STUDY WITH US: Projects for Masters and PhD Candidates
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Introduction to Flinders Health and Medical Institute (FHMRI)


FHMRI brings together world-leading, innovative and inspiring research experts to improve health, prevent disease and combat health inequities.

We work with health practitioners and patients to better understand and seek solutions to the most pressing health and medical needs of Australians, inclusive of those in rural and remote communities.

The Institute is comprised of three research themes and a Research Education and Development Hub, which bring together diverse research and education strengths. The three thematic areas are:

1. Molecular Biosciences
   To cure disease and improve health, we need to know more about how the body works and then understand the molecular basis of what can go wrong. Our researchers are undertaking cutting-edge research to find scientific solutions to clinical dilemmas.

   We are making discoveries across an array of research programs including defining the complex mechanisms underlying the microbiome-gut-brain axis and the nervous system, identifying novel molecules and pathways involved in cancer, tackling immunity and drug resistant bacteria and creating new approaches to providing early disease detection methods and medical treatments.

2. Clinical Translation
   Our clinical researchers work to develop and implement new methods for the prevention, diagnosis and treatment of disease to improve health. This is facilitated by their co-location with Flinders Medical Centre and private hospital, and strong partnerships with rural and remote communities.

   Clinicians, researchers and nurses are working together to enhance understanding about blinding eye conditions, heart and vascular disease, sleep disorders, and many other diseases.

3. Healthy Communities
   Living a healthy life means more than just the absence of disease - it encompasses our physical, mental and social wellbeing. While many Australians enjoy good health, there is still an unacceptable divide in health inequalities.

   Our research is committed to understanding the effects of people’s circumstances on their health, including the impact of living in rural and remote locations and being Aboriginal and Torres Strait Islander peoples. We use health data research to minimise and prevent injury and disease and promote better health, and seek to improve the organisation and delivery of health services.
FHMRI's RED Hub provides support, training and professional and personal development for our researchers.

This includes our Honours and Higher Degree by Research (HDR) students (e.g. Masters and PhD).

How does RED Hub support our students?

The RED Hub provides an innovative suite of programs, training workshops, fora and events to promote excellence in research and build a vibrant, cohesive, interdisciplinary community. It provides:

- Mentoring Programs
- Research Seminar Programs
- Student communities of practice (online networking forums)
- Professional development opportunities (including CV development, careers workshops, milestone workshops, grant writing experiences)
- Personal development opportunities (including leadership opportunities)

Mentoring

We aim to foster the development of students through mentoring programs. These programs are designed to facilitate the transfer of the personal and professional knowledge of an experienced person (mentor) to a less experienced staff member or student (mentee) to assist in the development of the mentee. The Honours and HDR mentoring program are run in a group format.

What is the process for enrolling in Honours or a Higher Degree by Research (PhD or Masters)?

1. Contact supervisor(s) of interest via email
2. Meet with the supervisor(s) to discuss potential projects and visit the facilities where the research will be conducted
3. Make sure you meet the eligibility criteria for Flinders University (you should discuss this with your potential supervisor as well). Check eligibility requirements as follows:
   - PhD & Masters candidates: flinders.edu.au/study/apply/apply-research-degree
4. Read the information about HDR scholarships at the following link: flinders.edu.au/study/apply/apply-research-degree/scholarships-fees
   Keep in mind that the major round of scholarship applications closes on October 31st
5. Apply.

For further information contact:

Honours Committee Chairs: Dr Lauren Thurgood: lauren.thurgood@flinders.edu.au and Associate Professor Jill Carr: jill.carr@flinders.edu.au

HDR Committee Chair: Professor Briony Forbes: briony.forbes@flinders.edu.au
Overview of FHMRI research

Molecular Biosciences

PROJECTS

EMBL Australia Organelle Biology and Disease
- Targeting transport, signalling and destruction inside the cancer cells
- Astrocyte stress reactivity networks in protostatic stress and activation in diseases of the nervous system
- Regulation of ubiquitin signalling and membrane organelles in Parkinson's disease

Associate Professor Pirjo Apaja

Human Neurophysiology and Genetics
- Design innovative biotechnologies to bioimage the human brain microenvironment to grow and study live neuronal tissue derived from induced pluripotent stem cells in vitro
- The influence of the human brain microenvironment on the cancerous progression of glioblastoma and its resistance to current drug therapies
- The impact of genetic predispositions on cellular function using brain cells derived from Parkinson's patients

Dr Cedric Bardy

Molecular Medicine and Genetics
- Novel treatment strategies for Chronic Lymphocytic Leukemia (CLL)
- Identifying the mechanisms of venetoclax resistance in Acute Myeloid Leukemia (AML)

Dr Giles Beat

Visceral Pain
- Potential projects include investigating visceral pain mechanisms from the level of the single cell through to intact pathways and clinically relevant models of visceral pain (including irritable bowel syndrome, inflammatory bowel disease, bladder pain syndrome and endometriosis)

Professor Stuart Brierley

Metabolism and Cancer
- Design cancer therapies based on targeting metabolic and growth pathways used by cancer cells
- Investigating insulin receptor and KIF-1FR signalling in diabetes and cancer

Professor Briony Forbes

Renal
- Particular genes and enzymes are induced early in the process of compensatory kidney growth. The project will seek to confirm if these genes are induced during hyper trophy, the cells involved and the underlying driving process

Professor Jonathan Gleadle

Immunoology Autoimmunity and COVID-19
- Investigating RNAs, we are interested in how they are formed and regulated in cancer, human diseases and across stem cell differentiation

Associate Professor Simon Conn

Molecular Virology
- Functional analysis of the dengue virus NS1 protein through high-throughput mutagenesis, molecular virology and high-resolution imaging

Professor Tom Gordon & Dr Jing Wang

Chromosomal Instability and Cancer
- Test our hypothesis that more genetically disrupted cancer cells will produce more reactive oxygen species, and that this will be a useful prognostic marker for stratifying patient treatments
- Test our hypothesis that there is a novel aneuploidy sensing pathway that connects gain or loss of chromosomes with metabolic disruption

Dr Stephen Gregory

Childhood Dementia
- Evaluation of novel therapeutic strategies in mouse and cell models
- Examination of tissues from mouse models to explore the impact of being a carrier of a mutation in a childhood dementia disease-causing gene

Dr Nicholas Eyre

Precise Medicine
- Our group uses 'big-data' to develop diagnostic tools that can present personalised likelihoods of therapeutic and adverse effects to cancer medicines
- Investigate strategies to improve the use of targeted therapies in advanced cancers

Dr Ashley Hopkins

Pain and Pulmonary Neurobiology
- Development of a sentinel cell line to detect and differentiate between pain types in serum
- Development of a novel neuron-chip interface that allows growth of different pain neurons in vitro

Professor David Lynn

Lymphoproliferative Research
- Drug resistance mechanisms in lymphoproliferative malignancies
- Lipid metabolism in CLL
- Redox and metabolic changes in CLL

Associate Professor Bryone Kuss

Gene Expression
- Study genes that mediate cancer cell responses to metabolic and epigenetic disruptors Non-coding RNA involvement in gastrointestinal cancers, characterising 3-dimensional organisim models of colorectal cancer

Associate Professor Michael Michael

Pharmacology
- Characterise the structural features of enzymes that bind specific drugs eg: anti-cancer drug(s) and predispose to interactions between drugs in patients receiving polypharmacy

Dr Pramod Nair

Motion vision
- Exploration of the neural mechanisms underlying motion vision

Professor Karin Nordström

Integrative Neuroscience
- Whether activation or inhibition of neurotransmitters in a specific brain area alters stress associated behaviour and physiological changes

Dr Yoichiro Otsuka

Environmental control of cell growth and cell division
- The mechanisms behind environmental and TOR pathway control of cell division

Professor Janne Petersen

Pregnancy Health and Beyond
- Effects of micronutrients on placental function
- Genetic factors including fetal sex that contribute to placental function and pregnancy outcomes at the population, cohort and placental transcriptome levels
- Bioinformatic analyses of multi-omic profiling of the placenta across gestation
- Role of circRNA in placental development and function and pregnancy outcome
- Follow-up of STOP women and children aged 3 years old

Professor Claire Roberts
Overview of FHMRI research
Molecular Biosciences

PROJECTS

MND& NR Research
• Motor Neuron Disease: examining urinary biomarkers that may be prognostic or pharmacodynamic
  Dr Mary-Louise Rogers

Prostate Cancer
• Development of novel therapeutic strategies to target the androgen receptor and cyclin-dependent kinases in lethal prostate cancer
• Cancer cell plasticity as a therapy resistance mechanism in lethal prostate cancer
• Non-coding genomic alterations as drivers of lethal prostate cancer
  Associate Professor Luke Selth

Eye & Vision Health
• Response of human eye cells to infection with emerging viruses (Dengue virus, Zika virus, Ebola Virus)
• Toxoplasma gondii infection of human eye cells
• Migration mechanisms for leucocytes into the human eye
• Treatment strategy for COVID-19
  Professor Justine Smith

Bowel Health
• Developing biomarkers to allow early detection and prevention of cancer
• Looking into risk of bowel cancer in people with a family history of cancer
• Using biomarkers to monitor success of cancer treatment
• Developing new ways to reduce the number of colonoscopies being done in Australia
• Determining the type (and combination) of polyps in the bowel that increase risk for cancer in the future
• Looking into whether people will make changes to their lifestyle to reduce cancer risk
• Improving the quality of colonoscopy in South Australia
  Associate Professor Erin Symonds

Lymphoproliferative Research – Proteomics and Metabolism
• The effect of the tumour microenvironment on CLL cell survival
• Assessing proteome changes following targeted therapies
• Targeting metabolic pathways in CLL as a novel therapeutic strategy
  Dr Lauren Thurgood

Multiple Myeloma Translational Research
• Manipulating endoplasmic reticulum stress levels in multiple myeloma cells to enhance the cytotoxic effects of proteasome inhibitors
• Biomarker and therapeutic roles of adhesion proteins in multiple myeloma
• Characterising drug efflux transporters on multiple myeloma cells to enhance therapeutic responses
• Elucidation of the role a novel iron-dependent cell death mechanism termed "ferroptosis" plays in the survival of multiple myeloma cells and how this biological process contributes to the efficacy of drugs used to treat this cancer
  Dr Craig Wallington-Beddoe

Protein Misfolding and Inflammation
• Characterising the dual roles of hypochlorite as an inducer of protein misfolding and a regulator of extracellular proteostasis machinery
• Characterising the extracellular proteostasis network in pregnancy
• Elucidating the role of protein misfolding in pregnancy-associated complications
• Investigating non-canonical functions of human alpha-macroglobulins in health and disease
  Dr Amy Wyatt

Molecular Biosciences

PROJECTS
Overview of FHMRI research
Clinical Translation

PROJECTS

Lung Disease
• Investigation into the physiological outcomes and hemodynamic effects of fluid instillation with the creation of a two-hit acute lung injury model, utilising ventilator-induced injury or bacterial stimulated inflammation
  
Associate Professor Shailesh Bihari
• Investigation into the physiological and immunological outcomes of bacterial and viral induced respiratory inflammation
  
Associate Professor Dani-Louise Dixon
• Modulate the proinflammatory response during acute respiratory inflammation by exposure to a low-to-moderate dose of ionising radiation, thereby reducing the severity of injury to the lung
  
Dr James McEvoy-May

Sleep Health
• Evaluating aspects of a new respiratory-mechanics based method for assessing breathing effort and timing in ICU or in a Sleep Health context
  
• New methods for assessing noise impacts on sleep and health outcomes
  
Associate Professor Shailesh Bihari & Professor Peter Catcheside
• Evaluating airflow-lighting effects on circadian physiology and performance
  
• New methods for assessing noise and/or breathing disturbance in sleep
  
• Assessing the effects of mask fit, leak and moisture on breathing resistance
  
Professor Peter Catcheside

Cancer Survivorship and Psycho-Oncology
• Finding My Way program
  
• Healthy Living after Cancer – online
  
• Defining symptoms & impacts of Adjustment Disorder in cancer
  
• Reducing the burden of cardiovascular disease in breast cancer patients and survivors
  
• iSCREEN
  
• Identifying the predictors of digital engagement for people with cancer
  
Professor Bogda Koczvara

Urology
• Multiple projects including detailed upper airway physiology studies to advance knowledge on the mechanisms of upper airway muscle reflexes and how impaired pharyngeal muscle function contributes to airway collapsibility through to clinical trials aimed at delivering one or more targeted therapies to treat sleep apnoea including new pharmacotherapies
  
Professor Danny Eckert

Cardiac Imaging
• Using cardiac imaging to answer mechanistic questions in three broad areas in cardiology: Heart failure and Cardiomyopathy, Coronary Artery Disease and Arrhythmia Disorders
  
Professor Joseph Selvanayagam

Rheumatology
• Improve understanding of mechanisms of response, or lack thereof, to biologic DMARDs
  
• Improve understanding of RA pathophysiology by characterising newly identified macrophage, fibroblast, and T-cell subsets and analysing their responses to treatment
  
• Attempt to identify markers that will reliably predict RA remission and flare
  
Associate Professor Jenny Walker & Associate Professor Mihir D Wechalekar

Upper Gastrointestinal (GI) cancer
• Detect precancer or cancer at its earliest stage when cure is more likely
  
• Cost-effectively deliver Barrett’s oesophagus (precancer) surveillance by stratifying for cancer risk and targeting individuals at significant risk
  
• Develop a cost-effective framework for Barrett’s oesophagus screening
  
Professor David Watson

Liver
• Clinical research into new models of care for chronic liver failure, applying new therapies for hepatocellular carcinoma, investigating new models of liver care for remotely living Aboriginal and Torres Strait Islander peoples, investigating heart disease in patients with cirrhosis
  
Professor Alan Wigg

Cardiac Imaging
• Using cardiac imaging to answer mechanistic questions in three broad areas in cardiology: Heart failure and Cardiomyopathy, Coronary Artery Disease and Arrhythmia Disorders
  
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Overview of FHMRI research

Healthy Communities

PERSONALISED HEALTH INFORMATICS
- Contact tracing and social distancing intervention
- Digital tools for mental health professionals to interact and support patients outside the clinic
- Systematic reviews
- Novel health interventions
- COVID-19 & mental health

Associate Professor Niranjan Bidargaddi

HEALTH ECONOMICS
- Telehealth services in primary care
- Comparing methods of Health Technology Assessment in Australia and the UK
- Evaluation of policy reforms in the community-based aged care services
- Assessing the costs and benefits of incorporating more complex model structures for the economic evaluation of new health technologies

Associate Professor Hossein Afzali

RURAL & REMOTE HEALTH
- Review of Remote Primary Health Care Manuals utilising evidence reviews and brief qualitative research

Mrs Anthea Brand

RURAL & REMOTE HEALTH
- Rural and remote workforce retention

Associate Professor Narelle Campbell

FLINDERS Northern Territory
- Evaluation of local Aboriginal and Torres Strait Islander cultural safety training which is provided to nearly all students and new employees working in health services in the Northern Territory

Dr Chris Rissel

WOMEN, ALCOHOL AND BREAST CANCER PREVENTION
- Seek understanding of how women’s perception of breast cancer risk is relative to the social conditions (gender, age, social class and cultural/environmental drivers) that shape women’s reasons and logic for continuing or modifying alcohol consumption

