

School of Biomedical Sciences

Available Postgraduate Projects 2011

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DEVELOPMENTAL AND REGENERATIVE BIOLOGY

Dr David Simmons

- What do invasive trophoblast glycogen cells of the placenta do? Insights from gene expression and cell ablation experiments.

Professor Brian Key

- Filming axons as they grow in the brain. What can we learn and how can we translate this into a therapeutic advancement?
- How to regenerate the mammalian brain?

Dr David Pennisi

- Examining developmental cardiovascular defects in mice with Crim1 mutations
- Using genetically engineered mouse lines to determine the tissue-specific role of Crim1 in organ formation during development

FUNCTIONAL AND COMPARATIVE ANATOMY

Associate Prof Mark Brown

- Muscles within muscles: Anatomical and electrophysiological indices of function in segmented muscle.

Dr Kristy Weir

- Effects of prenatal glucocorticoid exposure on the skin
- Understanding the skin stress response

NEUROSCIENCE

Dr Mark Bellingham

- Understanding molecular and neuronal changes in motor neuron disease and Alzheimer's disease.
- The life of motor neurons— regulation of motor neuron development, function and fate by neural circuits and neurotransmitters

Dr Marc Ruitenber

- Determining the role of microglia and CX3CR1 signalling in hippocampal neurogenesis
- Dissecting the role of complement factors C5a and C3a in experimental spinal cord injury
- Intravenous immunoglobulin (IVIg) therapy to ameliorate secondary degeneration following spinal cord injury

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NEUROSCIENCE (Continued)

Dr Ulrike Siebeck

- Face/object/shape recognition in reef fish
- Learning and memory in reef fish

Dr Ethan Scott

- Cerebellar Circuits in Zebrafish and their role in Motor Coordination and Learning.

Dr Sean Millard

- Investigating neuron-specific alternative splicing as a mechanism for restricting Dscam2 repulsion to individual cells.
- The role of complement-like proteins in fly neurodevelopment.*
- How does Dscam2 signal repulsion?
- Manipulating Complement Proteins in a Fly Model for Parkinson's Disease.*
- Correlating synaptic defects in the Dscam2 mutant with visual system behaviour**

*Collaboration with Trent Woodruff, Peter Noakes and Steve Taylor (All SBMS)

** Collaboration with Bruno Van Swinderen (QBI)

Dr Stuart Mazzone

- Investigation in to the activation properties of a novel airway sensory nerve involved in cough trauma induced plasticity of airway sensory neurons
- Investigation in to the calcium channels expressed by airway relaxant nerves

Richard Clark/Johan Rosengren (Joining SBMS January 2011)

- Development of new peptide-based drugs for the treatment of pain (RC)
- Design and development of novel neuroprotective peptides (RC)
- Understanding the structure/function relationships of the iron-regulatory peptide hepcidin (RC)
- Understanding the biological role and structure activity studies of antimicrobial peptides (JR/RC)
- Synthesis and characterisation of a peptide library targeting relaxin family peptide receptors (JR/RC)
- Structure based drug design of novel analogues for the relaxin-3 receptor RXFP3 (JR)
- Design and synthesis of brain-targeting peptide drugs for neurological disorders (JR)

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PHARMACOLOGY

Dr Andrew Battle

- Understanding the effect of membrane composition and drug influences on the gating of "nanovalue" mechanosensitive channels.

Dr Anna Kloda

- Mechanosensitive ion channels in prokaryotes.

Dr Simon Phipps

- Defective innate immunity and the onset of asthma.
- The chemoattractant chemerin and the development of allergic asthma.
- Contribution of interleukin- 21 to the formation of inducible bronchus-associated lymphoid tissues (iBALT).
- The innate immune receptor TIR8 and regulation of CD4+ T helper 2 cell responses.
- Steroids and the NLRP3 inflammasome.

Dr Trent Woodruff

- Role of Complement in Cancer: Can activation of complement with specific drugs reduce tumour growth?
- Role of Complement Receptors on Neurons: What is the function of these receptors in these cell in the adult, and developing, brain?
- Development of Specific Complement Receptor Inhibitors and Activators: Towards better therapeutic options to treat a diverse range of immune and inflammatory diseases.
- Role of Complement C3a in Health and Disease: Can the "little brother" of C5a have a big impact.
- Innate immune receptors in neurodegenerative diseases: A new pharmacological target for neuroprotection?

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PHYSIOLOGY

Prof Chen Chen

- Effect of metabolic regulatory hormones on hypothalamus-pituitary growth hormone axes.
- Membrane ion channels and signalling systems in the regulation of hormone secretion.
- Cellular and molecular mechanism of diabetic cardiomyopathy.
- Effect of ghrelin and synthetic agonists on cardiac myocytes.
- Cellular mechanism of cancer development in endometrial tissues.
- The molecular mechanism of pancreatic islet cell dysfunction in type-2 diabetes.

Dr Megan Probyn

- The effects of prenatal alcohol (ethanol) exposure on the lung.
- Store-operated Ca^{2+} entry in slow-twitch muscle: mechanism and roles.

Dr Bradley Launikonis

- Calcium mishandling in muscular dystrophy.
- 3-dimensional reconstruction of membranes and protein arrays relevant to excitation-contraction coupling from fluorescent imaging.

Associate Professor Peter Thorn

- What are the mechanisms of secretory dysfunction in type 2 diabetes?
- Single-vesicle imaging during secretion

Professor Daniel Markovich

- Membrane transporters and cancer.
- Molecular biology and kidney stones.
- Genetic diseases of membrane transporters.
- Cell biology of membrane proteins.
- Genetics of Autism

Dr Jon Cerlewis

- SOCS proteins in pregnancy and lactation: phenotype of CIS-knockout mice. PhD or Hons
- SOCS proteins and obesity. PhD or Hons

Dr Karen Moritz

- Effects of fetal hypoxia on renal development and programming of adult disease
- Actions of prenatal alcohol exposure during the periconceptual period

Dr Michael Piper

- Molecular regulation of adult neurogenesis

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PHYSIOLOGY (Continued)

Professor Wally Thomas, Dr Brooke Purdue, Dr Tamara Paravicini

Receptor Biology Group

- Why do our hearts express taste and smell receptors, normally found in the tongue and nose?
- Tetraspanins (membrane scaffolding proteins) and vascular responses to angiotensin
- An interaction between the angiotensin type 1 receptor and a hydrogen ion pump and cardiovascular homeostasis
- Are the NR4A nuclear receptors master regulators of cardiac growth and disease?
- Cardiac complications of hypertension: is there a role for magnesium transport and signalling by the ion channel TRPM7?
- Do growth factors influence magnesium homeostasis by regulating the TRPM6 ion channel in the kidney?

Projects in this lab may involve a wide variety of techniques, including cell culture and isolation, PCR, Western blotting, cellular imaging and confocal microscopy, radioligand binding, RNA interference, molecular biology techniques for cloning of receptors and channels, and in vivo models.