

FHMRI

FLINDERS HEALTH & MEDICAL
RESEARCH INSTITUTE

STUDY WITH US: **PROJECTS FOR
MASTERS AND PHD CANDIDATES**



Flinders
University

CONTENTS

- 3** Introduction to Flinders Health & Medical Research Institute
- 4** New Health & Medical Research Building
- 6** Research Education and Development Hub
- 7** Become a FHMRI researcher and join our vibrant research community
- 8** Index of potential supervisors
- 10** Overview of FHMRI research
 - Molecular Biosciences
 - Clinical Translation
 - Healthy Communities
- 18** Research Supervisors and their projects
 - Molecular Biosciences
 - Clinical Translation
 - Healthy Communities

Introduction to Flinders Health and Medical Institute (FHMRI)

**Understanding life. Accelerating medical
innovation. Promoting healthy communities.**

**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.

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.

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.

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.

*This booklet showcases many of the projects being offered at
FHMRI. I encourage you to contact supervisors and talk to them
about your interests and their projects.*

*I look forward to welcoming many of you personally if you decide to
commence your research endeavors at FHMRI.*

Wishing you all the best with the career path you choose.

Professor Peter Eastwood

Matthew Flinders Fellow; Director of the Flinders Health and
Medical Research Institute (FHMRI) and Dean (Research), College of
Medicine and Public Health (CMPH).



The future of
MEDICAL
RESEARCH
is **HERE**

New Health & Medical Research Building opening 2024

Flinders University is investing in a world-class Health and Medical Research Building (HMRB) for Southern Adelaide.

As a leading biomedical research facility, it will enable collaboration between researchers, healthcare and industry partners, translating world-class research into improved community healthcare outcomes.

The new facility will provide a focus for education and life-long learning, leveraging academic and research opportunities, and providing platforms for collaboration, innovation and the exchange of knowledge.

Seamlessly connected to Flinders University at Tonsley and Flinders in the CBD by the new Flinders train station, HMRB is the first stage and centrepiece of our Flinders Village development – Adelaide’s largest fully integrated education, research and health care precinct.



To learn more visit:



Research Education and Development (RED) Hub

Researchers of the Flinders Health and Medical Research Institute (FHMRI) are supported by the RED Hub, which nurtures our talented researchers so that their work can have maximal impact.

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 experience)
- 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.

RED Hub student development supported by Flinders Foundation



Become a FHMRI researcher and join our vibrant research community

Whatever your previous degree, there will be a research training position for you in one of our multidisciplinary research teams.

We have three overarching research themes in FHMRI: Molecular Biosciences, Clinical Translation and Healthy Communities. These include research in areas from medical science, clinical science, epidemiology, psychology and public health, to biochemistry, biotechnology, pharmacology and more. There is a project for you within FHMRI.

You will be supervised by leaders in their field and work with researchers and/or clinicians from other disciplines in a truly collaborative, real-world health and medical environment.

We are committed to educating the medical researchers of the future; our expert and internationally recognised researchers will mentor you and create tailored opportunities for your career pathway.

This booklet contains projects currently being offered by FHMRI researchers. Feel free to contact them to discuss potential project opportunities for a Higher Degree by Research.

It is good to talk to a few researchers to get a feel for what is available and what sparks your interest. Please note, this list is not exhaustive and you are welcome to approach other researchers if you have a particular interest and they are not listed here.

What is the process for enrolling in 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 at the following link:

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:

Professor Briony Forbes,
Deputy Director, Research Education
and Development (RED Hub);
briony.forbes@flinders.edu.au





Page index of potential supervisors

Hossein Afzali	70	Simon Conn	23	Andrea Harrington	28
Cedric Bardy	18	Zhaoli (Joy) Dai-Keller	76	Ashley Hopkins	29
Greg Barritt	18	Chris Delaney	59	Anna Hudson	62
Giles Best	19	Dani-Louise Dixon	60	Vivian Isaac	78
Niranjan Bidargaddi	71	Kelsi Dodds	24	Arne Ittner	30
Shailesh Bihari	56	Danny Eckert	60	Michael Jackson	30
Billie Bonevski	72	Laura Edney	76	Harald Janovjak	31
Jacqueline Bowden	72	Nicholas Eyre	24	Claire Jessup	32
Anthea Brand	73	Kate Fairweather	78	Billingsley Kaambwa	80
Stuart Brierley	20	Annie Farthing	82	Jonathan Karnon	81
Narelle Campbell	74	Briony Forbes	5	Damien Keating	32
Kootsy Canuto	74	Jonathan Gleadle	26	Sonja Klebe	33
Joel Castro Kraftchenko	20	Tom Gordon	26	Bogda Koczwaro	62
Peter Catcheside	56	Stephen Gregory	27	Bryone Kuss	34
Yee Lian Chew	22	Luke Grundy	28	Nicole Lovato	63
Jamie Craig	58	Luke Grzeskowiak	61	Karen Lower	34



David Lynn	35	Andrew Rowland	43	Vi Khanh Truong	49
Arduino Mangoni	36	Courtney Ryder	84	Andrew Vakulin	66
Dusan Matusica	36	Tim Schultz	85	Krasimir Vasilev	50
Robyn Meech	37	Luke Selth	44	Anthony Venning	89
Michael Michael	38	Joseph Selvanayagam	65	Jenny Walker	67
Gorica Micic	64	James Smith	86	Craig Wallington-Gates	51
Pramod Nair	38	Justine Smith	44	Jing Wang	26
Karin Nordström	39	Elke Sokoya	45	David Watson	68
Michael O'Callaghan	64	Michael Sorich	46	Mihir D Wechalekar	67
Yoichiro Otsuka	40	Nick Spencer	46	Alan Wigg	68
Janni Petersen	40	Jacqueline Stephens	87	Annabelle Wilson	90
Munish Puri	41	Erin Symonds	48	Jean Winter	52
Chris Rissel	82	Noemi Tari-Keresztes	88	Amy Wyatt	52
Claire Roberts	42	Lauren Thurgood	48	Wei Zhang	54
Geraint Rogers	42	Sara Tommasi	36	Vladimir Zagorodnyuk	53
Mary- Louise Rogers	43	Joshua Trigg	88	Anna Ziersch	90

Overview of FHMRI research

Molecular Biosciences

PROJECTS

CANCER

Liver Calcium Signalling

- Electrophysiological characteristics of liver cell calcium channels
- Molecular mechanism by which lipids alter channel activity
- Mechanisms by which the natural compound curcumin inhibits calcium channels activated by ischemia reperfusion

Emeritus Professor Greg Barritt

Molecular Medicine and Genetics

- Novel treatment strategies for Chronic Lymphocytic Leukemia
- Identifying the mechanisms of venetoclax resistance in Acute Myeloid Leukemia

Dr Giles Best

Circular RNAs in Cancer

- 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

Metabolism and Cancer

- Design cancer therapies based on targeting metabolic and growth pathways used by cancer cells
- Investigating insulin receptor and IGF-1R signalling in diabetes and cancer

Professor Briony Forbes

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

Precision Medicines

- Our group uses 'big-data' to develop prognostic tools that can present personalised likelihoods of therapeutic and adverse effects to cancer medicines

Dr Ashley Hopkins

- Understanding and predicting outcomes of medicines used to treat cancer, particularly immunotherapies, using machine learning and statistical analysis

Professor Michael Sorich

- Simcyp based physiologically based pharmacokinetic modelling (computer-based projects) and extracellular vesicle derived biomarkers of drug exposure and response (laboratory-based projects)

Associate Professor Andrew Rowland

Immunomodulation

- Modulation of immune cell activation during Type 1 diabetes and islet transplant rejection
- Checkpoint inhibitors as an immunotherapy for cancer
- Investigating the interplay between vascular and endocrine cell types during islet transplantation

Dr Claire Jessup

Asbestos Diseases

- Establish and characterise mesothelioma cancer organoids which can be used to predict treatment response
- Molecular features of drug tolerant mesothelioma cell populations
- Next generation sequencing to understand the molecular events that cause non-invasive mesothelioma to become invasive

Associate Professor Sonja Klebe

Lymphoproliferative Research

- Defining High Risk mechanisms in lymphoproliferative malignancies
- Lipid metabolism in Chronic Lymphocytic Leukemia
- Redox and metabolic changes in Chronic Lymphocytic Leukemia

Professor Bryone Kuss

Genetics and Epigenetics

- Identification and confirmation of mutations in chronic lymphocytic leukaemia and similar blood diseases
- Identification and confirmation of breast cancer susceptibility genes
- Long range gene regulation and effects of repetitive regions on DNA methylation

Associate Professor Karen Lower

Pharmacology

- Assessment of the effects of potent DDAH1 inhibitors on a comprehensive set of metabolomic, biological and clinical end points 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

Professor Arduino A Mangoni & Dr Sara Tommasi

- Study of factors that control steroid signalling in breast and prostate cancers through androgen and estrogen receptors
- Understanding role of bile acid signalling in the induction of colon cancer by diet and microbiome dysregulation

Professor Robyn Meech

- Investigate various aspects of cancer structural biology, to understand structure-function characteristics of the driver/secondary mutations, that will impact dose optimization, selection of better therapeutics for prescribing, and novel drug targeting approaches in different cancer mutations

Dr Pramod Nair

Gene Expression

- 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

Associate Professor Michael Michael

Environmental control of cell growth and cell division

- Understanding cancer cell metabolism
- The impact of cell metabolism on DNA repair and its implications for aging and cancer
- Cancer cells survival under nutrient stress

Professor Janni Petersen

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

Bowel Health

- Developing new ways to reduce the number of unnecessary colonoscopies

*Determining the type (and combination) of polyps in the bowel that increase risk for cancer in the future

*Using biomarkers to monitor the effectiveness of cancer treatment

Associate Professor Erin Symonds

- Develop novel non-invasive DNA methylation biomarker tests, as well as translate a methylated DNA blood biomarker test into the clinic for monitoring for the effectiveness of treatment in patients with gastrointestinal cancers

Dr Jean Winter

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

Associate Professor Craig Wallington-Gates

NEUROSCIENCE

Human Neurophysiology and Genetics

- Design innovative biotechnologies to biomimic 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 chemo- and radio therapies
- The impact of genetic predispositions on cellular function using brain cells derived from Parkinson’s patients

Dr Cedric Bardy

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

- Understanding the mechanism by which sensory neurons detect pelvic pain associated with endometriosis, and how pain is transmitted and processed to/by the central system

Dr Joel Castro Kraftchenko

- Characterise the anatomy and function of sensory nerves within the uterus that underlie pain
- study of contractile patterns of uterine smooth muscle to determine how they might contribute to successful reproduction

Dr Kelsi Dodds

- Understanding the mechanisms responsible for the development of chronic pelvic pain and the development of novel and safe pharmacotherapies

Dr Luke Grundy

- Characterisation of spinal projection neurons relaying visceral pain into the brain
- Sites of central convergence between visceral organs

Dr Andrea Harrington

Overview of FHMRI research

Molecular Biosciences

PROJECTS

- Characterisation of motor activity and sensation from the female reproductive tract
- Optogenetics to silence pain pathways in the visceral organs
- Identification of the different types of spinal afferent nociceptors
- Calcium imaging enteric neural networks underlying intestinal peristalsis

Professor Nick Spencer

Molecular Dementia and Memory

- Tau and kinase-mediated signal transduction using different biological model systems
- Molecular processes encoding mammalian cognitive function and molecular events that control memory and other brain functions

Dr Arne Iltner

Gut Sensory Systems

- How does the microbiome control our metabolism?
- How does the food we eat activate gut hormone release?
- How does the gut speak to our brain?

