

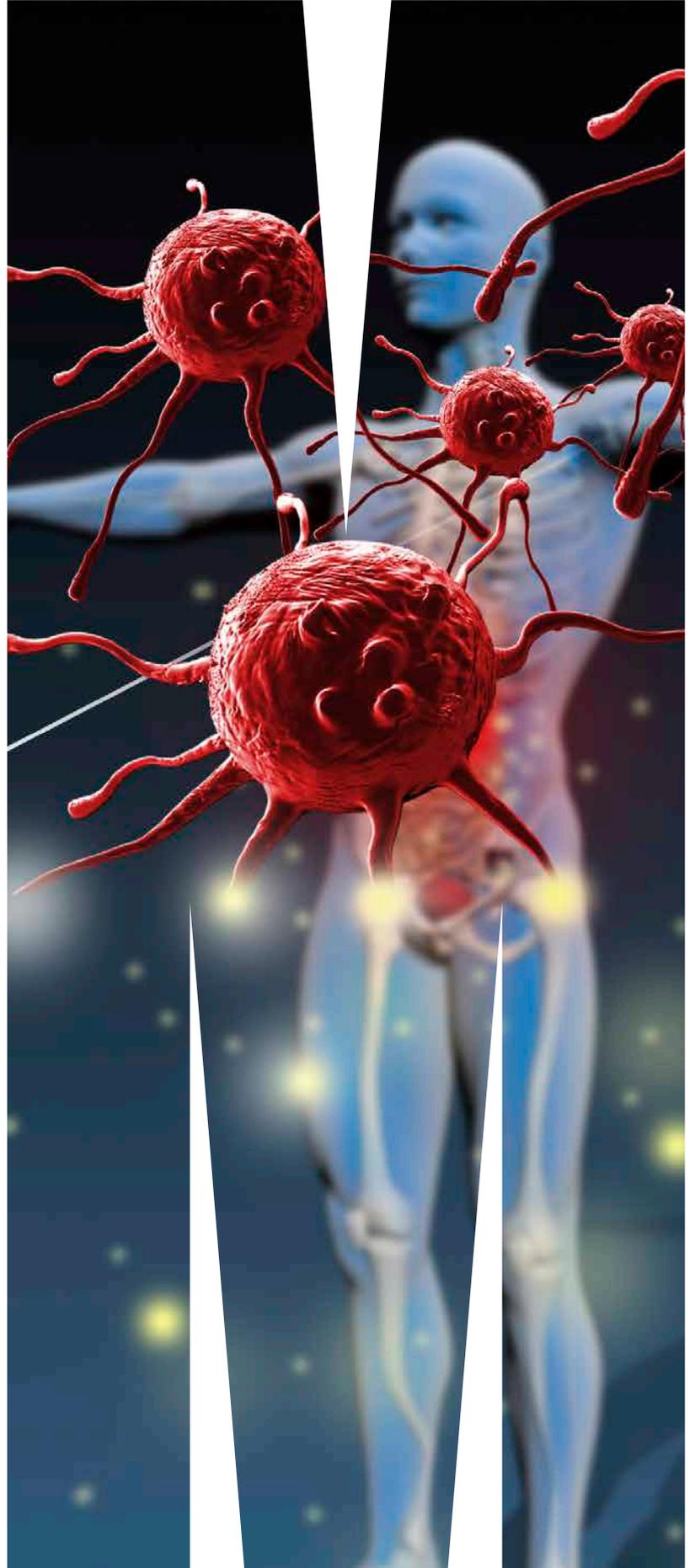


MONASH
University

MONASH
BIOMEDICINE
DISCOVERY
INSTITUTE

BACHELOR OF BIOMEDICAL SCIENCE HONOURS 2019

KEY RESEARCH AREAS



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MONASH UNIVERSITY

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CONTENTS

What is the Honours year about?	2
Why enrol in Honours?.....	2
What is the structure of the Biomedical Honours course?	2
Who administers the Biomedical Honours Course?	3
Choosing a host laboratory for your Honours year	3
How do I apply?	3
When will I know if I have a place?	3
When can I start my Honours project?	3
Monash Biomedicine Discovery Institute (School of Biomedical Sciences)	5
Key areas of research in Biomedical Sciences at Monash University	5
Department of Anatomy and Developmental Biology.....	5
Department of Biochemistry and Molecular Biology	6
Department of Microbiology	7
Department of Pharmacology.....	8
Department of Physiology	9
Australian Regenerative Medicine Institute (ARMI).....	10
Alfred Medical Research and Education Precinct (AMREP)	11
Baker Heart and Diabetes Institute	11
Burnet Institute	11
Australian Centre for Blood Diseases (ACBD)	12
Department of Immunology and Pathology, The Alfred Hospital.....	13
Department of Infectious Disease, The Alfred Hospital.....	14
Department of Allergy Immunology and Respiratory Medicine, The Alfred Hospital.....	15
Monash Alfred Psychiatry Research Centre, The Alfred Hospital.....	16
Department of Surgery, The Alfred Hospital	17
Department of Medicine, The Alfred Hospital	18
Department of Diabetes	19
Cabrini-Monash University Department of Medicine	19
Melbourne Sexual Health Centre	19
School of Public Health and Preventive Medicine	21
Department of Epidemiology and Preventive Medicine	21
Department of Forensic Medicine	22
Centre for Obesity Research and Education (CORE).....	22
School of Rural Health	23
School of Primary and Allied Health Care	24
School of Psychological Sciences	25
Monash Medical Centre	26
School of Clinical Sciences.....	26
Department of Psychiatry, School of Clinical Sciences at Monash Health	28
Department of Surgery, School of Clinical Sciences at Monash Health	29
Hudson Institute of Medical Research.....	30
Centre for Cancer Research	30
Centre for Innate Immunity and Infectious Diseases	31
Centre for Endocrinology and Metabolism	32
The Ritchie Centre.....	33
Centre for Reproductive Health.....	34

What is the Honours year about?

A full-time Bachelor of Biomedical Science Honours year gives students the opportunity to undertake a specific avenue of research selected from the range of research interests in any area of biomedical science. The course is made up of a course work component and an independent research project. Students select and undertake an individual research project often working within a team or research group under close supervision. As part of the Honours course students receive training in oral communication, data analysis and advanced discipline related knowledge. At the end of the year students report their findings to School or Departmental staff and write a research thesis.

Why enrol in Honours?

- Increase employment opportunities.
- Gain experience in research.
- Allows students to determine if they are suited to a career in biomedical research.
- Contribute new knowledge to medical science.

The Biomedical Science Honours Course comprises two units:

- BMS4100 = 75% of overall course mark
- BMS4200 = 25% of overall course mark

What is the structure of the Biomedical Honours course?

The Bachelor of Biomedical Science Honours program within the Faculty of Medicine, Nursing and Health Sciences is unique in that it is devoted almost entirely to the research project. We have kept coursework and examinations to a minimum so that your major focus (75% of total assessment) will be on your chosen research project.

Individual Student Research Project (75%)

- This can be undertaken at any approved location, including all departments, affiliated institutes, and centres of the Faculty. Under some circumstances projects may also be undertaken in other Faculties.
- Must be conducted under the supervision of a member of the academic or research staff of the Faculty who has had experience in supervising honours students.
- The choice of project and supervisor will largely be left to you. You will need to identify the areas of research you are interested in and seek out opportunities for projects in those areas.
- Assessment of your research project will be through a literature review, seminars and the final thesis.

Component	Assessment	
BMS4100 Biomedical Research Project (36 points)		
Literature Review	10%	School/Department
Seminar 1	S or NS	School/Department
Seminar 2	10%	School/Department
Thesis	80%	School/Department
Total	100%	

BMS4200 Advanced Studies in Biomedical Science (12 points)		
Discipline-Specific component	40%	School/Department
Common Core Component		
Statistics course and assignment	30%	Faculty
Written Critique exam	30%	Faculty
Total	100%	

Individual Student Research Project (75%)

Discipline Specific Component (10%)

Your **School/Departmental** coordinators will be responsible for this component via the Schools system or within Departments based within each of the Schools. This could take the form of advanced lecture series, learning specialized techniques or critical analysis of a **discipline specific** journal article.

Common Core Component (15%)

This component of your assessment will be based on topics unrelated to your individual research project. It will involve a statistics module, an accompanying workshop and test and, a written critique of a scientific paper, in a three-hour examination format. Further details will be available closer to the date of the common core assessment.

Who administers the Biomedical Honours Course?

The Biomedical Science Honours Course is managed by a Management Committee, which is comprised of:

- Convenor – Associate Professor Tim Cole (Department of Biochemistry and Molecular Biology)
- Coordinator – Dr Shae-Lee Cox (School of Biomedical Sciences)
- Staff and student representatives from: School of Biomedical Sciences, Central Clinical School, Hudson Institute of Medical Research, School of Clinical Sciences, School of Public Health and Preventative Medicine, School of Primary and Allied Health Care, Australian Regenerative Medicine Institute and School of Psychological Sciences.

