2020 THIRD YEAR RESEARCH OPPORTUNITIES GUIDE

Faculty of Health and Medical Sciences

health.adelaide.edu.au
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The purpose of the Research Placement course is to provide small group research experiences (in consecutive semesters, as parts 1 and 2) for all third year Bachelor of Health and Medical Sciences (BHMS), Bachelor of Health and Medical Sciences (Advanced) and Bachelor of Health Sciences (Advanced) students, supervised by academic and research staff. A cross-disciplinary research conference event will be a highlight of the course.

This Research Opportunities Guide provides a link to available projects for 2020 via individual’s researcher profiles.

**How to apply**

Students will be invited by email to nominate their project preferences online during a single week in February for students who are starting part 1 at the beginning of the year (semester 1). Most of the communication will be via MyUni so it is important that you enrol for Part 1 of the Research Placement course as soon as possible.

(Mid-year entries into part 1 will be invited to nominate project preferences during a time window before semester 2, to be announced closer to the date).

**Other Information**

Students can only be placed in projects for which they are eligible, based on majors and other criteria as listed in the project descriptions. Students who enrol after the preference round, who do not submit preferences, or whose preferences cannot be accommodated, will be assigned by course coordinators into projects that are appropriate to their majors.

Assignments into projects by course coordinators will be final, and not open to requests for reassignment.

Students are allowed to contact supervisors only after their placement with that supervisor has been confirmed in mid February.

To best fit to the field of work, research activities may be spaced weekly, or packed into a shorter span of days, to achieve 20 hours of research contact time per semester, as determined by the supervisor in consultation with the students in the group.

**Special requirements**

Note that police clearances, immunisations, or other special requirements if specified in the guide must be organised by students in advance of the research project start date, at their own expense.

**Timeline**

- In December the Research Placement Guide will be posted online.
- In February: project preferences will be accepted from students (online poll website) for a limited time only. The precise dates will be posted on MyUni.
- Prior to commencement of semester 1: Students will be notified of their project group by e-mail.
- Week 3 of the semester: Students have their introductory meetings with their supervisors, setting the planned schedule of contact meetings for the semester, discussing relevant reports or literature to be read, and completing orientation and induction requirements as needed for the research project.
CANCER BIOLOGY AND CLINICAL ONCOLOGY
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

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.

Genomic studies have identified new lesions known to confer high-risk for which the biological and clinical implications remain unclear. In addition, recent studies have implicated the human microbiome in ALL development, treatment response and life-long comorbidities. The aim is to incorporate genomic knowledge into clinical care and to systematically identify druggable targets to improve patient outcomes. In addition, immunotherapies have shown efficacy in some settings. However, not all high-risk/relapsed ALL patients are eligible for immunotherapy with 50% of patients experiencing hypersensitivity reactions. As the National Referral Centre for genomic screening of ALL cases we sequence a large number of patients, identifying a significant number of alterations and novel gene fusions for investigation.

All projects will involve a range of techniques which may include genomic sequencing, flow cytometry, cytokine measurement, molecular biology and cloning techniques including primer design, PCR/Sanger sequencing, bacterial work and tissue culture. In addition, patient derived xenografts (PDX)/mouse avatars/germ free mice) models of ALL may be used.

For available projects please view Professor White’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/deborah.l.white
**CANCER TREATMENT TOXICITIES GROUP**

**Lead Researcher:** Associate Professor Joanne Bowen  
**Contact:** joanne.bowen@adelaide.edu.au

**Research Summary**

The group investigates underlying mechanisms and treatments for some of the most common toxicities of cancer therapies, including diarrhoea, vomiting, 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. My 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

**Major**

Medical Science; Neuroscience

**Maximum Number of Students**

8

**Category**

Wet Laboratory; Human Research

**Research Areas**

Cancer Biology and Clinical Oncology  
Nutrition and Metabolic Health  
Neuroscience, Behaviour and Brain Health

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**AQUAPORIN PHYSIOLOGY AND DRUG DISCOVERY RESEARCH PROGRAM**

**Lead Researcher:** Professor Andrea Yool  
**Contact:** andrea.yool@adelaide.edu.au

**Research Summary**

Our goals are to define the molecular basis of the dual water and ion channel functions of aquaporins, to understand the roles of AQPs in physiological systems, and to build a definitive portfolio of AQP antagonist and agonist compounds as tools for basic research and clinical innovation. Aquaporins are currently being uncovered as essential components of rapid cell migration in wound healing and cancer metastasis, particularly in aggressive cancers such as glioblastoma and colon cancers. We have shown molecular knockdown or pharmacological blockade of AQP1 can slow or stop aggressive cancer cell movement. Our work over the past decade has challenged the original dogma that the archetypal channel AQP1 is rigid and constitutively open. Our focus on AQP pharmacology defined the first library of pharmacological agents in the world, based on arylsulfonamide scaffolds showing differential activities on the ion and the water pores. We are also discovering new pharmacological AQP modulators from traditional Chinese and Indian herbal medicines, identifying the active chemical components and defining their molecular targets of action on AQP gating domains. Our findings could offer exciting opportunities for clinical intervention in cancer metastasis, brain oedema, and other fluid transport disorders.

For available projects please view Professor Yool’s Researcher Profile under “My Research”

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

**Major**

Medical Science; Neuroscience

**Maximum Number of Students**

4

**Category**

Wet Laboratory

**Research Areas**

Cancer Biology and Clinical Oncology  
Neuroscience, Behaviour and Brain Health  
Innovative Therapeutics  
Cardiac, Respiratory and Vascular Health

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*Hot spots show ion currents in real time, carried by aquaporin-1 channels localized in the leading edges of migrating colon cancer cells.*

(Pei et al, 2019, Molecular Pharmacology May 2019, 95 (5): 573-583; DOI: https://doi.org/10.1124/mol.118.115428 )
CANCER TREATMENT TOXICITIES GROUP

Lead Researcher: Dr Janet Coller
Contact: janet.coller@adelaide.edu.au

Research Summary

The group investigates underlying mechanisms and treatments for some of the most common toxicities of cancer therapies, including diarrhoea, vomiting, 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. My 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 Dr Janet Coller’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/janet.coller

Major
Medical Science; Neuroscience

Maximum Number of Students
8

Category
Wet Laboratory; Human Research

Research Areas
Cancer Biology and Clinical Oncology
Nutrition and Metabolic Health
Neuroscience, Behaviour and Brain Health
Regulation of alternative splicing during epithelial-mesenchymal transition

**Research Summary**

In the last decade, our conception of the complexity of the mammalian transcriptome has been revolutionized by the annotation of the human genome and the advent of deep sequencing technologies. It is now clear that the majority of the genome is transcribed into protein-coding and non-coding regulatory RNAs, however the functional consequences of the majority of these RNAs remains unknown.

During cancer progression, tumour cells undergo significant changes in cellular function. For epithelial tumour cells to metastasise they must acquire abilities to invade, survive and then colonise distant sites.

Epithelial cell plasticity (or epithelial-mesenchymal transition) plays a major role in the metastatic cascade. Our lab is examining how EMT and cancer metastasis are regulated by non-coding RNAs. In particular, our research focusses on how microRNAs alter the cancer cell transcriptome using in vitro and in vivo cancer models coupled with next generation sequencing.

For available projects please see Dr Gregory’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/philip.gregory

**Major**

Medical Science

**Maximum Number of Students**

3

**Category**

Wet Laboratory; Dry Laboratory

**Research Areas**

Cancer Biology and Clinical Oncology
MYELOID METABOLISM AND EPIGENETICS

Lead Researcher: Dr Daniel Thomas
Contact: daniel.thomas@adelaide.edu.au

Research Summary

The way we understand and treat cancer is changing rapidly due to next generation sequencing and new insights into cancer stem cell epigenetics and metabolism. My research studies acute myeloid leukemia as a test-bed for precision oncology to assign the best non-chemotherapeutic treatment to the right patient. Acute myeloid leukemia is a poor prognosis blood cancer with a high recurrent mutation rate, stable karyotype and intra-clonal heterogeneity but a low total mutation burden, making it a perfect disease to discover and design mutation-specific therapies for cancer. My lab uses drug screens, CRISPR/Cas9, humanized mouse models, bioinformatics, Seahorse analyser and pre-leukemic stem cells to discover novel metabolic vulnerabilities that are specific to recurrent mutations in cancer. Our work has discovered several new targets for the IDH1 mutation in cancer and novel epigenetic druggable pathways for WT1 mutations, IDH2 mutations and TET2 mutations. Hopefully these discoveries will translate into effective therapy for solid cancers as well!

For available projects please see Dr Thomas’ Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/daniel.thomas

Major
Medical Science

Maximum Number of Students
Flexible

Category
Wet Laboratory; Dry Laboratory; Human Research; Systematic Review; Meta-analysis

Research Areas
Cancer Biology and Clinical Oncology
ONCOGASTROENTEROLOGY RESEARCH GROUP

Lead Researcher: Dr Hannah Wardill
Contact: hannah.wardill@adelaide.edu.au

Research Summary
The human gut is home to trillions of bacteria, viruses and fungi, collectively termed the microbiome. Dr Wardill’s research aims to understand how the microbiome influences the outcomes of cancer therapy and how host-microbe interactions can be exploited to predict and prevent complications of cancer therapy. Dr Wardill is currently leading several collaborative research projects aiming to
1) establish a faecal transplantation service for people with blood cancer, and
2) develop a paediatric biobank for the comprehensive evaluation of the factors that determine a child’s response to chemotherapy, and their risk of long-term health implications after treatment.

In addition her clinical research projects, Hannah is also working on developing a murine model of graft versus host disease in which she is refine faecal transplantation processes for optimal clinical translation.

For available projects please view Dr Wardill’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/hannah.wardill

Major
Medical Science

Maximum Number of Students
4

Category
Wet Laboratory; Dry Laboratory; Human Research

Research Areas
Cancer Biology and Clinical Oncology
Immunology and Infection
Nutrition and Metabolic Health

E coli: one of trillions of bacteria that are found within the human gut
REPRODUCTIVE CANCER RESEARCH GROUP

Lead Researcher: Dr Carmela Ricciardelli
Contact: carmela.ricciardelli@adelaide.edu.au

Research Summary

Ovarian cancer is a devastating disease and the leading cause of death from gynaecological malignancies, affecting approximately 1 in 90 women in Australia. Over 70% of patients present with advanced disease, and despite improvements in surgery and new developments in chemotherapy, ovarian cancer mortality rates have not changed dramatically over the last decade. Significant improvement in ovarian cancer survival will require the development of novel ovarian cancer biomarkers for early detection and more effective molecularly targeted therapeutics.

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

Major
Reproductive Health; Medical Science

Maximum Number of Students
2

Category
Wet Laboratory

Research Areas
Cancer Biology and Clinical Oncology
**SOLID TUMOUR GROUP**

Lead Researcher: Dr Jennifer Hardingham  
Contact: jenny.hardingham@sa.gov.au

Research Summary

Our work is focused on novel treatments for metastatic colorectal and breast cancer. Themes include identification and development of new therapeutic agents for the treatment of colorectal cancer and breast cancer, development of new biomarkers of drug resistance and therapeutic targets, mouse models of breast and colon cancer to test the efficacies of novel inhibitors.

