BRIAN DALTON

SCHOOL OF HEALTH AND EXERCISE SCIENCES

Dalton uses various models of study to understand how the human nervous system controls the muscles to move and balance the body.

Dalton and his team investigate the adaptability of the brain, nerves and muscles in response to acute and chronic stressors (e.g., healthy adult aging, sleep deprivation, hypoxia, and neuromuscular fatigue).

Despite remarkable advancements, there are numerous questions left unanswered to understand how the human sensory systems direct the brain and muscles to perform functional tasks such as standing balance.

A critical function of the human brain is to produce movement for performance and functional tasks required for independent living. Whether we engage in high-intensity exercise or stand still, rapid processing and integration of sensorimotor signals within the central and peripheral nervous system are needed for optimal control and functioned. Dalton and his team are investigating precisely how our brain and sensory centers work together to direct nerves responsible for exciting muscle actions that are necessary for movement and balance. His team's findings will provide critical information into how we perform tasks of daily living with an emphasis on the origins of balance deficits and falls.

Main Focus Area

1. Understanding sensorimotor control and neuromuscular function across the lifespan
2. Investigating how the brain (cortical and sensory control) manages standing balance
3. Examining how fatigue affects our ability to control muscle responses

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About

Dalton's interest in human movement began early in his career as he observed the impact of aging on a family member. Dalton was captivated by the declining control in movement which meant that daily tasks were becoming challenging. The ability get out of a chair or take the stairs is something that we often take for granted. Even the act of standing still requires a sophisticated system of cues and reactions in the body's systems. It was this fascination that served as the impetus for Dalton to first complete his undergraduate degree and MSc in Kinesiology at Memorial University of Newfoundland. Then, Dalton continued on to the University of Western Ontario where he graduated with a PhD in Kinesiology (Neuromuscular Physiology). Following his doctoral degree, Dalton completed a postdoctoral fellowship at the University of British Columbia with a focus on sensorimotor physiology. Since joining UBC in 2016, Dalton and his team have worked to provide scientific evidence on the age-related effects of balance control, which examines how physiological processes adapt to chronic and natural age-related alterations to maintain function. The ultimate goal of Dalton's research is to provide a better understanding of the fundamental processes related to the sensorimotor control of standing balance and movement, with an emphasis on determining strategies to lessen the effects of adult aging on risks of falls and motor impairments.

Research Environment

Dalton is head of the Sensorimotor Physiology and Integrative Neuromechanics (SPIN) Lab at UBC's Okanagan campus where his team of trainees are working to understand the complexities of human movement and balance. Dalton works collaboratively with colleagues across both Okanagan and Vancouver campuses, as well as internationally, to provide a rich environment for his trainees to pursue their own interest in neuromuscular studies. For instance, Dalton is a member of the Origins of Balance Deficits and Falls Research Cluster at UBC which connects >55 active members, from across 7 departments and schools at UBC, and a wide network of institutions across Canada, US and the world to build the basic science behind healthy balance control and the mechanisms that underlie balance deficits.

Next Stages

Dalton's lab is currently investigating two exciting avenues. The first is determining the effects of acute sleep deprivation on cognitive-motor function, fatigue and balance control. The need for sleep is important for our well being and motor function, but specific sensorimotor origins are less clear. For this reason, Dalton and team are working on studies focused on identifying the origins of neuromuscular fatigue and balance deficits in a sleep deprived-state. The second concentrates on the effects of hypoxia (oxygen deprivation) on the sensorimotor control of balance. With access to transportation allowing travel to higher elevations, a large proportion of the world's population living at high elevations, disorders that reduce oxygen availability, and the gradual decline of the earth's oxygen levels, it is important to understand how low levels of inspired oxygen affect the ability to perform functional tasks and the corresponding neuromuscular origins.

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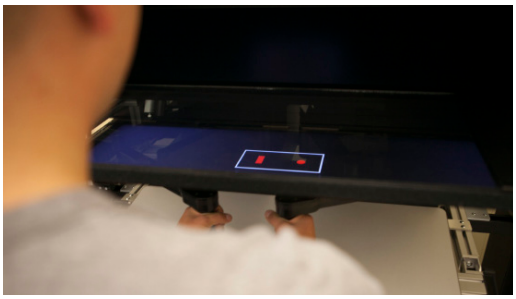

FEATURED PROJECT

Research shows women outlast men during dynamic muscle exercises

Dalton and his team found that women are considerably less exhausted after natural, dynamic muscle exercises than men of similar age and athletic ability. The study was completed in collaboration with the University of Guelph and University of Oregon.

The team recruited eight men and nine women that were at a similar level of physical fitness. Participants were asked to flex their foot against a suite of sensors as quickly as they could 200 times. The speed, power and torque of their movements and electrical activity of their muscles was then captured and recorded over time. The study found that women were considerably less exhausted.

But it's not all about competition. The results will also inform more practical applications, such as designing exercise programs or even adapting work environments to minimize work-related fatigue and improve overall productivity.

TO LEARN MORE:

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