Choosing a host research group for your Honours year

The key to a successful and enjoyable Honours year is to select an interesting project, a compatible supervisor and a supportive research group. Students should take advantage of the various Honours information sessions run by individual Departments to learn about potential projects and meet supervisors. Dates for Honours information sessions are publicised on the web. Students are also encouraged to visit Departments and chat with staff about Honours projects.

How do I apply?

Submit both forms (unless you're enrolled in the Advanced (Honours) degree):

Project Application form – all students

eAdmission form – all students (except for those enrolled in the *Bachelor of Biomedical Science Advanced (Honours)* who have met the 70% average required to progress to the fourth year of the course)

If you have a query about the Biomedical Science Honours program or the application process, please submit an enquiry online via ask.monash or call 1800 MONASH (1800 666 274).

When will I know if I have a place?

All applications will be reviewed and students who meet the eligibility criteria will be informed of their success in obtaining an Honours place by email, which will be sent out in late December 2018. Students must then notify the Faculty and supervisor of their intention to accept or reject the place. Students will be able to enrol into the Honours course via WES in January 2019.

When can I start my Honours project?

The **official commencement** date for the Bachelor of Biomedical Science Honours is **Monday 25 February 2019** which starts with the Orientation week. Students may start earlier, but only if this arrangement is acceptable to their supervisor. *Students should not begin laboratory work until after the completion of the Orientation Program and safety courses which will be held during Orientation week (week 0).* An early start may involve reading recommended references, preparation of the project outline and commencement of the literature review.



KEY AREAS OF RESEARCH IN BIOMEDICAL SCIENCES AT MONASH UNIVERSITY

Monash Biomedicine Discovery Institute & School of Biomedical Sciences

Department of Anatomy and Developmental Biology

Contact person

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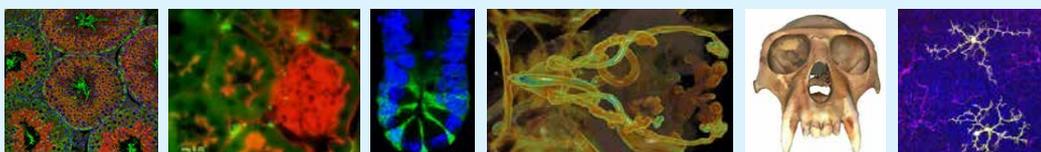
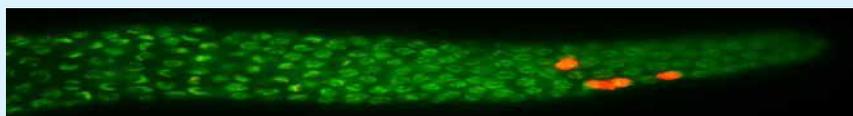


www.med.monash.edu/anatomy/research

Description of key research areas

The Department of Anatomy & Developmental Biology at Monash University is very active in a variety of research areas. It boasts several of the world's leading research scientists in the field of Developmental biology and Anatomy. Major areas of research include:

- Blood cell homeostasis: cell death and disease (Prof Benjamin Kile)
- Bone biomechanics, implant design and pathologies (Dr Olga Panagiotopoulou)
- Brain development and function, stem cells (A/Prof Roger Pocock)
- Cardiovascular and renal cell biology (Prof Jane Black)
- Cell biology of the oocyte and early embryo development (Prof John Carroll)
- Comparative, evolutionary and functional anatomy (Dr Justin Adams)
- Endocrine control of fetal development (Prof Tim Cole)
- Epigenetics and Reprogramming (Prof Jose Polo)
- Gene Regulation (Dr Partha Das)
- Germline stem cells (Dr Robin Hobbs)
- Hippo signalling, organ size control and cancer (Prof Kieran Harvey)
- Immunology, development and diseases of the eye (Prof Paul McMenamin)
- Intestine development, stem cells and cancer (A/Prof Helen Abud)
- Investigating the transition from student to professional in healthcare education (Dr Michelle Lazarus)
- Kidney development and disease (Prof Ian Smyth)
- Kidney development, programming and disease (Prof John Bertram)
- Kidney stem cells and regeneration (A/Prof Sharon Ricardo)
- Nervous system development and repair (Dr Brent Neumann)
- Neurogenesis and neuroregeneration (Prof Zhi-Cheng Xiao)
- Ovarian biology and female infertility (Dr Karla Hutt)
- Palaeoanthropology, biomechanics and digital modelling (Dr Luca Fiorenza)
- Prostate health and disease (Prof Gail Risbridger)
- Sensory perception and ageing (Dr Jie Liu)
- Sex determination, limb morphogenesis (A/Prof Craig Smith)
- Stem Cells and Translational Immunology (Dr Tracy Heng)
- Thymus development, aging and regeneration (A/Prof Ann Chidgey)



Department of Biochemistry and Molecular Biology

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www.med.monash.edu/biochem/research

www.med.monash.edu/biochem/teaching/Hons_general.html

Description of key research areas

The Department of Biochemistry and Molecular Biology at Monash University is very active in a variety of research areas, has made significant contributions in these areas and is well respected internationally as a research centre.

Major areas of research in the Department of Biochemistry and Molecular Biology:

- Signal transduction in the regulation of secretion, cytoskeletal rearrangement and cellular proliferation in cancer.
- Proteases and their inhibitors and receptors in degenerative diseases.
- Peptide biology.
- The role of protein folding and misfolding in disease.
- Nuclear protein transport in medicine and development.
- Bioinformatics: Searching for novel protein domains in the human proteome.
- Structural biology (crystallography) of medically important proteins.
- Molecular analysis of the cause and expression of autoimmune diseases.
- Peptide Folding, Protein Engineering and Drug Design.
- Diabetes and renal failure, mechanisms of proteinuria in the kidney.
- The molecular neurobiology of Alzheimer's disease and related disorders.
- Molecular analysis of platelet function in thrombosis and haemostasis.
- The structure and function of a molecular machine: mitochondrial ATP synthase.
- Mitochondrial turnover, vacuolar ATPase function and autophagy.
- Fluorescent proteins with novel properties.
- Functional and biochemical aspects of hyaluronan with special reference to its role in disease.
- Redox homeostasis and cell death.
- Adrenal steroid signaling and actions in embryonic development, stem cells and endocrine control of obesity.
- Mitochondria, oxidative stress and apoptosis in neurological disease and host-pathogen interactions.
- Environmental causes of type 1 diabetes.
- Protein tyrosine phosphatases in cancer and diabetes.
- RNAi and RNA processing mechanisms.
- miRNA's and disease.
- Microbial oncogenesis.
- Cell signaling and cancer.
- Tumour immunology and dendritic cells
- Regulation of metabolism and metabolic disease

Department of Microbiology

Contact person

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www.med.monash.edu/microbiology/teaching/honours.html

Description of key research areas

Most research projects within the Department of Microbiology are aimed at understanding how specific bacteria, viruses or parasites are able to cause disease, and how that knowledge might be used to develop more effective treatment strategies. These projects will involve training in the latest methods in microbial genetics, genomics, transcriptomic analysis, real-time PCR, and proteomics. In particular, this Department focuses on the use of genomic and post-genomic approaches to the study of bacterial pathogenesis.

Specific research projects include:

- Characterizing cytomegalovirus using systems biology approaches
- Understanding the function of novel proteins involved in the pathogenesis of *P. falciparum* malaria.
- Regulation of virulence genes in *Clostridium perfringens* and *Dichelobacter nodosus*.
- Conjugative transfer and maintenance of the toxin plasmids of *Clostridium perfringens*.
- Understanding antibiotic resistance in nosocomial pathogens using systems biology approaches
- Host-pathogen interactions in *clostridial myonecrosis*.
- Characterising unique proteins in *Babesia bovis* and the development of a new vaccine against bovine tick fever.
- The molecular mechanisms by which *Helicobacter pylori* causes stomach cancer.
- The host immune response to *Clostridium difficile* infections.
- Antibiotic resistance, virulence and mobile genetic elements of *Clostridium sordellii*.
- How do bacterial pathogens sense environmental cues?
- New targets for old drugs: exploring antibacterial potential of carbonic anhydrase inhibitors.
- Molecular characterisation of antibiotic resistance in coagulase negative staphylococci.
- Novel virulence mechanisms in the hospital-acquired pathogen *Acinetobacter baumannii*.
- Mechanisms of *Pasteurella multocida* pathogenesis and virulence regulation.
- Biologically-derived synthons for chemical synthesis.
- Interactomic studies to decipher the *Plasmodium falciparum* kinome network.
- Chemical biology of pathogens: Finding the molecular mechanisms of anti-malarial action
- The molecular basis of host-pathogen interaction in innate immunity
- How does the human fungal pathogen, *Candida albicans*, cause disease?

