2024 (& 2023 Mid-Year) HONOURS RESEARCH OPPORTUNITIES GUIDE

Faculty of Health and Medical Sciences

health.adelaide.edu.au

CONTENTS

WHY STUDY HONOURS?

Study with us and open the door to a range of rewarding career opportunities. Become a part of a community of alumni that includes Nobel Prize winners, pioneering researchers and world-renowned leaders in health. Our research programs are held in high regard, their quality and impact respected by peers and the community.

Honours is a one-year qualification studied as an addition to an undergraduate degree. Completing an honours degree provides an opportunity to investigate an area of interest in greater detail. As an extension of an undergraduate degree, honours is recognised as a prestigious qualification and develops specific knowledge and skills in your chosen research field as well as working independently, critical reasoning, scientific writing and presentation. An honours degree will prepare you for further postgraduate study, such as a masters and/or PhD. For those interested in academia or a research-based career, honours is the platform to kick start these professions. The skills and knowledge developed throughout an honours degree are highly transferable and are sought by employees and can provide a distinct point of difference in a competitive job market.

Studying Honours can provide you with the skills and experience to pursue different career opportunities, particularly a career in research. Employers recognise that the research ability and broad range of transferable skills which University of Adelaide graduates possess equip them well for challenging and diverse roles in industry, government and business, as well as in research and academic organisations.

By undertaking a research degree with us, you will be involved in discovery, innovation and cutting-edge research. Our strong focus on addressing global challenges creates a highly stimulating setting for our postgraduate students interested in changing the world.

APPLYING FOR HONOURS

Honours degrees have two intake periods per year: semester 1 and mid-year

For semester 1 entry you are encouraged to apply by 9 December but applications will continue to be accepted up to two weeks before semester commences.

For mid-year entry you are encouraged to apply by 1 July.

The application process varies depending on which degree you are applying for. Choose your desired degree and follow the steps outlined below.

Three easy steps in applying for honours

1

Identify an area of interest

Discover current research opportunities in this publication, or browse our research areas on the **Faculty of Health and Medical Sciences website**.

2

Complete the relevant form

To initiate an expression of interest, download and **complete the relevant form** according to the instructions for the honours program you wish to undertake.

3

Submit

Submit your completed expression of interest, a copy of your academic transcript, and any other additional documents required to **fhsresed@adelaide.edu.au**

Further information

Please note: To be considered for the above scholarships, applicants are strongly encouraged to submit an expression of interest by 30 November (semester 1 start) or July 1 (semester 2 start). All Semester 2 applicants will be ranked with the following years Semester 1 applications.

The University offers **scholarships** to undergraduate students. These scholarships, as well as many others funded by industry and non-profit organisations, are available to potential and currently enrolled students.

Students enrolled in the Bachelor of Medicine and Bachelor of Surgery degree at the University of Adelaide will need to apply for a leave of absence and supply a banding letter. Students can request this by emailing **fhsassessment@adelaide.edu.au**

Are you currently studying at another university?

If you are completing undergraduate studies at another institution, you will need to provide a copy of your academic transcript once your final results are available.

Closing deadlines and next steps

Once final results for the semester are available (in July or December), Honours coordinators will finalise their recommendations for honours projects. Successful students will then be emailed with instructions to submit a formal application for admission to the honours degree via a university internal transfer or, for external applicants, via SAT

AGEING, FRAILTY AND MOBILITY

AGEING, FRAILTY AND MOBILITY RESEARCH GROUPS

An increasing number of Australians are living for several decades beyond their retirement. As such, up to 4 million Australians are predicted to be impacted by frailty by 2050, making it a major personal, public, societal and economic health issue for our community.

Experts from geriatric medicine, general practice, nursing, pharmacy, orthopaedics and rehabilitation medicine, together with researchers in knowledge translation, health economics, epidemiology and demography are working together to identify the prevalence, impact and distribution of frailty in the community and developing health care interventions that are appropriate and translatable to patient care.

Furthermore, researchers are working collaboratively to explore the nature of ageing and frailty in order to develop and deliver models of care—benefiting individuals and our entire community.

Researchers across the faculty are focused on:

- identifying the associations and long-term impact of frailty on health outcomes such as resilience, quality of life, susceptibility to disease complications and disability
- examining the impact of medications on frailty to determine if frailty is a driver of susceptibility to adverse drug events
- understanding the community environment and its contribution to frailty to enable design of new environments that support healthy ageing
- developing and testing frailty health economics models
- developing and testing new interventions and technologies to support, treat and reverse frailty in older people
- identifying early predictors of frailty to evaluate early interventions to minimise or avoid the progression of the individual to frailty
- developing and assessing technologies in hospital to monitor movement and behaviours of elderly patients at high risk of falling to minimise these events.

AGEING, FRAILTY AND MOBILITY RESEARCH OPPORTUNITIES

GENOMICS OF MENTAL WELLBEING AND HEALTHY AGEING — ENABLING RESEARCH GROUP

Lead Researcher: Dr Azmeraw Amare

Contact: azmeraw.amare@adelaide.edu.au

Research Summary

Leveraging genomic data obtained from international biobanks, our research applies advanced bioinformatic techniques to explore the "omics" of (a) risk and pharmacological treatment response to mental health disorders (depression, bipolar disorder, schizophrenia), (b) neurodegenerative disorders (Alzheimer's disease and other dementias), (c) ageing traits (frailty, longevity, cognition and intrinsic capacity) and (d)mechanism of genetic overlap across physical medical and mental health disorders. Specific areas of research include • Pharmacogenomics in the treatment of mental illness • The genomics of risk to mental illness — depression, bipolar disorder, schizophrenia • Mechanism of genetic overlap across physical medical and mental health disorders • The epidemiology of mental illness and effective clinical interventions • Genomics of healthy ageing traits — human intrinsic capacity • Investigate the relationship of human intrinsic capacity with physical and mental health endpoints, including disability, morbidity, and mortality "We have a place for Honours students who are interested in big data analytics — both genetic & clinical data using python or R programming languages. Students with a quantitative science background such as bioinformatics, computer science, mathematics, physics, engineering, Epidemiology/Biostatistics etc. would be appropriate.

For available projects please view Dr Amare Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/azmeraw.amare

Dr Azmeraw Amare

Projects available for

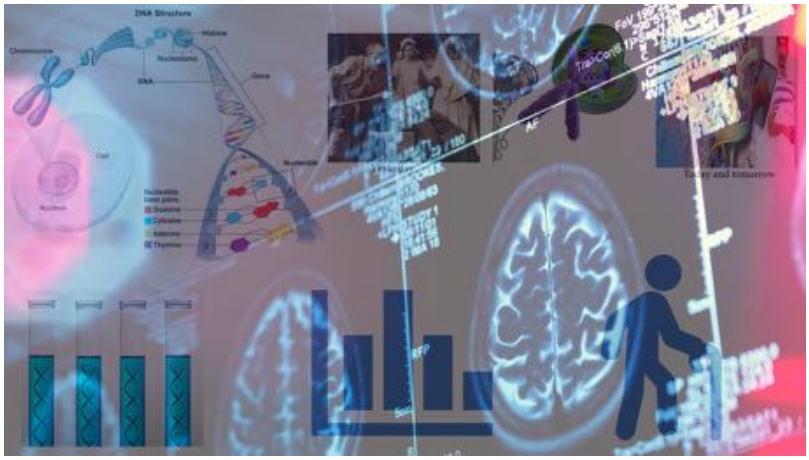
Honours

Category

Dry Lab

Research Areas

Ageing, Frailty and Mobility
Behaviour and Brain Health
Neuroscience
Translational Health Outcomes



NEUROPHYSIOLOGY OF HUMAN MOVEMENT

Lead Researcher: Associate Professor John Semmler

Contact: john.semmler@adelaide.edu.au

Research Summary

Research in this laboratory bridges neuroscience, physiology and exercise science disciplines to examine how the brain controls human movement throughout the life span. We specialise in the use of brain stimulation techniques to painlessly and non-invasively measure how the brain controls skeletal muscles under diverse conditions, such as ageing, exercise, training and disuse. The overall goal is to understand how the healthy nervous system adapts to different challenges, and how it may be boosted to improve motor function in conditions involving brain injury or disease. The three key areas of our research focus are: • Brain plasticity and motor function in older adults • Neurophysiology of exercise and training • Predictors and modulators of motor system plasticity and learning.

For available projects please view A/Prof Semmler Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/john.semmler

A/Prof John Semmler

Projects available for

Honours

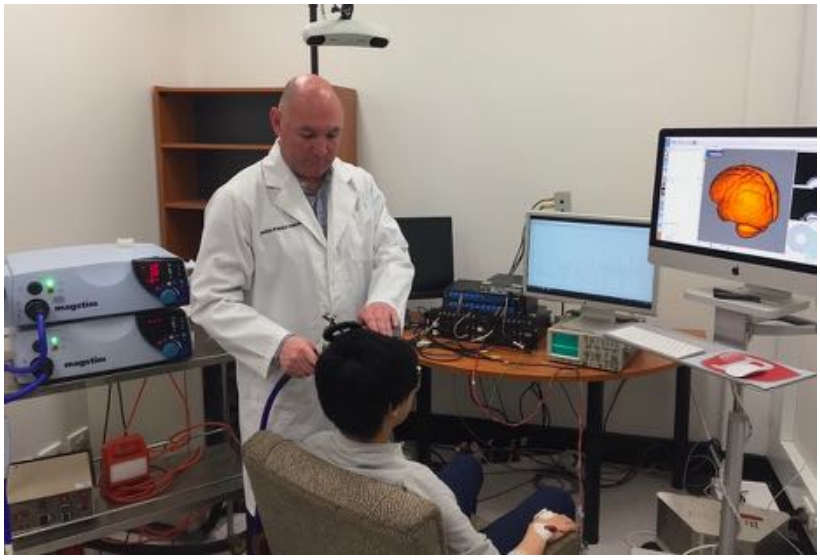
Category

Human Research

Dry Lab

Research Areas

Ageing, Frailty and Mobility
Behaviour and Brain Health
Neuroscience



INTEGRATIVE HUMAN NEUROPHYSIOLOGY

Lead Researcher: Dr Simran Sidhu

Contact: Simran.sidhu@adelaide.edu.au

Research Summary

The research conducted in this laboratory investigates how the central nervous system coordinates the movement of our bodies and how it is reorganised as a consequence of physical activity. The lab focuses on the area of exercise (in)tolerance and exercise related neuroplasticity in healthy, aged, and clinical populations such as Multiple Sclerosis. The research involves the application of non-invasive neurophysiological tools at the cutting edge of integrative neurophysiology, for e.g. transcranial magnetic stimulation and transcranial direct current stimulation.

For available projects please view Dr Sidhu Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/simran.sidhu

Dr Simran Sidhu

Projects available for

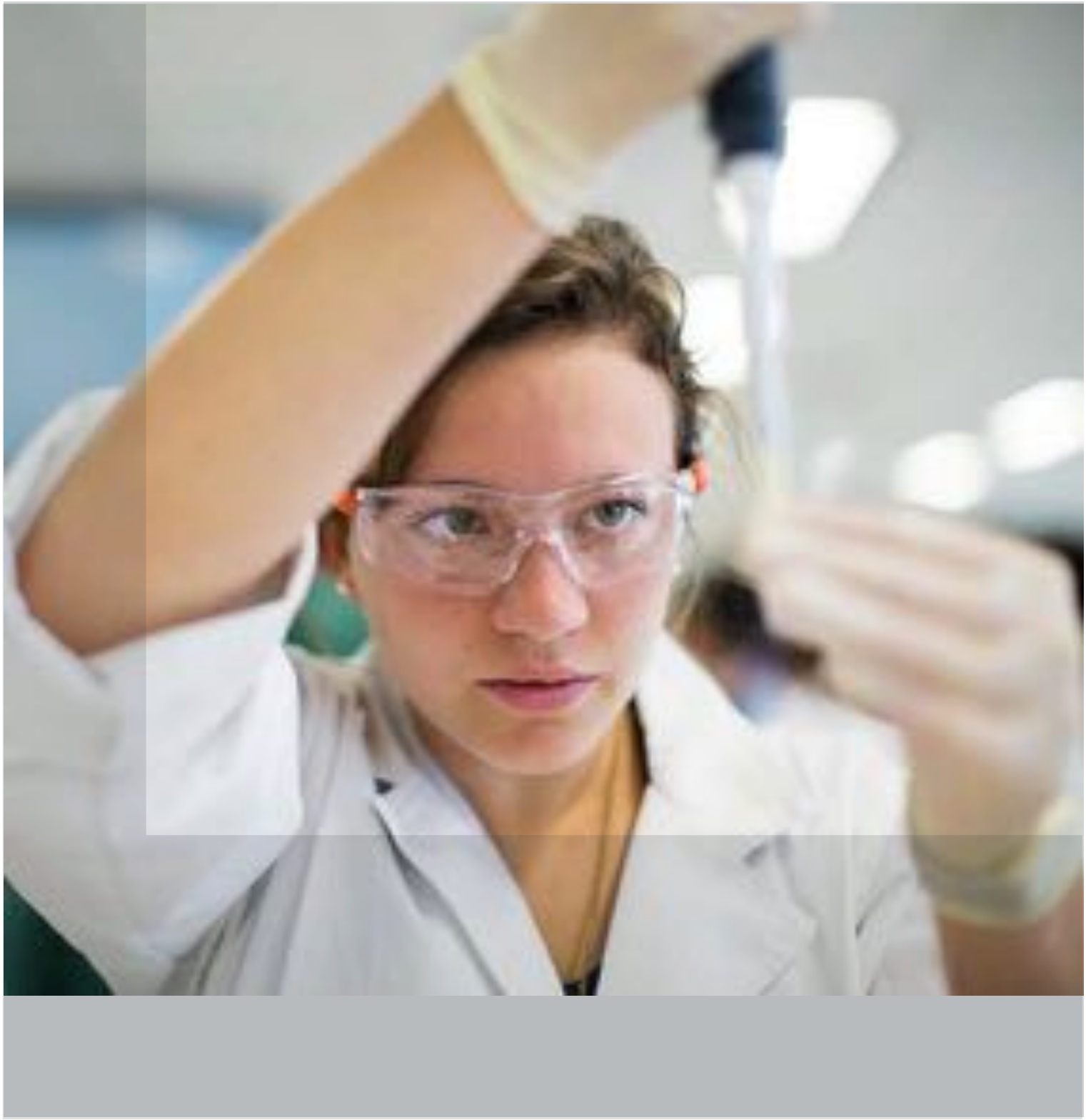
Honours

Category

Human Research

Research Areas

Ageing, Frailty and Mobility
Behaviour and Brain Health
Neuroscience



CANCER BIOLOGY AND CLINICAL ONCOLOGY

CANCER BIOLOGY AND CLINICAL ONCOLOGY RESEARCH GROUPS

Cancer is a general term for more than 100 diseases that are characterised by the abnormal growth of cells. Cancer affects a large portion of Australians, with one in two diagnosed by the age of 85.