For available projects please view Dr Jennifer Hardingham’s Researcher Profile under “My Research”  
researchers.adelaide.edu.au/profile/jennifer.hardingham

Major  
Medical Science

**Maximum Number of Students**  
2

**Category**  
Wet Laboratory; Systematic Reviews; Meta-analysis; Human Research

**Research Areas**  
Cancer Biology and Clinical Oncology  
Innovative Therapeutics  
Translational Health Outcomes

**SOLID TUMOUR GROUP, BASIL HETZEL INSTITUTE**

Lead Researcher: Dr Eric Smith  
Contact: eric.smith@adelaide.edu.au

Research Summary

The Solid Tumour Group, incorporating the SAHMRI Colorectal Cancer Node, is headed by Professor Timothy Price, and investigates the molecular and cellular mechanisms underlying the carcinogenesis and therapeutic resistance of solid tumours, to identify novel prognostic and predictive factors, biomarkers of drug resistance, therapeutic targets, and to develop and trial new therapeutic agents in pre-clinical models, with translation to the clinical setting.

For available projects please view Dr Smith’s Researcher Profile under “My Research”  
researchers.adelaide.edu.au/profile/eric.smith

Major  
Medical Science

**Maximum Number of Students**  
2

**Category**  
Wet Laboratory

**Research Areas**  
Cancer Biology and Clinical Oncology

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*Solid Tumour Group, Basil Hetzel Institute, The Queen Elizabeth Hospital*
CARDIAC, RESPIRATORY AND VASCULAR HEALTH
CARDIAC, RESPIRATORY AND VASCULAR HEALTH RESEARCH GROUPS

Clinical Pharmacology Research 18
Cardiovascular Pathophysiology and Therapeutics Group 19
Molecular Physiology of Vascular Function Research Group 20
Northern Cardiovascular Research Group 20
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.
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.

### CARDIAC, RESPIRATORY AND VASCULAR HEALTH RESEARCH OPPORTUNITIES

#### CLINICAL PHARMACOLOGY RESEARCH

**Lead Researcher:** Professor Sepehr Shakib  
**Contact:** sepehr.shakib@adelaide.edu.au

**Research Summary**
Assessment of drug interactions in patients prescribed oral anticoagulants - In recent years new oral anticoagulants have been marketed which have the promise of having fewer drug-drug and drug-food interactions, as well as not requiring monitoring blood tests, compared to the current gold standard of warfarin. In practice, these drugs still have significant drug-drug interactions and the concern is that the prescriber of these agents may not take these drug-drug interactions into account when prescribing. Furthermore, as there is no ability to monitor the effect of these new agents, if there are significant drug-drug interactions, the effect would not be identified through this monitoring.

The aim of this study is to analyse electronic prescribing of oral anticoagulants across South Australian public hospitals using electronic medication management, to review the prevalence and significance of drug-drug interactions with warfarin and novel oral anticoagulants (apixaban, rivaroxaban, dabigatran).

**Major**  
Clinical Trials (GPA below 4.8)

**Maximum Number of Students**  
10

**Category**  
Dry Laboratory; Data Analysis

**Research Areas**  
Cardiac, Respiratory and Vascular Health

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#### CLINICAL PHARMACOLOGY RESEARCH

**Lead Researcher:** Professor Sepehr Shakib  
**Contact:** sepehr.shakib@adelaide.edu.au

**Research Summary**
Assessment of variability in laboratory test results in healthy volunteers undergoing phase I clinical trials - Healthy volunteer subjects who take part in clinical trials have a number of screening assessments to ensure that they are “healthy”. These assessments include history, examination, vital signs, as well as investigations such as electrocardiographs, and laboratory tests. The laboratory tests performed include general tests such as biochemistry, hematology and urinalysis, as well as some study specific assessments e.g. amylase. These tests are performed in order to be able to establish a normal baseline, such that drug related adverse events can be identified with more sensitivity and specificity.

One of the common issues with the assessment of laboratory results in healthy volunteer phase I studies, is that the reference ranges which are used to define abnormalities in patients, may not apply to a healthy volunteer population. For example, creatine kinase is frequently measured in phase 1 healthy volunteer studies for the assessment of rhabdomyolysis. It is very common for young healthy volunteers who are very active, and undertake regular exercise, to present with values above the “reference range” for sedentary patients.

The rationale of this research is to provide a better understanding of variation in pathology results in healthy volunteer phase I studies, in order to better inform the design of protocols, as well as better manage subjects when changes in their laboratory results are observed.

As described in the background information, the reference ranges for assessment of disease in a patient, may not be appropriate for the assessment of trial participation in a healthy volunteer. Consequently, understanding the variability and distribution of laboratory results in healthy volunteers may result in reduced inappropriate exclusion of subjects at screening.

**Major**  
Clinical Trials (GPA below 4.8)

**Maximum Number of Students**  
10

**Category**  
Dry Laboratory; Data Analysis

**Research Areas**  
Cardiac, Respiratory and Vascular Health
CARDIOVASCULAR PATHOPHYSIOLOGY AND THERAPEUTICS GROUP

Lead Researcher: Dr Cher-Rin Chong
Contact: cher-rin.chong@adelaide.edu.au

Research Summary
We want to find ways to prevent heart disease in patients with diabetes. Patients with diabetes are 6 times more likely to die from heart disease than those without. Therefore, interventions to reduce the impact of diabetes are much needed. We are particularly interested at investigating how the DNA repair mechanism affects the abnormal metabolism of the diabetic heart, and whether or not intervening this pathway can affect the transcription, post-translational modification and enzymatic activity of the diabetic heart.

For available projects please view Dr Chong’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/cher-rin.chong

Major
Medical Science

Maximum Number of Students
Flexible

Category
Wet Laboratory; Human Research

Research Areas
Cancer Biology and Clinical Oncology
Nutrition and Metabolic Health
Innovative Therapeutics

CARDIOVASCULAR PATHOPHYSIOLOGY AND THERAPEUTICS GROUP

Lead Researcher: Dr Saifei Liu
Contact: saifei.liu@adelaide.edu.au

Research Summary
My current research relates to three areas:
1) Chemotherapy induced cardiotoxicity,
2) B-type natriuretic peptide physiology and pathophysiology in heart failure, and
3) Mechanistic interactions of inflammatory activation and glycocalyx shedding in cardiovascular disease.

For available projects please view Dr Liu’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/saifei.liu

Major
Medical Science

Maximum Number of Students
Flexible

Category
Wet Laboratory; Dry Laboratory; Human Research

Research Areas
Cardiac, Respiratory and Vascular Health
Cancer Biology and Clinical Oncology
MOLECULAR PHYSIOLOGY OF VASCULAR FUNCTION RESEARCH GROUP

Lead Researcher: Dr David P Wilson
Contact: david.p.wilson@adelaide.edu.au

Research Summary
The objectives of our research group are to identify and investigate mechanisms and therapies for vasomotor disorders. The research involves investigation of vasospasm of large or small vessels and mechanisms contributing to vasodilatory septic shock. The research team is involved in both preclinical, basic research, and translational research using a three-pronged approach, which includes:
• Clinical characterization of vasomotor disorders
• Discovery of underlying molecular mechanisms
• Exploring novel therapies in basic & clinical studies.

For available projects please view Dr Wilson’s Researcher Profile under “My Research”

researchers.adelaide.edu.au/profile/david.p.wilson

Major
Medical Science

Maximum Number of Students
Flexible

Category
Wet Laboratory; Dry Laboratory; Human Research

Research Areas
Cardiac, Respiratory and Vascular Health

NORTHERN CARDIOVASCULAR RESEARCH GROUP

Lead Researcher: Associate Professor Margaret Arstall
Contact: margaret.arstall@sa.gov.au or emily.aldridge@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.

For available projects please see Associate Professor Arstall’s Researcher Profile under “My Research”

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

Major
Medical Science

Maximum Number of Students
Flexible

Category
Wet Laboratory; Systematic Reviews; Human Research

Research Areas
Cardiac, Respiratory and Vascular Health
Pregnancy and Birth

Dr David P Wilson

The Northern Cardiovascular Research Group
CHILD AND ADOLESCENT HEALTH
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.
WOMEN’S AND CHILDREN’S HOSPITAL ORTHOPAEDICS

Lead Researcher: Dr Christy Graff
Contact: christy.graff@adelaide.edu.au

Research Summary
Dr Christy Graff is a paediatric orthopaedic surgeon at the Women’s and Children’s Hospital in North Adelaide. She is especially interested in investigating areas of paediatric orthopaedics associated with paediatric trauma. She is currently undertaking two systematic reviews, as well as reviewing the hospital’s data, in paediatric supracondylar fractures and paediatric re-fractures of radius and/or ulna fractures.
For available projects please see Dr Graff’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/christy.graff

Major
Medical Science

Maximum Number of Students
4

Category
Human Research

Research Areas
Child and Adolescent Health
Musculoskeletal Health

Dr Christy Graff MBBS MHMSc FRCS FRACS
EARLY ORIGINS OF HEALTH
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.
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.

EARLY ORIGINS OF HEALTH RESEARCH OPPORTUNITIES

CRANIOFACIAL BIOLOGY RESEARCH GROUP

Lead Researcher: Ms Michelle Bockmann
Contact: michelle.bockmann@adelaide.edu.au

Research Summary

My research focuses on understanding health and disease states, and how humans grow and develop.

I am interested in understanding how the interplay between genes, epigenome, environment, behaviour and the commensal bacteria (the microbiome) can influence the health and well-being outcomes of children and young adolescents.

Key current research areas include:
1. The role of the oral microbiome in health and disease
2. Pre-natal influences on oral health in mid-childhood
3. The role of diet in early development
4. Dental anthropology and forensics

Our group has a broad range of projects available that enable students to tailor their experience to attain specific skills. We operate both wet and dry laboratories, have a strong track record in bioinformatics and big data analysis, and have some very active collaborations with other groups (and potential co-supervisors) in Sydney and the USA.

For available projects please view Ms Bockmann’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/michelle.bockmann

Major
Medical Science; Nutritional Health

Maximum Number of Students
3

Category
Wet Laboratory; Dry Laboratory; Human Research

Research Areas
Early Origins of Health
Child and Adolescent Health
Oral Health
Nutrition and Metabolic Health

Diagramatic representation of reported associations between oral disease and systemic diseases and disorders
CRANIOFACIAL BIOLOGY RESEARCH GROUP

Lead Researcher: Associate Professor Toby Hughes
Contact: toby.hughes@adelaide.edu.au

Research Summary
My research has a broad focus on early life factors that influence health and development throughout childhood and early adult life. I am interested in the nexus between oral and systemic conditions, and specifically in interactions between the genome, the epigenome, the environment and the commensal bacteria (the microbiome).

Key current research areas include:
1) The role of the oral microbiome in health and disease
2) Speech development and the role of the oral anatomy
3) Pre-natal influences on oral health in mid-childhood
4) The role of diet in early development
5) Craniofacial development in children
6) Physical anthropology and forensics

My group has a broad range of projects available that enable students to tailor their experience to attain specific skills. We operate both wet and dry laboratories, have a strong track record in bioinformatics and big data analysis, and have some very active collaborations with other groups (and potential co-supervisors) in Sydney, Melbourne and the USA.