Professor Paul Ward

ABORIGINAL AND TORRES STRAIT ISLANDER PUBLIC HEALTH
- Cross sectional studies aimed at understanding the epidemiology and health care access for key populations
- Assessing the role of Aboriginal Liaison Officers in hospitals
- How to change the way in which nutrition research and practice is delivered to Aboriginal people

Dr Jacqueline Stephens

RURAL WORKFORCE RETENTION
- Assessing the role of Aboriginal Liaison Officers in hospitals
- How to change the way in which nutrition research and practice is delivered to Aboriginal people

Dr Annabelle Wilson

HEALTH, SOCIETY AND EQUITY (SOUTHGATE)
- Factors contributing to health inequities or the social and economic experiences of people from refugee backgrounds who have settled in Australia

Dr Joanne Flavel & Dr Toby Freeman

EVALUATION OF LOCAL ABORIGINAL AND TORRES STRAIT ISLANDER CULTURAL SAFETY TRAINING WHICH IS PROVIDED TO NEARLY ALL STUDENTS AND NEW EMPLOYEES WORKING IN HEALTH SERVICES IN THE NORTHERN TERRITORY
- Evaluation of local Aboriginal and Torres Strait Islander cultural safety training which is provided to nearly all students and new employees working in health services in the Northern Territory

Dr Chris Rissel

FEMALE, ALCOHOL AND BREAST CANCER PREVENTION
- Seek understanding of how women’s perception of breast cancer risk is relative to the social conditions (gender, age, social class and cultural/environmental drivers) that shape women’s reasons and logic for continuing or modifying alcohol consumption

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- Evaluation of local Aboriginal and Torres Strait Islander cultural safety training which is provided to nearly all students and new employees working in health services in the Northern Territory

Dr Chris Rissel
Research Supervisors and their projects
Molecular Biosciences

**Supervisor name:**
**Associate Professor Pirjo Apaja**

**Supervisor email:**
pirjo.apaja@flinders.edu.au

**Name of research group:** EMBL Australia Organelle Biology and Disease

**Description of research area and interests:**
Our group is studying faulty membrane transport and signals in cancers such as brain blastomas and diseases of the nervous system e.g. Parkinson's disease, neurodevelopmental disorders. We are looking for ways to support cells to fight against proteotoxic stress. Our cells are constantly moving materials inside them, and during this process repair or degrade damaged molecules. Sometimes this movement through membrane transport gets jammed, causing accumulation of harmful materials, faulty cell signalling, aberrant differentiation or uncontrolled cell division. This can lead to cancer or a neurodevelopmental or neurodegenerative disease. Our laboratory uses multidisciplinary techniques: targeted proteomics and computational protein network studies, biochemical and cell biological assays and advanced light microscopy with relevant human disease biopsies or cellular reprogramming of induced pluripotent stem cells. Our research program is at the forefront of human cellular neuroscience research and translational applications that benefit global public health. Our lab has expertise in a range of state-of-the-art technologies including transcriptomics, machine learning-based analysis, electrophysiology and functional imaging. We currently focus on discovering treatments for brain cancer and neurodegenerative disorders.

**Outline of project:**
1. Targeting transport, signalling and destruction inside the cancer cells
2. Astrocyte stress reactivity networks in proteotoxic stress and activation in diseases of the nervous system
3. Regulation of ubiquitin signalling and membrane organelles in Parkinson's disease

**Skills students will gain:**
Knowledge of:
- proteotoxic stress signalling, protein quality control
- membrane protein and organelle function
- post-translational modifications
- protein interactions and networks in human diseases

Experience in:
- molecular biology, protein chemistry and cell biology
- advanced fluorescence microscopy
- culture of cancer cells and primary astrocytes and neurons

**Location:**
SAHMRI

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**Supervisor name:**
**Dr Cedric Bardy**

**Supervisor email:**
cedric.bardy@flinders.edu.au

**Name of research group:** Laboratory for Human Neurophysiology and Genetics

**Description of research area and interests:**
We bioengineer live human brains in vitro. The brain cells are generated from fresh biopsies or cellular reprogramming of induced pluripotent stem cells. Our research program is at the forefront of human cellular neuroscience research and translational applications that benefit global public health. Our lab has expertise in a range of state-of-the-art technologies including transcriptomics, machine learning-based analysis, electrophysiology and functional imaging. We currently focus on discovering treatments for brain cancer and neurodegenerative disorders.

**Outline of project:**
- Bioengineering the human brain in vitro. The study aims to design innovative biotechnologies to bioengineer the human brain microenvironment to grow and study live neuronal tissue derived from induced pluripotent stem cells in vitro.
- Brain Cancer. The study investigates the influence of the brain microenvironment on the cancerous progression of glioblastoma and its resistance to current chemo- and radiotherapies.
- Parkinson's disease. The study investigates the impact of genetic predispositions on cellular function using brain cells derived from Parkinson's patients. The study combines bioinformatics analysis of electrophysiological activity and single cell transcriptomics.

**Skills students will gain:**
Neuroscience, Cancer, Stem Cells, Electrophysiology, high content microscopy, transcriptomics, bioinformatics, Human tissue culture, Computer scientists and bioinformaticians (and others) strongly encouraged to apply.

**Key staff associated with project:**
Dr Mark van den Hurk
Dr Zarina Greenberg
Dr Brett Stringer
www.bardy.lab.com
flinders.edu.au/people/cedric.bardy
Location: SAHMRI

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**Supervisor name:**
**Dr Giles Best**

**Supervisor email:**
giles.best@flinders.edu.au

**Name of research group:** Molecular Medicine and Genetics

**Description of research area and interests:**
With the head of the Molecular Medicine and Genetics department, Associate Professor Bryone Kuss, we are responsible for co-ordinating aspects of a research program on Chronic Lymphocytic Leukemia (CLL) and Acute Myeloid Leukemia (AML). My work focuses on understanding the mechanisms that drive the survival and proliferation of leukemia and lymphoma cells. I am particularly interested in the role of the tumour microenvironment and how the interaction between leukemia/lymphoma cells and the other cells that comprise the TME can confer resistance to therapy. The goal of the work is to use this information to identify novel therapeutic strategies.

**Outline of project:**
- Novel treatment strategies for Chronic Lymphocytic Leukemia (CLL)
- Identifying the mechanisms of venetoclax resistance in Acute Myeloid Leukemia (AML)

**Skills students will gain:**
- Experience in a range of scientific techniques, including flow cytometry, western blotting, mass spectrometry
- The ability to design and execute experimental plans
- Communication skills necessary for relaying scientific information to teams of clinicians and fellow scientists in both written and oral formats

**Key staff associated with project:**
Associate Professor Bryone Kuss
Associate Professor Karen Lower
Dr Lauren Thurgood
Dr Binoy Appukuttan
Dr Stephen Gregory
flinders.edu.au/people/giles.best
Location: Flinders Medical Centre
Research Supervisors and their projects

Molecular Biosciences

Supervisor name: Professor Stuart Brierley
Supervisor email: stuart.brierley@flinders.edu.au
Name of research group: Visceral Pain Research Group

Description of research area and interests:
Our research focuses on common forms of chronic pain that arise from our internal organs. In particular, we focus on the ‘Gut-brain’ axis, which allows processes in the gut to be detected and felt. This includes investigating epithelial cells, afferent neurons, spinal cord mechanisms, brain neurochemistry and pain responses using a wide array of state-of-the-art molecular, genetic, pharmacological and functional techniques. This is complemented by using clinically relevant models of inflammatory bowel disease, bladder pain syndrome and endometriosis, which utilizes similar techniques to those described above. We have a track record of which utilizes similar techniques to those described above. We also have samples from these patient cohorts which allows translation from our pre-clinical studies to human tissue.

Your project will utilize a wide array of state of the art molecular, genetic, pharmacological and functional techniques. This is complemented by using clinically relevant models of inflammatory bowel disease (IBD) & irritable bowel syndrome (IBS) as well as samples from human-patients. We also focus on common conditions affecting other visceral organs, including bladder pain syndrome and endometriosis, which utilizes similar techniques to those described above. We have a track record of publishing in high impact journals including Nature (PMID: 27281198), Cell (PMID: 28648659), PNAS (PMID: 30015167), Nature Communications (PMID: 34475466), Gastroenterology (PMID: 23958540) and JCI Insight (PMID: 31536477).

Skills students will gain:
• Electrophysiology (laffrent, and patch clamp)
• Microscopy (epifluorescence, confocal, slide scanning)
• Neuroanatomy (circuit tracing)
• Molecular approaches (immunohistochemistry, real time PCR)
• In vitro neurophysiology imaging (calcium imaging)
• Physiology (whole animal approaches)
• Data analysis and management
• Laboratory small animal handling

Key staff associated with projects:
Dr Joel Castro Kraftchenko
Supervisor email: joel.castrokraftchenko@flinders.edu.au

Description of research area and interests:
The underlying mechanisms of chronic pelvic pain associated with endometriosis are poorly understood, with no efficacious treatment to date. Our research focuses on identifying the molecular entities and mechanisms responsible for pain detection and transmission in endometriosis. This will provide novel therapeutic strategies and ultimately improve the quality of life of patients with endometriosis.

We have a wide array of state-of-the-art molecular, genetic, imaging, pharmacological and functional techniques in our lab. We also have access to diverse core facilities available at SAHMRI and in campus. This is complemented by the use of pre-clinical models of endometriosis, as well as clinical samples from human patients.

Outlines of projects:
The first step in the pain pathway is the sensory neurons that project from peripheral tissues to the central nervous system (CNS). How sensory neurons detect/ transmit pain from pelvic organs affected by endometriosis is not known, providing a limiting factor for developing treatments for endometriosis-related chronic pelvic pain. There is a fundamental lack of understanding of:

1. The types of sensory neurons innervating the uterus and the vagina, and how pain is detected from these sites.
2. The precise ion channels/receptors expressed within these afferents, which govern their function.
3. How these sensory neurons are altered in endometriosis.
4. What changes in ion channel/receptor expression occur to trigger these alterations and ultimately generate chronic pelvic pain.

Our group is currently working to fill this gap of knowledge. We offer a wide range of potential projects within these topics that we’d be delighted to discuss.

Skills students will gain:
The student will acquire a series of intellectual and practical skills relevant to the research on chronic visceral pain-associated with endometriosis.
• The design and execution, in a timely manner, of a concrete scientific project
• Experimental techniques ranging from the molecular/cellular level to the whole organism.
• Analysis and interpretation of complex data sets.
• Development of the student’s scientific writing and oral communicative skills.
• Working with a dynamic research team, in a real-life, science-related working environment.

Key staff associated with projects:
Professor Stuart Brierley
Dr Luke Grundy
Dr Andrea Harrington
Ms Jessica Maddern.

All projects in my laboratory are focussed on the initiation, progression, diagnosis and treatment of human diseases, with particular focus on cancers. The common element to these projects is that students possess a high level of molecular biology skills and motivation to make a difference to one person's life. I believe that the laboratory provides an excellent environment for achieving high-impact outcomes.

Supervisor name: Associate Professor Simon Conn
Supervisor email: simon.conn@flinders.edu.au
Name of research group: Circular RNAs in Cancer Laboratory

Description of research area and interests:
Throughout my career, I have loved the challenges and opportunities of Molecular & Cellular Biology. Despite DNA sequencing identifying 26,000 genes, next-generation sequencing of the RNA transcripts has shown, unequivocally, that the canonical RNAs from these genes are the exception, rather than the rule. We are the only dedicated laboratory in Australia investigating the most contemporary class of non-coding RNA transcripts in eukaryotes, called circular RNAs. We are interested in how they are formed and regulated in cancer, human diseases and across stem cell differentiation. These are my molecular heroes and once you start researching them, I guarantee you will not be able to stop.

Outline of projects:
All projects in my laboratory are focussed on the initiation, progression, diagnosis and treatment of human diseases, with a particular focus on cancers. The common element to these projects is that students possess a high level of molecular biology skills and motivation to make a difference to one person's life. I believe that the laboratory provides an excellent environment for achieving high-impact outcomes.

Skills students will gain:
• Unparalleled knowledge of molecular biology – we will award students who are proven to be proficient in Molecular Biology a certificate of competence which can be used in their CV for future employment.
• Students will improve their critical thinking about scientific questions and appropriate experimental design.

Key staff associated with projects:
Dr Vanessa Conn
Dr Marta Gabryelska
Dr Brett Stringer.

@flinders.edu.au/people/simon.conn
Location: Flinders Centre for Innovation in Cancer
Research Supervisors and their projects

Molecular Biosciences

Supervisor name: Dr Nicholas Eyre
Supervisor email: nicholas.eyre@flinders.edu.au
Name of research group: Molecular Virology Group
Description of research area and interests: Our research focuses on virus-host interactions and viral genome replication for the related (+)RNA viruses dengue virus (DENV), Zika virus (ZIKV) and hepatitis C virus (HCV). In particular, we apply novel reporter virus tools, sensitive and minimally invasive high-resolution imaging techniques and targeted and random manipulation of viral genomes to better understand the viral and host determinants of viral replication compartment formation, morphology and function and how viral replication complexes interact with viral assembly platforms. We also apply our novel reporter viruses and associated technologies towards high-throughput screening of novel antiviral drug candidates. It is hoped that identification of features of viral proteins and virus-host interactions that are essential for the viral replication cycle will identify targets for future antiviral drug development. Furthermore, through application of novel reporter virus tools and high-throughput screening and imaging we aim to identify and characterise novel small molecule antiviral drug candidates for further pre-clinical testing and characterisation.

Outline of projects:
• Functional analysis of the dengue virus NS1 protein through high-throughput mutagenesis, molecular virology and high-resolution imaging
• Identification and characterisation of novel antiviral drugs that target the dengue virus NS1 protein through high-throughput screening, high-resolution imaging and structural analysis
• Identification and development of small molecule inhibitors of the essential interaction between SARS-CoV-2 nsp3 and nsp4 proteins

Skills students will gain:
• Molecular and cellular biology (cloning, mutagenesis, gene expression analysis, cell culture, heterologous gene expression)
• Protein-protein interaction assays (co-immunoprecipitation, proximity ligation assays, luminescence/fluorescence-based reporter assays)
• High-resolution confocal microscopy and live cell imaging
• Automated imaging for high-throughput screening

Key staff associated with projects:
Dr Amanda Aloia
Associate Professor Jill Carr
Dr Tim Chataway
Dr Alex Colella.

flinders.edu.au/people/nicholas.eyre
Location: Flinders Microscopy, Molecular Virology Group laboratory, Flinders Medical Centre

Supervisor name: Professor Briony Forbes
Supervisor email: briony.forbes@flinders.edu.au
Name of research group: Proteins in Metabolism and Cancer
Description of research area and interests: The Forbes lab aims to develop novel treatments for diabetes and cancer through understanding the basic mechanism by which insulin and insulin-like growth factors (IGFs) bind and activate their receptors to promote metabolic control, cell growth and survival. Surprisingly we still lack fundamental information as to how insulin and IGFs interact with their receptors to promote the key conformational changes required to activate the receptor tyrosine kinase domains and subsequent downstream signalling pathways. We will probe this interaction by making novel mutants of the ligands and the receptors and then testing these in cell-based assays for their abilities to promote downstream signalling. This will allow us to understand in detail which interactions between the ligands and the receptors are key for promoting specific receptor activation outcomes. Ultimately this information will allow us to create novel insulins for the treatment of diabetes and novel IGF inhibitors for the treatment of cancers that are dependent on IGF-signalling for growth and survival.

