with a goal of tuning 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 2020, the group extended its industry work on identifying methods of matching sport equipment and footwear to individual athletes. This was accomplished through the investigation of the internal mechanisms using ultrasound imaging that explain an athlete's response to changes in shoe cushioning material, investigating how foot shape, size and sensitivity influence preferred insole selection and utilizing 3D foot scans and 3D printing to create individualized insoles.

Injury research involves identifying potential injury factors such as global loading characteristics

General Comments

associated with ankle and knee sport related injuries as well as developing an understanding of the role played by equipment. This past year valuable insight was gained on the role of sport surface characteristics studying different compositions of infilled artificial turf as well as next generation non-infilled surfaces.

Exercise Physiology and Nutrition in Health and Sport

SAIED JALAL ABOODARDA

EXERCISE NEUROPHYSIOLOGY
LABORATORY

In 2020, Dr. Jalal Aboodarda's research focused on the integration of physiological and perceptual factors determining exercise tolerance in healthy individuals. Despite COVID-19 setbacks, the team managed to coordinate a large study investigating the kinetics of neuromuscular and perceptual responses to different exercise intensities and durations. In another project, they measured acute corticospinal excitability and inhibition responses to pre-induced fatigue and experimental pain conditions. Neurophysiological responses were quantified using non-invasive techniques such as transcranial magnetic stimulation of the brain and peripheral nerve electrical stimulation of the skeletal muscles.

PATRICIA K. DOYLE-BAKER

APPLIED PHYSIOLOGY AND
PREVENTION THROUGH
LIFESTYLE AND EXERCISE

Dr. Patricia K. Doyle-Baker's lab focuses on sport science and health and exercise research. Their research, although often at the individual level (i.e., athlete or student) also takes on projects that focus on finding ways to improve the physical activity levels of whole communities (i.e., sport organizations (NSO) or recreation centres). The early part of this past year was disproportionately devoted to designing a 3-year evaluation of a local recreation centre with colleagues from the Built Environment and Health Living Lab within the Department of Community Health Sciences in the Cumming School of Medicine. The evaluation related to an innovative project on children's play based out of a large recreation centre in Calgary with a goal of transforming the community they interact with. Unfortunately, the COVID-19 pandemic interrupted this research and other lab-based work. The group was able to pivot and investigate the impact the imposed social and physical distancing restrictions had on several population groups including at the community level in North Central Calgary, University Professors, and the Alpine ski race community. They also collaborated with some of the university

General Comments

librarians and completed a scoping review on stroke in athletes and look forward to sharing the outcomes of this research in the near future.

JOHN HOLASH

EXERCISE PHYSIOLOGY
LABORATORY

The focus of Dr. Holash's work was continued development and modification of courses and instructional materials within the Exercise Physiology group to leverage new technologies and instruments for course delivery. Dr. Holash represents the faculty on the current "Learning Technologies Advisory Committee" and is part of the Student Orientation Committee with William Bridal for the faculty of Kinesiology. Dr. Holash's primary roll within the faculty is to develop and integrate new advanced teaching and learning techniques and resources for exercise physiology. One of his focuses is to develop a team under the exercise physiology umbrella that hopes to integrate state-of-the-art computer-based methods for measuring, recording and analyzing large data sets of physiological variables. The goal of this team will be to enhance the student experience by providing opportunities for: software product development, rapid prototyping, machine learning, data processing and potentially some

entrepreneurship opportunities that revolve around leveraging digital technologies and scaling them. This year Dr. Holash started a research project with an honours student to investigate if virtual reality games, that allow individuals to participate in physical activities and competitions, produce activity levels high enough to make them a viable source of exercise. This type of activity might help provide a bridge for individuals who are unable to gather in groups to still participate together in activities albeit virtually.

MARTIN MACINNIS

EXERCISE AND ENVIRONMENTAL
PHYSIOLOGY LABORATORY

The Metabolic, Exercise, and Environmental Physiology (MEEP) Laboratory is an integrative physiology laboratory interested in understanding how humans respond to acute and chronic exercise and the extent to which these responses are influenced by nutrition, sex and the environment. This research group launched in 2018 and ongoing projects investigate: (1) adaptations in skeletal muscle, cardiovascular and hematological systems to different exercise training programs; (2) the mechanisms underpinning the plasticity of these physiological systems; (3) the development of non-invasive methods to assess

skeletal muscle fitness; (4) the influence of oxygen availability and carbohydrates on aerobic metabolism, neuromuscular fatigue and exercise performance and (5) the use of wearable technologies to improve exercise testing and prescription. They employ a wide breadth of techniques, ranging from the biochemical and molecular analysis of human tissue (e.g., blood and muscle) to whole-body measures of exercise metabolism, tolerance and performance (e.g., pulmonary gas analysis and femoral nerve stimulation). The overall aim of their research program is to understand how molecular and physiological mechanisms regulate physiological systems in humans, with goals to translate and apply this research to improve the health and fitness of individuals ranging from athletes to those with chronic disease and disability.



Nutrition, Metabolism and Genetics

RAYLENE REIMER

Dr. Raylene Reimer's 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. Changes to the gut microbiota in early life play a particularly strong role in increasing or decreasing the risk of many diseases later in life including obesity and asthma. This year the Reimer lab focused on two aspects of early life microbiota development. In the first instance, they examined changes in the gut microbiota that occur when offspring are born naturally or via Caesarean section. While it is known that C-section birth can increase the risk of certain diseases later in life, Dr. Reimer's lab further examined how this risk is altered when the mother is lean or has obesity. The second set of experiments examined how fathers' diet can affect the metabolism of their offspring. While there is ample evidence that maternal diet affects offspring health, they are the first to examine the effect of a father's diet that is high in protein, high in fibre, or high in fat

and sugar on the health of their offspring. The Reimer lab was also able to make significant progress on one of our human clinical trials until COVID-19 halted the study. This study is examining the potential for prebiotic fibre supplement to reduce pain and improve function in individuals with knee osteoarthritis and obesity. Ultimately the goal is to design and evaluate diets aimed at body weight management and optimal gut microbiota profiles.

