THE UNIVERSITY of ADELAIDE

School of Medicine

Postgraduate research opportunities in translational medical research in 2016

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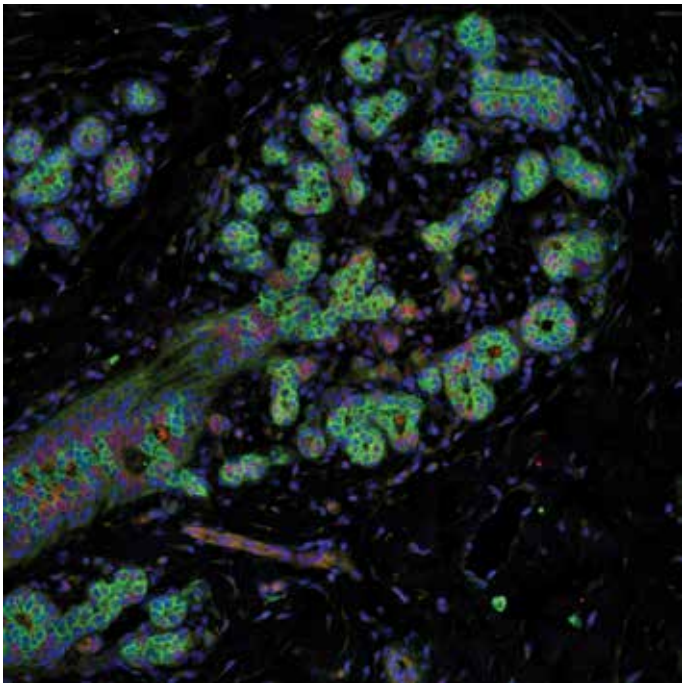
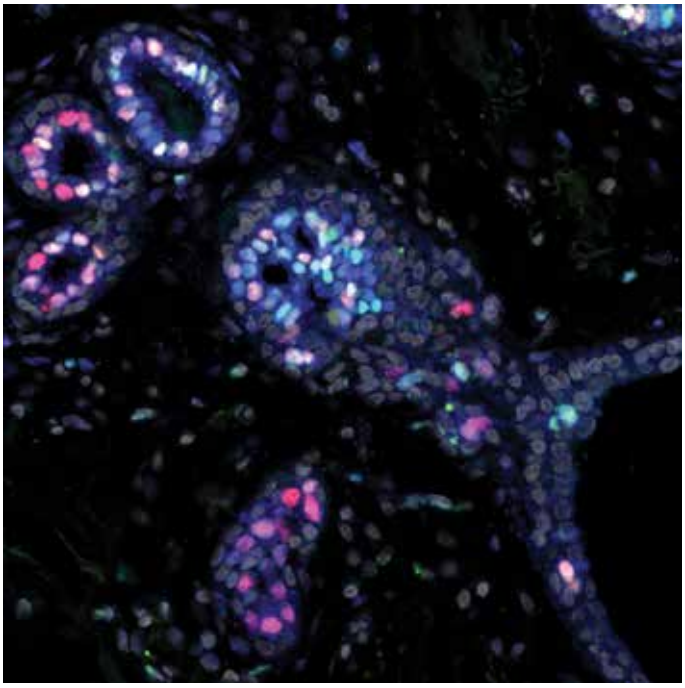
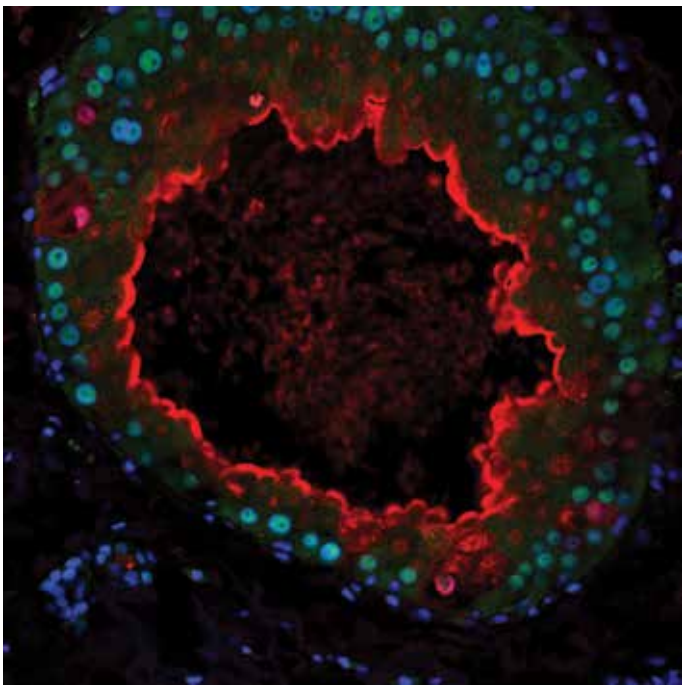


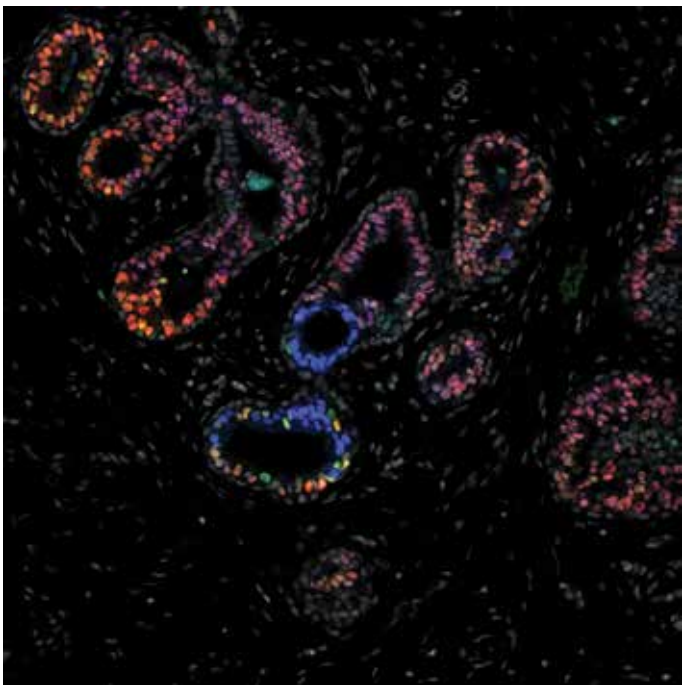
Primary normal human breast tissue showing expression of stem cell marker, KIT (green), and the androgen receptor (red).



Primary normal human breast tissue showing the complexity of androgen (blue)-, estrogen (green)- and progesterone-receptor (red) co-localisation.



Primary human breast lesion showing the complexities of androgen (blue)-, estrogen (red)- and progesterone-receptor (red)



Primary human breast tumour showing the powerful response of breast tissue to androgen signalling (illustrated by blue staining).

Images supplied by Dr Gerard Tarulli, Breast Cancer Research Group, Dame Roma Mitchell Cancer Research Laboratories

Contents

School of Medicine

Change your world

The School of Medicine is offering exciting opportunities for researchers at the Honours, Masters and PhD levels.

These research opportunities are open to a broad range of backgrounds, from science to medicine. If you are interested in human health, consider furthering your research career with us - there are sure to be projects that match your interests and background.

While we are well known for our role in training medical doctors, we also have a proud record of vigorous and diverse translational medical research programs. These range from basic sciences to clinical research. This booklet includes projects from the Disciplines of Medicine, Surgery, Acute Care Medicine, Psychiatry, Ophthalmology and Visual Science, Orthopaedics and Trauma and Rural Health.

To give you an idea of the scope of opportunities available with us, this booklet details postgraduate research projects available in 2016.

We offer a stimulating research environment, excellent facilities, supervisors who are respected internationally for their work, and partnerships with some of South Australia's great medical research institutions.

When you join the School of Medicine, you're part of a research community that has a great past – and a bright future. At any one time there are over 200 students enrolled in Honours, Masters and PhD programs.

Interested?

If you'd like to explore your research future with us, find a research project that excites you and contact the listed Lead Researcher. There are often a range of additional possible research projects available so don't hesitate to use the contacts provided to explore all possibilities.

If you're not sure where to start and would like further details of our research streams:

- For Honours in a research group included in this booklet contact the **Honours Coordinator: Prof Chris Rayner on +61 8 8222 5501 or chris.rayner@adelaide.edu.au**
- For MSc and PhD students, contact the postgraduate coordinator: **Prof David Callen on +61 8 8222 3145 or david.callen@adelaide.edu.au**

Location of laboratories and research groups:

UA/RAH

University of Adelaide/Royal Adelaide Hospital Frome Road precinct.

BHI/TQEH

Basil Hetzel Institute for Translational Health Research, The Queen Elizabeth Hospital, Woodville.

SAHMRI

South Australian Health and Medical Research Institute

WCH

Women's and Children's Hospital

HC

Hamstead Campus

LMH

Lyell McEwin Hospital

Our record

The School of Medicine has a proud track record in research with Nobel laureates Howard Florey and, more recently, J. Robin Warren counted among our graduates. Rather than resting on our track record, the School of Medicine is continually working to maintain its position as one of Australia's medical research powerhouses. Our researchers continue to attract significant research funding and publish in the top peer reviewed medical journals. The translational research projects highlighted in this booklet are partnered with the Royal Adelaide, Queen Elizabeth, Lyell McEwin and Modbury Hospitals, the Basil Hetzel Research Institute, and the South Australian Health and Medical Research Institute (SAHMRI).

Core facilities

Postgraduate students have access to core facilities including the latest in next-generation DNA sequencing, proteomics and animal house facilities. Advanced imaging equipment provides state-of-the-art instrumentation from sub-cellular level and live cell imaging through to instruments for small and large animals.

Research opportunities

Our researchers are recognised nationally and internationally for their achievements. Research ranges from inquiry into fundamental questions through to work which has a direct clinical application. Supervisors of our research projects are drawn from both our own staff and those of the school's affiliates. Many students will find that their host laboratory is part of a broader research grouping that provides excellent opportunities for involvement at many levels in an active research community, and enables projects that cross traditional discipline boundaries.

Basil Hetzel Institute for Translational Health Research (BHI)

The Basil Hetzel Institute is the productive research arm of The Queen Elizabeth Hospital (TQEH), is headed by Professor Guy Maddern and hosts 19 research groups from the Universities of Adelaide, and South Australia and the hospital. These groups undertake laboratory, clinical and population projects focussing on the most prevalent diseases/ health issues in the regional community. Close links with TQEH clinical departments and shared resources with the universities, along with a $19m purpose-built research facility provides researchers, clinical academics and students with the most modern health and medical research facilities currently available in South Australia. Research areas include: cardiovascular disease, cancers, immunological diseases, chronic inflammation, population epidemiology, transplantation immunology, vascular surgery, drug response, stroke, and surgical technologies and training.

See **basilhetzelinstitute.com.au** for further details or contact the **Research Secretariat +61 8 8222 6870 or gwenda.graves@health.sa.gov.au**

South Australian Health and Medical Research Institute (SAHMRI)

SAHMRI is an independent flagship health and medical research institute located adjacent to the new Royal Adelaide Hospital with Prof Steve Wesselingh as Executive Director. Located within SAHMRI are researchers and affiliates of the University of Adelaide. Newly established resources within SAHMRI include the Australian Cancer Research Foundation (ACRF) Flow and Laser Scanning Cytometry Facility which provides access to biomedical imaging technologies. Such technologies include: advanced flow cytometry, magenetic resonance imaging (MRI), computed tomography (CT), positron emission tomography (PET) and single photon emission computed tomography (SPECT). In addition, the David R Gunn Genomics Suite houses the latest DNA sequencers, the largest unit capable of generating a terabase of DNA sequence data in a single run. This facility will be available to local researchers to help understand the complex genomic landscape of diseases, including cancer and brain disorders.

Prostate Cancer Research Group

Supervisors A/Prof Lisa Butler (L) and Dr Maggie Centenera (R)

Lead Researcher:
A/Prof Lisa Butler

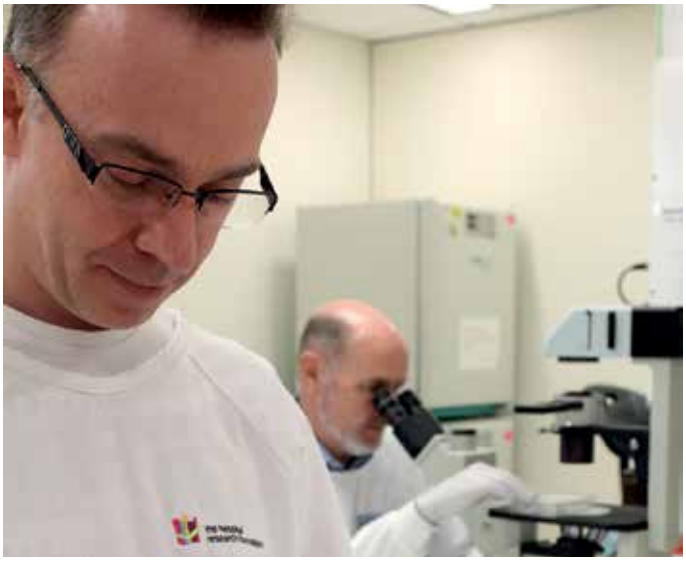
Contact: +61 8 8128 4360 or lisa.butler@adelaide.edu.au

Our research aims to improve therapeutic options for men with prostate cancer. Better biomarkers of response to therapies are required to inform treatment decisions and translate emerging agents into clinical use. We have developed a unique explant method of culturing human prostate tumours which provides critical information that is not possible with cell lines or animal models. Using this explant model together with the latest molecular biology techniques, we profile genomic, proteomic and lipidomic changes associated with response to current and emerging therapies for prostate cancer.

Research projects

- **Novel biomarkers of heat shock protein 90 inhibition in prostate cancer:** Using the prostate explant model, quantitative mass spectrometry and clinical trial data, this project will identify a protein signature that can monitor prostate cancer patient responses to treatment with the Hsp90 inhibitor, AUY922.
- **Effects of lipids on prostate tumour cell behaviour and response to therapy:** Understanding the link between obesity and prostate cancer will facilitate interventions to improve responses to therapies. This project will assess the effect of lipids on hormone signalling and response to therapies in prostate tumour cells.
- **Mass spectrometry imaging of lipid moieties in prostate tumours:** This project will use MALDI Mass Spectrometry Imaging to examine therapy-induced alterations in specific lipid moieties and their spatial location in prostate tumours. This has the potential to be developed into a clinical test to predict prostate cancer aggressiveness and responsiveness to therapy.

Solid Cancer Regulation Research Group



Dr Eric Smith, Background: Dr Paul Drew.

Lead Researcher: Dr Eric Smith

Contact: +61 8 8133 4005 or eric.smith@adelaide.edu.au

The Solid Cancer Regulation Research Group is investigating the role of androgens and of fibroblasts on the development and progression of oesophageal and prostate cancers. We use a combination of cellular and molecular biology techniques, including cell co-culture, explant and xenograft models, genome-wide next generation sequencing, DNA methylation, proteomic and secreteomic analyses. We are situated in the well-equipped laboratories at the Basil Hetzel Institute for Translational Health Research, and have active collaborations with local, national and international clinicians and basic scientists.

Research projects

- **The role of androgen signaling in fibroblasts on the progression and outcome of prostate cancer:** Fibroblasts alter tumour cell growth in co-cultures in vitro. Growth is promoted or inhibited depending on androgen signaling in the fibroblasts. We will investigate the genes responsible.
- **The role of androgen signaling in tumour cells on the progression and outcome of oesophageal cancer:** We have shown that androgen signaling is associated with a six fold decrease in survival. We will identify the genes responsible and their function, and the potential of drugs which target these genes to improve survival.
- **The role of cancer associated fibroblasts:** We are profiling normal and cancer fibroblasts using RNA-Seq, DNA methylation, microRNA and proteomic. We will discover novel fibroblast genes which influence cancer growth or metastasis. We expect this to lead to new drugs which act by inhibiting cancer associated fibroblasts.

See **www.adelaide.edu.au/directory/eric.smith** for recent publications and details about our Research Group.

Colorectal Cancer Molecular Oncology

The Molecular Colorectal Cancer Group

Lead Researchers: A/Prof Timothy Price, Dr Jennifer Hardingham, Dr Amanda Townsend

Contact: +61 8 8222 6142 or jennifer.hardingham@adelaide.edu.au

The colorectal cancer molecular oncology research group is based at the Basil Hetzel Institute with close links to the Oncology department at the Queen Elizabeth Hospital, providing access to clinical samples and patient data. We also have a collaboration established with Prof Andrea Yool in Physiology, School of Medical Sciences.

Our group is investigating novel therapeutic targets for the treatment of both early stage and advanced colorectal cancer (CRC). We aim to establish the efficacy of aquaporin water channel inhibitors, patented by Prof Yool, in abrogating tumour progression and metastasis in mouse models of CRC.

Research projects

- **Pharmacological blocking of aquaporin 1 to inhibit tumour angiogenesis and metastasis in a xenotransplant model of human colon cancer:** Water flux is a major mechanism of cell migration through the extracellular matrix. We have shown that 2 of the AQP1 inhibitors significantly restrict migration and invasion of human colon cancer cells expressing AQP1, and importantly the tube-forming capacity of human endothelial cells (angiogenesis). We aim to (1) show by mutagenesis whether water channel or ion channel activity or both are required for cell migration and (2) to test the efficacy of the 2 inhibitors to abrogate tumour angiogenesis and metastasis in a xenotransplant mouse model of human colon cancer.
- **Polymorphisms in EGFR signalling pathway as predictive biomarkers in patients receiving anti-EGFR antibody for metastatic colorectal cancer:** Aims (1) to identify a SNP profile in 644 samples from clinical trial of anti-EGFR, correlating with response to therapy, (2) validate SNPs in an independent trial cohort.

See **http://www.basilhetzelinstitute.com.au/postgraduate-training** for additional details.

SAHMRI Colorectal Node

A/Prof Joanne Young

Lead Researchers: A/Prof Joanne Young and A/Prof Tim Price

Contact: +61 8 8222 8695 or joanne.young@adelaide.edu.au

Joanne Young has two projects which investigate the identification of increased risk for colorectal cancer (CRC) in both individuals and families. A number of approaches are employed (including epidemiology, pathology and genetics) to study two subsets of patients in whom risk is currently difficult to recognise. The first group is young adults below age 50 years who have colorectal cancer or advanced polyps, and the second group includes patients with multiple or advanced serrated polyps at any age.

