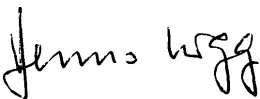




2008 was another successful year for the Roger Jackson Centre (RJC) for Health and Wellness Research with more than 100 peer-reviewed scientific publications and almost thirty graduate students finishing their Master's or doctoral training. Our students had great success in presenting their research at national and international scientific conferences and winning an unprecedented number of awards and honours for their work. We also completed the final installments of a Canada Foundation for Innovation Fund, acquiring new, state-of-the-art equipment for approximately \$ 3 million providing facilities that allow us to remain at the cutting edge of an ever more technology driven research enterprise. Another exciting development was the awarding of a \$ 5 million, five year team grant from the Alberta Heritage Foundation for Medical Research (AHFMR), spearheaded by the co-directors of the Human Performance Lab, which directly involves and benefits approximately half of the faculty members of the RJC. This grant provides not only important funding but a common purpose and goal and increases our already strong collaborative research efforts across the University and with our sister Universities in the province. In short, this past year was one of completing major infrastructural developments and setting the stage for an exciting future.

But what is next? There is a financial crisis hitting the world and with oil prices down, even the Province of Alberta must consider a deficit budget and post-secondary education has already been targeted for this coming year. But at the end of the day, in every crisis there are opportunities and we are ready to take on the challenge with a set of talented young faculty members and trainees who are second to none, with facilities that have just been upgraded and are among the very best in the world, and with a spirit that makes the impossible come true. After all, 2008 was a year of exciting developments with the election of an American president who nobody knew just a few years ago, and Mr. Usain Bolt breaking the 200m world record into an impossible head wind. Winners against all odds, success despite rather than because of the circumstances, that is how we approach this next year and the future.

We would like to thank the University of Calgary, the Faculty of Kinesiology, and all of you for your support in our pursuit of excellence and our desire to make a difference.



Benno M. Nigg  
Co-Director



Walter Herzog  
Co-Director



Cy Frank  
Co-Director



# Highlights

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- Honour Steven Boyd – Calgary “Top 40 Under 40” Class of 2008, awarded by Calgary Inc. Magazine.
- Honour Dale Butterwick – Recipient of Glen Keeley Memorial Award, for devotion to the sport of bull riding for the past 25 years.
- Honour Joan Vickers – Invited Think Tank Member, The Bi-Directional Link Between Mind And Motion. ZIFF Centre, Bielefeld, Germany.
- Honour Ron Zernicke – Doctor of Science (Honorary), University of Waterloo.
- Honour Ron Zernicke – Career Award, Canadian Society for Biomechanics/ Société Canadienne de Biomécanique (North American Congress of Biomechanics).
- Appointed Andrea Clark – Assistant Professor, Faculty of Kinesiology. Joint Appointment in Department of Surgery, Division of Orthopaedics, Faculty of Medicine.
- Appointed Walter Herzog – Canada Research Chair Tier I (Molecular and Cellular Biomechanics) Renewal.
- Appointed Jamie Johnston – Assistant Professor, Faculty of Kinesiology.
- Appointed Brian R MacIntosh – Associate Dean, Faculty of Graduate Studies.
- Appointed Tannin Schmidt – Assistant Professor, Faculty of Kinesiology. Joint Appointment in the Centre for Bioengineering Research & Education, Department of Mechanical and Manufacturing Engineering, Schulich School of Engineering.
- Award Steven Boyd – First and Second Year Teaching Excellence Award, 2007-2008.
- Award Steven Boyd – Third and Fourth Year Teaching Excellence Award for Mechanical and Manufacturing Engineering.
- Award Wayne Giles – Alberta Heritage Foundation for Medical Research, Medical Scientist Award.
- Award Brandon Hisey – Winner of the NDI New Investigator Award of the North American Congress on Biomechanics (MSc).
- Award Venus Joumaa – Winner of the NDI New Investigator Award of the North American Congress on Biomechanics (Postdoctoral).
- Award Tim Leonard – Winner of the NDI New Investigator Award of the North American Congress on Biomechanics (PhD).
- Award Stan Mazursky – First Place, M.Sc. Presentation, Exercise Physiologists of Western Canada, Saskatoon, Saskatchewan.
- Award Yves Pauchard – Winner of the European Society of Biomechanics S.M. Perren Research Award (\$10,000).
- Award Tim Welsh – Graduate Student Association - Outstanding



## Highlights

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	Graduate Supervision Award.
Award	Jay Worobets – Golf Digest Equipment and Technology Research Award at the World Scientific Congress of Golf.
Award	Ron Zernicke – Outstanding Achievement in Graduate Supervision, University of Calgary.
Award	Ron Zernicke – Pease Family Scholar Award, Iowa State University.
Elected	Russell Hepple – Elected to Editorial Board for American Journals of Physiology Regulatory Integrative and Comparative Physiology.
MD/PhD	Prism Schneider – Supervisor: Dr. Ron Zernicke, Thesis: Dynamic Control of Movement and Posture.
MD/MSc	Megan Yaraskavitch – Supervisor: Dr. Walter Herzog, Thesis: Changes in Passive Muscle Properties and Titin in Spastic Cerebral Palsy.
Ph.D.	Eun-Jeong Lee – Supervisor: Dr. Walter Herzog, Thesis: History Dependent Force Production in Single Skeletal Muscle Fibres.
Ph.D.	Derek Panchuk – Supervisor: Dr. Joan Vickers, Thesis: Rapid Interceptive Actions: Predictive or Prospective Control.
Ph.D.	Sang Kyoon Park – Supervisor: Dr. Darren Stefanyshyn, Thesis: The Influence of Knee Joint Laxity and Hormones on Dynamic Joint Function in Healthy Females.
Ph.D.	Jill Parnell – Supervisor: Dr. Raylene Reimer, Thesis: The Effects of Prebiotic Fiber on Obesity-related Defects in Gut Hormone Secretion.
Ph.D.	Ali Venner – Supervisor: Dr. P. Tish K. Doyle-Baker, Thesis: Biochemical Evaluation of Obese Children During a Health Intervention Programme.
Ph.D.	Jay Worobets – Supervisor: Dr. Darren Stefanyshyn, Thesis: The Influence of Golf Club Shaft Flex on Clubhead Speed.
M.Sc.	Denise Chan – Supervisor: Dr. Nick Mohtadi, Thesis: The Development and Evaluation of a Knee Non-physician Expert Training Curriculum.
M.Sc.	Gary Dormer – Supervisor: Dr Brian MacIntosh, Thesis: Fundamental Contractile Properties of Skeletal Muscle Following a Stroke in a Rat Model.
M.Sc.	Jared Fletcher – Supervisor: Dr Brian MacIntosh, Thesis: The Role of the Triceps-Surae Muscle-Tendon Unit on the Economy of Locomotion in Highly-Trained Distance Runners.
M.Sc.	Aviv Fried – Supervisor: Dr. Ron Zernicke, Thesis: Effects of



## Highlights

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- Mechanical Stimulation on Bone Fracture Healing.
- M.Sc. Matt Gotch – Supervisor: Dr. Janet Ronsky, Thesis: Numerical Modelling of Knee Joint Stiffness.
- M.Sc. Laura Higgins – Supervisor: Dr. Tim Welsh, Thesis: Action-centered Attention: The Influence of Attentional Set and Action Affordance.
- M.Sc. Carly McKay – Supervisor: Dr. Carolyn Emery, Thesis: The effect of Premature Return to Play on Recurrent Injury in Elite Adolescent Ice Hockey, and Associated Psychosocial Predictors.
- M.Sc. Ashi Mehta – Supervisor: Dr. Walter Herzog, Thesis: Cross-bridge Mechanics.
- M.Sc. Jill Norris – Supervisor: Dr. Nicole Culos-Reed, Thesis: Physical Activity Behaviour and Health-Related Quality of Life in Young Pediatric Cancer Survivors and their Families.
- M.Sc. Joshua Nugent – Supervisor: Dr. Joan Vickers, Thesis: Gaze Behaviors of Fly Casters and the Effects of Manipulating Attentional Focus.
- M.Sc. Jennie Petersen – Supervisor: Dr. P. Tish K. Doyle-Baker, Thesis: Evaluation of Changes in Physical Activity Levels Associated with a Community-wide Physical Activity Initiative in Calgary, Alberta.
- M.Sc. Matthew Ray – Supervisor: Dr. Tim Welsh, Thesis: The Mirror Neuron System and Observational Learning.
- M.Sc. Albert Sole – Supervisor: Dr. Carolyn Emery, Thesis: Human Risk Factors in Avalanche Incidents.
- M.Sc. Lynette Stephenson – Supervisor: Dr. Nicole Culos-Reed, Thesis: Physical Activity and Diet Behaviours in Colorectal Cancer Survivors: Relationship with Quality of Life.
- M.Sc. Samantha Swanson – Supervisor: Dr. Janet Ronsky, Thesis: Characterization of Scoliosis with Torso Surface Topography.
- M.Sc. Eva Szabo – Supervisor: Dr. Walter Herzog, Thesis: Muscle Adaptation in Patients with Joint Injury and Disease.
- M.Sc. Ryan van Asten – Supervisor: Dr. Stephen Norris and Dr. David Smith, Thesis: The Effects of Acute Whole-Body Vibration on Sprint Running Performance and Jumping Performance in High Performance Athletes.
- M.Kin. Crystal Horne – Supervisor: Dr. David Smith, Thesis: The Effect of High Intensity Intervals on Healthy Sedentary Adults: A Feasibility Study.
- MBT Kasia Okoniewska – Supervisor: Dr. Preston Wiley, Course-based Masters in Biomedical Technology.