Injury Prevention, Sport Medicine and Rehabilitation

AMANDA BLACK

THE INJURY PREVENTION,
CLINICAL INTERVENTION
AND IMPLEMENTATION
SCIENCE RESEARCH GROUP

The Injury Prevention, Clinical Intervention and Implementation Science Research Group lead by Dr. Amanda Black, is a new group in the Faculty of Kinesiology. Core projects focus on injury surveillance and epidemiology, evidence-based practice and knowledge translation and theory-driven implementation, behaviour change and evaluation. Ongoing projects include: (1) examining the implementation of concussion guidelines, education and management protocols for sporting organizations and high schools and (2) examining

the context for implementation for injury prevention initiatives and injury surveillance in high school and university athletic populations.

CAROLYN EMERY

SPORT INJURY PREVENTION
RESEARCH CENTRE (SIPRC)

Carolyn Emery is the Chair of the Sport Injury Prevention Research Centre and co-leads the Integrated Concussion Research Program at University of Calgary. Her research focuses on the evaluation of prevention and treatment strategies to reduce the burden of injuries and their consequences in youth sport. Her research has demonstrated that policy disallowing body checking in 15-17 year-old non-elite ice hockey leagues reduces injury rates >60% and concussion rates >50%. Her research also demonstrated a 45% reduction in injury rates in girls with neuromuscular training warm-up program implementation in physical education (ages 11-15). Surveillance in High Schools and Community Sports to Reduce Injuries and their Consequences in Youth Sport (SHRed Injuries) and SHRed Concussions is informing best practice in injury prevention and management across multiple youth sports nationally. The highest concussion rates in youth sport were found in rugby, football, ice hockey and ringette. Targeted

General Comments

prevention strategies are being evaluated across training (e.g., tackle training), equipment (e.g., helmet fit), and rules of the game (e.g., zero tolerance for head contact). The Alberta Prevention of Early Osteoarthritis (AB PrE-OA) Ankle study examined predictors of post-traumatic OA and demonstrated that youth with a significant ankle joint injury history have more pain and symptoms, poorer function and balance and reduced sport participation and ankle-related quality of life compared to uninjured controls. The AB PrEOA Knee study is evaluating an exercise intervention to prevent post-traumatic knee OA. Dr. Emery's research also focuses on youth with cerebral palsy, juvenile idiopathic arthritis, and evaluation of adapted physical activity programs.

KATI PASANEN

Dr. Pasanen's research program focuses on three major areas: (1) identification of risk factors for lower extremity injuries; (2) development of novel methods for training load monitoring using wearable technology and (3) development and evaluation of neuromuscular training programs to decrease the risk of lower extremity injuries in youth sport. Dr. Pasanen is also leading five collaboration studies in Finland – three of them in team sports, one in professional ballet

and one in recreational runners. Knowledge generated from this research could ultimately lead to better understanding of causes and mechanisms of lower extremity injuries which could allow us to develop current injury prevention strategies, promote lifelong sport participation and lower the public health care costs related to sport injuries.

KATHRYN SCHNEIDER

CONCUSSION PREVENTION,
DETECTION AND
REHABILITATION LAB

Dr. Schneider's lab focuses on the prevention, detection and rehabilitation of concussion with a special interest in the role of the cervical spine and balance systems. They use clinical and technological tests that evaluate multiple different areas of sensory and motor function, ultimately gaining insight into changes that may occur following a concussion and with recovery. Additionally, with the use of technological tests alongside clinical tests, they are gaining a better understanding of how to best evaluate various components of function. Ongoing projects in the lab focus on: (1) the role of neuromuscular training and sensorimotor training in the prevention of concussion; (2) changes in cervical spine, vestibular and sensory function with growth and development; (3) changes in cervical spine,

General Comments

vestibular and sensory function following a concussion; (4) optimizing assessment rehabilitation techniques to inform diagnosis and enhance recovery from concussion and (5) evaluating implementation of concussion protocols. The program of clinical research involves collaboration with multiple clinicians and researchers across the University of Calgary and other national and international groups, ultimately enabling clinically meaningful questions to be evaluated and translated back to the clinic.



JONATHAN SMIRL

CEREBROVASCULAR CONCUSSION RESEARCH LABORATORY

Dr. Jonathan Smirl's research team works in conjunction with the Sport Injury Prevention Research Centre and the Human Performance Laboratory. His team is focused on understanding the basis of the physiological and

autonomic disruptions which occur following concussion. The aim is to use this knowledge base to develop informed interventions (exercise, physiological and pharmacological) which can be used to aid in the recovery process during both the acute and chronic symptom periods.

Dr. Smirl's team is currently leading the exercise-based measures in the Pan-Canadian Surveillance in High Schools to REDuce (SHRed) Concussions project. They are actively collaborating with other Canadian institutions on objectively quantifying the extent concussed athletes rest and exercise following concussions. The build out of the research space for Dr. Smirl's team was completed in August 2020 and they have spent the remainder of the year bringing in new equipment and training so they will be able to perform in person testing in the upcoming year. Through an integrative approach to concussion research and collaboration network, Dr. Smirl's team aims to create new approaches and interventions which will enable us to objectively assess physiological disruptions following concussion and improve outcomes for individuals following this traumatic injury.

Public Engagement

PRESENTATIONS

Managing our healthy 'selves' is a leadership challenge. — Patricia Doyle-Baker
Student Wellness Centre Support Staff Retreat, University of Calgary.
Calgary, Canada. January 7.

SHRed Concussions. — Carolyn Emery
Canadian Traumatic Brain Injury Consortium, 8th Scientific
Meeting. Lake Louise, Canada. January 23.

Nutrition and your life. — Raylene Reimer
Grade 9 William D. Pratt Health Class Guest Lecture. Calgary,
Canada. February 21.

Get a Grip.— Patricia Doyle-Baker
Celebration of Physical Activity Day. Calgary, Canada. May 27.

Continuum Mechanist by Chance.— Salvatore Federico
Alberta Innovates High School Youth Researcher Summer Program.
Calgary, Canada. August 7.