For available projects please view Associate Professor Hughes’ Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/toby.hughes

Major
Medical Science; Nutritional Health

Maximum Number of Students
Flexible

Category
Wet Laboratory; Dry Laboratory; Systematic Reviews; Meta-analysis; Human Research

Research Areas
Early Origins of Health
Child and Adolescent Health
Oral Health
Nutrition and Metabolic Health
Host Genetic Control of the Oral Microbiome in Health and Disease

Andres Gomez,1,8 Josh L. Espinoza,2,6 Derek M. Harkins,3 Pamela Leong,4 Richard Saffery,4 Michelle Bockmann,5 Manolito Torralba,1 Claire Kuelbs,1 Rohith Kodukula,6 Jason Inman,3 Toby Hughes,6 Jeffrey M. Craig,4 Sarah K. Highlander,1 Marcus B. Jones,7 Chris L. Du pont,2 and Karen E. Nelson1,3,9,*

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3Departments of Human Biology and Genomic Medicine, J. Craig Venter Institute, Rockville, MD 20850, USA
4Murdoch Children’s Research Institute and Department of Pediatrics, University of Melbourne, Royal Children’s Hospital, Parkville, VIC 3052, Australia
5School of Dentistry, The University of Adelaide, Adelaide, SA 5005, Australia
6JCVI Summer Intern Program, Torrey Pines High School, San Diego, CA 9213, USA
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http://dx.doi.org/10.1016/j.chom.2017.08.013

SUMMARY

Host-associated microbial communities are influenced by both host genetics and environmental factors. However, factors controlling the human oral microbiome and their impact on disease remain to be investigated. To determine the combined and relative effects of host genotype and environment on oral microbiome composition and caries phenotypes, we profiled the supragingival plaque microbiome of 485 dizygotic and monozygotic twins aged 5–11. Oral microbiome similarity always increased with shared host genotype, regardless of caries state. Additionally, although most of the variation in the oral microbiome was determined by environmental factors, highly heritable oral taxa were identified. The most heritable oral bacteria were not associated with caries state, did not tend to co-occur with other taxa, and decreased in abundance with age and sugar consumption frequency. Thus, while the human oral microbiome composition is influenced by host genetic background, potentially carcinogenic taxa are likely not controlled by genetic factors.

INTRODUCTION

Although there has been a tremendous expansion in human microbiome research, with hundreds of projects underway globally (Blaser, 2014; Human Microbiome Project Consortium, 2012), the oral microbiome has not received the same level of attention as its gut counterpart. Indeed, this microbial ecosystem is a critical component of oral and systemic human health. For instance, although dental caries, the most common chronic disease in children (Benjamin, 2010), is of a multifactorial nature, it usually occurs when frequent sugar intake is metabolized by a specific bacterial milieu in the oral cavity, resulting in increased acidity and dental demineralization (Takahashi and Nyvad, 2011). In periodontitis, a chronic disease affecting adults, specific bacterial ecology elicits inflammatory responses in the host, leading to the destruction of periodontal tissue, pocket formation, and tooth loss (Loesche, 2011). Likewise, non-plaque-associated bacteria, viruses, and fungi can trigger gingival lesions associated with herpes and candidiasis (Holmstrup, 1999), and there is mounting evidence pointing to a specific microecosystem characterizing cancerous tissue in oral cancer (Schmidt et al., 2014). Interestingly, the connections between oral microbes and health extend beyond the oral cavity, as cardiometabolic, respiratory, and immunological disorders; gastrointestinal cancers; and obstetric complications are thought to have oral microbial associations (Beck et al., 2000; Rubinstein et al., 2013; Seymour et al., 2007).

Consequently, unraveling the forces that shape and define the oral microbiome is crucial for the understanding of both oral and broader systemic health. Research on development and maturation of the human microbiome in the early years of postnatal life has mainly been centered on the gut, pointing at mode of delivery and breastfeeding as important early driving forces (Azad et al., 2013; Dominguez-Bello et al., 2010) and diet and environment as subsequent determinants (Walter and Ley, 2011). Moreover, twin studies have shown that the gut microbiome similarity increases with host genetic background, that some gut taxa are driven by additive genetic effects, and that the abundance of specific gut taxa is linked to genes associated with immune and metabolic functions in the host (Goodrich et al., 2014, 2016). Nonetheless, the available evidence on the forces shaping the oral microbiome is scarce. For example, just as in the gut, oral microbial communities seem to be initially influenced by perinatal factors (Holgersson et al., 2013; Llf Holgersson et al., 2011, 2015). However, reports on the heritable fraction of the oral microbiome are conflicting. For instance, contrary to what has been found in the gut, twin studies on the genetic control of the oral microbiome (saliva and plaque) have shown less or no apparent influence of additive genetic factors (Papapostolou et al., 2011; Stahlinger et al., 2012). Yet other twin studies have focused on the abundance
EARLY ORIGINS OF HEALTH AND DISEASE RESEARCH GROUP

Lead Researcher: Dr Kathy Gatford
Contact: kathy.gatford@adelaide.edu.au

Research Summary
The Early Origins of Health and Disease Research Group aims to understand how exposures in pregnancy impact later health, and to develop and test interventions during and after pregnancy to reduce the impact of these exposures and improve health of offspring from birth to adulthood. We use intensive studies in preclinical models with a large network of collaborators to investigate mechanisms and evaluate interventions independent of potential confounding, as well as evaluating evidence from human cohorts.

For available projects please see Dr Gatford’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/kathy.gatford

Major
Medical Science; Reproductive Health

Maximum Number of Students
Flexible

Category
Wet Laboratory; Systematic Reviews

Research Areas
Early Origins of Health

Dr Kathy Gatford

NEUROGENETICS

Lead Researcher: Professor Jozef Gecz
Contact: jozef.gecz@adelaide.edu.au

Research Summary
The Neurogenetics Group aims to understand the neurobiology of human brain function by studying major neurological disorders which are genetically determined. By identifying and characterising the mutations implicated in intellectual disability, epilepsy and cerebral palsy, a greater understanding of the role of specific genes and proteins in normal brain function can be discovered.

Identification of genes and understanding of molecular mechanisms leading to intellectual disabilities, autisms and some epilepsies represents a challenge of significant medical importance. With a broad range of state-of-the-art human genetics and genomics skills, our team has discovered or contributed to the discovery of more than 200 different genes. Many of these genes pointed to new and unexpected biological pathways essential for normal brain function (e.g. non-sense mediated mRNA decay, NMD).

The four key areas of our research focus are:
- genomics and bioinformatics
- molecular mechanisms of neurodevelopmental disability
- molecular neuroscience

The NEURO team is complemented by a large number of national and international clinical and basic science collaborators.

For available projects please view Professor Gecz’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/jozef.gecz

Major
Medical Science; Neuroscience

Maximum Number of Students
2

Category
Wet Laboratory; Dry Laboratory

Research Areas
Early Origins of Health
Neuroscience, Behaviour and Brain Health
Translational Health Outcomes

iPSC-Derived Human Cortical Neurons. Claire Homan, PhD student.
REPRODUCTIVE BIOLOGY RESEARCH GROUP

Lead Researcher: Dr Eleanor Peirce
Contact: eleanor.peirce@adelaide.edu.au

Research Summary
Our research group is interested in the comparative morphology and evolution of gametes, gonads and external genitalia of Australian mammals. We have found great diversity in these characteristics across the species investigated and we are now exploring the functional implications of this diversity. We have published extensively in this field with articles in Nature and New Scientist as well as in the more specialist scientific journals. In addition, we are involved in developing reproductive technological procedures for long-term storage of sperm and eggs from some of these species to assist with conservation programs.

In particular our current research interests include studies on:
• Factors determining the efficiency of gamete production across species
• Factors determining sperm shape and size
• Co-evolution of molecules involved in sperm-egg interaction at fertilisation
• Environmental control of reproduction

For available projects please view Dr Peirce’s Researcher Profile under “My Research” – researchers.adelaide.edu.au/profile/eleanor.peirce

Major
Reproductive Health (GPA below 4.8)

Maximum Number of Students
10

Category
Dry Laboratory; Data Analysis

Research Areas
Early Origins of Health
FERTILITY AND CONCEPTION
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 this research area is available on the Robinson Research Institute’s website.
FERTILITY AND CONCEPTION RESEARCH OPPORTUNITIES

OVARIAN CELL BIOLOGY AND EMBRYOLOGY

Lead Researcher: Professor Rebecca Robker
Contact: rebecca.robker@adelaide.edu.au

Research Summary

The Ovarian Cell Biology and Embryology research group is led by Prof Rebecca Robker. The team investigates biological mechanisms by which cells in the ovary nurture the oocyte, endow it with the essential components to form an embryo, and trigger its release into the oviduct for fertilisation. Discovering this information is essential for understanding the foundations of reproduction and the earliest stages of embryogenesis.

We are investigating the cellular mechanisms that control when the oocyte is released from the ovary (ovulation), focusing on how hormones induce proteolytic genes in ovarian cells. Our studies are also examining how oocytes and sperm are affected by obesity and age, and the impact on embryogenesis and offspring health. We are actively involved in identifying therapies, both pharmaceutical and lifestyle, that can rejuvenate damaged gametes and improve embryo development. We use mouse models for our basic research and collaborate with human fertility clinics to translate our findings.

Our vision is to discover cellular mechanisms by which maternal physiological signals influence ovarian cells, to control ovulation and the healthy development of offspring. We use this knowledge to improve female (and male) reproductive health, generate new approaches to treat infertility and optimise embryo growth in all pregnancies.

For available projects please view Professor Robker's Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/rebecca.robker

Major
Reproductive Health

Maximum Number of Students
Flexible

Category
Wet Laboratory; Human Research

Research Areas
Fertility and Conception
Early Origins of Health

Oocytes contain lipid droplets (green), mitochondria (red) and DNA. Our lab is investigating how obesity and age affect oocytes and their ability to form an embryo.

A blastocyst stage embryo contains the Inner Cell Mass (ICM) which becomes the fetus and the trophectoderm cells (TE) which form the placenta. Our lab identifies potential therapies to improve embryogenesis and fertility.
REPRODUCTIVE BIOLOGY RESEARCH GROUP

Lead Researcher: Dr Sean O’Leary
Contact: sean.oleary@adelaide.edu.au

Research Summary
My research focuses broadly on the factors that influence pregnancy success leading to healthy outcomes for mothers and babies, and developing reproductive strategies to improve livestock production.

Research Interests:
• Improving reproductive strategies in livestock species
• Investigating the role of ovarian factors as predictors of fertility and pregnancy success
• The role of progesterone during pregnancy and the endocrine/immune crosstalk between the ovary, fetus, placenta and endometrium
• Nutritional determinants of pregnancy success and how lifestyle factors including maternal micronutrient status and obesity can lead to complications of pregnancy
• Factors in seminal plasma that drive early responses in the maternal reproductive tract leading to increased embryo survival
• Developing surgical techniques in large animal models to facilitate the study of human genetic diseases and infertility

For available projects please view Dr O’Leary’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/sean.oleary

Major
Reproductive Health

Maximum Number of Students
3

Category
Wet Laboratory

Research Areas
Fertility and Conception

SPERM AND EMBRYO BIOLOGY

Lead Researcher: Dr Nicole McPherson
Contact: nicole.mcpherson@adelaide.edu.au

Research Summary
The Sperm and Embryo Biology Group run by Dr Nicole McPherson is a part of the Robinson Research Institute, Freemasons Centre for Men’s Health and School of Medicine at the University of Adelaide. The group’s main research themes encompass lifestyle factors and male fertility, improving IVF technologies through choosing the best sperm, paternal programming of embryo and offspring health, early fertilisation events and basic and comparative sperm biology. The research group works in very close collaboration with the Monash IVF group and Repromed in SA, which allows access to clinical samples and ensures our research stays clinically translatable. Many of the research projects from this group are in collaboration with the Clinical Researchers and Scientific Directors of the Monash IVF group.