Research Projects

- **Young Onset Colorectal Cancer (CRC) Study:** There has been a rise in CRC incidence in young adults recently, with such patients presenting at a more advanced stage than in older adults. This project will explore the profile of the young onset patient with CRC or advanced polyps (symptom patterns, physical and physiological characteristics, family history, lifestyle risk factors and blood biomarkers) with the aim of modeling a risk profiler for use in primary healthcare.
- **CRC Risk in Families with Advanced Polyps:** CRC is among the most familial of the solid tumours. With the rise in polypectomy, opportunities for the identification of familial clustering of CRC are likely to decline. However, the examination of serrated polyps may offer a way to identify patients whose relatives are at increased risk for CRC. A prospective study of genomic and environmental factors using a case-control design will address limitations of reported retrospective studies to date.

For further details see: **www.researchgate.net/profile/Joanne_Young4**

Shalini Sree Kumar was awarded PhD in 2014 for her thesis entitled *Biomarkers of resistance to anti-EGFR treatment in wild type KRAS/BRAF colorectal cancer cell lines.*

Shalini had the opportunity to present her work nationally at the Lorne Cancer Conference, and at the European Society for Medical Oncology annual conference in Amsterdam. She now has a full-time position as Research Fellow in Clinical Oncology at the University of Malaya Medical Centre, Kuala Lumpur, Maylasia.

"I really appreciated the help and insight provided by both the laboratory and clinical team here at BHI in understanding the biology and therapy of colorectal cancer."

Shalini Sree Kumar

Northern Network Colorectal Surgical Service

BHI/TQEH UA/RAH LMH

Lead Researcher: Prof Peter Hewett

Contact: +61 8 8222 7719 or sheona.page@health.sa.gov.au

The Northern Network Colorectal Surgical Service (NNCSS) incorporates the colorectal units at the Royal Adelaide, The Queen Elizabeth and Lyell McEwin Hospitals. The NNCSS conducts research assessing the efficacy of new and/or emerging surgical and oncological interventions, novel treatment options, post-operative care, and quality of life improvements for patients with colorectal diseases, such as cancer, haemorrhoidal disease, anal fissure, and pelvic floor disorders. Students who are interested in pursuing a career in surgical and clinical research are encouraged to contact our team to discuss research opportunities.

Research project

> An investigation into the long-term quality of life outcomes following the surgical treatment of anovaginal fistulae.

For further details see **health.adelaide.edu.au/surgery/research/hewett_peter.html**

Breast Cancer Research Unit

BHI/TQEH

Breast Cancer Research Unit

Lead Researcher: Prof Andreas Evdokiou

Contact: +61 8 8222 7451 or andreas.evdokiou@adelaide.edu.au

Breast cancer is the most common cancer in women that metastasizes to bone. Despite recent advances, our knowledge of why bone is such a fertile "soil" for tumour cells to home to the bone with devastating consequences remains poor. The aim of our research is to provide vigorous cell and animal-based preclinical data that will facilitate the translation of novel therapeutics to clinical trials for bone metastases. Our goal is to continue towards developing new and cutting-edge therapies to improve the quality of life and longevity of patients with bone related malignancies.

Research projects include:

> **Antitumour efficacy of pro-apoptotic receptor agonists:** an immunotherapeutic approach for the treatment of skeletal malignancies
> **Novel vitamin-E-Bisphosphonates:** A new therapeutic approach targeting bone loss associated with osteoporosis and bone related malignancies.
> Targeting cancer in bone with hypoxia activating pro-drugs.
> Adoptive immunotherapy targeting cancer in bone with T cells carrying death ligands.
> Using peroxidase enzymes to accelerate fracture healing in healthy or osteoporotic bone
> A nano-engineered solution for localised cancer therapy

Breast Biology and Cancer Unit

BHI/TQEH

Breast Biology and Cancer Unit at the Basil Hetzel Institute

Lead Researcher: A/Prof Wendy Ingman

Contact: +61 8 8222 614 or wendy.ingman@adelaide.edu.au

Breast cancer is the most prevalent type of cancer among women, with approximately 13,000 new cases diagnosed each year in Australia. The aim of our research is to understand the cellular and molecular mechanisms that underpin this high incidence of breast cancer. We study how key risk factors, including menstrual cycling and breast density, affect the ability of the immune system to protect the breast which may lead to increased susceptibility of the mammary gland to cancer. The overarching objective of this research is to provide therapies that reduce a woman's lifetime risk of developing breast cancer.

Research projects

We have research projects investigating the mechanisms behind breast cancer and mastitis.

> **Macrophages in mammographic density:** Macrophages are cells with diverse roles in immune responses against invading pathogens and cancer, and tissue development and homeostasis. This project will explore the function of macrophages in establishing breast density, which is a major risk factor for breast cancer.
> **Hormonal regulation of macrophages in the breast:** The ovarian hormones estrogen and progesterone regulate a variety of cellular pathways in the breast that affect cancer risk. This project will investigate how these hormones regulate macrophages using tissue cultures and histological analysis of breast tissue.
> **Novel approaches to the treatment and prevention of mastitis:** Recent studies indicate that antibiotics have limited efficacy in both treating and preventing mastitis. This project will investigate the underlying cause of mastitis using a combination of animal models and cell culture.

For further details see: **www.adelaide.edu.au/directory/wendy.ingman**

Acute Leukaemia Research Program

BHI/TQEH

Lead Researchers: Dr James X Gray, Prof Richard J D'Andrea, Dr Sarah Bray, Dr Debora Casolari.

Acute Myeloid Leukaemia (AML) has a worldwide incidence of approximately 3.5 per 100,000 persons per year, with most cases occurring in adults (~1000 new cases per year in Australia). The majority of AML cases respond well to the initial chemotherapy, but relapse is the norm and is associated with very poor response to subsequent chemotherapy, hence the poor overall survival. The twelve month average survival of 50 to 70 year-olds is less than 30% and less than 10% at 5 years.

The leukaemogenic process is characterized by the accumulation of acquired somatic mutations and epigenetic changes in haematopoietic progenitor stem cells, which result in deregulation of cell proliferation and survival, and maturational arrest. An increasing number of genetic alterations have been identified in AML and these may provide new targets for therapy, or have important impact on outcome following treatment with conventional chemotherapy. However, the emerging paradigm is that there is most likely a range of genetic events that contribute to development of AML, with recurring mutations detected affecting a number of genes and pathways, which cooperate in the leukaemogenic process.

High resolution molecular methods such as "next generation" DNA sequencing are used to analyze the protein-coding genome from the diagnosis and relapse genomes of AML patients. Germ-line control DNA is extracted from mesenchymal cells (MSC) derived from cryopreserved bone marrow aspirate and expanded in tissue culture. Current research in this lab now focuses on novel mutations identified from this work. Mutations in these genes are of significant interest and to date, are not reported in AML.

Projects can be adapted for Honours, Masters and PhD level of research. Students working on this project will have exposure and learn molecular biology methods, such as gene cloning, DNA sequencing, gene expression, PCR, microarray based assays, mammalian tissue culture and immunoflouresence, flow cytometry, bioinformatics and a variety of standard DNA and protein molecular methodologies.

Leukaemia Research Group (formally Melissa White Memorial Laboratory)

SAHMRI

Prof Deborah White

Lead Researcher: Prof Deborah White

Contact: Contact: +61 8 8128 4302 or deborah.white@sahmri.com

The Leukaemia Research Group studies chronic myeloid leukaemia (CML) & acute lymphoblastic leukaemia (ALL). CML is characterised by the Philadelphia chromosome (Ph) resulting in the BCR-ABL1 oncogene. This encodes a tyrosine kinase, BCR-ABL, that can be targeted by tyrosine kinase inhibitors (TKIs). Most CML patients need TKI treatment for life, however approximately 30% can cease therapy and remain in remission. Why the remaining patients relapse remains undetermined. Treatment of Ph+ ALL with TKIs has remission rates of 90% but responses are short-lived with survival rates of 40-50%. Our aim is to interrogate drug sensitivity and mechanisms of drug resistance to develop personalised therapies.

Research projects include:

Honours Project:

- Investigation of signalling pathways involved in ABL001 (a newly developed drug) mediated inhibition of CML cell lines.

PhD Research Projects:

- Identification of mechanisms of Drug Resistance in models of paediatric Ph-like ALL treated with targeted therapies.
- Determining the prerequisites for the achievement of treatment-free remission in CML to facilitate the development of new therapeutic approaches with curative intent.
- Utilising Precision Medicine to maximize cure in childhood/young adult cases of high risk ALL undergoing transplantation.
- Investigating mechanisms of drug resistance, and therapeutic approaches to reverse/prevent resistance, in models of high-risk adult and adolescent young adult Ph-like ALL treated with targeted therapies.

See **https://www.sahmri.com/our-research/themes/cancer/theme/theme-overview** for further details.

"Bcr-Abl, a constitutively active tyrosine kinase, is the causative agent in Chronic Myeloid Leukaemia (CML). Drugs that target Bcr-Abl are known as tyrosine kinase inhibitors (TKIs). They have transformed this disease from a fatal neoplasm, to a chronic disease in the majority of patients. However, not all patients respond well, and in a significant minority drug resistance is a major concern. This Project aims to identify novel TKI resistant mechanisms in leukaemic cells by generating resistance in CML cell lines. The resistant lines are currently screened for resistant mechanisms including Bcr-Abl kinase domain mutations, BCR-ABL1 amplifications, and activation of alternative signaling."

PhD project title: Drug Resistance in Chronic Myeloid Leukaemia.
Ms Liu Lu, Bachelor of Health Science (Hons), The University of Adelaide
PhD Candidate (Cancer Theme – SAHMRI)

Dame Roma Mitchell Cancer Research Laboratories

Dame Roma Mitchell Cancer Research Laboratories staff and students

Prostate Cancer Research Group

Lead Researchers: Professor Wayne Tilley, Dr Luke Selth, Dr Tanya Day

Contact: +61 8 8222 3618 or luke.selth@adelaide.edu.au; tanya.day@adelaide.edu.au

The DRMCRL Prostate Cancer Research Group is situated in well-equipped laboratories in the Hanson Institute Building on Frome Road. We actively collaborate with local, national and international research groups and clinicians, which ensures our research is competitive on the world stage. Our research program is well funded by grants from the National Health and Medical Research Council, Prostate Cancer Foundation of Australia and the US Department of Defense.

The student environment within DRMCRL is exciting and fulfilling, and is an excellent base for a career in biomedical research.

Our research is focussed on two broad programs: i) defining the molecular mechanisms of androgen receptor (AR) action in prostate cancer development and progression, and ii) investigating the role of microRNAs in prostate cancer metastasis and their use as potential biomarkers of disease. These research programs utilise clinically relevant models of prostate cancer (i.e. xenografts, tissue explants, patient-derived xenografts) and cutting-edge genomic/transcriptomic/proteomic techniques in addition to classical molecular biology and biochemical approaches such as immunohistochemistry, ChIP, transcriptional reporter assays, qRT-PCR and Western blotting.

Research projects

- Defining the role of androgen receptor splice variants and gain-of-function mutants in lethal prostate cancer
- MicroRNAs as mediators and markers of prostate cancer metastasis
- Utilising the AR-E231G mutant to model prostate cancer development and progression

See for further details: **health.adelaide.edu.au/medicine/drmcrl**

Breast Cancer Research Group

Lead Researchers: Dr Theresa Hickey, Dr Gerard Tarulli, Prof Wayne Tilley

Contact: +61 8 8222 3225 or gerard.tarulli@adelaide.edu.au

Our team has a reputation for world-class research into hormonal regulation of normal breast tissue and breast cancer, with collaborations across Europe, Asia and the Americas. The DRMCRL is an inspiring place for young researchers wishing to delve into medical research, with strong mentoring support and access to the tools, facilities, networks and guidance necessary to embark upon a successful biomedical career.

Research projects

Our group investigates the genetic control of hormone action in the breast, with the aim of developing personalised breast cancer therapies. We apply clinically relevant models of breast cancer including primary human tissue, xenografts and transgenic mice. We marry these with cutting edge molecular techniques including proteomic RIME, transcriptome profiling via microarray and RNA-sequencing, ChIP-seq to map genome-wide transcription, real time PCR, Western blotting, cloning, transactivation assays, gene manipulation and expression systems. With these tools we test novel therapies that harness the powerful actions of hormones as targeted breast cancer treatments.

Specific Research Projects Include:

- The dynamics of steroid receptor crosstalk between the androgen, estrogen, and progesterone receptors in breast cancer
- The evidence-based application of androgen receptor antagonists and agonists to treat women with breast cancer.
- Harnessing hormone action as breast cancer prevention

See **health.adelaide.edu.au/medicine/drmcrl** for further information.

"I joined the Leukaemia Laboratory in my honours year, studying the use of tyrosine kinase inhibitors (TKIs) for the treatment of chronic myeloid leukaemia (CML). TKI therapy revolutionised disease treatment, however the Bcr-Abl mutation, T315I, renders leukaemic cells insensitive to all first and second generation TKIs. This resistance is in part due to altered drug-protein interaction, but recent evidence suggests the T315I mutation may confer further functional changes to leukaemic cells. My PhD project further investigates the role of the T315I mutation in order to improve treatment for this highly refractory disease subset."

PhD project title: The T315I Bcr-Abl mutation in Chronic Myeloid Leukaemia and Acute Lymphoblastic Leukaemia: *biology, resistance and treatment.*
Mr Benjamin Leow, Bachelor of Health Science (Hons), The University of Adelaide
PhD Candidate (Cancer Theme – SAHMRI)

Immunotherapy and Graft-versus-leukaemia (GVL) Research Group

(L-R) Amy Hughes, Agnes Yong, Jade Clarson

Lead Researcher: Dr Agnes Yong

Contact: +61 8 8222 3421 or agnes.yong@health.sa.gov.au

The Immunotherapy and GVL research group investigates the mechanisms of inherent immunogenicity of haematological cancers, and immune responses against leukaemia-associated antigens (LAAs) WT1, proteinase 3, PRAME and BMI-1, particularly in chronic myeloid leukaemia (CML), myelodysplasia (MDS) and multiple myeloma. We aim to enhance anti-leukaemia immune responses in the setting of allogeneic stem cell transplantation with the graft-versus-leukaemia effect, or in an autologous setting targeting tumour-associated antigens. Our research program is also developing chimeric antigen receptor (CAR) T cells for myeloid leukaemia.

Research projects

- **Characterisation of immune responses in haematological cancers:** CML patients treated with interferon alpha (IFN) with immune responses against LAAs such as proteinase 3 have improved outcome. We will study immune responses in CML patients on tyrosine kinase inhibitors (TKIs) including newly diagnosed CML patients enrolled on the clinical trial of upfront nilotinib, a second generation TKI, in combination with IFN. We also are studying LAAs in myeloma and MDS, to identify immune responses which correlate with clinical response to treatment, which may be amenable to enhancement, in order to improve patient outcome.
- **Chimeric antigen receptor (CAR) T cell therapy in myeloid leukaemia:** We are developing novel CAR T cell therapy for acute myeloid leukaemia and CML. We will synthesise CAR molecules with specificity against two or three leukaemia epitopes, to minimise immune escape. The pre-clinical program will lead to a Phase I clinical study in patients with advanced myeloid leukaemia.

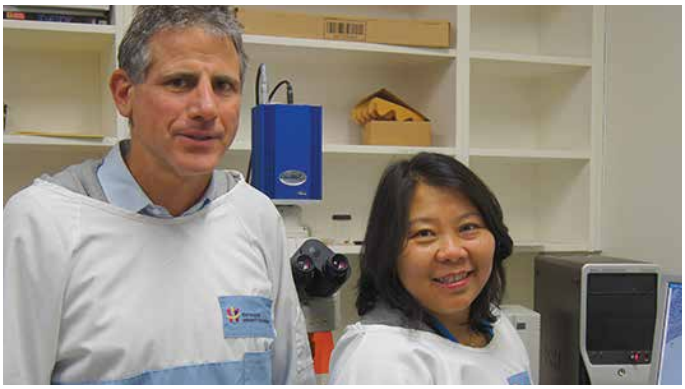
See **http://www.adelaide.edu/directory/agnes.yong** for further information.

"Acute lymphoblastic leukaemia is a major non-traumatic cause of death in children; with treatment relapse a rapidly emerging clinical hurdle and major cause of death in this disease. My PhD project aims to understand the underlying genetic causes of treatment resistance, and using high throughput screening of existing and novel drugs, identify new avenues to overcome this resistance. I aim to discover new ways of combining drug therapies that target the specific genetic changes responsible for each patient's disease, with the ultimate goal of improved disease remission with curative potential. This research requires advanced systems and world-class researchers, such as those in place at SAHMRI, that are critical to achieving my goal of improving patient outcomes in people with ALL."

PhD project title: Investigating Modes of Resistance in Philadelphia-chromosome-like Acute Lymphoblastic Leukaemia (ALL).
Ms Kartini Asari, BBiomedSc, GradDipReprodSc; Monash University
PhD Candidate (Cancer Theme – SAHMRI)

Liver Metastasis Research Unit

BHI/TQEH



Analysing patient biopsies in search for prognostic biomarkers.

Lead Researcher: Dr Ehud Hauben

Contact: +61 8 8222 7392, 0468 367 869 or ehud.hauben@adelaide.edu.au

Our group takes advantage of expertise in cancer research, immunology and cell biology to address the urgent clinical need of early detection, prediction and treatment of liver metastases in patients with colorectal cancer. Being a small group with clear translational research focus on identification and development of predictive and therapeutic biomarkers, we apply a straightforward bed-to-bench-and-back approach utilizing high-throughput methods for target discovery in cancer patients' blood and tissue samples. Our technology platform includes state of the art proteomic techniques such as mass spectrometry, tissue microarray, glycoproteomics, flow cytometry and multiplex analysis

Research projects

Colorectal cancer (CRC) is a major cause of morbidity and mortality throughout the world and is the second most common cancer in both men and women in Australia. The risk of being diagnosed by age 85 is 1 in 10 for men and 1 in 15 for women. The majority of CRC related deaths are attributable to liver metastasis, the most critical prognostic factor observed in ≈50% of CRC patients, however the molecular mechanisms enabling/preventing colorectal tumour cell metastasis remain unclear, and to date there is no clinical test to predict metastatic risk and allow informed selection of preventive treatment. Therefore, identification of new prognostic markers, and therapeutic targets, respectively for prediction of the spread of cancer to the liver, and for development of new preventive therapies, is a critical medical need. The aims of our group are to utilise novel proteomic and glycoproteomic techniques for analysis of tissue and blood samples from CRC patients subsets with distinct disease progression patterns, to identify therapeutic targets and predictive biomarkers of liver metastasis and to develop quantitative assays for their measurement in clinical settings.