SHRed Concussions: Research opportunities in concussion prevention. —
Carolyn Emery
Students Interested in Medical Sciences (SIMS) Research
Symposium. Calgary, Canada. October.

*Take my breath away: asthma in female athletes. The effects of
reproductive hormones and strategies for screening and
management.* — Patricia Doyle-Baker, Connie Lebrun and Jane
Thornton
CSEP Conference Symposium. Fredericton, Canada. October 23.

*Exercise and the aging athlete: consideration on how to adapt
cardiovascular training to an aging population.* — John Holash
Foothills Nordic Ski Club, Masters X-Country Ski Group. Canmore,
Canada. October 30.

*The influence of driven blood pressure oscillations on cerebral
autoregulation.* — Jonathan Smirl
International Cerebrovascular Seminar Series.

WORKSHOPS, FORUMS, PANELS, & WEBINARS

Muscle mass and physiological responses to exercise.— Jenny Zhang
STEM Fellowship Virtual Webinar Series.

The transition: From graduate student to tenure track professor. –
Amanda Black
Canadian Traumatic Brain Injury Research Consortium. January.

SHRed Injuries Rugby. Neuromuscular training warm-up programs for injury Prevention. – Carla Vandenberg, Isla Shill, Anu Raisanen
University of Calgary. January 24.
University of Calgary. January 27.
University of Calgary. January 31.
Western Canada High School. February 28.
Online. June 18.
Online. June 19.
Online. June 23.
Grand Prairie Rugby, Crosslink Country Sportsplex, Grande Prairie.
March 5.

Concussion in sport: Assessment and management. – Kathryn Schneider,
Isabelle Gagnon
Concussion in sport: Assessment and management for Health Care
Professionals. February 3.

SHRed injuries: Neuromuscular training warm-ups for injury prevention. – Carla Vandenberg, Mike McKinnon
Edmonton Sport Council Coaching Clinic. February 5.
Edmonton Sport Council Coaching Clinic. February 26.
Sport Injury Prevention Research Centre Coach Online Workshop.
November 2.
Sport Injury Prevention Research Centre Coach Online Workshop.
November 5.

The New Standard of Warming Up: Quality PE through skill development, fitness and injury prevention. – Carla Vandenberg,
Larissa Taddei, Patrick Pankow
Calgary Catholic School District Professional Development Day.
January 31.
North Central Teacher's Convention. February 6.
Calgary City Teacher's Convention. February 13.

Public Engagement

Endless Skies Teacher's Convention. February 14.
Central Alberta Teacher's Convention. February 20.
Palliser District Teacher's Convention. February 21.
South West Teacher's Convention. February 21.
Greater Edmonton Teacher's Convention. February 27.
Mighty Peace Teacher's Convention. March 6.

Future Careers Panel. – Martin MacInnis
Kinesiology Graduate Student Association. University of Calgary.
February 27.

Wondering how to keep up with your fitness goals during #COVID19.
Keeping a grip on fitness. – Patricia Doyle-Baker
UCalgary COVID-19 Community Support webinar series with the
UC Chancellor Deb Yedlin. April 2.

Safe Return to Sport. – Aki-Matti Alanen (PhD), Supervisor: Kati Pasanen
Olympic Oval Webinar, University of Calgary. June.

Wearable technology and movement analysis in sports. – Aki-Matti
Alanen (PhD), Supervisor: Kati Pasanen
Finnish Coaches Association Webinar. September 25.

Stress and Anxiety during COVID keeps us hopping. – Patricia Doyle-
Baker
Panel: Return to school and mental health impacts. Mathison
Centre & O'Brien Institute partnership with the University of
Calgary. September 29.

Osteoarthritis: One disease, many causes. – Walter Herzog
Federal University of Santa Catarina Webinar. Ararangua, Brazil.
October 27.

SHRed injuries: Neuromuscular training program. – Carla Vandenberg,
Mike McKinnon
Online. November 25.
Online. December 2.
Online December 3.
Online. December 8.
Online. December 10.

Fundamental Principles of Muscle Mechanics. – Walter Herzog

Public Engagement

Webinar for Federal University of Manaus. Manaus, Brazil.
November 27.

Paediatrics Section Guest Lecture. – Kathryn Schneider
University of Alberta Physiotherapy Program. December.

MEDIA & INTERVIEWS

Winter running: boost endurance and lower injury risk. – Reed Ferber
Global News, Tiffany Lizée. January 3.

*Mouthguards do more than just protecting teeth in youth ice hockey.
New Study finds risk of concussion reduced by wearing
mouthguard.* – Carolyn Emery, Brent Hagel
UToday. January 24.

Low-calorie sweeteners do not mean low risk for infants. – Raylene Reimer
EurekAlert! January 29.

Low-calorie sweeteners pose a risk to developing babies, research says. –
Raylene Reimer
CTV News Calgary, Michael Franklin. January 29.

*Sweeteners risky for developing babies, study finds. (Pregnancy and
low-calorie sweeteners).* – Raylene Reimer
CBC French Radio, Tiphonie Roquette. January 30.

Low-calorie sweeteners do not mean low risk for infants. – Raylene Reimer
UToday, Leanne Yohemas. January 30.

The Sweet and the Sour. (Risks of aspartame and stevia on offspring). –
Raylene Reimer
CTV News at Noon Calgary, Medical Watch. February 4.

*Pregnant women who consume low-calorie drinks may be programming
their children to be fat, scientists warn. (Artificial sweeteners
during pregnancy).* – Raylene Reimer
UK The Mail on Sunday, Stephen Adams. February 4.

Happy Gut, Happy Life. (Diet and your microbes). – Raylene Reimer
CTV Morning Live Ottawa. February 6.



Public Engagement

Maternal consumption of artificial sweeteners. — Raylene Reimer
Freelance, Lisa Fields. February 6.

Kids and Weight Training. — Patricia Doyle-Baker
770 Radio CHQR, Joel McFarland. February 11.

[*I heart exercise for Valentine's Day.*](#) — Martin MacInnis
UToday, Leanne Yohemas. February 14.