For available projects please view Dr McPherson’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/nicole.mcpherson

Major
Reproductive Health; Medical Science

Maximum Number of Students
2

Category
Wet Laboratory; Human Research

Research Areas
Fertility and Conception
Men’s Health
Early Origins of Health
Translational Health Outcomes

Blastocyst mouse embryos

Dr Sean O’Leary
IMMUNOLOGY AND INFECTION
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.
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.

**IMMUNOLOGY AND INFECTION RESEARCH OPPORTUNITIES**

**GASTROINTESTINAL NEURO-IMMUNE INTERACTIONS**

Lead Researcher: Dr Patrick Hughes  
Contact: patrick.hughes@adelaide.edu.au

**Research Summary**

The Gastrointestinal Neuro-Immune Interactions Group investigates how communication between the immune and nervous system is altered in gastrointestinal diseases, primarily Inflammatory Bowel Disease and Irritable Bowel Syndrome.

These diseases are associated with pronounced changes to microbiota, immune and nervous systems leading to symptoms of chronic inflammation, pain and anxiety/depression. While these symptoms indicate that the nervous and immune systems are intimately linked, surprisingly little is understood regarding how altered communication between these systems generates symptoms.

The Gastrointestinal Neuro-Immune Interactions Group applies state-of-art molecular and functional techniques to animal models and human tissue to investigate the immune and nervous systems from molecular pathways through to functional studies. Our human tissue is sourced from strong collaborations with clinical gastroenterologists where we have been involved in several clinical trials.

We are interested in discovering new targets for novel treatments of disease and development of biomarkers and imaging techniques for diagnosis of these diseases.

The group is currently supported by NHMRC and philanthropic grants and industry partnerships.

For available projects please view Dr Hughes’ Researcher Profile under “My Research”

researchers.adelaide.edu.au/profile/patrick.hughes

**Major**  
Medical Science; Nutritional Health

**Maximum Number of Students**  
Flexible

**Category**  
Wet Laboratory; Human Research

**Research Areas**  
Immunology and Infection  
Nutrition and Metabolic Health  
Neuroscience, Behaviour and Brain Health  
Innovative Therapeutics

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**VACCINOLOGY AND IMMUNOLOGY RESEARCH TRIALS UNIT**

Lead Researcher: Professor Helen Marshall  
Contact: helen.marshall@adelaide.edu.au

**Research Summary**

The research program at the Vaccinology and Immunology Research Trials Unit (VIRTU) is directed to address urgent priorities in infectious disease prevention and includes clinical trials in investigational vaccines, infectious and social epidemiology and public health. VIRTU conducts ongoing research on meningococcal, influenza, pneumococcal and pertussis vaccines and suitable HDR projects within these broad areas can be developed after discussion with Prof. Helen Marshall, Director of the Unit. One of the main areas of current research at VIRTU includes meningococcal disease.

Meningococcal disease causes significant morbidity and mortality worldwide and invasive meningococcal disease can result in long-term disability. VIRTU currently conducts several projects on meningococcal disease including the following:

1. The “B Part of It study, the largest study of its kind globally assessing the herd immunity impact of meningococcal B vaccine.
2. Assessing long-term physical, neurocognitive, economic and societal impact of invasive meningococcal disease in Australian adolescents and young adults
3. Evaluation of the newly implemented South Australian immunisation program against meningococcal B disease

In addition to projects suitable for HDR students, VIRTU routinely conducts systematic reviews and meta-analyses on infectious diseases and vaccines which are suitable for third year undergraduate research students.

For further information please see Professor Marshall’s Researcher Profile

researchers.adelaide.edu.au/profile/helen.marshall

**Major**  
Medical Science; Clinical Trials

**Maximum Number of Students**  
5

**Category**  
Systematic Reviews; Meta-analysis; Human Research

**Research Areas**  
Immunology and Infection

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Dr. Patrick Hughes

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Professor Helen Marshall, Director of Vaccinology and Immunology Research Trials Unit
INNOVATIVE THERAPEUTICS
Research in innovative therapeutics aims to identify new, economically sustainable therapeutic approaches that can deliver better outcomes for patients and the community.

From 2001 to 2014, health care expenditure in Australia doubled to $140 billion (9.5% GDP), and has since been increasing at a rate of 7.7% per annum. The various tiers of government fund 68% of these costs, 11.5% of which can be attributed to pharmaceuticals alone.

The development of new and cost-effective therapeutics is critical for sustaining and advancing the delivery of health care to the Australian community. Our research aims to produce novel therapeutic approaches to enhance efficacy and specificity; lower the side effects; provide greater safety; and reduced need for hospitalisation or other health services.

Researchers across the faculty are focused on:
- identifying novel targets for therapy to prevent metastasis and modulate the progression of cancers
- identifying new biomarkers to identify disease, predict disease trajectories and monitor response to treatment
- developing tissue regeneration technologies to address tissue injuries and disease
- developing cost-effective in vitro models to replace animal models for testing therapeutic efficacy
- developing rigorous clinical evaluation approaches of novel combinations of existing therapeutic agents, including development of novel modes of delivery.
INNOVATIVE THERAPEUTICS RESEARCH OPPORTUNITIES

ADELAIDE HEALTH TECHNOLOGY ASSESSMENT

Lead Researcher: Dr Drew Carter
Contact: drew.carter@adelaide.edu.au

Research Summary
My current research focusses on ethical resource allocation. I am analysing the ethical principles that ought to inform intensive care unit (ICU) admission and discharge, especially when the ICU is full and additional patients require admission. I am researching the ethics of managed-entry agreements, where governments provisionally fund new health interventions on the condition that research is undertaken to reduce uncertainty concerning the intervention’s effectiveness or cost-effectiveness, for example. I am also researching how national bodies such as the Pharmaceutical Benefits Advisory Committee (PBAC) and the Medical Services Advisory Committee (MSAC) ought to include more than conventional cost-effectiveness in their judgements of the value for money that a health intervention provides. Finally, I am interested in developing a framework that evaluation agencies can use to more easily assess the ethical dimensions of genomic health technologies.

For available projects please view Dr Carter’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/drew.carter

Major
Medical Science; Clinical Trials

Maximum Number of Students
4

Category
Systematic Reviews

Research Areas
Innovative Therapeutics
Surgical and Health Systems Innovation
Translational Health Outcomes

CPHRG

Lead Researcher: Ms Paula Gillespie-Fotheringham
Contact: paula.gillespie-fotheringham@adelaide.edu.au

Research Summary
Art psychotherapy, play therapy, family therapy, child development, developmental trauma, attachment related issues.
Details of specific projects can be found in the School of Public Health Student Research Projects Handbook which you can access here:
researchers.adelaide.edu.au/profile/paula.gillespie-fotheringham

Major
Public Health

Maximum Number of Students
2

Category
Systematic reviews

Research Areas
Innovative Therapeutics
Child and Adolescent Health
Early Origins of Health
MUSCULOSKELETAL HEALTH
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

BONE AND JOINT RESEARCH GROUP, CENTRE FOR ORTHOPAEDIC AND TRAUMA RESEARCH

Lead Researcher: Dr Julia Kuliwaba
Contact: julia.kuliwaba@adelaide.edu.au

Research Summary

The Centre for Orthopaedic and Trauma Research (COTR) was formed in 2012 and its members include orthopaedic surgeons, clinical researchers, and biomedical scientists and engineers. This diverse combination of researcher expertise enables the scientific study of highly clinically relevant topics pertaining to the human musculoskeletal system. The research aims to better understand bone and joint diseases and conditions, including osteoarthritis and joint replacement, pathological bone loss, infection, spinal conditions and fracture.

The COTR team of biomedical scientists and engineers and their laboratories are located in the new Adelaide Health and Medical Sciences building (AHMS) on North Terrace.

The Bone and Joint Research Group focus on understanding the pathobiology of osteoarthritis, osteoporosis, and other musculoskeletal conditions. The laboratory is internationally recognised for human tissue-level analyses, utilising a well-established human musculoskeletal tissue bank. The research involves a multidisciplinary approach utilising numerous tissue-level techniques: ranging from molecular to microstructural to clinical imaging.

For available projects please view Dr Kuliwaba’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/julia.kuliwaba

Major
Medical Science

Maximum Number of Students
10

Category
Wet Laboratory; Dry Laboratory; Human Research

Research Areas
Musculoskeletal Health
Ageing, Frailty and Mobility
Nutrition and Metabolic Health
Translational Health Outcomes
**CENTRE FOR ORTHOPAEDIC & TRAUMA RESEARCH - SPINAL RESEARCH GROUP**

**Lead Researcher:** Dr Claire Jones  
**Contact:** claire.jones@adelaide.edu.au

**Research Summary**

My team engages in diverse research themes across orthopaedics and injury, predominantly related to spinal disorders and trauma, and neurotrauma. Our research bridges medicine and engineering, and we develop and use experimental methods using cadaveric and animal models, medical imaging, computer models, clinical data and human volunteers. Some of our current research projects include understanding the injury mechanisms of cervical spine facet dislocation and fracture, determining the relationship between imaging biomarkers of spinal osteoarthritis and bone biomechanics, the mechanical properties of spinal and cranial dura, and animal models of spinal cord injury and concussion.  

For available projects please view Dr Jones’ Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/claire.jones

**Major**  
Medical Science

**Maximum Number of Students**  
8

**Category**  
Wet Laboratory; Dry Laboratory; Human Research

**Research Areas**  
Musculoskeletal Health  
Neuroscience, Behaviour and Brain Health  
Ageing, Frailty and Mobility

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**MESENCHYMAL STEM CELL GROUP**

**Lead Researcher:** Professor Stan Gronthos  
**Contact:** stan.gronthos@adelaide.edu.au

**Research Summary**

Postnatal mesenchymal stem cells (MSC) derived from connective tissues are capable of developing into multiple cell lineages (myelosupportive stroma, adipocytes, smooth muscle cells, myoblasts, ligament cells, chondrocytes and osteoblasts). Our Lab examines the transcriptional, epigenetic and signalling factors that regulate MSC self-renewal, proliferation, multi-differentiation and immune cell modulation. These molecular processes are being investigated as underlying mechanisms mediating tissue repair, inflammation, tumour cell development and aged related diseases. For available projects please view Professor Gronthos’ Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/stan.gronthos

**Major**  
Medical Science

**Maximum Number of Students**  
Flexible

**Category**  
Wet Laboratory

**Research Areas**  
Musculoskeletal Health  
Cancer Biology and Clinical Oncology

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*Skletal Stem Cells*
North West Adelaide Health Study
Musculoskeletal Health Group

Lead Researcher: Dr Tiffany Gill
Contact: tiffany.gill@adelaide.edu.au

Research Summary
My research is in the area of musculoskeletal epidemiology. I use data collected as part of the North West Adelaide Health Study, a cohort study with 20 years of data collection in the northern and western suburbs, which has one of the largest population-based musculoskeletal data collections in Australia. The data enable us to examine the prevalence, incidence, risk and other factors associated with musculoskeletal conditions in the population.