# General comments

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## Biomechanics

**BENNO M. NIGG & PETER FEDEROLF**

Impact forces and their effects on the human body have been a research interest of our group for several years. The main topic we addressed this year was local effects of impacts or vibrations on the muscles. We analyzed muscle activation as well as energy turnover in muscles by quantifying the local oxygenation of muscles exposed to vibrations. In a more applied project we investigated how shoe stiffness affects the impact shock during touch down in running. 150 subjects in age groups between 10 and 75 were included in the study.

Regular wearing of unstable shoes is believed to increase balance skills. In an ongoing study, we try to quantify the improvement in stability during balance exercises and during walking. In addition, we are investigating if improved stability leads to an improved performance in situations in which motor control and cognitive tasks are done at the same time (e.g. talking on a phone while walking).

A third focus area of our group is the quantification of fatigue during running. We believe our group to be the first to distinguish between activation patterns of muscles that are fatigued and those that are not with a classification rate higher than 95%.

Biomechanical analyses of basketball movements suffer from high variability in the execution of the movement by subjects and a high variability in observed biomechanical variables. In a large study we quantified this

variability for many typical basketball movements and provided guidelines to improve future studies.

**WALTER HERZOG**

I would like to start my comments by congratulating my trainees Venus Joumaa, Tim Leonard and Brandon Hisey for winning the NDI Young Investigator's Award at this year's North American Conference of Biomechanics in the postdoctoral, doctoral and master's competitions, respectively. Their work exemplifies our striving for excellence in scientific research.

This year, we made important discoveries on skeletal muscle force production and the role of the structural protein titin in passive and active force production in children with cerebral palsy, in overstretched myofibrils and whole muscles. There is now strong evidence that titin acts as a molecular spring that can regulate its stiffness by calcium binding and by shortening its resting length through specific, force-dependent attachments to actin.

We further confirmed the crucial role of muscle weakness in the onset and development of Osteoarthritis and made first ever measurements of the stresses and strains acting on the vertebral artery between cervical segments C1-C6 during chiropractic spinal manipulation. The results of this last study contradicted accepted beliefs and defied generally accepted intuition of the mechanics of vertebral arteries in this clinically important treatment approach.



### **STEVEN BOYD**

#### BONE IMAGING LABORATORY

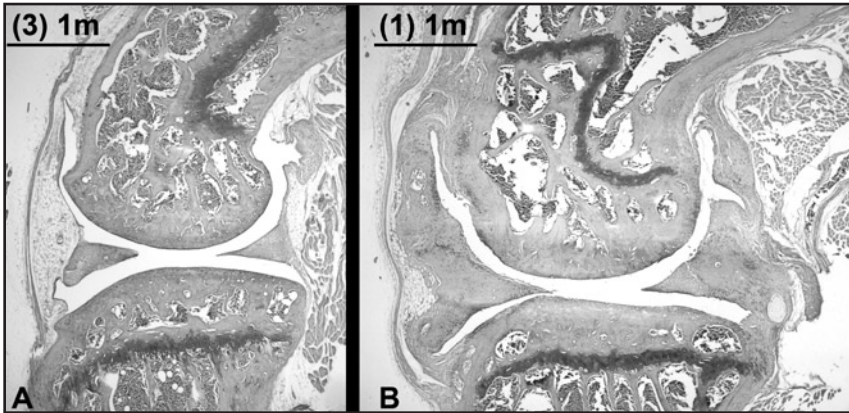
Our research group focuses on the use of micro-computed tomography (micro-CT) for the study of bone disease and joint injury. The work in the Bone Imaging Laboratory involves clinical measurements of 3D bone architecture in patients. We are studying patients receiving experimental treatments for osteoporosis, and developing a baseline database of bone quality in a population based study. In addition to our clinical work in the RJC, we also are doing pre-clinical research at our facilities in the Heritage Research Medical Centre where we have in vivo micro-CT equipment for studying bone quality in models of osteoporosis. The pre-clinical work in the hospital and the clinical work in the RJC allows for so-called bench-to-bedside application of our research findings.

The lab consists of seven full-time graduate students all registered in the graduate program of the Schulich School of Engineering, a Research Assistant, two postdoctoral fellows and several undergraduate students coming from Calgary, other schools in Canada, and internationally (Switzerland and France). We have active current collaborations with the Faculty of Medicine, Alberta Childrens Hospital, Faculty of Kinesiology and the Schulich School of Engineering at the University of Calgary, in addition to collaborations with faculty's in other universities in Canada and abroad (e.g., Switzerland).

### **ANDREA CLARK**

Osteoarthritis is a debilitating disease resulting in joint stiffness, swelling and pain. Three million (1 in 10) Canadians suffer from osteoarthritis but there is no treatment to stop or reverse the progression of joint degeneration. Osteoarthritis is characterized by the breakdown of articular cartilage. Cartilage cells (chondrocytes) are sensitive to their cartilage matrix environment and can rapidly respond to changes therein. The focus of our research is to identify and characterize specific signal transduction mechanisms through which chondrocytes respond to mechanical and chemical changes in the cartilage with a biological response. These investigations will be carried out using innovative real-time confocal microscopy techniques and genetically engineered mice. Real-time in situ confocal microscopy enables elegant studies of simultaneous mechanical loading and biological responses of cartilage tissue and cells to be conducted. In addition to live cell imaging, genetically engineered mice will be utilized so that the role of very specific cartilage/chondrocyte molecules can be elucidated. In addition to improving our understanding of articular cartilage function and health, these data will provide a first step in evaluating potential targets for pharmaceutical intervention to treat osteoarthritis.





Comparison of a cross-section through a healthy (A) and osteoarthritic (B) mouse knee joint.

### GERALD COLE

The past year saw further continuation of our research and development activities for elite level alpine ski racing, with focus in three areas.

(i) We have been working with the Canadian Alpine Ski Team in developing and conducting a more comprehensive and objective ski testing program. The navigational device that was developed with the Position, Location And Navigation (PLAN) Group of the Schulich School of Engineering is being used for this application.

(ii) Together with Dr. Stephen Norris, we are investigating specific apparel designs with the goal of improving skiing performance.

(iii) In collaboration with the medical staff of the Canadian Alpine Ski Team, we are continuing to develop concepts in equipment and training with the goal of reducing ACL injuries in ski racing.

### JANET RONSKY

Relations amongst joint structure, joint function and neuromotor control was a research priority of our group this year, specifically in the areas of knee joint injuries and cartilage degeneration, scoliosis and joint prostheses. Integrated comparisons between traditional and CAD/CAM generated prostheses were completed. Subject specific relations between tissue sensation, socket interface pressures and gait variables revealed subject comfort was not directly related to peak or mean pressure distribution at local sites, or tissue sensation, during standing or walking. Using innovative experimental approaches, we found that applying an anterior load to the knee joint increases hamstring muscle stiffness. This finding highlights the sensory importance of ligaments within the knee, especially the ACL. Examining the hamstring muscle stiffness in response to an anterior joint load changes in ACL



ruptured and reconstructed patients compared to normal healthy individuals is the next project phase. Novel MRI based diagnostic tools for in-vivo detection of knee joint laxity were extended to models for in-vivo prediction of force-displacement relations for various joint structures. Joint contact mechanics kinematics models continued to be developed using in-vivo data, to advance our understanding of the role that the meniscus plays in joint stability, knee injuries and osteoarthritis. In-vivo patellofemoral cartilage deformation under controlled loading conditions was quantified in healthy subjects, with novel algorithms developed for volume and contact area determination, based on image registration and MR imaging techniques. These techniques will enable longitudinal evaluations of joint health status.