Department of Pharmacology

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www.med.monash.edu/pharmacology

Description of key research areas

Research involves diverse areas of pharmacology, in many cases in collaboration with Australian and/or international colleagues in academia and in industry. Major research activities within the Department are aimed at increasing our understanding of various therapeutic targets for the treatments of a range of diseases including hypertension, atherosclerosis, stroke, diabetes, heart and renal failure and respiratory diseases. The Department also has active research programs focused on the pharmacology and toxicology of a range of Australasian animals including snakes and jellyfish and pharmacology education.

The Department of Pharmacology provides projects involving a range of techniques from cellular and molecular pharmacology through tissue and classical organ bath pharmacology, to complex instrumentation of experimental animals to mimic human diseases.

The broad areas of research that are offered in the Department include:

- Cardiovascular & Pulmonary Pharmacology (focused on novel pharmacological and/or cell-based therapies to treat systemic and pulmonary hypertension and stroke, including immune mechanisms and stem cells).
- Fibrosis Pharmacology (novel antifibrotic mechanisms, including relaxin and stem cells)
- Integrative Cardiovascular Pharmacology (Angiotensin II and its role in cardiovascular diseases, including hypertension, atherosclerosis, fibrosis and stroke)
- Pharmacology Education (advanced education concepts in Pharmacology).
- Respiratory Pharmacology (focused on improved therapeutic strategies in chronic lung diseases, including asthma and pulmonary hypertension).
- Venoms and Toxins (including all Australian venomous creatures).

Department of Physiology

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www.med.monash.edu/physiology/honours

Description of key research areas

The Department of Physiology is a large, research-intensive unit, strongly supported by external research grant funding. There are ~60 scientists (academic and research) in the Department and their research programs attract over \$9 million in research support each year. Staff in the Department of Physiology and affiliated institutions offer an extensive range of exciting research projects and high-calibre supervision to students undertaking Honours in biomedical science. Research within the Department covers a wide range of integrative, cellular and molecular physiology, with particular strengths in sensory and autonomic neuroscience, cardiovascular and renal physiology, neuroendocrinology, obesity and metabolic physiology, muscle and exercise, stress, development, and smooth muscle physiology. The Department of Physiology provides projects involving an array of state-of-the-art techniques from cellular and molecular physiology, through tissue and organ culture to complex instrumentation of experimental animals, and human-based research. There is special emphasis on animal models of disease and the vertical integration of animal models with cellular and sub-cellular/molecular tools of investigation. Projects may also be conducted with co-supervision through other Monash Departments. The Department encourages students who wish to take integrated approaches to major health problems, using whole animal models in conjunction with the full range of investigative tools that are available at Monash and in affiliated institutions. Opportunities exist for collaborative studies with Monash Malaysia.

The broad areas of research that are offered in the Department include:

- Sensory and cognitive neuroscience.
- Cardiovascular and renal physiology.
- Membrane physiology and cellular signaling.
- Neuroendocrinology.
- Obesity and metabolic physiology.
- Physiological genomics.
- Reproductive physiology.
- Sleep and sleep disorders physiology.

Australian Regenerative Medicine Institute (ARMI)

Contact person

Ms Jane McCausland (Student Programs Manager)

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ARMI, Level 1, 15 Innovation Walk
Clayton Campus

www.armi.org.au/careers-education/honours-armi

Description of key research areas

At ARMI, students begin their research career with the research leaders in regenerative medicine. Completing an Honours year at ARMI gives students a firm grounding in cutting edge technologies and the science of regenerative and stem cell biology.

Our key research areas include:

- **Heart and muscle development and regeneration:** discovery of the basic rules that govern formation of muscle stem cells in the embryo and adult; a better understanding of how stem cells are used during muscle regeneration; treatments for muscular dystrophy using zebrafish models; and making the heart a better regenerating organ by stimulating specific signaling pathways

Groups: Prof Currie, Prof Marcelle, Dr Ramialison, Dr McGlenn

- **Immunity and regeneration:** understanding the role of the immune system in scar-free healing; determining how immune cells form and are continually replenished; defining the immune system as a critical component of tissue regeneration; understanding the difference in immune regulation between the regenerative and non-healing context; harnessing the immune system for delivery of therapeutics to regenerating tissues

Groups: Prof Lieschke, Dr Martino

- **Stem cells and regeneration:** defining how the genome is read and packaged to form a stem cell; understanding how a stem cell-like state is maintained and regained in induced reprogramming; identifying what environment cues (niche) and other cell systems (immune) interact to influence stem cell function; enhancing endogenous stem cell-mediated repair of injured tissues; making therapeutically relevant cell types from stem cells to treat disease

Groups: Prof Nagy, A/Prof Nilsson, A/Prof Polo, A/Prof Laslett, Dr Hobbs

- **Neural regeneration:** defining how the brain and spinal cord respond after injury and what innate regenerative potential exists in the nervous system of mammals and non-human primates; making neural cells from stem cells; identifying genes needed to make the brain form normally; formation of neural stem cell populations in regenerating systems such as the zebrafish brain; characterizing relative regenerative differences in spinal cord of zebrafish and mammals.

Groups: Prof Bernard, A/Prof Bourne, Dr Kaslin, Dr Merson

The Australian Regenerative Medicine Institute is located at the Clayton Campus of Monash University. It opened in 2009 and was established through a joint venture between Monash University and the Victorian Government. ARMI aims to be one of the world's largest regenerative medicine and stem cell research centres and its research aims to understand the mechanisms underlying regenerative processes. This fundamental knowledge is essential if we want to advance treatments for degenerative diseases such as muscular dystrophies, dementia, cardiac diseases and ageing. ARMI is also committed to contributing to undergraduate teaching programs and establishing a major site for postgraduate training. The state of the art laboratories at ARMI draw together some of the world's best scientists in exciting new innovative research programs.

KEY AREAS OF RESEARCH AT THE ALFRED MEDICAL RESEARCH AND EDUCATION PRECINCT (AMREP)

Baker Heart and Diabetes Institute

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www.bakeridi.edu.au/students

Description of key research areas

The Baker Heart and Diabetes Institute is an independent, internationally renowned medical research facility with a focus on diagnosis, prevention and treatment of diabetes and cardiovascular disease. The comprehensive range of research undertaken to target these deadly diseases, combined with the flexibility and innovation to respond to changing health and community needs, is unique and sets the Baker Institute apart from other health and research Institutes.

With over 300 scientists, clinicians, research nurses and students, the Baker Institute provides a collaborative, stimulating and supportive environment for students to develop the skills and the confidence to launch their career. Research projects are offered for Doctorate, Masters and Honours students across cardiovascular and diabetes research with a bench to bedside approach.

Burnet Institute

Contact person

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www.burnet.edu.au/education_and_training/36-honours_program

Description of key research areas

The Burnet is Australia's leading research institute that is focused on infectious diseases of global significance. Our unique blend of medical research and public health programs are aimed at reducing the impact of diseases such as HIV, hepatitis, malaria, tuberculosis, influenza and cancer. Burnet's activities are carried out within and between 3 major Centres: the Centre for Biomedical Research, the Centre for Population Health and the Centre for International Health. Burnet plays an important role in education, providing training in laboratory and public health research at both undergraduate and postgraduate levels. Laboratory based research at the Burnet occurs principally within the Centre for Biomedical Research with an emphasis on infectious diseases, autoimmunity, cancer and vaccine development and diagnostics. The Centre for Population Health studies the molecular epidemiology of malaria, the epidemiology and surveillance of infectious diseases in Australia and overseas, health issues relating to alcohol and other drugs, sexual health and behaviour, health promotion and policy, and is a centre of excellence into injecting drug use research. The Centre for International Health responds to health problems in developing countries through the provision of technical advice and support, organisational capacity-building, applied research, policy analysis and development, and training and education programs. The Centre's expertise spans HIV prevention and care, women's and children's health, sexual and reproductive health, drug use, primary health care, strengthening national health systems, and education across these fields.

Australian Centre for Blood Diseases (ACBD)

Contact person

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Commercial Road, Melbourne 3004



www.acbd.monash.org/students/honours1.html

Description of key research areas

The Australian Centre for Blood Diseases (ACBD) is the largest blood-focused research centre in Australia. The ACBD conducts world-leading research into malignant (blood cancers) and non-malignant (blood clots) haematology and works closely with a large network of haematologists to translate their laboratory research into clinical benefits. Our state-of-the-art facilities and high calibre scientists and clinicians provide an excellent environment for undergraduate and higher degree research students.