Professor Damien Keating

Pain and Sensory Cell Biology

- 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 phenotypes
- Detection of human vesicular miRNAs in complex CSF solutions

Dr Dusan Matusica

Motion vision

- Exploration of the neural mechanisms underlying motion vision

Professor Karin Nordström

Integrative Neuroscience

- Elucidation of brain mechanisms for autonomic physiological responses to emotional stress

Associate Professor Yoichiro Otsuka

Motor Neuron Disease

- Examining urinary biomarkers that may be prognostic or pharmacodynamic

Associate Professor Mary-Louise Rogers

Learning and neurological disease using a nematode model

- Investigating how a specific neuropeptide signalling pathway controls both feeding and mating behaviours
- Assessing the proteomic changes associated with memory formation
- Investigating the role of neuronal dopamine signalling in pain sensitisation

Dr Yee Lian Chew

Urogenital

- Role of TRP channels in sensory mechanisms underlying bladder dysfunction in cystitis
- Investigation of potential role of endogenous and exogenous cannabinoids for safe and effective treatment of the bladder pain
- Determining the basic processes behind the circadian rhythm control of voiding which are important for understanding mechanisms of nocturia

Associate Professor Vladimir Zagorodnyuk

INFECTON & IMMUNITY

Molecular Virology

- 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

Dr Nicholas Eyre

Immunology and Autoimmunity

- 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

Professor Tom Gordon & Dr Jing Wang

- Identify and isolate genuine human autoantibodies to the type 1 diabetic autoantigen

- Identify functionally significant anti-neuronal antibodies in narcolepsy with cataplexy, and use a range of neurophysiological assays to characterise the effect of these antibodies on various nerve signalling axis

Dr Michael Jackson

Eye and 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

Microbiome and Host Health

- Investigations of the complex mediatory role of the human microbiome in acute and chronic conditions including acute infections in those receiving intensive care, recurrent urinary tract infections, chronic lung disease, cancer, and ageing-associated cognitive decline

Professor Geraint Rogers

Chronic Disease

- Establishing a leaky gut biomarker panel in rheumatoid arthritis
- Prioritising anti-inflammatory nutrition

Dr Elke Sokoya

OTHER

Medical Biotechnology

- Development of single cell oils rich in omega-3 fatty acids to assist human nutrition
- Development of controlled alginate hydrolysis for medical applications
- Characterisation of the delivery of therapeutic proteins to diseased cells
- Targeting fatty acid metabolism for containing obesity
- Green extraction process development for novel bioactives

Associate Professor Munish Puri

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 hypertrophy, the cells involved and the underlying driving process

Professor Jonathan Gleadle

Synthetic Physiology

- Genome-wide protein engineering
- Antibiotics resistances in synthetic biology
- CRISPR-assisted next-generation sequencing
- MicroRNA and other non-coding RNA promoters

Professor Harald Janovjak

Systems Immunology/Biology

- The impact of the microbiome on cancer immunotherapy efficacy and toxicity
- How do vaccines induce memory responses in the innate immune system?
- Investigating how the microbiota regulates immunity in early life
- New methods for systems level analyses of innate immunity and cancer

Professor David Lynn

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
- Role of ACE2 in placenta and pregnancy outcomes

Professor Claire Roberts

Biomedical Nanoengineering

- Design biomaterials or processes which can be used in medical applications, including bioengineering antimicrobial biomaterials, drug delivery systems and biosensors for detecting the early sign of infections

Dr Vi Khanh Truong

- Creating the next generation of medical devices and technologies such as antibacterial coatings for orthopaedic devices, catheters and wound dressings
- Role of adsorbed proteins on inflammatory responses to biomaterials
- Role of surface on stem cells senescence
- 3D engineering scaffolds for hard and soft tissue regeneration
- Methods for diagnosis of infections and cancers

Professor Krasimir Vasilev

Protein Homeostasis in Health and Disease

- Characterising pregnancy-associated protein homeostasis
- Characterising the multifaceted role of hypochlorite in protein homeostasis
- Characterising the role of human alpha-macroglobulins in controlling cell growth and the pathology of cancer
- Characterising the role of human alpha-macroglobulins in controlling infection
- Identifying neurotrophic factors that underpin autism spectrum disorder

Dr Amy Wyatt

Centre for Marine Bioproducts Development

- Food and nutraceutical developments from marine bioresources
- Marine microbial natural products development for industry application
- Novel 3D-bioprinting marine-derived biomaterials and bioinks
- Development of Australian seaweed-based functional foods and biodegradable bioplastics

Professor Wei Zhang

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

Sleep Health

- Evaluating aspects of a new respiratory-mechanics based method for assessing breathing effort and timing in ICCU or in a Sleep Health context
- New methods for assessing noise impacts on sleep and health outcomes

Associate Professor Shailesh Bihari & Professor Peter Catchside

- Environmental noise impacts on sleep, functioning and health
- The use of circadian-system guided lighting strategies
- Improving sleep in patients with motorneurone disease using new monitoring technology
- Respiratory load sensory mechanisms
- Improved methods for assessing personal protective equipment (PPE) mask resistance, leak and filtration performance effectiveness

Professor Peter Catchside

- 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

- Assessment of the efficiency of breathing in health and disease and determining the underlying mechanisms of muscle activation in movement control and strategies for rehabilitation

Dr Anna Hudson

- Evaluating the efficacy of personalised treatments for insomnia (including wearable devices) and new models of care to transform the management of insomnia and associated mental ill-health

Dr Nicole Lovato

- Better understand sleep, insomnia and circadian rhythms to create targeted and more effective treatments including cognitive behavioural therapy, bright light therapy, melatonin

Dr Gorica Micic

- Examine the impact of sleep disorders and their treatment on gait and falls risk in older people
- *Determine the viability of using a portable virtual reality headset to perform vestibular-ocular motor screenings and detect driver sleepiness in road side situations

Associate Professor Andrew Vakulin

Eye and Vision

- Glaucoma; predicting the genetic risk
- Diabetic retinopathy; evaluation of inflammatory molecules and their novel role in abnormal retinal blood vessel development

Professor Jamie Craig

Paediatric, Reproductive and Perinatal Pharmacoeconomics

- Improving maternal and child health through the development and promotion of safer, more effective and personalised approaches to pharmacotherapy

Associate Professor Luke Grzeskowiak

Cancer

- Improving outcomes for cancer survivors through examination of the burden of disability and unmet needs after cancer diagnosis, including development and implementation of new models of care. Multiple projects are available

Professor Bogda Koczwara

- 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

Urology

- Epidemiologic methods including predictive modelling, systematic literature reviews with meta-analysis, covering topics ranging from screening and treatment selection to health-related quality of life

Associate Professor Michael O'Callaghan

Heart Health

- To understand the role Senescent cells play in atherosclerosis
- Examine plaque tissue for the presence of viral, particularly bacteriophage, and bacterial DNA using genomic sequencing

Associate Professor Chris Delaney

- Coronary artery disease, non-ischaemic cardiomyopathy and hypertrophic cardiomyopathy. The research program uses Cardiovascular Magnetic Resonance imaging, Cardiac Computed Tomography and echocardiography as mechanistic, diagnostic and prognostic tools to investigate pathophysiology, diagnosis and outcome of heart disease

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

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

Overview of FHMRI research Healthy Communities

PROJECTS

Digital Health

- AI2: A service that automates the retrieval of Medicare Data to enable health care professionals to streamline the ways that they can monitor and assess patient care
- Endometriosis Platform: provides a platform co-created with those seeking to accurately identify symptoms, share stories and support each other to fast-track diagnosis and treatments
- MINDtick: A diagnostic tool that combines self-monitoring with enhanced intelligence to interact with and support mental health care beyond the clinic

Associate Professor Niranjan Bidargaddi

Behavioural

- Design and evaluation of a health mobile phone app for pregnant Aboriginal and Torres Strait Islander mothers and their children under 5 years
- Where do people in rural and remote communities go to seek information on reducing alcohol consumption?
- Designing tobacco control messages for people with mental ill health
- Pilot testing elements in the Wellbeing SA Aboriginal Health Promotion Plan.
- Best practice/evidence regarding online youth engagement to support meaningful social connection and protective behaviours

Professor Billie Bonevski

- Investigating the suicidality-smoking nexus
- Social identity (and stigma) and its role in health care contexts
- The application of nuclear family twin models to understand the role of genes and environment in health outcomes

Dr Kate Fairweather

- Vaping risk messaging
- Tobacco cessation support for people with disability
- Public engagement with tobacco endgame strategies (policy controls) including by priority populations

Dr Joshua Trigg

- Increasing and improving access to mental health support
- Acceptability of and engagement with Digital Mental Health Platforms
- The conceptualization of Guided Self-Help Material for common mental health disorders
- The acceptability of Low Intensity CBT in cancer survivorship

Dr Anthony Venning

Health Economics

- Improving methods for the evaluation of new health technologies

Associate Professor Hossein Afzali

- Evaluating the costs and health outcomes of different diagnostic and treatment pathways, from primary care through to tertiary care, for patients with cancer
- Capturing patient preferences for addressing supportive care needs and developing implementation

Dr Laura Edney

- Assess the performance and validity of using sleep-specific quality of life outcome measures in economic evaluation relative to frequently used preference measures
- Assess the economic impact of avoidable hospital readmissions due to acute coronary syndrome and chest pain

- Determining which components or attributes of health interventions are preferred by stakeholders to help design services that will achieve the greatest uptake

Associate Professor Billingsley Kaambwa

- Developing and implementing methods for the economic evaluation of local health service interventions

Professor Jonathan Karnon

- Evaluating the impact of innovation in the healthcare system
- Substitution of doctors by nurses and allied health professionals in hospitals and residential aged care

Dr Tim Schultz

National Centre for Education and Training on Addiction

- Analysis of parents' perspectives on alcohol supply to adolescents
- Scoping research on alcohol, tobacco and other drug content in medical and health sciences degrees
- Alcohol, tobacco and other drug screening and brief interventions in health and social care settings
- Impact of paid versus unpaid overtime on the wellbeing of alcohol and other drug workers
- What measures are available to assess drug- and alcohol-related presenteeism in Australia?