### **TANNIN SCHMIDT**

Our research involves mechanistic based, multidisciplinary study of articular cartilage lubrication with biomechanical-biotribological, biophysical, and biochemical methods. Relevant areas include the study of normal, injured, and diseased cartilage and synovial fluid, where composition and interactions of mechanically relevant biomolecules can be altered, as well as other tissues in the joint affected by injury and disease. Our current work involves examination and elucidation of the structure-function relationship governing the multiple biological properties of cartilage lubricating macromolecules

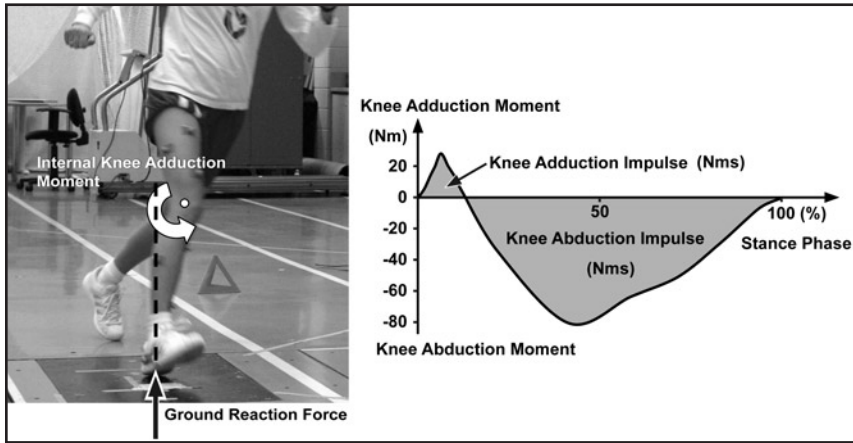
present in synovial fluid and at the surface of cartilage that contribute to the overall maintenance and integrity of the knee. The composition and structure of these lubricating molecules can be altered after a traumatic knee injury, which is associated with an increased incidence of osteoarthritis. The desired outcome of our research is to develop new cell or tissue based treatments and/or therapeutics that stop, slow, and/or reverse the progressive degeneration of articular cartilage after a sports injury that leads to the well-established high occurrence of osteoarthritis in knee joints.

### **DARREN STEFANYSHYN**

Our research program investigates questions related to sport performance and sport injury biomechanics. Performance research involves developing a basic understanding of the mechanics of human movement, quantifying sources and locations of energy production and absorption during various locomotor and athletic movements. The goal is to determine the mechanical factors dictating an athlete's performance and if performance can be improved by manipulating these particular factors.

Our performance 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. In 2008 we made great progress in our study of golf clubs, developing a





Knee joint loading during lateral cutting movements.

method of identifying the optimum shaft stiffness for a golfer based on their swing style. We continued our research on performance apparel and functional footwear in several sports including running, walking, sprinting, golf and badminton. This past year, several of our equipment projects also aimed directly at helping athletes at the 2010 Vancouver Olympics.

The injury research involves identifying potential factors such as global loading characteristics associated with ankle and knee sport related injuries. One of our main research findings this past year was that anterior cruciate ligaments in female athletes are likely related to an athlete's knee joint laxity and not necessarily their menstrual cycle as commonly believed.

**VINCENT VON TSCHARNER**

This year's work on the behavior of muscles during movements has led

to further insight. The wavelet based time/frequency analysis combined with pattern recognition methods was further developed by introducing the classification of EMG multi muscle patterns and spectra by the spherical classification method and by the support vector machines.

The theory of pattern recognition was further investigated in theory and in practice. The spherical classification method was used to separate multi muscle intensity patterns of EMGs. This method outperformed previously used ones. We also showed that the spherical classification can discriminate the multi muscle intensity patterns of the EMG of 4 lower leg muscles from healthy subjects and subjects suffering from osteoarthritis while walking. This classification of a dynamic process is very important because it allows to test whether the muscle atrophy of a patient has already progressed to the point that it shows the char-

acteristics of a pathology of the gait resulting from osteoarthritis.

At the end of 2008 we succeeded in outperforming the spherical classification by the support vector machine using a linear kernel. Last year's hypothesis that the EMG will significantly change with fatigue was confirmed by applying the support vector machine and we were able to reveal the details caused by fatigue. A comparison of the advantages and disadvantages of the two classification methods indicated that they are complementary. Additional work will focus on how to combine the two methods. The successful classification of EMGs can now be extended to include kinetic and kinematic data.

Mechanomyographic signals (MMG) yield information about the muscle activity which is significantly different than what can be obtained by EMG analysis. Last year the wavelet analysis was adapted for the analysis of MMGs. This year the classification of con-centric and ex-centric movements by the t- and o-vector used previously in the EMG analysis was confirmed. The results clearly showed two frequency bands that were elicited at different times during a movement. These frequency bands most likely reflect two different mechanisms of MMG signal generation.

### **RON ZERNICKE**

Human biomechanics and the functional adaptation of bone to exercise, diet, and injury constitute the major areas of research. We have developed methods to relate the surface contours of the torsos of adolescent scoliotic children to the underlying deformities of their spine and rib cage. These advancements combine 3-D optical scanning, surface shape modelling, and artificial neural networks to produce effective prediction of scoliotic deformity with minimal use of harmful X-rays.

The second major focus is the functional adaptation of bone. We are probing relations between mechanical stimuli (e.g., strain gradients, strain magnitudes, and strain rate) and the sites of new bone formation induced by exercise and mechanical loading regimens. We examined the microstructural changes in periarticular cancellous bone structure (via micro-CT scanning), and mechanical properties and blood flow in the chronically unstable knee joint. In probing the mechanisms that contribute to mechanotransductive remodeling, we are using a novel combination of high-resolution imaging, finite element modeling, and animal-specific controlled loading models. To complement those experimental studies and investigate the underlying mechanisms of functional adaptation, we are developing hierarchical mathematical models to quantify fluid flow characteristics (e.g., shear stress, pore pressure, and nutrient transport) in the bone micropores.



## Mind Sciences

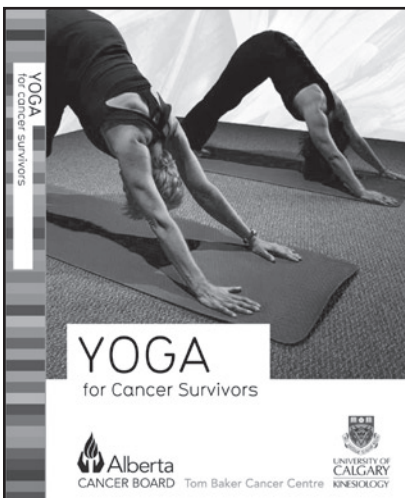
### S. NICOLE CULOS-REED

HEALTH & EXERCISE PSYCHOLOGY

Research focuses on Physical Activity for Cancer Survivors and improving the quality of life of cancer patients and survivors. Part of this research has included the development of exercise programs and lectures which are also open to support persons. Upcoming work will include providing greater accessibility and options for physical activity programs to the cancer survivor population, to examine the feasibility of lifestyle interventions at various stages of the cancer continuum (diagnosis, treatment, post-treat-

ment, survivorship, and palliation) and to collaborate with other cancer centres to better understand the role of physical activity for different cancer types. Our goal is not only to increase activity thereby improving the physical condition of cancer survivors, but also to improve their emotional, and ultimately their overall, quality of life.

As an example, our research on yoga for cancer survivors has developed into a community program, offered at multiple locations within Calgary. In addition, we have produced a "Yoga for Cancer Survivors" DVD that is distributed to cancer survivors through various resources, in order to encourage survivors to seek a better quality of life. The distribution of this DVD will reach much farther than our current program, offering the opportunity to study a much larger populace. The feedback we receive from these classes and DVD will be critical to our on-going research on the benefits of physical activity for cancer survivors.



