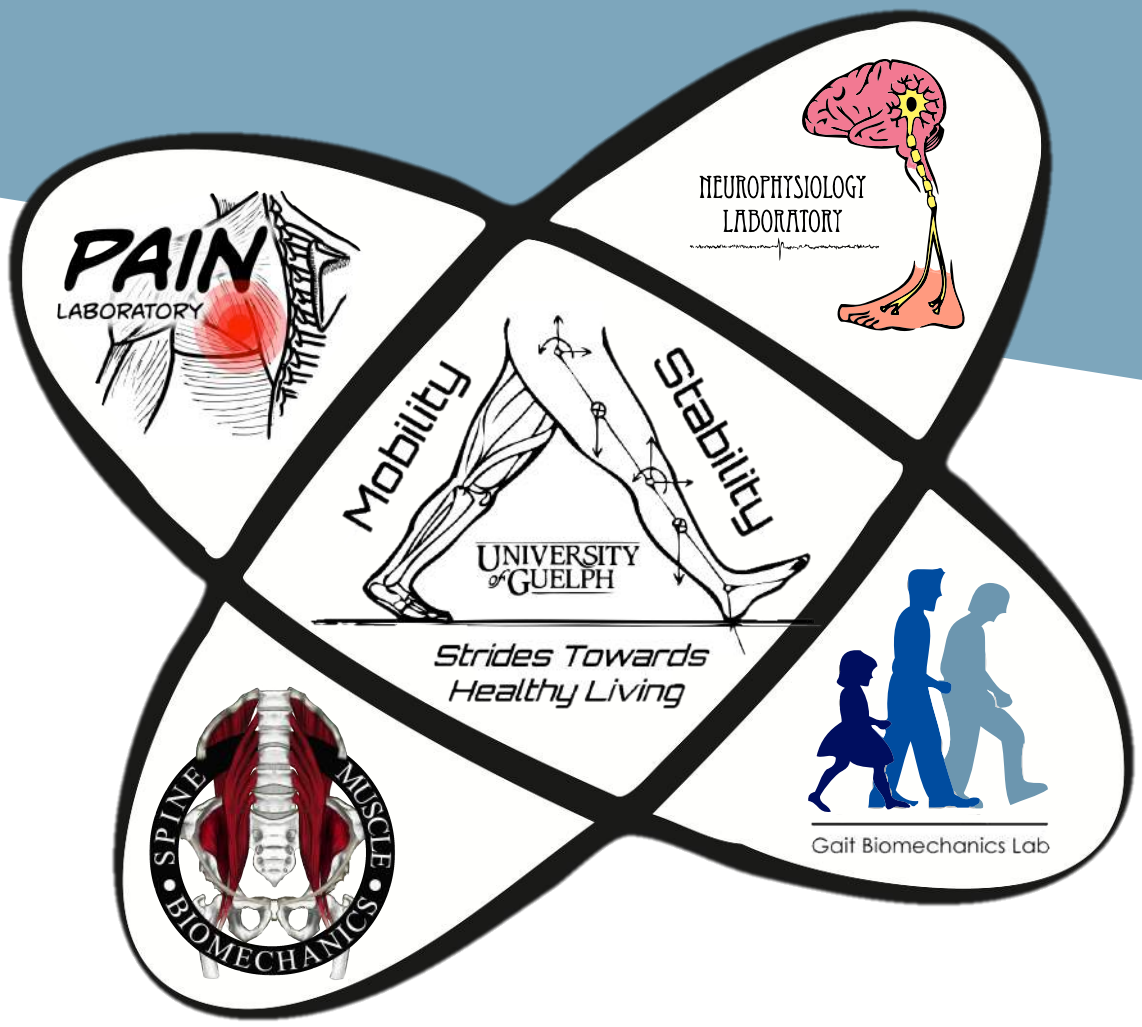
Department of Human Health & Nutritional Sciences

College of Biological Science

Mobility and Stability:

Research in Biomechanics and Neuromuscular Physiology



The Department of Human Health and Nutritional Sciences conducts innovative, world-class research exploring the biological aspects of human health. We aim to advance our understanding of aging and chronic disease, with an emphasis on the impact of sensory contributions, nutrition, physical activity, and biomechanics as powerful determinants of human health.