Outline of projects:
• Functional analysis of the dengue virus NS1 protein through high-throughput mutagenesis, molecular virology and high-resolution imaging
• Identification and characterisation of novel antiviral drugs that target the dengue virus NS1 protein through high-throughput screening, high-resolution imaging and structural analysis
• Identification and development of small molecule inhibitors of the essential interaction between SARS-CoV-2 nsp3 and nsp4 proteins

Skills students will gain:
• Technical skills gained will include molecular biology, protein-expression and purification, immunoblotting, cell culture, in vitro biological assays (metabolic and cell growth assays). Broader analytical, critical thinking and oral and written communication skills will be gained. You will have opportunities to meet and network with exceptional national and international researchers in the field. Prior knowledge of cell biology, signalling and protein structure and function would be helpful but not essential.

Key staff associated with projects:
Ms Carli Sawtell
Ms Allanah Merriman
Andrew Blyth (PhD student).
flinders.edu.au/people/briony.forbes
Location: Flinders Medical Centre

Supervisor name: Professor Jonathan Gleadle
Supervisor email: jonathan.gleadle@flinders.edu.au
Name of research group: Renal
Description of research area and interests: Up to a tenth of the world’s population is affected by chronic kidney disease and over 2 million people are receiving dialysis or kidney transplantation. Regardless of the cause of the kidney disease, most patients exhibit a relentless decline in kidney function, often accompanied by reductions in kidney size. There is a pressing need to develop novel therapies that prevent chronic kidney disease development and progression. This project will address this by investigating and capitalising on the natural response to loss of kidney mass. After donation of a kidney from a healthy individual or following nephrectomy for kidney cancer, the remaining kidney undergoes functional improvement and growth. The mechanism driving this remarkable ability of the remaining kidney to naturally enlarge and increase its function in a healthy and enduring way has been elusive, though insulin growth factor has been suggested. We are using contemporary genomic techniques to define responsible mechanisms.

Outline of projects:
• Development of novel treatments for diabetes and cancer through understanding the basic mechanism by which insulin-like growth factors (IGFs) and insulin bind and activate their receptors (the IGF-IR and the insulin receptor) to promote cell growth, survival and metabolic control.

Skills students will gain:
• Technical skills gained will include molecular biology, protein-expression and purification, immunoblotting, cell culture, in vitro biological assays (metabolic and cell growth assays). Broader analytical, critical thinking and oral and written communication skills will be gained. You will have opportunities to meet and network with exceptional national and international researchers in the field. Prior knowledge of cell biology, signalling and protein structure and function would be helpful but not essential.

Key staff associated with projects:
Dr Darling Rojas-Canales
Mrs Elise Tucker
Dr Anthony Fedele.
flinders.edu.au/people/jonathan.gleadle
Location: Renal Lab, Flinders Medical Centre

Supervisor name: Associate Professor Jil Carr
Supervisor email: jil.carr@flinders.edu.au
Name of research group: Molecular Virology Group laboratory, Flinders Medical Centre
Description of research area and interests: Development of novel treatments for diabetes and cancer through understanding the basic mechanism by which insulin-like growth factors (IGFs) and insulin bind and activate their receptors (the IGF-IR and the insulin receptor) to promote cell growth, survival and metabolic control.

Outline of projects:
• Development of novel treatments for diabetes and cancer through understanding the basic mechanism by which insulin-like growth factors (IGFs) and insulin bind and activate their receptors (the IGF-IR and the insulin receptor) to promote cell growth, survival and metabolic control.

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Key staff associated with projects:
Dr Amanda Aloia
Associate Professor Jill Carr
Dr Tim Chataway
Dr Alex Colella.

flinders.edu.au/people/nicholas.eyre
Location: Flinders Microscopy, Molecular Virology Group laboratory, Flinders Medical Centre
Research Supervisors and their projects
Molecular Biosciences

Supervisors’ names:
Professor Tom Gordon
Dr Jing Wang

Supervisors’ emails:
t.gordon@flinders.edu.au;
jing.wang@flinders.edu.au

Name of research group: Department of Immunology Autoimmunity and COVID-19 Research Program

Description of research area and interests:
This world class research group uses sophisticated immunochemical, genomic and proteomic techniques to discover molecular signatures of autoantibodies in human autoimmune diseases such as lupus (in collaboration with the Garvan Institute in Sydney), and performs molecular profiling of protective antibodies in patients with acute COVID-19 infection (in collaboration with the Doherty Institute in Melbourne).

Outline of projects:
Molecular signatures or barcodes of antibodies in the above diseases are used in the clinical setting as biomarkers of blood antibody responses and as markers of treatment responses.

Skills students will gain:
- Critical analysis of literature and learning how to convert great ideas into effective experiments
- Solid grounding in cell biology: cell staining, immunofluorescence, microscopy, quantitative analysis and appropriate statistical treatment of data
- Opportunities to use cutting edge genetic technologies including CRISPR and NextGen Sequencing to answer significant questions about cancer metabolism

Location: Flinders Medical Centre

Supervisor name:
Dr Stephen Gregory
Supervisor email:
stephen.gregory@flinders.edu.au
Name of research group: Chromosomal Instability and Cancer Lab

Description of research area and interests:
My research is focussed on finding new ways to target cancer cells. Specifically, we know that late stage cancers typically gain and lose DNA with each cell division and this chromosome instability has characteristic effects on the cell’s metabolism that are not seen in normal dividing cells. Our current work is aimed at finding metabolic interventions that can leverage this difference between cancer and normal cells.

Outline of Projects:
- To test our hypothesis that more genetically disrupted cancer cells will produce more reactive oxygen species (ROS), and that this will be a useful prognostic marker for stratifying patient treatments. We will use several methods including Raman spectroscopy to test leukemia samples for the connection between ROS and karyotype.
- To test our hypothesis that there is a novel aneuploidy sensing pathway that connects gain or loss of chromosomes with metabolic disruption. We have identified several genes that seem to mediate this effect and are now in the process of investigating how they work.

Skills students will gain:
- Opportunities to use cutting edge genetic technologies including CRISPR and NextGen Sequencing to answer significant questions about cancer metabolism
- Solid grounding in cell biology: cell staining, immunofluorescence, microscopy, quantitative analysis and appropriate statistical treatment of data
- Opportunities to use cutting edge genetic technologies including CRISPR and NextGen Sequencing to answer significant questions about cancer metabolism

Location: Flinders Medical Centre

Supervisor name:
Dr Luke Grundy
Supervisor email:
luke.grundy@flinders.edu.au
Name of research group: Visceral Pain Research Group

Description of research area and interests:
Chronic pain is a major, but underacknowledged clinical issue affecting >1.5B people globally. In Australia, chronic pain affects 3.3M people and costs $73B per annum. Chronic pelvic pain is a common, debilitating and complex form of chronic pain that derives from our internal organs and is a key clinical feature of a number of bladder disorders. The mechanisms underlying the pathogenesis of chronic pelvic pain remains unknown and there are no current clinically efficacious and safe pharmacological treatments or cures for chronic pelvic pain. My research program focuses on understanding the mechanisms responsible for the development of chronic pelvic pain and the development of novel and safe pharmacotherapies.

Outline of projects:
Patients with chronic and/or recurrent urinary tract infections (UTIs) are at increased risk of developing chronic pelvic pain and functional bladder disorders associated with altered sensation, including overactive bladder syndrome and interstitial cystitis. The underlying mechanisms responsible for inducing this protracted state of neuronal hypersensitivity are unknown. Multiple projects are available for enthusiastic Honours and PhD students to investigate the complex interactions of bacteria, the toxins that they release, and the development of inflammation in the modulation of sensory nerve function.

Skills students will gain:
- Opportunities to use cutting edge genetic technologies including CRISPR and NextGen Sequencing to answer significant questions about cancer metabolism
- Solid grounding in cell biology: cell staining, immunofluorescence, microscopy, quantitative analysis and appropriate statistical treatment of data
- Opportunities to use cutting edge genetic technologies including CRISPR and NextGen Sequencing to answer significant questions about cancer metabolism

Location: SAHMRI
Molecular Biosciences

Research Supervisors and their projects

**Supervisor name:** Dr Andrea Harrington
**Email:** andrea.harrington@flinders.edu.au
**Research group:** Central Pathways Projects, Visceral Pain Research Group

**Description of research area and interests:** Our research is aimed at characterising the neural circuits within the spinal cord and brain controlling how painful sensations from internal visceral organs are processed. We use a range of neural tract physiological and molecular approaches at the whole animal to single cell levels in order to establish the neuroanatomy, pharmacology and functional connectivity of these nerve pathways. We then use this information to identify how these central circuits may be altered in various models of chronic visceral pain and mediate cross-organ sensitisation. We offer a range of Honours & HDR projects that are focused on various aspects and can be tailored to student interests.

**Outline of projects:**
- Characterisation of spinal projection neurons relaying visceral pain into the brain. These projects will combine neuroanatomical tract tracing approaches with molecular localisation to identify the types of neurons in the spinal cord activated by painful visceral stimuli and where they relay this information into the brain. An extension of these projects is to then identify changes to the spinal neurons in models of chronic visceral pain.
- Identifying altered sensitivity of visceral afferent input and spinal cord dorsal horn circuits in models of chronic visceral pain. These projects will use molecular, neuroanatomical tract tracing, neurophysiology imaging and whole animal physiology approaches to establish the degree of sensitisation developed in the central pathways in various models of chronic visceral pain and identify the mechanisms involved.
- Sites of central convergence between visceral organs. These projects will combine neuroanatomical tract tracing approaches with molecular localisation to identify where in the spinal cord and brain sensory signaling from multiple visceral organs converge and communicate to establish sites important to the develop of cross-organ sensitisation or referred pain in chronic visceral pain.

**Skills students will gain:**
- Molecular approaches (immunohistochemistry, real time PCR)
- Microscopy (epifluorescence, confocal, slide scanning)
- neuroanatomy (circuit tracing)
- in vivo neurophysiology imaging (calcium imaging)
- physiology (whole animal approaches)
- data analysis and management
- laboratory small animal handling

**Key staff associated with projects:**
- Potential co-supervisors: Professor Stuart Brierley
  - Dr Luke Grundy
  - Dr Joel Castro
  - Dr Gudrun Schrober
  - Dr Sonia Garcia-Caraballo

**Location:** SAHMRI

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**Supervisor name:** Associate Professor Kim Hemsley
**Email:** kim.hemsley@flinders.edu.au
**Research group:** Childhood Dementia Research Group

**Description of research area and interests:**
- Santtiiﬁppo syndrome (or Mucopolysaccharidosis type III MPS III) is a devastating autosomal recessively inherited childhood-onset form of dementia that affects approximately 1 in 65,000 children in Australia. It has a variable rate of progression, but generally causes death in early adulthood. There is currently no treatment. We use cell, mouse and in collaboration fly models of the disease with the goal of better understanding what causes degeneration of the central nervous system in this disorder, developing and testing potential treatments and establishing strategies for predicting how rapidly the disease will progress. This information is needed to guide the timing of intervention with a therapy. Our research focuses on expanding to include the study of other related disorders that cause childhood-onset dementia, which also remain untreatable. We are also keen to deepen our understanding of whether the parents of children with these disorders are at greater risk of developing early-onset neurodegenerative disease.

**Skills students will gain:**
- Students could expect to gain skills in cell culture, qPCR, ELISA, mass spectrometry, immunocytochemistry, immunohistochemistry and/or immunofluorescence, confocal microscopy, delivery of therapeutic agents to mouse models, performance of behavioural testing. Students will also gain skills in reading and critiquing the scientiﬁc literature, preparing and delivering written and oral presentations and communicating with families affected by childhood-onset dementia.

**Key staff associated with projects:**
- Dr Adeline Lau
- Ms Helen Beard
- Ms Leanne Winner
- Ms Daniel Neumann
- Ms Barbara King

**Location:** Flinders Medical Centre

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**Supervisor name:** Dr Ashley Hopkins
**Email:** ashley.hopkins@flinders.edu.au
**Research group:** Precision Medicines Group

**Description of research area and interests:**
- My research focus is precision oncology. I use clinical epidemiology and pharmacometric techniques to develop clinical prediction models for advanced cancer treatments. Ultimately these models aim to improve patient outcomes by identifying precision use strategies and facilitating informed decisions with respect to medicines. The data with which my clinical prediction models are made are typically “big data”, sourced from clinical trials conducted by pharmaceutical companies, or data registries. Current data contributors include Roche, Eli Lilly, Eisai, Novartis, Boehringer Ingelheim, and ASCO’s CancerLinQ.

**Outline of projects:**
- Our group uses “big data” to develop prognostic tools that can present personalised likelihoods of therapeutic and adverse effects to cancer medicines. The aim is to help clinicians and patients make more informed decisions about their medicines. We currently have access to data (demographic, laboratory and tumour data) from over 60,000 advanced cancer patients treated with immunotherapies, targeted therapies and chemotherapies. Such data allow the development of prognostic tools that can present personalised likelihoods of therapeutic and adverse effects to medicines. It is hypothesised that effective communication of personalised predictions of expected benefits and harms from medicines used in advanced cancer treatment will improve shared decision making, lead to more informed and empowered patients, and enable better decisions regarding whether to commence and continue medicines.

**Skills students will gain:**
- Skill development focusses on the basics of:
  - Cancer pharmacology
  - Clinical epidemiology
  - Precision medicine
  - Patient centered care

**Key staff associated with projects:**
- Professor Michael Soric
  - Associate Professor Andrew Rowland
  - Dr Gareeshan Kichanadasse
  - Professor Ross McKinnon

**Location:** Flinders Medical Centre
Our team is focused on understanding how the microbiome controls our metabolism. We are interested in the gut microbiome as it relates to obesity, diabetes, depression, bipolar disorder, and mania.

**Supervisor name:** Damien Keating  
**Supervisor email:** damien.keating@flinders.edu.au

**Description of research area and interests:** Our team is focused on understanding how our cells signal with each other through the release of hormones and neurotransmitters. A major focus for us is how our cells signal with each other through the release of hormones and neurotransmitters.

**Skills students will gain:** These skills include understanding how the gut microbiome regulates host metabolism, how the gut microbiome interacts with specialized gut endocrine cells to regulate host metabolism, and how the gut microbiome interacts with specialized gut endocrine cells to regulate host metabolism.

**Location:** Flinders Medical Centre

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**Supervisor name:** Bryone Kuss  
**Supervisor email:** bryone.kuss@flinders.edu.au

**Description of research area and interests:** Our team is focused on understanding how the gut microbiome regulates host metabolism, how the gut microbiome interacts with specialized gut endocrine cells to regulate host metabolism, and how the gut microbiome interacts with specialized gut endocrine cells to regulate host metabolism.

**Skills students will gain:** These skills include understanding how the gut microbiome regulates host metabolism, how the gut microbiome interacts with specialized gut endocrine cells to regulate host metabolism, and how the gut microbiome interacts with specialized gut endocrine cells to regulate host metabolism.