Professor Jacqueline Bowden

Rural & Remote Health

- Review Remote Primary Health Care Manuals suite of manuals that are used to guide high quality care for people living in remote areas of Australia

Dr Anthea Brand



- Rural and remote workforce retention

Associate Professor Narelle Campbell

- Dementia care in rural and remote Australia
- Novel psychosocial and cognitive markers of suicide behaviours

Dr Vivian Isaac

- Analyse existing data to provide additional information about the decision making process nursing and allied health students and recent graduates undertake when they consider rural and remote practice

Dr Chris Rissel & Ms Annie Farthing

- 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

- The adaptation and trial of an online social and emotional wellbeing education and support program for young Aboriginal and Torres Strait Islander males
- Commissioning of the evaluation of Indigenous health programs
- A health promotion intervention trial with male football fans
- The development of men's health education and training resources for health professionals across Australia
- Evaluation of alcohol policy reforms in the NT

Professor James Smith

- Recovery of persons with mental health challenges and alcohol and other drug issues

- Empowerment of Families & Friends of persons with alcohol and other drug use issues
- The lived experience of gambling issues among Aboriginal and Torres Strait Islander and Culturally & linguistically diverse people

Dr Noemi Tari-Keresztes

Injury Studies

- Coolamon Study exploring the care of Aboriginal & Torres Strait Islander children with burns
- Safer Pathways project, developing patient-centred discharge and follow-up planning service for Aboriginal and Torres Strait Islander children with burns
- Exploring the effectiveness of the Ironbark program which aims to reduce the rate of falls amongst older Aboriginal people
- The Australian Traumatic Brain Injury National Data project to identify key determinants of outcomes for patients, and establishing national clinical quality indicators, targeting the identified key gaps (including for the health of Aboriginal and/or Torres Strait Islander communities)

Dr Courtney Ryder

Aboriginal and Torres Strait Islander Public Health

- Investigate health service systems supports for Aboriginal and Torres Strait Islander men's health programs
- Assess the acceptability of Aboriginal and Torres Strait Islander men's social & emotional wellbeing programs, identify & implement strategies to optimise referrals

- Co-design a culturally appropriate social & emotional wellbeing program, pilot and evaluate

Associate Professor Kootsy Canuto

Population Health

- Migrant women's health
- Diet quality through a cultural lens
- Use of cannabis in pain management

Dr Zhaoli Dai-Keller

- Ear and hearing health; development of strategies to improve ear health screening and the treatment pathways, particularly for Aboriginal and Torres Strait Islander children
- Kidney health; using data linkage to investigate the complex interplay between sociodemographic factors, healthcare utilisation, and the development of chronic disease among Aboriginal and Torres Strait Islander young people

- Infectious disease epidemiology; using data linkage to investigate interplay between sociodemographic factors, healthcare utilisation and access, and geography for hepatitis diagnosis and treatment

- Disaster Health; access to healthcare services during disasters and emergencies, particularly by minority groups, children, and young people

Dr Jacqueline Stephens

- Assessing the role of Aboriginal Liaison Officers in hospitals
- Strengths-based approaches in Aboriginal and Torres Strait Islander health and nutrition
- Aboriginal understandings of wellbeing within football
- Peer mentoring for dietitians working in Aboriginal and Torres Strait Islander health

Associate Professor Annabelle Wilson

- Examining the social determinants of health for people from migrant and refugee backgrounds

Associate Professor Anna Ziersch

Research Supervisors and their projects

Molecular Biosciences



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 frontier 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 biomimic 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 human brain microenvironment on the cancerous progression of glioblastoma and its resistance to current chemo- and radio therapies.
- 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.

Collaborators associated with projects:

Dr Mark van den Hurk
Dr Zarina Greenberg
Dr Brett Stringer.

flinders.edu.au/people/cedric.bardy

bardylab.com

Location: SAHMRI



Supervisor name:

Emeritus Professor Greg Barritt

Supervisor email:

greg.barritt@flinders.edu.au

Name of research group: Liver calcium signalling group

Description of research area and interests:

We are studying the role of intracellular calcium as a signalling molecule in liver disease. We are particularly interested in two liver pathologies.

The first pathology relates to how altered intracellular calcium signalling contributes to the accumulation of lipid in liver cells in non alcoholic fatty liver disease (NAFLD). This NAFLD can progress to more serious liver disease, such as non alcoholic steatohepatitis (NASH) and hepatocellular carcinoma. The second pathology involves the role played by intracellular calcium in liver ischemia reperfusion injury (IRI is the paradoxical damage of restoring blood supply to tissue), which can occur following surgical liver resection for liver cancer and in liver transplant surgery.

We utilise the disciplines of cell physiology, biochemistry and molecular biology to investigate calcium signalling in liver cells. We have a particular knowledge and interest in the application of electrophysiology (patch clamp recording) to study calcium channels, and the use of intracellular fluorescent calcium reporters and cell imaging to measure intracellular calcium. We collaborate with liver surgeons in the S.A. Liver Transplant Unit (Flinders Medical Centre) in trying to understand pathological intracellular calcium signalling in the human liver.

**Outline of projects:**

We know that lipids in steatotic liver cells inhibit calcium channels in the plasma membrane and endoplasmic reticulum. We also know that other calcium channels in the liver cell plasma membrane are activated by ischemia reperfusion. However, molecular mechanisms involved in these processes remain to be understood. We are keen to investigate areas that include:

1. Are the electrophysiological characteristics of liver cell calcium channels altered by lipid accumulation?
2. What is the molecular mechanism by which lipids alter channel activity?
3. What is the mechanism by which the natural compound curcumin inhibits calcium channels activated by ischemia reperfusion?

Skills students will gain:

- Fluorescence microscopy
- Patch clamp recording and electrophysiology
- Cell culture
- Molecular biology techniques especially cell transfection
- Anatomy, cell biology, and physiological functions of the liver

Collaborators associated with projects:

Dr Grigori Rychkov.

flinders.edu.au/people/greg.barritt

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sciencedirect.com/science/article/abs/pii/S0143416019301241?via%3Dihub

Location: SAHMRI

Supervisor name:

Dr Giles Best

Supervisor email:

giles.best@flinders.edu.au

Name of research group: Molecular Medicine and Genetics and the Multiple Myeloma Translational research Laboratory

Description of research area and interests:

With the heads of the Molecular Medicine and Genetics department (Professor Bryone Kuss) and Multiple Myeloma Translational Research Laboratory (Associate Professor Craig Wallington-Gates), we have research programs focusing on Chronic Lymphocytic Leukaemia (CLL), Multiple Myeloma (MM) and Acute Myeloid Leukaemia (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 (TME) 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 CLL, MM & AML
- Identifying the mechanisms of venetoclax resistance in Acute Myeloid Leukemia

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

Collaborators associated with projects:

Professor Bryone Kuss

Associate Professor Craig Wallington-Gates

Associate Professor Karen Lower

Dr Lauren Thurgood

Dr Binoy Appukkuttan

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 (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: 30012612), Nature Communications (PMID: 24476666), Gastroenterology (PMID: 23958540) and JCI Insight (PMID: 31536477)

Outline of projects:

We offer a wide range of potential projects on these topics that we'd be delighted to discuss with you. This includes 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). 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, which allows us to determine how our internal organs communicate with our brain to generate the symptoms of chronic pain. Our lab (& your project) is already funded by NHMRC, ARC and NIH.

Skills students will gain:

- Electrophysiology (afferent, 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

Collaborators associated with projects:

Dr Joel Castro
Dr Andrea Harrington
Dr Luke Grundy
Dr Gudrun Schrober
Dr Sonia Garcia-Caraballo
Dr Mariana Brizuela.

flinders.edu.au/people/stuart.brierley

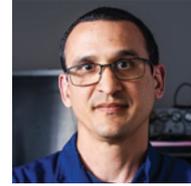
youtube.com/watch?v=D6_jjEPLKe4

youtube.com/watch?v=wqvjPAR4Xhc

youtube.com/watch?v=EV9gWyKul5M&feature=youtu.be

[watch?v=EV9gWyKul5M&feature=youtu.be](https://youtube.com/watch?v=EV9gWyKul5M&feature=youtu.be)

Location: SAHMRI



Supervisor name:

Dr Joel Castro Kraftchenko

Supervisor email:

joel.castrokraftchenko@flinders.edu.au

Name of research group: Visceral Pain Research Group

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.

Outline 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.

Collaborators associated with projects:

Professor Stuart Brierley
Dr Luke Grundy
Dr Andrea Harrington
Ms Jessica Maddern.

**[flinders.edu.au/people/
joel.castrokraftchenko](http://flinders.edu.au/people/joel.castrokraftchenko)**

Location: SAHMRI



Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Dr Yee Lian Chew

Supervisor email:

yeelian.chew@flinders.edu.au

Name of research group: Chew worm lab

Description of research area and interests:

In the Chew worm lab, we are interested in investigating the fundamental basis of learning and neurological disease using a nematode (worm) model. We use the worm because it has a compact and experimentally accessible nervous system of only 300 neurons, and it's transparent! – which makes visualising neuronal responses and changes really simple and can be conducted in real-time in living animals. Some of the questions we are interested in include:

- What genes are required for associative learning responses?
- What are the neuromodulators required for sensitisation of pain receptor cells?
- How are neuropeptides used to switch between behavioural states of feeding and mating?
- What are the interactors of disease-associated genes such as SOD1 in motor neuron disease?

Outline of projects:

- *Caenorhabditis elegans* is a small nematode worm that has a compact nervous system of 302 neurons and an unrivalled access to genetics and live-animal microscopy. This makes the nematode system a highly effective model for neuroscience studies. The lab is focused on understanding the cellular and molecular basis of nervous system functions, focussing on the ability to acquire experience-dependent behavioural changes.

Examples of projects offered include:

Investigating how a specific neuropeptide signalling pathway controls both feeding and mating behaviours: Male worms have an intriguing adaptive response in that they will choose to leave a good source of food in order to search for mates, suggesting that there is a control mechanism that switches their behaviour from active feeding to active mate-searching. We have found that a neuropeptide LURY-1 is found in neurons that control feeding, as well as other neurons that regulate male mating behaviour. This project will seek to test if LURY-1 contributes to this behavioural switch in male worms, using established genetic knockout and transgenic lines that express the peptide specifically in either feeding neurons or mating neurons. This would reveal a previously unknown system for control of adaptive behaviour in an animal model.

Assessing the proteomic changes associated with memory formation:

Classical conditioning is a form of learning where animals associate a biologically potent stimulus (e.g. food or starvation) with a normally innocuous stimulus (e.g. a sound/smell/taste). If worms are cultivated in a high salt buffer in the absence of food, they will associate high salt with starvation, and will henceforth start to avoid high salt conditions. This project will use a cutting-edge technology called TurboID to analyse protein-based changes in salt-sensing neurons in naive and conditioned animals to determine what proteomic changes are associated with new learning behaviours.

Investigating the role of neuronal dopamine signalling in pain sensitisation:

Sensitisation of pain receptors is a key step in the development of chronic pain, a condition that affects up to one-fifth of Australians. The molecular mechanisms

underlying sensitisation are not yet well understood. Our research suggests that the neurochemical dopamine is important for sensitisation of critical components of pain-sensing neural circuits. This project will investigate dopamine-dependent mechanisms on pain sensitisation in *C. elegans*, using techniques such as advanced microscopy, CRISPR/Cas9 and high-throughput behavioural analysis.

Skills students will gain:

- Nematode handling and maintenance
- Molecular Biology and cloning
- Genetics/genetic crosses
- Animal behaviour experiments
- Transferable life skills – writing, organisation, time management, oral presentation skills, teamwork, working autonomously

Collaborators associated with projects:

PhD students in Chew lab

Collaborators nationally.

flinders.edu.au/people/yeelian.chew
chewwormlab.wordpress.com/

Want to know more about worms?
wormbook.org/ or [youtube.com/watch?v=zjqLwPglNv0&ab_channel=OpenWorm](https://www.youtube.com/watch?v=zjqLwPglNv0&ab_channel=OpenWorm)

Location: Flinders Medical Centre



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 disease, with a particular focus on cancers. The common element to these projects is that students possessing a high level of molecular biology skills and motivation to make a difference (to even one person) will find the laboratory an excellent environment for achieving high-impact outputs.