The first ever Yoga for Cancer Survivors DVD was developed by Dr. Nicole Culos-Reed and her research team this past year. This 4-set DVD is identical to the current 7 week class based program offered in Calgary to survivors and their support persons.

### JAMIE JOHNSTON

MOVEMENT NEUROPHYSIOLOGY LAB

My research priorities are to (1) address fundamental issues in motor neuroscience using the hand as a research model and (2) develop sensitive multidimensional analytical techniques to a) provide quantifiable information about hand functional deficits to clinicians, b) assess progress made after clinical interventions, and c) test the effec-



## General comments

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tiveness of functional and therapeutic electrical stimulation devices and the functional capabilities of new hand prostheses. Currently my research examines the process of sensorimotor integration crucial for adapting motor patterns to environmental and task conditions. The goal is to improve our understanding of how the Central Nervous System coordinates the multiple muscles and joints of the hand while allowing it to adapt to task conditions, e.g., different object properties. We examine this issue in healthy young and elderly, as well as individuals with carpal tunnel syndrome.

The ultimate objective of my research is to complement information provided by existing clinical tools to characterize and monitor hand function, bridging the gap between basic and clinical research. The hand is an ideal model as hand function is disrupted by a number of neuro-musculo-skeletal disorders as well as traumatic injury and stroke. The importance of hand function for everyday activities

and the pervasiveness of hand disabilities have led to an explosion of biomedical technology designed to replace and/or improve hand function in these individuals. However, the development of such tools has oftentimes outpaced the science necessary to assess their effectiveness. The experimental approaches and analytical methods developed through decades of research on manipulatory behaviours in healthy individuals have the potential to provide significant insights into the functional impairments incurred by such individuals.

### JOAN VICKERS

NEURO-MOTOR PSYCHOLOGY & APPLIED SPORTS PSYCHOLOGY

My research group concentrates on investigating the role of the gaze and visual attention in motor skill acquisition and performance. In the course of all actions, the brain is limited in how much information it can process and act upon at a time. Performers must constantly decide



Vision-in-action data showing the gaze of the athlete (as indicated by the small white circle) on the front of the hoop.



where to look, what to attend to and how to time fixated information with precisely controlled actions. Gaze can be directed to only one area at a time and information central to success is selected from spatially complex environments under severe time constraints. A tight perception-action coupling is required between visual, cognitive and motor processes, however, the control strategy that underlies successful performance is a matter of debate. Theoretically, a predictive control strategy holds that advance visual information is used for response selection and the movement is carried out without modification once initiated, whereas a prospective control strategy holds that visual information is continually updated through to the end of the movement. Overall, our results show that when a predictive control strategy is used, in which precise visual information is acquired in advance of the movement, higher levels of success occur than when a prospective control strategy is used. Our main discovery is the quiet eye, which is an early fixation or tracking gaze of long duration to a specific external location prior to the final action being performed.

### **TIMOTHY N. WELSH**

COGNITIVE & MOTOR  
NEUROSCIENCE LAB

The overall goal of my research is to gain a comprehensive understanding of the neural and cognitive processes that underlie human movement. It is my general belief that, under optimal learning and work-

ing conditions, everyone, including people with movement and/or cognitive disorders, can be contributing members of the community. It is my hope that, once this detailed knowledge of the processes underlying movement has been developed, the scientific and clinical communities can work together to create the optimal rehabilitative, learning, and working conditions necessary to facilitate the performance of all members of society.

My specific contributions to this goal come in the form of gaining a deeper understanding of the interaction between the processes of selective attention and action planning, cerebral specialization for movement and movement-related processes in average and special populations like Down syndrome or autism, and the neural basis of coordinated movement. In order to achieve these goals, my lab typically uses behavioural measures of movement such as reaction time, movement time, and movement trajectories to make assumptions about the underlying neural networks that bring about action. For example, because we know that certain neurons in the cortical motor centres code for the direction of movement, we can make inferences about how a particular action was coded in these motor centres by measuring the curvature of movement. At present, my lab is working on a series of projects looking at such diverse issues as the control of eye and hand movements in the elderly, social selective attention in people with and without



autism, and the contributions of primary motor cortex to the inhibition of return phenomenon. These studies will provide us with clues to the manner in which a variety of people use different strategies to plan and execute movements.

### **Nutrition, Metabolism & Genetics**

#### **RAYLENE REIMER**

There is widespread recognition that diet plays an important role in the incidence of many diseases including cardiovascular disease, diabetes, obesity, some cancers, osteoporosis and inflammatory conditions. The overall objective of my research is to couple the identification of genes involved in the pathogenesis of diabetes and obesity with nutrition-based strategies to prevent and/or treat these conditions. The specific aims of my current research program include:

#### *Role of Intestinal Adaptation in Obesity*

Using both the genetically obese JCR:La-corpulent rat and diet-induced obese rat models we are examining the role of diets high in protein and fibre on intestinal adaptation, gut hormones involved in satiety, hepatic lipid synthesis and body weight regulation. Other novel nutrients we are examining include calcium and specific proteins and bioactive ingredients found in dairy products which are linked to improved weight loss. We are specifically addressing the mechanisms by which these dietary components

promote weight loss and regulate adiposity. Most recently we have translated the findings of our animal work into human clinical studies and demonstrated significant weight loss with a prebiotic fibre supplement taken over 3 months.

#### *Regulation of GLP-1 (glucagon-like peptide-1) secretion*

GLP-1 is a potent insulin secretagogue with high potential for the treatment of diabetes. We have established a molecular screening facility in which we are able to determine the role of specific nutrients and dietary compounds in triggering GLP-1 release. Using cell lines we can further explore the intracellular signaling pathways involved in GLP-1 secretion. Techniques used by our lab include Microarrays, Real Time PCR, Multiplex analysis, and metabolomics.

#### *Role of Diet Composition in Early Dietary Programming*

It is now increasingly clear that dietary influences exerted early in life have long-term consequences, many of which are pathological. The goal of this work is to undertake basic research on how dietary patterns during growth and development affect physiological responses related to lipid and glucose metabolism in later life and program risk for obesity and type 2 diabetes.

The long-term goal of our work is to identify novel nutritional therapies to prevent and treat chronic disease.



## **Physiology/Biology**

### **P. TISH K. DOYLE-BAKER**

A.P.P.L.E. RESEARCH GROUP

Our group's research efforts focus strongly on the impact of energy expenditure and physical activity on health both from a clinical and public health perspective.

#### *Exercise Influences in the Pediatric Age Group.*

Our group has been investigating the biochemical effects of high intensity exercise on adipocytokines with the hope of providing valuable tools for the application of intervention programs in the pediatric population. The B.E. H.I.P. (Biochemical Evaluation of a Health Intervention Program) has recently been completed and overweight/obese children demonstrated that they can engage in a program that focuses on high intensity exercise leading to favourable health changes.

#### *Health Parameters*

Weight gain and behavioural patterns developed during university may have negative health consequences that often carry forward into adult life. The Forgotten Youth Information Health Study (FYI Health Study) is a feasibility study which will give baseline measures from three time points on cholesterol and glucose, body composition, diet, bone mineral density, and stress levels.

#### *Community Based Research*

The EcoEUFORIA (Economic Evaluation of using Urban Form to Increase Activity) is a modern day version of Dr. Snow's observations in 1854 that

recognized the impact of infrastructure on urban dwellers' behaviour patterns and their health. This three year project is entering its second year and we look forward to analyzing the data in year three.

### **NEIL EVES**

Exercise is recognized as a fundamental requirement in the prevention and treatment of a multitude of diseases and can lead to successful disease modification and health promotion. Physiological alterations due to inactivity and disease affect all systems within the body and can lead to rapid worsening of symptoms and deterioration in the ability to perform exercise. At present, there is only minimal understanding of the mechanisms associated with exercise intolerance and how exercise training can attenuate disease progression and improve prognosis (especially in respiratory disorders). The present focus of my research is to investigate the integrative physiological mechanisms responsible for reduced exercise capacity in disease and to design novel interventions that can be implemented to optimally enhance physiological adaptation. Current research projects are examining the contribution of altered inspiratory muscle mechanics on exertional dyspnea and the effects of heart-lung interaction in patients with respiratory disease. We also have a number of ongoing investigations looking at the inflammatory responses to exercise in patients with chronic obstructive lung disease to try and understand





how exercise affects this important biological process. It is hoped that our research will provide a better understanding of the physiological limitations imposed by disease and will help improve treatment for the growing number of individuals who have chronic respiratory conditions.