**Location:** Flinders Medical Centre

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**Supervisor name:** Associate Professor Karen Lower  
**Supervisor email:** karen.lower@flinders.edu.au

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**Location:** Flinders Medical Centre

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**Supervisor email:** karen.lower@flinders.edu.au

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**Supervisor email:** karen.lower@flinders.edu.au

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**Location:** Flinders Medical Centre

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**Supervisor name:** Associate Professor Karen Lower  
**Supervisor email:** karen.lower@flinders.edu.au

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**Location:** Flinders Medical Centre
Professor David Lynn

Supervisor email: david.lynn@flinders.edu.au

Name of research group: Systems Immunology/Biology Laboratory

Description of research area and interests: Professor Lynn leads a multidisciplinary group of researchers that apply computational and experimental systems immunology methods to investigate how vaccines and microbes (pathogenic and commensal) modulate the immune system in a range of different contexts. He has two major NHMRC-funded projects in this area investigating how the microbiota modulates immune responses to vaccination and cancer immunotherapy. He also has a parallel research program in cancer systems biology (particularly CRC and prostate cancer) and his group has developed a broad range of bioinformatics software and online databases facilitating systems biology analysis that are used by thousands of researchers worldwide. Professor Lynn is also very actively engaged in clinical research. He is the PI in SA for the BRACE trial, which has recently received $10 million in funding from the Gates Foundation to investigate whether BCG provides non-specific protection for infants. BCG provides non-specific protection for infants.

Skills students will gain:
- Mouse models of cancer; immunology; flow cytometry; range of animal handling techniques; epigenetics; ELISA; gene expression analysis
- Preclinical models; vaccine biology; immunology; mouse models of infection; flow cytometry; range of animal handling techniques; ELISA; gene expression analysis
- Bioinformatics; systems biology; network analysis; programming; gene expression analysis; multi-omics integration

Key staff associated with projects:
- Dr. Stephen Blake
- Dr Natalie Stevens
- Dr Miriam Lynn
- Dr Feargal Ryan

Location: SAHMRI

Professor Arduino A Mangoni

Supervisor email: arduino.mangoni@flinders.edu.au

Name of research group: Pharmacology

Description of research area and interests: We are interested in the role of specific metabolites and enzymes within the arginine metabolic pathways in the pathophysiology of disease states. In particular, we are investigating the enzyme dimethylarginine dimethylaminohydrolase 1 (DDAH1) as a therapeutic target in cancer, diabetes or radiation induced lung fibrosis, and atherosclerosis. We have developed effective ways to reduce the expression and activity of DDAH1 for therapeutic purposes e.g. cancer and lung fibrosis, however we are also investigating strategies to "activate" DDAH1 in other medical conditions e.g. atherosclerosis and hypertension.

Skills students will gain:
- Analytical chemistry, assessment of in vitro and in vivo models of common diseases, molecular biology techniques, principles of drug discovery and development
- Assessment of the effects of potent DDAH1 inhibitors developed in house, with or without other agents (e.g. anti-angiogenic drugs), on a comprehensive set of metabolic, biological and clinical end points in in vitro and in vivo models of triple negative breast cancer and lung fibrosis
- Identification of the mechanisms that suppress DDAH1 activity under specific circumstances in order to identify novel DDAH1 "activators" for the treatment of diseases affecting the cardiovascular system, particularly hypertension and atherosclerosis

Key staff associated with projects:
- Dr Sara Tommasi
- Mr Anthony Doman
- Vintha Ragavan (PhD student)
- International collaborators from the Mario Negri Institute of Pharmacological Sciences (Milan, Italy), the Department of Biomedical Sciences of the University of Sassari (Italy), and the Medizinische Fakultät Carl Gustav Carus | Technische Universität Dresden.

Location: Flinders Medical Centre

Dr Dusan Matusica

Professor Rainer V Haberberger

Supervisors’ names: Dusan.matusica@flinders.edu.au
rainer.haberberger@flinders.edu.au

Name of research group: Pain and Pulmonary Neurobiology lab

Description of research area and interests: We are interested in biomarkers that can be used to detect and define pain. Detecting pain seems easy, it hurts, but determination of e.g. a response to treatment or defining pain in newborns or people that cannot express themselves is more challenging. We aim to find and develop biomarkers in blood and cerebrospinal fluid of humans and animal models of pain types by using different strategies. This will be an essential tool to reduce the burden of chronic pain and the misuse of painkillers such as opioids.

Skills students will gain:
- Confidence in conduction and analysis of qRT-PCR experiments
- Insight into analysis of sequencing data
- Handling of human and animal samples
- Cell culture
- Insight into neuron-chip interface technology

Key staff associated with projects:
- Dr Marie O'Shea
- Associate Professor Michael Z Michael
- flinders.edu.au/people/dusan.matusica
- news.flinders.edu.au/blog/2017/09/05/better-pain-relief-via-microchips-new-research/
- flinders.edu.au/people/rainer.haberberger
- linkedin.com/in/rainer-viktor-haberberger-5144197b/
- originalSubdomain=au

Location: Flinders Medical Centre

Professor Rainer V Haberberger

Supervisors’ emails: dusan.matusica@flinders.edu.au
rainer.haberberger@flinders.edu.au

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- Insight into neuron-chip interface technology

Key staff associated with projects:
- Dr Marie O'Shea
- Associate Professor Michael Z Michael
- flinders.edu.au/people/dusan.matusica
- news.flinders.edu.au/blog/2017/09/05/better-pain-relief-via-microchips-new-research/
- flinders.edu.au/people/rainer.haberberger
- linkedin.com/in/rainer-viktor-haberberger-5144197b/
- originalSubdomain=au

Location: Flinders Medical Centre
Research Supervisors and their projects

Molecular Biosciences

Supervisor's names:
Professor Ross McKinnon
Dr Madelé van Dyk

Supervisor's emails:
ross.mckinnon@flinders.edu.au,
madele.vandyk@flinders.edu.au

Name of research group: FHMRI Cancer

Description of research area and interests:
The main research area for this project is Precision Medicine in Oncology, where we will focus on using existing knowledge together with individual patient and disease characteristics to provide an individualised treatment, to give the patients a better chance at survival. To do this, the project will involve elements of: Clinical Pharmacology (what the body does to the drug and in turn how the drug affects the body), Clinical Oncology (clinically prevent, diagnosis and treat cancer), Pharmacogenomics (how the drug effects the body), Pharmacometrics (mathematical models of biology, pharmacology, disease, and physiology used to describe and quantify interactions between drugs and patients).

Outline of projects:
Due to the short survival time for some advance cancers, this project will investigate strategies to further improve the use of targeted therapies in advance cancers. The aim of this project is improving survival while minimising toxicity by increasing our current understanding of how a particular drug produces its effects against cancer and how we can better use it to provide a more personalised approach. The project will use a combined molecular and clinical approach to answer initial clinical questions but also open up a pathway to investigate further challenging unmet clinical needs.

Skills students will gain:
Handling clinical patient samples and cancer patient recruitment. Interacting with cancer patients. Advance training in the use of detecting and quantifying medications from human samples (cancer patients) with a high-performance liquid chromatography-mass spectrometry (HPLC-MS) approach (similar techniques used in forensic science). Advance training in analysing clinical based research data, performing statistical analyses on this data and how to interpret and relate this data to establish and address real-world challenges currently faced in clinical practice. The student will also have the opportunity to write up their own publications in a well-experienced and supported environment. Working with senior clinicians and scientists from Adelaide’s major research institutions and hospitals, the student will have the opportunity to network within a multi-disciplinary environment ranging from Clinical Pharmacology, Clinical Oncology, Pharmacogenomics, and Pharmacometrics. Currently we have international and national collaborations with Germany and Sydney, which will allow the student to present their work to world-class leaders in this field, further expanding their networking experience.

Key staff associated with projects:
Dr Ganeshan Richenadasa (FHMRI)
Dr Stehanie Routler Lange
Professor Alan Body (UniSA)
Dr Betty Sulisuto
Dr Daniel Barratt
Mr Shane Spencer (University of Adelaide).

Website: linkedin.com/in/madelé-van-dyk
Location: Flinders Centre for Innovation in Cancer

Supervisor name:
Associate Professor Michael Michael

Supervisor email:
michael.michael@flinders.edu.au

Name of research group: Gene Expression Laboratory

Description of research area and interests:
We study the epigenetic determinants of colorectal cancer, including the involvement of non-coding RNAs. Our studies include: Understanding environmental (dietary) influences on cancer risk. Understanding cellular adaptations to altered metabolism. Developing biomarkers for cancer diagnosis and prognosis. Exploring novel RNA-based therapeutics.

Outline of projects:
Study genes that mediate cancer cell responses to metabolic and epigenetic disruptors.
Non-coding RNA involvement in gastrointestinal cancers. Characterise 3-dimensional organoid models of colorectal cancer.

With Professor Janni Petersen:
Identify cancer-specific targets for the diabetes drug, metformin.
Identify drugs that enhance the anti-cancer effect of metformin.
Develop yeast as a vector for gene therapy.

Skills students will gain:
Molecular biology, cell culture techniques, bioinformatics.

Supervisor name:
Dr Pramod Nair

Supervisor email:
pramod.nair@flinders.edu.au

Name of research group: Pharmacology

Description of research area and interests:
Our research utilises advanced computational and experimental approaches to study how drugs are metabolised by different enzymes. More specifically, our group uses various computational tools for Biomolecular Modelling of pharmacological targets (e.g. enzymes, receptors) to rationally guide our experiments (e.g. site-directed mutagenesis and enzyme kinetics). Some of our studies also utilise state-of-the-art computational approaches that are performed on supercomputing platforms to characterise protein flexibility and drug binding. Understanding the flexibility of biomolecules is valuable to gain atomic insights of complex phenomena such as molecular recognition, protein folding, and the transport of ions and small molecules in and out of proteins.

Outline of projects:
Cytoschrome P450 (CYP) and UDP-glucuronosyltransferase (UGT) are key enzyme families responsible for the metabolism (i.e. chemical breakdown) of drugs in the body. A combination of novel computational and experimental approaches will be used to characterize the structural features of CYPs and UGTs that allow these enzymes to bind specific drugs (e.g. anti-cancer drugs) and predispose to interactions between drugs in patients receiving polypharmacy. The project will assist the rational design of new drugs and support the safe and efficacious use of current drugs.

Skills students will gain:
Biomolecular Modelling tools e.g. Molecular Docking and Molecular Biology methods e.g. polymerase chain reaction, site-directed mutagenesis.

Key staff associated with projects:
Professor Ross McKinnon
Professor John Miners

flinders.edu.au/people/pramod.nair

Location: Flinders Medical Centre

Supervisor name:
Professor Janni Petersen

Supervisor email:
michael.michael@flinders.edu.au

Name of research group: Gene Expression Laboratory

Description of research area and interests:
We study the epigenetic determinants of colorectal cancer, including the involvement of non-coding RNAs. Our studies include: Understanding environmental (dietary) influences on cancer risk. Understanding cellular adaptations to altered metabolism. Developing biomarkers for cancer diagnosis and prognosis. Exploring novel RNA-based therapeutics.

Outline of projects:
Study genes that mediate cancer cell responses to metabolic and epigenetic disruptors.
Non-coding RNA involvement in gastrointestinal cancers. Characterise 3-dimensional organoid models of colorectal cancer.

With Professor Janni Petersen:
Identify cancer-specific targets for the diabetes drug, metformin.
Identify drugs that enhance the anti-cancer effect of metformin.
Develop yeast as a vector for gene therapy.

Skills students will gain:
Molecular biology, cell culture techniques, bioinformatics.
Research Supervisors and their projects
Molecular Biosciences

Supervisor name: Professor Karin Nordström
Supervisor email: karin.nordstrom@flinders.edu.au
Name of research group: Motion vision group

Description of research area and interests:
In the motion vision group we use electrophysiology and quantitative behaviour techniques to understand how the visual system extracts vital information from the surround. We work on insects, primarily hoverflies, which are excellent study animals as they are small and physiologically accessible, which means that we can record from individual neurons in living, behaving animals. We routinely record from neurons at different stages of sensory processing, from the periphery, through the brain to the descending nerve cord. We are particularly interested in how sensory selectivity is achieved at the single neuron level, and how this affects behavioural output, but we also work on projects related to the biology of the insects, including their important role in pollination, how early development affects adult traits, sleep, stress.

Outline of projects:
Potential students can approach us for a tailor-made project that will suit your specific interests and learning outcomes. We are looking for enthusiastic students with a commitment to learn and who want to contribute to an active, collaborative group. Speak to current or past lab members to find out more.

Skills students will gain:
- Electrophysiology
- Matlab, data analysis, statistical analysis, quantitative behaviour, motion vision, insect vision, insect husbandry.
- Key staff associated with projects:
  - Dr Yui Ogawa
  - Dr Joseph Fabian
  - Mrs Sarah Nicholas
  - www.hoverflyvision.weebly.com
- Location: Flinders Medical Centre

Supervisor name: Dr Yoichiro Otsuka (Youichiro Otsuka) (YoYo)
Supervisor email: yoichiro.otsuka@flinders.edu.au
Name of research group: Integrative Neuroscience Laboratory

Description of research area and interests:
Autonomic responses to emotionally significant events, or psychological stressors, are involuntary and are triggered by the brain via the autonomic (sympathetic) nervous system. We often notice these changes manifesting in reactions such as feeling hot (so called emotional hyperthermia), having a rapid heartbeat or becoming pale (shock or vasodilation). These reflexes are unavoidable and are necessary in order to prepare the body for survival. However, these changes can become excessive and persist even in the absence of actual emotionally significant events, leading to pathology and severe states of illness, sometimes called autonomic dysfunction. Whilst it is a prevalent health problem, it remains understudied primarily due to its poorly understood mechanisms of action.

For this understanding, it is essential to establish the basic brain circuitry through which emotional signals trigger normal autonomic physiological responses. The circuitry is largely unknown. Our lab is pursuing the brain circuitry for these psychogenic autonomic physiological responses by combining state-of-the-art biotechnological techniques with conscious/anaesthetized animal physiological and neuroanatomical experiments.

Outline of projects:
Experiments will be conducted in conscious/anaesthetized rats/mice. The project will investigate whether activation or inhibition of neurons in a specific brain area alters stress-associated behavioural and physiological changes. Miniature probes will be chronically implanted for recording of bio-physiological signals. To control brain neurons activity, special exogenous protein will be expressed in the neurons by genetic alteration using adenovirus-associated viral vectors and transgenic animals.

Skills students will gain:
The projects in the brain neuroscience research field HDR and Honours students will have opportunities to learn general animal surgery and the following major techniques:
1. Recording vital bio-physiological signals such as brain and heart electrical signals, blood pressure and body temperature in conscious live animals
2. Controlling neuronal activity with state-of-the-art techniques including optogenetics and chemogenetics

Key staff associated with projects:
- Emeritus Professor William Blessing (former clinical doctor in Neurology)
- Miss Anna Antipov (3rd year PhD student)
- Mr Jett Zivkovic (2nd year PhD student)
- Miss Nosreen Khan (Honours student)
- Miss Wei-Hung Yang (Honours student)
- 5 medical students

flinders.edu.au/fmhri-neuroscience/our-labs/integrative-neuroscience-laboratory
Location: Flinders Medical Centre

Supervisor name: Professor Janni Petersen
Supervisor email: janni.petersen@flinders.edu.au
Name of research group: Environmental control of cell growth and cell division

Description of research area and interests:
We have an interest in understanding two major signalling networks that are implicated in tumourigenesis and diabetes in humans.