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

Collaborators associated with projects:

Dr Vanessa Conn

Mrs Kirsty Kirk

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 Kelsi Dodds

Supervisor email:

Kelsi.dodds@flinders.edu.au

Name of research group: Visceral Neurophysiology Laboratory

Description of research area and interests:

Under the leadership of Professor Nick Spencer, our team are interested in understanding how nerves in visceral organs (e.g., the gut) detect and transmit sensory signals, and how movements are generated in these organs that underlie their various functions (e.g., peristalsis). Dr Kelsi Dodds' research is centred around the physiology of the female reproductive tract – primarily the uterus. One of her major research goals is to characterise the anatomy and function of sensory nerves within the uterus that underlie pain. This is important to understand for female pelvic pain conditions, such as period pain and endometriosis. Dr Dodds also studies contractile patterns of uterine smooth muscle to determine how they might contribute to successful reproduction.

Outline of projects:

New projects offered involve novel surgical techniques, fluorescent microscopy, and genetically engineered animal models to visualise sensory nerve populations in the uterus, as well as organ bath preparations with electrophysiology to study uterine motility.

Skills students will gain:

Students have the potential to gain experience in a range of laboratory skills, including molecular biology (e.g., immunohistochemistry); microscopy (e.g., epifluorescence, confocal); calcium imaging; electrophysiology (e.g., nerve recordings); ex vivo organ bath recordings including

spatiotemporal mapping and pharmacology; behavioural studies including optogenetics; small animal handling; animal microsurgery; as well as project planning, data analysis, and scientific writing and communication.

Collaborators associated with projects:

Professor Nick Spencer

Dr Tim Hibberd

Ms Melinda Kyloh

Mr Lee Travis.

flinders.edu.au/people/kelsi.dodds

flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/visceral-neurophysiology

Location: Flinders Medical Centre



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

Skills students will gain:

- Molecular and cell biology (cloning, mutational approaches, 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

Collaborators associated with projects:

Associate Professor Jill Carr
Associate Professor Tim Chataway
Dr Alex Colella.

flinders.edu.au/people/nicholas.eyre

Location: 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:

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-1R 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.

Collaborators associated with projects:

Ms Carlie Sawtell
Ms Allanah Merriman
Mr Andrew Blyth.

flinders.edu.au/people/briony.forbes

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



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:

The project will follow exciting preliminary evidence that 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 hypertrophy, the cells involved and the underlying driving process.

Skills students will gain:

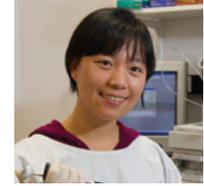
A broad array of contemporary molecular and cellular techniques to determine RNA and protein expression and regulatory mechanisms.

Collaborators associated with projects:

Dr Darling Rojas-Canales
Mrs Elise Tucker
Dr Anthony Fedele.

flinders.edu.au/people/jonathan.gleadle

Location: Flinders Medical Centre



Supervisors' names:

Professor Tom Gordon

Dr Jing Wang

Supervisors' emails:

t.gordon@flinders.edu.au;

jingjing.wang@flinders.edu.au

Name of research group: Immunology and Autoimmunity

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:

Full spectrum of immunological techniques; bioinformatics; protein sequencing by mass spectrometry.

Collaborators associated with projects:

Associate Professor Tim Chataway.

researchnow.flinders.edu.au/en/persons/tom-gordon-2

researchnow.flinders.edu.au/en/persons/jing-jing-wang-2

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 cancers 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:

- 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

flinders.edu.au/people/stephen.gregory

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



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 pelvic pain derives from our internal organs and is a major, but underacknowledged clinical issue affecting >1 Million Australians every year. Chronic pelvic pain is a key clinical feature of a number of common bladder disorders and can arise spontaneously, as a result of recurrent urinary tract infection (UTIs), or as a consequence of chemotherapy and immunotherapy. There are no current clinically efficacious and safe pharmacological treatments or cures for chronic pelvic pain, ensuring patients continue to live with diminished personal, psychological, sexual, social, and professional life. My research program focuses on understanding the mechanisms responsible for the development of chronic pelvic pain and the development of novel and safe pharmacotherapies to treat or prevent chronic pelvic pain from developing.

Outline of projects:

- **Urinary tract infections (UTI's)** - Patients with chronic and/or recurrent UTI's are at increased risk of developing chronic pelvic pain and functional bladder disorders associated with altered sensation, including interstitial cystitis. The underlying mechanisms responsible for inducing this protracted state of neuronal hypersensitivity are unknown. Multiple projects are available for enthusiastic 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.

- **Bladder Cancer** – The most common treatment for non-muscle invasive bladder cancer is BCG immunotherapy. However, many patients experience bladder pain that limits their therapeutic dose, decreasing treatment efficacy. Projects are available for students to investigate the mechanisms of BCG induced bladder pain, and test novel prophylactic therapies to prevent the development of pain during bladder cancer treatment.
- **Drug Delivery** – Traditional approaches to pain management, such as opioid based analgesics, are unsuitable for treating chronic pelvic pain due to their debilitating side effects, including addiction and dependence. Taking a different approach, we have shown that we can effectively inhibit bladder pain via instillation of therapeutic compounds into the bladder lumen. The next step required to advance this transformative intervention is to develop drug delivery systems that allow selective targeting of the bladder following systemic administration.

Skills students will gain:

Students will have the potential to learn a variety of laboratory skills including in-vivo imaging and behavioural testing, sensory nerve recordings, cell culture of primary sensory neurons, live cell calcium imaging, quantitative and single PCR, flow cytometry, and bacterial culture. Students will also develop animal handling and surgical skills and gain experience in project planning.

Collaborators associated with projects:

Professor Stuart Brierley
Dr Steven Taylor.

flinders.edu.au/people/luke.grundy
youtu.be/EV9gWyKul5M

Location: SAHMRI and/or Flinders Medical



Supervisor name:

Dr Andrea Harrington

Supervisor email:

andrea.harrington@flinders.edu.au

Name of 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 tracing, 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 have multiple projects available, with options for scholarships, as part of the following Australian Research Council funded studies.

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.
- **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 signalling from multiple visceral organs converge and communicate to establish sites important to the development 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 vitro* neurophysiology imaging (calcium imaging)
- physiology (whole animal approaches)
- data analysis and management
- laboratory small animal handling

Collaborators associated with projects:

Professor Stuart Brierley
Dr Luke Grundy
Dr Joel Castro
Dr Sonia Garcia-Carballo.

flinders.edu.au/people/andrea.harrington

flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups

Location: SAHMRI

Supervisor name:

Dr Ashley Hopkins

Supervisor email:

ashley.hopkins@flinders.edu.au

Name of research group: Clinical Cancer Epidemiology Lab

Description of research area and interests:

The Clinical Cancer Epidemiology Lab aims to deliver actionable prediction strategies and breakthroughs that improve the lives of patients with cancer. We achieve this through epidemiological research which honours the contributions of patients who have enrolled their clinical data and experiences to science.

Outline of projects:

My research team leverages established collaborations with industry partners (e.g. Pfizer, Roche, Lilly) to identify biomarkers and predictors of efficacy, quality-of-life, and adverse outcomes associated with anti-cancer medicines. Our objective is to bring together big data and emerging data science breakthroughs (e.g., machine learning and artificial intelligence) to inform oncologists and clinical practice guidelines about the selection of the right medicine for the right patient. We have current active projects informing the precision use of anti-cancer medicines across breast, lung, prostate, colorectal and other major cancer types.

Skills students will gain:

Students will develop skills in clinical epidemiology, cancer pharmacology, precision medicine, clinical trial design, and publishing/presenting research. Our group provides opportunities to network with international leaders of oncology research and big pharma.

Collaborators associated with projects:

Professor Michael Sorich
Associate Professor Andrew Rowland
Dr Ganessan Kichenadasse
Professor Ross McKinnon.

flinders.edu.au/people/ashley.hopkins

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Dr Arne Ittner

Supervisor email:

arne.ittner@flinders.edu.au

Name of research group: aiLab –

Laboratory for Molecular Dementia and Memory Research

Description of research area and interests:

Our research program focusses on a brain protein called tau, which is central in Alzheimer's disease and other forms of dementia. We are particularly interested in the molecular events involving tau in the healthy brain and in Alzheimer's disease.

Cognitive functions such as learning, decision making, and adaptive behaviour are shaped by memory of previous experiences. We aim to understand the biological foundation of memory and how it is impaired in dementia. Memory formation relies on synapses – junctions between brain cells that control transmission of relevant information. Protein phosphorylation mediated by enzymes called protein kinases is a common mode of signal transduction within synapses. We believe it is critical to understand how protein kinases signal to control memory function and how tau is regulated in healthy and disease states of memory as this is largely unknown.

Our team within the Flinders Health and Medical Research Institute offers a unique environment for students to get involved and start their career in biomedical research. Our work is supported by NHMRC, ARC and Flinders University.

Outline of projects:

- Research projects offered to students will build on our expertise on tau and kinase-mediated signal transduction using different biological model systems.

Student projects will explore molecular processes encoding mammalian cognitive function. Furthermore, the classic and most recent methods of protein biology, proteomics, and neuroscience will be used to delineate the molecular events that control memory and other brain functions. Projects focus on a molecular, genetic or cognitive process as a starting point and are further developed into a complete project plan.

Skills students will gain:

1. Strong skill sets in molecular and neuronal cell biology (molecular cloning, PCR, CRISPR, cell culture, immunofluorescence microscopy)
2. Technical expertise in protein biology and proteomics of signal transduction (immunoblots, phospho-peptide mapping, protein interaction assays)
3. Skills in the analysis of cognitive and behavioural capacities (memory and behaviour tests)
4. Understanding of the fields of neurobiology and dementia research (literature searches and discussion, journal clubs)
5. An opportunity to network within the Australian and international scientific community.

Collaborators associated with projects:

Dr Kristie Stefanoska

Dr Prita Asih.

flinders.edu.au/people/arne.ittner

dementia.org.au/research/news/read/grants-boost-help-brightest-young-researchers-dive-dementia-research

Location: Flinders Medical Centre



Supervisor name:

Michael Jackson

Supervisor email:

michael.jackson@flinders.edu.au

Name of research group: Autoimmunity research laboratory

Description of research area and interests:

Autoimmunity is a major health burden, affecting up to 8% of the population in Australia. Our research focuses on the role of autoantibodies in autoimmune diseases such as Type 1 Diabetes and human narcolepsy with cataplexy. Autoantibodies have the ability to mediate ongoing inflammatory damage or functional impairment for patients with these diseases, requiring ongoing immune suppression to prevent disease progression. Our research is focused on identifying the molecular pathways by which autoantibodies arise, and the pathogenic role they exert in the disease process. An increased understanding of these aspects of the autoimmune process provides increased opportunities for therapeutic approaches and clinical management of patients. Our work is clinically focused, utilising genuine human autoantibodies derived from patients in combination with cell-based and molecular research platforms.

Outline of projects:

Type 1 diabetes: This project aims to identify and isolate genuine human autoantibodies to the type 1 diabetic autoantigen, IA-2, in an attempt to understand the role these antibodies play in disease progression. We use proteomic interrogation of these isolated autoantibodies to determine the origins of B cells giving rise to autoimmune plasma cells, and are developing cell-based models of insulin secretion to understand how anti-IA-2 antibodies interfere with insulin secretion.



Narcolepsy with cataplexy: We are the first research group to identify functionally significant anti-neuronal antibodies in this disease, and use a range of neurophysiological assays to characterise the effect of these antibodies on various nerve signalling axis. This work is interdisciplinary, combining techniques of immune research and neuroscience (neuroimmunology) to understand the role of functionally significant antibodies in driving complex neurological disorders such as narcolepsy.

