UNIVERSITY OF CALGARY
FACULTY OF KINESIOLOGY

Research Strategic Plan

2016-2021

UNIVERSITY OF CALGARY
FACULTY OF KINESIOLOGY

VISION

TO BE AN INTERNATIONAL LEADER IN THE STUDY AND ADVANCEMENT OF HUMAN MOVEMENT, SPORT, HEALTH, AND WELLNESS.

MISSION

TO PROVIDE EXCELLENCE IN RESEARCH, EDUCATION, AND COMMUNITY PROGRAMS RELATED TO HUMAN MOVEMENT, SPORT, HEALTH, AND WELLNESS.

Faculty of Kinesiology Strategic Research Themes

The Faculty of Kinesiology at the University of Calgary has significant opportunity to continue to build translational research capacity in four strategic theme areas aligned with human movement, sport, health and wellness. The research capacity in the Faculty of Kinesiology is informed by strengths in basic science, applied, clinical and population health research.

The Faculty of Kinesiology is ideally positioned to facilitate unique collaborative and interdisciplinary research opportunities in:

1. ***Movement Science and Musculoskeletal Health***
2. ***Injury Prevention, Sport Medicine and Rehabilitation***
3. ***Exercise Physiology and Nutrition in Health and Sport***
4. ***Psychosocial Aspects of Health and Sport***

Four strategic theme areas highlight research leadership and research capacity in the Faculty of Kinesiology with significant collaborations across all four Kinesiology Research Themes, multiple Faculties and research Institutes at the University of Calgary. These research themes align with four of six Eyes High strategic research priorities at the University of Calgary including:

1. ***Brain and Mental Health***
2. ***Engineering Solutions for Health***
3. ***Inflammation, Infection and Chronic Diseases***
4. ***Human Dynamics in a Changing World.***

Figure 1: Faculty of Kinesiology, University of Calgary Strategic Research Themes

University of Calgary	Faculty of Kinesiology	Community Partnerships

Collaborating Faculties: Cumming School of Medicine, Schulich School of Engineering, Nursing, Faculty of Arts, Faculty of Science, Werklund School of Education

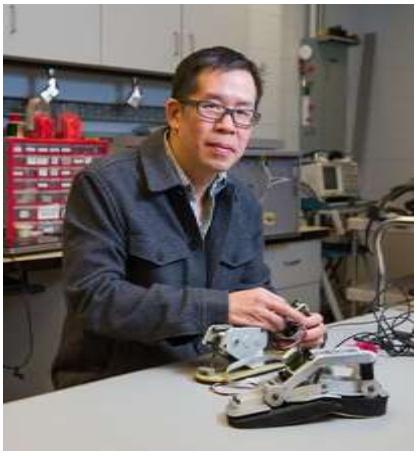
Collaborating Institutes: Alberta Children's Hospital Research Institute, Hotchkiss Brain Institute, McCaig Institute for Bone and Joint Health, O'Brien Institute of Public Health, Libin Cardiovascular Institute

Faculty of Kinesiology Research Trainees: Postdoctoral scholars, Graduate/Undergraduate students

Faculty of Kinesiology Research Themes

Research leadership in key strategic theme areas of strength will facilitate continued growth of research and trainee capacity in the Faculty of Kinesiology. Strong and ongoing research collaborations are established between the Faculty of Kinesiology and multiple faculties (Cumming School of Medicine, Schulich School of Engineering, Faculty of Nursing, Faculty of Arts, Faculty of Science, Werklund School of Education, Faculty of Veterinary Medicine) and Institutes at the University of Calgary (Alberta Children's Hospital Research Institute, Hotchkiss Brain Institute, McCaig Institute for Bone & Joint Health, O'Brien Institute of Public Health, and Libin Cardiovascular Institute). These collaborations support the opportunity to continue to build research capacity in four strategic theme areas aligned with the Faculty of Kinesiology platforms associated with human movement, sport, health and wellness (Figure 1). Building on existing research strengths and emerging strengths, the Faculty of Kinesiology at the University of Calgary is well positioned to be a national and international leader in key strategic priority theme areas. Cross-cutting research expertise in the Faculty of Kinesiology are identified as essential research platforms (Figure 1) (biomechanics, motor control, epidemiology, biostatistics, quantitative and qualitative research methods, exercise physiology, nutrition, health and sport psychology, pedagogy and sociology in sport, knowledge translation). Key community partnerships and a focus on knowledge translation will continue to inform best practice and policy related to human movement, sport, health, and wellness across the lifespan.