Specific projects for the year 2016 include:

- HLA-G expression in CRC cell lines and clinical samples
- The role of the chemokine–chemokine receptor system in liver metastasis
- Midkine as candidate biomarker of hepatic metastatic progression

For further information see: **https://scholar.google.com.au/citations?user=8K2HSRAAAAAJ&hl=en**

Centre for Personalised Cancer Medicine (CPCM)

UA/RAH

Staff and students of the Mucositis Research Group

Mucositis Research Group

Lead Researchers: Prof Dorothy Keefe and Prof Richard Logan

Contact: Dr Emma Bateman +61 8 8222 3261 or emma.bateman@adelaide.edu.au

The mucositis research group studies cancer therapy-induced mucosal injury, its relationship with non-mucosal toxicities, and methods for prevention and treatment of these toxicities. We are a multi-laboratory group, covering a full spectrum from animal models to gene arrays and population-based study, including patient-reported outcomes and toxicity clustering. Professor Keefe works with various pharmaceutical companies on drug development in mucositis. Members have been very closely involved with recent updates of clinical guidelines and systematic reviews for the Multinational Association of Supportive Care in Cancer.

Research projects

We have many opportunities for honours and PhD students interested in mucositis research. This might include development of animal models of chemotherapy, radiotherapy and pre-clinical testing of targeted agents (particularly tyrosine kinase inhibitors), patient gene arrays for toxicity profiling, systematic reviews investigating treatment-induced toxicity, development of clinical guidelines in cancer treatment-related oral and gastrointestinal mucositis, investigation of changes to the microbiome in treatment-related mucositis and characterisation of molecular pathways involved in mucositis.

Interested students are encouraged to contact us to discuss possible projects within the framework of our research, with the aim to custom-design these projects to each student.

For further information see **http://www.adelaide.edu.au/directory/emma.bateman**

Virology Laboratory

BHI/TQEH

The Virology laboratory staff.

Lead Researcher: Professor Eric Gowans

Contact: +61 8 8133 4003 or eric.gowans@adelaide.edu.au

Our interests are in the design of novel vaccines for HCV and HIV. These viruses escape neutralising antibody, and the problems associated with vaccine design are similar. Thus, our efforts are directed towards the design of vaccines which elicit cell mediated immunity, and encompass basic immunology through to clinical trials, although it is vital to examine the efficacy of vaccines in animals.

Research projects

- **Cell penetrating peptide or proteins to increase the efficacy of DNA vaccine delivery:** The uptake of naked DNA vaccines by cells is very inefficient in vivo and the bulk of the injected DNA remains extracellular. In fact, ~95-98% remains in the interfibrillar space. We will compare two promising strategies to improve DNA delivery by generating a protein/peptide:DNA complex with i) a peptide transduction domain-dsDNA binding domain fusion protein (PTD-dsDBD) and ii) a unique tetrapeptide.
- **Mechanism of action of the natural adjuvant, perforin:** Dendritic cells (DCs) are crucial to initiate immunity against various infectious agents including HIV and hepatitis C virus (HCV). We have developed a novel cytolytic DNA vaccine, which uses the adjuvant activity of perforin to enhance anti-viral T cell immunity against HIV and HCV following vaccination. We will use cutting edge immunological techniques to investigate to investigate the mechanism behind this adjuvant effect.

For further information see **http://www.basilhetzelinstitute.com.au/**

Centre for Orthopaedic and Trauma Research (COTR)

UA/RAH

The COTR Directors (L-R Prof Howie, Prof Findlay, Prof Atkins and Prof Freeman)

Directors: Prof Donald Howie, Prof Brian Freeman, Prof David Findlay & Prof Gerald Atkins

Contacts: +61 8 8222 5661, david.findlay@adelaide.edu.au or gerald.atkins@adelaide.edu.au

The Centre for Orthopaedic and Trauma Research (COTR) was formed in 2012 and its Members include orthopaedic surgeons, clinical researchers and biomedical scientists. 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 arthritis and joint replacement, pathological bone loss, infection, spinal conditions and fracture. The research is both clinical and basic science, with a wide range of projects across these areas.

Undertaking a higher degree with the COTR will provide an opportunity to work within multidisciplinary research teams and use state of the art facilities and technologies. The Centre welcomes enquiries from students with engineering, biomedical science, behavioural science, population health or medicine backgrounds, wishing to undertake honours, masters and PhD research projects.

For further details see: **http://www.adelaide.edu.au/ortho-trauma**

Joint Replacement and Reconstruction Research Unit

UA/RAH

Lead Researchers: Prof Donald Howie, A/Prof Bogdan Solomon, Mr Stuart Callary

Contact: +61 8 8222 2665 or bogdan.solomon@health.sa.gov.au

The Joint Replacement and Reconstruction Research Unit conducts research into a broad range of areas related to primary and complex revision hip and knee replacement as well as joint reconstruction for congenital joint disorders. The research opportunities include epidemiology using a joint replacement registry, clinical studies, basic bone biology and pathology, diagnostics, anatomy and surgical techniques, gait analysis and biomechanical testing.

Research projects

- Biomechanical, histological and diagnostic investigations of the mechanisms of failure of hip and knee replacement implants
- Risk factors for complications after joint replacement surgery – using a 30 year hip and knee replacement outcomes registry
- Optimising surgical techniques for joint replacement and reconstruction
- Studies of early prosthesis stability that predict later loosening

For further details see: **http://www.adelaide.edu.au/directory/lucian.solomon**

Orthopaedic Trauma Group

UA/RAH

Lead Researchers: A/Prof Bogdan Solomon and A/Prof Mellick Chehade

Contact: +61 8 8222 2665 or bogdan.solomon@health.sa.gov.au

Through orthopaedic trauma research, we aim for optimal management of musculoskeletal injury. We have a multifaceted research program, supported by a long-term prospective clinical database, covering bone biology, advanced imaging, biomechanics, anatomy, pathology, clinical trials and epidemiology.

Research projects

- The anatomy and epidemiology of fracture and outcomes of fracture management
- Redefining weight-bearing regimes after pelvic and lower limb fractures to reduce complications and increase acute care efficiencies
- Optimising the care process, the management and outcomes of hip fractures in the elderly patient – using a comprehensive hip fracture registry

For further details see: **http://www.adelaide.edu.au/directory/lucian.solomon**

Adelaide Spinal Research Group

UA/RAH

Lead Researchers: Prof Brian Freeman, Dr Claire Jones, Dr Julia Kuliwaba

Contact: +61 8 8222 3056 or claire.jones2@health.sa.gov.au

The Adelaide Centre for Spinal Research (ACSR) is one of the most vibrant spinal research groups in Australia. It brings together clinicians, engineers and scientists in a multidisciplinary program spanning clinical and pre-clinical research, biomechanics, and bone and intervertebral disc structure and biology, all relating to the healthy, disordered, and injured spine and spinal cord.

The ACSR supports students with Medicine/Surgery, Biomedical Science and Mechanical Engineering backgrounds to undertake Honours, Masters and PhD research projects. Orthopaedic residents and fellows are also frequently supported.

Research projects

Our research facilities include a well equipped biomechanics laboratory with 6-axis spine simulator, Instron testing machine, 6-axis load cells, Optotrak motion capture system, high speed cameras, and cadaver preparation facilities. We have unique hard tissue histology capabilities and excellent local large animal and imaging facilities for pre-clinical and basic science studies. Clinical research utilises a Wacom tablet monitor for analysis of medical images, and the first pQCT in SA, for low-dose measurement of muscle and bone parameters in patients. We strive to create a positive and rewarding research experience for our students.

Research areas:

- Characterising the bone microstructure and biomechanical properties of spinal tissues, and the effects of age, gender, trauma and disease
- Clinical and biomechanical investigation of injury mechanisms of acute spinal and spinal cord injury and chronic spinal conditions
- Biomechanical evaluation of spinal surgery techniques and implants.

For further details see: **http://www.adelaide.edu.au/directory/claire.jones**

South Australian Spinal Cord Injury Service

HC

Lead Researchers: A/Prof Ruth Marshall, Dr Jillian Clark

Contact: +61 8 8222 1651 or jillian.clark@health.sa.gov.au

The South Australian Spinal Cord Injury Research Centre brings together clinician-researchers from the disciplines of Epidemiology, Traumatology, Orthopaedics, Endocrinology and Medical Rehabilitation. Collaborations formed between our group and our basic science colleagues have been instrumental in advancing our investigations of deficiencies in understanding of the pathophysiology of spinal cord injury and the pathogeneses of its detrimental consequences. The long term goal is to develop an understanding that will underpin medical diagnostics and guide clinical practice.

Research projects

Our research projects investigate fundamental principles of the physiological and biological responses to spinal cord injury. We endeavour to characterise the clinical phenotype in order to shed light on the interplay between body systems and increase our understanding of the cell types and signalling pathways involved. We employ laboratory, advanced imaging, physiological, behavioural and data-linkage techniques to answer biological questions that have important clinical implications for mitigating secondary injury, augmenting tissue repair, restoring function and promoting health.

Project areas:

- Our projects are highly translational, affording opportunities for bench-bedside and bedside-bench research involving diagnostics, therapeutics, and clinical practice guidelines. We welcome expressions of interest from Honours, Masters, and Ph.D. candidates.

For further details see: **http://www.adelaide.edu.au/ortho-trauma/research**

Bone Cell Biology Group

UA/RAH

Research Assistant Renee in the lab

Lead Researchers: Prof Gerald Atkins (Head), Prof David Findlay, Dr. Matt Prideaux, Dr. Asiri Wijenayaka

Contact: +61 8 8222 3107 or gerald.atkins@adelaide.edu.au

We are an internationally recognised research group running an integrated program of research into the cell biology of the major bone cell types, osteoclasts, osteoblasts and osteocytes. Our work is funded by competitive grants from the NHMRC. The group consists of four post-docs, two Research Assistants and five current HDR students.

Research projects

- Elucidating novel molecular and cellular aspects of bone biology in health and disease
- The effect of implant-derived wear particles on bone activity Vitamin D metabolism in osteoclasts, osteoblasts and osteocytes
- The central role of osteocytes in bone pathophysiology
- Bone and beyond – the systemic influence of bone cells

For further details see: **http://www.adelaide.edu.au/directory/gerald.atkins**

Paediatric Orthopaedic and Trauma Program

WCH

Lead Researchers: A/Prof Peter Cundy, Contact Dr Nicole Williams

Contact: +61 8 8161 7059, n.williams@adelaide.edu.au or georgia.antoniou@health.sa.gov.au

The research team at the Women's and Children's Hospital has a long track record of internationally recognised research activity including basic science and clinical research investigating a range of paediatric musculoskeletal conditions. Current areas of interest include mechanisms of bone growth and repair, paediatric musculoskeletal infections, the management of congenital and developmental musculoskeletal deformities such as scoliosis and lower limb deformity and paediatric trauma, and studies using data from the SA Cancer Register, Birth Defects Register and Pregnancy Outcome Data.

Research projects

- Bone growth and repair
- Epidemiology and management of congenital and developmental musculoskeletal deformities

For further details see: **http://www.adelaide.edu.au/directory/nicole.williams01**

Upper Limb Musculoskeletal Biomechanics Research Program

UA/RAH

Lead Researchers: Dr Claire Jones, Prof Greg Bain, A/Prof Michael Sandow

Contact: +61 8 8222 3056 or claire.jones2@health.sa.gov.au

There is a range of projects available in the area of upper limb musculoskeletal biomechanics, surgery and medical device development and evaluation. The Centre's biomechanics laboratory houses an Instron 8874 biaxial materials testing machine, and custom testing apparatus, and accesses a variety of other equipment via the Adelaide Centre for Spinal Research.

Research projects

- Microstructure and function of upper limb tendons, suture-tendon interaction
- Biomechanical evaluation of novel rotator cuff repair techniques and anchors
- Upper limb fracture mechanisms

For further details see: **http://www.adelaide.edu.au/directory/claire.jones**

The Translational Vascular Function Research Collaborative

BHI/TQEH

The Translational Vascular Function Research Collaborative Group

Director: Prof John Beltrame

Contact: +61 8 8222 6740 or john.beltrame@adelaide.edu.au

The Translational Vascular Function Research Group undertakes basic clinical and epidemiological studies into vascular disorders with the objective of improving the health of these patients. Currently the group focuses upon coronary heart disease and peripheral artery disease, although many principles are applicable to other vascular disorders.

The research group includes both physicians and medical scientists located at the Basil Hetzel Institute, the University of Adelaide Medical School and The Queen Elizabeth Hospital. The integrative nature of the group provides a unique opportunity to ensure that innovations are translated from bench to bedside to health outcome, as well as the reverse.

Molecular Physiology of Vascular Function Research Group

Lead Researcher: Dr David Wilson

Contact: +61 8 8313 3193 or david.p.wilson@adelaide.edu.au

This group focuses upon the pathophysiology and molecular signalling of vascular disorders. This includes coronary artery spasm, coronary microvascular disorders, peripheral vascular disorders, and reperfusion injury. Laboratory studies include the assessment of isolated human vessel function using myography, followed by a series of biomolecular assays aimed to provide a mechanistic understanding of the disorders and thus direct the translation to improvements in medical therapy.

Research projects

- **Mechanisms underlying Coronary Microvascular Dysfunction:** The coronary slow flow phenomenon is a coronary microvascular disorder that was first clinically characterised by this research team. This project will further advance our understanding of the pathophysiologic mechanisms responsible for this disabling condition.
- **Vasomotor dysfunction in Peripheral Artery Disease:** Peripheral arterial disease typically involves obstructive atherosclerotic lesions of the large leg arteries although the role of the microcirculation is less clear. In this project the functional properties and molecular characteristics of the microcirculation in patients with peripheral artery disease will be investigated.
- **Role of zinc in the vasculature:** Dietary zinc has emerged as a new factor in maintaining normal function and integrity of blood vessels. This project will explore the role of zinc and its family of transporter proteins in the endothelial lining and smooth muscle of blood vessels.

See **http://www.adelaide.edu.au/directory/david.p.wilson** for additional details.

Clinical Physiology of Vascular Function Research Group

Lead Researcher: Prof John Beltrame

Contact: +61 8 8222 6740 or john.beltrame@adelaide.edu.au

This clinical research team utilise both invasive and/or non-invasive techniques to identify the presence of vascular dysfunction in patients with vascular symptoms including angina and intermittent claudication. These include the assessment of coronary artery spasm, coronary blood flow, cardiac magnetic resonance imaging, popliteal artery vasodilation, subcutaneous blood flow and endothelial function.

Research projects

- **Vasomotor Studies of Patients with Myocardial Infarction and Non-Obstructive Coronary Arteries:** Approximately 5-10% of patients who experience a myocardial infarct do not have significant coronary artery disease, prompting the clinical question of what is the underlying mechanism? This study will utilise invasive and non-invasive clinical techniques to elucidate potential mechanisms that may be responsible for the myocardial infarct.
- **Vasomotor Properties of the Popliteal Artery:** The popliteal artery is a peripheral limb vessel that is readily imaged thereby allowing dynamic assessment of its function. This project will assess the presence of vasomotor dysfunction in this vessel amongst patients with peripheral artery disease thereby providing insights into the underlying pathophysiological processes and potentially identifying novel therapeutic targets.

Vascular Disorders Health Outcome Research Group

Lead Researcher: Prof John Beltrame

Contact: +61 8 8222 6740 or john.beltrame@adelaide.edu.au

This group focuses on the health status of patients with vascular disorders including their symptomatic status, associated physical limitations and quality of life. Thus consistent with the changing environment in medical research, this group adopts a 'patient-orientated' approach to the delivery of medical care in patients with vascular disorders by evaluating patient health status in population studies and assessing the quality of care delivered. The group have developed large databases in patients with acute myocardial infarction, coronary artery and microvascular disease, coronary spasm, and peripheral artery disease.

Research projects

- **Improving Health Outcomes in Patients undergoing Coronary Angiography:** Coronary angiography is the clinical benchmark technique in the assessment of coronary artery disease with more than 8,000 performed in South Australia each year. Despite its diagnostic benefits in identifying the presence of coronary disease, its benefit to the patient has been less rigorously studied and will be the focus of this project.
- **Optimising the Quality of Care in Patients with ST Elevation Myocardial Infarction:** ST Elevation Myocardial Infarction (STEMI) is a medical emergency for which effective therapies have been developed, although their implementation may need to be optimised. This project will identify treatment gaps in STEMI management and investigate potential system improvements.
- **Health Outcomes in Patients with Intermittent Claudication:** Intermittent claudication is the primary symptom of peripheral artery disease. This project will examine the disability associated with this symptom and its impact on quality of life.

Vascular Surgical Research Group

Professor Robert Fitridge

Lead Researcher: Prof Robert Fitridge

Contact: +61 8 8222 7711 or robert.fitridge@adelaide.edu.au

The Vascular Surgical research group consists of both clinicians and laboratory researchers. Research themes address both basic laboratory science and clinical research. Major interests include peripheral arterial disease and associated impaired wound healing in patients with diabetes. Research projects address aspects of the pathophysiology of vascular inflammation and wound healing, potential therapies and their clinical implications.

Research projects

- **Assessing preoperative variables to predict amputation in diabetic patients:** Approximately 75% of lower limb amputations in Australia are associated with diabetic foot ulcers. Predisposing factors contributing to the risk of amputation are the presence and severity of infection and ischaemia, size of the ulcer and presence of osteomyelitis. The Wifi model, which takes into account these factors, has recently been developed. We aim to externally validate the Wifi model and assess what other factors are correlated with outcomes.
- **Anti-integrin therapy to improve healing of diabetic wounds (in collaboration with Professor Allison Cowin, (Regenerative Medicine, University of South Australia):** Up to 25% of people with diabetes will develop non-healing ulcers. Inflammation is a fundamental component of normal wound healing but excessive inflammation is a major contributing factor leading to chronic non-healing wounds. We will aim to identify immune specific integrins in chronic wounds and then determine whether immune specific integrin function-blocking antibodies dampen inflammation and improve healing in diabetic mouse models.