Skills students will gain:

Cell culture, clinical medicine, bioassays, bioinformatics and proteomics, molecular and immunological experimental techniques.

Key staff associated with project:

Honours and Ph.D students, Dr Jing Jing Wang.

flinders.edu.au/people/michael.jackson

Location: Flinders Medical Centre

Supervisor name:

Professor Harald Janovjak

Supervisor email:

harald.janovjak@flinders.edu.au

Name of research group: Synthetic Physiology Laboratory

Description of research area and interests:

The Synthetic Physiology Laboratory combines synthetic biology and physiology to understand and ultimately treat human disease. Synthetic biology, through its paradigm 'build to understand', has proven to tackle even the most complex biological problems. The Synthetic Physiology Laboratory is now taking the next step and applying synthetic paradigms to manipulate cell and animal physiology in health and disease. The laboratory has established new methods to 'remote control' the signaling pathways and consequently the behaviour of nerve cells, cancer cells and key cells linked to diabetes. The laboratory has then harnessed these unique methods to, e.g., reverse cell death in a genetic neurodegeneration model of Parkinson's disease, or to identify a drug candidate for non-small cell lung cancer. The major future challenge is to expand the synthetic capabilities to the entire genome with a focus on major drivers of human disorders.

Outline of projects:

- Genome-wide protein engineering (this project includes international research collaboration: USA, Germany): The goal of this project is to develop a new protein engineering platform that will for the first time allow a genome-wide manipulation of disease driver proteins.
- Antibiotics resistances in synthetic biology (this is an industry research project): The goal of this project is to turn recently emerged antibiotics resistances

into useful synthetic biology methods.

- CRISPR-assisted next-generation sequencing (this project includes international research collaboration: USA, South Korea): To goal of this project is to explore a potential role of CRISPR technologies for improved next-generation sequencing of disease related genes.
- MicroRNA and other non-coding RNA promoters (this project includes international research collaboration: Greece): The goal of this project is to functionally characterize the promoters of miRNAs and other non-coding RNAs for exploitation in synthetic physiology.

Skills students will gain:

- A comprehensive set of molecular biology skills, including genetic engineering and next-generation sequencing
- A comprehensive set of cell biology skills, including bacterial and human cell culture, microscopy and high-throughput robotics
- A comprehensive set of transferable skills, including skills in research design and methodology, presentation skills and skills in reporting and publishing research
- Skills in the development of intellectual property and collaboration with industry partners

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janovjak-lab.com

Location: Flinders Centre for Innovation in Cancer

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Dr Claire Jessup

Supervisor email:

claire.jessup@flinders.edu.au

Name of research group:

Immunomodulation Laboratory

Description of research area and interests:

The Immunomodulation (iMOD) Laboratory is interested in harnessing the power of the immune system to modulate disease. We examine the molecular activation of immune cells involved in the treatment of cancer and the development of autoimmune diseases (e.g. Type 1 diabetes).

Outline of projects:

- Modulation of immune cell activation during Type 1 diabetes and islet transplant rejection
- Checkpoint inhibitors as an immunotherapy for cancer
- Investigating the interplay between vascular and endocrine cell types during islet transplantation.

Skills students will gain:

- Tissue culture, *in vitro* immune assays and cell isolation from patient samples
- Cellular analysis techniques including flow cytometry and confocal microscopy
- Molecular techniques including real-time PCR, cloning and antibody engineering
- Islet transplantation, diabetes and cancer disease models.

flinders.edu.au/people/claire.jessup

Location: Flinders Medical Centre



Supervisor name:

Professor Damien Keating

Supervisor email:

damien.keating@flinders.edu.au

Name of research group: Gut Sensory Systems

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 centres on the gut and how specialised secretory cells lining the gut wall can respond to the food we ingest and the gut microbiome to release signalling molecules that affect metabolism, obesity, food intake and activate the gut-brain axis. We publish in the leading international journals including Nature. People are at the centre of good research and we aim to provide our team members with a well-rounded and diverse skill set and professional development for whatever career path they choose.

Outline of projects:

- How does the microbiome control our metabolism? – we recently published a key paper describing how the gut microbiome interacts with specialised gut endocrine cells to regulate host metabolism (Martin et al, PNAS 2019). We wish to build on this to understand the mechanisms controlling this pathway.
- How does the food we eat activate gut hormone release? – we use human gut tissue samples to show that nutrients and other factors trigger the release of gut hormones that are important for metabolic control and blood glucose levels (Sun et al, Diabetes 2017, Findeisen et al, Nature 2019). We want to use our novel approaches to understand how

other nutrients trigger gut hormone release and the physiological implications of this.

- How does the gut speak to our brain?
 - new work in our lab has discovered a number of ways that gut endocrine cells are activated that are relevant to the gut-brain axis. We would like to understand how these various stimuli, including food, fluids, and psychoactive drugs, activate specific parts of our brain to trigger diverse effects including nutrient intake, mood and activity. Outcomes from such projects relate directly to human health disorders including obesity, diabetes, depression, bipolar disorder and mania.

Skills students will gain:

These studies are carried out using a number of approaches including measurements of secretion, ELISA, transfection of cells, immunohistochemistry, live cell imaging, 3-D reconstruction microscopy, real time RT-PCR, Western blot and culturing of primary cells and cell lines. These are complimented with whole animal in vivo studies including metabolic profiling of transgenic and knockout mouse lines.

flinders.edu.au/people/damien.keating

flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/gut-sensory-systems

Location: Flinders Medical Centre



Supervisor name:

**Associate Professor
Sonja Klebe**

Supervisor email:

sonja.klebe@flinders.edu.au

**Name of research group: Anatomical
Pathology/Asbestos Diseases Lab**

Description of research area and interests:

Malignant mesothelioma is an aggressive tumour with an extremely poor prognosis; even with treatment, most patients die within 2 years of being diagnosed. Current treatment still relies on combination chemotherapy, and despite considerable efforts, new treatment modalities have been unable to significantly improve patient survival in over 15 years. Our research group is focused on improving outcomes for patients suffering with malignant mesothelioma. We utilise cancer cells derived directly from patients to understand the biology of mesothelioma so we can create more effective, personalised treatments for patients.

We are also committed to improving diagnosis so that patients can receive earlier cancer detection and treatment and our research has had a real-world impact on the way pathologist diagnose mesothelioma.

Outline of projects:

- Can mesothelioma organoids be used to predict treatment response? Drug screening programs aimed at testing patients' own, living cancer cells in the laboratory prior to assigning treatment is becoming a real possibility with the use of innovative three-dimensional models of cancer called cancer organoids. We aim to establish and characterise mesothelioma cancer organoids using cells derived directly from patients.

- Why are some sub-populations of mesothelioma cells tolerant to therapy? "Drug-tolerant" cells are a distinct sub-population of slow-growing cancer cells, which through multiple mechanisms, can survive exposure to anti-cancer treatment without acquiring additional genetic mutations, eventually giving rise to clinical progression. We aim to characterise the molecular features of these drug tolerant cell populations.
- What are the molecular differences between non-invasive and invasive mesotheliomas? We are interested in using next generation sequencing to understand the molecular events that cause non-invasive mesothelioma to become invasive.

Skills students will gain:

Students will have the potential to learn various laboratory techniques including, cell culture using patient derived cells and cell lines, cloning, quantitative PCR, ELISA, flow cytometry and immunohistochemistry. We work closely with patient's diagnostic specimens and students will gain experience handling these types of specimens.

Collaborators associated with projects:

Dr Ash Hocking
Dr Sarita Pabarakaran
Dr Alix Farrall
Ms Lauren Mortimer.

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Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Professor Bryone Kuss

Supervisor email:

bryone.kuss@flinders.edu.au

Name of research group:

Lymphoproliferative Research Group

Description of research area and interests:

Haematological malignancies: Chronic Lymphocytic Leukaemia (CLL), non-Hodgkin lymphoma and other lymphoproliferative conditions. A particular interest in metabolomics, proteomics and molecular genomics of these tumours and their response to therapies.

Outline of projects:

- Defining High Risk mechanisms in lymphoproliferative malignancies
- Lipid metabolism in CLL
- Redox and metabolic changes in CLL

The dream of a cancer treatment that does not require chemotherapy is becoming a reality for some patients with the advent of molecularly targeted therapies. However, in others these new drugs fail as their cancers develop resistance and are prognostically "high risk". Understanding how cancer cells do this is the primary aim of our research. Using leukaemic cells from patients with Chronic Lymphocytic Leukaemia and other lymphoid malignancies, we will explore the molecular mechanisms of cell metabolism, and drug resistance to find new ways to overcome it. We will ascertain the profiles that are associated with resistance leading to high-risk tumours. Relevant drugs include Ibrutinib, an inhibitor of Bruton's tyrosine kinase which impairs the B cell receptor (BCR) pathway in lymphocytes, and venetoclax, which inhibits the pro-survival protein BCL2.

We hypothesise that resistance mechanisms will be multifactorial involving functional escape from the BCR pathway inhibition by utilisation of pathway redundancy; alteration of homing receptor expression; metabolic rewiring and reactivation of the NFkB and NFAT pathways.

In addition, we will use our experience with lipidomics to explore how malignant cells process lipids and use them for energy. With particular interest in developing a lipid-based PET (Positron Emission Tomography) with labelled lipid molecules to improve the diagnosis and management of lymphoproliferative malignancies.

This research addresses clinical issues using a comprehensive and systematic approach to explore the biology of Lymphoproliferative diseases and represents collaboration between Flinders Medical Centre, University of Queensland and Royal North Shore Hospital, NSW.

Skills students will gain:

Molecular biology particularly DNA and RNA extraction, proteomic analysis, lipidomics, PCR and next gen sequencing approaches to genomic questions. Flow cytometry and cell culture.

Collaborators associated with projects:

Dr Lauren Thurgood
Dr Giles Best
Associate Professor Karen Lower.

flinders.edu.au/people/bryone.kuss

Location: Flinders Medical Centre



Supervisor name:

**Associate Professor
Karen Lower**

Supervisor email:

karen.lower@flinders.edu.au

Name of research group: Genetics and Epigenetics research lab

Description of research area and interests:

The lab is focussed on understanding the genetic basis of disease, from identification of inherited and somatic mutations through to dysfunctional epigenetic regulation of gene expression. All research has a clinical focus and utilises patient samples to answer key outstanding clinical questions.

Outline of projects:

- Identification and confirmation of mutations in chronic lymphocytic leukaemia and similar blood diseases
- Identification and confirmation of breast cancer susceptibility genes
- Long range gene regulation and effects of repetitive regions on DNA methylation

Skills students will gain:

- Standard molecular lab methods, such as PCR and Sanger sequencing
- Analysis and confirmation of next generation sequencing
- Cloning and gene expression analysis
- CRISPR Cas9 methodologies

**Collaborators associated with projects:**

This research will be carried out within the larger research group including:

Dr. Binoy Appukuttan
Dr Stephen Gregory
Dr Lauren Thurgood
Professor Bryone Kuss.

All projects have a clear clinical focus and are tightly linked to answering key clinical questions.

One project is a collaboration with Oxford University.

flinders.edu.au/people/karen.lower

Location: Flinders Medical Centre.

Supervisor name:

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 analyses 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 against COVID19 in up to 10K healthcare workers. He also leads a NHMRC-funded systems vaccinology study in infants.