For available projects please view Dr Gill’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/tiffany.gill

Major
Medical Science

Maximum Number of Students
Flexible

Category
Human Research

Research Areas
Musculoskeletal Health

WCH Paediatric Orthopaedic Clinical Research Team

Lead Researcher: Associate Professor Nicole Williams
Contact: nicole.williams01@adelaide.edu.au

Research Summary
The WCH paediatric orthopaedic clinical research team has many ongoing research projects aimed at prevention, early detection and optimal management for bone and joint problems in children. A range of injury, congenital and developmental conditions are studied including hip dysplasia, fractures, spinal deformity, bone and joint infections and inherited conditions affecting bones and joints. The team has a number of national and international collaborative partnerships. Short-term and longer term projects are available.

For available projects please view Associate Professor Williams’ Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/nicole.williams01

Major
Medical Science

Maximum Number of Students
Flexible

Category
Systematic reviews; Meta-analysis; Human Research

Research Areas
Musculoskeletal Health
Child and Adolescent Health

Late diagnosed dislocation and dysplasia of left hip in a 2 year old child
NEUROSCIENCE, BEHAVIOUR AND BRAIN HEALTH
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.
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.

**BEHAVIOURAL NEUROSCIENCE**

**Lead Researcher:** Dr Alexandra Whittaker  
**Contact:** alexandra.whittaker@adelaide.edu.au

**Research Summary**

Current work is examining chemotherapy-induced cognitive impairment. This common condition experienced by cancer patients treated with chemotherapy causes a long-lasting reduction in cognitive and executive functions, and attention. Effects range from subtle to profound with a consequent impact on quality of life. We believe that, akin to other neurodegenerative conditions such as Alzheimers, this cognitive dysfunction may be brought about through neuroimmune changes occurring in the brain bringing about neurotoxicity. If we can better understand the mechanism of this action we may be in a position to prevent its onset at the time of chemotherapy treatment. This could potentially prevent cognitive decline occurring.

For available projects please view Dr Whittaker’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/alexandra.whittaker

**Major**  
Medical Science; Neuroscience

**Maximum Number of Students**  
3

**Category**  
Wet Laboratory; Dry Laboratory; Systematic reviews

**Research Areas**  
Neuroscience, Behaviour and Brain Health

**DASSA–WHO COLLABORATING CENTRE**

**Lead Researcher:** Associate Professor Linda Gowing  
**Contact:** linda.gowing@adelaide.edu.au

**Research Summary**

My primary research focus is the translation of evidence into best practice in the treatment of alcohol and other drug dependence. This work includes the preparation of systematic reviews, but my current focus is on drawing together the findings of systematic reviews and other types of research to form a view on the efficacy, effectiveness and safety of different interventions for treating addiction. From time to time I also undertake case note audits and other research projects at Drug and Alcohol Services South Australia where I hold the position of Principal Research Officer. Current projects include reviewing the evidence on baclofen and disulfiram for alcohol dependence, types of psychosocial intervention in outpatient settings, and assessment of acute sleep disturbance during amphetamine withdrawal.

For available projects please view Associate Professor Gowing’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/linda.gowing

**Major**  
Medical Science; Neuroscience; Addiction and Mental Health

**Maximum Number of Students**  
2

**Category**  
Systematic reviews; Meta-analysis; Human Research

**Research Areas**  
Neuroscience, Behaviour and Brain Health
DISCIPLINE OF PSYCHIATRY
Lead Researcher: Dr Scott Clark
Contact: scott.clark@adelaide.edu.au

Research Summary
My research broadly focuses on two key areas:
1. Modelling of medication response, cognition and function in severe mental illness combining blood based (-omics), EEG and clinical data for personalised psychiatry.
2. Epidemiology and monitoring of adverse health outcomes in serious mental illness: Myocarditis, Severe infection

For available projects please view Dr Clark’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/scott.clark

Major
Medical Science; Neuroscience; Addiction and Mental Health

Maximum Number of Students
3

Category
Wet Laboratory; Systematic reviews; Meta-analysis; Human Research

Research Areas
Neuroscience, Behaviour and Brain Health
Child and Adolescent Health
Translational Health Outcomes
Innovative Therapeutics

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DISCIPLINE OF PSYCHIATRY
Lead Researcher: Dr Catharine Jawahar
Contact: catharine.jawahar@adelaide.edu.au

Research Summary
Psychosocial stress is a major contributor to psychiatric disorders such as depression, anxiety, and psychosis. Specifically, early life stressors attribute to nearly 30% of all adult psychiatric disorders. It is understood that the dysregulation of neuro-immune-endocrine systems in response to stress, significantly underlies the onset of these psychiatric disorders. However, the mechanisms that mediate the persistent effects of early stress and how it programs the developing neuro-immune-endocrine systems is poorly understood. This project aims to understand the epigenetic effects, in particular, DNA methylation effects of high vs low Childhood Trauma exposure. This is a cross-sectional study aiming to understand differential epigenetic effects in those exposed to high vs low childhood trauma, through a) analysis of a pilot epigenetic data-set, and/or b) Systematic review on epigenetic effects of childhood trauma exposure. This study will help understand key epigenetic mechanisms that mediate early brain programming and could potentially be used as an epigenetic biomarker(s) and as a target for future therapeutics.

For available projects please view Dr Jawahar’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/catharine.jawahar

Major
Medical Science; Neuroscience; Addiction and Mental Health

Maximum Number of Students
Flexible

Category
Dry Laboratory; Systematic Reviews

Research Areas
Neuroscience, Behaviour and Brain Health
Child and Adolescent Health
DISCIPLINE OF PSYCHIATRY

Lead Researcher: Associate Professor Oliver Schubert
Contact: oliver.schubert@adelaide.edu.au

Research Summary
My research focuses on 3 broad areas:

1. ‘Omics’ for Mental Health
I undertake genomic, transcriptomic, and proteomic studies that explore the molecular underpinnings of schizophrenia, bipolar disorder, and major depression. The aim is to define biological signatures of homogenous patient subgroups within these diagnostic entities, and to detect genetic and molecular substrates associated with treatment response. These biomarkers might be of use for personalised prescribing and for development of novel treatments in psychiatry.

2. Longitudinal Mental Health Research in Youth
Measuring mental health outcomes repeatedly over time adds valuable information to cross-sectional clinical assessments. In large datasets, longitudinal research can delineate typical trajectories of treatment response, recovery, or deterioration; my projects aim to predict trajectories for individual patients so treatments can be better tailored to their needs, and to identify and improve gaps in current service provision.

3. The Interface of Mental Health and Physical Illness
The importance of mental health factors for outcomes in medicine at large is widely recognized. I conduct collaborative studies with colleagues working in anaesthesia, O&G, respiratory medicine, infections diseases, and rheumatology with the aim of improving treatment outcomes by assessing and addressing mental health concerns in their patient populations.

For available projects please view Associate Professor Schubert’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/oliver.schubert

Major
Medical Science; Neuroscience; Addiction and Mental Health

Maximum Number of Students
3

Category
Wet Laboratory; Dry Laboratory; Systematic reviews; Meta-analysis; Human Research

Research Areas
Neuroscience, Behaviour and Brain Health
Translational Health Outcomes
Pregnancy and Birth
Innovative Therapeutics

Associate Professor Oliver Schubert

DISCIPLINE OF PSYCHIATRY

Lead Researcher: Dr Catherine Toben
Contact: catherine.toben@adelaide.edu.au

Research Summary
A strong association between stressful life events and the onset of mental health disorders is often linked with chronic low grade inflammation. As a molecular immunobiologist I am particularly interested in gaining a better understanding of the bidirectional and molecular link between brain function and immune system responses to stress. Specifically my work focuses on the identification of transcriptomic and proteomic signatures associated with alterations in particular symptom domains (such as cognition) of psychiatric disorders including depression, PTSD and schizophrenia. A further research focus is how interventions such as altered nutrition and/or mindfulness based practices can harness inherent neuro-regenerative and protective immune mechanisms to reduce stress induced psychiatric symptoms. Ongoing collection of empirical data from clinical cohorts as well as animal models of early and later life chronic stress is an important component of my methodology.

For available projects please view Dr Toben’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/catherine.toben

Major
Medical Science; Neuroscience; Addiction and Mental Health

Maximum Number of Students
Flexible

Category
Wet Laboratory; Systematic reviews; Meta-analysis; Human Research

Research Areas
Neuroscience, Behaviour and Brain Health

Dr Catherine Toben

Associate Professor Oliver Schubert

50 Neuroscience, Behaviour and Brain Health Research Groups
EXPERT COGNITION LAB

Lead Researcher: Dr Rachel Searston
Contact: rachel.searston@adelaide.edu.au

Research Summary
Professionals in a variety of domains are capable of extraordinary feats of expertise. What gives rise to the ability to diagnose a rare disease, develop an elegant solution to a programming problem, spot a suspect’s face in a crowd, or discriminate highly degraded samples of evidence left at a crime-scene? How do experts’ mental representations and decision processes differ from novices’ in these areas? What predicts expert performance? What is the best way to optimise the development of expertise with training and experience?

The Expert Cognition Lab focuses on fundamental questions about the nature and development of expertise as they apply to practical problems in industry. We are interested in understanding how best to create expert performance in contexts such as medicine, forensic science, security, and education. We are working to develop a scientific basis for the selection, training, and assessment of expert performers.

For further information please view Dr Searston’s Researcher Profile researchers.adelaide.edu.au/profile/rachel.searston

Major
Medical Science; Neuroscience

Maximum Number of Students
Flexible

Category
Human Research

Research Areas
Neuroscience, Behaviour and Brain Health

INTEGRATIVE HUMAN NEUROPHYSIOLOGY LABORATORY

Lead Researcher: Dr Simran Sidhu
Contact: simran.sidhu@adelaide.edu.au

Research Summary
Dr Sidhu’s research bridges three disciplines: neuroscience, physiology, and exercise science – with a focus on elucidating neurophysiological mechanisms of exercise intolerance. In addition to the application of non-invasive neurophysiological tools at the cutting edge of integrative neurophysiology (e.g. transcranial magnetic stimulation; TMS), Dr Sidhu has acquired strong experience in cardiopulmonary and autonomic physiology; underpinning her success in conducting integrative studies in healthy, aged, and diseased populations that are world-recognised.

For available projects please view Dr Sidhu’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/simran.sidhu

Major
Medical Science; Neuroscience

Maximum Number of Students
3

Category
Human Research

Research Areas
Neuroscience, Behaviour and Brain Health
Ageing, Frailty and Mobility

Fingerprint expert challenge
INTEGRATIVE HUMAN NEUROPHYSIOLOGY LABORATORY

Lead Researcher: Ms Lavender Otieno (Academic Support: Dr Simran Sidhu)
Contact: lavender.otieno@adelaide.edu.au

Research Summary
Age-related changes in the brain during physical fatigue - Neuromuscular fatigue is exercise-induced reduction in the ability of a muscle or muscle group to produce maximum force or power. This can be attributed to metabolic changes within the muscle (peripheral fatigue) and/or an inability of the central nervous system to maximally drive the muscle (central fatigue). Age-related modifications in the neuromuscular system can predispose older adults to a different magnitude of fatigue. For example, age-related alterations in muscle fibre composition leads to a weaker but more oxidative and fatigue resistant muscle; whilst significant changes in the anatomy and physiology of the central nervous system (CNS) may impair the ability of older adults to produce optimal neural drive during exercise. In order to understand the compensatory mechanisms within the brain during fatigue, previous studies have investigated changes in excitability and inhibition of the primary motor cortical circuitry of young adults during single-joint exercise.