Centre for Heart Rhythm Disorders

Cardiac Electrophysiology Laboratory (Royal Adelaide Hospital)

Lead Researchers: Prof Prashanthan Sanders, Dr Dennis Lau, Dr Rajiv Mahajan, A/Prof Glenn Young, Dr Kurt Roberts-Thomson

Contact: +61 8 8222 2723 or prash.sanders@adelaide.edu.au

The Centre for Heart Rhythm Disorders (CHRD) is a vibrant Research Centre with a highly experienced team of research scientists, physicians, bioengineers and computational modelers across multiple sites working closely with hospitals, clinics and Universities nationally and internationally. The Centre's research program covers a broad spectrum from computer modelling of cardiac arrhythmias, cellular electrophysiology, small and large animal models, clinical mechanistic, outcome and population based studies.

The Centre has a thrombosis and vascular biology laboratory which conducts a series of projects focused on understanding the thrombogenic state in AF. The Centre also conducts small and large animal studies in mapping arrthymias, cardiac remodelling and the many factors predisposing the development AF. It's clinical trials operations continues to grow with a focus on understanding the mechanisms responsible for AF and also working to develop new paradigms for the treatment and prevention of AF.

Atrial Fibrillation Research Group

Dr Jeroen Hendriks

Lead Researcher: Dr Jeroen Hendriks

Atrial Fibrillation (AF) is the most common sustained heart rhythm disorder. Integrated Care Management is recognised as a structured way to redesign management of AF in daily practice, incorporating a multidisciplinary approach. The CHRD is currently developing the Academic Atrial Fibrillation Nursing program where research initiatives are directed to improve the management of AF by concentrating on significant aspects of integrated care. By investigating these aspects we can better understand the relationship between evidence based care and best practice in patient care. The program provides an excellent opportunity for nurses with a masters degree to prepare for an academic career in this dynamic and evolving field.

Research projects

- Integrated care in AF Management (iCARE-AF Clinics)
- Education and self-management in patients with AF
- Multidisciplinary team approaches www.adelaide.edu.au/chrd

See **www.adelaide.edu.au/directory/jeroen.hendriks** for further details.

Cardiometabolic Group

Dr Aaron Sverdlov
(MBBS, PhD, FRACP, FCSANZ, FESC)

Dr Doan Ngo
(B.Pharm, PhD, FCSANZ, FESC)

Lead Researchers: Dr Aaron Sverdlov and Dr Doan Ngo

Contact: +61 8222 7432, aaron.sverdlov@adelaid.edu.au or doan.ngo@adelaide.edu.au

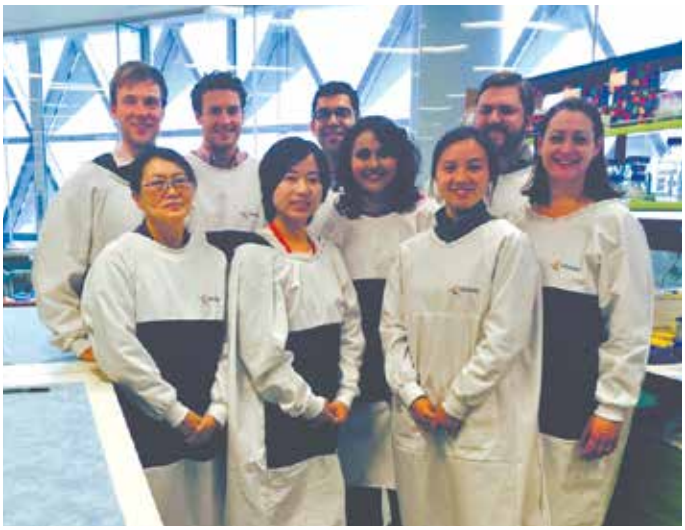
The prevalence of obesity has more than tripled in the last decade worldwide. The cardiometabolic group focuses on the assessing mitochondrial function and angiogenesis in obesity induced cardiovascular and metabolic complications. We are a newly formed group, with both lead investigators recently returned from Boston University where our cutting-edge research have led to publications in high-tiered journals, including Circulation and Nature Medicine. Our combined unique yet intersecting expertise ranging from clinical cardiology to molecular biology offer an exciting environment for productive research.

Research project

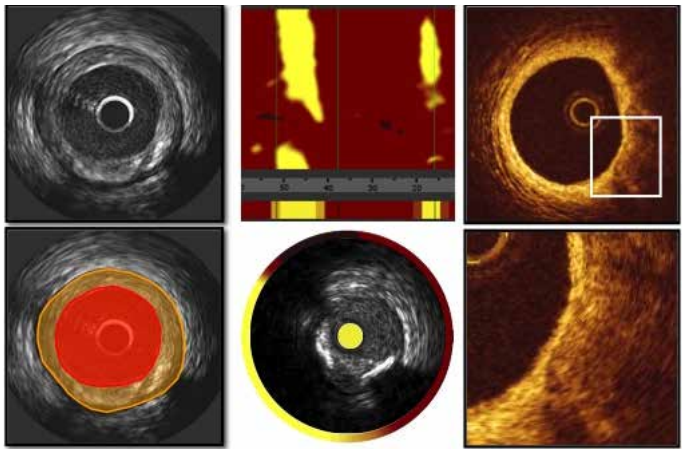
- **Modulation of adipose tissue angiogenesis in obesity:** Dr Doan Ngo. Obesity is associated with reduced adipose tissue angiogenesis. Recently, Dr Doan Ngo identified that the novel anti-angiogenic isoform VEGF-A165b is upregulated in obesity. Using "bench to bedside" approaches, we will determine the role of VEGF-A165b in regulating adipose tissue biology and angiogenesis in obesity with concomitant assessment of cardiometabolic outcomes.

This project aims to identify the VEGF-A165b as a novel modulator of adipose tissue biology, potentially leading to development of new therapeutic targets to combat obesity. > Mitochondrial function in metabolic heart disease (MHD). Lead investigator: Dr Aaron Sverdlov. We have identified mitochondrial reactive oxygen species (ROS) as key mediators of MHD and described key mitochondrial proteins that are modified by ROS. In collaboration with Boston University we will use novel approaches to identify exact mechanisms involved, potentially leading to treatments for MHD.

Vascular Research Centre



Front row (L-R): MyNgan Duong, Wenru Pan, Nisha Schwarz, Tracy Nguyen, Belinda Di Bartolo
Back row (L-R): Benjamin Pullen, Alex Janssan, Anthony Pisaniello, Daniel Scherer



Examples of coronary artery imaging with intravascular ultrasound highlighting (top left) plaque burden and (bottom left) planimetry of vessel (yellow) and lumen borders (red); near infrared spectroscopy (top middle) demonstrating lipid content (yellow) and cross-sectional frame of plaque containing calcium (signal drop-out) and lipid rich component;optical coherence tomography (top right) highlighting (bottom right) lipid rich plaque.

Lead Researchers: Prof Stephen Nicholls and Dr. Peter Psaltis

Contact: +61 8 8128 4534 or peter.psaltis@sahmri.com

Cardiovascular diseaese is the leading cause of mortality in Western society. Our interest at Heart Health in SAHMRI is to investigate the mechanisms of cardiovascular disease and the associated factors that protect or promote the progression of this disease. These factors include 'good' and 'bad' cholesterol, macropahges and other inflammatory mediators, vascular function and the interactions between these components with the aim of practical applications as the endpoint. Our research encompasses and spans basic laboratory science all the way through to clinical human trials, including vascular imaging modalities.

Research projects

- **Study the origin of inflammatory macrophages in normal and diseased blood vessels:** To investigate how different origins of macrophages influence their biological activities and impact vascular function and disease.
- **Investigate the ability of stem cells to treat atherosclerotic plaque:** Stem cells improve heart function and reduce inflammation. We will determine whether stem cells modify atherosclerosis.
- **Study the factors that influence the function of good cholesterol:** We are investigating the factors that promote and impair the functional properties of high-density lipoproteins.
- **Molecular imaging of atherosclerosis:** We will use nuclear imaging to determine the factors that distinguish hot and cold plaques.
- **Developing novel nanoscale biosensors for vascular disease:** In collaboration with physicists and chemists we are developing novel nanoscale biosensors that enable study of vascular function and disease at a cellular level.

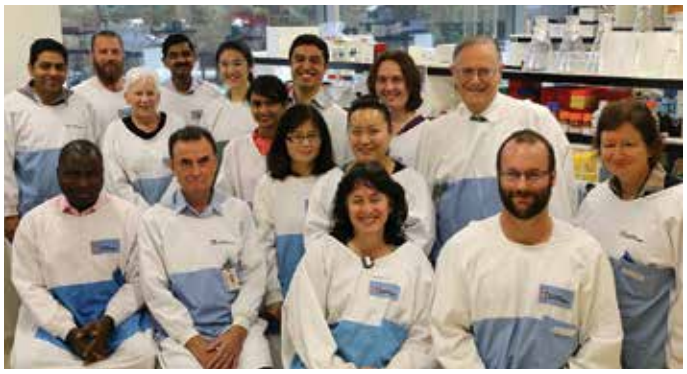
For further details see: **https://www.sahmri.com/our-research/themes/heart-health/groups/vascular-research-centre**

"The PhD experience at Centre for Heart Rhythm disorders has been very invaluable for my academic career. It provided an excellent opportunity to develop my own research ideas and expand my knowledge. The environment is very supportive and collegial and the supervision by my mentor has been unparalleled. Research and administrative staff are extremely friendly and eager to help and provide advice. The experience in this world-class Center has been pivotal for me securing a prestigious postdoctoral fellowship program at Pennsylvania and I feel well equipped to take the challenges as an Academic Electrophysiologist in the future."

Dr Rajeev Kumar Pathak

Cardiovascular Diseases and Therapeutics Group

BHI/TQEH UA/RAH



The cardiovascular diseases and therapeutic group staff and PhD students

Lead Researcher: Prof John D Horowitz

Contact: +61 8 8222 7432 or john.horowitz@adelaide.edu.au

We are interested in improving understand of the mechanisms underlying the "new" forms of cardiac disease which have become increasingly important in the 21st century, such as aortic valve disease, Tako-Tsubo Cardiomyopathy, congestive heart failure and atrial fibrillation, as well as rarer disorders such as hypertrophic cardiomyopathy and bicuspid aortic valve. Furthermore, we are attempting to develop more effective treatments for these conditions. Our research involves collaboration in the USA, UK and Germany as well as interstate at the Baker Institute (Melbourne).

Research projects

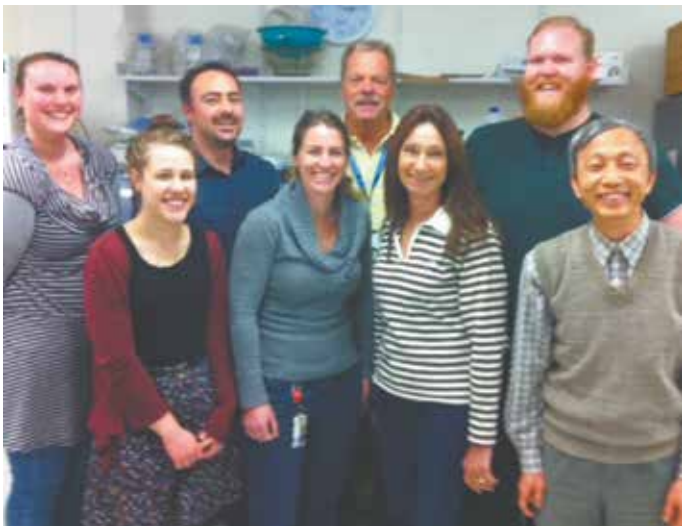
- **Pathogenesis and treatment and stress cardiomyopathy (Dr T Nguyen, Dr A Sverdlov, Dr Y Chirkov, Prof J Horowitz):** Stress cardiomyopathy (Tako-Tsubo Cardiomyopathy, TTC) is a life-threatening cardiac inflammation which occurs especially in ageing women in response to sudden release of adrenaline and other catecholamines. Studies are under way to improve diagnostic processes for TTC, accelerate patient recovery and prevent recurrences. We are also investigating the signal transduction pathways responsible for initiating the process.
- **Inflammation and aortic valve calcification (Dr T Nguyen, Dr D Ngo, Prof J Horowitz):** Aortic stenosis represents the most common basis for valve replacement in Australian society. Studies are being undertaken to develop treatments to slow the progression of valve disease. Experiments utilize cell culture, animal models and clinical follow-up studies.
- **Adenylate cyclase and anti-aggregatory therapy (Dr Y Chirkov, Prof J Horowitz):** Patients undergoing intracoronary stent insertion are treated with a number of agents to prevent stent thrombosis. Our studies have identified platelet adenylate cyclase as a major determinant of anti-aggregatory drug efficacy, and we wish to evaluate the therapeutic potential of this finding.

"I started my exciting research career with cardiovascular research group at located at the Basil Hetzel Institute. Myocardial infarction is one of the biggest health problems in Australia and many different forms exist among patients. My research interest was on myocardial infarction in the absence of coronary blockages, which we now refer to as MINOCA (Myocardial Infarction with Non Obstructive Coronary Arteries). This subgroup of myocardial infarction is relatively new and not very well understood consequently the management of these patients is not defined. I began my PhD with very little understanding in the area however I now realise its severity and significance therefore now nearing the end of my PhD I am committed to improving quality of life of these patients."

Sivabaskari (Tharshy) Pasupathy, PhD student, Discipline of Medicine

The Lung Research Unit

BHI/TQEH



The Lung Research Unit

Lead Researchers: Prof Sandra Hodge and Prof Paul Reynolds

Contact: +61 8 8222 3443 or sandra.hodge@health.sa.gov.au

Our Lung Research Unit is a multidisciplinary, internationally recognised team that comprises the Chronic Inflammatory Lung Disease Group (Head Prof Sandra Hodge), Pulmonary Vascular and Gene Therapy Program (Head Prof Paul Reynolds) and the Lung Transplant Research Group (Head Prof Mark Holmes).

Research projects

Our clinically-based or basic science PhD and Honours projects include:

- **Innovative therapies for chronic lung disease:** Our investigations highlight that defective lung macrophage function contributes to inflammation, and that the macrophage-targeted therapy Azithromycin (a macrolide antibiotic) has anti-inflammatory effects. Our innovation is to address the problem of potential microbial resistance using novel macrolides that lack anti-microbial properties.
- **Overcoming steroid resistance in chronic lung disease and lung transplantation:** Steroid resistance is a major challenge. We have made novel discoveries involving lymphocytes in these patients and most importantly the mechanisms involved in steroid resistance of these cells. Current projects are investigating novel 'steroid sparing' therapeutic approaches.
- **Investigating the effect of E-cigarettes on lung immune function:** We are interested in the effects of cigarette smoking on the lung. As there is little data regarding the effects of E-cigarettes on lung health, we are also investigating their effects on lung immune function.
- **Lung Biometals:** Homeostasis and functional roles of Zinc and its transporters in the endothelium of normal and diseased blood vessels is being investigated, with the aim of advising the development of treatment strategies for major human vascular and alveolar lung diseases. In particular, the relationship between Zinc and increased airway autophagy is a highlight research goal.

SAHMRI

- Other project opportunities involve the development of cell and gene therapies for pulmonary vascular disease and thoracic malignancy.

Gut Development, Disease and Intestinal Immunology Group

Dr Adrian Cummins

Lead Researcher: A/Prof Adrian Cummins

Contact: +61 8 8222 7076 or adrian.cummins@adelaide.edu.au

The Gut Development, Disease and Intestinal Immunology Group is investigating how the structure of the small intestine is altered during postnatal growth and in disease with short bowel syndrome and how the gut-associated lymphoid tissue reacts to weaning with generation of immunologically oral tolerance.

Research projects

- **Wnt/beta–catenin signalling and crypt fission during repair of short bowel syndrome:** Wnt/beta catenin signalling will be investigated in intestinal crypts in rats that have had surgically resected small intestine. Control rats will have intestinal transsection. Wnt/beta catenin will be assessed in Lgr5+ stem cells. Crypt fission will be measured by a tissue microdissection technique. We will assess blockade of Wnt/beta–catenin signalling by recombinant dickkopf and promotion by the Wnt agonist, R-spondin-1.
- **When does immunological oral tolerance develop during infancy?** The gut-associated lymphoid tissue peaks in activity at 21 days of life. Rats will be given intragastrically keyhole limpet haemocyanin at various times before and after this peak. Immunological activity will be measured by soluble interleukin-2 concentration and by antigen-specific proliferation of mesenteric lymph node cells. Down-regulation should occur after day 21 of life.

Cell Signalling & Gene Expression Group

Lead Researcher: Prof Chris Proud

Contact: +61 8 8128 4801 or nutritionmetabolism@adelaide.edu.au

Prof. Proud's laboratory studies the signalling pathways by which hormones, growth factors and nutrients regulate the function of mammalian cells, especially gene expression and protein metabolism. The proper control of these pathways plays an important role in cell growth and proliferation, and in neurological processes such as learning and memory. Defects in their control contribute to tumorigenesis, type 2 diabetes, cardiovascular disorders and neurodegenerative disease.

Research projects

We offer a range of projects that will suit students interested in laboratory-based research exploring the role of eukaryotic elongation factor 2 kinase (eEF2K) in tumour cells and the roles of the MAP kinase-interacting kinases (MNKs) in metabolic diseases such as diabetes and obesity. We have a range of unique resources for studying these enzymes.

Additionally, we study the importance of the translation factor eIF4E in the control of protein synthesis in neurons and its relationship e.g., to autism, and in regulating the synthesis of proteins involved in cell migration and tumour metastasis.

Available projects:

- Role of eEF2K in protecting cancer cells against nutrient starvation and in tumourigenesis and tumour progression.
- The roles of the MNKs in promoting the adverse effects associated with the metabolic syndrome and type 2 diabetes.
- Roles of eIF4E and the fragile X mental retardation protein, FMRP, in regulating the synthesis of specific proteins in neurons and cancer cells.