Our cancer biology research seeks to understand the fundamental mechanisms by which cancers arise, progress and respond to treatment.

Clinical oncology consists of three primary disciplines: medical oncology (the treatment of cancer with medicine, including chemotherapy); surgical oncology (the surgical aspects of cancer, including biopsy, staging, and surgical resection of tumours); and radiation oncology (the treatment of cancer with therapeutic radiation).

Understanding the causes of cancer will enable the development of innovative approaches to treat both liquid cancers (leukaemia and myeloma) and solid cancers (breast, prostate, ovarian and gastrointestinal cancer).

Researchers across the faculty are focused on:

- identifying the molecular and cellular basis of cancer
- developing preclinical models that closely resemble human cancer
- understanding the mechanisms involved in cancer spread and resistance to chemotherapy
- identifying novel biomarkers for detection of cancer
- developing and evaluating new drugs to treat cancer.

CANCER BIOLOGY AND CLINICAL ONCOLOGY RESEARCH OPPORTUNITIES

ACUTE LYMPHOBLASTIC LEUKAEMIA (ALL) - CANCER PROGRAM / PRECISION MEDICINE THEME - SAHMRI

Lead Researcher: Professor Deborah White

Contact: deborah.white@sahmri.com

Professor Deborah White

Research Summary

Acute Lymphoblastic Leukaemia (ALL) is the most common childhood cancer and leading cause of non-traumatic death in children. Adolescents and young adults (AYA) with ALL the therapeutic outcomes are poor. Most older adults will die of their disease.

The recent wealth of genomic information has seen the emergence of new lesions known to confer high-risk, and other recurrent fusions and gene deletions for which the biological and clinical implications remain unclear. Further, recent studies have implicated the human microbiome in ALL development, treatment response and life-long comorbidities. The major challenge is to incorporate knowledge gained through Next Generation Sequencing (NGS) into clinical care and to systematically identify druggable targets and rational effective therapies to improve patient outcomes. To add to the complexity of therapeutic choice in ALL, immunotherapies (bi-specific T-cell engagers (BiTEs) and CAR-T cells), have shown efficacy in the relapsed/refractory setting, as a transplantation bridge. However, not all high-risk/relapsed ALL patients are eligible for immunotherapy, ~50% of patients experience severe hypersensitivity reactions and the long-term clinical sequelae remains unknown. Our laboratory is the National Referral Centre for genomic screening of ALL cases across all age groups, as such we sequence a large number of patients and have identified a significant number of alterations and novel gene fusions for investigation.

For available projects please view Professor White's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/deborah.l.white

Projects available for

Honours

Category

Wet Lab

Research Areas

Cancer Biology and Clinical Oncology

Innovative Therapeutics

Members of the ALL Cancer Program

ACUTE LYMPHOBLASTIC LEUKAEMIA GROUP

Lead Researcher: Dr Elyse Page

Contact: elyse.page@adelaide.edu.au

Research Summary

Children with Down Syndrome (DS) have a 20-fold increased risk of developing acute lymphoblastic leukaemia. While chemotherapy is the most effective treatment for childhood leukaemia, children with DS experience treatment related toxicity, and lower survival rates. Therefore, there remains an urgent need to design new treatment strategies. Chromosome 21 is the most common chromosomal gain in ALL, therefore this study will also apply to an additional 30% of children with ALL who harbour +21 or iAMP21. It is essential to understand how the different genomic mutations or abnormally expressed proteins drive the growth of leukaemia. This research project studies predisposing factors to leukaemia development and investigates gene, protein and epigenomic interactions in childhood leukaemia. This information will help us to identify new therapeutic targets and discover which drugs may aid in the cure of disease. Importantly, many drugs that target these genomic abnormalities are in use for other diseases and are safe. Through the use of a targeted therapy, there is the potential to decrease the dosage of the toxic chemotherapy to improve treatment efficacy for children with leukaemia.

For available projects please view Dr Page's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/elyse.page

Projects available for

Honours

Category

Wet Lab

Research Areas

Cancer Biology and Clinical Oncology

Translational Health Outcomes

Dr Elyse Page

Lead Researcher: Dr Laura Eadie

Contact: laura.eadie@adelaide.edu.au

Research Summary

T-cell Acute Lymphoblastic Leukaemia (T-ALL) is a genomically complex, high-risk disease affecting children and adults. More effective, targeted treatments are urgently required to avert resistance and relapse. My research comprises part of a larger program that fulfils an un-met pre-clinical need by providing validated, targeted therapies for T-ALL patients based on their individual disease.

Recurring, rare and novel oncogenic mutations are increasingly identified through comprehensive next generation sequencing, however, only the most recurrent mutations have been studied in isolation. We know co-occurring mutations interact, so treating patients with a single therapy arm (eg: chemotherapy) often fails to yield true clinical benefit and disease relapse is common.

To maximise clinical impact, better understanding of the functional interplay between multiple co-occurring mutations is required, so we can devise targeted combination treatment approaches. I have curated the largest T-ALL patient cohort, with accompanying genomic sequencing analyses, in Australia. My team uses in vitro and in vivo models together with transcriptomic sequencing, to model how different mutations cooperate and drive disease. This program will contribute to the assembly of an arsenal of potential treatments for specific high-risk genomic subtypes in order to realise precision medicine for Australians with T-ALL.

For available projects please view Dr Eadie's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/laura.eadie

Projects available for

Honours

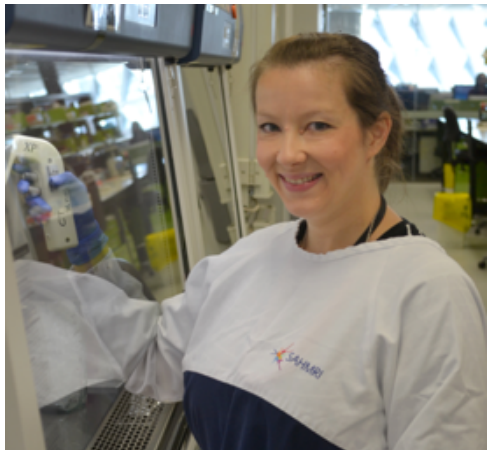
Category

Wet Lab

Research Areas

Cancer Biology and Clinical Oncology Innovative

Therapeutics



Dr Laura Eadie

ACUTE LYMPHOBLASTIC LEUKAEMIA GROUP

Lead Researcher: Dr Sue Heatley

Contact: sue.heatley@adelaide.edu.au

Research Summary

While cure rates in children with acute lymphoblastic leukaemia (ALL) now exceed 85%, the incidence in adolescents and young adults has been increasing over the last decade. High-risk ALL is further complicated by the heterogenous nature of the disease. Relapsed ALL remains a significant challenge, however as treatment strategies move towards personalised medicine, it is important to identify the driving feature of the disease at diagnosis and whether this contributes to treatment failure. An in-depth characterisation of these targetable of these targetable genomic fusions will enhance the clinical application of anti-leukaemic drugs in the immediate future. Many patients, in addition to gene fusions, have other genomic alterations that may be pathogenic. We have identified new alterations that may contribute to relapse and novel treatment options through re-purposing already available drugs. My research has focussed on understanding the contribution of additional lesions to an already high-risk subtype and whether these lesions are drivers or passengers of disease and/or relapse with the ultimate goal of improving survival rates in patients with B-ALL..

For available projects please view Dr Heatley's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/sue.heatley

Dr Sue Heatley

Projects available for

Honours

Category

Wet Lab

Human Research

Research Areas

Cancer Biology and Clinical Oncology

Translational Health Outcomes

Innovative Therapeutics

CANCER TREATMENT TOXICITIES GROUP

Lead Researcher: Professor Joanne Bowen

Contact: joanne.bowen@adelaide.edu.au

Professor Joanne Bowen

Research Summary

The group investigates underlying mechanisms and treatments for some of the most common toxicities of cancer therapies, including diarrhoea, bone loss, and neuroinflammation. My particular interest is how the gastrointestinal tract responds to exposure to chemotherapy, radiation and small molecule inhibitors used in treatment of solid tumours. Current projects focus on establishing new interventions for mitigation of gastrointestinal side effects that target interactions between the gut microbiome and immune system at the level of the mucosal barrier. We work with industry partners and conduct studies from the in vitro level through to clinical trials.

For available projects please view Associate Professor Bowen's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/joanne.bowen

Projects available for

Honours

Category

Wet Lab

Human Research

Research Areas

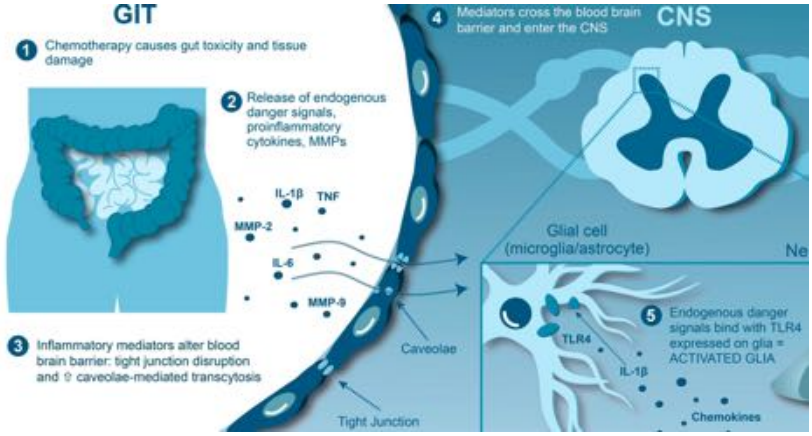
Cancer Biology and Clinical Oncology

Neuroscience, Behaviour

Nutrition and Metabolic Health

Brain Health

Oral Health



Members of the Cancer Treatment Toxicities Group

MYELOMA RESEARCH LABORATORY

Co-Lead Researchers: -Professor Andrew Zannettino

-Dr Kate Vandyke

Contact: andrew.zannettino@adelaide.edu.au

kate.vandyke@adelaide.edu.au

Research Summary

The Myeloma Research Laboratory within SAHMRI, has a team of senior researchers whose efforts are primarily focused on the bone marrow cancer multiple myeloma (MM). MM is a haematological malignancy characterised by the clonal proliferation of plasma cells, a cell type that normally protects against infection. MM is the second most common blood cancer, with more that 140,000 people diagnosed annually worldwide. Despite recent advances, myeloma remains universally fatal and has a 10-year survival rate of 28%.

Research projects focus on: a mechanistic understanding of intrinsic (cancer cell specific) and extrinsic (tumour microenvironment derived) drivers of myeloma tumour growth and spread; elucidation of novel blood-based biomarkers of disease progression; discovery of new therapeutic targets and novel drug delivery systems. Research is also being conducted on skeletal mesenchymal stem cell biology, bone development, acute lymphoblastic leukaemia, and metastatic breast cancer. The endocrine properties of bone marrow cells are also being investigated, together with novel approaches to treat diet- induced insulin resistance.

We use multi-faceted research approaches including: analyses of human patient samples, cell and molecular biology, genomics/ proteomics, complex bioinformatics, and mouse models of cancer and metabolic disease.

For available projects please view individual Researcher Profiles under "My Research"

researchers.adelaide.edu.au/profile/duncan.hewett

researchers.adelaide.edu.au/profile/kate.vandyke

researchers.adelaide.edu.au/profile/stephen.fitter

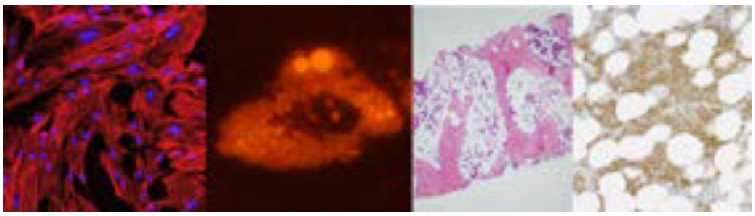
researchers.adelaide.edu.au/profile/melissa.cantley

researchers.adelaide.edu.au/profile/jacqueline.noll

researchers.adelaide.edu.au/profile/bill.panagopoulos

researchers.adelaide.edu.au/profile/krzysztof.mrozik

Members of the Myeloma Research Laboratory, SAHMRI



Bone Marrow Images. L to R: mesenchymal stem cells, adipocytes, myeloma patient trephine, malignant plasma cells (brown).

Projects available for

Honours

Category

Wet Lab

Human Research

Dry Lab

Research Areas

Cancer Biology and Clinical Oncology

Innovative Therapeutics

Nutrition and Metabolic Health Translational

Health Outcomes

PROSTATE CANCER RESEARCH GROUP

Lead Researcher: Professor Lisa Butler

Contact: lisa.butler@adelaide.edu.au

Research Summary

Prostate cancer is a major public health issue, killing approximately 3,300 men in Australia annually. The Prostate Cancer Research Group (PCRG) is tackling localised and metastatic prostate cancer by developing more robust diagnostic tests, biomarkers for responsiveness to current treatments and new drugs for clinical development. Professor Lisa Butler leads the PCRG which consists of some 18 researcher, support staff, PhD and honours students.

Visit the Prostate Cancer Research Group for more information: https://health.adelaide.edu.au/our-research/prostate-cancer-research-group

For available projects please view individual Researcher Profiles under "My Research"

researchers.adelaide.edu.au/profile/lisa.butler

researchers.adelaide.edu.au/profile/zeyad.nassar

researchers.adelaide.edu.au/profile/maggie.centenera

Projects available for

Honours

Category

Wet Laboratory; Human Research

Research Areas

Cancer Biology and Clinical Oncology

Innovative Therapeutics

Translational Health Outcomes

Professor Lisa Butler

REPRODUCTIVE CANCER RESEARCH GROUP

Lead Researcher: Dr Carmela Ricciardelli

Contact: carmela.ricciardelli@adelaide.edu.au

Research Summary

Dr Ricciardelli's current research focuses on further understanding the cross-talk between ovarian cancer cells and the tumour microevironment. The Reproductive Cancer Group seeks to understand the mechanisms involved in ovarian cancer spread, resistance to chemotherapy and the identification of novel biomarkers for early detection.