Target Of Rapamycin (TOR) and AMPK signalling networks are the major nutrient sensing pathways in all eukaryotic cells. Our work aims to extend our understanding of two major signalling networks that are implicated in tumourigenesis and diabetes in humans to adjust growth and cellular metabolism in response to changes in the nutrient environment. Our main model organisms are S. pombe and mammalian tissue culture models.

Outline of projects:
Cancer is a disease of inappropriate cell growth and cell division. In addition, cancer cells migrate to colonise new parts of the body, here they undergo cell division in environments with limited nutrient supply and therefore cancer cells are frequently nutritionally stressed. The Target of Rapamycin (TOR) signalling pathway co-ordinates cell division with available nutrients and importantly altered TOR signalling has been linked to 80% of cancers.

In shedding light on the mechanisms behind environmental and TOR pathway control of cell division we will aim to target these in human cancers.

Skills students will gain:
A range of techniques including mammalian tissue culture, cell biology and genetics (CRISPR/Cas9 technology), Biochemistry including: SDS-PAGE, western blotting, immune precipitation, kinase assays, Molecular biology including PCR, DNA cloning and DNA sequencing, Immuno-fluorescence microscopy and live cell imaging.

Good knowledge of genetics, biochemistry, cell biology and cell physiology is desirable.

Key staff associated with projects:
- Ms Tinkyng Wang
- Miss Katie Morrison
- flinders.edu.au/people/janni.petersen

Location: Flinders Centre for Innovation in Cancer

Miss Katie Morrison
Research Supervisors and their projects
Molecular Biosciences

**Supervisor name:** Professor Claire Roberts
**Supervisor email:** claire.roberts@flinders.edu.au
**Name of research group:** Pregnancy Health and Beyond Lab

**Description of research area and interests:** Claire Roberts is a pregnancy and placenta researcher who has recruited large numbers of pregnant women into pregnancy cohorts; two of which are named SCOPE (Screening for Pregnancy Endpoints) and STOP (Screening Testes to Predict poor outcomes of Pregnancy). She has large clinical, lifestyle and psycho-social datasets to go with biobanks for these cohorts. She has developed patented algorithms for use as screening tools to predict which women are at risk of developing a major pregnancy complication including preclampsia, gestational diabetes mellitus, small for gestational age and spontaneous preterm birth. These were developed in SCOPE and validated in STOP.

Claire’s research is interested in both genetic and modifiable risk factors including maternal diet and micronutrient status, metabolic health and other lifestyle factors, that could be targeted to reduce risk for pregnancy complications. For these her group interrogates cohort data and also uses cell and molecular techniques to determine how modifiable factors affect placental function ex vivo and in vitro.

The group is currently undertaking a study to profile placenta and maternal blood across gestation using next generation sequencing technologies. Multi-omic data is revealing how the placenta develops across gestation and what is different at the molecular level in the placenta in pregnancy complications. Differences conferred by fetal sex are a focus of interest.

**Outline of projects:**
- Effects of micronutrients on placental function.
- Genetic factors including fetal sex that contribute to placental function and pregnancy outcomes at the population, cohort and placental transcriptome levels.
- Bioinformatic analyses of multi-omic profiling of the placenta across gestation.
- Role of circRNA in placental development and function and pregnancy outcome.
- Follow-up of STOP women and children aged 3 years old.

**Skills students will gain:**
- Cell culture, ELISA, western blotting.
- Molecular biological techniques, bioinformatics and biostatistics.

**Key staff associated with projects:**
- Dr Tanja Jankovic-Karasoulos
- Dr Anya Arthurs
- Ms Melanie Smith
- Mr Dylan McCullough
- Dr Shalem Leemaqz.

**Location:** Flinders Medical Centre

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**Supervisor name:** Dr Mary-Louise Rogers
**Supervisor email:** mary-louise.rogers@flinders.edu.au
**Name of research group:** MND & NR Research Laboratory

**Description of research area and interests:** Our laboratory is wholly focused on motor neuron disease research. We are world leaders in urinary biomarkers, and publish leading journals, obtaining funding from various sources.

**Outline of projects:**
- Our laboratory was the first in the world to describe a urinary biomarker of motor neuron disease that follows disease progression and can determine treatment effects. The new project will be examining by proteomic and other analysis other urinary biomarkers that may also be prognostic or pharmacodynamic.

**Skills students will gain:**
- Proteomics.
- Western blots.
- ELISAs.
- Protein quantification.

**Location:** Flinders Medical Centre

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**Supervisor name:** Associate Professor Luke Selth
**Supervisor email:** luke.selth@flinders.edu.au
**Name of research group:** Prostate Cancer Research Group

**Description of research area and interests:**
- Prostate cancer will affect approximately 1.7 Australian men and results in >3,000 deaths per annum in this country alone. To improve outcomes for men with this disease, the Prostate Cancer Research Group at Flinders University undertakes basic research to characterise the mechanisms by which prostate tumours metastasise become resistant to targeted therapies. We feed this new knowledge into translational research projects aimed at developing new drugs and biomarkers to improve the treatment and management of patients.

**Outline of projects:**
- Developing novel therapeutic strategies to target the androgen receptor and cyclin-dependent kinases in lethal prostate cancer. This project aims to investigate the efficacy and mode of action of novel therapeutics developed by our national and international collaborators. Such pre-clinical evaluation is a critical step in the drug development pipeline.

- Cancer cell plasticity as a therapy resistance mechanism in lethal prostate cancer. This project aims to understand how prostate cancer cells switch between different phenotypic states to evade therapy. It will utilise cutting-edge single-cell ‘omic’ methods and unique models of highly ‘plastic’ prostate cancer.

- Non-coding genomic alterations as drivers of lethal prostate cancer.

This project comprises primarily bioinformatics-based research, with the goal to identify epigenetic drivers of therapy resistance. It will harness our labs collaborations with world-leading computational biology labs in Cambridge, UK.

**Skills students will gain:**
- Outlining edge omics techniques e.g. transcriptomics (RNA-seq, single-cell RNA-seq) and epigenomics (CHIP-seq, ATAC-seq, DNA methylation profiling).
- Molecular biology and biochemistry.
- Bioinformatics.

**Key staff associated with projects:**
- Ms Adrienne Hanson
- Mr Scott Townley
- Mr Reza Ghodsi (PhD student)
- Ms Razia Rahman (PhD student)
- Associate Professor Simon Conn
- Professor Shudong Wang (UniSA)
- Associate Professor Kim Gregory (UniSA), Professor Jason Carroll (Cancer Research UK, Cambridge)
- Luke Selth

**Location:** Flinders University
Research Supervisors and their projects

Molecular Biosciences

Supervisor name: Professor Justine Smith
Supervisor email: justine.smith@flinders.edu.au
Name of research group: Eye & Vision Health
Description of research area and interests: Professor Smith supervises projects on the group of diseases called uveitis. Uveitis is inflammation inside the eye that may be caused by a viral or parasitic infection, or may be a non-infectious inflammatory disease (similar to multiple sclerosis or inflammatory bowel disease). Professor Smith is an ophthalmologist, eye doctor, who treats patients with uveitis at Flinders Medical Centre, and at her laboratory, the research team studies the cellular and molecular mechanisms of uveitis and works towards better treatments.
Outline of projects:
• Migration mechanisms for leucocytes into the human eye: Adhesion molecules on the vascular endothelium allow leucocytes to patrol the body and fight pathogens. However, they may misdirect leucocytes into the eye in the absence of infection to cause uveitis. Study the adhesion molecules on the endothelium of the eye and investigate how expression may be manipulated as the basis for a new uveitis treatment.
• Treatment strategy for COVID-19: Use eye cells and/or tissues as a model system for developing drugs to treat COVID-19.
Skills students will gain:
Experimental design, including developing scientific hypotheses. Laboratory methods: our research involves many different molecular and cell biology techniques. Data analysis and presentation. Science communication.
Key staff associated with projects:
Mr Liam Ashander
Dr Yuefang Ma
HND and MD students who also work on the team to progress research on uveitis.
flinders.edu.au/people/justine.smith
Location: Flinders Medical Centre

Supervisor name: Associate Professor Erin Symonds
Supervisor email: erin.symonds@flinders.edu.au
Name of research group: Bowel Health Service
Description of research area and interests: The research of the Bowel Health Service focuses on preventing bowel cancer. This includes developing new biomarkers to improve screening options for people in the community, personalising surveillance for people at increased risk for bowel cancer, and monitoring for risk of cancer recurrence after surgery.
Outline of projects:
• Determining the type (and combination) of screening tests that should be offered to people at increased risk for bowel cancer.
• Developing biomarkers to allow early detection and prevention of cancer.
• Looking into risk of bowel cancer in people with a family history of cancer.
• Using biomarkers to monitor success of cancer treatment.
• Developing new ways to reduce the number of colonoscopies being done in Australia.
• Determining the type (and combination) of polyps in the bowel that increase risk for cancer in the future.
• Looking into whether people will make changes to their lifestyle to reduce cancer risk.
• Improving the quality of colonoscopy in South Australia.
Skills students will gain:
• Knowledge of risk factors for bowel cancer.
• Learn about different pathologies that can be found with colonoscopy.
• Experience in working with large data sets.
• Will learn about performing statistical analysis.
• Understanding patient behaviour when it comes to bowel cancer prevention.
Key staff associated with projects:
Gastroenterologists, nurses, technical staff, administration staff, scientists.
flinders.edu.au/people/erin.symonds
Location: Flinders Centre for Innovation in Cancer

Supervisor name: Dr Lauren Thurgood
Supervisor email: lauren.thurgood@flinders.edu.au
Name of research group: Lymphoproliferative Research Group – Proteomics and Metabolism
Description of research area and interests: My research is focussed on chronic lymphocytic leukaemia (CLL), a common adult leukaemia. The overall goal of my research is to understand the differences of these cancer cells to healthy cells and if these changes can be targeted using novel therapies. This approach uses techniques such as proteomics to look at changes in protein expression and cell culture models to understand how these cells respond to various stimulation.
I have a strong interest in cancer cell metabolism and how cancer cells use nutrients to proliferate. This includes understanding how disruption of nutrient delivery or nutrient use can be targeted for new therapies. Using the Cell Screen Facility at FHMRI, we are interested in screening large numbers of novel compounds against metabolic pathways to determine their efficacy in CLL.
Outline of projects:
• Targeting metabolic pathways in CLL as a novel therapeutic strategy.
• Based on preliminary data, we have identified metabolic pathways that are critical for CLL cell survival. This project will aim to analyse a large number of novel inhibitors against this pathway using cell culture models and animal models.
Skills students will gain:
Flow cytometry, cell culture, proteomics, understanding of clinical research, working in a large and diverse research team (e.g. clinicians, scientists).
Key staff associated with projects:
Dr Giles Best
Associate Professor Karen Low
Dr Stephen Gregory
Associate Professor Bryony Kuss.
flinders.edu.au/people/lauren.thurgood
Location: Flinders Medical Centre
Supervisor name: Dr Craig Wallington-Beddoe
Supervisor email: craig.wallingtonbeddoe@flinders.edu.au
Name of research group: Multiple Myeloma Translational Research Laboratory

Description of research area and interests: My translational research program focuses on the presently incurable blood cancer multiple myeloma with the aim of investigating key biological processes to develop novel therapeutic strategies. The research is conducted at Flinders University and at the Centre for Cancer Biology UniSA, and links with the haematology clinical trials unit and direct patient management at Flinders Medical Centre.

Outline of projects:
• Manipulating endoplasmic reticulum stress levels in multiple myeloma cells to enhance the cytotoxic effects of proteasome inhibitors and other novel agents, particularly in the setting of relapsed or refractory disease.
• Biomarker and therapeutic roles of adhesion proteins in multiple myeloma.
• Characterising drug efflux transporters on multiple myeloma cells to enhance therapeutic responses.
• Elucidation of the role a novel iron-dependent cell death mechanism termed “ferroptosis” plays in the survival of multiple myeloma cells and how this biological process contributes to the efficacy of drugs used to treat this cancer. This project involves exploring several aspects of the ferroptosis signalling pathway, relating lipid and iron metabolism, generation of ROS and glutathione production to multiple myeloma cell survival and death.

Skills students will gain:
Cell culture, PCR, RNA sequencing, Western blotting, flow cytometry and involvement in the development of phase 1 clinical trials.

Key staff associated with projects:
Dr Lauren Thurgood
Ms Rachel Mynott (PhD student)
Professor Stuart Pitson
Professor Claudine Bender
Dr Manjun Li

Location: Flinders Centre for Innovation in Cancer

Supervisor name: Dr Amy Wyatt
Supervisor email: amy.wyatt@flinders.edu.au
Name of research group: Protein Misfolding and Inflammation Laboratory

Description of research area and interests: Proteins are the molecular machinery responsible for carrying out the multitude of functions that are necessary to sustain life. In order for proteins to perform these functions they must first attain and then maintain their correct three-dimensional shape or ‘fold’. The accumulation of incorrectly folded (i.e. misfolded) proteins underlies more than 40 debilitating human disorders including Alzheimer’s disease, heart disease, arthritis and preeclampsia. Many of these conditions are currently without effective therapies. Misfolded proteins accumulate in the human body due to genetic mutations, damage induced by biological stresses or overwhelming of the biological systems normally responsible for protein folding quality control including molecular chaperones that stabilise misfolded proteins and facilitate their refolding or disposal. Our research focuses on understanding the relationship between inflammation and protein misfolding in health and disease with the end goal of contributing to the framework for the development of novel therapeutic and diagnostic strategies.

Outline of projects:
• Characterising the dual roles of hypochlorite as an inducer of protein misfolding and a regulator of extracellular proteostasis machinery
• Characterising the extracellular proteostasis network in pregnancy
• Elucidating the role of protein misfolding in pregnancy-associated complications
• Investigating non-canonical functions of human alpha-macroglobulins in health and disease

Skills students will gain:
• Biochemical analysis of proteins and protein misfolding using a range of techniques such as electrophoresis, Western blotting, chromatography, circular dichroism, fluorimetry and a range of plate reader assays.
• Bacterial cell culture and recombinant protein expression
• Purification of endogenous proteins from complex biological fluids
• Mammalian tissue culture and a range of cell-based assays
• Flow cytometry and confocal microscopy

Location: Flinders Medical Centre
Skill students will gain:
• Skills in reporting and publishing research

Skills students will gain:
• A comprehensive understanding of human respiratory/sleep physiology and health and relevant measurement approaches
• Skills in research design and methodology
• Statistical knowledge

Skills students will gain:
• Animal handling and surgical skills, protein analysis methods including ELISAs, histological staining and analysis, cell culture and general lab techniques.

Skills students will gain:
• Skills in research design and methodology
• Statistical knowledge
• Skills in reporting and publishing research

Name of research group: ICCU and FHMRI Sleep Health

Location: Flinders Medical Centre

Name of research group: ICCU and FHMRI Sleep Health

Location: Flinders Medical Centre

Name of research group: The Lung Lab

Location: Flinders Medical Centre (ICCU), Mark Oliphant Building (Sleep Health)

Name of research group: FHMRI Sleep Health Research Laboratory

Location: Flinders Medical Centre

Name of research group: FHMRI Sleep Health (formally Adelaide Institute for Sleep Health)

Location: Flinders Medical Centre

Description of research area and interests:
The Lung Lab has various interests in the respiratory health but specifically stimuli of acute lung injury and methods to alleviate respiratory inflammation and damage. We have an established history in several in vitro and in vivo models, as well as clinical studies linked with the Intensive and Critical Care Unit at Flinders Medical Centre. Areas of focus include mediator regulation of cellular activation and infiltration of the lung and the resultant lung remodelling, and the implications on pulmonary function including respiratory mechanics and fluid regulation. As part of this research group, I have interests in intravenous fluid instillations and the hemodynamic effects on the respiratory system resulting in respiratory dysfunction and damage.