For further details see: **https://www.sahmri.com/our-research/student-opportunities**

Centre for Nutrition and Gastrointestinal Diseases

Lead Researcher: Prof Gary Wittert

Contact: gary.wittert@adelaide.edu.au

The Centre for Nutrition and Gastrointestinal Diseases, which is located at the new purpose built South Australian Health and Medical Research Institute (SAHMRI), is led by Prof Gary Witttert, Head of the Discipline of Medicine at the University of Adelaide.

The overarching goals of the Centre are to improve treatment of digestive diseases by identifying and understanding the interactions between the nervous system and the gastrointestinal tract, promoting translational research from single cells through to the patient and preventing metabolic disease by modulating nutritional delivery.

Specific projects on offer in 2015 from Team Leaders: A/Prof Stuart Brierley, Dr Andrea Harrington, A/Prof Leonie Heilbronn, Dr Patrick Hughes, A/Prof Amanda Page, A/Prof Grigori Rychkov, and Dr Young are listed below.

Obesity and Molecular Metabolism

Obesity and Molecular Metabolism Lab (L-R)

Lead Researcher: A/Prof Leonie Heilbronn

Contact: +61 8 8128 4838 or leonie.heilbronn@adelaide.edu.au

Our group is focussed on understanding how changing nutritional intake, by overfeeding, caloric restriction, and altering meal timing, modulates insulin resistance and development of type 2 diabetes in at-risk individuals. We are especially interested in understanding the role that inflammation, oxidative stress and mitochondrial metabolism play in these processes. Additionally, we are interested in understanding and overcoming the metabolic disease risk of IVF.

Research projects

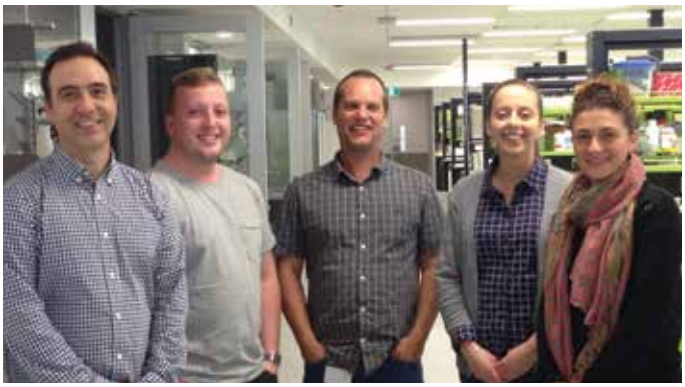
We have a range of projects that will suit students interested in clinical or laboratory based research into nutrition, obesity and type 2 diabetes risk.

Available projects:

- Studying the role of fasting and time restricted feeding to reduce diabetes and cardiovascular risk in overweight humans and in mice.
- How overfeeding contributes to metabolic dysfunction in human obesity, with a particular focus on adipose tissue remodelling and skeletal muscle plasticity.
- Whether 6 minutes of high intensity exercise can block the metabolic consequences of overfeeding in humans.
- How hyperbaric oxygen therapy increases insulin sensitivity in obese individuals.
- Whether individuals concevied through IVF will have increased metabolic suscpetibility to disease, later in life.

For further details see: **http://www.adelaide.edu.au/directory/leonie.heilbronn**

Gastrointestinal Neuroimmune Interactions



Left to right: Chris Mavrangelos (Senior RA), Sam Eade (Honors), Patrick Hughes (Lab Head), Nicole Dmochowska (Honors), Melissa Campaniello (Senior RA)

Lead Researcher: Dr. Patrick Hughes

Contact: +61 8128 4843 patrick.hughes@adelaide.edu.au

The gastrointestinal tract is constantly bombarded with foreign antigen, from the food we eat to viruses and bacteria. These threats are usually contained by an extensive nervous system and a powerful immune system, but abnormal responses by either the immune or nervous systems underlie several severe diseases including Inflammatory Bowel Diseases (IBD) and functional gastrointestinal diseases such as Irritable Bowel Syndrome (IBS) and Functional Dyspepsia (FD). The major theme of this group is dissecting how the immune and nervous systems communicate in the gut, and how this is altered in gastrointestinal diseases.

Research projects

- **Immune activation in FGID:** This project will identify the immune cells and mediators responsible for symptoms in IBS and FD by investigating how the immune profile of these patients changes when they have symptoms compared to when they are symptom free.
- **Effects of immune mediators on gastrointestinal nerve function:** This is important as changes in immune function in the gastrointestinal tract are "sensed" by gastrointestinal nerves, and these changes may lead to symptoms in Irritable Bowel Disease and Functional Dyspepsia. This project investigates the effects lead immune candidates have on gastrointestinal nerve function.
- **Changes in neuro-immune phenotype of acute and relapsing colitis:** This project investigates how the immune system changes in response to acute inflammation of the colon and whether these changes alter the immune response to subsequent reactivation of the inflammation.

These projects are funded by the NHMRC and the University of Adelaide.

For further details see: **http://www.adelaide.edu.au/directory/patrick.hughes**

Visceral Pain Group

Dr Stuart Brierley

Lead Researcher: Dr Stuart Brierley

Contact: +61 8 8222 2077 or stuart.brierley@adelaide.edu.au

Molecular Mechanisms of Abdominal Pain: Causes and Cures

Clinically, chronic pain is a major unresolved worldwide problem. Dr Brierley's research focuses on pain arising from the gut with particular emphasis on Irritable Bowel Syndrome (IBS). This research determines mechanisms responsible for detecting painful events and how they change during acute and chronic pain. Certain mechanisms are reprogrammed during chronic pain, which fail to 'reset' back to normal. Overall, understanding how these mechanisms are changed is the first step in finding new treatments for abdominal pain.

For more details see Dr Brierley's 'Research Tuesday' free public seminar: **blogs.adelaide.edu.au/researchtuesdays/2012/01/19/get-your-stomach-in-mint-condition/**

Research projects

- **TRP channels: Critical targets for the treatment of chronic abdominal pain:** This project will investigate TRP channels in colonic sensory neurons, determine their mechano and chemosensory properties, and how their function changes across acute and chronic pain models. We will determine how TRP expression is altered in tissue from human patients with chronic visceral, thereby linking TRP levels with symptoms. Project funded by NHMRC Australia.
- **Other Projects:** Several additional projects are available that we are happy to discuss with potential HDR students. These projects focus on other pain targets and are also funded by NHMRC Australia. Techniques that students will perform include: electrophysiological afferent fibre recordings, patch clamp recordings, immunohistochemistry, neuronal labeling, laser capture microdissection, QRT-PCR and tissue collection.

See **adelaide.edu.au/directory/stuart.brierley** for recent publications and additional details of the Research Group and projects.

Spinal Pathways of Visceral Pain

Lead Researcher: Dr Andrea Harrington

Dr Andrea Harrington

Contact: +61 8 8222 2602 or andrea.harrington@adelaide.edu.au

Chronic visceral pain is a major unresolved clinical problem associated with numerous functional gastrointestinal (GI) disorders. The sensory nerve pathways relaying information from visceral organs into the spinal cord are essential in shaping how harmful stimuli are perceived and differentiated from physiological stimuli. Remarkably, how visceral sensory nerves project into the spinal cord remains to be characterized as are the spinal cord circuits they communicate with.

As the development and maintenance of chronic visceral pain is attributed in part to changes in the spinal cord, this project will use mouse models of chronic visceral pain in order to characterise such changes. We use multiple molecular and physiological techniques to characterise the central terminals of visceral sensory fibres and the spinal cord neurons activated by visceral painful events in health and models of chronic visceral pain. The outcomes of this project will significantly enhance the overall understanding of visceral sensory pathways and will be used to identify novel therapeutic targets for the management of chronic visceral pain.

Research projects

A range of projects are on offer, in determining the anatomy, neurochemistry and pharmacology of visceral sensory nerve terminals in the spinal cord and the spinal cord neurons stimulated by various GI stimuli. Techniques that students will use include fluorescence immunohistochemistry, confocal microscopy, quantitative PCR and tissue collection, allowing localization of receptors and neurochemical markers specifically to visceral spinal terminals and the dorsal horn neurons they activate. This will also be combined with small animal surgery and the use of animal models.

- Neurochemical profile of spinal cord neurons activated by visceral pain
- Identifying pre-synaptic receptors regulating transmission from visceral afferent terminals in the spinal cord
- Mapping of viscera-responsive neurons in the spinal cord to painful and physiological visceral events.

See **adelaide.edu.au/directory/andrea.harrington, blogs.adelaide.edu.au/pg-research-medicine/2012/10/04/nerve-gut-research-laboratory/** for recent publications and additional details of the Research Group and projects.

Molecular Physiology of Ion Channels

Lead Researcher: A/Prof Grigori Rychkov

Contact: +61 8128 4854 or grigori.rychkov@adelaide.edu.au

Current research of this group investigates the basic molecular mechanisms that control the activation and regulation of store-operated Ca2+ channels and transient receptor potential (TRP) channels, and the roles these channels play in Ca2+ signalling in hepatocytes, vascular smooth muscle cells and sensory neurons.

The technique that best allows identification of ion channels and the investigation of their properties is patch clamping. We combine patch clamping of primary cells and cultured cells with Ca2+ imaging, confocal microscopy and molecular biology techniques.

Funding sources: NHMRC, ARC, Diabetes Australia.

Research projects

- **Role of TRPM2 channels in oxidative damage and drug toxicity in liver:** Oxidative damage and enhanced hepatocellular death are the hallmarks of many liver disorders, including liver damage by paracetamol overdose and ischemia-reperfusion injury. Often in these conditions hepatocellular death is preceded by an increase in intracellular Ca2+ concentration. In this project we will investigate the role of a particular type of Ca2+ channels on the surface of hepatocytes in mediating Ca2+ influx and liver damage produced by paracetamol and ischemia-reperfusion.
- **Molecular mechanisms of store-operated Ca2+ entry:** Store-operated Ca2+ channels play a central role in the functions of all animal cells. They participate in generating the cellular responses to hormones, antigens, growth factors and other physiological stimuli. The aims of this project are to elucidate cellular mechanisms that regulate interaction between the molecular components of store-operated Ca2+ channel, Orai1 and STIM1.

See **http://www.ncbi.nlm.nih.gov/pubmed/?term=rychkov+gy** for further information.

Intestinal Nutrient Sensing Group

Dr Richard Young

Lead Researcher: Dr Richard Young

Contact: +61 8 8128 4845 or richard.young@adelaide.edu.au

Our group studies the mechanisms of nutrient detection and uptake within the upper gut. These are essential processes to maintain control of blood glucose and effective nutrition, but are poorly understood. Defects in these pathways can worsen blood glucose control and lead to undernutrition, impacting on patients with diabetes, obesity and critical illness. Better understanding of this will provide novel therapies. Our translational research group has a strong clinical focus, wide access to patients and disease models, and expertise in anatomical, molecular and functional techniques.

Research projects

- **Why do sweetened drinks link to type 2 diabetes?:** Artificial sweetener intake is increasing in the community, and in high consumers may increase the rate of glucose uptake from the gut, increasing diabetes risk. We have shown that diabetic patients have defective control of gut sensors for glucose (sweet taste receptors) and increased glucose uptake. We have several Honours projects on offer that will assess gut function during diet supplementation with sweeteners (healthy subjects) and therapy (diabetic patients) studies, as well as fundamental studies in mice.
- **Molecular mechanisms of carbohydrate malabsorption in critical illness:** Critically ill patients are often undernourished due to a defect in sensing and transporting glucose from their small intestine, compromising their clinical outcome. We have shown defects in regulation of a novel sweet taste sensor and glucose transporter in critically ill patients and mice. We have 2 Honours projects that will assess new approaches to restore this function.

For further details see: **http://www.adelaide.edu.au/directory/richard.young**

Vagal afferent Research Group

A/Prof Amanda Page

Lead Researcher: A/Prof Amanda Page

Contact: +61 8128 4840 or amanda.page@adelaide.edu.au

Our productive group located at SAHMRI is a leading authority on vagal innervation of the gut and how it relates to major disease states including obesity, gastro-oesophageal reflux disease and functional dyspepsia. this has involved pioneering studies on the phenotypic specialisation and regulation of vagal sensory endings. With a strong clinical focus we use a combination of behavioural, electrophysiological and molecular techniques to understand the role of these afferents in mediating the development of obesity and/or resistance to weight loss and to identify modifiable targets.

It is increasingly appreciated that the stomach plays an important role in appetite regulation. It is targeted in bariatric surgery and gastric vagal electrical stimulation to treat obesity. A greater understanding of vagal afferent sensitivity to gastric stimuli (nutrient or distension) is one of the most promising areas for novel pharmacological approaches to the management of obesity.

Research projects

- **Circadian control of peripheral gastric satiety signals:** The overall aim of this proposal is to determine the circadian control of peripheral vagal afferent satiety signalling and to determine how this relationship changes in relation to nutrient intake and obesity.
- **Interactions between leptin and gastrointestinal vagal afferents under various states of nutrition:** We have shown that the effects of leptin on vagal afferent endings switch from excitatory in lean mice to inhibitory in obese mice. This project will expand upon these findings and determine the mechanisms behind this switch.

For additional details see: **adelaide.edu.au/directory/amanda.page**

Centre of Research Excellence (CRE) in Translating Nutritional Science to Good Health

SAHMRI UA/RAH

Back Row (L-R): Prof Christine Feinle-Bisset, Prof Ian Chapman, Prof Peter Clifton, Prof Michael Horowitz, Prof Chris Rayner, A/Prof Amanda Page, Prof Karen Jones Front Row (L-R): Prof Gary Wittert, A/Prof Jennifer Keogh, Ms Kylie Lange, Dr Tim Murphy, A/Prof Marianne Chapman

Director: Michael Horowitz

Contact: Dr Tim Murphy +61 8 8222 2960 or tim.murphy@adelaide.edu.au

The CRE capitalises on our achievement over the last five years of bringing together overlapping, multidisciplinary research teams, each with an international profile and an established record of sustained NHMRC Project Grant funding, joined by the broad theme of optimising nutrition to maintain health. The Chief Investigators, with backgrounds in endocrinology, gastroenterology, nutritional science, nuclear medicine, psychology, epidemiology and nursing, bring unique technical skills, unparalleled in this country, and a sustained record of productivity in clinical nutritional research, attested to by a high international profile, substantial impact on clinical practice, and the capacity to communicate a healthy nutrition philosophy to the public.

See **adelaide.edu.au/ccre-nutrition** for recent publications and additional details of the Research Group and projects.

Gastrointestinal Function and Appetite Regulation

Prof Christine Feinle-Bisset

Lead Researcher:
Prof Christine Feinle-Bisset

Contact: Prof Christine Feinle-Bisset +61 8 8222 5247 or christine.feinle@adelaide.edu.au

Our research focuses on the evaluation of gastrointestinal (GI) factors, such as GI hormones and GI motility, interactions between nutrients and receptors in the gut wall, in the regulation of appetite and energy intake, and blood glucose control, in humans, using a range of state-of-the-art techniques. We have a particular interest in the role of the macronutrients, fat and protein. While overconsumption of fat leads to weight gain, fat, when administered directly into the small intestine, has effects on GI functions that may contribute to suppression of appetite and energy intake.

We have assessed the role of fat digestion, fatty acid chain length, the role of cholecystokinin, which is released potently by fat, and also the effects of high-fat overfeeding, as well as dietary restriction, and most recently, the relationship between oral fat taste and GI sensitivity to fat and appetite regulation in lean and obese individuals. On the other hand, protein is thought to be the most satiating nutrient and, thus, most effective in bringing about and sustaining weight loss.

Here, our research focuses on the GI effects of different loads of protein, role of protein digestion and specific effects of different amino acids, and how these relate to appetite suppression and blood glucose control.The ultimate aim of our research is to identify nutrients that have the ability to modulate GI function in a way that helps to control appetite and energy intake.

Research projects

Currently we are offering several research projects in the following areas and are happy to discuss details with interested students.

- **Effects of specific amino acids on gut functions and energy intake in humans:** High-protein diets lead to sustained weight loss, due to the superior satiating capacity of protein, and improve blood glucose control. Since specific amino acids may mediate the effects of whole protein, this project will determine the impact of isolated amino acids (aromatic, branched chain, etc.) on gut hormone release, gut motor activity, appetite, energy intake and blood glucose control in healthy humans. We use a wide range of state-of-the-art clinical techniques in our work.
- **Gastrointestinal nutrient sensing and gut hormone release:** This project aims to characterise in detail the luminal mechanisms involved in the secretion of gut hormones from enteroendocrine cells using novel ex-vitro techniques. Tissue samples from different gastrointestinal regions will be mounted in specialized absorption chambers (called Ussing chambers) to study secretory responses to different amino acids (and potentially also other nutrients). A broad range of basic science techniques are involved, including animal work, tissue dissection, ELISA hormone measurements, electrophysiological tissue measurements, etc.

Postprandial Hypotension

Lead Researcher: Prof Karen Jones

Contact: +61 8 8222 5394 or karen.jones@adelaide.edu.au

Postprandial hypotension, defined as a fall in systolic blood pressure greater than 20mmHg, occurring within 2 hours of a meal, is now recognised to be an important clinical problem by predisposing to syncope and falls. Those at greatest risk include older subjects and patients with autonomic dysfunction, the latter most frequently secondary to diabetes mellitus. Postprandial hypotension occurs in 30-40% of nursing home residents and is more common than orthostatic hypotension.

Research projects

We have established that the hypotensive response to meals is triggered by the interaction of nutrients with the small intestine in a load-dependent manner; eg the magnitude of the fall in blood pressure is much greater when intraduodenal glucose is infused at 3 kcal/min compared to 1 kcal/min. Conversely, 'gastric distension' attenuates the fall in blood pressure. Hence, postprandial hypotension is, in the broadest sense, a 'gastrointestinal disorder' and treatment could be directed at facilitating 'gastric distension' and/or reducing 'small intestinal' feedback. Given its high prevalence and significant sequelae, particularly in an ageing population, postprandial hypotension has received inappropriately little attention.

Further studies are required to provide important insights into the pathophysiology of postprandial hypotension, particularly the under-recognised 'gastric' and 'small intestinal mechanisms'. A number of projects would be possible within the general area described.

See **adelaide.edu.au/directory/karen.jones** for recent publications and additional details of the Research Group and projects.