[*Fitness in the Age of COVID.*](#) — Patricia Doyle-Baker
UCalgary COVIDcast Podcast. March 26.

Running outside with COVID: is it safe? — Patricia Doyle-Baker
CBC Radio, Alex Zabjek. April 8.

Sharing the sidewalk, Part 2. — Patricia Doyle-Baker
The Current, Matt Galloway. April 9.

[*New study on women's menstrual cycle shows no impact on exercise performance.*](#) — Patricia Doyle-Baker
UToday, Stacy McGuire. April 24.

[*Researcher pioneers prevention of sport-related concussions in youth. Kinesiology's Carolyn Emery awarded Canada Research Chair.*](#) —
Carolyn Emery
UToday. September 23.

[*Sport and recreation opportunities expand for those with disabilities. UCalgary a partner in Calgary Adaptive Hub: Powered by Jumpstart*](#) — Carolyn Emery, Elysa Sandron
UToday. October 13.

[*Pearls of Performance.*](#) — Carolyn Emery
Pearls of Performance Podcast (Health & Safety in Sports), Evert Verbagen.
October 13.

[*Kinesiology researcher creates new way to assess and track neurological function.*](#) — Ryan Peters
UToday, Stacy McGuire. October 15.

[*University celebrates 2020 Killam Laureates with online event for all.*](#) —
Reed Ferber, Raylene Reimer, Walter Herzog
UCalgary News, Dan Ferguson. October 16.

[*Running Injury Prof Wins McCaig-Killam Teaching Award.*](#) — Reed

Public Engagement

Ferber

UCalgary News, Advancement. October 19.

Student health during COVID19. — Patricia Doyle-Baker
SAIT Journalism, Kaur Simrandepp. November 4.

[*Parents' high anxiety levels linked to less active kids during pandemic.*](#) —
Patricia Doyle-Baker
UToday, Brittany DeAngelis. December 18.

[*Creating a Flipped Classroom with John Holash.*](#) — John Holash
COVID Coffee Chats @UCalgary Podcast, Mia Anderson. December.

TOURS & EVENTS

The Human Performance Lab welcomes students into its facilities for tours and events annually. Students from Calgary high schools and programs such as Operation Minerva, IBM STEM4Girls, Shad Valley and Heritage Youth Researchers Summer Program are provided the opportunity to visit various labs in the faculty to learn about science, technology, engineering and mathematics in a university setting. For health reasons, all events were cancelled in 2020.

BLOG POSTS

[*Concussion affects 1 in 10 youth athletes every year. Here's what needs to change.*](#) — Carolyn Emery
The Conversation. May 26.

[*Interested in Concussion CPD? Level up with this #MOOC.*](#) — Kathryn Schneider, Pierre Fremont
British Journal of Sport Medicine (BJSM) Blog. September 19.

KNOWLEDGE TRANSLATION

Meeting with Rugby stakeholders in Israel. – Kathryn Schneider, Isabelle Gagnon
Management of Concussion in Rugby, Tel Aviv Children's Hospital. February 4.

Methodology and Risk of bias training – Intervention/Randomized Controlled Trials, Online Webinar. – Kathryn Schneider, David Cassidy
6th Consensus Conference on Concussion in Sport. March 2.

Methodology and Risk of bias training – Diagnostic studies, Online Webinar. – Kathryn Schneider, David Cassidy
6th Consensus Conference on Concussion in Sport. March 2.

Methodology and Risk of bias training – Case Control studies, Online Webinar. – Kathryn Schneider, David Cassidy
6th Consensus Conference on Concussion in Sport. March 5.

Methodology and Risk of bias training – Cohort studies, Online Webinar. – Kathryn Schneider, David Cassidy
6th Consensus Conference on Concussion in Sport. March 5.

[*Terve Urheilija alkulammittely \(Healthy Athlete warm-up program\).*](#)
– Kati Pasanen, I. Latinen
YouTube Channel. August 6.

[*Soccer NMT warm-up program.*](#) – Kati Pasanen, I. Latinen
YouTube Channel. August.

Concussion Awareness and Training tool (CATT) for Health Care Professionals. – Kathryn Schneider
Physiotherapy Section. December 1.
Occupational Therapy Section. December 1.

[*RECOVER.*](#) – Amanda Black
Online resource launch.

Patents & Licenses

Device, System, and Method for Measuring Cutaneous Sensitivity and Providing Feedback.

U.S. Provisional Patent Application No. 63/062,745.

Inventors: Peters, R.

Method and system for matching athletes with equipment.

U.S. patent number 10,639,528, issued May 2020.

Inventors: Stefanyshyn, D.J., Wannop, J.W., Madden, R.M., Worobets, J.T.



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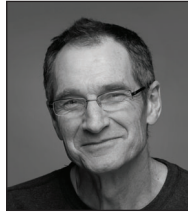
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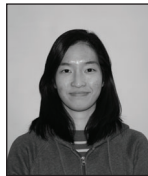
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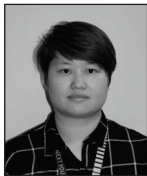
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Since 1981, researchers at the UCalgary's multidisciplinary Human Performance Laboratory (HPL) within the Faculty of Kinesiology have explored nuances and complexities behind achievement, mobility and longevity.