### **WAYNE GILES**

Present research projects are directed toward understanding the electrophysiological mechanisms for pacemaker activity in the heart and for repolarization of the action potential in atrial and ventricular myocytes. In addition, electrophysiological properties of isolated chondrocytes are studied. This experimental work is complemented with development of mathematical models of the human ventricular action potential.

### **RUSSEL T. HEPPLE**

#### AGING & SKELETAL MUSCLE GROUP

Our major focus this year was on understanding the mechanisms by which long term caloric restriction (without malnutrition) slows the loss of muscle and preserves its contractile function with aging. To this end, we recently showed that although there is increased activation of the ubiquitin-proteasome pathway of protein degradation in aging muscles, the acceleration of age-related muscle atrophy between late middle age and senescence is greater than would be

expected for the increased activation of this pathway. Furthermore, caloric restriction had very minor effects on this pathway, suggesting that optimal activation of the proteasome may be fundamental to the preservation of muscle function with aging. In addition to these studies, we are examining the apoptosis pathway in the context of age-related muscle atrophy and its attenuation by caloric restriction, as well as determining the impact of selecting for high voluntary running activity on mitochondrial function and age-related muscle changes.

### **DUSTIN HITTEL**

2008 has been an exciting year for the Hittel lab. With the help of a generous donation from Encana to the REACH! campaign we have purchased a high-resolution respirometer and camera system for our fluorescence microscope. These instruments will allow us to analyze muscle mitochondrial function in vivo (in living tissue) and determine how this relates to the development of type 2 diabetes. This funding has also allowed us to recruit an excellent graduate student from the University of Ottawa. Over the next year we will be making detailed measurements of mitochondrial function in muscle from obese and diabetic mice as well as cultured muscle cells. We fully expect that the findings of her research will be published in a peer-reviewed journal and presented at an international obesity and dia-



betes conference. Finally, funding from the REACH! Campaign has helped us to publish a paper in the highly cited journal *Diabetes*. In this paper we used an innovative protein profiling technology to show (for the first time) that a protein called myostatin, is secreted from diabetic muscle into the bloodstream. We believe that myostatin contributes to the significant muscle-loss associated with diabetes. Over the next year we will be evaluating myostatin as new "biomarker" and potential therapeutic target for type 2 diabetes.

### **BRIAN MACINTOSH**

The central theme of research in my laboratory is the study of force modulation in skeletal muscle. This includes the study of force-velocity and force-length relations, and the interactions of these with and without prior activity. Prior activity can be an acute modifier, as in potentiation and fatigue, or a chronic modifier as in training and disuse atrophy. Skeletal muscle contractile responses (twitch and incompletely fused tetanic responses) are modified by regulatory light chain phosphorylation, and my research is concerned with understanding the role of this process in modifying the contractile response, and how certain conditions may modify the interaction of light chain phosphorylation and potentiation or fatigue. My research group has made several key observations. Recent work has demonstrated that it is inap-

propriate to subtract the passive force measured at the initial whole muscle length to estimate active force of contractions. This common approach results in an underestimation of active force at long lengths. Passive force is now known to change during contraction of a muscle that has substantial series elastic properties. Future work will consider the impact this revelation has on some fundamental properties of muscle. Current and recently completed projects address the questions: i) How does aging, stroke or congestive heart failure alter the fundamental contractile properties, fatigue and potentiation? ii) Can various types of tremor be differentiated with simple measurements of EMG and motion patterns? iii) Can a submaximal test be devised to estimate maximal oxygen uptake in youth and young adults with Down syndrome? iv) Can sequential bouts of exercise 24 hours apart be used to objectively identify chronic fatigue syndrome? and v) What is the appropriate warm-up for performance of athletic events? My work uses a number of approaches to study the contractile properties of skeletal muscle, including in vitro single intact or skinned fibres and fibre bundles, in situ whole muscle and intact human subjects performing in vivo isolated muscle or muscle group contractions or performing whole body exercise.



### **JANE SHEARER**

Worldwide, it is estimated that over 1 billion people are overweight and 300 million are obese. If current trends continue, 700 million adults will be obese by the year 2015 while one in three children will develop type 2 diabetes in their lifetime. As such, obesity represents the single most preventive factor leading to decreased individual health. The goal of the Shearer laboratory is to examine the interactions between nutrition, genes and the development of metabolic diseases including diabetes and cardiovascular disease. The laboratory has three main research areas:

#### *Cardiovascular Disease Prevention and Management*

Under normal conditions, 60–80% of energy required by the beating heart is derived from fat with the remaining supplied by glucose. Numerous pathological conditions, including diabetes perturb this balance resulting in abnormal heart function and further pathological declines. Projects in this area examine why this imbalance occurs and potential therapeutic strategies including stem cell therapy.

#### *Metabolic Consequences and Markers of Obesity*

There is increasing evidence that defective mitochondrial energetics and abnormal substrate metabolism are fundamental characteristics of the failing heart. This project examines how obesity alters both skeletal muscle and cardiac mitochondrial integrity and function. Specific

markers of metabolic dysfunction in the blood and tissues are also being explored (metabolomics).

#### *Dietary Modulators of Glucose Utilization and Insulin Sensitivity*

Chlorogenic acids are the main antioxidants found in brewed coffee. Epidemiological studies show regular coffee consumption significantly lowers type 2 diabetes (T2D) risk. Coffee ingestion has also been shown to alter production of the gut hormones glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide 1 (GLP-1). This project generates data to clarify mechanisms by which CGA acts to reduce risk of T2D.

### **DAVID J. SMITH, STEPHEN NORRIS & JON KOLB**

The research interests of our group include athlete performance enhancement through hyperoxia, hypoxia and vibration; adaptations of the cardiovascular and muscular systems to training interventions; and monitoring techniques to assess readiness for competition or degree of fatigue resulting from training. Monitoring athletes in both resting and exercise situations is critical to understanding their response to training effects. A traditional approach to training endurance athletes has been the use of hypoxia which is a general reduction in oxygen delivery. Our approach to hypoxia training is to use both a natural altitude environment as well as normobaric hypoxic interventions via oxygen filtration.



Another relatively new training tool is the use of hyperoxia in conjunction with high intensity training to improve performance. Our research is focused on the degree of competitive edge these modalities may give high performance athletes. In monitoring athletes we are now examining the use of heart rate variability to give insight into the effect of different training interventions in order to potentially protect athletes from severe overreaching. The use of vibration for improving the training regimes of athletes is also part of our ongoing research. The potential training effects of vibration that may occur in the post-vibration period may lead to better warm-up protocols for athletes competing in sporting events that require high amounts of power output. Ongoing research in environmental physiology continues to examine thermoregulation challenges associated with exercise in hot climates. In addition to our main focus of athlete performance, we are also continuing our studies on the effect of exercise for cancer survivors. We have expanded our cancer survivor groups to include prostate, colon, and breast cancer. Our interventions are examining the effect of different intensities and sequence of aerobic exercise for these survivors. Finally, our group continues to provide ongoing national leadership to athletes, coaches and sport organizations, in preparation for the upcoming Vancouver 2010 and London 2012 Olympic Games.

## Sport Medicine Research

**WILLEM MEEUWISSE &  
CAROLYN EMERY**

This year, our group continues to focus on a 3-year National multi-centre study of injuries related to body checking in youth ice hockey. The question of safe introduction of body checking has been hotly debated with incomplete evidence of its impact. This 3-year study will be a definitive work involving collaborations with Edmonton, Montreal and Quebec. In addition, we have launched the first comprehensive prospective cohort study examining injury in female youth ice hockey as well as examining psychosocial factors associated with return to play in elite youth ice hockey. Our group is also engaged in the analysis of data with the National Hockey League Concussion Working Group, which has accumulated 10 years of prospective data. We presented new findings at the Zurich Concussion in Sport Consensus Conference in October, for which Dr. Meeuwisse was the Chair.