Gastrointestinal function in diabetes mellitus

Lead Researcher: Prof Chris Rayner

Contact: +61 8 8222 2916 or chris.rayner@adelaide.edu.au

Diabetes is increasing in prevalence in the developed world, due to the rise in overweight and obese people. The central role of the gastrointestinal tract in determining blood glucose concentrations after a meal, and the potential for dietary or pharmacological strategies that modify gut function to have a place in first line treatment for diabetes, have frequently been overlooked in the past, but are fundamental to the understanding and management of the disease.

Research projects

Our group has established an international reputation in the area of gastrointestinal function in diabetes. We have a history of supervising higher degree students from a broad variety of clinical and scientific backgrounds.

We have the capacity to measure gastric emptying with scintigraphy, ultrasound or breath tests, gastroduodenal pressure events with manometry, release of small intestinal hormones (eg. GLP-1, GIP, CCK) by in-house assays on plasma samples, gut sensations by validated visual analogue scores, and appetite and food intake by ad libitum buffet meals.

A number of projects would be possible within the general area of gastrointestinal function. These might include evaluation of dietary or drug interventions to control postprandial hyperglycaemia, or physiological studies seeking to understand the basis of disordered gastric or small intestinal function in diabetes.

Nutrition in the elderly

Lead Researchers: Prof Ian Chapman and Dr Stijn Soenen

Contact: +61 8 8313 3638 or stijn.soenen@adelaide.edu.au or ian.chapman@adelaide.edu.au

The majority of Australian healthcare costs are incurred by older people. Both the percentage and absolute number of Australians aged ≥65 years are increasing rapidly. Among older people, obesity and undernutrition have become more common over recent decades. Both conditions are associated with increased morbidity and mortality.

Research projects

- **Undernutrition in residential care:** The project will determine the prevalence of undernutrition in residential care facilities in relation to muscle mass and function, quality of life and morbidity in a cross-sectional and longitudinal study.
- **Ageing and state of nutrition - role of gastrointestinal mechanisms:** The project is a continuation of our studies which have shown that oral, gastric and small intestinal mechanisms are pivotal to the regulation of appetite and energy intake, and that many of these mechanisms are modified substantially by ageing. We have shown that the suppression of energy intake by oral or intraduodenally infused dietary protein is significantly less in healthy older than young adults. These results highlight the need to explore in greater detail the targeted use of protein-rich supplements in malnourished elderly.
- **Effects of ageing on the outcomes of bariatric surgery:** The project will determine the effect of aging on outcomes of bariatric surgery (laparoscopic adjustable gastric banding, vertical banded gastroplasty, gastric bypass, biliopancreatic diversion), one of the most rapidly growing areas of surgery in Australia.

"My PhD project aims to understand genetics and molecular mechanisms of cognitive aging to better predict diagnose and treat age-related cognitive decline. I'm in my second year of PhD in the Psychiatric Neuroscience Centre of the Discipline of Psychiatry. I really enjoy the process of developing and mastering my professional skills using great research facilities available and highly-skilled assistance from lab members. With wise support of my supervisors, I hope to contribute to the field of genetics and molecular biology of cognitive decline in elderly."

Liliana Ciobanu, Student, Discipline of Psychiatry

Adelaide Geriatrics Training and Research with Aged Care (GTRAC) Centre and Aged & Extended Care Services

BHI/TQEH

Dr Jeanine Teo, Dr Solomon Yu, Ms Rosie Bonnin, Mr Mark Porter, His Excellency the Honourable Hieu Van Le AO, Governor of South Australia , Prof Pascale Quester, Mr Richard Hearn, Prof Renuka Visvanathan, Ms Agathe Jagczak , Dr Olga Theou, Dr Neha Mahaja, Ms Lihini Wijeyaratne

Director: Prof Renuka Visvanathan

Contact: + 61 8 8222 6000 or renuka.visvanathan@adelaide.edu.au

This academic geriatrics and gerontology research group is especially interested in translational research that contributes to the improved health and well-being of older people. Areas of research interest for this group include frailty and sarcopenia, falls prevention, dementia care, medication optimization and gerontechnology. This group is also linked to the Centre of Clinical Research Excellence Translating Nutritional Science to Good Health.

Research projects

Currently we are offering several research projects in the following areas and are happy to discuss details with interested students.

> **The AmbiGeM project:** Funded by the NHMRC in 2015, this project aims to investigate the effectiveness of an electronic sensor system to prevent falls in older people in hospitals. The study incorporates a stepped wedge randomized trial with qualitative sub-studies.

Lead researcher: A/Professor Anne Wilson

Contact: +61 0419 030 436 or anne.wilson@flinders.edu.au

A number of research opportunities exist for postgraduate students:

> The acceptability of the intervention to patients, carers and clinicians.

> The usefulness and feasibility of the method based on analyzing the improvements realized by its use.

> The experiences of the users of the technology system.

Patients and carers across study sites will be asked to express their likes and dislikes, their willingness to see the intervention implemented in clinical practice and the effects on their privacy. Additionally, participants will be asked to make suggestion for improvement. Nursing staff will also be asked to log problems that arise directly from the use of the intervention.

Candidates will preferably but not exclusively have a 1st Class Honours, a Masters or an equivalent degree and strong motivation to pursue further research study. Prospective students should have basic knowledge in research methodology. Relevant experience in research and publication is highly desirable.

For further details see: **https://health.adelaide.edu.au/medicine/g-trac/**

Surgical Evaluation Group

BHI/TQEH

Prof Guy Maddern

Lead Researcher: Prof Guy Maddern

Contact: +61 8 8222 6756 or guy.maddern@adelaide.edu.au

We are interested in developing minimally invasive techniques capable of destroying both primary and secondary liver tumours by inserting electrodes into the tumours. A study looking at inoperable colorectal secondary metastatic disease treated by this technique has commenced using new hybrid technology. The evidence behind new surgical technologies and its implementation and introduction into the Australian healthcare system is another focus. New technology is assessed using formal systematic reviews, accelerated reviews and horizon scanning. A further research interest is in the prevention of adhesion formation.

Research projects

- Ablative techniques in tumour treatment
- Health technology assessment in surgery
- Prevention of adhesion formation in abdominal surgery
- Surgical simulation
- Factors in surgical mortality

For further details see: **adelaide.edu.au/directory/guy.maddern**

ENT Surgery

BHI/TQEH

Lead Researcher: Prof PJ Wormald

Contact: +61 8 8222 7158 or peterj.wormald@adelaide.edu.au

The Department of Otolaryngology, Head and Neck Surgery is committed to excellence in ENT research, education and clinical training. The research team currently consists of 9 students (4 PhD, 4 Master of Surgery and 1 Honours degree student), supported by five scientists and clinical staff and is recognized internationally as one of the leading rhinological research institutions in the world. Prof. Wormald was nominated for the 2012 University of Adelaide award for excellence in research supervision.

Research projects

Research in our department is focused on understanding the pathogenesis of chronic rhinosinusitis (CRS), using a multidisciplinary approach, aimed at identifying new diagnostic/prognostic markers and treatment strategies to the benefit of our patients. Despite extensive research in the bacteriological and immunological aspects of CRS, the pathogenetic basis of CRS remains poorly understood. Several of our research projects are aimed at understanding molecular, cellular, microbiological and immunological aspects of CRS using patient samples and applying techniques of molecular/cell biology and flow cytometry. Other projects involve testing the safety and efficacy of novel compounds in vitro and in an animal model of CRS, developed by the department.

Specific projects for the year 2016 include:

- Safety and efficacy of novel anti-bacterial compounds in vitro and in vivo
- The effect of bacterial toxins on mucociliary function
- Human clinical trial using Chitodex gel as a drug carrier

The Centre for Clinical and Experimental Transplantation (CCET)

UA/RAH

Prof Toby Coates

Director: Prof Toby Coates

Contact: +61 8 8222 0900 or toby.coates@health.sa.gov.au

The CCET (ccet.org.au) is a research centre that brings together a wide variety of expertise in transplantation, cellular therapies, kidney disease and immunobiology. We have a number of research areas for summer projects, honours and PhD students, and offer funding opportunities.

Research projects

- Clinical islet and kidney transplantation
- Clinical epidemiology (ANZDATA registry)
- Modulation of alloresponse with cellular therapies (dendritic cells, mesenchymal stem cells and regulatory T cells)
- Post-transplant immune monitoring (cellular / solid phase alloresponse assays)
- Pregnancy immunology and pre-eclampsia
- Vasculitis and glomerulonephritis.
- Materials Science and Nanoparticles in Transplantation
- Pig Stem Cell to Beta-cell

We have a commitment to supporting students and providing a stimulating environment with national and international collaborations. See adelaide.edu.au/directory/patrick.coates for recent publications and additional details of the research group and projects.

Dr Robert Carroll

Senior Researcher: Dr Robert Carroll

Contact: +61 8 8222 0900 or robert.carroll@health.sa.gov.au

Dr Carroll runs two clinical trials utilising immune monitoring techniques to prevent complications of immunosuppression in paediatric and adult renal transplant patients.

Research Projects

Dr Carroll has positions for PhD and Honours Students wishing to be involved in translational clinical research projects of immune monitoring studies. Students will learn a variety of techniques (including FACS, ELISA, ELISPOT) that will be applicable to post doctoral positions and also to laboratories involved in transplant organ matching programmes. These projects involve close collaboration with clinicians, basic scientists and members of the Australia Red Cross Blood Service and also international collaborators, Prof Dragun, Charite Hospital, Berlin and Prof Peter Heeger, National Institute of Health, USA.

For further information see **http://www.ccet.org.au or http://www.adelaide.edu.au/directory/robert.carroll**

Obstetric Nephrology and Pregnancy Immunology Group

Lead Researcher: Dr Shilpa Jesudason

Contact: +61 8222 0900 or shilpa.jesudason@health.sa.gov.au

We offer a broad array of clinical research projects exploring renal disease in pregnancy, pregnancy immunology, and parenthood outcomes for women and men with all stages of chronic kidney disease (including dialysis or a kidney transplant recipients). Dr Jesudason has established South Australia's only tertiary-referral Obstetric Nephrology Clinical Service based in the Maternal-fetal Medicine Unit at the Women's and Children's Hospital, and offers summer student, Honours and PhD opportunities.

Research projects

Projects include studies of parenthood outcomes from the Australian and New Zealand Dialysis and Transplant Registry; qualitative studies exploring patient and clinician perspectives on pregnancy-related issues; prospective cohort studies and population studies using linked datasets, evaluating risk factors for adverse pregnancy outcomes in this high-risk cohort. Our laboratory projects explore the immune phenotype of normal pregnancy and pre-eclampsia, defining changes in naturally-occurring mechanisms of maternal-fetal tolerance, using novel technologies for evaluating immune responses.

For further details see **ccet.org.au**

Mucosal Immunology Group

Lead Researchers: Dr Harshita Pant, A/Prof Michele Grimbaldeston, Prof Toby Coates and Prof Angel Lopez

Contacts: +61 8 8222 5566 or harshita.pant@adelaide.edu.au

Our research team from ENT Surgery (Dr Pant), Centre for Clinical and Experimental Transplantation (Prof Coates) and Centre for Cancer Biology (Prof Lopez, A/Prof Grimbaldeston) bring a unique set of skills aimed at improving the diagnosis and treatment of patients with recalcitrant mucosal inflammation (chronic rhinosinusitis with nasal polyps (CRSwNP), allergic rhinitis, eosinophilic oesophagitis) and mucosal oropharyngeal squamous cell carcinoma (OSCC). Our internationally recognised research group is equipped with state-of-the-art technology and we are committed to providing a stimulating and supporting environment for our students. We have research opportunities for summer projects, honours, MS and PhD candidates.

Research Projects

- **Mucosal inflammation:** CRSwNP is a complex disease with features of altered mucosal immune regulation, microbial diversity (dysbiosis) and, localised allergic phenotype. Systemic allergy is often absent in CRSwNP yet the mucosa contains abundant eosinophils, mast cells, IgE and cytokines (GMCSF, IL-3, IL-5 and IL-9). Recalcitrant CRSwNP is poorly understood and treatment limited to repetitive antibiotics, corticosteroids and surgeries. Our focus is to determine the role of resident microflora in disease causation, identify prognostic biomarkers and novel therapies that provide long-term disease control. We have recently developed new tools and means to modulate allergic inflammation in vitro, which will be assessed in vivo models of disease.

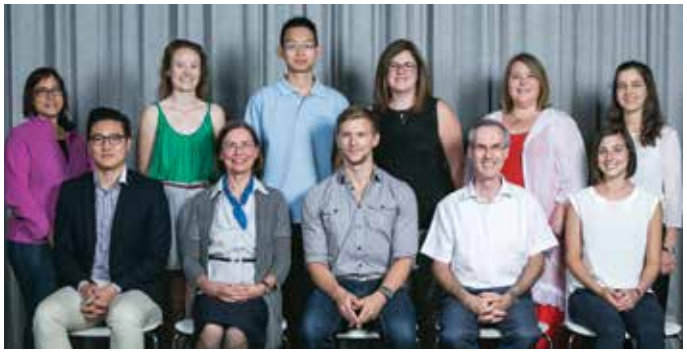
- **Mucosal SCC:** Tonsil and tongue-base comprise >90% of oropharyngeal SCC (OSCC). Despite standardised treatments, survival is poor and traditional prognostic indicators have been unreliable predictors of outcomes. HPV-associated OSCC is prevalent in young adults but has a better prognosis that may be linked to its unique mucosal immunopathology. Our focus is to investigate the role of T cells in tumour progression with the potential of manipulating host immune cells to enhance disease-free survival in both forms of OSCC.

Specific Research Projects include:

- Regulating nasal polyp growth with novel therapeutics in the presence of Staphylococcus aureus superantigens in an in vivo disease model.
- Modulating CRSwNP regulatory T cell (Treg) function using drug-based, probiotic-based and cell-based therapies in vitro and in an in vivo disease model.
- Characterisation of molecular and immunologic profiles of T cell populations in HPV and non-HPV associated OSCC.

Stroke Research Programme (SRP)

BHI/TQEH



Students and staff from the Stroke Research Programme

Lead Researcher: Prof Simon Koblar

Contact: A/Prof Anne Hamilton-Bruce +61 8 8222 6411 or anne.hamilton-bruce@health.sa.gov.au
Dr Karlea Kremer +61 8 8128 4546 karlea.kremer@adelaide.edu.au
Dr Xenia Kaidonis +61 8 8128 4543 xenia.kaidonis@adelaide.edu.au

The SRP is a collaborative between The Queen Elizabeth Hospital (TQEH) and the University of Adelaide via the Schools of Medicine, Medical Science and Molecular and Biomedical Science.

The SRP is located at the South Australian Health and Medical Research Institute (SAHMRI) and The Basil Hetzel Institute (BHI) of TQEH. We also participate in the Australian Stroke Genetics Collaboration, a multi-centre study into the genetic causes of stroke.

The SRP has trained 22 PhD, 3 Masters and 26 Honours students, and four Neurologists with clinical and/or scientific interests in Stroke medicine. Honours projects often lead to opportunities for a future PhD.

Research Projects:

- **Neuroplasticity in Stroke:** Characterising post-stroke cortical plasticity to identify critical windows for rehabilitation after brain injury. We are part of a multi-institutional research project on neuroplasticity in stroke that has been awarded NHMRC funding worth $735,660 over four years (2014-2017). The project will enrol patients from the Stroke Units at both the Royal Adelaide Hospital (RAH) and The Queen Elizabeth Hospital (TQEH).
- **Dental Pulp Stem Cell (DPSC) Therapy for Stroke:** Our research investigates brain repair following ischaemic stroke using adult human stem cells from teeth (DPSC). We have published that DPSC have therapeutic potential, however, it remains unknown how these stem cells mediate improvement following stroke, and the best treatment paradigm for DPSC administration. We link with Professor James Fawcett, Cambridge Centre for Brain Repair, University of Cambridge, on this project.
- **Transient Ischemic Attack (TIA) Intervention:** Our group seeks improved diagnosis of TIA to help prevent stroke. We have completed a pilot study that found potential biomarkers specific for TIA and wish to confirm this study.
- **Animal Assisted Therapy (AAT) for Stroke Victims:** We will examine saliva of both patients and animals for soluble markers for objective assessment of therapy with pets. We link in this collaboration with Dr Susan Hazel, Lecturer in Animal Science, Roseworthy Campus, University of Adelaide.
- **The Proposed TOOTH (The Open study Of dental pulp stem cells (DPSC) Therapy in Humans) Stroke Clinical Trial:** We intend to investigate the safety, feasibility and parameters of efficacy of autologous human adult stem cell therapy in participants with chronic stable disability. TOOTH will provide the first-in-human evidence of the potential of human DPSC as an active biological therapy. It will utilise autologous DPSC, an adult human neural-type stem cell. We have already published a series of studies that demonstrate DPSC differentiate into functional neurons, interact with the host nervous system to induce neural plasticity, and enhance neurological recovery following intracerebral injection into a rodent stroke brain. We anticipate that autologous DPSC will enhance neurological recovery in humans with chronic stroke, as an adjunctive therapy with rehabilitation.

See **adelaide.edu.au/srp/** for other projects, recent publications and details about our Research Group.

Rheumatology Research Group

Maureen Rischmueller

Catherine Hill

Lead Researchers: A/Prof Maureen Rischmueller; A/Prof Catherine Hill

Contacts: +61 8 8222 6688 or maureen.rischmueller@health.sa.gov.au

The Rheumatology Department's research focus is the causation and complications of rheumatic diseases. The research encompasses immunogenetics, pathogenesis and epidemiology. Dr Maureen Rischmueller's research focus is the genetics of systemic autoimmune diseases (such as rheumatoid arthritis, Sjögren's syndrome) and autoantibody-mediated inflammatory and pathogenic disease mechanisms.

Associate Professor Catherine Hill's research focus is population studies of health literacy, and musculoskeletal disorders, treatment of osteoarthritis, and the epidemiology and genetics of Giant Cell Arteritis. Dr Samuel Whittle's research focus is fibromyalgia and chronic musculoskeletal pain with reference to inflammatory and epigenetic mechanisms.

Research Projects:

> **Molecular Subsetting of Interferon Pathways in primary Sjögren's syndrome (pSS):** pSS is an autoimmune disorder in which the type I interferon (IFN) system is upregulated. The aim of the project is to recruit pSS patients and characterise the IFN response in relation to anti-nuclear autoantibodies and clinical symptoms.