Major areas of research at the ACBD include:

Non-malignant Haematology (Thrombosis & Haemostasis)

- Platelet adhesion receptors in haemostasis and thrombosis (A/Prof Robert Andrews)
- Molecular imaging, drug delivery, and nanotechnology (Dr Christoph Hagemeyer)
- Drug discovery of novel anti-thrombotics (Dr Justin Hamilton)
- Neurotrauma and haemostasis (Prof Rob Medcalf)
- Inflammation and thrombosis in vascular biology (Prof Harshal Nandurkar – Head of Department)
- Microfluidics platforms in thrombosis research and drug screening (Dr Warwick Nesbitt)

Malignant Haematology (Blood Cancers)

- Blood stem cells in haematological malignancies (A/Prof David Curtis)
- Acute leukemias (A/Prof Ross Dickins)
- Transcription factors in leukemias (Matt McCormack)
- Genomics of myeloproliferative disorders (Prof Andrew Perkins)
- Multiple myeloma (Prof Andrew Spencer)
- Translational leukemia research (Dr Andrew Wei)

Clinical Research

- Bone Marrow Transplant Program (Dr Sharon Avery)
- ECRU Translational Research Division (Dr Anthony Dear)
- The Ronald Sawers Haemophilia Centre (A/Prof Huyen Tran)

Department of Immunology and Pathology, The Alfred Hospital

Contact person

Associate Professor Margaret Hibbs
(Honours coordinator)

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www.med.monash.edu.au/immunology/teaching/honoursstudies.html

Description of key research areas

The Department of Immunology and Pathology is located at the Alfred Hospital campus in Prahran as a partner institute in the Alfred Medical Research and Educational Precinct (AMREP). Our partner organisations are the Baker IDI Institute, the Burnet Institute and Alfred Health, which together form a strong research consortium that links basic and clinical research with excellence in student mentorship and training. The precinct is well-supported by state-of-the-art facilities that are critical for cutting edge research and high quality outcomes. The Department has a strong national and international profile, an excellent record of success in obtaining competitive grant funding, and an outstanding reputation for high quality undergraduate and postgraduate teaching.

The Department's research ranges from basic science in immunology, cell biology and molecular pathology to disease models and human diseases. The research in the Department is driven by world leading authorities in immunology and inflammation, and our main areas of interest are:

- B cells, immune memory and autoimmunity (Prof David Tarlinton – Head of Department)
- Signalling pathways in autoimmunity and chronic inflammation (A/Prof Margaret Hibbs)
- Leukocyte membrane proteins in inflammation and cancer (A/Prof Mark Wright)
- Allergy and asthma (Prof Jennifer Rolland / Prof Robyn O'Hehir)
- Human B lymphocyte differentiation (A/Prof Menno van Zelm)
- Non classical MHC and host defence (Dr Dan Andrews)
- Intestinal immunity (Prof Nicola Harris)
- Respiratory immunology (Prof Ben Marsland)

Department of Infectious Disease, The Alfred Hospital

Contact person

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www.med.monash.edu.au/cecs/infectious-diseases

Description of key research areas

The Department of Infectious Diseases, Central Clinical School, and Alfred Health, is a premier centre for clinical and biomedical research, offering undergraduate and postgraduate study programs. The clinical services work closely with research staff and laboratories are based within the Burnet Institute at the Alfred Hospital campus. The Department is therefore uniquely placed to be able to provide study opportunities that integrate clinical services with clinical and basic science research.

The department specialises in the following areas:

- HIV associated co-morbidity
- HIV Cure clinical research
- Prevention of HIV infection
- Viral hepatitis
- Infections in the Immunocompromised host
- Fungal infections
- Infections in the Intensive Care Unit
- Antimicrobial Stewardship
- Antibiotic usage and resistance
- Influenza
- Infection control and surveillance
- International health
- Health information technology
- The Victorian Spleen Service and Registry
- Bone and joint and surgical site infections
- Infections in CF and Burns
- Resistance in Staph aureus and Gram-negative bacteria

For more information on research areas within the Department of Infectious Disease, please visit:

www.med.monash.edu.au/cecs/infectious-diseases/research/areas/index.html

For information on study opportunities within the department, please visit the Central Clinical School education web page:

www.med.monash.edu.au/cecs/education/index.html

Department of Allergy Immunology and Respiratory Medicine, The Alfred Hospital

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www.med.monash.edu.au/cecs/airmed

Description of key research areas

The Department of Allergy, Immunology and Respiratory Medicine is one of the most comprehensive Departments in these disciplines in Australia, covering the range of respiratory conditions including asthma and allergic diseases, chronic obstructive pulmonary disease (COPD), sleep disordered breathing, general respiratory diseases, adult cystic fibrosis (State Centre of Excellence) and lung transplantation.

The Department has a very active biomedical and clinical research focus with a strong record of success in both competitive NH&MRC and other research grant funding.

The high international and national profile of the Department is reflected in numerous publications and speaking invitations to senior personnel. Allergy, Immunology and Respiratory Medicine is committed to delivering outstanding best practice clinical care, outcome driven professional education and community outreach as well as translational research of international acclaim.

The key research areas are:

- Allergy, Asthma and Clinical Immunology
- Lung Transplantation
- Cystic Fibrosis and Health Information
- Respiratory Physiology
- Pulmonary Hypertension
- Bronchiectasis and Lung Cancer
- Sleep Medicine and COPD
- Interstitial Lung Disease

Monash Alfred Psychiatry Research Centre, The Alfred Hospital

Contact person

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www.maprc.org.au

Description of key research areas

MAPrc is based within the Alfred Hospital Precinct, in Melbourne. We carry out world-class research to help make a difference to the lives of people suffering from serious mental illnesses. MAPrc comprises a multidisciplinary team of over 100 staff and postgraduate students from medicine, nursing, psychology, engineering, allied health, neuroscience, and health information services.

Research at MAPrc is extraordinarily diverse. Our projects range from neuroscience techniques that are recognized around the world for the breakthrough insights they provide into brain structure and function in health and illness, to innovative new treatments to boost the effectiveness of conventional medications for psychiatric illnesses. Estrogen as a treatment for schizophrenia and Transcranial Magnetic Stimulation for depression, pain and cognitive disorders are examples of new and effective approaches that are being developed at MAPrc. Other research streams include grassroots initiatives looking at ways to make the delivery of community mental health service more efficiently.

Therapeutic Brain Stimulation Division

The Therapeutic Brain Stimulation Division at MAPrc is headed by Professor Paul Fitzgerald and is the leading brain stimulation facility in Australasia. Our projects incorporate a range of cutting-edge neuroscience techniques to improve outcomes for people with disorders of mental and brain function.

- Cognitive Therapeutics Research Program (A/Prof Kate Hoy)
- Pain & Affective Neuroscience Unit (Dr Bernadette Fitzgibbon)
- Early Intervention for Mood & Psychotic Disorders (Dr Manreena Kaur)
- Mindfulness Neuroscience (Dr Neil Bailey)
- Neurobiological Investigations of Depression (Dr Robin Cash)

Women's Mental Health Division

The Women's Mental Health Division at MAPrc is headed by Professor Jayashri Kulkarni and is one of the few research centres worldwide that focuses on women's mental health adopting a psychoneuroendocrinology approach. Our projects incorporate a biopsychosocial model, combined with novel interventions to improve outcomes for people with mental ill health.

- Women's Mental Health Unit (Prof Jayashri Kulkarni)
- Cognitive Neuroscience Unit (Dr Caroline Gurvich)
- Perinatal Psychiatry (Prof Jayashri Kulkarni, Dr Carolyn Breadon)
- Trauma & Psychopathology (Prof Jayashri Kulkarni, Dr Caroline Gurvich, Dr Natalie Thomas, Dr Gemma Sharp)
- Gender & Hormone Research (Prof Jayashri Kulkarni, Dr Caroline Gurvich, Dr Natalie Thomas, Dr Gemma Sharp)

Mental Health Service Research Program

We aim to improve mental health service provision through examining patient, staff and environmental contributors to care provision and outcome, and the experience and effectiveness of new therapy or care approaches.

- Promoting community / hospital mental health service innovation (Dr Stuart Lee, Dr Liza Hopkins)
- Psychological intervention to improve neurocognition and care engagement (Dr Stuart Lee)

Department of Surgery, The Alfred Hospital

Contact person

Prof Wendy Brown

Email: wendy.brown@monash.edu



www.med.monash.edu.au/surgery/alfred/research

Description of key research areas

The Department of Surgery at The Alfred Hospital's research programme spans across all of the surgical disciplines. The broad aim of all of our research is to improve patient outcomes. This is achieved by a diverse research platform which includes: prospective patient databases recording outcomes of care, projects focused on better understanding the underlying basic science of the diseases we treat, randomised controlled trials and prospective cohort studies comparing therapies as well as innovative therapies and devices.