The results suggest that in order to maximise neural output and maintain force output during fatigue, there is an increase in intracortical excitability and a decrease intracortical inhibition. However, this has not been investigated in older adults. Central fatigue in ageing not only impair quality of life but also reduce capacity to work and live independently. Exercise intolerance and disability has resulted in very large healthcare costs. For example, the Australian government spends over $11 billion annually on aged-care services, and that expenditure is expected to increase significantly in line with the number of people aged over 65 years set to nearly triple by 2050. Since improving brain function during fatigue can compensate for impaired work capacity and reduce socio-economic costs, there is a critical need to examine the underlying neurophysiological mechanisms. Therefore the aim of this project was to determine the age-related differences in modulation of excitability and inhibition in the brain following a fatiguing single joint exercise.

For available projects please view Dr Sidhu’s Researcher Profile under “My Research” – researchers.adelaide.edu.au/profile/simran.sidhu

Major
Medical Science; Neuroscience (GPA below 4.8)

Maximum Number of Students
10

Category
Dry Laboratory; Data Analysis

Research Areas
Neuroscience, Behaviour and Brain Health

INTEGRATIVE HUMAN NEUROPHYSIOLOGY LABORATORY

Lead Researcher: Ms Sabrina Sghirripa (Academic Support: Dr Simran Sidhu)
Contact: sabrina.sghirripa@adelaide.edu.au

Research Summary
Brain Rhythms, Lifestyle and Cognitive Performance in Normal Ageing - Advancing age is associated with a progressive decline in cognitive performance, even in the absence of pathology such as Alzheimer’s disease. However, much less is known about the neurophysiological underpinnings of cognitive performance in normal ageing and how lifestyle factors mediate this change. The neurons of the brain communicate via synapses, and when large populations of neurons fire in synchrony, this can be measured as rhythmic activity using electroencephalography (EEG). These brain rhythms subserve a range of cognitive and behavioural processes, and change in power and frequency with age. In particular, brain rhythms in the alpha frequency band (~8-12Hz) are thought to play an important role in orchestrating neural activity during cognitive processes such as memory. Although alpha rhythms tend to slow down and reduce in amplitude with increasing age, little is known about how these changes, along with lifestyle factors, contribute to cognitive decline. Therefore, this project will examine the association between the alpha brain rhythm, lifestyle influences and cognition in healthy older adults.

For further information please see Miss Sghirripa’s Researcher Profile under “My Research” – researchers.adelaide.edu.au/profile/sabrina.sghirripa

Major
Medical Science; Neuroscience (GPA below 4.8)

Maximum Number of Students
10

Category
Dry Laboratory; Data Analysis

Research Areas
Neuroscience, Behaviour and Brain Health

Miss Sabrina Sghirripa
NEIL SACHSE CENTRE FOR SPINAL CORD RESEARCH

Lead Researcher: Dr Ryan O’Hare Doig
Contact: ryan.doig@sahmri.com

Research Summary
Dr O’Hare Doig’s lab looks to help develop novel techniques to provide a more accurate diagnosis and prognosis of spinal cord injury (e.g. PET-CT imaging), identify potential treatment strategies for clinical settings (e.g. stem cell therapy), and improve the quality of life (e.g. sexual function) of individuals with spinal cord injury.

Key research areas of his group include: Molecular biology, neuroinflammation, nuclear imaging (PET-CT), functional imaging (fMRI), nanomedicine and stem cell biology.

For available projects please see Dr O’Hare Doig’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/ryan.oharedoig

Major
Medical Science; Neuroscience

Maximum Number of Students
5

Category
Wet Laboratory; Human Research

Research Areas
Neuroscience, Behaviour and Brain Health

ROYAL ADELAIDE HOSPITAL OPHTHALMOLOGY AND OPHTHALMIC RESEARCH

Lead Researchers: Professor Dinesh Selva and Dr Michelle Sun
Contact: michelle.sun@adelaide.edu.au

Research Summary
Bioengineering is the future of regenerative medicine and the potential applications within ophthalmology have vision-restoring implications. The potential impact is tremendous. Our research investigates how we can utilise various bioengineering techniques to tackle various eye diseases. Current structures under investigation include the eyelid, lacrimal gland and retinal tissue utilising bioengineered scaffolds and various cell culture techniques. Both animal and human studies are under investigation. Students will have the unique opportunity to participate in both clinical and laboratory-based research - ‘from lab to the patient’.

For available projects please see Dr Sun’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/michelle.sun

Major
Medical Science; Clinical Trials

Maximum Number of Students
2

Category
Wet Laboratory; Human Research

Research Areas
Neuroscience, Behaviour and Brain Health

Surgical and Health Systems Innovation

Human eyelid fibroblasts cultured onto a bioengineered scaffold - a bioengineered eyelid
STROKE RESEARCH PROGRAM

Lead Researcher: Professor Simon Koblar
Contact: simon.koblar@adelaide.edu.au

Research Summary

Our major areas of current research are in stroke prevention, the molecular and cellular mechanisms underlying ischaemic stroke, and the translation of stroke management pathways in the clinical domain. We are currently involved in discovering a plasma protein/s which may tell the clinician when a patient is at risk of stroke following a transient ischaemic attack (TIA) so immediate treatment can be instigated. Stroke is the leading cause of adult disability and we aim to find out how to repair the brain following an ischaemic stroke. We have found that a stem cell from the tooth, Dental Pulp Stem Cell (DPSC), is able to generate neurons and improve function when injected into the rodent brain following a stroke. There is a major need to understand the underlying mechanisms of stem cell therapy as different stem cells are used around the world in clinical trials. It is assumed that a neural stem cell maybe the optimum cell for therapy in the brain and so we are using molecular techniques to redirect DPSC into a neural stem cell. Finally, we research how to better translate stroke discoveries into the clinic for better patient outcomes.

For available projects please see Professor Koblar’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/simon.koblar

Major
Medical Science; Neuroscience

Maximum Number of Students
3

Category
Wet Laboratory; Dry Laboratory

Research Areas
Neuroscience, Behaviour and Brain Health
VISUAL PHYSIOLOGY & NEUROBOTICS LABORATORY

Lead Researcher: Dr Steven Wiederman
Contact: steven.wiederman@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 distractors and background clutter. We use electrophysiological techniques to investigate how flying insects see the world and build autonomous robots that emulate these neuronal principles.

1. Use electrophysiological recording techniques to characterise neuronal physiology.
2. Use neuroanatomical techniques to examine the underlying neuronal architecture.
3. Develop computational models that mimic complex biological behaviors.
4. Design autonomous robots based on bio-inspired sensory and control processes.

For available projects please view Dr Wiederman’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/steven.wiederman

Major
Medical Science; Neuroscience

Maximum Number of Students
Flexible

Category
Wet Laboratory; Dry Laboratory

Research Areas
Neuroscience, Behaviour and Brain Health

 Dragonflies exhibit complex behaviours, detecting prey in clutter, predicting the target’s future location and selecting one, from amidst a swarm. Using electrophysiological techniques, we study how the brain underlies these abilities.

From our physiological experiments, we develop neuro-inspired, autonomous robots. This ground vehicle autonomously chases moving objects, even amidst distracters.
NUTRITION AND METABOLIC HEALTH
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.

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.
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.

**NUTRITION AND METABOLIC HEALTH RESEARCH OPPORTUNITIES**

**CENTRE OF RESEARCH EXCELLENCE IN TRANSLATING NUTRITIONAL SCIENCE TO GOOD HEALTH – GASTROINTESTINAL FUNCTION IN DIABETES**

**Lead Researcher:** Professor Chris Rayner  
**Contact:** chris.rayner@adelaide.edu.au

**Research Summary**

Professor Chris Rayner works closely with Professors Michael Horowitz and Karen Jones in a group that has a well-established program of research focussing on gastrointestinal function in diabetes. Our Centre of Research Excellence in Translating Nutritional Science to Good Health, established with NHMRC funding in 2007, is a focal point for researchers who have an interest in nutrition and gut function, particularly in relation to diabetes, obesity, critical illness, and aging.

Professor Rayner’s major research interest concerns nutrient-gut interactions, including the regulation of gastrointestinal motility, with an emphasis on the role of upper gut function in diabetes. His work seeks to develop an understanding of the mechanisms of nutrient sensing and incretin hormone release in the gut, and how these can be manipulated for therapeutic gain.

Current projects include:

- Role of the incretin hormone GIP in health and type 2 diabetes, using a human GIP receptor antagonist - in collaboration with Dr Simon Veedfeld/Prof Jens Holst (University of Copenhagen)
- Role of the sweet taste receptor in the small intestine – in collaboration with A/Prof Richard Young (SAHMRI)
- Intestinal bitter taste receptors – a potential treatment approach for type 2 diabetes – in collaboration with Dr Tongzhi Wu.

For available projects please see Professor Rayner’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/chris.rayner

**Major**  
Medical Science; Nutritional Health

**Maximum Number of Students**  
Flexible

**Category**  
Human Research

**Research Areas**  
Nutrition and Metabolic Health
CRE IN TRANSFORMING NUTRITIONAL PHYSIOLOGY TO GOOD HEALTH - TYPE 2 DIABETES RESEARCH GROUP

Lead Researcher: Dr Tongzhi Wu
Contact: tongzhi.wu@adelaide.edu.au

Research Summary

The gut (stomach and intestines) is central to the control of blood glucose and appetite. Understanding better how nutrients and specific drugs interact with the gut, and how we can modify this process to advantage, will be the key to finding effective and affordable new treatments for type 2 diabetes.

Our recent work has shown that intestinal “taste” (particularly bitter) sensing holds great potential for stimulating gastrointestinal hormones and controlling blood glucose and energy intake in health and type 2 diabetes, and that the most widely used antidiabetic drug, metformin, exerts numerous gastrointestinal effects key to its anti-diabetic action.

Supported by the NHMRC and Diabetes Australia, our group is now undertaking a program of studies to:

a) define the roles of intestinal bitter taste sensing in the regulation of gastrointestinal hormone secretion, energy intake and postprandial glycaemia, and the implications for T2DM therapy; and

b) clarify the role of bile acids in the anti-diabetic action of metformin.

This work spans experiments on the benchtop at SAHMRI utilising biopsies taken from patients coming to the RAH for endoscopy, to clinical trials at the AHMS Clinical Research Facilities of the University of Adelaide in volunteers with and without type 2 diabetes.

For available projects please see Dr Wu’s Researcher Profile under “My Research”

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

Major
Medical Science; Nutritional Health

Maximum Number of Students
3

Category
Wet Laboratory; Human Research

Research Areas
Nutrition and Metabolic Health

The research team at the Diabetes SA education session.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

Lead Researcher: Dr Domenico Sergi
Contact: domenico.sergi@csiro.au

Research Summary

Medium-chain fatty acids have been shown to be β-oxidised at a higher rate compared to long-chain saturated fatty acids suggesting they may be able to modulate mitochondrial function and prevent lipotoxicity-induced insulin resistance. Thus, the aim of this project is to investigate the impact of medium-chain fatty acids on mitochondrial function, insulin sensitivity and the activation of pathways known to regulate mitochondrial biogenesis, function and fatty acid catabolism. This project will employ an in vitro cell-based model of human skeletal muscle myotubes which closely mimics in vivo physiology. Cells will be challenged with medium-chain fatty acids and the following endpoints will be evaluated.