> **Impact of gout in a population cohort (NWAHS):** Gout and hyperuricaemia are increasing in Western society. This study, utilising data from the North West Adelaide Health Study, will be the first Australian study to determine the effect of self-reported gout and elevated serum uric acid on health-related quality of life, medicines and health service use.

> **Measuring the patient's perceptions of glucocorticoid therapy:** Glucocorticoid therapy is used commonly in rheumatological and other diseases, however, adverse effects are common. The research objective is to develop a validated questionnaire that measures adverse events of glucocorticoid therapy from the patient's perspective.

Clinical Autoimmunity and Inflammation Research Group

A/Prof Susanna Proudman

Lead Researchers: A/Prof Susanna Proudman, A/Prof Vidya Limaye, Dr Pravin Hissaria (Human Immunology, Pathology SA)

Contacts: +61 8 8222 5190 or susanna.propudman@health.sa.gov.au

The Clinical Autoimmunity and Inflammation Research Group undertakes research into the aetiology and outcomes of autoimmune diseases through the study of well-characterised patient cohorts. Studies of biological samples paired with clinical data, aim to discover and validate novel biomarkers of disease. Laboratory-based studies in inflammatory mediators which have translated into clinical studies of inexpensive and well-tolerated anti-inflammatory therapies such as fish oil and vitamin D.

A/Prof Proudman's research focuses on recent onset rheumatoid arthritis and systemic sclerosis, with Dr Hissaria. A/Prof Limaye's research focus is inflammatory muscle disease with an emphasis on autoantibodies.

Research Projects

> **Recent onset rheumatoid arthritis:**
  - Examination of the clinical and biochemical effects of fish oil in patients with rheumatoid arthritis.
  - Models for predicting outcomes of treat-to-target therapy including pharmacogenetics.
  - Association with periodontal disease

> **Systemic sclerosis**
  - Studies of complications such as calcinosis and gastrointestinal disease.
  - Collaborative studies looking at the cellular mechanisms of fibrosis and vasculopathy, which are the principal pathophysiologic mechanisms responsible for disease manifestations such as pulmonary arterial hypertension.

> **Inflammatory muscle disease**
  - Studies of the epidemiology, clinical, serological, and genetic features of inflammatory muscle disease

TQEH Department of Intensive Care Medicine Research

BHI/TQEH

A/Prof Sandra Peake

Lead Researcher: A/Prof Sandra Peake

Contact: +61 8 8222 6463 or sandra.peake@sa.gov.au

Research focuses on:

- Improving patient safety and outcomes
- Answering pragmatic, relevant clinical questions that are of importance to the clinicians who provide patient care
- Advancements in the delivery of more efficient and effective treatments in the ICU that will not only benefit patients but also decrease costs, preserve resources and increase access to scarce critical care beds
- Statistical analysis of short and long-term outcomes relating to Intensive Care

Research activities conducted within the department are a combination of:

- Investigator-initiated studies, including those by advanced trainees as part of the course requirements of the College of Intensive Care Medicine, and intensive care nurses
- Investigator-initiated studies conducted under the auspices of the Australian and New Zealand Intensive Care Society Clinical Trials Group
- Industry-sponsored clinical trials

The areas of research available for projects include: sepsis studies, observational surveys, patient safety, nutrition studies. outcome studies, statistical method reviews and pharmacokinetic studies.

The Health Observatory

SAHMRI BHI/TQEH

Director: Prof Robert Adams

Contacts: +61 8 8222 6740 or robert.adams@adelaide.edu.au

We conduct population and clinical research studies and examine health services to identify opportunities that lead to more effective health care and management.

The aim of this research is to maximise health outcomes.

Current areas of research:

- **Sleep medicine:** examines health outcomes, links to other diseases and ways to improve service delivery
- **Simulation modelling and systems design:** used to predict the implications of making significant changes to the existing healthcare system, such as with Transforming Health. A simple example created by one of our partners can be seen at: http://youtu.be/P45WgRlc2sI
- **Musculo-skeletal medicine:** a wide range of observational and clinical intervention studies in gout, giant cell arteritis and osteoarthritis

For further details see: **http://www.thehealthobservatory.org.au/**

Musculoskeletal Research Group

BHI/TQEH SAHMRI UA/RAH

Lead Researchers: A/Prof Catherine Hill; Dr Tiffany Gill

Contacts: +61 8 8222 6688, catherine.hill@health.sa.gov.au or tiffany.gill@adelaide.edu.au

In collaboration with The Health Observatory (THO) and the Rheumatology Unit at The Queen Elizabeth Hospital, this group undertakes epidemiological and cohort investigations of musculoskeletal diseases with special interest in musculoskeletal pain, osteoarthritis, health literacy and giant cell arteritis (GCA).

Research Projects

- **Analysis of musculoskeletal data from North West Adelaide Health Study (NWAHS):** This established cohort study of 4000 individuals conducted over a 10 year period has collected musculoskeletal data on 2 occasions. Compared to existing Australian cohort studies, this detailed data on location and duration of musculoskeletal pain is unique to the NWAHS. Possible projects include the interaction between exercise, lifestyle factors, health literacy and other biomedical markers with the presence of risk factors for musculoskeletal disease.
- **South Australian Giant Cell Arteritis (GCA) Registry:** This project collects data on the incidence, clinical features and risk factors for GCA in SA. It is a statewide initiative and the first GCA registry in Australia. GCA is the commonest form of vasculitis in the elderly and untreated can result in blindness and stroke. This project aims to provide new insights into clinical features, genetic and risk factors with the aim of finding new therapeutic interventions.

For further details see: **http://www.adelaide.edu.au/directory/tiffany.gill**

Clinical Practice Unit

BHI/TQEH

Researchers from Respiratory Medicine and the Clinical Practice Unit

Lead Researcher: Prof Brian Smith

Contact: +61 8222 6531 or Brian.Smith@health.sa.gov.au

Building a quality research track record is an essential component for any early career researcher, and this award-winning multi-disciplinary unit facilitates these opportunities. The unit offers potential Honours, Masters and PhD student's support but also flexibility to pursue areas of interest within the scope of evidence based medicine, epidemiology and respiratory health. We currently have over 50 projects underway for health priority areas including Indigenous health, COPD, asthma and tobacco using novel medical procedures and devices and innovative use of electronic resources including apps such as augmented reality.

Research can take on a number of forms including hospital based randomised placebo controlled trials, retrospective evaluations and qualitative research, all with the potential to make practical real-world impact, attract high impact publications, conference presentations, media attention, grants, fellowships and prestigious awards.

Research Projects

- **Valve study:** Investigation of a new mechanism for high risk patients undergoing bronchoscopy using minimal invasive lung volume reduction procedures. This is a first of its kind study in South Australia with the aim of improving treatment safety, quality of life and reducing treatment failure.
- **Indigenous studies:** Investigating multiple areas of research including smoking, depression and asthma in Aboriginal, TSI and low socio-economic populations.
- **Interactive studies:** Evaluation of an interactive patient-held guideline incorporating apps for COPD to improve disease management, quality of life and reduce hospital utilisation.

See **Science Direct** for recent publications and additional details

Rural Health

UA/RAH

Lead Researcher: Prof Jonathan Newbury

Contacts: A/Prof David Mills pdavid.mills@adelaide.edu.au
Prof Jonathan Newbury jonathan.newbury@adelaide.edu.au
Dr Gillian Laven gillian.laven@adelaide.edu.au and
Dr Elena Rudnik elena.rudnik@adelaide.edu.au

Rural medical education at the University of Adelaide provides medical students with an excellent integrated learning experience. Rural Health provides blended learning experiences where students follow patients from the community (primary care) through specialist and hospital care and back into the community clinical environment. Research opportunities within the Discipline of Rural Health can include a wide range of areas.

Potential research topics include: rural clinical practice; rural public health interventions; Aboriginal and Indigenous health and health service provision; chronic disease management; policy and planning; medical education and workforce; recruitment of rural background students; Global Health; stroke; rural paediatrics and geriatrics and interprofessional learning.

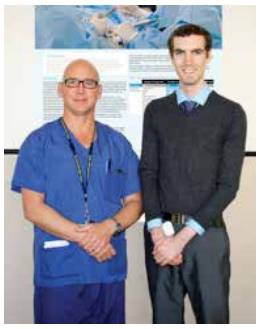
Research Projects

- **Professor Newbury:** Aboriginal health and service provision, stroke prevention, breast feeding, mental health and is keen to hear of student's own ideas!
- **A/Prof David Mills:** chronic disease management; Indigenous health and medical education
- **Dr Gillian Laven:** rural clinical supervisors and teachers research interest and capacity; medical education; selection of students; Global Health; rural public health interventions.
- **Dr Elena Rudnik:** Docs in School program; personality profiles of health profession students who participate in rural clinical placements; mental health service models for rural communities; interprofessional collaboration of rural health practitioners and interprofessional education and learning in a rural setting.

See **Discipline of Rural Health staff Home Pages** for publications and additional details of the research group interests and projects.

Perioperative Model of Care

UA/RAH



Prof. Guy Ludbrook and Dr Richard Seglenieks, a former Honours student

Lead Researcher: Prof Guy Ludbrook

Contact: +61 8 8222 5422 or guy.ludbrook@adelaide.edu.au

For elective surgery, there are the dual challenges of older and sicker patients requiring surgery and resource limitations. To continue to deliver high quality care to these patients requires significant changes to heath care delivery, based around robust processes of patient triage and streaming to the care pathways best matched to patients' individual needs. These include (i) call centre-based computer-assisted self-assessment, (ii) centralized collection and (iii) assimilation of patient data, and referral to centres with capacity (staff, services and infrastructure) best meeting a patient's needs. The group will continue to collect data through studies involving hospitals and clinical trials.

Research Projects

> **A perioperative model of care and preoperative predictors of postoperative adverse effects:** novel approaches to preoperative assessment and management before elective surgery are warranted to ensure that a sustainable high quality service is provided to patients. This requires significant changes to heath care delivery. It is proposed that a new Model of Care is needed, based around robust processes of patient triage and streaming to the care pathways best matched to patients' individual needs.

An electronic information system underpins this Model, providing the tools for communication, and data collection, analysis and storage, necessary to provide a high quality yet efficient service. Each step in the Model is formally studied, providing data on quality and cost to allow an evaluation of the overall value. Computer algorithms are starting to generate evidence- and consensus-based decision support tools to guide clinical decision making. Further studies are indicated to assess the quality of information gathered and its utility as part of a model of preoperative care.

For further details see: **health.adelaide.edu.au/acm/**

Population Research and Outcome Studies

SAHMRI

Population Research and Outcome Studies (PROS) provides high quality population health information to improve the health and wellbeing outcomes of the South Australian population. The core business of PROS is the monitoring and surveillance of population health and chronic disease epidemiology. In collaboration with The Health Observatory (THO) and the Rheumatology Unit at The Queen Elizabeth Hospital, epidemiological and cohort investigations of musculoskeletal diseases are undertaken.

Musculoskeletal Epidemiology Research Group

Lead researcher: Dr Tiffany Gill

Contact: +61 8 8313 1206 or tiffany.gill@adelaide.edu.au

Research Projects:

> **Medication use among those with musculoskeletal pain:** The project will use data from the North West Adelaide Health Study, a population based cohort study in South Australia.

> **Associations between dietary intake and musculoskeletal pain:** The project will use data from the North West Adelaide Health Study, a population based cohort study in South Australia.

For further information see: **http://www.adelaide.edu.au/directory/tiffany.gill**

Nutritional Epidemiology

Lead Researcher: Dr Zumin Shi

Contact: +61 8 8313 1188 or zumin.shi@adelaide.edu.au

Research Projects:

> **Dietary patterns (methods beyond factor analysis) and chronic diseases among adults:** The project will use data from two population based cohort studies from Australia (North West Adelaide Health Study) and China (Jiangsu Nutrition Study).

> **Dietary intake (at food, nutrient, and dietary patterns levels), nutritional status and 10-year mortality:** This project will use data from a population based cohort study in China. Detailed information on dietary intake was collected at baseline.

> **Parental nutritional status and health outcomes of school aged students (year 1 to year 12) in China:** The study collected nutrition related information on 7000 children and their parents in a city. Information on sleep habits of the students is also available.

For further information see: **http://www.adelaide.edu.au/directory/zumin.shi**

Freemasons Foundation Centre for Men's Health

BHI/TQEH SAHMRI UA/RAH

Director: Prof Gary Wittert

Contact: +61 8 8313 0514 or menshealth@adelaide.edu.au

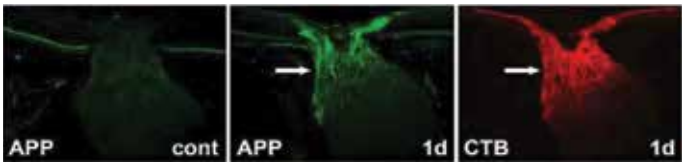
The Freemasons Foundation Centre for Men's Health supports a transdisciplinary research program that focusses primarily on the common and interrelated chronic conditions that constitute the bulk of the disease burden in men and have the most significant effects on well-being and quality-of-life.

The Centre supports basic and applied science, public health and clinical research conducted at SAHMRI, QEH/Basil Hetzel, RAH/ Hanson Institute, and collaborating organisations in a range of areas. These research programs not only targeted the most pressing issues in men's health but also concurrently address many of the National Health Priority Areas of cardiovascular disease, diabetes, mental health/ depression, and obesity. Sudents are offered a contemporary and well supported higher degree experience and work with teams of world-class scientists, clinicians, and educators.

For further details see: **www.adelaide.edu.au/menshealth**

Ophthalmic Research Laboratory

UA/RAH



Accumulation of markers of axonal transport: amyloid precursor protein (APP) and cholera toxin B (CTB) in glaucomatous optic nerve head.

Lead Researcher: Prof. Robert Casson

Contact: +61 8 8222 2729 or robert.casson@adelaide.edu.au

The Ophthalmic Research Laboratory is co-located in the Centre for Neurological Disease Research within the Hanson Institute. We conduct world-leading basic retinal cell biology and visual science research with a special focus on clinical translation.

Research Projects:

- **Retinal Energy Metabolism:** This research focuses on understanding retinal energy metabolism and manipulating it to clinical advantage. We have a highly innovative research programme that has already delivered "proof-of-principle" clinical translation. In a first-to-man, double blind randomized trial, we recently demonstrated that ocular glucose delivery temporarily recovered contrast sensitivity and visual acuity in patients with severe primary open-angle glaucoma.(Casson et al., 2014)
- **Axonal Transport in Glaucoma**
- **Early Molecular Pathology in Glaucoma:** In a NHMRC-funded project we investigated and subsequently proved that early phosphorylation of tau also occurred in ocular tissue in our experimental model of glaucoma. Furthermore, in parallel studies we proved that axonal transport dysfunction actually represents one of the earliest molecular events in the retinopathy associated with our model. (Chidlow et al., 2011)

For further information see **https://health.adelaide.edu.au/ophthalmology/research/glaucoma_oct2014.html**

Psychiatric Neuroscience Centre

UA/RAH

Prof Bernhard Baune

Director: Prof Bernhard Baune

Contact: +61 8 8222 5141 or bernhard.baune@adelaide.edu.au

Research within the Psychiatric Neuroscience Centre in the Discipline of Psychiatry is directed into a branch of animal research and human research. Both streams use a variety of technical platforms (e.g. Imaging, genetics, -omics, animal models, genetic engineering, cell technologies) in order to study the neurobiology of psychiatric disorders and the mechanisms underlying treatments and interventions. Currently, the main research groups supporting this research centre are in the areas of basic neuroscience, behavioural animal modelling, genetic engineering of mouse models, gene-environmental studies, human genetics and –omics, neuroimmunology, neuroregeneration, neural plasticity and neural repair.

Research groups offering specific projects for potential higher degree research students within this centre includes Psychiatric Neuroscience, Neuroimmunology, Neuroregenration, Neural plasticity and Neural Repair ad Psychiatric 'omics research.

For further details: **http://health.adelaide.edu.au/psychiatry/research_centres/psychiatric_neuros**

Neuroimmunology Research Group

Lead Researchers: Dr Catharine Jawahar, Dr Catherine Toben, Prof Bernhard Baune.

Contact: +61 8 8222 5141 or catharine.jawahar@adelaide.edu.au

The aim of the Neuroimmunology Research Group is to investigate the role of the immune system in the brain ranging from normal brain function to specific Neuropsychiatric Disorders such as Cognitive Decline, Depression and Anxiety. Currently, the research focus is on the molecular effects of cytokines on the hippocampus, the prefrontal cortex and glia cells under physiological and immune- challenged conditions. Ultimately, the work aims at developing immune-modifying treatments beneficial for common Psychiatric Disorders such as Cognitive Decline and some forms of Depression.

Research Projects:

- **The role of cytokines and its receptors in cogntive fucntion and mood:** This project utlises various genetically modified mice to uncover immunological mecahnisms in the brain.
- **Early life stress (ELS), immune function and neurobiology in mental illness:** Immune system is increasingly implicated in mediating long-term effect of ELS on adult mental health. This project aims to understand the immune mechansims involved in the biological embedding of ELS and its effect on behaviour of the individual
- **Immune-modulating interventions with effects on Neuropsychiatric disorders:** Investigate effects of clinical interventions of immune-modifying agents that benefit cognitive, emotional and behavioural function in psychiatric disorders.

For further details: **http://health.adelaide.edu.au/psychiatry/research/neuroimmunology_rg/**

Neuroregeneration, Neural plasticity and Neural Repair Research Group

Lead Researchers: Dr Catherine Toben, Prof Bernhard Baune

Contacts: +61 8 8222 515, catherine.toben@adelaide.edu.au or bernhard.baune@adelaide.edu.au

The study of natural mechanisms of neuroprotection, agents used as neuroprotectives and therapeutic neuroprotection is an emerging area of study for their role in either preventing or supporting recovery processes of psychiatric illnesses. The aim of this research group is to identify specific agents and mechanisms relevant to neuroplasticity, neurorepair and neuroprotection with specific relevance to cognitive processes such as learning and memory, attention as well as emotional processes relevant to neuropsychiatric disorders.

Research Projects

- **Study neuroprotective agents in mouse models:** Identify and investigate the effects of neuroprotective agents in animal models of neuroinflammation with hypothesised positive effects on cognitive and emotioanl phenotypes.
- **The role of T cells in Depression:** Recent evidence has pointed towards T cells having an active role in the process mediating clincial depression. In this project we utilise chronic mild stress mouse models to mimic depressive like behaviour and thereby enable more defined roles of T cells to be determined.