Our current programme includes:

- Burns – The Alfred is the State adult burns unit and hosts the national Burns Registry. Current research projects focus on examining and benchmarking acute burn care practices (against other units in Australia and overseas) and monitoring patient outcomes.
- Cardiothoracic – The Alfred is the State Heart and Lung transplant service as well as one of the busiest general cardiothoracic units.
- Endocrine surgery – The Alfred hosts the Monash University Endocrine database, a large population based resource with over 5000 participants..
- ENT – The Alfred has a large head and neck and otolaryngology unit. Research projects focus on the management of head and neck cancer and hearing loss.
- Hepatobiliary – The Alfred hepatobiliary unit is one of the busiest in the state. They have maintained a prospective database of cancer patients for 10 years and also have an interest in the management of hepatic trauma.
- Colorectal surgery – The Alfred Colorectal unit participates in the national colorectal audit and is currently undertaking randomised controlled trials as well as observational studies exploring ways of improving outcomes from Colorectal surgery.
- Neurosurgery – The Neurosurgery unit has a clinical interest in brain injury as well as vascular disease.
- Orthopaedic surgery – provides the full range of general and sub-specialised orthopaedic clinical services across the breadth of the specialty.
- Plastic surgery – The Plastics unit at the Alfred has a major interest in reconstruction and trauma.
- Trauma – The Alfred is one of the State's level 1 trauma centres and is the host of the Victorian Trauma Registry.
- Upper Gastrointestinal – The Upper GI unit at the Alfred has a large prospective database of all cancer patients treated through the unit as well as those undergoing reflux surgery and bariatric surgery.
- Urology – The Urology Unit maintains a large prospective database of transperineal prostate biopsy and there are several projects utilising this resource.

For more information on research areas within the Department of Surgery, please visit: <http://www.med.monash.edu.au/surgery/alfred/research>

For information on study opportunities within the department, please visit the Central Clinical School education web page: <http://www.med.monash.edu.au/cccs/education/index.html>

Department of Medicine, The Alfred Hospital

Contact person

Dr Steven Petratos

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Tel: 9902 9500



www.med.monash.edu.au/cecs/education/honours.html

Description of key research areas

The Department of Medicine laboratories based at AMREP engage in a broad and diverse range of basic and clinically focused research topics. In many instances the research is undertaken in collaboration with other departments located at the Alfred campus.

The Department consists of different research groups offering a number of research projects aimed at honours and PhD levels:

- Epidermal and Craniofacial Development – offers basic projects in the study of developmental abnormalities and epithelial cancers, including development of the craniofacial skeleton, brain and skin barrier, and the cellular and signalling bases of tumours of the esophagus, skin, head and neck.
- Stem cell therapies for brain disorders – investigates the molecular mechanisms causing nerve fibre degradation in multiple sclerosis (MS) and the degeneration of neurites in Alzheimer's disease (AD). In MS, our research is developing novel strategies to deliver agents to the brain and spinal cord to block nerve fibre damage.
- Clinical Pharmacology – offers basic and clinical projects in the study of cardiovascular disease with a primary focus on the cellular mechanisms involved in cardiac remodeling, and use of novel therapeutics in the prevention of pathological hypertrophy and fibrosis in vivo.
- Endocrinology – is involved in the role of sex hormones in cardiovascular disease and physiology, in particular with an interest in the molecular mechanisms in vascular and cardiac cell types.
- Endocrinology and Diabetes – is focused on the role of Advanced Glycation End product (AGE) uptake and ERM signaling in diabetes. In addition this group has an interest in the signal transduction pathway of IGF (insulin growth factor) binding protein 6 in cancer cell lines.
- Infectious Disease – is primarily involved in the study Invasive Fungal Infections (IFI). *Aspergillus* was the most common fungus causing invasive infection, but changes in antifungal prophylaxis, has resulted in an emergence of more resistant fungi. The challenge is to develop assays for the detection of all resistant strains of *Aspergillus*.
- Pathology – research is directed towards understanding the pathogenesis of infectious diseases of the central nervous system. Molecular and histological techniques specifically investigate viral latency, strain variation and pre-clinical disease states. Current projects focus on HIV/ AIDS and progressive multifocal leukoencephalopathy (PML).
- Respiratory Medicine – has research interests in cystic fibrosis, asthma, pulmonary vascular disease, emphysema and lung transplantation with projects examining the mechanisms involved in the suppression of graft-specific immunity.

Department of Diabetes

Contact persons

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Dr Tom Karagiannis
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<http://www.med.monash.edu/cecs/diabetes/education/>

Description of key research areas

The Department of Diabetes consists of 60 staff and postgraduate students. There are total of nine program and laboratory heads which include a combination of senior clinician and basic researchers ensuring a diverse range of projects in the field. The Jreissati Family Translational Research Laboratory is a state-of-the-art purpose-built facility on Level 3 of the Alfred Centre with dedicated facilities including communal cell culture, imaging, immunoblotting, and viral transfection rooms. The Meydan Family Translational Research Hub located on Levels 5 and 6 of the Alfred will provide open plan office space providing an appropriate scholarly environment for students. The major areas of research in the Department of Diabetes are related to understanding and investigating therapies for diabetic complications including diabetic nephropathy, retinopathy, and wounds. Apart from culture and in vivo models aimed at evaluating the molecular details of human disease progression and treatment, the department offers projects in next generation sequencing and medical bioinformatics analyses.

Cabrini-Monash University Department of Medicine

A/Prof Michele Levinson (Head of Department)
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Tel: 9508 3466

Dr Amber Mills (Research Fellow)
Email: amills@cabrini.com.au
Tel: 9508 3464



<http://cabrini.com.au/research-and-education/research-programs/cabrini-monash-university-department-of-medicine/>

Melbourne Sexual Health Centre

Dr Eric Chow
Email: eric.chow@monash.edu or
echow@mshc.org.au
Tel: +61 3 9341 6233



www.mshc.org.au

Description of key research areas

The Melbourne Sexual Health Centre (MSHC) is a specialised unit for the diagnosis and treatment of sexually transmissible infections (STI/HIV) and is a principal centre for training health professionals in Victoria. The Centre conducts epidemiological, public health and clinical research primarily aimed at improving the services offered at MSHC.



KEY AREAS OF RESEARCH IN THE SCHOOL OF PUBLIC HEALTH AND PREVENTIVE MEDICINE

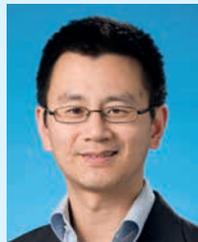
School of Public Health and Preventive Medicine

Contact persons

A/Prof Allen Cheng
Email: allen.cheng@monash.edu

Dr Joanne O'Toole
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Tel: 9903 0929

553 St Kilda Road, Melbourne Vic 3004



www.monash.edu/medicine/sphpm/teaching/honours

Description of key research areas

The School of Public Health and Preventive Medicine, undertakes research in a number of areas:

- Cardiovascular epidemiology
 - Cost effectiveness of health services for cardiovascular disease (CVD) and heart failure (HF).
 - Primary prevention model of CVD.
- Preventive Medicine
 - Chronic disease and ageing.
 - Overweight and obesity in Australia.
- Clinical pharmacology
 - Clinical and basic studies of new drug therapies for HF.
 - Effect of drugs on autonomic and endothelial parameters in HF.
- Occupational and environmental health
 - Environmental arsenic exposure health effects.
 - Gulf War veterans' health.
 - Cellphone health effects.
- Health services research
 - Cost-effectiveness and development of discharge performance indicators.
- Occupational Health
 - Occupational exposures and workers' health.
 - Surveillance of workplace-based adverse events.
- Respiratory epidemiology
 - Diet, pollution and chronic lung disease.
- Rheumatology
 - Lifestyle factors and MRI evaluation of osteoarthritis.
 - Preventing disability from back pain.
- Sports injury prevention
- Trauma epidemiology
 - Emergency medicine.
 - Ambulance Service delivery.
- Bioethics and Human Rights
 - Public health law and human rights.
 - International research ethics
 - Women's Health

Department of Forensic Medicine

Contact person

Professor Olaf Drummer

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57-83 Kavanagh St, Southbank 3006



www.med.monash.edu.au/sphpm/dofm.html

Description of key research areas

Research projects are focused on improving our understanding of medical, scientific and legal issues associated with the practice and applications of forensic medicine. Topics include adverse medical treatment related events, issues reporting of deaths to the coroner, development of more efficient procedures for nuclear DNA analysis, development of DNA technology for genetic-linked diseases that lead to sudden death, new applications drug detection methods in forensic toxicology, application of segmental hair analyses to establish drug histories in drug dependent persons and in persons dying from drug toxicity, investigation of drug uptake and release in tissues of deceased persons, estimation of the relative mortality of drugs, traffic medicine (effect of drugs on driving skills, hemianopia and driving skills, ageing drivers), sexual assault (drug facilitated assault, outcomes of paediatric and adult cases, injury patterns), and wound interpretation.

Centre for Obesity Research and Education (CORE)

Contact person

Professor Wendy Brown

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Mr Paul Burton

Email: Paul.Burton@monash.edu

Tel: 9903 0625

The Alfred Hospital,
Commercial Road, Prahran 3181

www.core.monash.org

Description of key research areas

Management and treatment of obesity, severe obesity and related co-morbidities such as diabetes. The mission of the Centre for Obesity Research and Education (CORE) is to understand the disease of obesity, to identify optimal methods for its long-term management that are safe and cost effective, and to determine preventive strategies that can be implemented.