Outline of projects:
The project aims to continue investigation into the physiological outcomes and hemodynamic effects of fluid instillation with the creation of a two-hit acute lung injury model, utilising ventilator-induced injury or bacterial stimulated inflammation. The project will use in vivo models to explore the mechanisms underlying the physiological changes associated with the two-hit acute lung injury model.

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Description of research area and interests:
The Lung Lab

Location: Flinders Medical Centre

Name of research group: The Lung Lab

Location: Flinders Medical Centre (ICCU), Mark Oliphant Building (Sleep Health)

Name of research group: FHMRI Sleep Health Research Laboratory

Location: Flinders Medical Centre

Name of research group: FHMRI Sleep Health (formally Adelaide Institute for Sleep Health)

Location: Flinders Medical Centre

Description of research area and interests:
The project will use in vivo models to explore the mechanisms underlying the physiological changes associated with the two-hit acute lung injury model.

Outline of projects:
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Research Supervisors and their projects

Clinical Translation

Supervisor name: Associate Professor Dani-Louise Dixon
Supervisor email: dani.dixon@flinders.edu.au
Name of research group: The Lung Lab

Description of research area and interests: The Lung Lab has various interests in the respiratory health but specifically stimul of acute lung injury and methods to alleviate respiratory inflammation and damage. We have an established history in several in vitro and in vivo models, as well as clinical studies linked with the Intensive and Critical Care Unit at Flinders Medical Centre. Areas of focus include mediator regulation of cellular activation and infiltration of the lung and the resultant lung remodelling, and the implications on pulmonary function including respiratory mechanics and fluid regulation. As part of this research group, I have interests in innate immunology associated with acute and chronic lung injury including ALI/ARDS, infant bronchitis, and chronic heart failure.

Outline of projects:
The project aims to continue investigation into the physiological and immunological outcomes of bacterial and viral induced respiratory inflammation. The project may use in vitro, in vivo, or a combination of both models, as well as clinical samples, to explore the mechanisms underlying the inflammation of respiratory diseases.

Skills students will gain:
- Animal handling and surgical skills, protein analysis methods including ELISAs, histological staining and analysis, cell culture and general lab techniques, clinical sample preparation and analysis.

Supervisor name: Professor Danny Eckert
Supervisor email: danny.eckert@flinders.edu.au
Name of research group: FIMRI Sleep Health/Adelaide Institute for Sleep Health

Description of research area and interests:
Understanding the physiological causes of sleep apnoea and developing new targeted therapies through a comprehensive translational research program. A variety of experimental approaches are used to measure upper airway neuromuscular control and respiratory mechanics in humans to advance knowledge of basic mechanisms through to multicentre clinical trials to test new therapies including pharmacotherapies.

Outline of projects:
Multiple projects are on offer. These include detailed upper airway physiology studies to advance knowledge on the mechanisms of upper airway muscle reflexes and how impaired pharyngeal muscle function contributes to airway collapsibility through to clinical trials aimed at delivering one or more targeted therapies to treat sleep apnoea including new pharmacotherapies.

Skills students will gain:
- A comprehensive understanding of human sleep and respiratory physiology
- Clinical research expertise
- Advanced skills in study design and methodology
- Data and statistical analysis techniques
- Skills in reporting and publishing research

Supervisor name: Professor Bogda Koczwara
Supervisor email: bogda.koczwara@flinders.edu.au
Name of research group: Cancer Survivorship and Psycho-Oncology Group

Description of research area and interests:
Our research examines novel digital technologies to enable access to care. We have a particular interest in management of comorbidities and cancer, especially cardiovascular disease and are currently developing a nurse led clinical pathway for care delivery. Our research examines novel digital technologies to enable access to care. We have developed innovative online psychological interventions for cancer patients. We are also focusing on e-Health literacy and health disparities in access and uptake of digital technologies in cancer.

Outline of projects:
- Finding My Way research program – adaptation and replication of the Australian Finding My Way program, to the UK context, adaptation of the program to the metastatic breast cancer setting and analysis of implementation data.
- Healthy Living after Cancer – Online: an online adaptation of an evidence-based nutrition, physical activity, and weight management program for cancer survivors.

Skills students will gain:
- Evidence synthesis, systematic literature reviews, intervention co-design, qualitative and quantitative analysis, clinical trials design and conduct, ethics and governance reporting

Key staff associated with projects:
Dr Reegan Knowles
Dr Lisa Beatty
Dr Emma Kemp.
flinders.edu.au/people/bogda.koczwara
Location: Flinders Centre for Innovation in Cancer
Research Supervisors and their projects

Clinical Translation

Supervisor name: Dr Nicole Lovato
Supervisor email: nicole.lovato@flinders.edu.au
Name of research group: FHMRI Sleep Health (formally Adelaide Institute for Sleep Health)

Description of research area and interests: Dr Lovato’s research is focused on the basic and clinical aspects of sleep, circadian rhythms, and sleep disorders such as insomnia, and the translation of this knowledge to ensure best-practice sleep healthcare is accessible and cost-effective for the community. Dr Lovato has developed and assessed novel, tailored psychology-based treatments for patients suffering from insomnia and other sleep disorders. She has an ongoing interest in this area.

Outline of projects:
Several projects will be offered, each focusing on evaluating the efficacy of personalized treatments for insomnia including wearable devices and new models of care to transform the management of insomnia and associated mental ill-health in Australia and globally.

Skills students will gain:
• Statistical knowledge
• Skills in reporting and publishing research

Key staff associated with projects:
Professor Leon Lack
Associate Professor Andrew Vakulin
Dr Gorica Micic
Dr Emer Van Rijwyk
Dr Alexander Sweetman
flinders.edu.au/adelaide-institute-sleep-health
Location: Mark Oliphant Building

Supervisor name: Dr James McEvoy-May
Supervisor email: j.mcevoy@flinders.edu.au
Name of research group: The Lung Lab

Description of research area and interests: This Lung Lab has various interests in the respiratory health but specifically stimuli of acute lung injury and methods to alleviate respiratory inflammation and damage. We have an established history in several in vitro and in vivo models, as well as clinical studies linked with the Intensive and Critical Care Unit at Flinders Medical Centre. Areas of focus include mediator regulation of cellular activation and infiltration of the lung and the resultant lung remodelling, and the implications on pulmonary function including respiratory mechanics and fluid regulation. As part of this research group, I have interests on bacterial and viral stimuli of respiratory inflammation, investigating physiological and immunological outcomes of respiratory function, with a focus on the immunomodulation potential of low dose ionising radiation. In addition, I have research interests in respiratory health following in utero exposures to ionising radiation. These radiation-based interests extend to both medical and occupational exposures.

Outline of projects:
The project aims to modulate the proinflammatory response during acute respiratory inflammation by exposure to a low-to-moderate dose of ionising radiation, thereby reducing the severity of injury to the lung. The project may use in vitro, in vivo or a combination of both models to explore the mechanisms underlying the immunomodulatory properties of ionising radiation.

Skills students will gain:
• Investigate targeted treatments for respiratory health
• Investigate targeted treatments for circadian rhythm disorders and insomnia
• Improve sleep and daytime functioning

Key staff associated with projects:
Professor Danil Louise Dixon
Associate Professor Shalish Bhari
Associate Professor Tony Hooker.
researchnow.flinders.edu.au/en/persons/james-mcevoy
Location: Flinders Medical Centre

Supervisor name: Dr Gorica Micic
Supervisor email: gorica.micic@flinders.edu.au
Name of research group: FHMRI Sleep Health (formally Adelaide Institute for Sleep Health)

Description of research area and interests: Dr Micic is a Clinical Psychologist and Postdoctoral Research Associate at FHMRI Sleep Health. Her research interests relate to understanding the psychological, behavioural and physiological aspects of normal and disordered sleep. This includes the underlying mechanisms of circadian rhythm (body clock) disorders, insomnia and environmental factors that impact sleep (e.g., light and noise). She has conducted extended and intricate human laboratory experiments in these areas and has access to various existing datasets through this work, within the research team and through collaborations. This work aims to better understand sleep, insomnia and circadian rhythms to create targeted and more effective treatments to improve sleep, daytime functioning and wellbeing.

Outline of projects:
• Establish the psychological and physiological impacts of environmental noise on sleep
• Investigate the underlying causes and mechanisms of circadian rhythm (body clock) misalignment
• Improve sleep and daytime functioning through optimised light and noise interventions
• Investigate targeted treatments for circadian rhythm disorders and insomnia
• Examine cross-sectional and longitudinal impacts of sleep and sleep-related factors

Key staff associated with projects:
Professor Peter Catchside
Dr Nicole Lovato
Professor Leon Lack
Dr Branko Zajamsek
Dr Kristy Hansen, Associate Professor Andrew Vakulin
Dr Alexander Sweetman
Dr Ranjay Chakraborty
Dr Sarah Aplston
Dr Yohannes Melaku.
flinders.edu.au/adelaide-institute-sleep-health
flinders.edu.au/people/gorica.micic
Location: Mark Oliphant Building

Supervisor name: Dr Yohannes Melaku.
Supervisor email: ymelaku@flinders.edu.au
Name of research group: FHMRI Sleep Health (formally Adelaide Institute for Sleep Health)

Description of research area and interests: Dr Melaku’s research interests include set-up of Polysomnography (PSG) and administration of psychological, neurocognitive and other day and night-time performance and functioning assessments. This research aims to understand sleep and its relationship with physical and mental health.

Outline of projects:
Several projects will be offered, each focusing on evaluating the efficacy of personalized treatments for insomnia including wearable devices and new models of care to transform the management of insomnia and associated mental ill-health in Australia and globally.

Skills students will gain:
• Extensive sleep laboratory skills
• Understanding of human-based research in the laboratory and ambulatory settings
• Work with diverse clinical groups including healthy and vulnerable individuals
• Methodological research implementation, translation of findings and publishing

Key staff associated with projects:
Professor Peter Catchside
Dr Nicole Lovato
Professor Leon Lack
Dr Branko Zajamsek
Dr Kristy Hansen, Associate Professor Andrew Vakulin
Dr Alexander Sweetman
Dr Ranjay Chakraborty
Dr Sarah Aplston
Dr Yohannes Melaku.
flinders.edu.au/adelaide-institute-sleep-health
flinders.edu.au/people/gorica.micic
Location: Mark Oliphant Building
Research Supervisors and their projects

Clinical Translation

Supervisor name: Dr Michael O’Callaghan
Supervisor email: michael.o'callaghan2@sa.gov.au
Name of research group: Flinders Medical Centre Urology Unit

Description of research area and interests:
My research investigates health outcomes in patients with urologic cancers. A particular focus is prostate cancer and our group manages the state prostate cancer registry, SA-PCOC. In addition to this, our research studies kidney cancer, bladder cancer, testicular cancer and other aspects of urology.

Outline of projects:
Our group supervises students at undergraduate, Honours, Masters and PhD levels, and particularly junior medical staff who are seeking selection into the urology specialty program. Projects use a variety of epidemiologic methods including predictive modelling, systematic literature reviews with meta-analysis, and cover topics ranging from screening and treatment selection to health-related quality of life.

Skills students will gain:
Systematic literature reviews, evidence appraisal, meta-analysis, statistical analysis, cohort studies.

Supervisor name: Professor Joseph Selvanayagam
Supervisor email: joseph.selvanayagam@flinders.edu.au
Name of research group: Cardiac Imaging Research

Description of research area and interests:
As the Director of Cardiac Imaging Research (CIR), Professor Joseph Selvanayagam leads a group with an international reputation in randomised clinical trials, and cardiac imaging research. The research program can be summarised under the overall theme of using cardiac imaging to answer mechanistic questions in three broad areas in cardiology: Heart failure and Cardiomyopathy, Coronary Artery Disease and Arrhythmia Disorders. The CIR team members have the required technical expertise in advanced imaging analysis to successfully carry out the proposed project. The group also has the existing IT infrastructure to execute the project within the required time frame.

Outline of projects:
Hypertrophic cardiomyopathy (HCM) is an inherited condition that results in an abnormally thickened heart muscle. It is the most common inherited heart muscle condition affecting up to 1 in 200 of the general population. Treatment of HCM has focused on relief of symptoms by drugs such as Beta-blockers which slow the heart rate and allows blood to completely fill the chambers before it is pumped out, leading to improved heart function. However, symptom relief is often incomplete and there is no evidence on the benefit of Beta-blockers or related medications to reverse abnormal heart muscle thickening.

There is some preliminary evidence that a drug, Perhexiline, currently used as an anti-anginal agent, increases the energy efficiency of the heart, and may aid in the improvement of symptoms in patients with HCM. No study has looked at the reduction of muscle thickness with Perhexiline which is the principal driver of heart failure in HCM. We aim to study the effects of perhexiline treatment on heart muscle thickness in symptomatic HCM patients.

Skills students will gain:
Overview of conduct of research projects. Active involvement in the proposed project, including writing of the first draft. Completion of abstract. Co-author in an original article.

Key staff associated with project:

Supervisors’ names:
Associate Professor Jenny Walker
Associate Professor Mihir D Wechalekar

Supervisors’ emails: mihir.wechalekar@flinders.edu.au jenny.walker@flinders.edu.au
Name of research group: Rheumatology

Description of research area and interests:
Rheumatoid arthritis (RA) is a chronic inflammatory disease of the joints that commonly affects hands, wrists, feet, ankles, knees and shoulders. Treatment aims to reduce symptoms, improve function and prevent structural damage to joints. Current therapies target production of pro-inflammatory cytokines and include disease modifying anti-rheumatic drugs (DMARDs). This is in contrast to an alternative pathological approach based on target-organ (synovial tissue (ST), the joint lining or synovial tissue (JL) biology. We run a synovial tissue biobank, the only such facility in Australia & one of the very few worldwide.

Outline of projects:
RA affects 1-2% of the population, mostly in their working age, and leads to pain, disability and enormous societal costs; response to treatment predicts ability to work. Despite treatment advances, including biologic disease modifying therapies (DMARDs), remission (lack of clinical detectable disease) occurs in only 20%, and sustained remission in even less. In addition, there are no established parameters that can currently objectively predict remission or impending flares. RA is a heterogeneous disease clinically and pathologically, and one reason for the suboptimal response relates to the current non-targeted, trial and error use of DMARDs. This is in contrast to an alternative pathological approach based on target-organ (synovial tissue (ST), the joint lining) biology. RA analyses can allow therapy to be targeted to specific variants of the disease and potentially provide an objective guide to therapy modification and discontinuation. With existing national and international collaborations underpinned by a unique serial sequential biospecimen (ST, serum, RNA, DNA) collection from a clinically well-characterised cohort of treatment naïve patients with RA we aim to: (a) improve understanding of mechanisms of response, or lack thereof, to biologic DMARDs; (b) improve understanding of RA pathophysiology by characterising newly identified macrophage, fibroblast, and T-cell subsets and analysing their responses to treatment; and; (c) attempt to identify markers that will reliably predict RA remission and flares.