For further details see: **http://health.adelaide.edu.au/psychiatry/research/neuroprotection_rg/**

"I am grateful to have the chance to start my PhD studies in The Discipline of Psychiatry. I have always had a strong interest in the pathobiology of psychiatric disorders. Being in the discipline allows me to learn about both the clinical and research perspectives of those disorders. The head of the discipline, Prof. Bernhard Baune and the other supporting team members have provided many opportunities and experiences which will continuously prepare me for my future professional career in the medical research field."

Franky Chun-Ho So, Student, Discipline of Psychiatry

Psychiatric Neuroscience Research Group

Lead Researchers: Prof Bernhard Baune, Dr Catharine Jawahar, Dr David Stacey

Contacts: +61 8 8222 5141, bernhard.baune@adelaide.edu.au or catharine.jawahar@adelaide.edu.au

The Psychiatric Neuroscience Research Group combines the search for psychiatric disease genes with basic studies of the nervous system. Research focuses on the genetics and neurobiology of psychiatric disorders with an emphasis on the biology of cognitive and emotional processes. Overall aim of the group is to identify candidate genes of psychiatric disorders and more subtle phenotypes, to study the functions of these genes in pharmacological studies in relation to psychiatrically relevant phenotypes of cognition, emotion and behaviour as well as the study of the mechanisms that underlying gene-environment interactions.

Research Projects:

- **Animal models of psychiatric disorders:** Using a number of validated behavioural tests we assess for behavioural dysfunctions (mood and cognition-like) and effects of different pharmacological agents in inbred and genetically modified mouse strains of neuroimmunological interest.
- **Genetics / Epigenetics / gene-expression analyses in psychiatric disorders:** Individual differences in susceptibility to psychiatric disorders and response to treatments have a genetic contribution. The aim of this project is identify and analyse the various gene polymorphisms that are associated with development or treatment of psychiatric disorders
- **Post-mortem studies:** Identification of genetic and gene expression differences between healthy individuals and people with psychiatric disorders using Laser-capture microdissection of specific group of cells from post-mortem brain tissues.

For further details see: **http://health.adelaide.edu.au/psychiatry/research/psychiatric_neuroscience_rg/**

Psychiatric 'omics Research Group

Lead Researchers: Dr Cohen-Woods, Dr Stacey, Dr Schubert and Prof Baune

Contacts: +61 8 8222 5153, sarah.cohen-woods@adelaide.edu.au or david.stacey@adelaide.edu.au

Findings from genome-wide association studies (GWAS) indicate the heritable component of psychiatric disease is comprised of genetic variation influencing gene-expression levels. There is a pressing need to integrate transcriptomic and epigenomic data with GWAS data in order to provide more comprehensive understanding of the aetiology of psychiatric disease. Further, to understand the molecular mechanisms underlying psychiatric disease, genomic, epigenomic, and transcriptomic effects on the proteome and vice-versa, and how they influence psychiatric phenotypes requires investigation.

Research Projects:

- **Defining the role of inflammation in depression during ageing:** Transcriptomic and genomic data integrated to predict inflammation (proteins) to define an inflammatory predictive model in geriatric depression.
- Identification of transcriptomic alterations in major depressive disorder (MDD) cases exhibiting peripheral inflammation using next generation RNA sequencing technology.
- **Lithium treatment response in bipolar disorder:** Functional characterisation of a genome-wide association study and a systems biology analysis using next generation RNA sequence data.
- Epigenetic mechanisms of brain dysfunction in psychotic and mood disorders.
- **The Longitudinal Lifestyle of Our Kids Study:** Longitudinal study collecting genetic and epigenetic data in conjunction with psychological and physiological data investigating the role of physical activity in the primary years.

Clinical Psychiatry Research Centre

UA/RAH

(also at The Queen Elizabeth Hospital and the Lyell McEwin Hospital)

Director: Prof Bernhard Baune

Contact: +61 8 8222 5141 or bernhard.baune@adelaide.edu.au

Clinical research is pivotal to improving the mental and physical health of patients with severe mental illness. To enhance clinical research in Psychiatry, the Discipline of Psychiatry at the University of Adelaide has established a Clinical Psychiatry Research Centre. Psychiatry research within this Clinical Centre is conducted across the teaching hospitals of the University of Adelaide.

The purpose of the Centre is primarily to provide high quality clinically relevant assessments and to conduct clinical studies in patients with severe mental illness. The Centre enhances clinical collaborations between clinical academics and clinicians in order to address clinically important questions and to conduct research in clinical environments.

Research groups within the clinical centre providing specific projects for potential high degree research students include Neuropsychology, Psychiatricand Medical Comorbidity, Neurostimulation, Midfulness and Psychosis.

For further details see: **http://health.adelaide.edu.au/psychiatry/research_centres/clinical_psychiatry/**

Cognition and Functioning in Psychiatry Research Group

Dr Oliver Schubert, Clinical Academic and Senior Lecturer, Discipline of Psychiatry

Lead Researchers: Prof Bernhard Baune, Ms Tracy Air, Dr Oliver Schubert, Dr Scott Clark

Contacts: +61 8 8222 5141, bernhard.baune@adelaide.edu.au or tracy.air@adelaide.edu.au

This research group investigates neuropsychological factors that influence the practical capacity of individuals with psychiatric disorders such as depression, anxiety or psychosis to function and perform on a daily basis. The research group undertakes projects that explore cognitive function, emotion and behaviour in psychiatric disorders with or without medical comorbidity. Another major focus of the group is the study of psychiatric interventions on neuropsychological measures of cognition and mood.

Research Projects:

- **The Cognitive Function and Mood Study (CoFaMS):** Investigate effects of depression and anxiety on a person's mental status and capacity by analysing psychological, and functional genetic differences in a healthy cohort and those suffering from mood and anxiety disorders.
- **Cognitive and Functional Assessment of Psychosis Staging Study (CoFAPSS):** In current clinical practice it is impossible to predict individual course of psychotic illness or treatment response. This longitudinal study assesses patients at different stages of psychotic illness to develop accurate biomarkers of risk profile, transition between disease stages and potential for functional recovery.
- **Cognition and Functioning in Depression with Peripartum Onset (PPD) Study:** This longitudinal study investigates the relationship between cognition, functioning, and parenting ability in mothers with PPD. Results will inform the personalization of cognitive interventions to improve PPD outcomes.

For further details see: **http://health.adelaide.edu.au/psychiatry/research/neuropsychology_rg/**

Mindfulness Research Group

Lead Researcher: Dr Maura Kenny

Contact: Maura.Kenny@health.sa.gov.au

Due to new research findings in the field of treatment and relapse prevention of depression, anxiety, stress and emotional dysregulation, attention has turned to working with meta-cognitive psychological processes rather than working with the content of thinking. This has led to the development of therapies such as Mindfulness-based Stress Reduction, Mindfulness-based Cognitive Therapy, Acceptance and Commitment Therapy and Dialectical Behaviour Therapy. These are also known as Mindfulness-based Interventions (MBIs) and all share an emphasis on mindfulness meditation practice to varying degrees.

Research Projects:

- MBIs in workplace stress, depression, anxiety, chronic psychosis and chronic pain
- Mediators of Mindfulness-based Interventions (MBIs) effects
- MBI's Effects on Biomarkers (eg heart rate variability, PNS tone)
- MBIs in Educational Settings

For further details see: **http://health.adelaide.edu.au/psychiatry/research/mindfulness_rg/**

Psychiatric and Medical Comorbidities Research Group

Lead Researchers: Dr Oliver Schubert, Prof Bernhard Baune

Contacts: +61 8 8222 5141, oliver.schubert@adelaide.edu.au or bernhard.baune@adelaide.edu.au

The Psychiatric and Medical Co-morbidity Research Group is built around the idea that physical and brain processes are interrelated in a bidirectional way. For example, heart disease is more frequently associated with depression and vice versa. Moreover, individuals with psychiatric disorders have a 25-30 years decreased life-expectancy than the general population due to a high degree of medical comorbidity. The group uses a range of methods providing for investigations of the molecular, functional, clinical, and epidemiological characteristics of psychiatric-medical co-morbidity.

Research Projects:

Projects in this group aim to investigate the aetiology and clinical consequences of psychiatric conditions in both cardio vascular disease (CVD) and diabetes mellitus (primarily type 1) and vice versa (e.g., metabolic consequences of psychiatric disorder), as well as the role and impact of psychiatric, psychological, and psychosocial interventions on the course of these conditions.

- **Mood disorder, cognitive function and cardiovascular disease:** An investigation of the brain morphology and neuropsychiatric sequelae in patients with comorbid CVD and depression
- **The neuropsychiatric sequelae associated with type 1 and 2 diabetes:** A study of the neuropsychiatric characteristics and consequences of type 1 and type 2 diabetes
- **Comorbidity between depression and life-limiting illness including cancer:** Describing the relationship between depression and end-of life cancer (Conceptualisation of depression in life-limiting illnesses)

For further details see: **http://health.adelaide.edu.au/psychiatry/research/medical_comorbidity_rg**

Neurostimulation Research Group

Cassie Burton demonstrates repetitive transcranial magnetic stimulation

(at The Adelaide Clinic, Gliberton)

Lead Researcher: Professor Cherrie Galletly

Contact: +61 8 8269 8144 or cherrie.galletly@adelaide.edu.au

The Neurostimulation Research Group undertakes research in repetive Transcranial Magnetic Stimulation (rTMS) and Electroconvulsive Therapy (ECT), which are both very effective treatments for Major Depression. There are very few rTMS services in Australia so our group provides an opportunity for innovative clinical research. ECT is a more established treatment and here we are looking at the patient experience, and at means to predict and reduce cognitive side effects of the treatment. We are undertaking collaborative research with Monash University and the Black Dog Institute (NSW).

Research Projects:

- Does increasing the duration of rTMS treatment sessions improve efficacy?
- How do patients describe their experience of ECT?
- What is the effect of ECT on quality of life?

For further details see: **http://health.adelaide.edu.au/psychiatry/research/neurostimulation_rg/**

Translational Research Unit, Northern Mental Health (TRUnorth)

Lead Researchers: Professor Cherrie Galletly, Dr Dennis Liu

Contact: +61 8 8269 8144, cherrie.galletly@adelaide.edu.au or dennis.liu@health.sa.gov.au

TRUnorth research unit is located at the Northern Adelaide Mental Health Service and Lyell McEwin Hospital, the fastest developing health service in the metropolitan Adelaide. The overarching goals of the TRUnorth are to improve treatment of severe mental illness by studying and understanding the biological and psychological mechanisms underlying the development of mental disorders, promoting translational research wide range of research collaborations and academic-clinical partnership.

Research Projects:

- The associations between testosterone levels and psychiatric and physical factors in women with schizophrenia (Lead researcher: Prof Cherrie Galletly).
- Linguistic analysis of interviews between psychiatrists and people with thought disorder – how is meaningful communication achieved (Leading Researcher: Prof Cherrie Galletley)
- Cognitive remediation in early psychosis. (Leading researchers: Dr Dennis Liu, Dr Ryan Balzan)
- Suicide prevention action response coordination (SPARC) pilot study. (Leading researchers: Dr Dennis Liu, Prof Cherrie Galletly, Prof Nicolas Proctor)
- Maternal psychological stress, maternal and placenta cord blood serum BDNF level and its potential impact on foetus brain development (Leading researcher: Dr Dennis Liu, A/Professor Vicki Clifton Dr Luke Grzeskowiak , Prof Xin-fu Zhou)
- Study of sleep disturbance in patients with schizophrenia (Lead researchers: Prof Cherrie Galletly, Prof Gary Wittert, Prof Robert Adam, A/Professor Nicholas Antic, Dr Hannah Newall, Dr Dennis Liu)
- Cardiovascular Health in People with Psychosis (CHIPP) (Prof Cherrie Galletly and Prof Campbell Thompson, Dr Dennis Liu, Miss Lisa Hahn)
- The Meaning and Impact of Limited Literacy in the Lives of People with Serious Mental Illness (Prof Cherie Galletly, Dr Alisa Lincoln (National Institute of Mental Health, USA), Dr Dennis Liu)
- Evaluation of Meta-Cognitive Group Training for Psychosis Spectrum Disorders in community practice (leading researchers: Dr Dennis Liu, Dr Ryan Balzan)

Translational Mind and Brain Centre

UA/RAH

Director: Prof Bernhard Baune

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The Translational Mind and Brain Centre in the Discipline of Psychiatry aims to fill the gap existing between clinical practice and advancement of Neuroscience research in Psychiatry. Our concept builds on an integrated model between basic science, improved diagnostics and novel treatments of Psychiatric Disorders. Research in this centre identifies clinical problems that are taken to the bench-site in a circular process feeding back into clinical practice. We also focus on basic Neuroscience projects that have a clear translational application in clinical practice and on basic science research and clinical practice that enhances Regeneration of the Mind and Brain.

Research group within this centre include Neuroimaging, Biomarkers and pharmacogenetics, Rural and remote mental health, Epidemiology and health services and Trajectory modelling with each group researching specific projects that are avaliable for potential higher degree research (HDR) candidates.

For further information see: **http://health.adelaide.edu.au/psychiatry/research_centres/translational/**

Biomarkers and Pharmacogenetics Research Group

Dr Scott Clark, Clincal Academice, Discipline of Psychiatry

Lead Researchers: Dr Scott Clark, Dr Oliver Schubert, Prof Bernhard Baune

Contacts: +61 8 8222 5141, scott.clark@adelaide.edu.au or oliver.schubert@adelaide.edu.au

The Biomarker and Pharmacogenetic Research Group has a clinical orientation towards identifying biological markers relevant to psychiatric disorders and pharmacoresponse with an emphasis on mood disorders, cognitive function, and psychosis. The specific emphasis has been developed in this research group by studying the pharmacogenetic response to antidepressants as well as to electroconvulsive therapies in treatment resistant depression, pharmacogenetics of response to lithium treatment in bipolar disorder and an extensive biomarker project in clozapine treated patients is under way.

Research Projects

- Pharmacogenetics of antidepressant treatment response in major depression
- Prediction of treatment response to neurostimulation (e.g., ECT, TMS)
- Pharmacogenetics of Clozapine in Psychosis
- Biomarkers to describe cognitive and emotional phenotypes of depression and psychosis

For further details see: **http://health.adelaide.edu.au/psychiatry/research/biomarkers_rg/**

Epidemiology and Health Services Research Group

Lead Researcher: Dr Scott Clark

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The aim of this research group is to understand health care needs of people with mental health issues and to evaluate effectiveness and accessibility of services in addressing needs. This includes identifying predictors that can help understand successes and failures of health service interventions. The research group aims to develop evidence based service delivery approaches that can address unmet needs in a cost-effective, equitable and easily accessible manner. A focus of this group is on exploring the health service needs and evaluations for patients diagnosed with schizophrenia receiving clozapine.

Research Project

- **Chronic Psychosis: Morbidity, Morality and Service use in South Australia:** This study uses data linkage of existing information in public clinical services to provide a detailed understanding of treatment processes and outcomes in those with chronic psychosis treated with oral clozapine in comparison to long acting injectable (depot) antipsychotics. Goals include: The identification of local predictors of outcomes in chronic psychosis to inform the early safe use of clozapine over depot medication, the identification of optimal broad physical health monitoring protocols to reduce morbidity and mortality, the development of interventions designed to optimise the management of chronic psychosis that can be directly translated and implemented in local depot and clozapine clinics.

For further details see: **http://health.adelaide.edu.au/psychiatry/research/epidemiology_rg/**

Neuroimaging Research Group

Lead Researcher: Dr David Stacey, Prof Bernhard Baune

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Neuroscience utilises key Imaging technologies such as MRI and PET among others to better characterise brain function and brain morphology in healthy individuals and in psychiatric conditions such as depression and schizophrenia. A significant progress in understanding the underlying biology and in identifying potential biomarkers in Neuroimaging has been made in the recent years by combining Genetics and Neuroimaging. In collaboration with experts around the world, this research group has been pioneering the Imaging Genetics approach in Depression and in Pharmacogenetics in particular.

Research Projects

- Neuroimaging of Pharmacoresponse in Depression
- Genetic basis of functional and structural brain characteristics in healthy and pathological psychiatric conditions
- Immunogenetics of brain morphology and function
- Immunogenetics in Gene x Environment Interaction

For further details see: **http://health.adelaide.edu.au/psychiatry/research/neuroimaging_rg/**

Remote and Rural Mental Health Research Group

Lead Researcher: Dr Jacob Alexander

Contacts: jacob.alexander2@health.sa.gov.au

This research group aims to understand the special needs of people with mental health issues residing in rural and remote areas. The group also studies strategies that enable capacity building at the local level, as well as providing mental health specialist support and education to health personnel who live and practice in country. Research efforts include identifying predictors of successful health service interventions, identifying gaps in existing service delivery, generating an evidence base to promote cost-effective and sustainable practices.

Research Projects

- Use of videoconferencing equipment for the provision of CBT to rural and Remote locations
- Utilising videoconferencing equipment across cultural barriers
- Evaluating the use of teleconferencing facilities for ongoing medical education- medical students, continuing professional development
- Telemedicine service involvement in setting up a psycho-oncology service

For further details see: **http://health.adelaide.edu.au/psychiatry/research/rural_mental_health_rg/**

Trajectory Modelling Research Group

Lead Researchers: Dr Scott Clark, Dr Oliver Schubert, Prof Bernhard Baune

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Current diagnostic categories in mental illness are based largely on common symptomatology rather than an understanding of the underlying mechanisms of brain, cognitive and general day-to-day function. Illness and functional trajectories describe patterns of illness and impairment in individuals over time. This research group will apply probabilistic and growth mixture multivariate modelling techniques to various measures of patient history to identify and predict specific illness and functional trajectories in mood and psychotic disorders.

Research Projects:

- Psychosis trajectory research project
- Analysis of existing clinical data of patients with first episode psychosis and their long-term clinical trajectory over time.
- Mood disorder trajectory research project
- Analysis of existing clinical follow-up data on the relationship between clinical treatment outcomes and long-term functioning in daily life.

For further details see: **http://health.adelaide.edu.au/psychiatry/research_centres/translational/**

For further enquiries

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