For available projects please view Dr Carmela Ricciardelli's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/carmela.ricciardelli

Projects available for

Honours

Category

Wet Laboratory

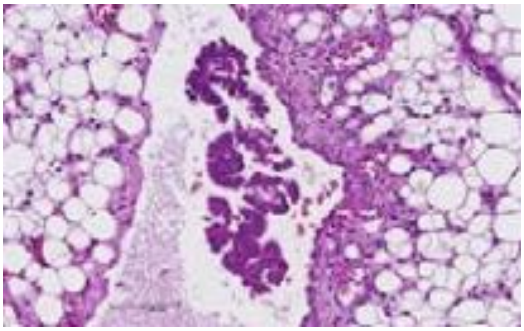
Research Areas

Cancer Biology and Clinical Oncology Translational

Health Outcomes

Fertility and Conception

Dr Carmela Ricciardelli



Ovarian cancer peritoneal implant

CARDIAC, RESPIRATORY AND VASCULAR HEALTH

CARDIAC, RESPIRATORY AND VASCULAR HEALTH RESEARCH GROUPS

Healthy heart, lungs, arteries and veins are vital to overall good health. Despite being largely preventable, cardiovascular disease is one of Australia's leading health problems, affecting one in six people and accounting for nearly 30% of deaths.

Our researchers conduct interdisciplinary research to understand the mechanisms which underlie the development of coronary heart disease, peripheral arterial disease, and vascular and heart rhythm disorders. Utilising the skills of physicians, bioengineers, research scientists and computational modelers, research is focused on translating biomedical discoveries to clinical practice.

Furthermore, researchers undertake clinical trials and epidemiological studies into cardiovascular disorders with the objective of improving health outcomes for patients.

Researchers across the faculty are focused on:

- understanding the molecular and cellular mechanisms underlying cardiac and vascular disorders including peripheral arterial disease, atherosclerosis and cardiac arrhythmias
- exploring the relationship between atrial fibrillation, blood clotting and stroke
- developing improved cardiovascular imaging and disease detection methods
- understanding the relationship between high density lipoproteins (HDL) and cardiovascular risk
- developing strategies to modify cardiovascular risk through the control of obesity and obesity-related conditions
- applying evidence-based medicine, recommendations and guidelines to target education and improve health outcomes for at risk cardiac patients
- developing new approaches to treat airway inflammation in asthma and chronic obstructive pulmonary disease (COPD)
- developing cell and gene therapy approaches for diseases affecting lung blood vessels (pulmonary hypertension) and lung transplant.

CARDIAC, RESPIRATORY AND VASCULAR HEALTH RESEARCH OPPORTUNITIES

NORTHERN CARDIOVASCULAR RESEARCH GROUP

Lead Researcher: Associate Professor Margaret Arstall
Contact: **margaret.arstall@sa.gov.au**
prabha.andraweera@adelaide.edu.au
emily.aldridge@adelaide.edu.au
melanie.wittwer@adelaide.edu.au
maleesa.pathirana@adelaide.edu.au

Research Summary

Our research group aims to improve outcomes for people with cardiovascular disease in northern Adelaide. Our main research themes include management of coronary heart disease, pregnancy complications and postpartum health, and heart disease in women. We are a passionate team of clinicians and scientists with a strong focus on collaborative clinical research in a hospital setting. The diversity of our research strengths and methods means that there are many opportunities for students to explore and develop their own research interests. Our group currently has more than 15 projects ranging from observational clinical studies, laboratory and banking projects, clinical trials, and registries. Specific projects can be viewed with the research profiles of our team under "My Research": Margaret Arstall, Prabha Andraweera, Emily Aldridge, Melanie Wittwer, Maleesa Pathirana

researchers.adelaide.edu.au/profile/margaret.arstall

researchers.adelaide.edu.au/profile/prabha.andraweera

researchers.adelaide.edu.au/profile/emily.aldridge

researchers.adelaide.edu.au/profile/melanie.wittwer

researchers.adelaide.edu.au/profile/maleesa.pathirana

Projects available for

Honours

Category

Wet Lab

Systematic Reviews

Human Research

Research Areas

Cardiac, Respiratory and Vascular Health

Pregnancy and Birth

Members of the Northern Cardiovascular Research Group

PSALTIS GROUP, VASCULAR RESEARCH CENTRE, LIFELONG HEALTH THEME

Lead Researcher: Associate Professor Peter Psaltis

Contact: peter.psaltis@adelaide.edu.au

Research Summary

Our group undertakes basic, translational, and clinical research on vascular and immune stem cells, macrophage and vascular biology, inflammatory regulators of atherosclerosis, pharmacological modulation of atherosclerosis, biomarkers of coronary artery disease and coronary plaque imaging. We use animal models, cell culture systems and human clinical specimens for research. We employ cutting-edge technologies such as single cell RNA sequencing, multi-coloured flow cytometry and mitochondrial metabolism assays for basic research and optic coherence tomography (OCT) for translational research. We have led and are contributing to multiple clinical trials for clinical research. Honours projects with our group are available to explore the following topics:

-Human EndoMac Progenitor cells – Isolation and characterization

Blood vessel formation is essential for tissue development, growth, and repair. Macrophages and endothelial cells play interlinked roles in blood vessel formation. In adult tissues, these cell types are thought to originate independently of each other. We have discovered unique adult stem cells in mouse tissues termed Endothelial-Macrophage (EndoMac) progenitor cells that give rise to both macrophages and endothelial cells and contribute to blood vessel formation after tissue injury. We have found analogous cells in human tissues. This project aims to isolate, characterise, and investigate the properties of human EndoMac progenitor cells, for therapeutic manipulation.

-Effect of high glucose on EndoMac progenitor cells

Diabetes impairs wound healing and revascularisation of ischaemic tissue, as hyperglycemia affects blood vessel formation. We have found hyperglycemia to dampen the vasculogenic capacity of mouse EndoMac progenitor cells after tissue injury. This project will investigate the metabolic effects of high glucose on mouse EndoMac progenitor cells and their properties, for pharmacological intervention.

Supervisors: Peter Psaltis, Shiwani Sharma, Sanuri Liyanage
Projects available for: Honours and Masters
Location: South Australian Health and Medical Research Institute
Research projects start: Semester 1 and 2

For available projects please view Associate Professor Psaltis' Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/peter.psaltis

Projects available for

Honours

Category

Wet lab

Human Research

Research Areas

Cardiac, Respiratory and Vascular Health

Immunology and Infection

Translational Health Outcomes

Innovative Therapeutics

Members of the Vascular Research Centre

TRANSLATIONAL VASCULAR FUNCTION RESEARCH COLLABORATIVE

Lead Researcher: : Professor John Beltrame

Contact: john.beltrame@adelaide.edu.au

Research Summary

The Translational Vascular Function Research Collaborative located at The Basil Hetzel Institute undertakes basic, clinical trials and epidemiological studies into cardiovascular disorders with the objective of improving the health outcomes of these patients. We aim to conduct interdisciplinary research using a collaborative approach, with results being directly integrated into clinical practice. The research group includes both physicians and medical scientists. The integrative nature of the group provides a unique opportunity to ensure that innovations are translated from bench to bedside to improve health care quality, outcomes and aid clinicians through shared decision making. We welcome new students to join our group where they can be involved in a diverse range of projects with diverse opportunities. We offer exceptional supervising and mentoring and provide opportunities for students to participate in vacation research electives, Honours or PhD programs. For more information please visit: https://www.basilhetzelinstitute.com.au/research/research-theme/cardiovascular-disease/tvfrc/

Our team consists of both physicians and medical scientists located at the Basil Hetzel Institute, University of Adelaide Medical School, and various teaching hospitals. The integrative nature of the group ensures that our innovative research is translated from bench to bedside to health outcome's as well as the reverse.

For available projects please view Professor Beltrame's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/john.beltrame

Projects available for

Honours

Category

Wet Lab

Dry Lab

Human Research

Research Areas

Cardiac, Respiratory and Vascular Health

Translational Health Outcomes

Members of the Translational Vascular Function Research Collaborative based at the Basil Hetzel Institute for Translational Health Research

Lead Researcher: : Dr Sivabaskari Pasupathy

Contact: sivabaskari.pasupathy@adelaide.edu.au

Research Summary

Coronary artery disease (CAD) is a condition in which there is an inadequate supply of blood and oxygen to the myocardium. It mostly results from occlusion of the coronary arteries and results in a demand-supply mismatch of oxygen. It is a cause of major morbidity and mortality in Australia and worldwide. The diagnosis and management of acute and chronic obstructive CAD is well established in clinical guidelines and often involves coronary angiography determining the severity of CAD and their management. However, 30-50% of these coronary angiogram procedures demonstrate NO OBSTRUCTIVE CAD to account for the patients' symptoms. These patients are now labelled as NOCA (Non Obstructive Coronary Artery) syndromes, and typically been overlooked and misdiagnosed as 'non-cardiac chest pain'. However, studies have demonstrated that the symptoms may arise from coronary vasomotor disorders not evident on coronary angiography. We have created the term MINOCA (Myocardial Infarction with Non Obstructive Coronary Arteries) to highlight the acute NOCA syndromes and the term INOCA (Ischaemic with Non-Obstructive Coronary Arteries) to describe the chronic NOCA syndromes. In both of these NOCA syndromes, coronary vasomotor disorders (ie large vessel coronary spasm and/or coronary microvascular dysfunction) may be responsible for the clinical presentation. Our group is recognised as international leaders in this field. Our group has recently assembled a national research team to form a Centre of Research Excellence, with established international collaborations. Our projects are designed to investigate clinical characteristics of these patients, quality of life improvement, clinical trials, genetic studies and personalized medicine approaches.

Projects available for

Honours

Category

Dry Lab

Human Research

Research Areas

Cardiac, Respiratory and Vascular Health Translational

Health Outcomes

Dr Sivabaskari Pasupathy

CHILD AND ADOLESCENT HEALTH

CHILD AND ADOLESCENT HEALTH RESEARCH GROUPS

Research is ongoing to detect, prevent and treat the many chronic physical and mental disorders that originate in childhood, to improve the health of all children and adolescents.

Internationally, the Robinson Research Institute is known for achieving advances in childhood and adolescent mental health and diabetes. It is also recognised nationally as being at the forefront of immunisation research.

The Robinson Research Institute leads our child and adolescent health research, and an in-depth explanation of this research area is available on the **Robinson Research Institute's website**.

CHILD AND ADOLESCENT HEALTH RESEARCH OPPORTUNITIES

CYSTIC FIBROSIS AIRWAY RESEARCH GROUP (CFARG) AND RESPIRATORY X-RAY IMAGING LABORATORY (REXIL)

Lead Researcher: Associate Professor Martin Donnelley

Contact: **martin.donnelley@adelaide.edu.au**

Research Summary

The CFARG and ReXIL teams focus on developing genetic therapies for cystic fibrosis airway disease, as well as X-ray based outcome measures for assessing efficacy. We offer a range of projects across these spaces, and typically have wet-lab, animal-work and computer-based imaging projects on offer.

For available projects please view A/Professor Donnelley's Researcher Profile under "My Research":
researchers.adelaide.edu.au/profile/martin.donnelley

Projects available for

Honours

Category

Wet lab

Dry lab

Research Areas

Child and Adolescent Health

Members of CFARG and REXIL

DISCIPLINE OF PSYCHIATRY

Lead Researcher: Associate Professor Scott Clark

Contact: **scott.clark@adelaide.edu.au**

Research Summary

The Discipline of Psychiatry leads cutting edge studies exploring 5 main domains: 1) The aetiology and pathophysiology of psychiatric disorders and associated deficits in cognition and function 2) The determinants of normal cognitive function 3) The mechanisms of pharmacological and non-pharmacological treatments 4) Clinical trials of novel treatments for mental illness 5) The determinants of physical health outcomes in people with Mental Illness. We carry out laboratory based (human, animal, cellular) -omic analysis, brain imaging and EEG, digital data including actigraphy, ecological monetary assessments, facial and speech recognition, machine learning and bioinformatics. We collaborate internationally with large consortia such as NIMH AMP-Schizophrenia, ABCD, the UK-Biobank and ConLiGen to access complex multimodal data for analysis. We work with National trials networks such as MAGNET and APECC to implement cutting edge clinical trials of novel interventions including neurostimulation, VR and new pharmacological agents. We use rich data to build models for treatment stratification for personalised approaches to mental health care. We work with local service data and international consortia (Global Burden of Disease Study) to identify opportunities to reduce adverse impacts of mental health treatments and to improve physical health outcomes. For available projects please view A/Professor Clark's Researcher Profile under "My Research":
researchers.adelaide.edu.au/profile/scott.clark

Projects available for

Honours

Category

Wet lab; Dry lab;

Systematic Review;

Human Research

Meta-analysis

Research Areas

Child and Adolescent Health;

Neuroscience;

Behaviour and Brain Health;

Translational Health Outcomes;

Innovative Therapeutic

A/Prof Scott Clark

RMNCAH&N CONTINUUM OF CARE

Lead Researcher: Associate Professor Zohra Lassi

Contact: zohra.lassi@adelaide.edu.au

Research Summary

My research interests include Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition particularly in marginalised and low-resourced settings. I have a special interest in research synthesis, scaling up evidence-based interventions in community settings, and implementation research in the health system. My program of work is built upon my established multidisciplinary international research collaborations and focuses on identifying opportunities to improve the sexual and reproductive health of adolescents living in Australia and other parts of the world. This involves working with adolescents and health services to co-design and test new strategies to deliver sexual and reproductive health interventions and services that are specifically focused on the needs of young people. For available projects please see Dr Lassi's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/zohra.lassi

A/Prof Zohra Lassi

Projects available for

Honours

Category

Human Research

Systematic Review

Meta-analysis

Research Areas

Child and Adolescent Health, Pregnancy and Birth, Translational Health Outcomes, Nutrition and Metabolic Health

EARLY ORIGINS OF HEALTH

EARLY ORIGINS OF HEALTH RESEARCH GROUPS

The health trajectory of every child—including their metabolic, cardiovascular, immune and reproductive health, and neurological function—is profoundly influenced by their parents' health and wellbeing prior to conception, throughout pregnancy, and during early postnatal life.

The Robinson Research Institute leads our research in the early origins of health and is well placed to tackle this challenge, having conducted some of the largest trials in the world investigating interventions in pregnant women and newborn infants to improve outcomes for the mother and child.

A more in-depth explanation of this research area is available on the **Robinson Research Institute's website**.