Skills students will gain:
Skills in laboratory techniques- histology, immunohistochemistry, RT-PCR. Exposure to and involvement in some newer research techniques- RNASEq, CyTof Translational research from bedside to bench to bedside.

Key staff associated with projects:
Ms Annabelle Small, Research Associate. flinders.edu.au/people/mihir.wechalekar
Location: Flinders Medical Centre
Supervisor name: **Professor David Watson**
Supervisor email: david.watson@flinders.edu.au
Name of research group: Upper Gastrointestinal (GI) cancer research group

**Description of research area and interests:** Our aim is to transform the outcomes for individuals with oesophageal adenocarcinoma by prevention and early detection, focusing on strategies to: 1) detect precancer or cancer at its earliest stage when cure is more likely; 2) more cost-effectively deliver Barrett's oesophagus surveillance (precancer) surveillance by stratifying for cancer risk and targeting individuals at significant risk; and 3) develop a cost-effective framework for Barrett's oesophagus screening in the Australian population.

**Outline of projects:**
- Developing, testing and applying context.
- Devising and testing new surveillance strategies for clinical practice; and
- Developing a cost-effective framework to determine cost-effectiveness and cost-utility of new strategies for clinical practice.

**Skills students will gain:**
- Molecular biology.
- Clinical outcomes measures.
- Statistical analysis.
- Data management.
- Health economics.

**Key staff associated with projects:**
- Dr Kaye Muller
- Dr Jeyamani Ramachandran
- flinders.edu.au/people/david.watson

Location: Flinders Medical Centre

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Supervisor name: **Professor Alan Wigg**
Supervisor email: alan.wigg@sa.gov.au
Name of research group: Liver research group

**Description of research area and interests:**
Clinical research into new models of care for chronic liver failure.

**Outline of projects:**
- Developing and testing new surveillance strategies within a health economics model to ensure clinical resources are focussed to areas of greatest benefit, and concurrently to minimise low-value interventions for Barrett's oesophagus and oesophageal adenocarcinoma.

**Skills students will gain:**
- Molecular biology.
- Clinical outcomes measures.
- Statistical analysis.
- Data management.
- Health economics.

**Key staff associated with projects:**
- Dr Norma Bulamu
- Dr Roger Yazbek
- flinders.edu.au/people/david.watson

Location: Flinders Medical Centre

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**Outline of projects:**
- Telehealth services in primary care
- Comparing methods of Health Technology Assessment in Australia and the UK
- Evaluation of policy reforms in the community-based aged care services
- Using longitudinal data to estimate costs and outcomes of frailty interventions
- Assessing the costs and benefits of incorporating more complex model structures for the economic evaluation of new health technologies

**Skills students will gain:**
- Critical appraisal.
- Descriptive statistics.
- Advanced statistics.
- Multivariable analysis.
- Modelling.
- Surveys.
- Interviews.

**Key staff associated with projects:**
- Professor Jonathan Karnon
- flinders.edu.au/people/hossein.afzali

Location: Health Sciences Building
**Research Supervisors and their projects**

**Healthy Communities**

### Supervisor name: Associate Professor Niranjan Bidargaddi

**Supervisor email:** niranjan.bidargaddi@flinders.edu.au

**Name of research group:** Personalised Health Informatics Group

**Description of research area and interests:** The objective of our research is to develop and implement digital health systems that improve capacity to predict, identify, treat and prevent in general and clinical populations e.g. mental health, endometriosis, ageing. Our most recent focus has been real-time monitoring and support for the mental health sector (MRFF Rapid Translation projects). Areas of interest include: 1) Objective, real-time monitoring, and early support tools for mental health using smartphones and wearables and innovative use of Medicare claims data. 2) Trials of digital health interventions focussed on real-time monitoring and support. 3) End-user studies with State mental health care authorities, community mental health care providers and consumer/carer groups focussed on community mental health care providers with State mental health care authorities, interventions focussed on real-time claims data. 2) Trials of digital health using smartphones and wearables. Our interest include: 1) Objective, real-time monitoring and support tools for mental health using smartphones and wearables and innovative use of Medicare claims data. 2) Trials of digital health interventions focussed on real-time monitoring and support. 3) End-user studies with State mental health care authorities, community mental health care providers and consumer/carer groups focussed on community mental health care providers with State mental health care authorities, interventions focussed on real-time claims data.

**Supervisor name:** Mrs Anthea Brand

**Supervisor email:** anthea.brand@flinders.edu.au

**Name of research group:** Remote Primary Health Care Manuals Project

**Description of research area and interests:** The Remote Primary Health Care Manuals (RPHCM) are a suite of manuals that are used to guide high quality care for people living in remote areas of Australia. The manuals have a focus on Indigenous health and are developed and updated by the users for the users to ensure that the knowledge contained in the manuals is not only evidence based but is appropriate to the particularities of remote primary health care and is culturally appropriate to meet the needs of local communities. There are a number of research areas arising from the review process of these manuals including how the manuals inform practice and the outcomes of their implementation as well as research topics associated with specific protocols across early childhood, antenatal and postnatal care, chronic disease, trauma, ear and eye health.

**Key staff associated with project:**

- Project Officers (Academic B/C) - Remote Primary Health Care Manuals

**Location:** Centre for Remote Health, Alice Springs

**Skills students will gain:**

- Skills in systematic reviews, Digital Health, qualitative interview and analysis skills, project planning, multidisciplinary work experience.

**Outline of projects:**

- The RPHCM are reviewed on a regular basis, the current review period is funded for the period 2019-2022. A variety of short form research projects could be undertaken during the review period under the supervision of the project team and/or in collaboration with other research groups. The duration of the review period is best suited for evidence reviews and brief qualitative research.

### Supervisor name: Associate Professor Narelle Campbell

**Supervisor email:** narelle.campbell@flinders.edu.au

**Name of research group:** Rural and Remote Health

**Description of research area and interests:** Rural and remote workforce retention

**Outline of projects:**

- Participants from a national 2010 allied health professional study that examined participant personality profession and work location agreed to be followed-up. The proposed study will contact these 2010 participants to understand the match between their 2010 work intentions and subsequent work location decisions. The aim of the research will be to investigate rural and remote work location decisions and association between intention and actual outcome.

**The existing data set comprises 586 records of allied health professionals with an interest and/or experience in rural and remote work.**

**Location:** Anywhere – I work from the Flinders Northern Territory campus (Darwin).

**Outline of projects:**

- Depending on the level and interests of the participant personality profession and work location decisions and association between intention and actual outcome.

**Skills students will gain:**

- Ethics application to re-use existing data set to follow up participants from 2010 study

- Survey design, data collection and analysis

- Data set analysis

- Publication – conference presentation/ writing a paper

**Key staff associated with projects:**

- Dr Chris Rissel, other staff may contribute to supervision dependent on the needs and level of the research student.

**Funding:**

- Flinders.edu.au/people/narelle.campbell

- The Flinders Northern Territory campus (Darwin).

- I am experienced with supervision via distance and the research design does not require face to face data collection or analysis. Students who are physically located in the Northern Territory will be preferenced. We are planning a PhD scholarship which could potentially provide some financial support.
Research Supervisors and their projects

Healthy Communities

Supervisor name: Dr Laura Edney
Supervisor email: laura.edney@flinders.edu.au
Name of research group: Health Economics
Description of research area and interests: Cancer is a common cause of morbidity and mortality in Australia and appropriate, cost-effective treatment to improve health outcomes is a key health priority. Ensuring current health care meets quality standards for all patients can contribute to improving overall health outcomes and health equity. Our research utilises population-level administrative datasets to evaluate diagnostic pathways, treatment patterns, specific care models, their costs and their relationships to health outcomes with a focus on how these differ across tumour and patient groups. We are also interested in the supportive care needs of cancer patients and understanding patient preferences for how supportive care needs might be best addressed and how these can inform local implementation of evidence-based care models with a focus on reducing age and location disparities in unmet needs.

Outline of projects:
Projects include describing and evaluating patterns of health care, costs and outcomes for cancer patients; evaluating the costs and outcomes of multidisciplinary team-based care for cancer patients; capturing patient preferences for addressing supportive care needs; and developing implementation frameworks to adapt evidence-based interventions to the local context to reduce the unmet supportive care needs of cancer patients.

Skills students will gain:
Students can gain a range of skills in qualitative and/or quantitative research methodologies and analyses depending on the specific topic. All projects will require collaborating with oncologists based at the Flinders Medical Centre.

Key staff associated with projects:
Professor Jonathan Karmon
Professor Bogda Kozwara.
Location: Health Sciences building

Supervisor name: Dr Joanne Flavel
Supervisor email: joanne.flavel@flinders.edu.au
Name of research group: Health, Society and Equity (Southgate)
Description of research area and interests: My research is concerned with the role of social and economic factors such as housing, income, employment and education that impact people’s daily lives, and determine population health outcomes and health inequalities. I work on projects examining how social and economic factors contribute to rising health inequalities and I also work on projects that examine the social and economic experiences of people from refugee backgrounds who have settled in Australia.

Outline of projects:
I would be interested in supervising students looking at factors contributing to health inequities or the social and economic experiences of people from refugee backgrounds who have settled in Australia. I am primarily interested in quantitative research projects involving secondary data analysis.

Skills students will gain:
Quantitative research that aims to provide an evidence base to inform policy and advocacy.

Key staff associated with projects:
Professor Fran Baum
Dr Toby Freeman
Flinders.edu.au/southgate-institute-health-society-equity.html
Location: Health Sciences Building

Supervisors’ names:
Dr Toby Freeman
Professor Fran Baum
Dr Katy Osborne
Associate Professor Anna Ziersch
Supervisor email: toby.freeman@flinders.edu.au
Name of research group: Health, Society and Equity (Southgate)
Description of research area and interests: The project seeks to understand and build an evidence base for decolonising practice in Aboriginal and Torres Strait Islander primary health care. Colonisation in Australia is ongoing and contributes to major effects on the health and wellbeing of Aboriginal and Torres Strait Islander peoples. Decolonising health care practices are the ways of working that seek to overcome colonial approaches to health. This means transforming the policies, processes and practices that have influenced health in the past, and which are still present today.

Outline of projects:
The project is funded by the NHMRC, and partners with 5 Aboriginal primary health care services across Australia. We are engaging in research methods with each partner service including community forums, logic model workshops, interviews with staff and board members, staff diaries, and client surveys.

Skills students will gain:
Students will be able to select a topic that is directly related to the project and of interest to them. They will then have the opportunity to be part of a dynamic and supportive team of Aboriginal and non-Indigenous researchers seeking to conduct research that combines Indigenous and non-Indigenous knowledge and approaches to research. Students will have the opportunity to gain skills in partnership-based research, qualitative and mixed methods research, and Indigenous research methods.

Key staff associated with projects:
Associate Professor Tamara Mackean, Dr Kim O’Donnell, Professor Juanita Sherwood. Associate Professor Deb Askew, Professor Annette Browne, Professor Michael Kidd, Ms Sonya Egerl, Ms Colleen Hayes, Ms Laura Bahnisch.
flinders.edu.au/southgate-institute-health-society-equity/aboriginal-torres-strait-islander-health
Location: Health Sciences Building

Potential projects could include:
• Narrative review of decolonising practice in health care
• Analysis of the policy context for Aboriginal and Torres Strait Islander Primary Health Care
• Examining services' users' experiences of decolonising practice
• Selecting one (or more) of the partner services to investigate decolonising practice at that service in depth.
• Conducting research with the Aboriginal and Torres Strait Islander primary health care sector more broadly to gather a range of perspectives on decolonising practice

Skills students will gain:
Students could gain skills in qualitative, social justice and evidence-based research that aims to have policy and practice impact to support the health of our population, and people’s rights to health.

Key staff associated with projects:
Professor Fran Baum, Dr Matt Fisher, Associate Professor Tamara Mackean, Dr Conia Musatina, Kristen Foley, Dr Yvonne Parry, Associate Professor Anna Ziersch, Dr Joanne Flavel.
flinders.edu.au/southgate-institute-health-society-equity.html
Location: Health Sciences Building

Supervisor name: Dr Toby Freeman
Supervisor email: toby.freeman@flinders.edu.au
Name of research group: Health, Society and Equity (Southgate)
Description of research area and interests: Health inequities in Australia are increasing. I lead a number of research projects examining different facets of how to address this rising health inequity, including: pursuing greater equity through comprehensive primary health care / community health; how to make public policy more equitable in access, use, and benefits from online information and services; and health care for people experiencing homelessness.

Outline of projects:
I would be interested in supervising students looking at these or other aspects of how to address health inequities. I am primarily interested in qualitative and mixed methods research projects, including participatory action research partnering with health services.

Skills students will gain:
Students could gain skills in qualitative, social justice and evidence-based research that aims to have policy and practice impact to support the health of our population, and people’s rights to health.

Key staff associated with projects:
Professor Fran Baum, Dr Matt Fisher, Associate Professor Tamara Mackean, Dr Conia Musatina, Kristen Foley, Dr Yvonne Parry, Associate Professor Anna Ziersch, Dr Joanne Flavel.
flinders.edu.au/southgate-institute-health-society-equity.html
Location: Health Sciences Building
Research Supervisors and their projects
Healthy Communities

Supervisor name:
Dr Mohammad Hamiduzzaman
Supervisor email: mohammad.hamiduzzaman@flinders.edu.au
Name of research group: Flinders University Rural Health, South Australia

Description of research area and interests:
I am chief investigator in major national projects, funded by Australian Department of Health, Harmony in the Bush: A Personalised Model of care for Dementia and VERILYConnect: Virtual Dementia Friendly Rural Communities. Also, chief Investigator of person-centred clinical interactions and COVID-19 Risk management projects. Major focus of my research is to reduce the clinical visits and medication for older adults and improve their physical and intellectual capacity through health literacy, self-care management and health seeking behavioural tools.

Outline of projects:
Management of frailty represents an indispensable part of clinical care for older adults in Australia. The patients' activation has potential to achieve adherence to self-care management of frailty leading to better health and well-being outcomes and possible decrease in the care burden of practitioners. Therefore, studies are required to understand the frailty and patient activation among the older adults.

These areas can be explored by:
- Panel data analysis to understand frail older adults' self-care management
- Review of literature on the effectiveness of patient activation interventions
- A survey to understand the prevalence of frailty and associated covariates in age-location specific population groups
- Develop the 'Patient Activation' intervention protocol for investigating frailty management

Skills students will gain:
Systematic literature review skills, understanding of ageing and frailty concepts, research philosophy and methodology, conceptual framework development, data collection and analysis, intervention protocol development, research publications writing, and thesis writing. Finally, you will achieve continuous engagement with a research team and environment.

Key staff associated with projects:
Colin MacDougall (PhD student) Dr Vivian Isaac Dr Abraham Kuot.
flinders.edu.au/people/mohammad.hamiduzzaman scholar.google.com/citations?user=H3JSgAAAAAJ&hl=en

Location: Flinders University, students can be based anywhere.

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Supervisor name:
Dr Vivian Isaac
Supervisor email: vivian.isaac@flinders.edu.au
Name of research group: Rural and Remote Health

Description of research area and interests:
Dr Vivian Isaac is a Senior Lecturer, Rural Mental Health at Flinders University Rural Health South Australia (FRHSA). He has a PhD in Rural Health (University of New South Wales) and previously a Wellcome Trust Research Fellow at the Institute of Psychiatry, King's College, London and an experienced social worker. Vivian Isaac's main academic interests is to understand the interactions between psychosocial biomarkers, social cognition, and health behaviors of vulnerable communities in rural and remote settings. He has an interest in cognitive ageing, dementia care, cognition and stress outcomes in rural health workforce and psychosocial epidemiology.