UNIVERSITY of GUELPH

CHANGING LIVES
IMPROVING LIFE

Musculoskeletal disorders in Canada are expected to affect 15 million individuals by the year 2031 resulting in a huge economic burden on the healthcare system. Our research and technology development in the Department of Human Health and Nutritional Sciences addresses this growing burden of musculoskeletal disease. Our primary objective is to prevent disability and improve quality of life by identifying, at a pre-clinical stage, mechanical, neural and physiological risk factors related to musculoskeletal disability, including aging, sensory deficits, pathological degeneration and chronic pain.

John Srbely, D.C., PhD

Pain, and joint and muscle dysfunction in chronic disease and aging

Through my years of multidisciplinary primary healthcare experience, I developed an interest in the study of pain and joint function associated with aging and chronic diseases such as osteoarthritis, myofascial pain, and fibromyalgia. My research program examines the physiologic mechanisms of myofascial trigger points and their role in the clinical expression of pain and joint/muscle dysfunction in chronic disease and aging, and aims to enhance existing and develop novel treatment approaches to clinical pain management

Dancey E, Murphy B, Srbely J, Yielder P. The effect of experimental pain on motor training performance and sensorimotor integration. Exp Brain Res. 2014; [Epub ahead of print].

Srbely JZ, Dickey JP, Bent LR, Lee D, Lowerison M. Capsaicin-induced central sensitization evokes segmental increases in trigger point sensitivity in humans. J Pain. 2010; 11(7):636-43..

For more information, please visit www.uoguelph.ca/hhns/People/JSrbely.html

Lori Ann Vallis, PhD

Falls prevention; cognitive and sensory inputs in balance and locomotor control

Purposeful action requires the central nervous system to integrate available sensory information about body position in space with control of the motor system. It is suggested that at different stages in life, there is a shift in the role of various sensory inputs in locomotor control, however, this idea is largely theoretical. My research program aims to unravel the complex relationship between sensory input and executed adaptive locomotor strategies across the lifespan. I am interested in studying how children integrate sensory information and develop safe movement patterns in challenging environments and at the other end of the life spectrum exploring how the aging process influences and changes this relationship. The increasing number of aging baby-boomers in Canada and the financial impact that falls in the elderly has on the healthcare system draws attention to the importance of this research focus

Worden TA, Vallis LA. Concurrent Performance of a Cognitive and Dynamic Obstacle Avoidance Task: Influence of Dual-Task Training. J Mot Behav. 2014; 10:357-368.

McIntosh EI, Smale KB, Vallis LA. Predicting fat-free mass index and sarcopenia: a pilot study in community-dwelling older adults. Age (Dordr). 2013; 35(6):2423-34.

For more information, please visit www.uoguelph.ca/hhns/People/LVallis.html

Stephen Brown, PhD

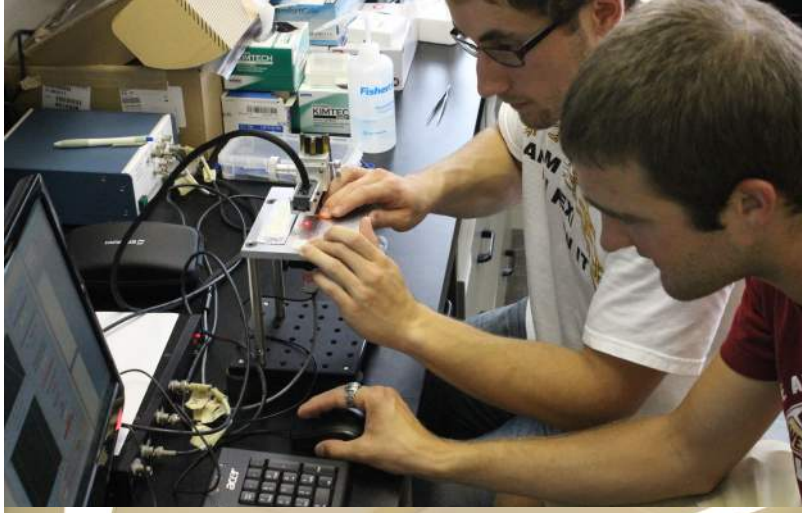
Lumbar spine and muscle mechanics related to low back pain