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Pingguan-Murphy, Belinda
Plum, Babette
Power, Geoff
Reed, Nick
Rivara, Fred
Roos, Ewa
Rouhi, Gholamreza
Roy, Brian
Russell, Kelly
Sanchez, Adelino
Schappacher, Gudrun

Schwellnus, Martin
Scott, Stephen H.
Seiberl, Wolfgang
Shrier, Ian
Skelly, Lauren
Snyder, Frank
Soligard, Torbjorn
Steffen, Kathrin
Stokes, Keith
Tagaki, Michael
Takken, Tim
Taylor, Taryn
ter Keurs, Henk
Timmermann, Scott
Toomey, Clodagh
Tourgeon-Fournier, Alexis
Twilt, Marinka
Tzeng, Sheiak
Valenti, Giovanna
van Donkelaar, Paul
Van Dyke, Nicol
Vasankari, Tommi

Verhagen, Evert
Ville, Mattila
Viviers, Pierre
von Mammen, Sebastian
Walcott, Sam
Waller, Benjamin
Walton, David
Webborn, Nick
Wedderkopp, Nils
Wellington, Cheryl
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Publications

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Publications

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- Zhang, J., Iannetta, D., Varesco, G., Millet, G.Y., Aboodarda,

Publications

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Technical Reports

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- Wannop, J.W., Kowalchuk, S., Bill, K., Smith, E., Clermont, C., Stefanyshyn D.J. (2020). Foot Sensitivity and Insole Selection. Technical Report for Superfeet.
- Wannop, J.W., Esposito, M., Stefanyshyn, D. (2020). Mechanical Traction of Non-Infilled Artificial Turf Surfaces. Technical Report for FieldTurf Inc.
- Wannop, J.W., Kowalchuk, S., Clermont, C., Smith, E., Barrons, Z., Sawka, A., Stefanyshyn, D.J. (2020). Optimizing the Comfort of 3D Printed Insoles. Technical Report for Wiiivv.
- Wannop, J.W., Kowalchuk, S., Smith, E., Stefanyshyn, D. (2020). 4D Shear: Phase 1 Shoe Shear, Stride Frequency, Pressure and Perception. Technical Report for adidas Future Team.
- Stefanyshyn, D.J., Wannop J.W., Esposito, M. (2020). Hockey Glove Impact Testing. Technical Report for Sherwood Hockey.
- Stefanyshyn, D.J., Wannop J.W., Kowalchuk, S. (2020). Agility Research Summary and Concept Creation. Technical Report for adidas Concept Excellence.
- Barrons, Z., Esposito, M., Kowalchuk, S., Wannop, J.W., Stefanyshyn, D.J. (2020). Hockey Stick Baseline Properties: Mechanical Testing. Technical Report for Sherwood Hockey.
- Barrons, Z., Esposito, M., Singh, P., Wannop, J.W., Stefanyshyn, D.J. (2020). Hockey Stick Baseline Properties: Biomechanical Testing. Technical Report for Sherwood Hockey.
- Wannop, J.W., Barrons, Z., Esposito, M., Kowalchuk, S., Stefanyshyn, D.J. (2020). Enhancing Power with Ankle Joint Stiffness. Technical Report for adidas Concept Excellence.
- Wannop, J.W., Kowalchuk, S., Stefanyshyn, D.J. (2020). Running Shoe Braking Forces: Functional Guidelines. Technical Report for Anta Sports Products Limited.
- Esposito, M., Barrons, Z., Wannop, J.W., Stefanyshyn, D.J. (2020). Midsole Cushioning: Mechanisms of Performance Improvement. Technical Report for adidas Future Team.

Technical Reports

Esposito, M., Barrons, Z., Gebauer, S., Wannop, J.W., Stefanyshyn, D.J. (2020). Futurecraft: Influence on Performance and Perception. Technical Report for adidas Future Team.

Wannop, J.W., Kowalchuk, S., Singh, P., Smith, E., Sawka, A., Stefanyshyn D. (2020). Quantification of on-ice Kinematics during Speed Skating. Technical Report for Speed Skate Canada.

Honert, E.C., Behling, A-V., Solomon, M., Subramaniam, A., Ostermair, F., Nigg, S. Nigg, B.M. (2020). Infinergy – An Evaluation of the Competitive Advantages to Enter the Flooring Sector. Technical Report for BASF.

Solomon, M., Honert, E.C., Nigg, S., Nigg, B.M. (2020). Foot and Gait Pressure Measurement System: An evaluation of repeatability, reliability and durability. Technical Report for XSensor.



Books & Book Chapters

Herzog, W. Cross-country skiing as a model of human movement analysis. In: Science and Skiing VIII. Edited by Karczewska-Lindinger, M. et al., Vuokatti Sports Technology Unit of the Faculty of Sport and Health Sciences of the University of Jyväskylä. Pg(s) 8-19. ISBN 978-951-39-8077-1.

MacInnis, M.J. and Skelly, L.E. Cellular adaptations to high-intensity and sprint interval training. Biochemistry of Exercise Handbook. Edited by LeBlanc, P.J., MacPherson, R., Josse, A., Tiidus, P. Routledge, Canada.

Finch, C., Fortington, L., Handcock, R., Sibson, R., Morgan, A., Derman, W., Schwellnus, M., Badenhorst, M., Verhagen, E., Bolling, C., Emery, C., Pasanen, K. Evaluating the impact of the IOC Sport Medicine Consensus Statements on Olympic Athlete Health and Wellbeing.

Hart, D.A., Herzog, W., Rios, J.L., Reimer, R.A., Collins, K.H.. Understanding the initiation and progression of diet-induced obesity associated pathophysiology: lessons learned from a rat model. In: Pathophysiology of Obesity-Induced Health Complications. Edited by Tappia, P.S., Ramjiawan, B., Dhalla, N.S. Pathophysiology of Obesity-Induced Health Complications. Advances in Biochemistry in Health and Disease, vol 19. Springer.

Keynote & Invited Lectures

- Doyle-Baker, P. Managing our healthy 'selves' is a leadership challenge. Student Wellness Centre Support Staff Retreat, University of Calgary. Calgary, AB. January 7.
- Edwards, W.B. Applied modeling of stress fractures in running. Integrative Physiology Department Seminar, University of Colorado. Boulder, USA. March.
- Emery, C.A. SHRed Concussions. Canadian Traumatic Brain Injury Consortium. Lake Louise, Canada. January.
- Emery, C.A. Students Interested in Medical Sciences (SIMS) Research Symposium, Virtual. October.
- Federico, S. Modelling Hydrated Fibre-Reinforced Soft Tissue. Department of Mechanical Engineering, Tianjin University. China. November 24.
- Federico, S. Modelling Hydrated Fibre-Reinforced Soft Tissue. Università Campus Biomedico. Rome, Italy. November 16.
- Herzog W. Dos and don'ts in an academic scientific career Conference of the International Society for Electrophysiology and Kinesiology. Tokyo, Japan. July 12. (Keynote)
- Herzog W. Titin: the forgotten filament in muscle contraction. 10th International Conference on Biomedical Engineering and Technology. Tokyo, Japan, September 15. (Keynote)
- Herzog, W. Basic muscle mechanics and selected applications in sports. International Society of Biomechanics in Sports Seminar Series. United Kingdom. September 10.
- Herzog, W. Obesity, exercise and musculoskeletal rehabilitation. Chilean Association for Human Movement Science. Chile. July 30.
- Herzog, W. Science is not about papers, it is about people. Neuromechanics Live, Brazilian Society of Biomechanics. Florianopolis, Brazil. July 8.
- Herzog, W. Secrets of successful international collaborations. IV Regional Health Innovation Symposium. Urugaiana, Brazil. October, 23.