Outline of projects:

- The impact of the microbiome on cancer immunotherapy efficacy and toxicity.
- How do vaccines induce memory responses in the innate immune system?
- Investigating how the microbiota regulates immunity in early life.

- New methods for systems level analyses of innate immunity and cancer.

We are seeking Honours and HDR students with an interest in immunology; microbiology; cancer biology; computational or systems biology. Previous experience in programming is strongly recommended if seeking a purely computational biology/ bioinformatics project, but mixed wet-lab/ bioinformatics projects are a possibility for those without programming skills.

Skills students will gain:

- Mouse models of cancer; immunology; flow cytometry; range of animal handling techniques; germ-free mice; gene expression analysis; microbiome analysis
- Preclinical models; vaccine biology; immunology; flow cytometry; range of animal handling techniques; epigenetics; ELISA; gene expression analysis
- Preclinical models and clinical cohorts; 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.

Collaborators associated with projects:

Dr. Stephen Blake
Dr Natalie Stevens
Dr Miriam Lynn
Dr Feargal Ryan.

flinders.edu.au/people/david.lynn

Location: SAHMRI

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Professor Arduino A Mangoni

Dr Sara Tommasi

Supervisors' email:

arduino.mangoni@flinders.edu.au

sara.tommasi@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, idiopathic or radiation induced lung fibrosis, and atherosclerosis. We have developed effective ways to reduce the expression and the 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.

Outline of projects:

- 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 metabolomic, 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.

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.

Collaborators associated with projects:

Mr Anthony Doman

Vinitha Ragavan

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.

**flinders.edu.au/people/arduino.mangoni
researchnow.flinders.edu.au/en/persons/sara-tommasi-2**

Location: Flinders Medical Centre

Supervisor name:

Dr Dusan Matusica

Supervisor email:

dusan.matusica@flinders.edu.au

Name of research group: Pain and Sensory Cell Biology 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 pain killers such as opioids.

Outline of projects:

- 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 phenotypes
- Detection of human vesicular miRNAs in complex CSF solutions

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



Collaborators associated with projects:

Professor Rainer V Haberberger

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-microchip-new-research/

linkedin.com/in/dusan-matusica-7993a675/?originalSubdomain=au

Location: Flinders Medical Centre

Supervisor name:

**Associate Professor
Robyn Meech**

Supervisor email:

robyn.meech@flinders.edu.au

**Name of research group: Molecular
Pharmacology and Cancer**

Description of research area and interests:

Our lab studies mechanism that control the initiation and progression of cancer and its response to drug treatment. A major area of focus is the enzymatic control of small molecules within cells, including anticancer drugs and ligands that activate nuclear receptor signalling pathways. Examples of ongoing projects include: 1) studies of factors that control steroid signalling in breast and prostate cancers through androgen and estrogen receptors. 2) A project that studies the role of bile acid signalling in the induction of colon cancer by diet and microbiome dysregulation.

Outline of projects:

- Understanding steroid signalling in cancer cells
- Understanding nuclear receptor mechanisms
- Analysis of Cancer Stem Cells
- Analysis of drug metabolism pathways
- Understanding drug resistance in cancer cells

Skills students will gain:

- Depending on the project the following may be used:
- Molecular biology (DNA cloning etc)
- Cell transfection and analysis
- Cell growth assays
- Fluorescence microscopy
- CRISPR

- RNA analysis/ RTPCR

- Reporter gene assays (e.g. luciferase)

- Protein-interaction assays

Collaborators associated with projects:

Dr. Julie-Ann Hulin

Dr. Dong Gui Hu

flinders.edu.au/people/robyn.meech

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

**Associate Professor
Michael Michael**

Supervisor email:

michael.michael@flinders.edu.au

**Name of research group: Gene Expression
Lab**

Description of research area and interests:

Colorectal cancer is the second highest cause of cancer related death in Australia. We study the genetic and epigenetic processes that are associated with this disease. Most of our work involves understanding how genes are aberrantly activated in cancer, so we study chromatin and RNA. We often focus on non-coding RNAs, including microRNAs. We also study how cells communicate through small extracellular vesicles, with a view to understanding how a tumour interacts with its microenvironment. Our projects range from developing novel diagnostics and understanding how the environment (especially diet) impacts cancer risk, to identifying novel therapeutic targets. With our collaborators, we are currently interested in the metabolic rewiring of cancer cells that allows them to proliferate in an uncontrolled manner. We combine molecular biology approaches with genetics, cell biology, biochemistry and pharmacology to explore how transcriptional and post-transcriptional processes are regulated, in the expectation that we will identify new anti-cancer treatments.

Outline of projects:

- Study genes that mediate cancer cell responses to metabolic and epigenetic disruptors.
- Non-coding RNA involvement in gastrointestinal/pancreatic cancers

- Epigenetic signatures associated with metastasis location
- Epigenetic changes associated with diet
- Characterise three dimensional organoid models of colorectal cancer
- Develop novel RNA, gene and cell therapy technologies

Skills students will gain:

- Molecular biology: purifying nucleic acids, PCR, RT-PCR, cloning, genomics (next gen. sequencing), bioinformatics. Protein quantification and characterisation
- Microbial and mammalian cell biology, flow cytometry, metabolism assays
- Advanced separation techniques (ultracentrifugation, chromatography), Nanoparticle characterisation, electron microscopy
- Near super-resolution light microscopy
- Small animal experimentation
- Experimental design, statistical methods

Collaborators associated with projects:

Professor Janni Petersen
Dr Shashikanth Marri
Ms Virginia Papangelis.

flinders.edu.au/people/michael.michael

[youtube.com/watch?v=YrjrlUkyPWE](https://www.youtube.com/watch?v=YrjrlUkyPWE)

Location: Flinders Centre for Innovation in Cancer



Supervisor name:

Dr Pramod Nair

Supervisor email:

pramod.nair@flinders.edu.au

**Name of research group: Drug Discovery
Group (Pharmacology)**

Description of research area and interests:

Our research focuses on investigating various aspects of drugs that range from pre-clinical drug development to drug metabolism. Our group uses innovative computational and experimental methods to understand the fundamental structural biology of biomolecular systems (e.g., enzymes, receptors) in cancer including driver mutations and acquired mutations (due to drug resistance) in proteins pre- and post-drug treatment. The fundamental structural understanding of protein at an atomic resolution is essential for the rational design and discovery of novel therapeutics. Specifically, our research utilises ligand- and structure-based drug design methods to develop new generation anti-cancer therapeutics for solid tumours and blood cancers. In some of our drug discovery programs, we utilise in silico screening of large-scale drug-like molecules (including existing drugs for repurposing) against various cancer targets, followed by in vitro testing to identify hits. The lead compounds are further optimised and tested in pre-clinical (in vitro and in vivo) models. Our studies also utilise state-of-the-art computational approaches that are performed on supercomputing platforms to characterise protein flexibility, drug binding mechanisms, and predict drug toxicity mediated by drug metabolizing enzymes.

**Outline of projects:**

Understanding the genetic and molecular basis of cancer is fundamental to the development of better cancer therapeutics in precision medicine. Emerging evidence suggests that the structural changes in proteins due to driver or acquired mutations are one of the fundamental causes of cancer progression and drug resistance in numerous cancers. This project will investigate various aspects of cancer structural biology, to understand structure-function characteristics of the driver/secondary mutations, that will have a direct clinical impact on dose optimization, selection of better therapeutics for prescribing, and novel drug targeting approaches in different cancer mutations.

Skills students will gain:

The student will gain experience in advance small molecule drug discovery tools including ligand (molecular similarities, cheminformatics, artificial intelligence) and structure-based (molecular docking, molecular dynamics simulations) methods and molecular biology and experimental methods including polymerase chain reaction (PCR), site-directed mutagenesis (SDM), in vitro assays (HPLC, mass spectrometry and colorimetric methods), kinome-wide screening.

Collaborators associated with projects:

Associate Professor Daniel Thomas

Associate Professor David Ross

Professor Arduino Mangoni

Dr Ganessan Kichenadasse

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Location: Flinders Medical Centre

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 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.

Collaborators associated with projects:

Dr Yuri Ogawa

Dr Joseph Fabian

Mrs Sarah Nicholas.

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hoverflyvision.weebly.com

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

**Associate Professor
Yoichiro Otsuka (Youichriou
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 (skin artery vasoconstriction). 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 undertreated 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/ anesthetized animal physiological and neuroanatomical experiments.

Outline of projects:

Experiments will be conducted in

conscious/anesthetized 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 adeno-associated viral vectors and transgenic animals.

Skills students will gain:

The project is 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.
3. Computer programming to analyse bio-physiological signal data with specialized signal process software.

Collaborators associated with projects:

Emeritus Professor William Blessing
Miss Anna Antipov
Mr Jett Zivkovic
Professor Tomoyuki Kuwaki
Professor Akihiro Yamanaka.

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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:

Janni Petersen is a cancer cell biologist, who has an interest in understanding the mechanisms that allow cancer cells to grow and divide. Cancer is a disease of inappropriate cell growth and cell division. Cancer cells migrate to colonize new parts of the body, here they undergo cell division in environments with limited nutrient supply therefore, cancer cells are frequently nutritionally stressed. In shedding light on the mechanisms behind environmental and metabolic control of cell division and cell survival we aim to identify novel target for the treatment of human cancers.

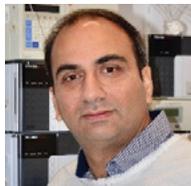
Outline of projects:

- Understanding cancer cell metabolism
- The impact of cell metabolism on DNA repair and its implications for aging and cancer
- Cancer cells survival under nutrient stress, what makes cancer cells unique?

Skills students will gain:

A wide range of techniques including:

- Mammalian tissue culture, cell biology, cell physiology
- Genetics (CRISPr/Cas9 technology)
- Biochemistry including: SDS-PAGE, western blotting, immuno-precipitations, kinase assays.
- Molecular biology including PCR, DNA cloning and DNA sequencing
- Imaging including Immunofluorescence, microscopy and live cell imaging.



Collaborators associated with projects:

Ms Tingting Wang
Ms Reham Mounzer.

flinders.edu.au/people/janni.petersen

Location: Flinders Centre for Innovation in Cancer

Supervisor name:

**Associate Professor
Munish Puri**

Supervisor email:

munish.puri@flinders.edu.au

**Name of research group: Bioprocessing
(Medical Biotechnology)**

Description of research area and interests:

The Research Program in my laboratory focuses on various issues pertaining to the Biotechnology and Pharmaceutical industries. The major goals of my research are to produce and purify novel therapeutic proteins/small metabolites (known as bioactives) from a variety of sources e.g. microbes, animal and plant cells and to improve their functional efficiency and specific activity for carrying out transformations of pharmaceutical intermediates/animal cell products with health benefits. This can be accomplished by two strategies: Bioprocessing and Metabolic engineering.

The following research is currently underway in partnership with our national and international collaborators: *a) health and nutrition* to develop preventive medicine and nutritional supplements to improve human health; *b) food biotechnology* for nutraceutical extraction and functional food development relating to single cell oils that are rich in omega-3 fatty acids, and enzyme production; *c) nanobiotechnology* for enhancing the thermostability of enzymes that have application in health products and *d) health substantiation* by validation of the function(s) of bioactives.

Outline of projects:

Several projects will be offered, each focused on developing a solution to an industry problem that is associated with

human health globally.