Key studies include randomised clinical trials of laparoscopic adjustable gastric bandweight loss surgery, evaluation of changes in physical and mental health following surgery, and the mechanisms of action of weight loss.

KEY AREAS OF RESEARCH IN THE SCHOOL OF RURAL HEALTH

School of Rural Health

Contact person

Associate Professor Shane Bullock
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School of Rural Health (Churchill)
Building 3W, Northways Rd
Churchill, Victoria. 3842



www.monash.edu/medicine/srh

Description of key research areas

One in three Australians live outside a major metropolitan centre. Generally, rural populations experience poorer health and poorer access to healthcare than metropolitan populations. The School is committed to the health of rural communities and developing a sustainable rural health workforce.

Our Honours projects are based at our rural sites and are supervised by supportive research staff. We offer a range of projects where you may work in Melbourne for the duration of the project, be based at one or our rural sites for the project, or spend time in both Melbourne and a rural site.

Specific Honours projects being offered include:

Improving rural clinical care

- Chronic pain management by rural primary care practitioners; The role of clinicians' personalities in making decisions about Advance Care Planning; The impact of an evaluation capacity building program among rural health practitioners; Medical emergency team (MET) outcomes analysis.

Training doctors

- Health professionals as sessional tutors and lecturers; Patient and student preferences regarding consultation in general practice; Heart in your hands – simulation development and evaluation; Medicine and the arts – ways of envisioning a new perspective on health; Impact of medical school community engagement on the career aspirations of rural children; Stories of illness – through a poetic lens.

Enhancing knowledge

- Imaging the claustrum connectome; Deprescribing in the elderly.

Attracting health professionals to rural communities.

- Understanding rural workforce recruitment – the Nursing and Allied Health graduate outcomes tracking study

Visit Supervisor Connect (<https://www.monash.edu/medicine/research/supervisorconnect>) for more detailed information about our projects and supervisors. We welcome candidates to contact us to further discuss your research interest.

KEY RESEARCH AREAS IN THE SCHOOL OF PRIMARY AND ALLIED HEALTH CARE

School of Primary and Allied Health Care

Department of General Practice

Contact person

Professor Jan Coles

Email: jan.coles@monash.edu

Department of General Practice
Building 1, 270 Ferntree Gully Road
Notting Hill 3168



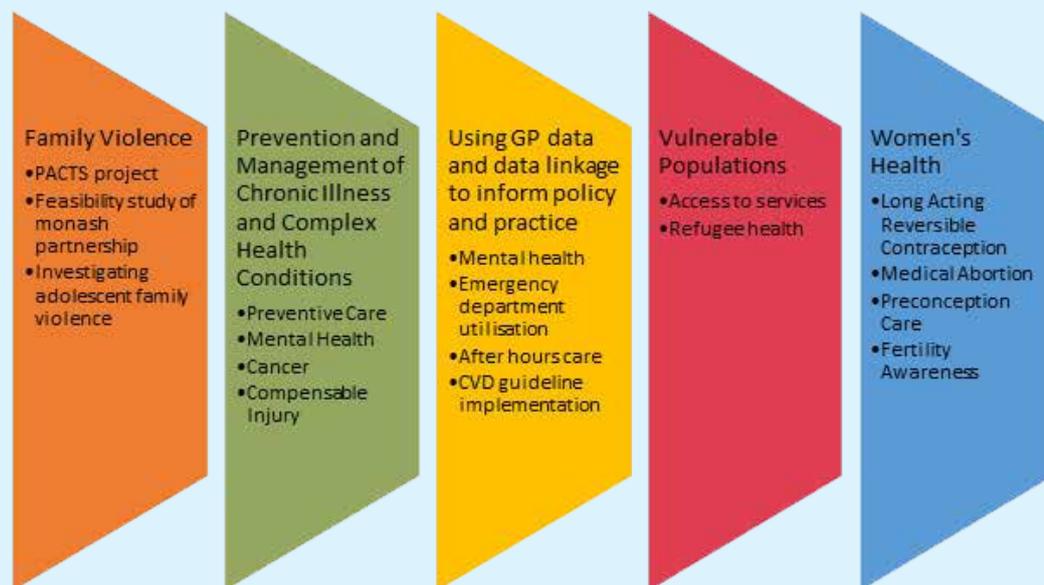
www.med.monash.edu/general-practice/research/bbmedsc.html

Are you interested in making a difference to the community?

Undertaking a Bachelor of Biomedical Science (Honours) program with the Department of General Practice will empower you to become an active participant in the generation of knowledge, contributing to the evidence base for health practitioners globally.

The Department provides a supportive environment for researchers, with supervision and mentorship of a designated academic supervisor, regular team meetings, excellent study facilities and parking on site.

Description of key research areas



We welcome all candidates to contact us to discuss your areas of research interest.

KEY AREAS OF RESEARCH IN THE SCHOOL OF PSYCHOLOGICAL SCIENCES

School of Psychological Sciences

Contact person

Dr Antonio Verdejo-Garcia

Email: Antonio.Verdejo@monash.edu

www.med.monash.edu.au/psych/research/students/projects.html

Description of key research areas

The School of Psychological Sciences/Monash Institute of Cognitive and Clinical Neurosciences (MICCN) offers a range of 4th year research projects, which are supervised by staff members who conduct neurosciences related research.

Projects are organized in four integrated research programs:

- Addiction: Drug and behavioural addictions, compulsive behaviours, “food addiction” and obesity
- Attention and Memory: Neurodevelopmental and neurodegenerative disorders
- Sleep: Impact of shiftwork, sleep disorders and treatment, circadian rhythms
- Clinical Translation: Clinical psychology and neuropsychology.



KEY AREAS OF RESEARCH AT MONASH MEDICAL CENTRE

Monash Medical Centre

Monash University research units based at the Monash Medical Centre, Clayton comprise the School of Clinical Sciences and the Hudson Institute of Medical Research.

The School of Clinical Sciences at Monash Health (SCS) is composed of four main hospital campuses, Monash Medical Centre (Clayton and Moorabbin), Dandenong Hospital, Kingston Centre and Casey Hospital. The SCS represents the largest hospital network in Australia and covers all medical specialties (medicine, surgery, psychiatry, obstetrics and gynaecology and paediatrics). The SCS offers a comprehensive range of research projects from patient based projects to basic science. Our main emphasis is on translational projects that combine both basic science and clinical medicine. Reflecting on the SCS's strengths in discovery and translational research, the School has an established track-record in the training of basic and clinician scientists both at undergraduate and postgraduate (PhD) levels. Opportunities for formal research training exist within all departments of the School. The administration is based at Monash Medical Centre.

The Hudson Institute of Medical Research continues to grow as it attracts talented scientists from Australia and overseas. Hudson's research into preterm babies, stem cells, cancer, inflammation, women's health and paediatric sleep has changed the way diseases are understood and treated.

School of Clinical Sciences

Contact person

Dr Paul King
(Honours Coordinator)
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Tel: 9594 5525



www.med.monash.edu/scs/dept-medicine

Description of key research areas

The School of Clinical Sciences has groups working in key areas of biomedicine:

Immune and Inflammatory Diseases

The Centre for Inflammatory Diseases (CID) runs active programs in key areas of inflammation with an emphasis on translational research. With the use of clinical and laboratory based experimental techniques, researchers in CID explore the basic mechanisms of inflammatory injury in important human diseases, and relate these to unmet needs in patient treatment and management. Current research in CID includes:

- Mechanisms of autoimmune kidney disease and vasculitis.
- Antigen presentation and immune tolerance.
- Mechanisms of injury in rheumatoid arthritis (RA) and treatments.
- Inflammation and treatment of systemic lupus erythematosus (SLE).
- Immune cell interactions in inflamed vasculature of the skin and kidney.
- Modulation of host immune responses following neuroinflammation.
- Mechanisms of liver/gut inflammation and fibrosis.
- Inflammation in Type 2 diabetes and diabetic kidney disease.
- Clinical microbiology, infectious diseases and infection control.
- Respiratory infection and immunity, and mechanisms of inflammation in asthma.

Nutrition and Dietetics

Centre Head: Professor Helen Truby

The Be Active, Sleep and Eat (BASE) facility is a leading research facility. It provides facilities for a multidisciplinary group of academics who conduct research across a wide range of areas that will educate the community with emphasis on the prevention of disease and maintenance of optimum health.