In 2008, we have launched a pilot research program examining the effectiveness of a combined neuromuscular injury prevention strategy and obesity prevention strategy in the reduction of sport injury and increasing healthy outcomes in junior high school students. This broad school-based injury prevention initiative has evolved from lessons learned in the sport-specific injury prevention programs developed and evaluated to date in



## General comments

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youth basketball and soccer. Future research also includes the development and evaluation of a youth sport injury prevention clinic. This will involve preseason evaluation and individually targeted prevention programs to reduce the risk of injury in youth sport. The long-term goal of this work is to maximize health and minimize the long-term impact of joint osteoarthritis in the child and adolescent population.

Other ongoing research activities with our colleague Dr. Brent Hagel (Paediatrics, Faculty of Medicine) included the examination of human risk factors in avalanche incident and examination of risk factors for injury in youth skiing and snowboarding

This year, our group also had a substantial international impact at the 2nd World Congress on Injury Prevention in Sport (Tromso, Norway) including one keynote lecture, 8 invited lectures, 2 workshops and 6 scientific paper presentations. This was a testament to the success of our research accomplishments at the SIPRC, Faculty of Kinesiology.

### **DALE BUTTERWICK**

Our small research group continues to build capacity in the establishment and use of valid and reliable tools for evaluating student performance of technical skills. We are poised to use such tools in the assessment of undergraduate student performance in health care professions complementary to Athletic Therapy.

Progress continues in the study of rodeo and bull riding injury and injury prevention. We are preparing to study baseline neuropsychological testing and balance testing of rodeo athletes with high risk of concussion. This data will help in guiding these athletes to a safe return to competition. There are currently two projects in the early stages of development in which our graduate students are participating.

### **PRESTON WILEY & VICTOR LUN**

The Sport Medicine Centre has made great strides in developing a web-based patient check-in and online questionnaire system to streamline patient care and clinical research. This has supported the development of dedicated clinics in knee injury care. These will be up and running in the New Year.

We are near completion in projects involving non-surgical treatments for plantar fasciitis, Achilles tendinopathy, and knee osteoarthritis. We hope to learn if new approaches to these problems should be incorporated into treatment paradigms for these diseases.

Current research projects include (1) The effectiveness of hip strengthening exercises compared to leg strengthening exercises on knee pain and quality of life in patients with knee osteoarthritis, and (2) Evaluation of sleep problems in Canadian elite athletes.



# Acknowledgements

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Adidas  
Agriculture Funding Consortium  
Alberta Bone and Joint Health Institute  
Alberta Breast Cancer Research Initiative – Translational Research Group Program  
Alberta Cancer Board  
Alberta Children’s Hospital Foundation  
Alberta Centre for Child, Family & Community  
Alberta Heritage Foundation for Medical Research (AHFMR)  
Alberta Ingenuity Fund (AIF)  
Alpine Canada Alpin  
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Biomechanigg Research Inc.  
Burnswest Corporation  
Busan Footwear Industrial Promotion Center  
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CAN National Centre of Excellence  
Canada Foundation for Innovation (CFI)  
Canadian Academy of Sport Medicine  
Canadian Diabetes Association  
Canadian Foundation for Dietetic Research  
Canadian Imperial Bank of Commerce (CIBC)  
Canadian Institutes of Health Research (CIHR)  
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Decathlon  
Engineered Air  
Fitter First Incorporated  
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Fraternal Order of Eagles, Alberta & Saskatchewan  
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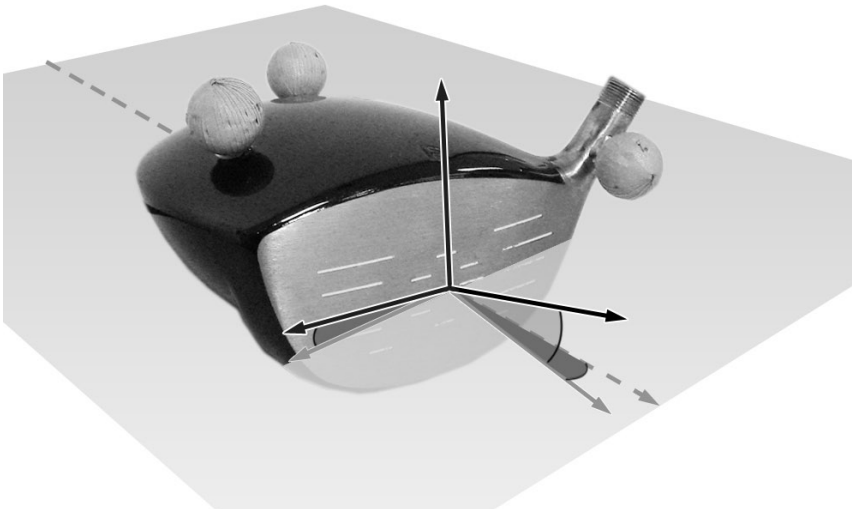


# Acknowledgments

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National Cancer Institute of Canada (NCIC)  
National Science Foundation (US)  
Natural Sciences and Engineering Research Council of Canada (NSERC)  
Noyen Construction Ltd.  
Olympic Oval Endowment Fund  
Olympic Oval High Performance Fund  
Own the Podium 2010  
Own the Podium 2010 Human Performance Research Fund  
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The Calgary Foundation  
The Canadian Chiropractic Assoc.  
The College of Chiropractors of Alberta  
The Reach! Campaign (via a generous donation from EnCana Corporation)  
Tom Baker Cancer Centre  
Top Notch Construction  
Total Sewer & Water Ltd.  
Tesco Soils Inspection Ltd.  
University of Calgary  
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The clubhead coordinate system of a golf club driver.



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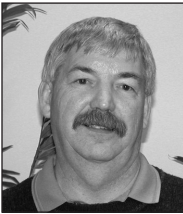
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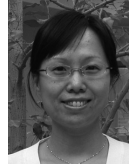
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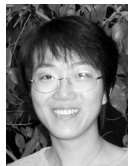
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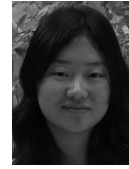
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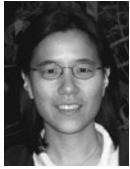
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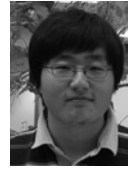
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**Elson, Chantelle**  
**Seadon, Scott**  
**Milne, Laura**  
**Taylor, Kimberly**  
**Wright, Kathryn**

**Summer Students**

**Baker, Daniel**  
**Duvall, Michael**  
**Hall, Jenna**  
**Huang, Steven**  
**Hung, Stephen**  
**Ikeda, Diane**  
**Johnson, Samantha**  
**Kaplan, Belle**

**Kinwoo, Robyn**  
**Norton, Olivia**  
**Pawa, Kasmira**  
**Sytsma, Andrew**  
**Wu, Andrew**  
**Wuest, Sarah**  
**Yamashita, Jenna**

**Visiting Students**



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### Book Chapters

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- KleinHorsman, M., Lee, Y. and Nigg, B.M. (2008). The Effect of Shoe Cushioning on Physiological Markers. Report to Decathlon.
- Kolb, J., Norris, S.R. and Smith, D.J. (2008). Examination of Key Hematological and Blood Borne Markers to a Sequential Intermittent Hypoxia Strategy, Own The Podium.
- Nigg, B.M. and Kim, M. (2008). Comparison of Mwalk and New Model MBT Shoe. Report to Masai Barefoot Technology.
- Nigg, B.M., Lee, Y. and Kim, M. (2008). Function of PowerDisk Walking Shoe. Report to PowerDisk Development Ltd.
- Osis, S. (2008). Anti Slip Footwear – Design Brief and Review. Research and Development Report for Mark's Work Wearhouse.
- Osis, S., Stefanyshyn, D.J. and Worobets, J.T. (2008). Anti Slip Footwear– Human Slipping Study. Research and Development Report for Mark's Work Wearhouse.
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## Technical reports