Outline of projects:
- Dementia care in rural and remote Australia: There is an overwhelming need to build best-practice evidence in dementia care, leading to improved health outcomes for persons with dementia and their carers. Evidence of non-pharmaceutical interventions is growing and have been recommended to be pursued at first instance, rather than pharmacological treatments in dementia care. The project will aim at co-design effective person-centred, non-pharmaceutical dementia care models for low-resourced rural and remote settings.
- Novel psychosocial and cognitive markers of suicide behaviours. Traditional indicators of suicide risk have predominantly focused on common mental health risk factors. We have noted that previous research does not adequately focus on psychosocial and cognitive factors; the evidence linking these factors with suicide is in its infancy or does not exist e.g., cognition; self-efficacy. Understanding the role of psychosocial and cognitive factors will improve strategies in suicide prevention.

Skills students will gain:
Epidemiological research methods, qualitative and quantitative analysis, psychometrics

Key staff associated with projects:
Dr Abraham Kuot Dr Mohammad Hamiduzzaman Dr Daya Ram Parajuli.
flinders.edu.au/people/vivian.isaac

Location: Flinders University

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Supervisor name:
Associate Professor Billingsley Kaambwa
Supervisor email: billingsley.baambwa@flinders.edu.au
Name of research group: Health Economics

Description of research area and interests:
Economics

Outline of projects:
- Estimation of healthcare costs and territory, this project will focus on: (i) several sources including the Admitted hospitalization data obtained from Australian health authorities to manage hospitalization and territory, this project will focus on: (ii) calculating the frequency of avoidable hospital readmissions due to ACS and chest pain
- Measurement of quality of life outcomes
d to frequently used preference-based quality of life outcome measures.
- Avoidable hospital readmissions due to acute coronary syndrome (ACS) and chest pain are an unnecessary expense to Australians. However, the actual number and cost of these readmissions are unknown making it difficult for Australian health authorities to manage the problem. Using existing national hospitalization data obtained from several sources including the Admitted Patient Collection of each Australian state and territory, this project will focus on: (i) calculating the frequency of avoidable readmissions due to ACS and chest pain (ii) calculating the actual cost of these readmissions and (iii) finding out what causes some of these costs to be high and others to be low.

Skills students will gain:
Understanding of
- Approaches for assessing the performance of sleep-specific versus generic quality of life measures.
- Statistical and econometric approaches for assessing validity and performance of quality of life measures.
- Methods of estimating hospital readmissions
- Methods of calculating costs and associated variability
- Econometric approaches for assessing healthcare costs

Key staff associated with projects:
Professor Robert Adams Associate Professor Issu Ranasinghe.
flinders.edu.au/people/billingsley.kaambwa

Location Health Sciences Building
Research Supervisors and their projects
Healthy Communities

Supervisor name: 
Professor Jonathan Karnon
Supervisor email: jonathan.karnon@flinders.edu.au
Name of research group: Health Economics

Description of research area and interests: 
Economic evaluation is an important tool to identify high and low value approaches to the organisation and delivery of health care. Economic evaluation is routinely used to inform decisions taken within local health services, such as the Southern Adelaide Local Health Network (SALHN), the network that manages Flinders Medical Centre. This research area aims to use the large amount of clinical and economic data collected across the health system to inform the design and implementation of new models of care, to improve the organisation and delivery of health care within local health services.

Outline of projects:
• Evaluating options for improving the organisation and delivery of health care in the Emergency Department
• Designing and evaluating models of care to reduce inpatient length of stay
• Evidence-based co-design of interventions to reduce Hospital Acquired Complications

Skills students will gain:
• Quantitative data analysis of health systems data
• Evidence review and synthesis
• Co-design methods with local health service clinicians and consumers

Key staff associated with projects:
Dr Laura Edney, clinical academics in relevant clinical areas.

Supervisors names: 
Dr Katy Osborne
Dr Toby Freeman
Professor Fran Baum
Supervisor email: katy.osborne@flinders.edu.au
Name of research group: Health, Society and Equity (Southgate)

Description of research area and interests:
There are opportunities for research projects linked to a broad area of study in the Southgate Institute to develop a comprehensive history of community health services in Australia (including women’s and Aboriginal and Torres Strait Islander health services) which offer a different model of care to the mainstream medical model.

Student research projects linked to this area of study would be primarily qualitative, and focus on the areas of: archival analysis of documents such as Federal and State/Territory policy documents from the 1970s onwards, and other documents, such as those from the Australian Community Health Association and its state branches.

Outline of projects:
This is an ongoing area of work for researchers in the Southgate Institute. Together with academic and industry partners in SA, Victoria and NSW, researchers at the Southgate lead a grant application to the ARC in 2020 which is currently under consideration. If this application is successful, there will be opportunities for students to be involved in the larger study. If it is unsuccessful, there will be opportunities to work on small research projects in this area which can contribute to developing a history of community health in Australia.

Skills students will gain:
• Qualitative research skills in areas such as:
  • Document analysis
  • Undertake and analyse interviews
  • Analyse interview transcripts
  • Building research partnerships with external stakeholders
  • Analysis and write up of qualitative research for academic publications

Key staff associated with projects:
Associate Professor Tamara Mackean
Professor Colin MacDougall
Professor Warwick Anderson
Professor Virginia Lewis
Professor David Legge
flinders.edu.au/people/jonathan.karnon
Location: Health Sciences Building

The research aims to:
• Develop a theoretically informed account of the social movements that advocated for community health services from the 1960s onwards, and other documents, such as those from the Australian Community Health Association and its state branches.
• Assess how political will for the 1973 Federal Community Health Program was achieved and subsequently lost.
• Analyse the development of community health services in New South Wales, South Australia and Victoria from the 1970s until the present and determine the forces that promoted and discouraged their development.

Skills students will gain:
• Literature reviewing
• Undertaking and analysing interviews
• Undertaking and analysing interviews
• Analyse interview transcripts
• Building research partnerships with external stakeholders
• Analysis and write up of qualitative research for academic publications

Key staff associated with projects:
Ms Madeleine Bower
Ms Annie Farthing
Associate Professor Narelle Campbell
Ms Annie Farthing
Ms Barbara Richards
Ms Madeleine Bower
flinders.edu.au/people/chris.rissel
flinders.edu.au/people/chris.rissel
Location: Flinders Northern Territory campus (Darwin) but experienced with supervision via distance.

Supervisor name: 
Dr Chris Rissel
Supervisor email: chris.rissel@flinders.edu.au
Name of research group: Flinders University, Northern Territory

Description of research area and interests:
Remote and rural health is a unique setting for primary health care and public health. It covers a broad range of health issues and social determinants of health. It provides many opportunities for original research and program evaluation. For simpler, more defined projects or entry level research, there are existing data-sets of health data available for analysis, or opportunities to collect data to describe health problems. More complex projects involve the development and/or evaluation of health programs or services, in collaboration with health service providers. Health outcomes of interest include specific allied health professionals or nursing clinical indicators, and more general morbidity and mortality indicators.

Understanding and respecting traditional Aboriginal and Torres Strait Islander culture is fundamentally important, and critical for delivering effective health care. Local cultural safety training is provided to nearly all students and new employees working in health services in the Northern Territory (considered remote using the Modified Monash Model). Evaluating this cultural training allows for improvements to the training, and demonstrates the impact of the training on professionals practice.

Skills students will gain:
• Literature reviewing
• Undertaking and analysing interviews
• Undertaking and analysing interviews
• Analyse interview transcripts
• Building research partnerships with external stakeholders
• Analysis and write up of qualitative research for academic publications

Key staff associated with projects:
Associate Professor Narelle Campbell
Associate Professor Sue Lenthall
Ms Annie Farthing
Ms Barbara Richards
Ms Madeleine Bower
flinders.edu.au/people/chris.rissel
flinders.edu.au/people/chris.rissel
Location: Flinders Northern Territory campus (Darwin) but experienced with supervision via distance.

Outline of projects:
• Conduct systematic literature review of frameworks and tools to evaluate primary health care in remote settings. Collect data to investigate a specific topic, analyse existing data to produce a report, work with health professionals to develop new services or programs with a view towards implementing and evaluating
• Analyse data from the process evaluation of cultural safety training, and prepare a report. Conduct a 3-6 month follow-up of the impact of cultural safety training on professional practice, and prepare a report. Contribute to a working group to review and improve cultural training

Skills students will gain:
• Literature reviewing
• Undertaking and analysing interviews
• Undertaking and analysing interviews
• Analyse interview transcripts
• Building research partnerships with external stakeholders
• Analysis and write up of qualitative research for academic publications

Key staff associated with projects:
Associate Professor Narelle Campbell
Associate Professor Sue Lenthall
Ms Annie Farthing
Ms Barbara Richards
Ms Madeleine Bower
flinders.edu.au/people/chris.rissel
flinders.edu.au/people/chris.rissel
Location: Flinders Northern Territory campus (Darwin) but experienced with supervision via distance.

Outline of projects:
• Conduct systematic literature review of frameworks and tools to evaluate primary health care in remote settings. Collect data to investigate a specific topic, analyse existing data to produce a report, work with health professionals to develop new services or programs with a view towards implementing and evaluating
• Analyse data from the process evaluation of cultural safety training, and prepare a report. Conduct a 3-6 month follow-up of the impact of cultural safety training on professional practice, and prepare a report. Contribute to a working group to review and improve cultural training

Skills students will gain:
• Literature reviewing
• Undertaking and analysing interviews
• Undertaking and analysing interviews
• Analyse interview transcripts
• Building research partnerships with external stakeholders
• Analysis and write up of qualitative research for academic publications

Key staff associated with projects:
Associate Professor Narelle Campbell
Associate Professor Sue Lenthall
Ms Annie Farthing
Ms Barbara Richards
Ms Madeleine Bower
flinders.edu.au/people/chris.rissel
flinders.edu.au/people/chris.rissel
Location: Flinders Northern Territory campus (Darwin) but experienced with supervision via distance.

Outline of projects:
• Conduct systematic literature review of frameworks and tools to evaluate primary health care in remote settings. Collect data to investigate a specific topic, analyse existing data to produce a report, work with health professionals to develop new services or programs with a view towards implementing and evaluating
• Analyse data from the process evaluation of cultural safety training, and prepare a report. Conduct a 3-6 month follow-up of the impact of cultural safety training on professional practice, and prepare a report. Contribute to a working group to review and improve cultural training

Skills students will gain:
• Literature reviewing
• Undertaking and analysing interviews
• Undertaking and analysing interviews
• Analyse interview transcripts
• Building research partnerships with external stakeholders
• Analysis and write up of qualitative research for academic publications

Key staff associated with projects:
Associate Professor Narelle Campbell
Associate Professor Sue Lenthall
Ms Annie Farthing
Ms Barbara Richards
Ms Madeleine Bower
flinders.edu.au/people/chris.rissel
flinders.edu.au/people/chris.rissel
Location: Flinders Northern Territory campus (Darwin) but experienced with supervision via distance.
Research Supervisors and their projects

Healthy Communities

Supervisor name: Dr Jacqueline Stephens
Supervisor email: jacqueline.stephens@flinders.edu.au
Name of research group: Aboriginal Health

Description of research area and interests: Epidemiology of infectious diseases, child health (ear health, chronic disease), and First Nations health. Inequitable access to healthcare, especially for people living in rural and remote locations.

Outline of projects:
Cross sectional studies aimed at understanding the epidemiology and health care access for key populations.

Skills students will gain:

- Development of research projects, writing and submission of ethics applications, working with stakeholder organisations, data collection and analysis, report writing, presenting at conferences/seminars.

Key staff associated with projects:
- Dr Annabelle Wilson
- Dr Tamara MacKean
- Potential key staff include: Dr Jonathon Craig, Dr Tamara MacKlean, Dr Annabelle Wilson, other members of the Aboriginal Health Unit.

Location: Health Sciences Building

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Supervisor name: Professor Paul Ward
Supervisor email: paul.ward@flinders.edu.au
Name of research group: Women, Alcohol and Breast Cancer Prevention research group

Description of research area and interests: Alcohol consumption is an important risk factor for breast cancer. However, we know little about the reasons and logic for alcohol consumption among Australian women in midlife particularly in relation to diversity in women’s life circumstances. Various new projects are underway to contribute knowledge to future breast cancer prevention. Specifically, they seek understanding of how women’s perception of breast cancer risk is relative to the social conditions (gender, age, social class and cultural/environmental drivers) that shape women’s reasons and logic for continuing or modifying alcohol consumption. Our research will generate recommendations for tailored approaches and enable ‘audience segmentation’ of alcohol/breast cancer preventive messages. The research team brings together expertise in sociology, anthropology, psychology, epidemiology, oncology, health promotion and cancer prevention.

Outline of projects:
- An Australian Research Council (ARC) funded Discovery project (‘Osiris’) is focussing on social class, alcohol consumption and differential perceptions of breast cancer risk among women in midlife (45-64 years). A NHMRC Kickstart grant was awarded to expand the ARC Discovery research to understand how women pre-midlife (25-44 years) understand alcohol-related breast cancer risk before midlife when breast cancer risk increases with age.
- Two College of Medicine & Public Health PhD researchers have commenced doctoral projects – Mrs Jessica Thomas (Flinders Foundation Scholarship) is exploring women’s perception of breast cancer risk relative to social role quality and Mrs Kristen Foyer (NHMRC scholarship) will explore the commercial determinants of alcohol consumption wornen are exposed to during midlife. Another PhD will begin this year (using a stipend from the ARC Discovery funding) to explore women’s own perceptions of breast cancer candidacy.

Skills students will gain:
- Qualitative research, quantitative research, surveys, theoretical development

Key staff associated with projects:
- Dr Emma Miller
- Dr Blinda Lunney
- Dr Margaret Becker

Location: Health Sciences Building

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Supervisor name: Dr Annabelle Wilson
Supervisor email: annabelle.wilson@flinders.edu.au
Name of research group: Aboriginal and Torres Strait Islander Public Health

Description of research area and interests: My work is related broadly to how health professionals work with Aboriginal people. I research strategies that support health professionals to work in Aboriginal health (including community of practice peer mentoring) and barriers and facilitators to practice.

I also undertake research about the food system including how to (re)build trust with consumers during food scares. I have recently transferred this to pandemic management, looking at what strategies might help maintain public trust during COVID-19 to ensure that public health recommendations are taken up by the public.

Outline of projects:
- I am currently involved in a large project assessing the role of Aboriginal Liaison Officers in hospitals. I am an Advanced Accredited Practising Dietitian and currently have a grant under review looking at how to change the way in which nutrition research and practice is delivered to Aboriginal people, from a deficit to a strengths-based model. I am involved in a number of small grants related to the food system.

Skills students will gain:
- Qualitative research
- Aboriginal and Torres Strait Islander health research
- Indigenous knowledges and methodologies
- Reflexivity
- Health Professional practice

Key staff associated with projects:
- Associate Professor Tamara Mackean, Dr Kim O’Donnell, Ms Liz Withall.

Location: Health Sciences Building
FOR MORE INFORMATION,
PLEASE CONTACT US AT:
FHMRI@FLINDERS.EDU.AU