Walter Herzog – Canada Research Chair (Tier 1)



Art Kuo – Canada Research Chair (Tier 1)

Key Drivers of Success:

1. *Enhance research strengths through alignment with the University of Calgary Strategic Research Plans in 1. Brain and Mental Health, 2. Engineering Solutions for Health, 3. Inflammation, Infection and Chronic Diseases, and 4. Human Dynamics in a Changing World.*
2. *Identify research leadership that will support collaborative, interdisciplinary and individual research activities to achieve national and international recognition.*
3. *Position the Faculty of Kinesiology to continue to improve track record for team and individual Tri-Council (CIHR, NSERC and SSHRC) and other sources of external funding with internal and external peer-review, mentorship, and fundraising initiatives.*
4. *Invest in strategic research priorities through recruitment of excellent faculty, post-doctoral fellows, graduate students and undergraduate students.*
5. *Track performance-based metrics in support of ongoing planning to inform initiatives in areas of strategic research priority.*
6. *Facilitate local, provincial, national and international academic and community partnerships to support research and knowledge translation.*

Human Performance Lab

Thrive Lab

Sport Injury Prevention Research Centre

Running Injury Research

Faculty of Kinesiology Research Themes

1. *Movement Science and Musculoskeletal Health*

Human mobility depends on the integrated function of the nervous system, muscles, and skeleton. These systems continually adapt to their environment and to each other, in response to exercise, injury, or disease. The Movement Science and Musculoskeletal Health research theme is aimed at understanding how these systems act and interact, and how to improve or manage mobility in cases of damage or disability.

This theme brings together expertise in orthopaedic, neuromuscular, and clinical biomechanics, as well as sensorimotor control and neuroscience. Our expertise spans a wide range of scales, from the actions of proteins necessary for the proper function of joints and cartilage, to the interactions between bone or muscle cells under mechanical loads, to adaptations of tissues and organs, and the overall function, mobility, and behavior of the entire body. Our integrated research approach leverages an extensive set of shared research facilities, including state-of-the-art imaging of the cell, tissue, or joint, machines to perform mechanical testing of bone and joint integrity, and devices for motion capture, robots for movement assessment and therapy, and an electrophysiology suite for sensorimotor neuroscience. Application areas include osteoarthritis, osteoporosis, joint injury, prosthetics and neuroprosthetics, obesity, aging, Parkinson's disease, and recovery from stroke or spinal cord injury. These diverse areas necessarily integrate knowledge from the biological sciences with bioengineering approaches, to design new materials, agents, and devices to aid or rehabilitate those with impaired mobility. The theme thus promotes interdisciplinary collaboration between experts producing a basic scientific understanding of movement and those applying that understanding to improve mobility and function in settings spanning sport performance, aging and development, as well as clinical evaluation, diagnosis, and therapy.The Faculty of Kinesiology is well positioned to influence the development and evaluation of exercise and nutrition interventions to maximize musculoskeletal health across the lifespan. Interdisciplinary development and evaluation of strategies to prevent the development and progression of musculoskeletal disease aligns with the University of Calgary Eyes High Research priorities including Engineering Solutions for Health, and Inflammation, Infection and Chronic Diseases.

2. Injury Prevention, Sport Medicine and Rehabilitation

Injuries are the leading cause of death, hospitalization and medical attention in Canadian youth. Sport and recreation participation accounts for over 30% of this injury burden. In Alberta 1 in 3 youth seek medical attention for a sport or recreational related injury every year. These injuries are predictable and preventable. Injury may lead to reduced physical activity participation, obesity, early post-traumatic OA and other negative health outcomes (e.g., disability, depression, overweight). The Sport Injury Prevention Research Centre (SIPRC) is 1 of 9 International Olympic Committee Research Centres internationally in injury and illness prevention in sport. An interdisciplinary team in the Faculty of Kinesiology leads a community and clinically based research program including large cohort and intervention studies to evaluate risk factors, primary and secondary prevention strategies, management, and rehabilitation following injury and consequences of injury. Through research, training and knowledge translation priorities, the primary goal of the SIPRC is to reduce the burden of sport and recreational injuries in youth. This research has influenced national and international sport practice and policy through strong community partnerships.

Canada's youth are at risk of concussion through sporting and recreational activities and there is emerging evidence that concussions could have long term consequences. A focus of research activities in the Faculty of Kinesiology address the urgent need to advance knowledge in the assessment, diagnosis, prognosis and rehabilitation following a sport-related concussion. The development and evaluation of prevention, management and rehabilitation strategies to reduce the burden of acute and chronic effects of concussion is imperative. Interdisciplinary research developing and evaluating concussion management and rehabilitation strategies (e.g., education, policy, vestibular and cervical rehabilitation), will inform best practice in concussion management and rehabilitation. Research in injury prevention and sport medicine is in alignment with four Eyes High Research priorities including Brain and Mental Health, Engineering Solutions for Health, Inflammation, Infection and Chronic Diseases, and Human Dynamics in a Changing World.