Keynote & Invited Lectures

- Herzog, W. Skeletal muscle mechanics: problems, questions and possible solutions. Federal University of Santa Catarina. Florianopolis, Brazil. December 2.
- MacInnis, M.J. Applications of wearable technology to exercise physiology. Canadian Society for Exercise Physiology Annual General Meeting: CSEP 2020: Strengthening our performance, keeping our connections. October.
- Pasanen K. Lower extremity injuries in youth team sports. Can they be predicted? Can they be prevented? Sport Innovation (SPIN) Summit 2020. Own the Podium. For Canada to be a world leader in high performance sport at the Olympic and Paralympic Games. October 22.
- Reimer, R. Nutrition for you and trillions of your closest friends: effect of diet on your gut microbiota. Canadian Museum of Nature. Ottawa, Canada. February 6.
- Reimer, R. Role of gut microbiota in the pathogenesis and management of obesity. Obesity Prevention and Management - Calgary Family Medicine Residents. Calgary, Canada. March 12.
- Schneider, K. Dizziness and headache following sport-related concussion: Subtypes and recovery. Canadian Traumatic Brain Injury Research Consortium meetings. June.
- Schneider, K. IOC centre meetings. November 5.
- Schneider, K. SHRed concussions: an update on the clinical outcomes. Canadian Traumatic Brain Injury Research Consortium meetings. Lake Louise, Canada. January.
- Smirl J.D. The influence of driven blood pressure oscillations on cerebral autoregulation. International Cerebrovascular Seminar Series: Zoom Online – Global.

Official Research Related Functions _____

AMANDA BLACK

BOARD MEMBER

Canadian Athletic Therapy Association Education
Committee
Pediatric Research in Sport Medicine Society Education
Committee

GRANT REVIEWER

Child Health Research Development (CHRD)
Partnership for Research in Innovation in the Health
System (PRIHS) Stage 2, Alberta Innovates, Internal Peer
Reviewer

CONFERENCE REVIEWER

Canadian Athletic Therapists Association (CATA)
Conference
Pediatric Research in Sports Medicine (PRiSM) 7th Annual
Meeting

MEMBERSHIP

International Society of Qualitative Research in Sport &
Exercise
Canadian Athletic Therapy Association (CATA)
Alberta Athletic Therapy Association
Pediatric Research in Sport Medicine Society
American College of Sports Medicine

TYLER CLUFF

GRANT REVIEWER

University Research Grants Committee (URGC), University
of Calgary
Faculty of Graduate Studies Graduate Awards Committee,
University of Calgary
NSERC CGS-M competition, University of Calgary

CONFERENCE REVIEWER

Motor Learning and Motor Control (MCML) Conference,
Society for Neuroscience

MEMBERSHIP

Society for Neuroscience

TISH DOYLE-BAKER

ADVISORY BOARD MEMBER

International Congress on Sport Science in Skiing (ICSS)

Official Research Related Functions

Annals of Applied Sport Science
EDITORIAL BOARD MEMBER
International Journal of Environmental Research in Public Health. Special Edition Editor: Stroke in Athletes
International Journal of Kinesiology and Sport Science
GRANT REVIEWER
South Africa National Research Foundation (NRF)
Markin Undergraduate Student Research Program,
University of Calgary
CONFERENCE ORGANIZATION
Walk 21 Conference Committee
Exercise Perspectives in Exercise, Health, and Fitness
Conference Committee
MEMBERSHIP
Alberta Centre for Active Living (ACAL)
Alberta Children's Hospital Research Institute (ACHRI)
Alberta Fitness Leadership Associate (AFLCA)
American College of Sports Medicine (ACSM)
Canadian Society of Exercise Physiology
European College of Sport Science
O'Brien Institute for Public Health

BRENT EDWARDS

EXECUTIVE BOARD MEMBER
International Society of Biomechanics, Secretary General
EDITORIAL BOARD MEMBER
JBMR Plus, Journal of Bone and Mineral Research
GRANT REVIEWER
Athritis Society Training Awards Review Panel
NSERC Discovery Grants, External Reviewer
CONFERENCE REVIEWER
Canadian Society of Biomechanics
American Society of Biomechanics
MEMBERSHIP
American College of Sports Medicine
American Society of Biomechanics
American Society of Bone and Mineral Research
Canadian Society of Biomechanics
International Society of Biomechanics
Orthopaedic Research Society

Official Research Related Functions _____

CAROLYN EMERY

EDITOR

British Journal of Sport Medicine, Associate Editor

ADVISORY BOARD MEMBER

Centre for Health and Injury and Illness Prevention in Sport (CHi2PS), University of Bath

EDITORIAL BOARD MEMBER

Journal of Science and Medicine in Sport
International Journal of Sports Physical Therapy

SCIENTIFIC ADVISOR

6th International Consensus on Concussion in Sport, Expert Group
International parasport translation of IOC consensus on the recording and reporting of data for injury and illness in sport 2020, Expert Group

COMMITTEE MEMBER

Canadian Physiotherapy Association, Strategic Research Committee
Massive Open Online Course (MOOC) in Concussion Leadership Committee
Parachute Canada Concussion Awareness Advisory Committee

GRANT REVIEWER

Canadian Institutes of Health Research (CIHR) Project Grant, Internal Peer Review
National Institute for Health Research, United Kingdom