EARLY ORIGINS OF HEALTH RESEARCH OPPORTUNITIES

EARLY ORIGINS OF HEALTH & DISEASE RESEARCH GROUP

Lead Researcher: Associate Professor Kathy Gatford

Contact: kathy.@adelaide.edu.au

Research Summary

I am an Associate Professor in the Adelaide Medical School and lead the Early Origins of Adult Health & Disease Research Group in the Robinson Research Institute at the University of Adelaide. My research focuses on understanding how the early life environment programs subsequent health including metabolic homeostasis, lung function, neurodevelopment and immunity, and testing interventions to prevent adverse effects of poor pregnancy in pre-clinical models. This work will be translated to improve both human pregnancy outcomes and progeny health, and animal well-being and productivity. Associate Professor

For available projects please view A/Prof Gatford's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/kathy.gatford

A/Prof Kathy Gatford

Projects available for

Honours

Category

Wet Lab; Dry Lab

Research Areas

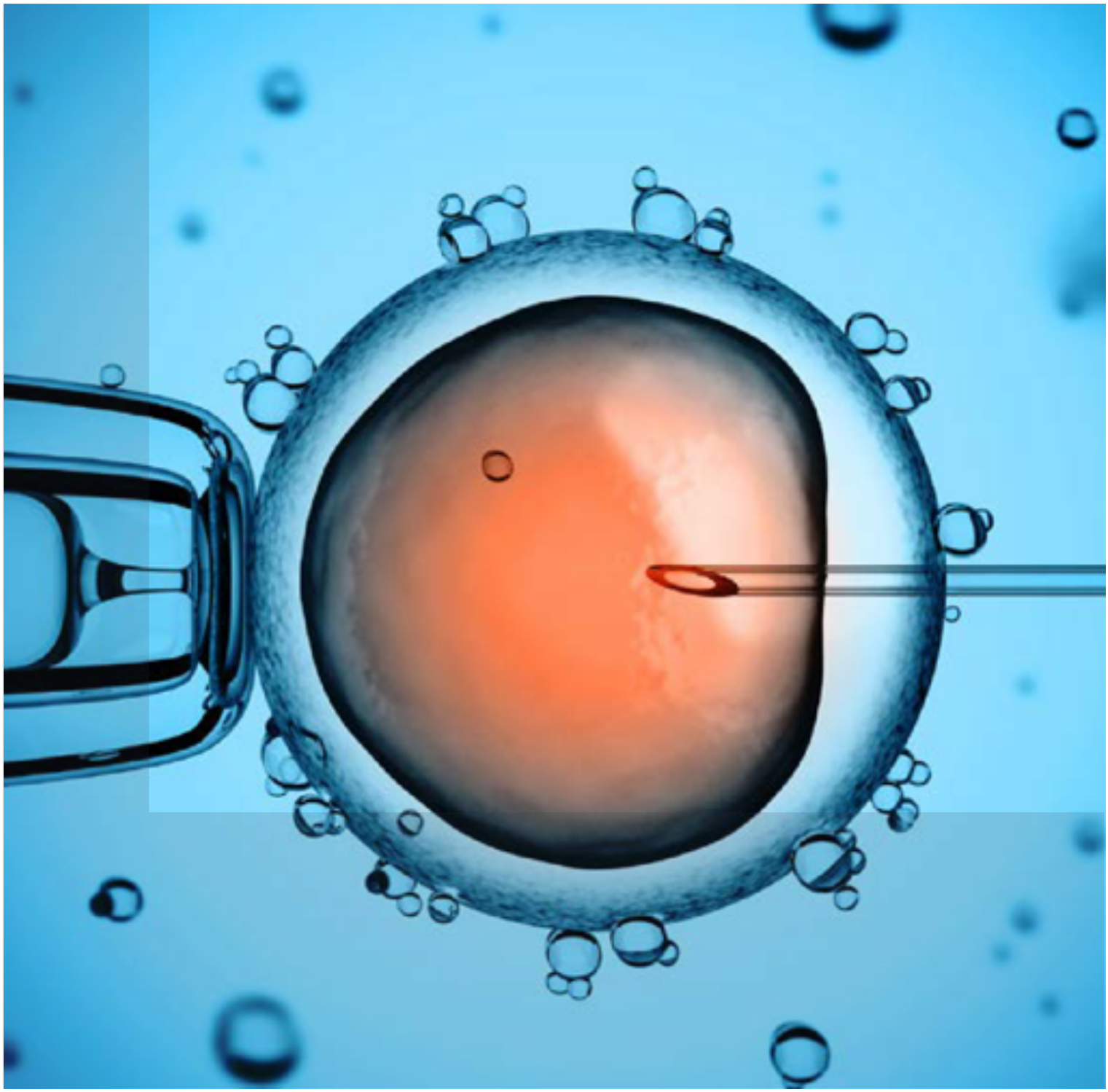
Early Origins of Health

Pregnancy and Birth

Innovative Therapeutics

Cardiac, Respiratory and Vascular Health

Members of the Early Origins of Healthand Disease Research Group



FERTILITY AND CONCEPTION

FERTILITY AND CONCEPTION RESEARCH GROUPS

Conception is the foundation event for each new life, with every child's development, growth trajectory and health over the life course set in motion from the moment sperm and oocyte unite to form an embryo.

Our research in this area is led by the Robinson Research Institute, which is internationally recognised for its work in fertility and conception. A more in- depth explanation of t**his research area is available on the Robinson Research Institute's website.**

FERTILITY AND CONCEPTION RESEARCH OPPORTUNITIES

MALE REPRODUCTIVE LIFE COURSE

Lead Researcher: Dr Nicole McPherson

Contact: nicole.mcpherson@adelaide.edu.au

Research Summary

We now know that the responsibilities of fatherhood start well before conception. Obesity and chronic disease in men, whilst known to impact their own fertility, also extends to the disease burden in their children. Promoting 'healthy paternity' may motivate men to improve their own health and in doing so, intervene in the transfer and amplification of chronic disease and reproductive ill-health in the next generation. Our research examines the biology of how disease risk is transferred via sperm and uses this knowledge to develop tests of risk and interventions for use in IVF practice and for family planning.

For available projects please see Dr McPherson's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/nicole.mcpherson

Projects available for

Honours

Category

Wet lab

Human Research

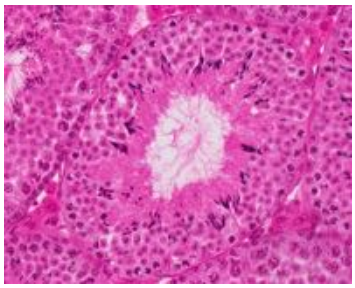
Research Areas

Fertility and Conception

Pregnancy and Birth

Nutrition and Metabolic Health

Men's Health



Stage 3 of spermatogenesis

Dr Nicole McPherson

OVARIAN CELL BIOLOGY AND EMBRYOLOGY

Lead Researcher: Professor Rebecca Robker

Contact: rebecca.robker@adelaide.edu.au

Research Summary

Our team is discovering the processes by which cells in the ovary nurture the oocyte and trigger its release at ovulation, and elucidating key events that control fertilisation and the earliest stages of embryo development. A diverse range of projects are focused on 1) discovering fundamental biology that controls the generation of new life; 2) developing new therapies for infertility and new contraceptives; 3) understanding how preconception health in parents (nutrition, age and toxicant exposure) shapes epigenetic reprogramming and lifelong health trajectories of offspring. Our state-of-the art facilities at AHMS use cutting-edge techniques and advanced core facilities. We use unique mouse models and cell culture, high-resolution confocal microscopy and image analysis to interrogate biological questions on a molecular level. We use timelapse video microscopy, sequencing and cellular phenotyping to monitor embryo development and then correlate these measures with later postnatal growth. We have established collaborations with local fertility clinics where we are uncovering the biology of human oocytes and sperm and determining how gamete quality influences early embryo development and pregnancy initiation. Each project is designed in consultation with prospective students according to their interests, expertise and career goals. We encourage students to meet with us and discuss the possibilities.

For available projects please view Professor Robker's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/rebecca.robker

Projects available for

Honours

Category

Human Research

Wet Lab

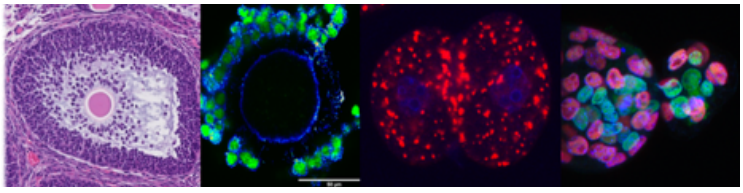
Research Areas

Fertility and Conception

Early Origins of Health

Innovative Therapeutics

Professor Rebecca Robker



REPRODUCTIVE SUCCESS

Lead Researcher: Dr Kylie Dunning

Contact: kylie.dunning@adelaide.edu.au

Research Summary

In our team we use safe, cutting-edge, light-based technologies (also referred to as photonics) to better understand the biology that underpins successful development of the oocyte (egg) and early embryo. With one-in-six Australian couples struggling to start a family without medical intervention, we are committed turning our laboratory discoveries into impact for these couples, engaging early and often with clinical experts to address the greatest clinical challenges.

For available projects please view Dr Dunning's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/kylie.dunning

Projects available for

Honours

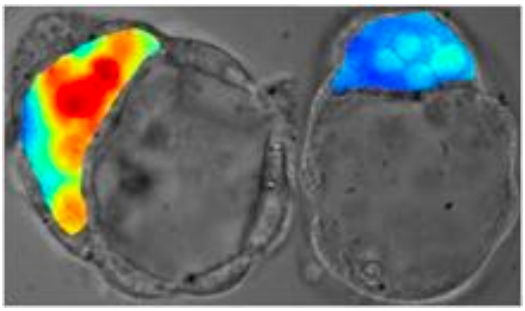
Category

Wet lab

Research Areas

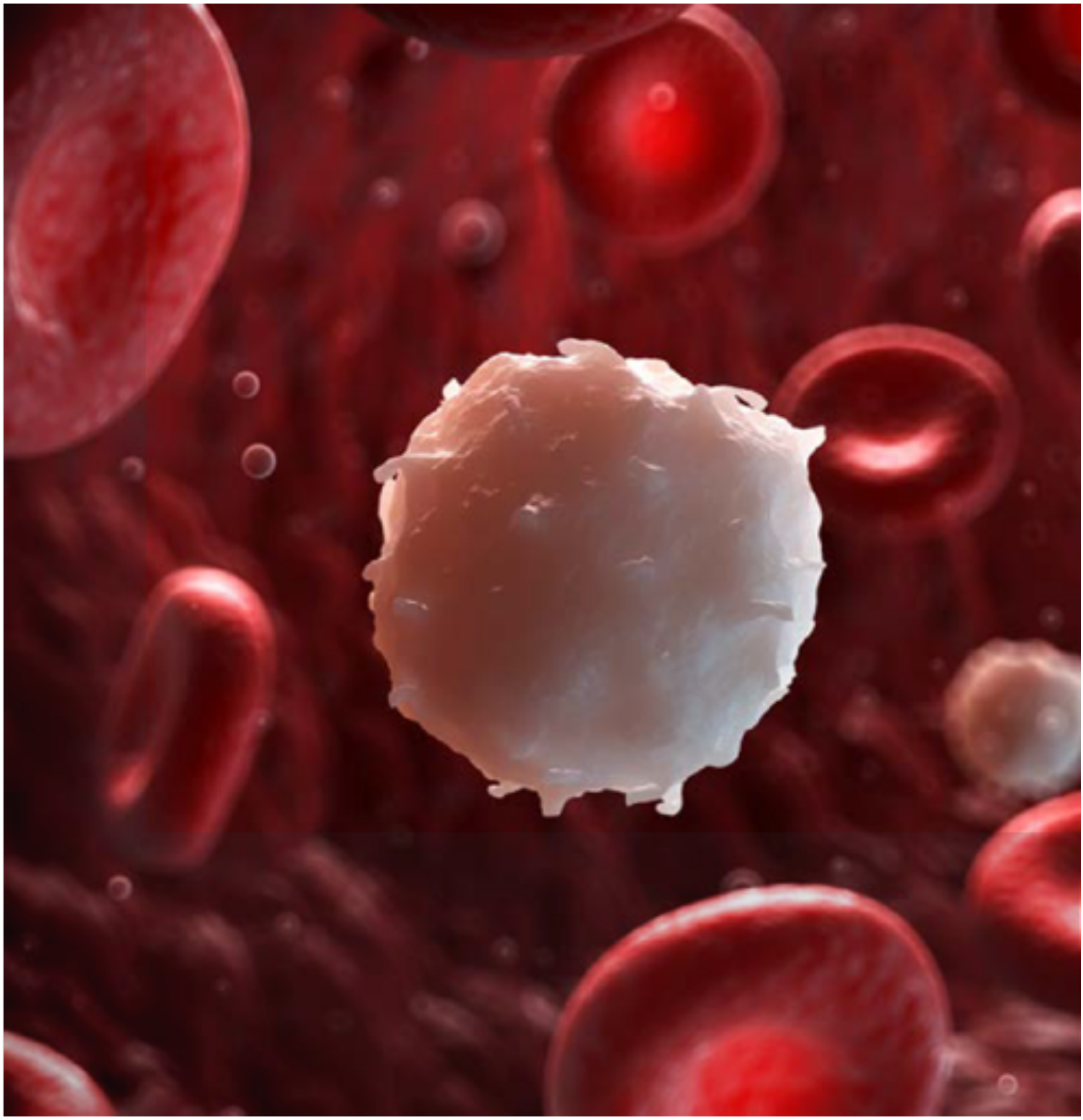
Fertility and Conception

Early Origins of Health



FAD intensity within inner cell mass of a mouse blastocyst

Members of the Reproductive Success Group



IMMUNOLOGY AND INFECTION

IMMUNOLOGY AND INFECTION RESEARCH GROUPS

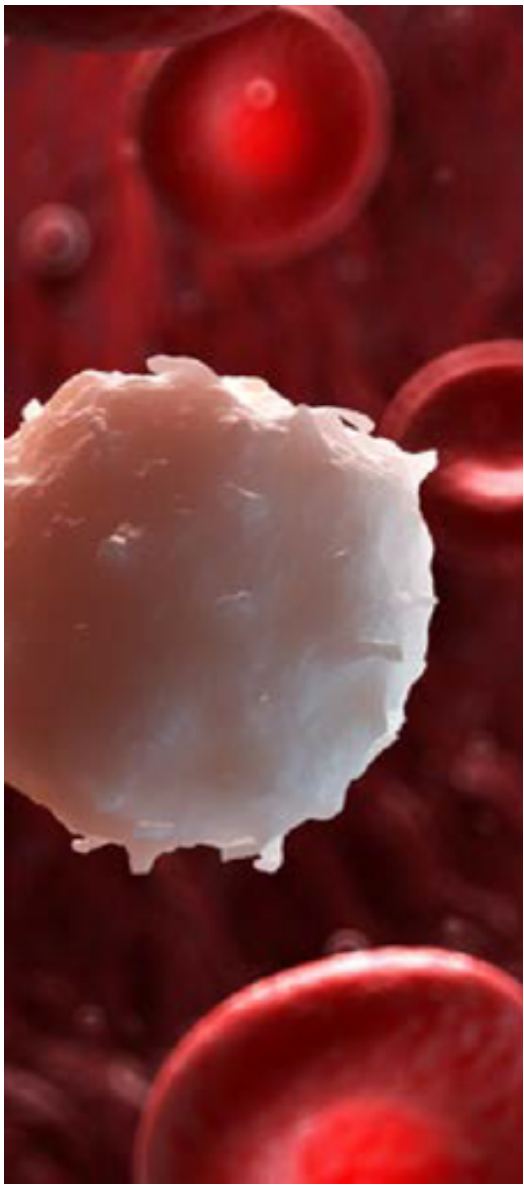
Our immune system is at the front line for controlling infection from foreign pathogens, including bacteria and viruses. A healthy, functioning immune system is fundamental to our overall health and wellbeing.

