

SCHOOL OF BIOMEDICAL SCIENCE- www.uq.edu.au/sbms

MOLECULAR PATHWAYS IN HUMAN DISEASE

[Professor Rodney Minchin](#)

- Arylamine N-acetyltransferases regulate drug resistance in human cancers.
- NAT1 as a biomarker of metastatic potential in breast cancer patients – effects of genetic variation.
- Sulfotransferase gene copy number and susceptibility to early onset Parkinson's disease.
- How acetyltransferases control cellular metabolism, survival and longevity.
- Gene regulation through the acetylation/deacetylation pathway.

[Dr Stuart Mazzone](#)

- Understanding the activation properties of airway sensory neurons
- Mechanisms regulating growth of sensory neurons
- Pathogen recognition and induction of inflammation by neuronal cells (Collaboration with Dr Simon Phipps)
- Mapping of neural circuits using recombinant Herpes Simplex Virus 1

[A/Prof Trent Woodruff](#)

- Genes in Development and Behaviour
- Molecular Pathways in Human Disease

[Dr Dominic Ng](#)

- Novel cellular functions of stathmin-family of microtubule-destabilizing proteins

[A/Prof Simon Phipps](#)

- The effect of maternal diet and the microbiome on susceptibility to viral bronchiolitis
- The contribution of necroptotic cell death to the onset of type-2 immunity
- Understanding the mechanisms by which plasmacytoid dendritic cells protect against virus-induced asthma
- ER stress and antiviral immunity

GENES IN DEVELOPMENT AND BEHAVIOUR

[Professor Chen Chen](#)

- Biomarkers of diabetic retinopathy
- Neuroendocrinology and metabolic disorders
- Signal and mechanism of diabetic cardiomyocytes
- Novel therapeutic treatment strategy of diabetes

[Dr Dominic Ng](#)

- Defining mechanisms and functions of microcephaly proteins required for neurodevelopment

[Dr David Simmons](#)

- Investigate the formation of the fetal-maternal interface of the placenta using transgenic mouse models

[Dr Ethan Scott](#)

- Cerebellar circuits in Zebrafish and their role in motor coordination and learning

Dr Sean Millard

- The role of Dscam2 isoforms during neurodevelopment
- The role of complement proteins in fly neurodevelopment
- Molecular mechanisms of Dscam2 repulsion
- Correlating synaptic defects with fly visual behaviour

A/Prof Mark Bellingham

Mechanisms of neurological disease:

- Pathogenesis and treatment of motor neuron disease in animal models
- Electrophysiology of neurotransmitter receptors and ion channels in motor neurons and other central neurons
- Developmental changes in and mechanisms of short and long term synaptic plasticity
- Neurobiology of addiction and relapse
- Neurobiology of autism

Synaptic transmission:

- Electrophysiology of neurotransmitter receptors and ion channels in motor neurons and other central neurons
- Developmental changes in and mechanisms of short and long term synaptic plasticity

Neurotransmitter receptors and ion currents in CNS neurones:

- Neurotransmitter receptor modulation of motor neurones - neuropharmacology and second messenger systems
- Effects of anaesthetic agents on motor neuron excitability

Rhythmic control of movements:

- Role of glycine and GABA A receptors in programmed cell death of motor neurones and rhythmic movements
- Studies of ion currents controlling rhythm generation and computer models of single neurones and rhythmic networks

Dr Enzo Porrello

- Development of a microRNA-based therapeutic for heart regeneration
- A role for long non-coding RNAs in neonatal heart regeneration?

Dr Lachlan Rash

- Spider venom peptides as ion channel probes for in vivo imaging and target validation in pain and inflammation.