CONFERENCE ORGANIZATION

Canadian Concussion Network Annual meeting, Conference Organizing Committee, Chair
Canadian Traumatic Brain Injury Research Consortium national meeting, Conference Organizing Committee
Osteoarthritis Research Society International, World Congress Program Planning Committee
Sport Physiotherapy Canada Congress, Scientific Committee
World Conference on Prevention of Injury and Illness in Sport, Scientific Committee

CONFERENCE REVIEWER

Canadian Concussion Network Annual Meeting, Scientific Committee, abstract review
Osteoarthritis Research Society International, abstract



Official Research Related Functions

review

EXTERNAL REVIEWER

2020 candidate for Fellowship of Royal Society of New Zealand Te Apārangi, Independent Referee

2020 candidate for Stacie Prize National Research Council of Canada,

Director of Biomedical Engineering, University of Victoria
Promotion to Associate Professor and tenure, Michigan Technological University

Promotion to Associate Professor and tenure, School of Education & Development, University of Virginia

Promotion to Professor, Faculty of Health Science, University of South Carolina Chapel Hill

MEMBERSHIP

Alberta Children's Hospital Research Institute for Child Health, UCalgary

Alberta College of Physiotherapists

Alberta Physiotherapy Association

American College of Sport Medicine

Canadian Academy of Health Sciences Fellow

Canadian Pediatric Society

Canadian Physiotherapy Association

Canadian Physiotherapy Association Orthopaedic Division

Canadian Physiotherapy Association Pediatric Division

Canadian Physiotherapy Association Research Division

Canadian Physiotherapy Association Sport Physiotherapy Division

Canadian Society for Epidemiology and Biostatistics

Centre for Hip Health and Mobility, University of British Columbia

Hotchkiss Brain Institute, UCalgary

Institute of Public Health, UCalgary

McCaig Institute for Bone and Joint Health, UCalgary

Osteoarthritis Research Society International

Society for Epidemiologic Research

Society of Canada College of New Scholars

Strategic Research Committee of the Canadian Physiotherapy Association

Official Research Related Functions

SALVATORE FEDERICO

EXECUTIVE BOARD MEMBER

Past President, Canadian Society for Biomechanics (2019-2020 term)

COMMITTEE MEMBER

Selection Committee Member, Society for Natural Philosophy

Evaluation Group Member, Mechanical Engineering, Natural Sciences and Engineering Research Council of Canada (2019-2023 term)

Canadian National Committee of the International Union of Theoretical and Applied Mechanics (CNC-IUTAM)

EDITORIAL BOARD MEMBER

Atti dell'Accademia Peloritana dei Pericolanti, Classe di Scienze, Fisiche e Naturali
Mathematics and Mechanics of Solids

GRANT REVIEWER

Evaluation Group Member, Mechanical Engineering, Natural Sciences and Engineering Research Council of Canada (2019-2023 term)

MEMBERSHIP

ISB, International Society of Biomechanics

ASB, American Society of Biomechanics

CSB, Canadian Society for Biomechanics

IUTAM, International Union of Theoretical and Applied Mechanics

AIMETA, Italian Association of Theoretical and Applied Mechanics

ESB, European Society of Biomechanics

EUROMECH, European Mechanics Society

Society for Natural Philosophy

Society of Engineering Science

Cardiac Physiome Society

M&MoCS, International Centre for Mathematics and Mechanics of Complex Systems

REED FERBER

EDITORIAL BOARD MEMBER

Prosthetics and Orthotics International
Journal of Sport Rehabilitation
Journal of Athletic Training

Official Research Related Functions

SCIENTIFIC ADVISORY BOARD MEMBER
Biotricity Inc., Redwood City, CA
Fitbit Inc., San Francisco, CA

WALTER HERZOG

EDITOR

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

EDITORIAL BOARD MEMBER

Biomechanics and Modeling in Mechanobiology
BMC Biomedical Engineering
Chiropractic & Manual Therapies
International Journal of Mechanical and Materials
Engineering
Journal of Biomechanics
Journal of Electromyography and Kinesiology
Journal of Functional Morphology and Kinesiology
Journal of Manipulative and Physiological Therapeutics
Journal of the Canadian Chiropractic Association
Molecular and Cellular Biomechanics
Muscles, Ligaments and Tendons Journal
Sports Orthopaedics and Sports Traumatology
Sportverletzung Sportschaden
The Current Issues of Sport Science (CISS)

ADVISORY BOARD MEMBER

German Journal of Exercise and Sport Research
German Journal of Sport Sciences
Nike Sport Research
Sportorthopädie Sporttraumatologie, International Board
Member
Sportwissenschaft Journal

COMMITTEE MEMBER

Motor Control Group, International Society of
Biomechanics, Vice-Chair
Human Mobility Group, Biomedical Engineering Calgary
Initiative, Co-Leader
SUPPORT: Training and Professional Development,
University of Calgary, Chair

GRANT REVIEWER

Official Research Related Functions

NSERC (1990-present)
CIHR Foundation Grant Program
CIHR College of Reviewers

CONFERENCE ORGANIZATION

IUPESM World Congress on Medical Physics and
Biomedical Engineering 2021 (WC2021), Singapore,
International Scientific Committee Member
European Society of Biomechanics Congress, Warsaw,
Poland (2019-2022), Scientific Committee Member
International Congress on Science and Skiing (ICSS),
Austria, 2022, Scientific Advisory Board Member

MEMBERSHIPS

American Association for the advancement of Science
American Physiological Society
American Society of Biomechanics
Biophysical Society
Brazilian Society of Biomechanics
Canadian Society for Biomechanics
Chilean Association for Human Movement Science, Elected
Honorary Member
European College of Sport Science
European Society of Biomechanics
Royal Society of Canada. Fellow
International Society of Biomechanics
International Society of Electrophysiology and Kinesiology
Orthopaedic Research Society, American Academy of
Orthopaedic Surgeons
Osteoarthritis Research Society International