Our research is focused on understanding how our body's elaborate, innate and adaptive immune systems can distinguish foreign pathogens from self-tissue.
Malfunction of the immune system can result in the development of autoimmune disorders including type 1 diabetes, inflammatory bowel disease, multiple sclerosis, psoriasis and rheumatoid arthritis.

Furthermore, inappropriate immune responses are also implicated in central nervous system diseases such as anxiety, depression, epilepsy and stroke and have been proposed to play a role in addictions and pain. Understanding immune responses, and how to control and modulate them
is crucial to the successful treatment of patients requiring life-saving transplantation therapies. It is also critical for the development of safe and effective vaccines, which enable significant improvements worldwide in the health status of many communities.

Researchers across the faculty are focused on:

- developing new vaccines
- identifying novel targets in autoimmune diseases such as rheumatoid arthritis
- understanding the role of immune cells in neural tissue (glial cells) in normal healthy brains to elucidate their role in chronic pain, drug addiction and epilepsy and identifying new targets to treat these conditions
- developing immune interventions to prevent or modulate pathologies of pregnancy and graft rejection (in transplantation settings)
- conducting clinical trials to evaluate tolerability, safety and effectiveness of new agents to control infections in patients suffering chronic infections.



IMMUNOLOGY AND INFECTION RESEARCH OPPORTUNITIES

MOLECULAR IMMUNOLOGY

Lead Researcher: Professor Simon Barry

Contact: simon.barry@adelaide.edu.au

Research Summary

Prof Barry leads a research program with a basic science and a translational component. He is focused on Immunogenomics and immunotherapeutics, with research experience in the cell and molecular biology of human T cells, and the manipulation of these cells to model gene function. He has established world class Immunogenomics research capability and has applied this in both the immune tolerance and cancer immunology settings. In translational research he has developed a number of immunotherapy tools and technologies. In addition, the cancer immunotherapies program developing cancer CAR-T cell therapies has now spun out into Carina Biotech. The ENDIA longitudinal birth cohort is building a biobanks from birth to age 5 in children at risk from type 1 Diabetes. This research program aims to map the environmental determinants of type 1 diabetes and to connect the genetic risk of T1D to the genes that are altered using the ENDIA cohort to follow progression. Most recently he has co-founded a longitudinal COVID cohort study covering convalescents and newly infected people in South Australia. This cohort provides access to both convalescent covid and long COVID samples. These research programs have enabled him to build a research platform for applied immunology and immunogenomics, including capability to perform robotics based whole genome arrayed CrispR screening.

For available projects please view Prof Barry's Research Profile:

researchers.adelaide.edu.au/profile/simon.barry

Professor Simon Barry

Projects available for

Honours

Category

Wet Lab

Human Research

Research Areas

Immunology and Infection

Innovative Therapeutics

Child and adolescent Health

Cancer Biology

Members of the Molecular Immunology Group

RICHTER LAB, SURGERY DEPARTMENT

Lead Researcher: Dr Katerina Richter

Contact: **katerina.richter@adelaide.edu.au**

Research Summary

Superbugs, or antibiotic-resistant bacteria, pose one of the greatest threats to human health worldwide, claiming 700,000 deaths every year. Bacteria naturally reside in biofilms as complex communities encased in a self-assembled slime. This lifestyle protects bacteria from medical therapies and promotes resistance contributing to therapeutic failure and exacerbation. The rise of superbugs stresses the need for novel treatments.

The Richter Lab is dedicated to improve medical therapies, changing the lives of patients suffering from superbug infections, such as surgical site infections, non-healing wounds and implant infections. We furthermore collaborate with veterinary scientists to innovate industry decontamination processes for better animal wellbeing and safer food production.

Current research projects focus on

1. Cold plasma technology to secure food safety and improve public health

2. Laser microneedle device to kill biofilms

3. Treating diabetic foot infections with cold plasma technology

We collaborate widely in multidisciplinary teams of scientists, clinicians and industry partners to ensure a real-life impact of our work.

For available projects please view Dr Richter's Research Profile:

researchers.adelaide.edu.au/profile/katerina.richter

Dr Katerina Richter

Projects available for

Honours

Category

Wet lab

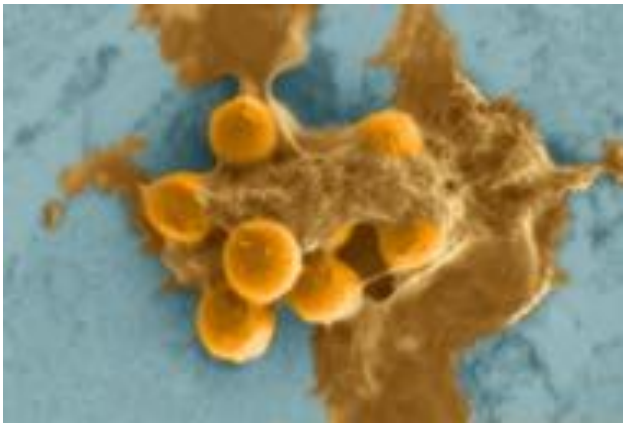
Research Areas

Immunology and Infection

Innovative Therapeutics

Translational Health Outcomes

Surgical Health Systems and Innovation



INDIGENOUS HEALTH AND HEALTH EQUITY

INDIGENOUS HEALTH AND HEALTH EQUITY

Closing the gap in health equality between Aboriginal, Torres Strait Islander people and other disadvantaged Australians is a national priority. Focused effort is required to understand and resolve the underlying basis for the inequalities of health care and health care outcomes across our most vulnerable Australian community members.

There are many factors impeding the availability and delivery of health care to ensure good health outcomes for Indigenous and disadvantaged groups in Australia. These include: physical access to services for rural and remote communities; cultural appropriateness of treatment; education on the maintenance of health; and financial restrictions.

Our researchers are investigating ways to overcome these barriers and provide an improved understanding of the health and health care amongst Indigenous and disadvantaged communities. This understanding is essential for the development and implementation of informed, effective public health policy.

Researchers across the faculty are focused on:

- reducing the burden of disease and health inequalities, arising from chronic dental diseases among Indigenous children
- monitoring and surveying Indigenous oral health and use of dental services
- working with Indigenous women to develop culturally-appropriate care in order to improve the outcomes for mothers and their babies
- working with the Indigenous community to use existing knowledge on best-practice chronic disease prevention and treatment to improve the coverage and appropriateness of health services and care
- conducting interventional clinical trials to provide evidence for optimal management of HIV/AIDS across high-, middle- and low-income communities.

Indigenous Health and Health Equity Research Groups

INDIGENOUS HEALTH AND HEALTH EQUITY

NORTHERN HEALTH PROJECT

Lead Researcher: Professor Mark Boyd

Contact: mark.boiyd@adelaide.edu.au

Research Summary

Population and individual health are profoundly influenced by social determinants of health. Evidence clearly demonstrates that health and disease are strongly linked with social advantage,. There is a 'social gradient of health' favouring the socially advantaged over the disadvantaged. Despite this, the health system focuses on the biomedical aspects of acute and chronic health conditions and generally ignores the 'upstream' determinants that underpin illness. The Northern Health Project (NHP) explores the potential to broaden health care delivery toward a more comprehensive approach that addresses both biomedical ('downstream') and social ('upstream') risks. This makes particular sense at the Lyell McEwin Hospital, which serves one of the most disadvantaged urban populations in Australia.

For available projects please view Prof Boyd's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/mark.boyd

Projects available for

Honours

Category

Dry Lab

Human Research

Research Areas

Health Equity

Cardiac Health

Translational Health Outcomes

Prof Mark Boyd

MUSCULOSKELETAL HEALTH

MUSCULOSKELETAL HEALTH RESEARCH GROUPS

Good musculoskeletal health is important at every stage of life and plays a vital role in keeping us on our feet. More than six million Australians (approximately 14% of the population) suffer from some kind of musculoskeletal condition, such as back pain, arthritis, osteoporosis and fractures.

Musculoskeletal health is a multidisciplinary area of research involving connective tissue biology (including bone, cartilage and muscle), diseases of connective tissue (including arthritis and osteoporosis), biomechanics and surgical/clinical interventions to treat traumatic bone injury and other conditions.

Researchers across the faculty are focused on:

- understating the cellular and molecular basis of normal and pathological bone turnover
- how to best repair fractures after traumatic injury with novel surgical approaches and post-operative management
- how to optimise the outcomes of joint replacement surgery in order to provide better and longer lasting outcomes for patients
- performing gait analysis and activity monitoring to evaluate the success of interventions across all musculoskeletal conditions
- developing better ways to manage spinal cord injury patients to improve their outcomes
- identifying links between bone cells and the molecules they produce and bone health.

MUSCULOSKELETAL HEALTH RESEARCH OPPORTUNITIES

MUSCULOSKELETAL CELLULAR COMMUNICATION (MCC Lab)

Lead Researcher: Dr Agnes Arthur

Contact: agnes.arthur@adelaide.edu.au

Research Summary

1 - The function of a family of receptor tyrosine kinase molecules, the Eph receptors and ephrin ligands expressed by MSC and within their microenvironment. The projects aim to decipher the function of ephrinB1 on the skeletal stem cells and their derivatives during bone development, postnatal skeletal homeostasis/remodelling, during the onset of osteoporosis and following fracture repair. The research also aims to identify the signalling mechanisms by which ephrinB1/EphB molecules mediate their responses during these processes.

2 - The communication between nerve and bone cells and how this communication contributes to maintaining bone health or repair following trauma (osteoporosis, fracture, cancer treatment).

For available projects please see Dr Arthur's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/agnes.arthur

Projects available for

Honours

Category

Wet Lab

Research Areas

Musculoskeletal Health

Translational Health Outcomes

Dr Agnes Arthur

WCH PAEDIATRIC ORTHOPAEDIC CLINICAL RESEARCH TEAM

Lead Researcher: Associate Professor Nicole Williams

Contact: nicole.williams01@adelaide.edu.au

Research Summary

The aim of our research program is to reduce the burden and improve outcomes for musculoskeletal conditions and injury in childhood and adolescence. We have a range of research streams including congenital deformity such as developmental dysplasia of the hip and clubfoot; rare inherited diseases affecting the musculoskeletal system; acquired conditions such as Perthes disease and slipped capital femoral epiphysis; musculoskeletal infection; and childhood and adolescent injury, including major trauma.

Our research team works in a multidisciplinary collaboration with other medical specialties, nursing and allied health research partners. The WCH Orthopaedic Department collaborates with international multicentre registries including the International Perthes Study Group and Global Hip Dysplasia Registry. The team also has close links with orthopaedic teams in Indonesia and the Pacific Islands Orthopaedic Association.

A/Prof Williams also collaborates and supervises research projects in the areas of medical and surgical leadership, diversity and equity in healthcare and healthcare provider wellbeing.

For available projects please see Professor William's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/nicole.williams01

Projects available for

Honours

Category

Human Research

Systematic Review

Meta-analysis

Prof Nichole Williams

Research Areas

Musculoskeletal Health

Child and Adolescent Health

Surgical Health Systems and Innovation

Indigenous Health and Health Equality

Members of the WCH paediatric orthopaedic clinical research team

NEUROSCIENCE, BEHAVIOUR AND BRAIN HEALTH

NEUROSCIENCE, BEHAVIOUR & BRAIN HEALTH RESEARCH GROUPS

NEUROSCIENCE, BEHAVIOUR AND BRAIN HEALTH RESEARCH

The brain and spinal cord comprise the central nervous system of the body. Damage and disease of the brain or spinal cord can lead to developmental delay, intellectual or physical disability, loss of cognitive function and behavioural and psychological disorders.

Neuroscience is an interdisciplinary science that focuses on the study of neurochemistry and experimental psychology. It deals with the structure and normal function of the nervous system and brain that impact on behaviour, cognitive function and neurological dysfunction.

Our researchers investigate these areas with the aim of developing therapies and informing improved health service provision for individuals.
Researchers across the faculty are focused on:

- understanding the function of genes that cause neurodevelopmental disorders, such as intellectual disability and epilepsy
- investigating the causes of diseases of the brain, spine or nervous system (including Parkinson's disease and Alzheimer's disease) to inform diagnosis, prevention and treatment
- understanding the cellular and molecular basis of cognition, perception and neuropsychology
- developing therapies, and translating results into the treatment and prevention of neurological diseases
- understanding the health psychology, healthy development across the lifespan, and disability to inform and assess rehabilitation and health service delivery
- developing innovative biological computation technologies to enable large-scale epidemiological studies that can inform health care policy and service provision.

NEUROSCIENCE, BEHAVIOUR AND BRAIN HEALTH RESEARCH OPPORTUNITIES

AQUAPORIN PHYSIOLOGY AND DRUG DISCOVERY

Lead Researcher: Professor Andrea Yool

Contact: andrea.yool@adelaide.edu.au

Research Summary

A major focus in our group is drug discovery for aquaporins, membrane channels found in all kingdoms of life. Increased levels of aquaporin-1 (AQP1) are localised in the leading edges of rapidly moving cells, and are a characteristic feature of aggressive cancers such as human glioblastoma, breast and colon subtypes. Pharmacological modulators developed by our team are being evaluated as tools for controlling migration in cancer cell lines. New agents limiting metastasis could be of substantial interest for cancer therapy.

Project 1. Using cell culture, molecular biology, expression systems, imaging, and pharmacological tools to define mechanisms and discover novel drugs for controlling the invasiveness of glioblastoma (brain cancer) cells. (Collaboration with Dr Sunita Ramesh, Flinders University; Prof Rainer Haberberger, UofA; and Dr Rohan Davis, Griffith Uni QLD).

Project 2. Exploring the roles of aquaporin channels in the tongue as signal transduction mechanisms in sensory system function. (Collaboration with Damian Espinase Nandorfy and Dr Leigh Francis at the Australian Wine Research Institute, UofA).