- i. Development of single cell oils rich in omega-3 fatty acids to assist human nutrition
- ii. Development of controlled alginate hydrolysis for medical applications
- iii. Characterisation of the delivery of therapeutic proteins to diseased cells
- iv. Targeting fatty acid metabolism for containing obesity
- v. Green extraction process development for novel bioactives.

Skills students will gain:

- Experience in conducting systematic literature reviews
- Analytical, microscopy, SDS-PAGE, bioreactor use and downstream skills
- Techniques including the growth of microbial and mammalian cells
- Experience in purifying proteins and immobilising enzymes
- An understanding of research in medical biotechnology
- Skills in the reporting and publishing of research.

We have international and national collaborations, which will allow students to interact with world class leaders in this field. Most of our projects are supported by Industry partners, thus depending upon the project, students will gain Industry exposure.

Collaborators associated with projects:

Dr Liu Fei Tan
Dr Adarsha Gupta
Ms Kushari Burns
Dr Reinu Abraham.

flinders.edu.au/people/munish.puri

Location: Health Sciences Building

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 Test 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 preeclampsia, 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
- Role of ACE2 in placenta & pregnancy outcomes.

Skills students will gain:

Cell culture, ELISA, western blotting, molecular biological techniques, bioinformatics and biostatistics.

Collaborators associated with projects:

Dr Tanja Jankovic-Karasoulos
Dr Anya Arthurs
Dr Melanie Smith
Mr Dylan McCullough
Dr Shalem Leemaqz.

flinders.edu.au/people/claire.roberts

Location: Flinders Medical Centre



Supervisor name:

Professor Geraint Rogers

Supervisor email:

geraint.rogers@flinders.edu.au

Name of research group: Microbiome & Host Health

Description of research area and interests:

Our research focuses on how the microbiome influences human health outcomes across a range of clinical contexts.

Outline of projects:

Potential projects include investigations of the complex mediatory role of the human microbiome in acute and chronic conditions including acute infections in those receiving intensive care, recurrent urinary tract infections, chronic lung disease, cancer, and ageing-associated cognitive decline.

Skills students will gain:

An understanding of the influence of the human microbiome on health and disease and of associated analytical techniques, particularly mass parallel sequencing. Experience in microbiology, bioinformatics, data science, molecular genetics, biostatistics, complex determinants of health, inter-disciplinary collaboration, and clinical translation.

Collaborators associated with projects:

Dr Steven Taylor
Dr Jocelyn Choo
Dr Lito Papanicolas.

flinders.edu.au/people/geraint.rogers

Location: Flinders Medical Centre



Supervisor name:

Associate Professor Mary-Louise Rogers

Supervisor email:

mary-louise.rogers@flinders.edu.au

Name of research group: Motor Neurone Disease and Neurotrophic 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 in 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
- Mass spectrometry

Collaborators associated with projects:

Dr Stephanie Shephard

Associate Professor Tim Chataway.

flinders.edu.au/people/mary-louise-rogers

flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/mnd-neurotrophic-lab

Location: Flinders Medical Centre



Supervisor name:

Associate Professor Andrew Rowland

Supervisor email:

andrew.rowland@flinders.edu.au

Name of research group: Precision Medicine Group

Description of research area and interests:

Every year 275,000 Australians are hospitalised because of an unintended effect of administering a medicine, half of these adverse events are unavoidable because of fundamental knowledge gaps in the way that drugs interact with our bodies. Our team engage strongly with the pharmaceutical industry to develop and implement cutting edge technologies to resolve knowledge gaps regarding the impact of life stage, organ interplay and disease on the activity of proteins that influence drug exposure and response. We then use this knowledge to inform safer and more effective drug dosing of medicines in vulnerable populations.

Outline of projects:

Research in our group spans from the application of computer-based models to simulate the effect of different demographic characteristics (age, sex, race and disease), through to conducting clinical trials in health volunteers and the isolating biomarkers from human blood.

The two key areas of research undertaken by our group that are amenable to HDR projects are: Simcyp based physiologically based pharmacokinetic modelling (computer-based projects) and extracellular vesicle derived biomarkers of drug exposure and response (laboratory-based projects). Our core projects centre around the development of strategies to improve the use of non-cytotoxic cancer medicines

to enhance both patient survival and quality of life.

Skills students will gain:

- Deep expertise in at least one cutting-edge analytical technology that is highly relevant to industry research and jobs. These include
 - PBPK modelling and simulation
 - extracellular vesicle isolation and characterisation
 - liquid chromatography mass spectrometry-based biomarker discovery
- Experience in conducting research aligned to industry outcomes and goals

Collaborators associated with projects:

Dr Zivile Useckaite

Professor Michael Sorich

Dr Ashley Hopkins.

flinders.edu.au/people/andrew.rowland
sites.flinders.edu.au/precision-medicine-group/

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



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 and become resistant to 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.

Our group collaborates widely with scientists, clinicians, computational biologists and engineers to ensure that our findings have maximal impact. Importantly, our "team science" approach means that we also undertake impactful research on other types of cancer, most notably breast cancer.

Our research exploits a unique assortment of model systems (patient-derived xenografts, patient-derived tumour material cultured in the lab and cell lines), contemporary 'omic' techniques and cutting-edge bioinformatics tools.

Outline of projects:

- Development of 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 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 worldleading computational biology labs in Cambridge, UK.

Skills students will gain:

Cutting-edge "omic" techniques i.e. transcriptomics (RNA-seq, single-cell RNA-seq), epigenomics (ChIP-seq, ATAC-seq, DNA methylation profiling), metabolomics; molecular biology and biochemistry; cell and tissue culture; bioinformatics; data analysis and presentation; science communication.

Collaborators associated with projects:

Dr Jianling Xie, Ms Adrienne Hanson, Mr Scott Townley, Dr Raj Shrestha, Mr Sam Rollin, Ms Razia Rahman, Ms Danielle Fang.

Collaborators also include: Professor Lisa Butler (University of Adelaide), Professor Shudong Wang (UniSA), Professor Amina Zoubeidi (University of British Columbia), Professor Jeff Holst (University of Sydney), Professor Johan Swinnen (KU Leuven), Associate Professor Phil Gregory (UniSA), Professor Jason Carroll (Cambridge University) and Professor Scott Dehm (University of Minnesota).

flinders.edu.au/people/luke.selth

**scholar.google.com.au/
citations?user=lfXWSaQAAAAJ&hl=en**

Location: Flinders Centre for Innovation in Cancer



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:

- **Response of human eye cells to infection with emerging viruses (Dengue virus, Zika virus, Ebola Virus):** Work with RNA and/or protein isolated from human eye cells that have been infected with an emerging human virus, to understand the interactions between the virus and different eye cells.
- **Toxoplasma gondii infection of human eye cells:** Toxoplasmosis is a common parasitic disease carried by cats that cannot be cured and that affects the retina. Infect human retinal cells and/or tissues with Toxoplasma gondii parasites to study how the parasite damages the retina.



- **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.

Collaborators associated with projects:

Mr Liam Ashander
Dr Yuefang Ma
HDR 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:

Dr Elke Sokoya

Supervisor email:

elke.sokoya@flinders.edu.au

Name of research group: Chronic Disease Research Laboratory

Description of research area and interests:

1 in every 2 Australians has a chronic illness such as cardiovascular disease, diabetes, depression and autoimmune disease. The common denominator underlying these conditions is a dysregulated immune system fuelling systemic inflammation. Current standard medical care attempts to control symptoms rather than addressing the root cause. However drug treatments alone do not reverse disease or keep us healthy.

The approach of the Chronic Disease Research Laboratory is to understand the drivers of these chronic conditions. The ultimate goal is to provide evidence that informs not only clinical practice, but also the general public, by providing a paradigm for preventative healthcare. Current projects are focussed on autoimmunity. An autoimmune disease occurs when the immune system starts to attack its own tissues. This tissue can be the synovial joints (rheumatoid arthritis), the pancreas (type I diabetes), the nerves (multiple sclerosis) or the bowel (Crohn's disease). Strikingly, the incidence of autoimmune disease has tripled in the last few decades and it affects more people than heart disease, diabetes and cancer combined.

Outline of projects:

Establishing a leaky gut biomarker panel in rheumatoid arthritis

- Rheumatoid arthritis (RA) is an autoimmune disease that causes significant pain, multiple joint swelling and ultimately joint destruction. A leaky gut is an open doorway between the gut

lumen and the rest of the body and is a key feature of RA. Working with patient samples, a number of different leaky gut tests will be performed in order to establish a leaky gut panel. This will be assessed at baseline and after reducing inflammation with standard of care medication. Direct targeting of a leaky gut, in future studies, provides an opportunity to stop the inflammation in RA, thereby increasing chances of a drug-free remission.

Prioritising anti-inflammatory nutrition: can we re-define rheumatoid arthritis treatment?

- Autoimmune diseases begin with a dysregulated immune system and around 70% of our immune system is in our gut. Recent work has shown that RA patients have gut dysbiosis, whereby the delicate balance of resident gut microbes is disturbed. One of the biggest influences on our gut microbiome is our food choices. In this study, RA patients will be randomised to one of two arms: disease-modifying anti-rheumatic drug (DMARD) treatment only or DMARD treatment plus an anti-inflammatory diet. A number of markers will be measured including our panel of leaky gut markers and biological markers of inflammation.

Skills students will gain:

- Exposure to state-of-the-art techniques such as microarray hybridisation technology platforms and metabolomics
- Experience in using the clinical database platform, REDCap, and an understanding of many aspects of clinical studies, including patient recruitment, inclusion and exclusion criteria and selecting controls
- Experience in collating and analysing clinical data
- Experience in using patient samples to identify treatable targets

Collaborators associated with projects:

Associate Professor Mihir Wechalekar
Associate Professor Jenny Walker
Dr Cuong Tran.

flinders.edu.au/people/elke.sokoya

elkesokoya.wixsite.com/cdr/lab

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Professor Michael Sorich

Supervisor email:

michael.sorich@flinders.edu.au

Name of research group: Machine learning and predictive biomarkers group

Description of research area and interests:

We aim to improve treatment outcomes by better identifying who will benefit most from treatment. This involves analysis of biomarker data (genetic mutations, gene expression) and other patient characteristics to identify patients that will benefit from treatment and those at risk of adverse effects. Our primary focus is understanding and predicting outcomes of medicines used to treat cancer with a particular interest in new cancer medicines that use the immune system (immunotherapies). This research involves use of machine learning and statistical analysis to better predict patient risks.

Outline of projects:

Projects are available in a range of areas focusing on understanding and predict treatment benefit and harms of medicines. These include:

- Identification of biomarkers of good treatment response to anti-cancer medicines
- Development of prediction models of patient risks of favourable and adverse outcomes of therapy
- Evaluation of new machine learning methods for predicting who will (and will not) gain benefit from treatment

Skills students will gain:

Students will gain an understanding of contemporary anti-cancer medicines including the key biomarkers and clinical factors being evaluated for guiding clinical use of medicines. Additionally, students will gain a strong understanding of the design and analysis of clinical trials used to evaluate contemporary medicines. Students will develop skills to manage data and to use machine learning and/or biostatistical methods to analyse data, develop prediction models and identify biomarkers of value.

