The Health Innovations Research Institute (HIRi) at RMIT University takes an integrated approach to address key health challenges facing the Australian community in the twenty-first century. Through research programs focusing on understanding how the human body functions at a molecular and cellular level, the primary focus of HIRi is to translate basic science discoveries into effective and safe therapeutic outcomes.

HIRi is located in a purpose-built 3,000 square metre Bioscience research building in Bundoora, with state-of-the-art infrastructure and facilities. Since its inception in December 2009, HIRi has invested significantly into world class infrastructure and technologies to enable research and development capabilities with research and industry partners.

The Institute carries out a broad range of activities from electrophysiology, molecular biology and cellular imaging to whole body pharmacology and physiology. Research activities are supported by well-appointed administration including fully-equipped meeting and board rooms, lecture theatres, IT services, commercialisation and intellectual property services.

Current equipment and facilities include:

**Molecular and cell biology suite**
The suite is well-equipped for protein purification and analysis, identification of genes and proteins and cell based assays. Routine equipment and facilities for cell and tissue culture include laminar flow hoods and class II biological safety cabinets.

- Amaxa Nucleofector Electroporator: permeabilisation and transfection of cells
- Nanodrop Spectrophotometer: microvolume protein quantification
- ATA Scientific Circular Dichroism CD Spectrophotometer: molecular structure of proteins
- Tri-Carb Radioisotope Liquid Scintillation Counter
- Biorad Proteon XPR-360 SPR; protein interactions and characterisation
- FluorChemQ Imaging System: semi-quantitative Western blot multiplex fluorescence, chemiluminescence or UV imaging and analysis of proteins, DNA, or RNA
- Corbett Rotor-Gene Q real-time PCR

**Electrophysiology suite**
The electrophysiology suite can support electrophysiological technologies alone or in combination with Ca²⁺ imaging for drug screening, ion or ligand-gated channel pharmacology, toxicology, functional expression, mutant screening and lead optimisation.

- XENOPUS LAEVIS OOCYTES
  - Axon OpusXpress 6000A: automated high-throughput parallel patch-clamp system
  - HiClamp: automated high-throughput voltage-clamp system

**Histology and immunohistochemistry facilities**
Facilities for routine sectioning and immunostaining:

- Leica cryostat
- Thermo Scientific Shandon Sequenza Immunostaining Slide Rack

**Computational molecular modelling facilities**
Computational facilities dedicated to modelling and simulation of time-dependent behaviour of biomolecular systems and their interactions at the atomic level.

- Extensive range of commercial, academic and in-house electronic, atomistic and coarse-grain modelling software
- Access to National Computational Infrastructure (NCI) and Victorian high performance computing facilities (VPAC and VLSCI)

**CELL-BASED EXPRESSION SYSTEMS**

- Fluxion Automated Patch Clamp: high-throughput patch-clamp system
- Nanion Technologies Port-a-patch: miniaturised patch-clamp system for whole-cell and single channel recording
- Nanion Technologies Patchliner: automated 8 channel patch-clamp system
Imaging suite

Outstanding facilities for imaging and analysis of cells and intracellular events.

» Two Nikon A1 inverted confocal microscopes and digital cameras, humidified environmental chamber with temperature and CO₂ control
  - live cell and intracellular imaging
  - high speed, high resolution
  - time lapse
  - lasers: 405, 488, 561, 637 nm
  - transmitted light DIC

» Nikon C1 upright confocal microscope and digital camera
  - lasers: 405, 488, 561 nm
  - transmitted light DIC

» Zeiss Axiosplan upright microscope
  - dark and lightfield, phase contrast, DIC
  - fluorescence (UV/DAPI, TRITC, FITC)

» ImageXpress Micro Imaging System: high-throughput, live cell based imaging with multi day time-lapse capabilities and integrated environment and fluids control
  - range of cell assays – counting, cycle analysis, health, proliferation, differentiation, signalling, staining
  - protein expression, movement, phosphorylation
  - transfection efficiencies
  - ratiometric [Ca²⁺] analysis
  - receptor studies
  - apoptosis

» Flexstation3 Multiplate Reader: high-throughput biochemical and cell based kinetic assays with fluids exchange
  - calcium mobilisation
  - cell adhesion, migration and viability assays
  - kinase/phosphotase assays
  - DNA/RNA quantitation
  - ELISAs
  - protein assays
  - fluorescent proteins and FRET
  - enzyme kinetics

Animal in vivo facilities

Facilities include a recently refurbished animal house with transgenic and quarantine capabilities, and equipment dedicated to physiological, metabolic and sensory monitoring.

» Telemetry Research
  - blood pressure
  - sympathetic nerve activity

» Columbus Instruments Oxymax Comprehensive Metabolic Monitoring System
  - non-invasive whole-body energy expenditure
  - fat oxidation
  - body temperature
  - physical activity

» YSI glucose/lactate analyser

Bioseb electronic von Frey system

Human biosignals and sensors facilities

Enabling technologies and software for non-invasive acquisition, measurement and identification of physiological and sensory biological signals.

» Datys wireless EMG and force 16 channel system

» Integrated multi-channel Amlab 32G signal acquisition and processing

» Canon Retinal Fundus Camera CR01

» Touch Bionics prosthetic robotic hand

» Stell DB01 data acquisition and processing unit

Clinical trials facilities

The Institute has expertise in conducting phase II and III randomised controlled trials in purpose-built clinical trial facilities for complementary medicine and other therapeutic interventions.

Personnel

HiRi brings together the research activities of more than 50 researchers working on four main research programs:

» ion channels and transporters as therapeutic targets

» metabolism, exercise and disease

» traditional and complementary medicine

» biophysics and engineering

Academic and industry collaborations span all corners of the globe, including China, South East Asia, Europe and USA. R&D partnerships with local startups, major national biotech companies, and international large pharma result in a fertile environment for advanced technological and outcome-driven product development and research.

Contacts

Director
Professor David J Adams
Tel: +61 3 9925 6606
Email: david.adams@rmit.edu.au

Manager, Commercialisation
Dr Craig Neylon
Tel: +61 3 9925 6684
Email: craig.neylon@rmit.edu.au

www.rmit.edu.au/research/institutes/healthinnovations