For further information please view Prof Yool's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/andrea.yool

Projects available for

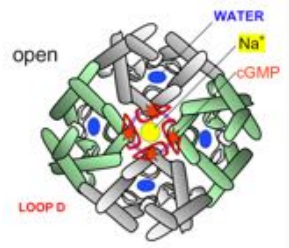
Honours

Category

Wet lab

Research Areas

Neuroscience, Behaviour and Brain Health



Prof Andrea Yool

COGNITIVE GENOMICS RESEARCH GROUP

Lead Researcher: Dr Liliana Ciobanu

Contact: liliana.ciobanu@adelaide.edu.au

Research Summary

Understanding the genetic basis of cognitive functioning is a critical aspect of investigating the biological mechanisms underlying cognitive health and disease. In our work, we aim to examine the role of genetic factors and their relationship to specific cognitive abilities, as well as their functional and structural brain correlates. To explore the genetic and neural basis of cognitive functioning we primarily utilise two large-scale datasets, the UK Biobank and NIH ABCD. A multifactorial cognitive model that we have recently developed is based on the CHC theoretical framework and will serve as the basis for identifying specific cognitive abilities to investigate. We employ advanced statistical methods and machine learning techniques to explore the complex relationships between these cognitive functions and a range of environmental and lifestyle factors, including alcohol consumption, psychotic-like experiences, childhood trauma, and socio-economic outcomes. By shedding light on the biological underpinnings of individual differences in cognitive functioning, this project has the potential to improve our understanding of cognitive health and disease, and ultimately lead to the development of new interventions and treatments.

For further information please view Dr Ciobanu's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/liliana.ciobanu

Projects available for

Honours

Category

Dry Laboratory; Human Research

Research Areas

Neuroscience, Behaviour and Brain Health

Dr Liliana Ciobanu

DISCIPLINE OF PSYCHIATRY

Lead Researcher: Dr Simon Hartmann

Contact: simon.hartmann@adelaide.edu.au

Research Summary

Only 30% of patients identified as at high risk of a psychotic episode transition to first episode psychosis. Improved accuracy of prediction is required to efficiently and safely intervene to prevent or minimise the impact of psychosis. As part of PRE-EMPT, the CRE for PREdiction of Early Mental Disorder and Preventive Treatment (https://pre-empt.org.au/), we have access to detailed national and international data sets to develop novel Bayesian and machine learning techniques to combine clinical and biological variables to improve prediction accuracy.

For available projects please view Dr Hartmann's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/simon.hartmann

Projects available for

Honours

Category

Dry Lab

Research Areas

Neuroscience, Behaviour and Brain Health

Dr Simon Hartmann

NEUROGENETICS RESEARCH TEAM

Lead Researcher: Dr Raman Sharma

Contact: raman.sharma@adelaide.edu.au

Research Summary

Raman's research focuses on understanding the molecular pathways altered by the gene variants implicated in neurodevelopmental and neurodegenerative disorders with aim of using this knowledge for developing treatments for the affected patients. Raman has over 30 years of experience in molecular and cell biology. His research has been supported by funding from the Australian Research Council, the National Health and Medical Research Council, Channel 7 Children's Research Foundation, Women's and Children's Hospital Foundation, Cancer Council of South Australia, National Breast Cancer Foundation and Cancer Council Queensland during last number of years. In 2009, He was awarded a UICC Yamagiwa-Yoshida Memorial International Cancer Fellowship funded by the Union for International Cancer Control (Switzerland) to work at the Scripps Institute, San Diego, USA, and in recognition to his outstanding contribution during this fellowship, he was inducted as a Life-time Honorary Fellow of UICC. During last many years, he has published in journals such as JBC, Nature Medicine, Oncogene, Cancer Research, Am J Hum Genet, Mol Cell Biol, Current Biology. He is passionate about mentoring and teaching theoretical and practical aspects of vast area of molecular and cell biology to young students.

For available projects please see Dr Sharma's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/raman.sharma

Projects available for

Honours

Category

Wet Lab

Human Research

Research Areas

Neuroscience, Behaviour and Brain Health

Translational Health Outcomes

Innovative Therapeutics

Members of the Neurogenetics research Team-Headed by Prof Jozef Gecz

PAIN AND PERIPHERAL NEUROSCIENCE

Lead Researcher: Professor Rainer Viktor Haberberger

Contact: rainer.haberberger@adelaide.edu.au

Research Summary

Chronic ongoing pain affects millions of people, and similar to cancer, there are different types of pain. Patients suffer for years because available drugs often don't work very well because they cannot be targeted to a specific pain type. This is because there is no tool available that allows a quick and easy discrimination between pain types.

We are currently investigating the structure and cellular content of human dorsal root ganglia which is where for example our pain-sensing neurons reside. In addition we develop, in collaboration with Flinders University, biosensors which we can use to detect subtypes of pain by just using blood of patients.

For available projects please see Professor Haberberger's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/rainer.haberberger

Projects available for

Honours

Category

Wet Lab

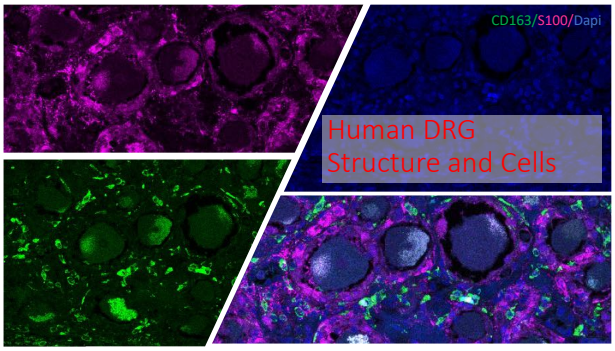
Human Research

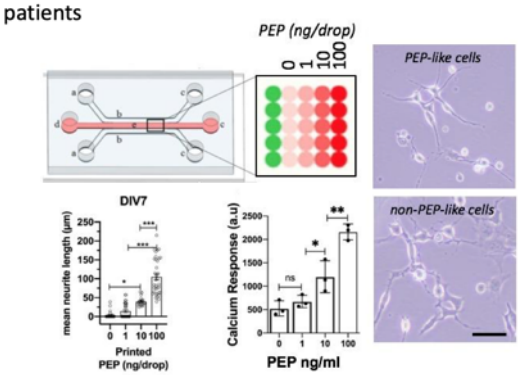
Research Areas

Neuroscience, Behaviour and Brain Health

Innovative Therapeutics

Dr Rainer Haberberger





SPINAL CORD INJURY RESEARCH GROUP

Lead Researcher: Dr Anna Leonard

Contact: anna.leonard@adelaide.edu.au

Research Summary

Our research is focused on understanding the mechanisms involved acutely after spinal cord injury and how this could be modulated to improve outcomes both acutely and chronically. This includes processes such as neuroinflammation, cord swelling (oedema) and barrier permeability. Whilst motor function remains an important outcome, we also focus on quality-of-life outcomes such as neuropathic pain, cognition, and autonomic dysfunction. In particular, our lab has a strong interest in understanding the clinical landscape to inform our research questions and study design, ultimately ensuring that our research will have a positive impact on patients and improve clinical translation.

For available projects please view Dr Leonard's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/anna.leonard

Projects available for

Honours

Category

Human Research

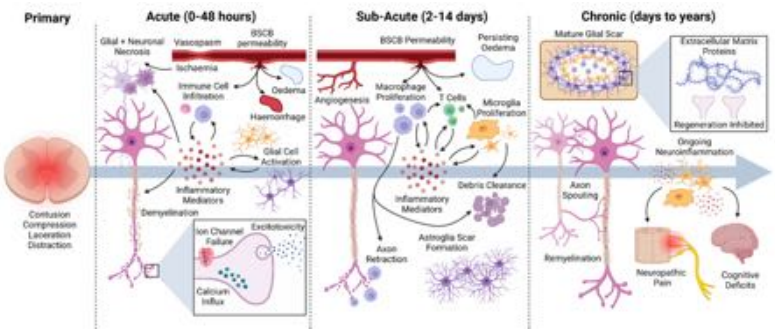
Research Areas

Wet Lab

Human Research

Systematic review

Dr Anna Leonard



Members of the Spinal Cord Injury Research Group

TRANSLATIONAL NEUROPATHOLOGY LABORATORY

Lead Researcher: Dr Annabel Sorby-Adams

Contact: annabel.sorby-adams@adelaide.edu.au

Research Summary

Ischaemic stroke is a leading cause of death and disability worldwide. Arising due to cerebrovascular occlusion, current treatment involves removing the blockage to re-establish blood flow to compromised brain tissue, however, this often paradoxically worsens injury through a process termed ischaemia reperfusion (I/R) injury. Recently the mitochondrial metabolite succinate has been identified as a key driver in I/R injury post stroke, mediating its effects through binding respiratory complex II, succinate dehydrogenase (SDH). Malonate, a competitive inhibitor of SDH has the potential prevent I/R injury post stroke and markedly improve patient outcomes. This project aims to evaluate the mechanisms underlying I/R injury post stroke in a clinically relevant large animal model and subsequently establish the efficacy of Malonate treatment alongside collaborators at the University of Cambridge.

For available projects please see Dr Sorby-Adams' Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/annabel.sorby-adams

Projects available for

Honours

Category

Wet Lab

Dry Lab

Research Areas

Neuroscience, Behaviour and Brain Health

Translational Health Outcomes

Innovative Therapeutics

Dr Annabel Sorby-Adams

VISUAL PHYSIOLOGY & NEUROBOTICS LABORATORY

Lead Researcher: Associate Professor Steven Wiederman

Contact: steven.weiderman@adelaide.edu.au

Research Summary

In the Visual Physiology and Neurobotics Laboratory (VPNL), we study how the brain processes visual information. Consider a human catching a ball, a dog leaping at a Frisbee or a dragonfly hunting prey amidst a swarm. Brains large and small evolved the ability to predictively, focus attention on a moving target, whilst ignoring distracters and background clutter. We use electrophysiological techniques to investigate how flying insects see the world and build autonomous robots that emulate these neuronal principles. We investigate visual processing from behavioural, computational and physiological levels, with a multidisciplinary team covering fields of neuroethology, neurobiology, psychology, computer vision and engineering.

For available projects please see A/Professor Weiderman's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/steven.weiderman

Projects available for

Honours

Category

Wet Lab

Research Areas

Neuroscience, Behaviour and Brain Health

A/Prof Steven Weiderman

NUTRITION AND METABOLIC HEALTH

NUTRITION AND METABOLIC HEALTH RESEARCH GROUPS

The effects of nutrition quality and availability on metabolic processes not only plays a significant role in the incidence of many serious illnesses, but can drastically influence our general health and wellbeing throughout our lives.

The links between nutrition, metabolism and human health are complex, and our researchers—from basic scientists, human physiologists, clinicians and population health specialists—are working to enhance our understanding of these links.

Our researchers are investigating the associations between diet and sleep, pregnancy, foetal growth and mortality, and serious illnesses such as coronary heart disease, stroke, hypertension, atherosclerosis, obesity, cancer, type 2 diabetes, osteoporosis, dental caries, gall bladder disease, dementia and nutritional anaemias.

Our overarching goal is to develop and validate innovative diets to promote health and wellbeing, and deliver improved health outcomes to the community in a range of areas.

Researchers across the faculty are focused on:

- determining the effects of modifying diet on metabolic health
- developing strategies to prevent and manage obesity and type 2 diabetes
- studying the molecular and cellular basis of appetite regulation
- understanding immune function and pain-sensing in the gut
- exploring how nutrition interacts with sleep patterns and metabolic disorders
- investigating metabolism in liver, muscle, fat tissue and bone tissue
- understanding nutrition in vulnerable populations such as the elderly, and determining the association between nutritional intake and chronic disease
- conducting longitudinal, large cohort studies to assess associations between diet and chronic diseases.

NUTRITION AND METABOLIC HEALTH RESEARCH OPPORTUNITIES

CHILDHOOD TYPE 1 DIABETES – ENVIRONMENTAL DETERMINANTS OF ISLET AUTOIMMUNITY (ENDIA)

Lead Researcher: Dr Rebecca Thomson

Contact: r.thomson@adelaide.edu.au

Research Summary

The Environmental Determinants of Islet Autoimmunity (ENDIA) study is the first study in the world to explore how environmental exposures from pregnancy through early life may contribute to, or protect against, the development of childhood type 1 diabetes. We have recruited 1500 babies (from the pregnancy aged up to 6 months) who have an immediate relative with type 1 diabetes (i.e. baby's mum, dad, brother or sister). Professor Jennifer Couper and Dr Rebecca Thomson from the University of Adelaide are leading the ENDIA consortium and Nutrition, Growth and Lifestyle theme within the ENDIA consortium, respectively. Our program of research investigates the potential determinants of type 1 diabetes during preconception, pregnancy and early life. This includes investigating the impact of maternal and paternal preconception lifestyle behaviours, maternal weight and gestational weight gain, maternal diet, physical activity levels, mental health and lifestyle during pregnancy, paternal weight and infant growth, diet and lifestyle. Approximately 60% of our mothers have type 1 diabetes, which allows us to also compare preconception and pregnancy lifestyle behaviours between women with and without type 1 diabetes.

For available projects please see Dr Thomson's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/r.thomson

Dr Rebecca Thomson

Projects available for

Honours

Category

Human Research

Research Areas

Nutrition and Metabolic Health

Child and Adolescent Health

Pregnancy and Birth

Early Origins of Health

Members of the ENDIA Research Group

INTESTINAL NUTRIENT SENSING

Lead Researcher: Associate Professor Richard Young

Contact: richard.young@adelaide.edu.au

Research Summary

The Intestinal Nutrient Sensing group investigates the intestinal taste system, which detects dietary sugars and low-calorie sweeteners and controls how glucose is absorbed and disposed. We have shown how this system is regulated in health, and its dysregulation in type 2 diabetes, critical illness, and obesity, as well as how dietary sweeteners can alter blood glucose responses and change gut bacteria. This NHMRC Ideas research spans preclinical research with novel genetic models to interventional clinical studies, and is providing new knowledge of gut physiology and microbiology to inform the public health debate on low-calorie sweeteners, and prevent, and better manage, type 2 diabetes and obesity.

The group is also investigating disease processes in critical illness and septic shock in NHMRC Ideas research. Findings in the intensive care unit have shown that blood levels of a steroid carrier protein (corticosteroid-binding globulin) are depleted in a third of patients with septic shock, and in a manner that predicts their morbidity and death. Restoring these levels (such as with insulin in diabetes) is likely to preserve or restore steroid targeting to areas of high damage to reduce morbidity and save lives, and is being evaluated in a mouse model.