Project areas include:

- Clinical dietetics including paediatrics
- Community and population nutrition
- Sport and exercise nutrition and
- Sleep, nutrition and metabolism

Stroke and Ageing

Centre Head: Professor Amanda Thrift

The stroke and ageing group concentrates on stroke and dementia with key themes of:

1), Clinical trials, imaging and informatics 2), Epidemiology and prevention and 3), Translational public health and evaluation. There are also opportunities for projects in global health (hypertension and diabetes in people living in poverty in rural India). Potential projects include:

- Data linkage to identify changes in use of Chronic Disease Management Plans and how this has impacted on hospitalisation and death
- Global Health (India) to identify factors associated with barriers to the controlling hypertension in poverty
- Impact of social network on health
- Ham and spam analysis of medical records to identify stroke cases
- Using Google maps to identify regions for service delivery
- Evaluation of 3D printing of carotid artery anatomy
- Data linkage to identify factors associated with hospital readmissions
- Cost-effectiveness of implementing new methods of care in stroke and identifying patients not requiring admission, and
- Mapping salvageable brain tissue using multimodality CT

For more information go to <http://www.monash.edu/medicine/scs/medicine/research/star>

Clinical Medicine

A large number of areas are available including critical care, emergency medicine, haematology, imaging, supportive and palliative care and surgery.

Bone and Muscle Health Research

Centre Head: Professor Peter Ebeling

The Bone and Muscle Research Group conduct clinical trials of new and current pharmaceuticals on muscle and bone, the effect of calcium, vitamin D and exercise on musculoskeletal health, and population-based studies of osteoporosis, sarcopenia and obesity in older age.

Key areas include:

- Assessing Bone Health in Sarcopenic Obese Older Adults
- Effects of Weight Loss on Bone Health in Obese Older Adults
- Wearable Activity Trackers for Monitoring Physical Activity and Mobility in Older Adults
- Exercise for Reducing Risk Factors for Falls in Obese Older Adults
- Associations Between Cardiovascular Health and Osteoporosis in Older Age
- The effects of lifestyle differences on musculoskeletal health in ethnic populations
- A New Wearable Technology for Assessing Osteogenic Exercise
- Vitamin D and Musculoskeletal Health in Older Adults

For more information go to <https://www.monash.edu/medicine/scs/medicine/research/bone-muscle/student-opportunities>

Cancer and Haematology

Research projects are available in all areas of cancer with a particular emphasis on blood malignancies. Research also involves early clinical trials of potential new therapies.

Womens' and Children's Health

Research projects are available in all areas of paediatrics and women's health.

Department of Psychiatry, School of Clinical Sciences at Monash Health

Contact person

Professor David Kissane

Email: david.kissane@monash.edu

Tel: 9594 1479



<https://www.monash.edu/medicine/scs/research/research-themes/neuroscience-psychiatry>

Description of key research areas

Psychiatry encompasses a wide range of subspecialties. The Department of Psychiatry offers a range of 4th year research projects, which are supervised by staff members who conduct research in a wide range of areas from laboratory-based research to clinical interventions.

Behavioural Neuroscience and Molecular Psychiatry

The Behavioural Neuroscience laboratory uses pre-clinical animal models to better understand the pathophysiology of severe psychiatric illnesses such as schizophrenia, so that we may design and test novel therapeutic strategies. Genetic and environmental risk factors are modelled in mice to better understand their impact on the brain and behaviour. Novel treatments are then designed and tested in these preclinical models to trial their efficacy. The lab uses a number of innovative techniques, including mouse touchscreen-based behavioural testing, molecular biology, and vivo electrophysiology.

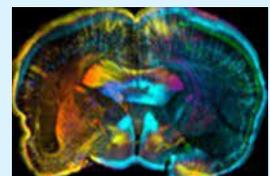
We are currently offering a range of PhD, Masters and Honours projects assessing the impact of specific genetic variants, and environmental insults (such as infection) on the development and function of critical brain circuits associated with psychiatric disorders. The Behavioural Neuroscience laboratory work closely with the molecular psychiatry laboratory to translate preclinical findings to new treatment strategies.



Contact person: Dr Rachel Hill. Email: rachel.hill@monash.edu

The Molecular Psychiatry laboratory aims to develop disease modifying novel treatments for psychotic disorders, in particular, schizophrenia using a broad translational approach. Starting from clinically derived insights and samples, we probe the cellular and molecular characteristics of post-mortem human and animal brain relevant to psychotic disorders. From these laboratory studies we investigate animal behaviour (in collaboration with the behavioural neuroscience laboratory) using transgenic models of psychosis, identifying relevant neuronal signalling pathways. These laboratory-based findings can then be re-applied to investigate new biomarkers in clinical samples using genetic, protein, and electrophysiological measures.

We are also establishing a clinical trials research group evaluating new treatments for these disorders in the hope to build a unique translational research program in psychotic disorders that utilise clinical and biomarker data to understand the molecular bases of psychotic disorders, and in turn generate novel treatments and diagnostics for these patient groups.



Contact person: Prof. Suresh Sundram. Email: suresh.sundram@monash.edu

Centre for Developmental Psychiatry & Psychology

Child & Adolescent Mental Health – Child & Adolescent Mental Health – suicide prevention using smartphone applications, assessment and treatment of school refusal and anxiety disorders, novel treatments of adolescent depressive disorders, neurodevelopmental disorders, Autism Spectrum Disorder (including genetics)

Contact person: A/Prof Glenn Melvin. Email: glenn.melvin@monash.edu

Centre for Mental Health Education and Research, Delmont Private Hospital

Suicide Prevention through effective psychiatric treatment.

Contact person: Prof Nicholas Keks. Email: nicholas.keks@monash.edu

Neuropsychiatry and Neuroimaging

Psychosocial aspects of Progressive Neurological Disorders, Neuroimaging Study of limb-onset Motor Neurone Disease.

Contact person: Dr Phyllis Chua. Email: phyllis.chua@monash.edu

Contact person

Professor Julian Smith

Email: julian.smith@monash.edu

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<https://www.monash.edu/medicine/scs/surgery/research>

Description of key research areas

The Department of Surgery at The School of Clinical Sciences at Monash Health has research activity within all surgical specialties. There are strong collaborations within the Monash Health Translation Precinct. There exist opportunities in basic surgical sciences, laboratory, clinical, database, surgical simulation and health services research.

Particular areas of strength are:

- Breast Surgery – Large patient database, patient reported outcomes, intra-operative radiotherapy, breast cancer trials
- Cardiothoracic Surgery – Less invasive and robotic assisted cardiac surgery, cardiopulmonary bypass and perfusion, acute kidney injury after cardiac surgery, studies arising from the ANZSCTS Database
- ENT/Head & Neck Surgery – Monash Health has the large services covering all facets of the specialty at all ages; head and neck cancer, laryngology & otology projects available
- Upper Gastrointestinal/Hepatobiliary Surgery – Large patient database, strong interest in oesophageal and pancreatic cancer; access to large biobank of tumour tissue
- Colorectal Surgery – national database; inflammatory bowel disease and colorectal cancer research
- Neurosurgery – particular interest in neurovascular and spine research
- Orthopaedic surgery – large patient load, adult and paediatric, major joint surgery; strong interest in shoulder, upper limb and hand research
- Plastic surgery – breast reconstruction, trauma, hand surgery, microsurgery
- Paediatric Surgery – Based at Monash Children's Hospital; projects available within all subspecialties (General, Urology, Orthopaedic, Thoracic, Neurosurgery, Plastic) across all paediatric age groups; links to Hudson Institute and Ritchie Centre
- Urology – strong interest in prostate cancer research and in benign urological conditions
- Vascular Surgery & Transplantation – very active in endovascular intervention and renal/pancreas transplantation research
- Surgical Simulation – based at Monash Children's Hospital in a state of the art facility; projects across multiple surgical specialties

For more information on research areas within the Department of Surgery at the School of Clinical Sciences at Monash Health, please visit: <https://www.monash.edu/medicine/scs/surgery/research>

Contact person

Associate Professor Mark Hedger
Centre for Reproductive Health

Email: mark.hedger@hudson.org.au
Tel: 9902 4758



https://studentresearchprojects.med.monash.edu.au/project-search?field_school_value=59&_ga=2.113755908.2024763343.1494478327-772514392.1457503449

The Hudson Institute of Medical Research is recognised as one of Australia's premier medical research institutes. Close collaboration with Monash University and Monash Medical Centre enables Hudson to increase the impact of its research by translating discoveries from 'bench to bedside'. Hudson is located at the Monash Health Translation Precinct, directly behind the Monash Medical Centre, Clayton. The Institute has over 400 researchers, clinicians and students.

Hudson is committed to the education and success of its students and combines this commitment with an exciting extra-curricular program and dedicated research-only supervisors.

Description of key research areas

Centre for Cancer Research

Centre Head: Associate Professor Ron Firestein

Scientists working in the centre undertake basic research into the molecular mechanisms underlying the development, growth and metastasis of tumours, as well as the relationship between the innate immune system and cancer. The discovery and development of novel therapies for the treatment of cancers is also an important aspect of the team's work.