A/Prof Peter Noakes

- Establishing an *in vitro* human neuromotor circuit to determine the roles of synaptic activity and trans synaptic signaling in Motor neuron disease. In collaboration with Wolvetang (AIBN), Bellingham (SBMS), Ngo (SBMS), and MND clinic RBWH.
- The role of mRNA binding proteins and/or synaptic activity in the regulation of mRNA transport into discrete pre and post-synaptic compartments.
- Role of PI3 kinase in the progression of motor neuron disease (MND)– using PI3 Kinase mutant mice and MND model mice - in collaboration with Prof Munier (QBI).
- Role of complement molecules C3a and C5a in altering the progression of motor neuron disease (MND) - MND – using transgenic mice that produce C3a or C5a by glial cells crossed with MND model mice – in collaboration with A/Prof Woodruff, and Dr Lee (SBMS)

CELL INJURY AND REPAIR

[A/Prof Peter Noakes](#)

- How does the motor neuron adapt when the activity dependent feedback signaling from muscle has been compromised? In collaboration with Bellingham and Lavidis (SBMS)
- The role of perineuronal nets in the loss of upper and lower motor neurons in mouse models of motor neuron disease and ageing.
- Over expression of muscle-derived molecules that can act to retain neuromuscular connections – during disease and ageing. In collaboration with Phillips (USyd), Lavidis (SBMS) and Bellingham (SBMS).
- Induction and stability of post-synaptic specializations by motor neuron agents in muscle and/or stem cells obtained from neuromuscular disease patients (motor neuron disease and other neuromuscular disorders). – in collaborations with Wolvetang (AIBN), Dr Ngo (SBMS), A/Prof Russell (Deakin), and Prof Coombs (Sch Hum Movt), Prof Munier, and MND Clinic RBWH

[Dr Dominic Ng](#)

- Characterizing the role of centrosome destruction in cardiac muscle cell maturation

[Dr Marc Ruitenber](#)

- Neural Regulation of Immune Function
- Intravenous immunoglobulin therapy for acute spinal cord injury
- The contribution of extracellular vesicles to the outcome of spinal cord injury

[Dr Bradley Launikonis](#)

- Ryanodine receptor-related myopathies in human muscle.
- Changes in calcium handling in human muscle with exercise.
- The nucleus of skeletal muscle.
- Calcium handling in the diaphragm muscle; and the effects of mechanical ventilation/preterm birth.

THERAPEUTIC DEVELOPMENT AND TRANSLATION

[Dr Johan Rosengren](#)

- Structural diversity and functional roles of novel cyclic plant peptides hiding in seed albumin genes
- Modelling of the interactions between relaxin peptide hormones and their receptors and structure based drug design
- Improving blood-brain barrier penetration and in vivo stability of a single chain relaxin-3 receptor antagonist for the treatment of neurological disorders

[Dr Richard Clark](#)

- Novel peptide drug leads for the treatment of pain.
- Development of peptide pro-drugs for inflammatory diseases
- Synthesis and structure/function studies of disulfide-rich peptides from natural sources
- Discovery and characterization of ant peptides for the development of novel antibiotic drugs

[Dr Karin Borges](#)

- Metabolic effects of triheptanoin in models of Motor Neuron Disease.
- Metabolic effects of triheptanoin in epilepsy models

[Dr Marc Ruitenber](#)

- The contribution of extracellular vesicles to the outcome of spinal cord injury
- Intravenous immunoglobulin therapy for acute spinal cord injury

Dr Lisa Kaminskas

- Understanding differences in the cellular trafficking and tumour disposition of PEGylated and native antibodies and antibody fragments: implications for chemotherapy
- Improving the treatment of rare and lethal diseases with PEGylated enzymes (must have coding experience)
- Nanomedicinal platforms for combating enhanced tumour drug delivery and multimodal disease imaging
- Can differences in drug disposition towards the lymphatic and mononuclear phagocyte systems explain gender differences in the pharmacokinetics of macromolecular chemotherapeutic drugs?
- Combining antibody therapy with local immune system activation as a means to improve lung cancer treatment

A/Prof Trent Woodruff

- Therapeutic Development and Translation
- Cell Injury and Repair

MOVING MORPHOLOGY AND FUNCTIONAL MECHANICS

Dr Olga Panagiotopoulou

- The effect of mandibular fixations on bone mechanics during chewing
- Locomotor foot pressures and pathologies in captive and domestic large mammals
- The effect of shoe-wear on the mechanics of the equine foot
- The effect of food material properties and feeding behaviour on the mechanics of the primate jaw