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- Osis, S., Worobets, J. and Stefanyshyn, D.J. (2008). Anti-slip footwear prototype and concept testing. Research and Development Report for Mark's Work Warehouse.
- Stefanyshyn, D.J., Graf, E., Wannop, J.W. and Worobets, J.T. (2008). Footwear torsion. Research Report for adidas International.
- Stefanyshyn, D.J., Smith, G. and Worobets, J.T. (2008). The influence of pure power mouthguards on golf performance. Research Report for Pure Power Athletics.
- Stefanyshyn, D.J., Osis, S., Worobets, J.T., Neubauer, J. and Van Dijk, W. (2008). Anti-slip footwear recommendations. Research and Development Report for Mark's Work Warehouse.
- Stefanyshyn, D.J., Visch, W., van der Wal, H. and Worobets, J.T. (2008). Badminton footwear. Research Report for Korean Footwear International and Haksan Inc.
- Stergiou, P. and Stefanyshyn, D.J. (2008). Golf shoe stability: biomechanical and mechanical testing methods. Research and Testing Report for Taylormade adidas Golf.
- Smith, D.J. (2008). Player Fitness Assessment. Report to Calgary Flames Hockey Club.
- Smith, G. and Stefanyshyn, D.J. (2008). Sledge hockey equipment evaluation. Research and Development Report for Top Secret Own the Podium 2010.
- Smith, G., Stefanyshyn, D.J., Worobets, J.T. and Osis, S. (2008). Sledge hockey development. Research and Development Report for Top Secret Own the Podium 2010.
- Stirling, L., von Tscharnher, V. and Nigg, B.M. (2008). Indicators of Fatigue During Prolonged Running. Research Report for adidas International.
- Vickers, J.N. (2008). Quiet eye testing and training in the free throw. Report to Canadian Women's Para-Olympic Basketball Team, Calgary, AB.
- Wannop, J.W., Worobets, J.T. and Stefanyshyn, D.J. (2008). Speed skate elastic apparel development. Research and Development Report for Top Secret Own the Podium 2010.
- Worobets, J.T. and Stefanyshyn, D.J. (2008). Airun shoe validation. Research and Testing Report for Korean Footwear International and Aison Inc.
- Worobets, J.T., Wannop, J.W. and Stefanyshyn, D.J. (2008). Klap mechanism revolution. Research and Development Report for Top Secret Own the Podium 2010.
- Worobets, J.T., Wannop, J.W. and Stefanyshyn, D.J. (2008). Formotion hiking on level ground. Research Report for adidas International.



# Keynote lectures

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- Boyd, S.K., In vivo micro-CT techniques for both pre-clinical and clinical work. ICHTS-CSBME 2nd APBM Workshop on Bone Histomorphometry and Imaging, Beijing, China, October 21-22, 2008.
- Butterwick, D., Sideline concussion management in sports. Second International Rodeo Medicine Conference. Tulsa, Oklahoma, December 8, 2008.
- Butterwick, D., The rodeo and bull riding catastrophic injury registry. Second International Rodeo Medicine Conference. Tulsa, Oklahoma, December 8, 2008.
- Butterwick, D., The future of rodeo research. Second International Rodeo Medicine Conference. Tulsa, Oklahoma, December 8, 2008.
- Cole, G.K., ACL Injury Mechanisms in Alpine Ski Racing. Invited Lecture, Alpine Canada Medical and Sport Science Research Meeting, Kelowna, Canada, September, 2008.
- Culos-Reed, S.N., Living well with Prostate Cancer: Physical Activity to Enhance Quality of Life. Canadian Prostate Cancer Network Annual Meeting, Calgary, Alberta, August, 2008.
- Culos-Reed, S.N., Well-being during the Cancer Journey: Nutrition and Physical Activity. Cancer Care and Family Practice: A Provincial Oncology Education Event for Family Physicians and Oncologists, Edmonton, Alberta, June, 2008.
- Emery, C.A., Women and Children First: Hockey Injuries in Female and Youth Hockey Players. American Orthopaedic Society of Sport Medicine. The Puck Stops Here. Comprehensive management of Hockey Injuries, Chicago, Illinois, USA, August, 2008.
- Herzog, W., The 13th International Conference on Biomedical Engineering. Muscle and Joint Biomechanics in the Osteoarthritic Knee. Singapore, December 3-6, 2008.
- Herzog, W., Chinese Association of Biomechanics in Sports (CABS). The Biomechanics of Muscle Contraction. Taiyuan, China, October, 14-18, 2008.
- Herzog, W., The 26th International Conference on Biomechanics in Sports. The biomechanics of muscle contraction: optimizing sport performance. Seoul, Korea, July 15-18, 2008.
- Herzog, W., Kuala Lumpur International Conference on Biomedical Engineering. The Biomechanics of Muscle Contraction: or Firing Biomechanics Research. Kuala Lumpur, June 25-28, 2008.
- Lun, V., Return to Play Guidelines, 33rd Family Practice Review and Update. Calgary, Alberta, November 20, 2008.
- Lun, V., "Return to Play Guidelines" and "What is it like to be Team Physician?" 13th Annual Sport Medicine Conference, Calgary, Alberta, July 5, 2008.



## Keynote lectures

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Meeuwisse, W., 2nd World Congress on Sport Injury Prevention, "Practical Models of Injury Prevention", Tromso, Norway, Jun 27, 2008.

Ronsky, J., Inventing the Future: Ideas for the 21st Century - Invited Keynote Round Table Panel Participant, Canada Research Chair Celebration.

Smith, D.J., Testing and monitoring techniques to determine individual physiological adaptations and acute responsiveness to training in elite athletes. European Congress of Sport Science, 8-12 July 2008, Estoril, Portugal.

Smith, D.J., The periodization paradigm: Integration of altitude into the training cycle. Canadian Society for Exercise Physiology. Banff, Alberta, October 16-17, 2008.

Stefanyshyn, D.J., Sports Equipment Energy and Performance? 3rd Congress of the Hellenic Society of Biomechanics. Athens, Greece.

Stefanyshyn, D.J., Can footwear influence sport performance? Sixth Brazilian Symposium on Footwear Biomechanics. Novo Hamburgo, Brazil, May 7-9, 2008.

Vickers, J. N., The influence of quiet eye duration and decision training on sports performance, Japanese Sport Psychology Association Conference, Nygoya, Japan, November 16, 2008.

Vickers, J. N., Quiet eye characteristics that can save an officer's life. Force Science Institute Seminar. San Jose, California, October 27, 2008.

Zernicke, R., Bone adaptation: Diet, exercise & injury. Southern California Conference on Biomechanics, American Society of Biomechanics. Thousand Oaks, California, April, 2008.

Zernicke, R., Functional imaging and bone adaptation. Symposium on Bone, University of British Columbia. Vancouver, British Columbia, May, 2008.



Basketball shoe testing with the University of Calgary Basketball Team.



## Keynote lectures

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- Zernicke, R., Successful strategies for Canadian grants. North American Congress of Biomechanics, Ann Arbor, Michigan, August, 2008.
- Zernicke, R., Biomechanics in three acts. North American Congress of Biomechanics, Invited Keynote Lecture (Canadian Society of Biomechanics Career Award). Ann Arbor, Michigan, August, 2008.
- Zernicke, R., Adaptation of bone to diet, exercise, or injury. Pease Family Scholar, Department of Kinesiology and College of Human Sciences. Iowa State University, Ames, Iowa, September, 2008.
- Zernicke, R., Mechanisms of bone adaptation. International Biomechanics Congress—Human Biomechanics. Czech Society of Biomechanics, Prague, Czech Republic, October, 2008.

## Contributions

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### **EDITORIAL BOARDS**

#### **Members of the RJC have served on the following editorial boards:**

- American Journal of Physiology  
American Journal of Physiology Regulatory Integrative and Comparative  
Physiology  
American Journal of Sport Medicine  
Brazilian Journal of Biomechanics  
British Sports Medicine Journal  
Circulation Research  
Clinical Biomechanics  
Clinical Journal of Sport Medicine  
Elsevier Publishing House  
Encyclopedia Reference of Neuroscience  
Exercise and Sports Science Reviews  
Experimental Physiology  
Experts On-Line, Internet Website of the Arthritis Society  
Family Health Magazine  
IEEE Transactions in Neural Systems and Rehabilitation Engineering  
International Journal of Molecular Sciences  
International Reviewer Panel, Medical Science Monitor



## Contributions

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Journal of Biomechanics  
Journal of Electromyography and Kinesiology  
Journal of Manipulative and Physiological Therapeutics  
Journal of Science and Medicine in Sport  
Journal of the Canadian Chiropractic Association  
Leistungssport  
Molecular and Cellular Biomechanics  
North American Journal of Sport Physical Therapy  
Open Biomedical Engineering Journal  
Open Psychology Journal  
Orthopaedische Zeitschriften  
Physician and Sportmedicine  
Sportorthopädie-Sporttraumatologie  
Sports-Orthopaedics and Sports-Traumatology  
Sportverletzung Sportschaden  
The Spine Journal

