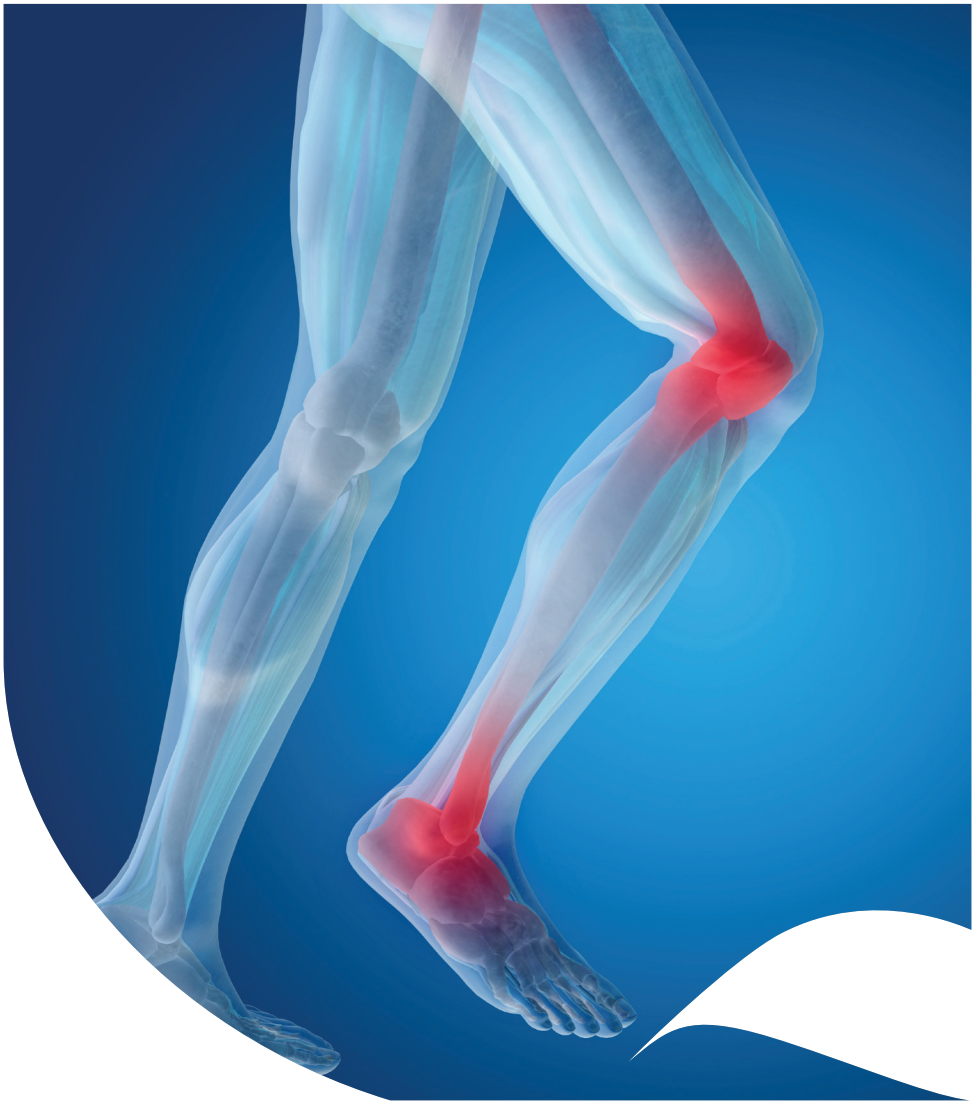
The University Of Queensland
AUSTRALIA

CREATE CHANGE

Biomedical Sciences

Motor Control and Biomechanics Research Group



The overarching goal of our research is to provide insights into the neuromuscular mechanisms that underpin healthy and pathological movement. We aim to optimise movement throughout the lifespan, in health and disease.

Our Motor Control and Biomechanics (MCB) research group combines:

- Associate Professor Kylie Tucker's Motor Control and Pain Research with
- Dr Taylor Dick's Neuromuscular Biomechanics Research.

Human movement is challenged by many factors throughout the lifespan. The traditional focus in musculoskeletal health has been on conditions such as low back and neck pain. Although important, many other conditions associated with developmental disorders, ageing, disease, injury and repetitive loading, also have a profound impact on our life long musculoskeletal health.

The MCB Group supports a collegial group of scientists, clinicians, and engineers who work together to provide basic and translational insights into the:

- neural and mechanical control of the muscles that contribute to tasks such as walking, balance, and posture
- development of neuromotor control through childhood and adolescents
- changes in movement control that occur in response to pain or that may predict the development of painful musculoskeletal conditions
- changes in muscle-tendon design and neuromuscular control that occur as a result of aging and neuromuscular disorders
- design and implementation of targeted wearable technologies and assistive devices to improve balance and mobility.

Our research laboratories are filled with a suite of state-of-the-art technologies for comprehensive assessment of neuromuscular function and movement. The methods and approaches used in our research group include:

- ultrasound, elastography, and magnetic resonance (MR) imaging - muscle and tendon structure and dynamic behaviour
- surface, fine wire and high density electromyography - muscle activation analysis
- 3D motion capture—movement patterns and gait analysis
- Force plates and dynamometers—kinetic analysis and
- portable sensor technologies—biomechanical analysis in the real world.

UQ's School of Biomedical Sciences – mission statement:

By harnessing our diversity across the breadth of biomedical science, we will generate, disseminate and apply foundational biology underpinning health and disease to inspire and empower the next generation of leading researchers, educators, and healthcare professionals to innovate together for better health outcomes globally. Our innovative research encompasses basic discovery through translational pathways to medical solutions:

Cell architecture: We use sophisticated molecular and imaging techniques to explain how various cellular components and pathways contribute to building healthy bodies.

Receptors and signalling: We decipher the passage of external messages from the cell surface, through cytoplasmic signalling pathways, and ultimately to genetic regulatory circuits in the nucleus.

Chronic disease: We characterise the genetic, molecular and cellular microenvironments associated with diseases, such as Alzheimer's disease, cancer, MND and others.

Drug design and development: We identify critical biological targets and design drugs based on structural analyses to develop novel therapies.

Functional and comparative anatomy: Our interdisciplinary studies of structure and function across phylogenetically disparate species advance our understanding of the human body in healthy, aging and diseased states.

Injury and repair: We study fundamental mechanisms of cells in response to stress, consequences of repair processes and how these may be influenced for optimal outcomes.

Musculoskeletal and motor control: We develop and apply novel tools, to investigate muscle function and neural control of muscles in humans.

Neurobiology and brain function: We search for and discover genetic and environmental factors that lead to and maintain healthy nervous systems.

Reproduction: We investigate the genetic and molecular environment during early fetal development to advance reproductive technologies and facilitate healthy pregnancies.

Contact

Associate Professor Kylie Tucker

E: k.tucker1@uq.edu.au

W: biomedical-sciences.uq.edu.au/profile/1371/kylie-tucker

Dr Taylor Dick

T: 0449864153
E: t.dick@uq.edu.au

W: https://biomedical-sciences.uq.edu.au/profile/5875/taylor-dick