Low back pain and injury affect 80% of the world-wide population at some time in their lifetime. Work in our lab focuses on the design and function of muscles of the low back and abdominal regions, and how these muscles can be used to protect against current and future incidences of back injury/pain. We are interested in understanding elements ranging from how the microscopic structure of muscle dictates its function, to how you activate your muscles to move and stabilize your low back during functional and athletic tasks. To probe these ideas we use a variety of experimental and modeling techniques to address questions related to muscle and low back mechanical function, injury, adaptation and rehabilitation, with the ultimate goal reducing the incidence and prevalence of low back-related injury and pain.

Beaudette SM, Graham RB, Brown SH. The effect of unstable loading versus unstable support conditions on spine rotational stiffness and spine stability during repetitive lifting. J Biomech. 2014; 47(2):491-6.

Gerling ME, Brown SH. Architectural analysis and predicted functional capability of the human latissimus dorsi muscle. J Anat. 2013; 223(2):112-22.

For more information, please visit www.uoguelph.ca/hhns/People/SBrown.html



Leah Bent, PhD

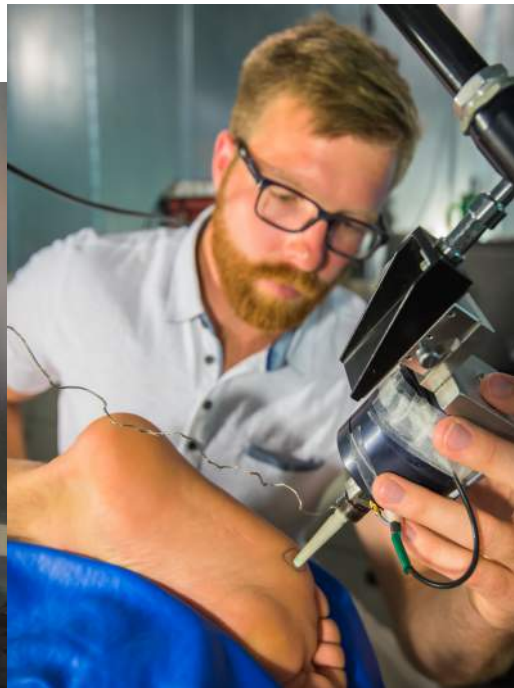
Sensory inputs in balance and movement

Sensory contributions are intimately related to successful movement. This relationship is complex, and becomes increasingly more so with aging as sensory function declines, leading to a loss of mobility. By utilizing novel research techniques, I aim to understand the sensory information that contributes to successful balance control, movement and the maintenance of equilibrium. In doing so, I hope to apply this knowledge to the development of rehabilitation programs and sophisticated devices (prosthetics, shoe insoles, visual aids) to enhance deficient sensory input in target populations.

Bent LR, Lowrey CR. Single low-threshold afferents innervating the skin of the human foot modulate ongoing muscle activity in the upper limbs. J Neurophysiol. 2013; 109(6):1614-25.

Muise SB, Lam CK, Bent LR. Reduced input from foot sole skin through cooling differentially modulates the short latency and medium latency vestibular reflex responses to galvanic vestibular stimulation. Ex Brain Res. 2012; 218(1):63-71.

For more information, please visit www.uoguelph.ca/hhns/People/LBent.html



The needs of the Department of Human Health and Nutritional Sciences are constantly evolving as we strive to produce top-level research in the health sciences. We are continually seeking collaborative partners who share our passion for human health and the promotion of a healthy lifestyle for the maintenance of health, aging, and the treatment of chronic disease.

Collaborative opportunities include:

- Research partnerships

- Graduate Student Support
  PhD Student – $19,300/year (4 years)
  MSc Student – $15,300/year (2 years)

- Donations in the form of research grants and awards

For more information about our research and how you can collaborate with the Department of Human Health and Nutritional Sciences, please visit www.uoguelph.ca/hhns, or contact the department Liaison Officer by phone (519-824-4120 ext. 54104) or email (hhnsliaisonofficer@uoguelph.ca).

HUMAN HEALTH and Nutritional Sciences

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