Insulin signalling will be assessed by investigating AKT/Protein kinase B phosphorylation by Western blot. This technique will be also used to quantify specific protein of the mitochondrial electron transport chain complexes and the phosphorylation and activation of AMPK which is known as a critical node in promoting oxidative metabolism. Furthermore, we will assess changes in mitochondrial dynamics (i.e. fusion and fission) by fluorescence microscopy using fluorescent probes or immunocytochemistry to target skeletal muscle mitochondria. Finally, the expression of genes involved in skeletal muscle oxidative metabolism and mitochondrial function will be investigated by real-time PCR.

For available projects please see Dr Sergi’s Researcher Profile under “My Research”

researchers.adelaide.edu.au/profile/domenico.sergi

Major
Medical Science; Nutritional Health

Maximum Number of Students
2

Category
Wet Laboratory

Research Areas
Nutrition and Metabolic Health

Dr Domenico Sergi
MYELOMA RESEARCH GROUP

Lead Researcher: Professor Amanda Page (Stephen Fitter)
Contact: amanda.page@adelaide.edu.au

Research Summary
The role of mTORC1 function in osteoblasts in the control of metabolism under conditions of nutrient overload - Over the last 15 years, studies in transgenic mice have revealed that the skeleton, and in particular osteoblasts (the bone forming cells of the skeleton), play a critical role in the control of systemic glucose metabolism. Osteoblasts are now considered an essential insulin target tissue and endocrine organ that communicates with other tissues in the body including the brain, liver, pancreas and skeletal muscle to control metabolism. This essential role in normal physiology suggests that insulin signalling in the skeleton may also become dysregulated in metabolic diseases and contribute to the overall pathophysiology. One of the important pathways that contributes to the development of insulin resistance, a hallmark of type 2 diabetes and other metabolic pathologies, is the mammalian target of rapamycin complex 1 (mTORC1). mTORC1 is also an important negative regulator of insulin signalling and tempers cellular responses to insulin via multiple negative feedback loops. Under conditions of over-nutrition, as occurs in obesity, mTORC1 becomes hyper-activated leading to chronic down-regulation of insulin signalling and insulin resistance. Our group has been investigating the role of mTORC1 function in osteoblasts using the targeted deletion of Rptor, an essential component of the mTORC1 complex, in mice (RptorOB-/- mice). We hypothesised that under conditions of over-nutrition, mTORC1 becomes hyper-activated in bone leading to the development of insulin-resistance in bone which contributes to a systemic reduction in glucose disposal and hyperglycaemia. It therefore follows that targeted suppression of mTORC1 in osteoblast should relax the mTORC1-dependent feedback loops thereby restoring normal insulin function and systemic metabolism. To investigate this question, we challenged RptorOB-/- mice with a high fat diet (over-nutrition) and used Promethion metabolic cages to assess how inhibition of mTORC1 function, specifically in osteoblasts, affects metabolism.

For further information please see Professor Page’s Researcher Profile under “My Research” – researchers.adelaide.edu.au/profile/amanda.page

NUTRITIONAL HEALTH RESEARCH GROUP

Lead Researcher: Dr Nichola Thompson
Contact: nichola.thompson@adelaide.edu.au

Research Summary
Ready Steady cook! Are Healthy recipes really as nutritional as they claim? - There has been a rising trend in Australia to cook at home and nutrition advocates promote learning to cook and meal planning as a great way to improve dietary patterns. However, the healthiness of home cooking is dependent on what people cook and how they cook it. The Australian population has turned to google as a rapid and easily accessible source of health information and as a result the largest source of food inspiration is the internet. Websites now promote recipes for ‘healthy living and weight loss’ with most on line recipe data bases having recipes subdivided into categories such as quick and easy, entertaining and healthy. Healthy recipes are written by a wide range of individuals from celebrity chefs, home cooks, fitness experts, and social influencers. Unfortunately many recipes are not designed by individuals who are actually qualified to provide nutrition advice with the majority of authors compiling the recipes because they have a passion for food. Thus, healthy recipes may not always be consistent with recommendations for good health or actually be any ‘healthier’ than previous recipes published without the ‘healthy or light title’. This study will use scientific techniques to analyse the nutritional content of recipes published on Australia’s most frequently used recipe data base taste.com.au. We will assess the recipes to investigate whether they comply with national and international nutrition recommendations. In addition we will explore whether using the healthy recipes really would result in improved nutrition compared to the ordinary recipes.

Major
Medical Science; Nutritional Health (GPA below 4.8)

Maximum Number of Students
5

Category
Dry Laboratory; Data Analysis

Research Areas
Nutrition and Metabolic Health

Dr Nichola Thompson

Nutrition and Metabolic Health Research Groups
VAGAL AFFERENT RESEARCH GROUP

Lead Researcher: Professor Amanda Page
Contact: amanda.page@adelaide.edu.au

Research Summary
Adaptive changes in food intake regulation during pregnancy - Appropriate maternal nutrition is essential for normal fetal growth during pregnancy, while over or under nutrition significantly increases the risk of future type 2 diabetes in the offspring. Meeting the nutritional requirements of pregnancy demands a state of positive energy balance. This project investigates the adaptive changes in food intake and energy expenditure during pregnancy to ensure the healthy development of the offspring.

For available projects please view Professor Page’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/amanda.page

Major
Medical Science; Nutritional Health; Reproductive Health (GPA below 4.8)

Maximum Number of Students
10

Category
Dry Laboratory; Data Analysis

Research Areas
Nutrition and Metabolic Health
Neuroscience, Behaviour and Brain Health
Pregnancy and Birth

Professor Amanda Page
ORAL HEALTH
Oral health is an essential component to a healthy life. Oral health is not only concerned with teeth, but the health of oral and related tissues that enables an individual to eat, speak and socialise without active disease, discomfort or embarrassment, and that contributes to general wellbeing.

Oral health research seeks to understand population and individual dental health to prevent or manage oral disease and to educate our community to maintain optimal oral health throughout their lives. Our research spans a broad range of fields including: dental education; endodontics and pulp biology (stem cell research); periodontics; orthodontics; craniofacial biology; oral and maxillofacial surgery; forensic odontology; population oral health; and cancer treatment.

Our research activity also includes epidemiological studies focusing on the efficacy of population oral health interventions, oral health services and oral health policy analysis in relation to oral disease prevention and provision of optimal dental health services.

Researchers across the faculty are focused on:

- assessing intergenerational change in oral health in Australia
- monitoring of Indigenous oral health and the use of dental services
- performing population-based studies focusing on socioeconomic and psychosocial factors related to the use of dental services
- investigating patient-reported outcomes of dental care, such as oral health impact, health utility and quality of life.
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.

ORAL HEALTH RESEARCH OPPORTUNITIES

TRANSLATIONAL RESEARCH IN ORAL HEALTH SCIENCE

Lead Researcher: Dr Peter Zilm
Contact: peter.zilm@adelaide.edu.au

Research Summary
My core area of research investigates the phenotypic and molecular changes in bacteria are when growing as biofilms and at relevant growth rates found in nature. All projects are supported with the latest technology utilising cellular impedance, (exCELLigence©) continuous culture, proteomics, metabolomics and new generation sequencing. Our research is focussed on bacteria that are linked to oral disease such as tooth decay (caries) and periodontal disease and which grow as biofilms on soft and hard surfaces. Recent published research has linked the potential for the systemic migration of oral bacteria (Porphyromonas gingivalis and Fusobacterium nucleatum) from the mouth which potentially leads to diseases such as cardiovascular disease, pregnancy implications and cancer.

We also have major collaborations with chemical engineers and industry in developing nano-technology as antimicrobial and anti-biofilm agents (intelligent particles) and coatings for surfaces on medical devices.

Other major collaborative projects with the Faculty of Science investigates the stress response to antimicrobials by the major pathogens, Staphylococcus aureus and Enterococcus faecalis.

For available projects please see Dr Zilm’s Researcher Profile under “My Research”
researchers.adelaide.edu.au/profile/peter.zilm

Major
Medical Science

Maximum Number of Students
2

Category
Wet Laboratory

Research Areas
Oral Health
Translational Health Outcomes
Innovative Therapeutics
Cardiac, Respiratory and Vascular Health
SURGICAL AND HEALTH SYSTEMS INNOVATION
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.
ENDOSCOPIC RESEARCH GROUP

Lead Researcher: Professor Rajvinder Singh
Contact: rajvinder.singh@sa.gov.au

Research Summary
Professor Rajvinder Singh MBBS MPhil FRACP AM FRCP is the Director of Gastroenterology at the Lyell McEwin and Modbury Hospitals, South Australia and a Professor of Medicine at the University of Adelaide.

He has a keen interest in Endoscopic research focusing mainly on Advanced Endoscopic Imaging Techniques and Endoscopic Treatment of premalignant and malignant lesions in the gastrointestinal tract.

Professor Singh has been successful in obtaining various grants nationally to further investigate the utility of novel endoscopic imaging techniques in the detection of dysplasia and early cancer. His research interests include Detection and (Endoscopic) treatment of early gastrointestinal tract pre-malignant and malignant lesions. This includes detecting dysplasia or early cancer in Barrett’s oesophagus, squamous cell cancer/dysplasia of the oesophagus, early gastric cancer, duodenal polyps, colon polyps and early colon cancers. He also has interest in various endoscopic treatment modalities including Endoscopic Mucosal Resection, Endoscopic Submucosal Dissection, Radio Frequency Ablation, Luminal stenting, Full Thickness Resection and Endoscopic closure of defects in the GI wall.

For more information please view Professor Singh’s Researcher Profile
researchers.adelaide.edu.au/profile/rajvinder.singh

Major
Medical Science

Maximum Number of Students
3

Category
Clinical Research; Human Research

Research Areas
Surgical and Health Systems Innovation
Cancer Biology and Clinical Oncology
**FORENSIC SCIENCE SA**

**Lead Researcher:** Associate Professor Neil Langlois  
**Contact:** neil.langlois@sa.gov.au

**Research Summary**

Forensic Pathology  
1. Data acquisition and analysis - these projects require extraction of information from autopsy reports from Coronial post-mortem examinations.  
2. Investigation of determining age of bruises - these projects are more practical, using experimental model systems  
For available projects please see Associate Professor Langlois’ Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/neil.langlois

**Major**  
Medical Science  

**Maximum Number of Students**  
1  

**Category**  
Systematic Reviews; Human Research  

**Research Areas**  
Surgical and Health Systems Innovation

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**JOINT REPLACEMENT RESEARCH UNIT**

**Lead Researcher:** Stuart Callary  
**Contact:** stuart.callary@sa.gov.au

**Research Summary**

The Joint Replacement Research Unit is based at the Royal Adelaide Hospital under the Centre for Orthopaedic and Trauma Research. Our aim is to translate research findings into improved clinical outcomes that benefit both the health care system and individual patients who have undergone joint replacement surgery.  
We have a number of exciting new projects that use the latest imaging technology including radiographs, radiostereometric analysis, MRI and CT. New implants are introduced to hip and knee replacement surgery every year in Australia. We offer pre-clinical testing and early surveillance of these newly introduced prosthesis to ensure patients are not put at risk of receiving inferior implant designs. We also investigate long term outcomes so that surgeons can make evidence-based informed decisions.  
For available projects please view Mr Callary’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/stuart.callary

**Major**  
Medical Science  

**Maximum Number of Students**  
4  

**Category**  
Dry Laboratory; Human Research  

**Research Areas**  
Surgical and Health Systems Innovation  
Ageing, Frailty and Mobility  
Musculoskeletal Health  
Translational Health Outcomes
SURGICAL SCIENCE RESEARCH GROUP

Lead Researcher: Professor Guy Maddern
Contact: guy.maddern@adelaide.edu.au

Research Summary
Laparoscopic Simulation Skills Program (LSSP)
• The aim of the LSSP is to develop and assess the efficacy and feasibility of a self-directed simulation-based training program, and to determine if a period of more formal (supervised) training is required.