Current key areas of interest include:

- Links between innate immunity, inflammatory processes and cancer – role of embryonic signalling pathways in cancer
- The targeting of these pathways with novel therapies
- Cell signalling pathways involved in tumour survival and growth, and the development of monoclonal antibodies to treat glioma and other cancers
- Role of integrin-linked kinase in cell migration and oncogenesis
- Molecular pathways involved in the metastasis of tumours, including colorectal, ovarian, prostate and bladder cancers
- Role of steroid hormones and nuclear receptors in breast cancer development and progression
- Role of peptidase activity on inflammatory signalling and tumour microenvironment in ovarian cancer
- Molecular links between obesity, oestrogens and cancer, and therapies aimed at breaking the linkage
- Role of the microenvironment in tumour progression, chemo-resistance, and metastasis

A Phase I Clinical Trials Program has been established at the centre in collaboration with Monash Health, to conduct clinical trials of new cancer-targeting therapies.

More information at: <http://hudson.org.au/research-centres/cancer-research>

Centre for Innate Immunity and Infectious Diseases

Centre Head: Professor Paul Hertzog

The Centre for Innate Immunity and Infectious Diseases (CiiiD) researches the molecular regulation of the innate immune response. This early immune response determines how the body responds to infection or the presence of cancer cells, providing immediate protection and sculpting the ensuing adaptive (sustained) immune responses. It initiates the inflammatory response and can modulate the development of inflammatory diseases. Our aim is to understand the molecular pathways that regulate these processes as well as their normal physiological roles. In this way, CiiiD scientists aim to develop new approaches to preventing, diagnosing and treating infections such as influenza, herpes and HIV, inflammatory diseases such as gastritis and chronic obstructive pulmonary disease, and cancers of the stomach, lung and breast. CiiiD is one of the largest centres for innate immunity in Australia, bringing in nearly \$3M in grant funding per annum and publishing nearly 100 peer-reviewed publications in the past three years, including works in prestigious journals such as Nature, Science, Nature Immunology, Nature Medicine and Cancer Cell.

Staff and students working in CiiiD have collective multidisciplinary expertise in molecular biology, signal transduction, protein interactions, cell biology, immunology, infectious disease, functional genomics and bioinformatics and transgenic techniques for generating and characterising gene knockout and transgenic mice as models of human disease. The multidisciplinary teaching and training environment within CiiiD provides students with a strong range of skills in biomedical research that will be recognised internationally for a research career. The Centre students include UROP, Honours degrees, Masters and PhD.

Research projects available in the Centre for Innate Immunity & Infectious Diseases are offered in the following research areas:

- Regulation of Interferon and Innate Signalling
- Cytokine Signalling in Cancer and Inflammation
- Pattern Recognition Receptors and Inflammation
- Gastrointestinal Infection and Inflammation
- Respiratory and Lung Research
- DNA Repair, Radiobiology and Genomics

More information at: <http://hudson.org.au/research-centres/innate-immunity-infectious-diseases>

Centre for Endocrinology and Metabolism

Centre Head: Professor Peter Fuller

The complex endocrine system impacts all aspects of health and disease. As a preeminent centre for Endocrinology research originating from Hudson, our laboratories undertake basic and clinical research. Our goal is to improve understanding of the role of hormones in human biology and disease to tackle key health challenges facing Australian and global communities, including reproductive health, bone health and cancer metastasis, cardiovascular disease, endocrine cancer and obesity. Clinical translation of these findings to improve diagnosis, therapeutic intervention, and prevention of disease remains a key focus for the group.

Current key areas of interest:

- The identification of novel pathways to promote bone growth and limit bone destruction, to improve treatment and management of bone disease such as arthritis and osteoporosis and the spread of cancer to bone.
- The TGF- β family and the mechanisms that govern its regulation and impact on biological activity, including wound healing, immune function, fibrosis and tumour progression
- The investigation of reproductive hormones in men, such as testosterone and their role in maintaining health and fertility and management of ageing, and treatment and prevention of disease such as cardiovascular disease, and diabetes
- Cardiovascular disease and the Mineralocorticoid Receptor (MR), primarily how the MR controls fibrosis and inflammation in the heart muscle and immune cells (macrophages).
- The role of reproductive hormone in regulating processes within the body, particularly the impact of interactions between the pituitary and ovary on reproduction and fertility regulation and the impacts of ageing including menopause.
- The role and regulation of reproductive hormones in obesity and breast cancer, particularly the impacts of obesity (adiposity) and its links to an increased risk of breast cancer development in menopausal women. Improved understanding of the impacts of ageing on fat distribution and the development of Metabolic Syndrome is also a key interest
- The role of steroid hormones and their interactions with intracellular nuclear receptors (regulators of gene expression) in the development, treatment, and prevention of serious health challenges including breast cancer and cardiovascular disease. Other investigations include a collaborative thyroid cancer study and ongoing research to understand the underlying activating mechanisms of nuclear receptors and reproductive hormones secreted by the ovary.

More information at: <http://hudson.org.au/research-centres/endocrinology-and-metabolism>



The Ritchie Centre

Centre Head: Professor Stuart Hooper

The Ritchie Centre is the largest of the six Research Centres within Hudson and is within the Monash University School of Clinical Sciences at Monash Health through the Departments of Obstetrics and Gynaecology and Paediatrics. The Ritchie Centre has a world-leading reputation in women's health research; fetal development and neonatal research; sleep medicine; and stem cell biology. The Ritchie Centre is one of the few research centres that have world-class laboratories and access to clinical patients (women and babies) in a major teaching hospital, allowing seamless translation of experimental work to clinical trials and healthcare.

There are five Research Themes in The Ritchie Centre:

- Women's Health
- Fetal & Neonatal Health – Respiratory and Cardiovascular
- Fetal & Neonatal Health – Brain Injury and Neurodevelopment
- Infant & Child Health
- Cell Therapy & Regenerative Medicine

Honours and PhD Projects are available in all of these themes and some projects involve more than one theme. Some examples of projects are listed here:

- Endometrial regeneration and regulation
- Role of endometrial stem cells in endometriosis
- Stem cell therapies in lung disease, pelvic floor prolapse, and spinal surgery disc injury and degeneration
- Fetal and neonatal development of the lungs, heart, brain and kidney
- Transition of the cardiorespiratory system at birth
- Disorders of the circulation and breathing during sleep in preterm infants
- Understanding sudden infant death syndrome
- Novel bedside tests of brain function in extremely low birth weight babies
- Physiological and mathematical models of the control of breathing in the newborn
- Causes of apnoea and its consequences on heart and brain function
- Causes and treatment of obstructive sleep apnoea in infants and children
- New therapies for preterm lung disease
- Pathophysiology of preeclampsia and the development of new therapies
- Prevention of perinatal brain injury (cerebral palsy)

More information at: <http://hudson.org.au/research-centres/the-ritchie-centre>

Centre for Reproductive Health

Centre Head: Professor Kate Loveland

Researchers at the Hudson Institute have been internationally recognised for their outstanding research into reproductive processes for more than 40 years. The current research program of the Hudson Institute's Centre for Reproductive Health is strongly based in both basic and translational science.

Reproductive Health is now a key global challenge, with impacts of the environment and changes in societies strongly impacting not only on both male and female reproduction but also on the long-term health of their offspring. The latter detrimental changes are established both in the sperm and egg, and during early development of the conceptus. With a rapidly increasing world population, the need for new contraceptive options has never been greater. Furthermore, translation of advances in reproductive sciences also impacts on cancer biology, animal food production, and conservation of endangered species. In addition, proteins involved in the regulation of reproduction also have wider actions influencing inflammation and tissue repair in a wide variety of organs.

Our research areas include:

- Uterine Biology – Three teams undertaking highly complementary work on uterine receptivity, implantation and placentation, endometrial cancer, and contraceptive development. Individual team focus:
 - Endometrial Remodelling. The intrauterine microenvironment of implantation; endometrial repair: embryo-maternal interactions via exosomes, tests for endometrial receptivity
 - Embryo Implantation. Embryo-maternal interactions: miRNA and embryo factors; placental development; endometrial cancer
 - Implantation and Placentation. Molecular changes during placentation; pre-eclampsia; post-translational changes during implantation and placentation
- Ovarian Biology – Mechanisms that control egg supply and health during ovarian development and throughout reproductive life. Strategies for preservation of fertility during chemotherapy and radiation treatment
- Gonadal Development – Genetic mechanisms underlying testis and ovary formation in the embryo, to improve diagnosis of disorders of sex development (DSD)
- Male Reproductive Immunology and Inflammation Biology – Understanding immune privilege in reproductive tissues; roles of the 'reproductive hormones' inhibin, activin and follistatin in the control of inflammation and tissue repair; lymphocytes and macrophages in male reproductive function
- Spermatozoal Development – Potential sites of action of male contraception: hormonal regulation of Sertoli cell junctions; minimally invasive diagnostic testing for testicular function
- Brain and Gender Brain sexual differentiation and gender bias in diseases such as Parkinson's disease, ADHD and schizophrenia towards improved therapies.

More information at: <http://hudson.org.au/research-centres/reproductive-health>

FURTHER INFORMATION

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