### **REVIEW OF GRANT APPLICATIONS**

#### **Members of the RJC have served reviewing grant application for:**

AHFMR Student Advisory Committee  
AHFMR Studentship Review Committee  
Canada Research Chairs Program  
Canadian Foundation for Dietetic Research  
Canadian Foundation for Innovation (CFI)

- Leaders Opportunity Fund

Canadian Institutes of Health Research (CIHR)

- Biomedical Engineering
- Biomedical Committee
- Institute of Aging
- Nutrition, Food & Health Peer Review Committee
- Operating Grants
- Strategic Teams in Applied Injury Research
- Studentships in Musculoskeletal Research

Canadian Lung Association – National Grants Review Board  
Heart and Stroke Foundation of Canada  
Markin-Flanagan / Health and Wellness USRP Committee  
National Institutes of Health



## Contributions

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Natural Sciences and Engineering Research Council Canada (NSERC)

- Discovery Grants
- Idea-to-Innovation Research Partnership Program
- Collaborative Health Research Project
- Research Tools and Instruments

Netherlands Disease Prevention Programme

Neurological Foundation of New Zealand

Ontario Ministry of Agriculture

Research Grants Council of Hong Kong – China

Science Foundation – Czech Republic

Singapore National Research Foundation

WorkSafe British Columbia, Research Secretariat

## Official research related functions

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### **STEVEN BOYD**

Logistics coordinator for "Tour for Kids" a 2 day cycling fund raising event for sending kids with cancer to camp

### **DALE BUTTERWICK**

Board of Directors, Canadian Professional Rodeo Sport Medicine Society

### **NICOLE CULOS-REED**

The Canadian Society for Psychomotor Learning and Sport Psychology (SCAPPS) – Co-Organizer of the 40th Annual General Meeting and Conference; Canmore, AB

### **P. TISH K. DOYLE-BAKER**

Sport Medicine Representative (SMCA)

Sport Scientist delegate for the Alberta Government for the return visit of the Japanese Hokkaido Women's Ice Hockey Team

### **CAROLYN EMERY**

Chair National Sport Injury Prevention Research Centre – Canadian

Academy of Sport Medicine Research Symposium

Chair Scientific Review Committee Chair (2008) – Canadian Physiotherapy



## Official research related functions

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Association National Congress  
Canadian Physiotherapy Research Advisory Consortium Chair  
Canadian Physiotherapy Association Divisions Research Liaison  
Sport Physiotherapy Canada Executive – National Research Representative

### **NEIL EVES**

Chair, Limitations to Exercise in COPD, CSEP Annual Meeting, Banff, AB  
Chair, Assessment and Management of Exercise in COPD. Canadian  
Respiratory Conference, Montreal, QC

### **WALTER HERZOG**

President, International Society of Biomechanics  
Chair, CIHR Biomedical Engineering Review Committee  
International Conference on Biomedical Engineering, Singapore (Advisory  
Committee member)  
North American Congress on Biomechanics (Scientific Program Committee)  
16th Congress of the European Society of Biomechanics (Scientific Program  
Committee)

### **VICTOR LUN**

Chairperson, Research Committee, Canadian Academy of Sport Medicine  
Medical Director, Canadian Sport Centre Calgary  
Core medical team, Beijing Summer Olympic Games

### **BRIAN MACINTOSH**

President, Canadian Society for Exercise Physiology  
Associate Dean (Graduate), Faculty of Kinesiology  
Co-Chairman, Organizing Committee for Canadian Society for Exercise  
Physiology Annual Conference, Banff, AB  
Organizing Committee, Chronic Fatigue Syndrome/Myalgic  
Encephalomyelitis Research Symposium, Calgary, AB

### **WILLEM MEEUWISSE**

Editor-in-Chief, Clinical Journal of Sport Medicine  
Chair, National Hockey League Health Management Panel  
Member, National Sport Science and Sport Medicine Advisory Committee  
Chair, Canadian Athlete Monitoring Program Committee  
Chair, Consensus Panel on Concussion in Sport, Zurich, Switzerland

### **NICK MOHTADI**

Clinical Research Director, McCaig Institute for Bone & Joint Health,  
Research Portfolio



## Official research related functions

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Member, Division of Orthopaedic Surgery Research Committee  
Member, Division of Orthopaedic Surgery Education Committee  
Chairman, Sport Medicine Section, Division of Orthopaedics. University  
of Calgary  
Member, OSRTC

### **BENNO M. NIGG**

Member, IOC Medical & Science Commission  
Scientific Board Member, Jacobs Center, Bremen, Germany  
Member, Int. Academy of Biology and Engineering in Medicine  
Member, Swiss Academy of Medical Science

### **RAYLENE REIMER**

Member, Beth Zaruby International Lectureship Committee

### **JANET RONSKY**

Alberta Research Council, Board of Directors, Member

### **DAVID SMITH**

Director of Sport Science, Canadian Sport Centre – Calgary  
Treasurer, Sport Science Association Alberta (SSAA)

### **DARREN STEFANYSHYN**

Chairperson, International Society of Biomechanics Technical Group on  
Functional Footwear  
Associate Editor, Footwear Science  
Editorial Board, Sports Technology

### **JOAN VICKERS**

Invited Think Tank Member, The Bi-Directional Link Between Mind And  
Motion. ZIFF Centre, Bielefeld, Germany

### **TIMOTHY WELSH**

Co-Organizer of the 40th Annual General Meeting and Conference. Canmore  
AB - The Canadian Society for Psychomotor Learning and Sport  
Psychology (SCAPPS)  
International Congress on Psychology, Berlin, Germany  
North American Society for the Psychology of Sport and Physical Activity.  
Annual Meeting. Niagara Falls, ON  
Canadian Spring Conference for Behaviour and Brain, Fernie, BC





# Official research related functions \_\_\_\_\_

## **PRESTON WILEY**

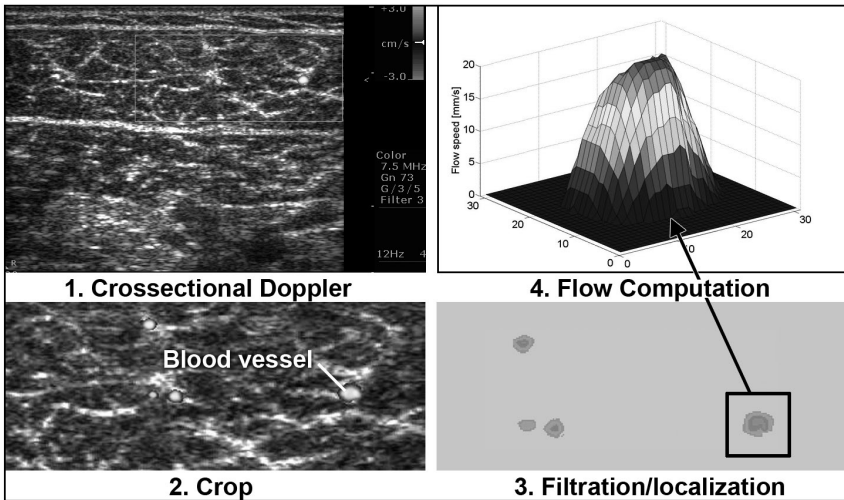
Co-Director, University of Calgary Sport Medicine Centre  
Planning Committee, Rendez-Vous 2008 (5 society Sport Medicine scientific meeting of the Clinical Journal of Sport Medicine) held in Las Vegas, USA  
Member, International Rugby Board, Medical Advisory Committee  
Board Member (President-Elect), Canadian Academy of Sport Medicine  
Credentials Committee Member, Canadian Academy of Sport Medicine

## **RONALD ZERNICKE**

International Advisory Board Member:  
Alberta Bone and Joint Health Institute  
Alliance for Canadian Arthritis Program  
State University of New York, Stony Brook, Biomedical Engineering Dept  
Cleveland Clinic Foundation, Dept of Biomedical Engineering  
University of Virginia, Dept Physical Medicine & Rehabilitation  
Member, Data & Safety Monitoring Board, Harvard University/NIH Project on Osteoporosis

# How to contact us \_\_\_\_\_

[www.kin.ucalgary.ca/hpl](http://www.kin.ucalgary.ca/hpl) and [www.sportmed.ucalgary.ca](http://www.sportmed.ucalgary.ca)



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