For available projects please see A/Prof Young's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/karen.jones

Projects available for

Honours

Category

Wet Lab

Human Research

Research Areas

Nutrition and Metabolic Health

Translational Health Outcomes

Innovative Therapeutics

A/Prof Richard Young

Members of Intestinal Nutrient Sensing Research Group

MOLECULAR NEUROTOXICOLOGY LABORATORY

Lead Researcher: Dr Ian Musgrave

Contact: ian.musgrave@adelaide.edu.au

Research Summary

Our laboratory is currently focussing on interactions between conventional medications and phytochemicals found in herbal medicines in a variety of tissues culture models including neuronal, liver and kidney cells. We are also investigating ADR reports in the TGA adverse drug reaction database and have an ongoing collaboration with Dentistry on antibacterials..

For available projects please see Dr Musgrave's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/ian.musgrave

Projects available for

Honours

Category

Wet Lab

Dry Lab

Research Areas

Nutrition and Metabolic Health

Neuroscience

Behaviour and Brain Health

Dr Ian Musgrave

OBESITY AND METABOLISM LAB

Lead Researcher: Dr Leonie Heilbronn

Contact: leonie.heilbronn@adelaide.edu.au

Research Summary

A healthy lifestyle is the cornerstone of good metabolic health to prevent and/or delay the onset of non-communicable diseases of aging, including type 2 diabetes, cardiovascular diseases, liver disease and cancers. However, it is not just good nutrition that is important to a healthy lifestyle. Our group is investigating the additional key regulators of metabolic health, including the roles that overnight fasting, meal timing, sleep, circadian rhythm, physical activity, and sedentarism play. We also studying the synergistic pathways in humans through which these collectively create a platform for lifelong health.

For available projects please see Dr Heilbronn's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/leonie.heilbronn

Projects available for

Honours

Category

Wet Laboratory

Research Areas

Human Research

Dr Leonie Heilbronn

Members of the Obesity and Metabolism Lab

ROYAL ADELAIDE HOSPITAL - INTENSIVE CARE UNIT RESEARCH – NUTRITION PROGRAM

Lead Researcher: Associate Professor Lee-anne Chapple

Contact: suzanne.mashtoub@adelaide.edu.au

Research Summary

We are a dynamic and competitive group of ICU consultants, dietitians, nurses, scientists and PhD candidates based in Intensive Care at the Royal Adelaide Hospital. The ICU Nutrition Research Group, led by Associate Professor Lee-anne Chapple, is a word-leader in nutrition research in critical illness with an emphasis on clinically-focused, technically-challenging studies ranging from physiological studies to large NHMRC-funded clinical trials. Nutrition delivery to critically ill patients is largely suboptimal, and patients experience significant muscle wasting, leading to reduced functional capacity that persists well after hospital discharge. Our group leads hands-on, clinically relevant studies that aim to reduce this muscle wasting to improve recovery for our patients. Our research focuses on a number of aspects relating to nutrition and metabolism including protein delivery and metabolism, route of feeding, gastric emptying, and physiological barriers to nutrition on the post-ICU ward. Our group have published their research findings in the highest impact journals including the American Journal of Respiratory and Critical Care Medicine and are positive supporters of students and early career researchers including Honours Students, PhD students and clinician-researchers. Our programme is particularly well-suited to students with an interest in acute care medicine, anaesthetics, endocrinology or gastroenterology.

For available projects please see A/Prof Chapple's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/lee-anne.chapple

Projects available for

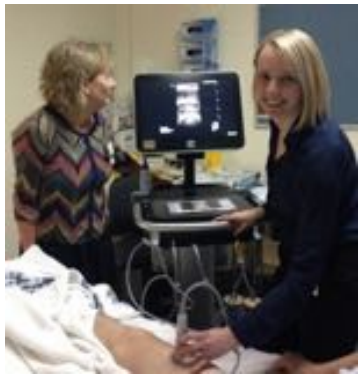
Honours

Category

Human Research

Research Areas

Nutrition and Metabolic Health



A/Prof Lee-anne Chapple

TYPE 2 DIABETES RESEARCH GROUP – CENTRE OF RESEARCH EXCELLENCE IN NUTRITION

Lead Researchers: Professor Chris Rayner
Associate Professor Tongzhi Wu

Contacts: chris.rayner@adelaide.edu.au
tongzhi.wu@adelaide.edu.au

Research Summary

The recent recognition that gastrointestinal function plays a key role in the regulation of energy and blood glucose homeostasis is rapidly changing the therapeutic strategies for metabolic disorders, particularly type 2 diabetes. Our group is recognised as an international leader in this field, and is undertaking a range of studies investigating the physiology and pathophysiology of gastrointestinal motor and endocrine function in both health and type 2 diabetes, and the implications of nutrient-gut interaction in relation to the metabolic risks and/or benefits. The following two projects are open for Honours candidates. Project 1: Gastric emptying in health and type 2 diabetes: implications for personalised management of postprandial glycaemia. Project 2: The impact of low-calorie sweeteners on glucose metabolism in health and type 2 diabetes.

For available projects please Researcher Profiles under "My Research"

researchers.adelaide.edu.au/profile/chris.rayner

researchers.adelaide.edu.au/profile/tongzhi.wu

Projects available for

Honours

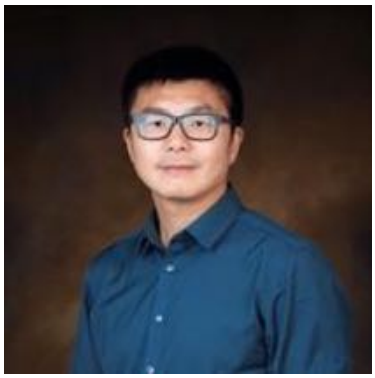
Category

Human Research

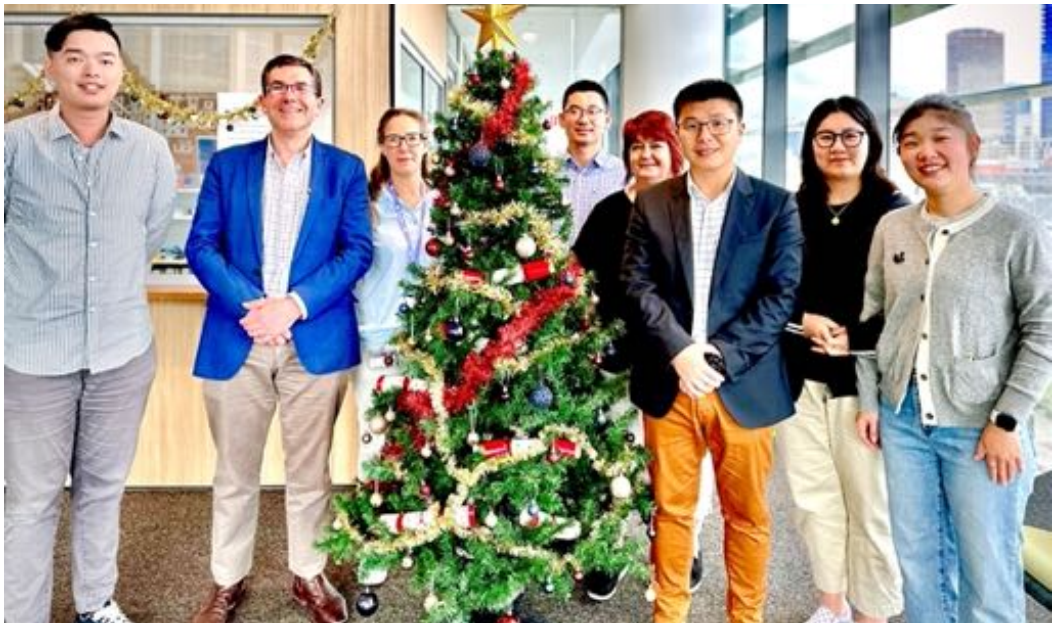
Research Areas

Nutrition and Metabolic Health

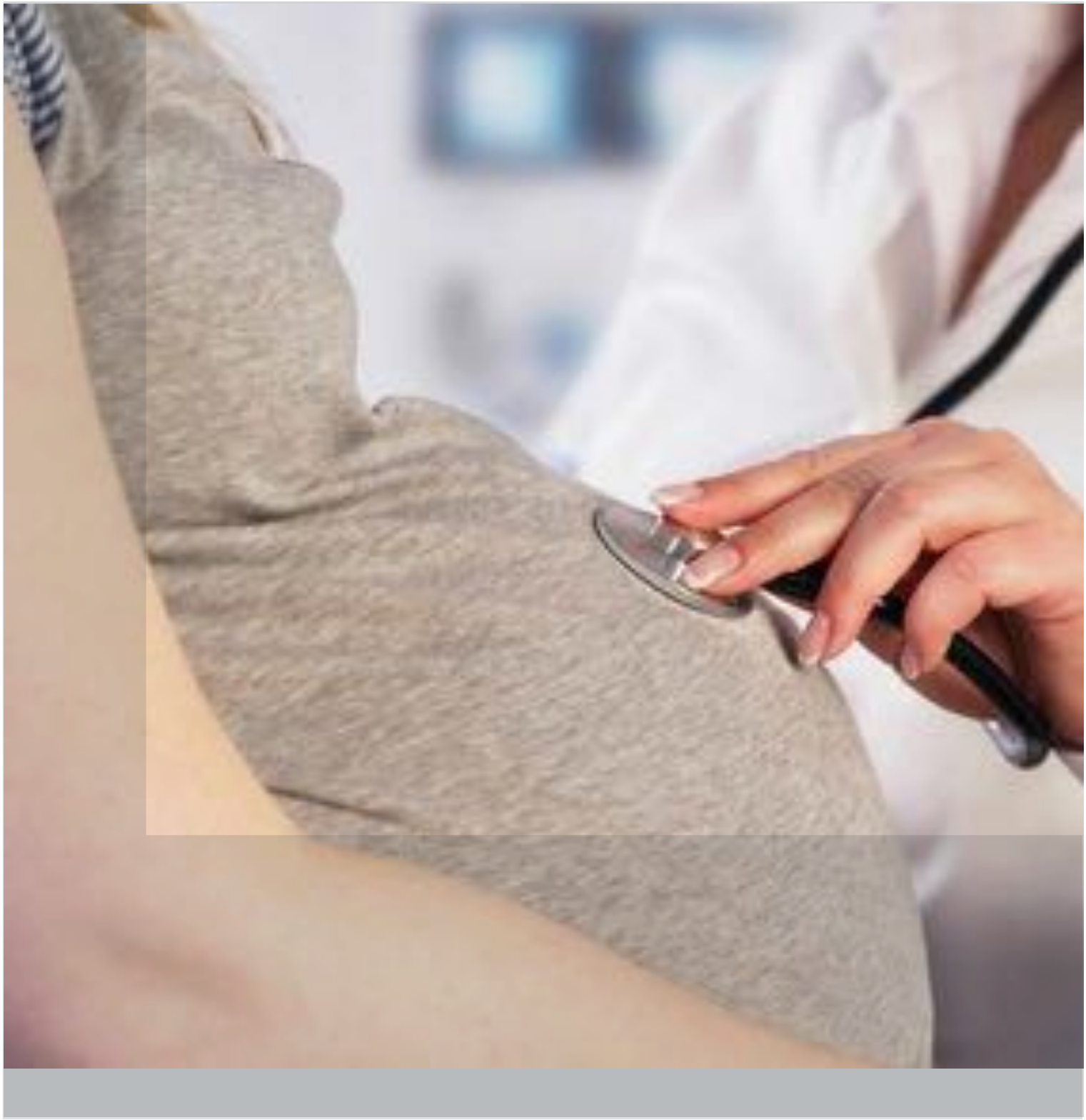
Professor Chris Rayner



Associate Professor Tongzhi Wu



Members of the Type 2 Diabetes Research Group



PREGNANCY AND BIRTH

PREGNANCY AND BIRTH RESEARCH GROUPS

Most prospective mothers anticipate healthy and problem-free pregnancies. However, in reality complications are common, with a quarter of Australian pregnancies affected by one or more conditions that can have serious, lifelong health implications for the mother and her baby.

The most common conditions affecting Australian pregnancies are preeclampsia, preterm birth, foetal growth restriction and gestational diabetes. Their cost for individuals, families and communities is enormous, and can last a lifetime.

The Robinson Research Institute leads our research in pregnancy and birth and has an outstanding record of success in the area. This success relates to the cross-disciplinary capability and bench-to-bedside approach, which has led to major improvements in the health outcomes of mothers and babies. A more in-depth explanation of this research area is available on the **Robinson Research Institute's website**.

PREGNANCY AND BIRTH RESEARCH OPPORTUNITIES

VASCULAR IMMUNOLOGY OF PREGNANCY

Lead Researcher: Dr Alison Care

Contact: alison.care@adelaide.edu.au

Research Summary

Each year, an estimated 76,000 women and 500,000 babies will die due to preeclampsia, a serious complication of pregnancy and one of the leading causes of maternal and perinatal deaths globally. Currently there is no cure to prevent the progression of disease. Following preeclampsia, women and their children have a greater risk of long-term complications like heart disease. Studies have found that women with preeclampsia have fewer regulatory T cells. These immune cells help regulate or suppress other cells in the immune system and are crucial to the development of the placenta; they are also important to long-term cardiovascular health. My team is investigating how the immune and vascular systems interact in pregnancy; when this goes wrong it can cause pregnancy complications such as preeclampsia. As well as delivering a better understanding of the causes of preeclampsia, this unified research approach will help us to develop screening tools for diagnosing the disorder. We are working to develop targeted immune interventions that can boost regulatory T cell numbers and vascular interventions to improve vascular function, to reduce preeclampsia impacts and improve long-term postpartum cardiovascular health.

For available projects please see Dr Care's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/alison.care

Dr Alison Care

Projects available for

Honours

Category

Wet Laboratory

Research Areas

Pregnancy and Birth

Cardiac, Respiratory and Vascular Health

Immunology and Infection

Members of the Vascular Immunology of Pregnancy Research Group

ADELAIDE CENTRE FOR EPIGENETICS – POLO LAB

Lead Researcher: Professor Jose Polo

Contact: jose.polo@adelaide.edu.au

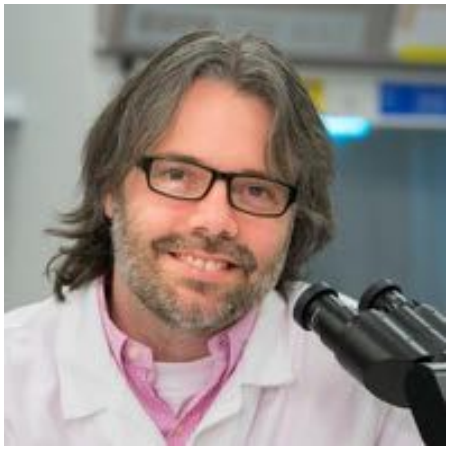
Research Summary

The Polo group is interested in the transcriptional and epigenetic mechanisms that govern cell identity, in particular pluripotency, reprogramming of somatic cells into induced pluripotent stem (iPS) cells, development, and cancer.