3. Exercise Physiology and Nutrition in Health and Sport

Exercise interventions are effective in optimizing health, wellness, performance and preventing of chronic diseases. Research in the Faculty of Kinesiology in this theme includes the evaluation of exercise interventions for optimizing health and wellness across the lifespan and in individuals with cancer and other chronic illnesses as well as for improving performance in sport. Aging is associated with increased risks for reduced aerobic fitness and cardiovascular disease. Research strengths include neuromuscular fatigue, skeletal muscle, aging and the physiological impact on performance in healthy and chronic disease populations. New methods of fatigue measurements that use central (motor cortical and motoneuronal excitability) and peripheral indices of neuromuscular function have been developed to determine their role in chronic fatigue and quality of life in patients as well as in peformance in athletes, including at high altitude. This work will inform interdisciplinary research evaluating exercise interventions in healthy, aging and chronic disease populations across the lifespan to inform healthy living, performance and independence.

Declines in physical activity and a nutritionally, socially, and culturally challenging environment contribute to increases in pediatric and adult overweight and obesity. Obesity results in a decreased life expectancy, increased risk of chronic illness and a lower quality of life. The proportion of obese children in Canada has nearly tripled over the past 25 years, resulting in greater than 25% of Canadian children being overweight or obese. There is a distinct need for solutions to inform the prevention and management of overweight and obesity across the lifespan and in target populations (e.g., cardiovascular disease, diabetes, neuromotor impairment). Targeted exercise interventions (e.g., exercise therapy, community exercise interventions, societal engagement) combined with nutritional strategies (e.g., fibre consumption, novel dietary fibres and functional foods) are safe and economical options at a population level. In alignment with Eyes High Research priorities including Engineering Solutions for Health, Inflammation, Infection and Chronic Diseases, and Human Dynamics in a Changing World, research in the Faculty of Kinesiology focuses on exercise and nutrition interventions across the lifespan in healthy and chronic illness populations.

4. Psychosocial Aspects of Health and Sport

Exercise interventions are effective in optimizing health, wellness, performance, however the impact of such interventions is dependent on optimal implementation to influence behaviour change in multiple populations across the lifespan. Psychosocial Aspects of Sport and Exercise is comprised of a diverse group of researchers. In exercise and health psychology, the research focuses on quality of life and physical activity for cancer survivors. The research employs a "clinic-to-community" model for the development of evidence-based sustainable wellness programming for a diversity cancer survivors both on and off active treatment. This research has resulted in the development of exercise programs, educational events and lectures for cancer survivors through a strong focus on knowledge translation through the Thrive Program and the Thrive Centre in the Faculty of Kinesiology at the University of Calgary.

The research in sport psychology focuses on competitive athletes, coaches, and officials in target areas of focus, including coping with acute and chronic stress; advocacy and development of psychological skills training that enhance mental toughness and psychological hardiness; and the application of biofeedback and neurofeedback assessment on training in athlete performance. The socio-cultural research focuses on sport, physical activity, and the body to understand how experiences of physical activity are impacted by sex, gender, sexuality, race, ethnicity, social class, ability, and age. Informed by sociocultural theory and qualitative methodologies, research in this area seeks to examine equity across all population groups in sport and physical activity. In coaching and pedagogy, the research focus is on application of motor learning theory applied to the teaching and coaching of motor skills with the ultimate goal of maximizing learning and performance. Sport technology research informs learning and improvement of human performance through innovative technologies and performance analysis. In alignment with Eyes High Research priorities including Engineering Solutions for Health, Inflammation, Infection and Chronic Diseases, and Human Dynamics in a Changing World, research in the Faculty of Kinesiology focuses on psychosocial aspects of health and sport in healthy and chronic illness populations across the lifespan.

Faculty of Kinesiology Research Strategy Summary

The Faculty of Kinesiology at the University of Calgary has significant interdisciplinary research capacity in four strategic theme areas aligned with human movement, sport, health and wellness. These include Movement Science and Musculoskeletal Health, Injury Prevention, Sport Medicine and Rehabilitation, Exercise Physiology and Nutrition in Health and Sport, and Psychosocial Aspects of Health and Sport. The world class leadership and research infrastructure in the Faculty of Kinesiology will continue to support faculty, staff, post-doctoral scholars, graduate and undergraduate trainees to build translational research programs that will have national and international impact in human movement, sport, health and wellness.