Coaching to Enhance Surgeons’ Non-Technical Skills
• This project is investigating whether surgical coaching is a potentially valuable tool to enhance surgeons’ non-technical skills

Developing novel diagnostic tools and preventative therapies for metastatic colorectal cancer
• Validating potential proteomic and lipidomic targets from stored tissue and blood of CRC patients

Systematic reviews of surgical topics
• The use of antibiotic coated sutures
• What is informed consent
• Do Multi-Disciplinary Teams Meetings work?
• Should asymptomatic contra-lateral inguinal hernias found at laparotomy be repaired?
• Tele-surgery: what is the evidence?
• Audit of surgical mortality
• Trocar injury deaths in Australia
• Deaths in patients under 30 years of age
• Surgical deaths in the patients older than 90
• Surgical deaths following delay in transfer

Health System Research
• How to deliver rural general surgery
• Advanced recovery programs
• What is the surgical learning curve for a liver resection, oesophagectomy, inguinal hernia repair, Whipples resection, open abdominal aortic aneurysm

Health Technology Assessment
• Reviews of new surgical Health Technology Assessment reports

For available projects please view Professor Maddern’s Researcher Profile under “My Research”

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

Major
Medical Science

Maximum Number of Students
Flexible
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.
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.

**ADDITION AND MENTAL HEALTH RESEARCH**

*Lead Researcher:* Professor Sepehr Shakib  
*Contact:* sepehr.shakib@adelaide.edu.au

**Research Summary**

Review of appropriate prescribing in patients in opioids in public hospitals - There is an increasing awareness of the issues associated with opioid prescribing and the increased need for good analgesic stewardship in our public hospitals. This project will evaluate the prescribing of opioids in public hospitals who use electronic prescribing, and compare this to best practice guidelines.

**Major**

Addiction and Mental Health (GPA below 4.8)

**Maximum Number of Students**

10

**Category**

Dry Laboratory; Data Analysis

**Research Areas**

Translational Health Outcomes

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**ADELAIDE EXPOSURE SCIENCE AND HEALTH**

*Lead Researcher:* Dr Sharyn Gaskin  
*Contact:* sharyn.gaskin@adelaide.edu.au

**Research Summary**

Our research interests primarily focus on Occupational and Environmental Health Science including industry-wide studies in healthcare, agriculture, manufacturing, emergency services and mining industries. We have expertise in public health, exposure science, environmental and medical epidemiology and we work closely with government and industry stakeholders. We work in the assessment and control of health hazards in workplaces and the environment including hazardous chemical management.

Details of specific projects can be found in the School of Public Health Student Research Projects Handbook which you can access here: researchers.adelaide.edu.au/profile/sharyn.gaskin

**Major**

Public Health

**Maximum Number of Students**

6

**Category**

Wet Laboratory; Dry Laboratory; Systematic Reviews; Human Research

**Research Areas**

Translational Health Outcomes  
Cardiac, Respiratory and Vascular Health  
Pregnancy and Birth
ADELAIDE EXPOSURE SCIENCE AND HEALTH
Lead Researcher: Dr Leigh Thredgold
Contact: leigh.thredgold@adelaide.edu.au

Research Summary
Dr Thredgold’s current research leverages his background in analytical chemistry to explore the pathways and impacts of environmental and occupational hazards on human health and society, and leads to the development of effective interventions to control and prevent exposure to hazards. In particular, with Dr Gaskin, he investigates the science of dermal exposure to toxic chemicals using in-vitro human skin models which is translated into practical outcomes and decision making software tools for collaborators and other industries. This collaborative research is industry focussed with wide applicability across the defence, emergency services, HAZMAT and public health sectors.

Details of specific projects can be found in the School of Public Health Student Research Projects Handbook which you can access here: researchers.adelaide.edu.au/profile/leigh.thredgold

Major
Public Health

Maximum Number of Students
Flexible

Category
Wet Laboratory; Systematic Reviews

Research Areas
Translational Health Outcomes
Pregnancy and Birth

CLINICAL PHARMACOGENOMICS RESEARCH GROUP
Lead Researcher: Professor Andrew Somogyi
Contact: andrew.somogyi@adelaide.edu.au

Research Summary
My research is focussed on the genetics determinants of severe and life threatening adverse reactions to medications and why some medicines do not work in some people. The specific areas are in indigenous populations: Aboriginal Australians and Papua New Guineans. The disease areas are: mental health (antidepressants); postsurgical pain; acute pain, chronic pain; infectious diseases (HIV, TB, Malaria); cancer (childhood leukaemia); kidney transplantation. I work with clinicians in Adelaide, Australia and internationally to unravel why some medicines don’t work and why some can cause significant harm. This is mainly done by examining the patients genetics in relation to medicines, often called pharmacogenomics which is an important component of Precision Medicine. We have blood or saliva collected, isolate and quantify the DNA and then use genetic testing to determine the patients variant allele frequency and relate this to their phenotype and response (good and bad) to the medicine. We also recruit large populations, for example we are involved in a trial looking at ketamine as a new therapy for treatment-resistant depression which involves over 300 patients in Australia.

For available projects please view Professor Somogyi’s Researcher Profile under “My Research” researchers.adelaide.edu.au/profile/andrew.somogyi

Major
Addiction and Mental Health; Medical Sciences

Maximum Number of Students
5

Category
Wet Laboratory; Meta-analysis; Human Research

Research Areas
Translational Health Outcomes
Innovative Therapeutics
Indigenous and Disadvantaged Health
Neuroscience, Behaviour and Brain Health
HEALTH WORKFORCE PLANNING GROUP

Lead Researcher: Professor Caroline Laurence
Contact: caroline.laurence@adelaide.edu.au

Research Summary
Caroline’s research interests is in the area of health workforce planning, particularly for the primary care sector. Her research has contributed to a greater understanding of the workforce pipeline in Australia including career decision making, workforce maldistribution, retention issues, changing workforce profiles and workforce policy analysis. Her current research projects include: the GP Graduate Tracking Study which is determining the practice location of graduates after training; a study investigating the perceptions of general practice as a career by medical students and junior doctors; and a study on embedding cost and benefits into workforce planning models. Most of her research undertaken with and funded by industry partners.

Details of specific projects can be found in the School of Public Health Student Research Projects Handbook which you can access here: researchers.adelaide.edu.au/profile/caroline.laurence

Major
Public Health

Maximum Number of Students
8

Category
Dry Laboratory; Human Research

Research Areas
Translational Health Outcomes
Surgical and Health Systems Innovation

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PRIMARY CARE AND HEALTH SERVICES RESEARCH GROUP

Lead Researcher: Dr Oliver Frank
Contact: oliver.frank@adelaide.edu.au

Research Summary
My current research activities are in exploring how GPs’ computer systems can help them to do their job better, particularly in increasing the performance of preventive activities and the quality, safety and efficiency of care. In May 2019, I am engaged also in projects aimed at helping patients to learn to sleep better and at helping people who are too fat to increase their health literacy as part of learning how to become slimmer.

For available projects please view Dr Frank’s Researcher Profile under “My Research”

researchers.adelaide.edu.au/profile/oliver.frank

Major
Public Health

Maximum Number of Students
2

Category
Human Research

Research Areas
Translational Health Outcomes

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74 Translational Health Outcomes Research Groups
Heat-Health promotion in the age of climate change - It is imperative that health promotion continually evolves to meet the needs of diverse Australian communities. This is particularly true in relation to heatwave risk communication in a context of a rapidly changing climate system that is inducing more extreme and longer lasting heatwaves. Considering the need to enhance heatwave resilience amongst the public, this project will involve conducting a scoping literature review to inform potential research proposals that could build knowledge of the social meanings attributed to heatwaves by the lay public. Potential experimental or qualitative research proposals could yield important findings leading to the design of evidence-based health messaging that could promote protective behaviours in heatwaves.

For further information please see Dr Hanson-Easey's Researcher Profile
researchers.adelaide.edu.au/profile/scott.hanson-easey

Major
Public Health (GPA below 5)

Maximum Number of Students
10

Category
Desk-based research

Research Areas
Translational Health Outcomes

What do we know about the social determinants of risk to health from heatwaves? - As climate change accelerates, the probability of longer and more severe heatwaves increases. It is well documented that elevated temperatures and heatwaves constitute a serious threat to health, and mental health. The human body’s capacity to regulate its core temperature in extreme heat contexts is contingent upon personal risk factors, including levels of acclimatisation, pre-existing illnesses, especially heat vulnerable diseases including cardiovascular and renal diseases, and broader contextual factors, such as the need for heat exposure (e.g. outdoor, and indoor factory workers), and individuals’ access to cooling adaptations, especially air-conditioning. Although various literatures on the impact of extreme heat and health are well established, there is far less evidence on the extent to which socio-economic and structural factors interact with pre-existing health problems in heatwaves, and how these events are experienced by the public. This project will search for, review, and synthesise academic and ‘grey literatures’ to determine the state of knowledge on this topic, with a particular focus on Australia.

For further information please see Dr Hanson-Easey’s Researcher Profile
researchers.adelaide.edu.au/profile/scott.hanson-easey

Major
Public Health (GPA below 5)

Maximum Number of Students
10

Category
Desk-based research

Research Areas
Translational Health Outcomes
SAHMRI HEALTH POLICY CENTRE

Lead Researcher: Dr Kerry Ettridge
Contact: kerry.ettridge@sahmri.com

Research Summary

I am based in the Health Policy Centre at the South Australian Health and Medical Research Institute (SAHMRI) and am a visiting research fellow in the School of Psychology. My work incorporates behavioural, public health and quality of life approaches to improve well-being and reduce risk of chronic disease, including cancer. I am specifically interested in research to underpin the development of interventions to curb obesity related behaviour. This can range from researching the best ways in which health effects information regarding health risk behaviour can be communicated (such as sugary drink consumption), to developing a deeper understanding of drivers of that behaviour.

I also have an interest in quality of life research among people experiencing cancer, with a focus on psychosocial domains. I am interested in research regarding the development and implementation of patient reported outcome measures for assessing psychosocial outcomes among those with cancer, as well as identifying the barriers to seeking support for psychosocial issues.

I work closely with and often co-supervise with Professor Caroline Miller who is based in the School Public Health, and is the Director of the Health Policy Centre.

Details of specific projects can be found in the School of Public Health Student Research Projects Handbook which you can access here: researchers.adelaide.edu.au/profile/kerry.ettridge

Major

Public Health

Maximum Number of Students

3

Category

Human Research

Research Areas

Translational Health Outcomes
Nutrition and Metabolic Health
Child and Adolescent Health