The ability to reprogram mature cells into a pluripotent state then back into any other mature cell provides a unique tool to dissect the molecular and cellular events of cellular programming. Moreover, iPS cells and the reprogramming technology are of great interest in pharmaceutical and clinical settings since this technology can be used to generate animal and cellular models for the study of various diseases. Recently our lab developed a technique to create and differentiate placental cells. This model will allow us to understand and model diseases of the placenta. Our lab combines different molecular, biochemical, cellular techniques and genome wide approaches with the aim to dissect the nature and dynamics of reprogramming and early placental differentiation in mouse, human and non-human primate models.

Understanding the epigenetic and transcriptional changes during reprogramming of cells to pluripotent stem cells.

The derivation of human embryonic stem cells (hESCs) and, more remarkably, the generation of human induced pluripotent stem cells (iPSCs) has revolutionised our understanding of pluripotency and opened new avenues for disease modelling, drug screening and regenerative medicine. The ability to reprogram any mature cell back to a pluripotent state, and then into another cell type, provides a unique opportunity to dissect the molecular and cellular events that occur during this conversion. Our lab aims to understand the kinetics and universality of the epigenetic and genomic changes occurring during reprogramming, the composition and assembly kinetics of transcriptional regulation complexes of pluripotency genes and how the cell of origin influences the in vitro and in vivo plasticity potential of cells generated during the reprogramming process. We will achieve this by combining stem cell technologies with several different molecular, biochemical, cellular techniques and genome-wide approaches; including ChIP, CUT&RUN, and single cell "omics".



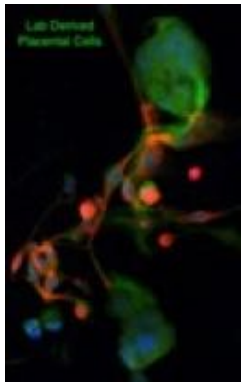
Professor Jose Polo

Molecular investigation of induced trophoblast cells (iTSC) and their derivatives.

The derivation of human embryonic stem cells (hESCs) and, more remarkably, the generation of human induced pluripotent stem cells (iPSCs) has revolutionised our understanding of pluripotency and opened new avenues for disease modelling, drug screening and regenerative medicine. However, the trophectoderm (TE) gives rise to the placenta and as such, iPSCs cannot provide models for TE or placenta. To address this important challenge, our lab has generated iTSCs for the first time. Our lab will use this model with both human and non-human primate cells, to understand the transcriptional and epigenomic changes that occur *in vitro* in the early human trophoblast and demonstrate that iTSCs can be used for disease modelling.

For available projects please see Professore Polo's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/jose.polo



Projects available for

Honours

Category

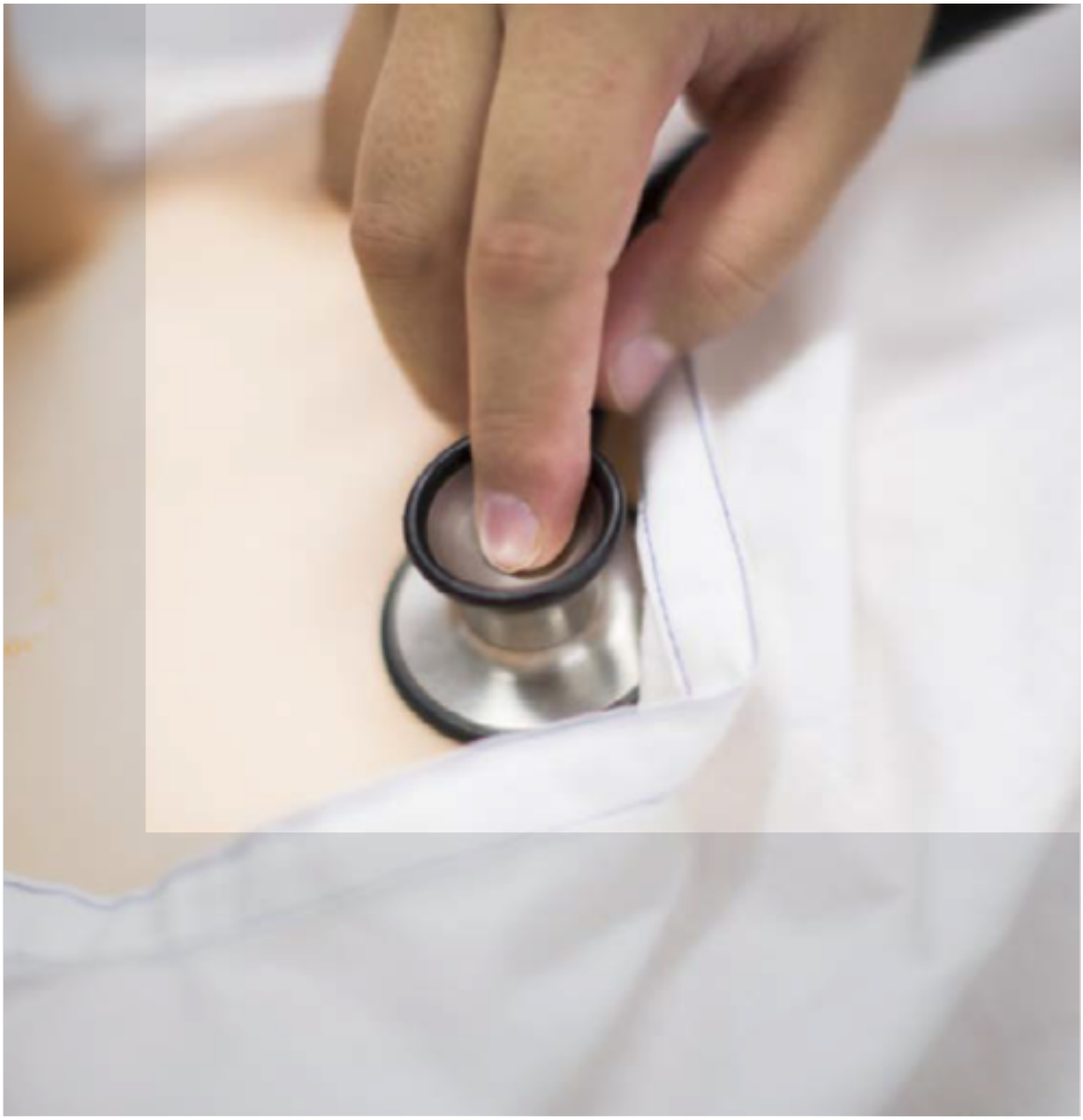
Wet Lab

Dry Lab

Research Areas

Pregnancy and Birth

Cancer Biology and Clinical Oncology



SURGICAL AND HEALTH SYSTEMS INNOVATION

SURGICAL AND HEALTH SYSTEMS INNOVATION RESEARCH GROUPS

Surgical innovation, and indeed all innovation in the health system, significantly enhances the quality and length of life for many in our community, and enables health services to reach more of our community.

Our researchers are working to enhance the quality, effectiveness and sustainability of surgical and health systems innovation at all levels. Our research addresses the many challenges of bringing health innovations into practice, including validating the innovation, justifying the economics, influencing the policies and spreading the knowledge to implement these new approaches.

Using evidence-based assessment, researchers test the efficacy and safety of the innovation, model the costs of implementation, and finally garner the support of the health industry, health service providers, policymakers and the community to implement the innovation. This exciting and challenging field can yield highly rewarding results that benefit society for years to come.

Researchers across the faculty are focused on:

- developing and evaluating the efficacy of new therapeutics
- evaluating new, less invasive diagnostic technologies to lower patient risk, improve the patient experience and reduce health service costs
- performing large-scale, multi-centre clinical trials to rigorously assess treatments and predictive diagnostic tests
- performing longitudinal studies to monitor patient health status and quality of care to identify problems in the health system's delivery of services
- performing long-term analysis of total- joint-replacement patients to analyse prosthetic failure, assessing the device, the biomaterials and methodology
- assessing the impacts of health policies and implementation of preventative health interventions.

SURGICAL AND HEALTH SYSTEMS INNOVATION RESEARCH OPPORTUNITIES

ADVANCED RECOVERY ROOM CARE

Lead Researcher: Professor Guy Ludbrook

Contact: guy.ludbrook@adelaide.edu.au

Research Summary

ARRC is a new 10-bed high acuity postoperative care unit at RAH to manage medium risk patients for 24 hours after surgery. It has ongoing funding, based on results of a prospective trial of outcomes and cost – the ARRC II trial.

It is a unique unit which is a world leader in early postoperative care and perioperative medicine.

It is run by anaesthetists, working closely with surgery, internal medicine, and allied health.

It has 6 medical residents in positions aimed at entering anaesthesia or ICU training in the future, and approx. 23 nurses.

The ARRC II trial is shortly to be published, examining impacts on patient and hospital-relevant outcomes, including, major complications, days at home, mortality out to 12 months, hospital utilisation, and economics (Markov modelling).

Based on the findings, substantial future work is progressing, examining improved risk prediction (including machine learning), additional specific treatment initiatives, and extensive economic analysis.

There are opportunities in all these areas for honours students, specifically risk prediction using ML and AI; extended economic analysis in perioperative medicine; and treatment initiatives such as epidural analgesia, glucose control, and advanced respiratory therapy.

For available projects please see Professor Ludbrook's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/guy.ludbrook

Projects available for

Honours

Category

Human Research

Research Areas

Surgical and Health Systems Innovation

Translational Health Outcomes

Professor Guy Ludbrook

Members of ARRC

ENT SURGERY - BIOMECHANICS

Lead Researcher: Dr Oveis Pourmehran

Contact: oveis.pourmehran@adelaide.edu.au

Research Summary

Our multidisciplinary research group, comprising medical researchers, clinicians, and engineers, is focused on enhancing treatment options for chronic rhinosinusitis (CRS) through targeted drug delivery to paranasal sinuses. Otolaryngologists identify unmet needs in treating upper airway diseases like CRS, and collaborate with medical researchers and biomedical engineers to address these challenges. Medical researchers develop effective medications, while engineers create innovative techniques and devices for targeted drug delivery to including hard-to-reach sinuses. We are currently developing an acoustic-mediated drug delivery system that uses tailored acoustic waves to propel nebulized droplets carrying medication into the sinuses. Additionally, we are working on computational fluid dynamics (CFD) modeling based on CT-scan images after virtual endoscopic sinus surgery. This enables us to analyze airflow patterns and droplet trajectories during drug delivery, ultimately improving efficiency. Another area of exploration is magnetic drug targeting for frontal sinus delivery. However, we first need to investigate the impact of nanomagnetic particles on the mucus layer and medication. This presents an intriguing and valuable opportunity for an Honours Research Project.

For more information please view Professor Singh's Researcher Profile

researchers.adelaide.edu.au/profile/oveis.pourmehran

Dr Oveis Pourmehran

Projects available for

Honours

Category

Meta-analysis

Dry Lab

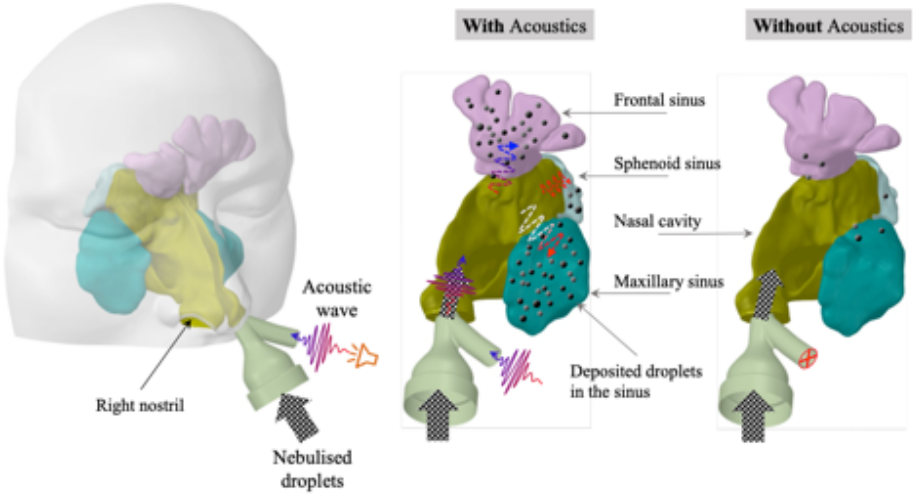
Wet Lab

Systematic Review

Research Areas

Surgical and Health Systems Innovation

Translational Health Outcomes



TRANSLATIONAL HEALTH OUTCOMES

TRANSLATIONAL HEALTH OUTCOMES RESEARCH GROUPS

Translational health research applies basic scientific findings from laboratory and preclinical studies to enhance human health and wellbeing at the personal and community level—taking experimental findings 'from bench to bedside' through new treatments and improved health policy.

High quality preclinical, clinical and epidemiological research is the foundation stone of optimised health care provision that serves to improve the quality of life of patients who are managed in the health system. Effective translational research is crucial to the continued improvement and sustainability of the Australian health system, and requires significant engagement with industry and service sectors within government.

Our researchers are developing new and innovative ways to transfer new knowledge to health service professionals, to: change practice; improve skills; and influence policy and procedures system-wide.

Researchers across the faculty are focused on:

- undertaking population surveys to develop and test new interventions to improve the mental health of children and adolescents
- undertaking evidence-based practice development to manage at-risk populations for trauma and mental disorders across the lifespan
- elucidating genetic factors that may serve as new targets for therapy, or are predictive of responses to pharmaceutical treatments
- performing longitudinal studies of patients undergoing invasive procedures to review and improve standard practice in the health care system
- developing evidence-based assessments of novel surgical techniques and postoperative care to enhance skills and promote knowledge transfer to health service professionals.

TRANSLATIONAL HEALTH OUTCOMES RESEARCH OPPORTUNITIES

CLINICAL PHARMACOGENOMICS RESEARCH GROUP

Lead Researcher: Professor Andrew Somogyi

Contact: andrew.somogyi@adelaide.edu.au

Research Summary

We study why some medicines work well in people and why others get harmful effects due to their genetic profile in influencing how the medicines work (their targets), and how the body absorbs, distributes and eliminates the medicines. Current projects are: pain medicines in cancer patients; medicines used during surgery that affect pain, nausea and delirium; medicines for treatment-resistant depression.

For available projects please view Professor Somogyi's Researcher Profile under "My Research"

researchers.adelaide.edu.au/profile/andrew.somogyi

Projects available for

Honours

Category

Wet Lab

Human Research

Research Areas

Translational Health Outcomes

Surgical Systems and Innovation

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