JOHN HOLASH

COMMITTEE MEMBER

Canadian Society of Exercise Physiology
High Performance Computing Canada
Westgrid

MARTIN MACINNIS

SCIENTIFIC ADVISOR

XIII World Congress International Society for Mountain
Medicine, Scientific Committee

CONFERENCE ORGANIZATION



Official Research Related Functions

Canadian Society for Exercise Physiology (CSEP) Annual
General Meeting 2020

GRANT REVIEWER

NSERC Discovery Grants

MRC Grant

CONFERENCE REVIEWER

XIII World Congress International Society for Mountain
Medicine, Abstract Reviewer

MEMBERSHIP

Canadian Society for Exercise Physiology

American Physiology Society

BENNO NIGG

EDITORIAL BOARD MEMBER

Brazilian Journal of Biomechanics

Orthopädische Zeitschriften

Footwear Science

International Scholarly Research Notices (ISRN)

Biomedical Engineering

KATI PASANEN

EDITOR

Translational Sports Medicine (TSM)

British Journal of Sports Medicine, Injury Prevention &

Health Protections of the athlete (BJSM IPHP), Senior

Associate Editor

Frontiers in Sports and Active Living, Editorial Board of

Injury Prevention and Rehabilitation, Review Editor

Textbook: Urheiluvammojen ehkaisy, hoito ja kuntoutus

(Sport Injuries: Prevention, diagnosis, treatment, and

rehabilitation), VK Kustannus Oy, Editor in Chief

ADVISORY BOARD MEMBER

Finnish Coaches Association, Finland

Finnish Strength and Conditioning Coaches Association,

Finland, Board of directors

Healthy Dancer program, Finnish National Ballet, Helsinki,

Finland

SCIENTIFIC BOARD MEMBER

Finnish Sports Physiotherapists Association

CONFERENCE ORGANIZATION

Official Research Related Functions _____

FSPA Congress “Injury prevention works – Mission Possible”, Helsinki, Finland, (Postponed to 2021),
Session Chair

CONFERENCE REVIEWER

FSPA Congress “Injury prevention works – Mission Possible”, Helsinki, Finland, (Postponed to 2021),
Abstract Reviewer

MEMBERSHIP

Alberta Children’s Hospital Research Institute
American College of Sports Medicine
Canadian Association of University Teachers
European Society of Biomechanics
Finnish Association of Physiotherapists
Finnish Coaches Association
Finnish Society of Sport Science
Finnish Sports Physiotherapists Association
Finnish Strength and Conditioning Coaches Association
HEPA Europe Injury Prevention Group
International Society of Biomechanics
McCaig Institute for Bone and Joint Health
Osteoarthritis Research Society International

RAYLENE REIMER

EDITOR

Frontiers in Endocrinology

RESEARCH CONSULTANT

BioRad Laboratories Inc.
General Mills Inc.
InovoBiologic Inc.
Beneo GmbH

COMMITTEE MEMBER

Canadian Museum of Nature Microbiome Exhibit,
Working Group Member
Canadian Nutrition Society Awards Committee
Canadian Nutrition Society-University of Calgary Faculty
Advisor
Canadian Obesity Network, Calgary Chapter
(Recruitment/Networking Coordinator), Executive
Committee
CIHR Banting Postdoctoral Fellowships Selection
Committee



Official Research Related Functions

Data Monitoring Committee: FMT in Major Depression
GRANT REVIEWER
Canadian Liver Foundation
CIHR College of Reviewers
New Frontiers in Research Fund – Exploration
The Fund for Scientific Research – FNRS Belgium

MEMBERSHIP
American Society for Nutritional Sciences
Canadian Nutrition Society
College of Dietitians of Alberta
Obesity Canada, Calgary Chapter
Obesity Canada (formerly Canadian Obesity Network)
The Obesity Society

KATHRYN SCHNEIDER

EDITOR
British Journal of Sport Medicine, IPHP Senior Associate
Editor
Frontiers in Neurology – Neuro-otology Review Editor

ADVISORY BOARD
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hold)
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Canadian Committee of Combative Sports Associations,
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the Canadian Physiotherapy Association
EyeGuide
Federal Working Group on Concussion in Sport,
Canadian Concussion Collaborative Representative
Federal Working Group on Concussion in Sport,
Surveillance initiative. co-lead with Dr. Charles Tater
Parachute Canada Expert Advisory group on Concussion,
Co-Chair, Scientific Committee and Expert Panelist

CONFERENCE ORGANIZATION
6th International Consensus Conference on Concussion
in Sport, Scientific Committee
Canadian Sport Physiotherapy Congress 2021, Abstract
Reviewer
Canadian Concussion Network Annual Meeting, Abstract
Reviewer

Official Research Related Functions _____

BOARD MEMBER

Sport Physiotherapy Canadian Concussion symposium,
Co-organizer

COMMITTEE MEMBER

Sport Physiotherapy Congress 2021, Scientific
Committee

GRANT REVIEWER

SSHRC Insight Grant

MEMBERSHIP

Hotchkiss Brain Institute
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Canadian Physiotherapy Association:
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Sports Physiotherapy Division
Neurological Division
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Canadian Academy of Manipulative Therapists
Physiotherapy Alberta College + Association
Vestibular Disorders Association

JONATHAN SMIRL

COMMITTEE MEMBER

International Cerebral Autoregulation Research
Network Steering Committee

CONFERENCE ORGANIZATION

Cerebral Autoregulation Research Network Annual
Meeting

CONFERENCE REVIEWER

Cerebral Autoregulation Research Network Annual
Meeting

MEMBERSHIP

American Physiological Society (APS)
Canadian Concussion Network (CCN)
Canadian Society for Exercise Physiologists (CSEP)
Canadian Traumatic Brain Injury Research Consortium
(CTRC)
Cerebral Autoregulation Research Network (CARNet)
The Physiological Society (Phys Soc)



Official Research Related Functions _____

DARREN STEFANYSHYN

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NFL Engineering Committee

BOARD MEMBER

Footwear Biomechanics Group

EDITORIAL BOARD MEMBER

Footwear Science, Associate Editor

European Journal of Sport Science