Collaborators associated with projects:

Dr Ashley Hopkins

flinders.edu.au/people/michael.sorich

Location: Flinders Medical Centre



Supervisor name:

Professor Nick Spencer

Supervisor email:

nicholas.spencer@flinders.edu.au

Name of research group: Visceral Neurophysiology Laboratory

Description of research area and interests:

Our team is interested in understanding the neurophysiological basis of pain pathways in visceral organs (i.e., how do visceral organs detect and transmit pain signals?), and the neural and myogenic control mechanisms underlying their motility patterns (i.e., how do visceral organs create movement to carry out their various functions?). Principally, we study the gastrointestinal tract (oesophagus, stomach, small intestine, colon), as well as the bladder and, more recently, the female reproductive tract (uterus, vagina).

Central to our research ethos is determining the normal function of visceral organs under physiological conditions, before investigating how they become altered in disease – you can't fix a broken-down car without first knowing how the engine is supposed to work! To answer these questions, we use many cutting-edge research techniques, including optogenetics, calcium imaging, microsurgery, and genetically engineered mouse models.

Outline of projects:

- Characterisation of motor activity and sensation from the female reproductive tract
- Optogenetics to silence pain pathways in the visceral organs
- Identification of the different types of spinal afferent nociceptors
- Calcium imaging enteric neural networks underlying intestinal peristalsis

- Real-time calcium imaging of the activation of spinal afferent nerve endings
- Recording dynamic changes in intracellular calcium from sensory nerve endings
- Characterising the role of intrinsic nerves in the movement of intestinal content.

Skills students will gain:

Students have the potential to gain experience in a range of laboratory skills, including molecular biology (e.g., immunohistochemistry); microscopy (e.g., epifluorescence, confocal); calcium imaging; electrophysiology (e.g., nerve recordings); ex vivo organ bath recordings including spatiotemporal mapping; behavioural studies including optogenetics; small animal handling; animal microsurgery; as well as project planning, data analysis, and scientific writing and communication.

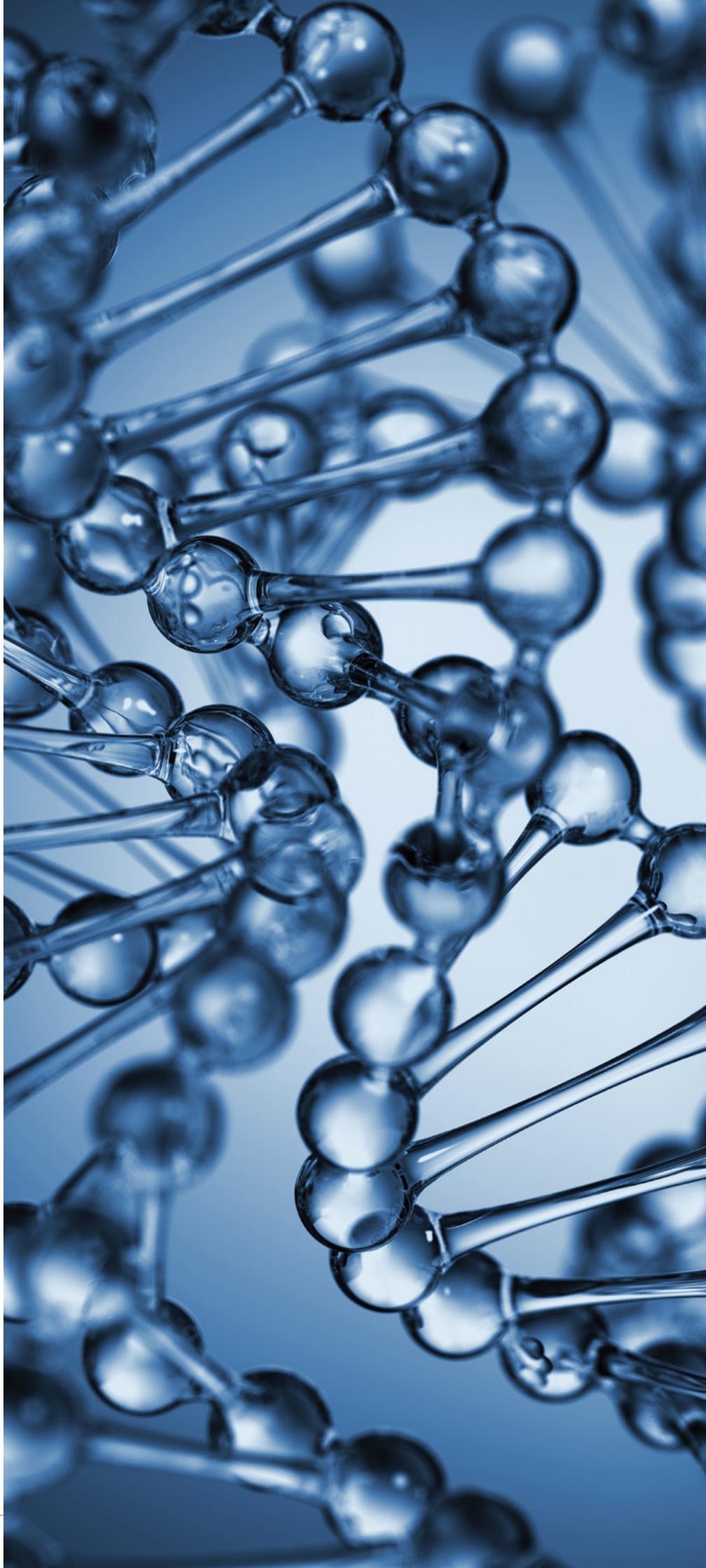
Collaborators associated with projects:

Dr Kelsi Dodds
Dr Tim Hibberd
Ms Melinda Kytloh
Mr Lee Travis.

flinders.edu.au/people/nicholas.spencer

flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/visceral-neurophysiology

Location: Flinders Medical Centre



Research Supervisors and their projects

Molecular Biosciences



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:

Colorectal cancer is one of the most common cancers in Australia, but it can be effectively treated if it is detected at an early stage, and can even be prevented if colorectal polyps are found and removed before they become cancerous.

The research of the Bowel Health Service team focuses on preventing colorectal cancer. This includes developing and validating new non-invasive biomarkers to improve cancer and polyp detection; personalising surveillance for people at increased risk for cancer; and monitoring for effectiveness of cancer treatment with biomarkers.

Outline of projects:

- Developing new ways to reduce the number of unnecessary colonoscopies being done in Australia
- Determining the type (and combination) of polyps in the bowel that increase risk for cancer in the future
- Establishing risk factors for developing pre-cancerous colorectal lesions
- Improving the quality of colonoscopy in South Australia
- Using biomarkers to monitor the effectiveness of cancer treatment

Skills students will gain:

- Knowledge of risk factors for colorectal cancer and polyps
- Experience with collating and reviewing clinical data
- Experience in working with and analysing large data sets
- Understanding patient preferences for colorectal cancer prevention
- Skills in biomarker research

Collaborators associated with projects:

Dr Jean Winter

Dr Molla Wassie

Ms Geri Laven-Law

Ms Marie Lowe

Clinicians (gastroenterologists, oncologists and surgeons).

flinders.edu.au/people/erin.symonds

flinders.edu.au/cancer/preventing-cancer-and-detecting-it-early

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**

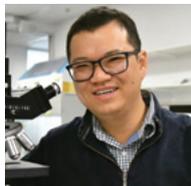
Description of research area and interests:

My research area is focussed on chronic lymphocytic leukemia (CLL), a common adult leukemia. 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:

- The effect of the tumour microenvironment on CLL cell survival
 - This project uses cell culture models to understand the interaction between CLL cells and supporting cells in the tumour microenvironment including fibroblasts, stromal cells and adipocytes



- Assessing proteome changes following targeted therapies
 - Targeted therapies as shifting the paradigm in CLL treatment. However, there are no predictive biomarkers for response or resistance. By analysing the proteome of CLL cells taken from patients pre- and post-treatment and correlating this with clinical outcomes we hope to identify biomarkers of response and resistance
- 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).

Collaborators associated with projects:

Dr Giles Best
Associate Professor Karen Lower
Dr Stephen Gregory
Professor Bryone Kuss.

flinders.edu.au/people/lauren.thurgood

Location: Flinders Medical Centre

Supervisor name:

Dr Vi Khanh Truong

Supervisor email:

vikhanh.truong@flinders.edu.au

Name of research group: Biomedical Nanoengineering Lab

Description of research area and interests:

My research is focused on engineering biointerface, which has been known as the region where biomacromolecules and cells interact with materials at the molecular, nano-, and cellular levels. Biointerface engineering is crucial for numerous applications ranging from biotechnology to medicine. Our Biomedical Nanoengineering Lab aims to engineer the biointerface to modulate the biological response for specific biomedical applications. Engaging with team members, students will have the opportunity to collaborate with chemists, physicists, biologists, microbiologists, and clinicians. Students will acquire the knowledge and abilities necessary to investigate the interaction between cells and biomaterials.

Outline of projects:

We have a wide range of projects to design biomaterials or process which can be used in many medical applications, including;

- Bioengineering Antimicrobial Biomaterials. Designing materials at various scales to stop infections for different applications such as orthopaedic implants, catheters, wound dressing, etc.
- Designing Drug Delivery System. This project is focused on encapsulating drugs in lipid or biopolymer formulations. Various techniques will be used in this project to encapsulate the desired drug molecules

- Designing biosensors for detecting the early sign of infections. The focus of this project is designing biosensors that can glow or change colour to alert the infections

Skills students will gain:

- Biomaterial synthesis and characterisation
- Drug encapsulation
- Cell culture and assays
- Microbiological skills
- Biotechnology-related skills

Collaborators associated with projects:

Professor Krasimir Vasilev – Co-supervising in bioengineering process

Other postdocs and PhD students in the Biomedical Nanoengineering Lab

flinders.edu.au/people/vikhanh.truong

news.flinders.edu.au/blog/2022/05/03/big-step-in-hip-implants/

bonezonepub.com/2022/05/09/researchers-develop-new-antibacterial-coating-combining-ha-and-gallium/

medicaldesignbriefs.com/component/content/article/mdb/features/rand/40250

Location: Health Sciences Building and Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Professor Krasimir Vasilev

Supervisor email:

krasimir.vasilev@flinders.edu.au

Name of research group: Biomedical Nanoengineering Laboratory

Description of research area and interests:

Our research sits at the interphase between materials, biology and medicine, focussing on engineering and tailoring at a molecular level, where biological entities interact with biomaterials and devices. Having the capacity to control that interphase allows me not only to interrogate and understand important physiological processes, but also to translate these capabilities to application, which benefits patients, clinicians and fellow researchers. Our work has been instrumental in advancing cutting-edge research across a range of disciplines and has resulted in the creation of innovative technologies, devices and research tools that are being utilised to overcome many pressing medical and biological challenges. Examples include: coatings that control infection and/or inflammation; precision diagnostic devices; drug delivery vehicles, and biomaterial surfaces capable of directing cellular responses required in areas such as tissue engineering and cell therapies.

The Biomedical Nanoengineering Laboratory has the following vision and mission.

- **Mission:** To create the next generation of medical devices and technologies via bridging the clinical needs with the latest advances in materials and engineering.
- **Vision:** To benefit as many people as possible through providing clinicians with game changing technologies that improve their capacity to diagnose and cure

diseases, enabling medical researchers with the tools to interrogate unanswered medical problems, and furnishing industry with the knowhow to manufacture urgently needed medical devices that lead to significant improvement of human health, and the associated societal and economic benefits.

Outline of projects:

There are many project opportunities available, non-exhaustive examples are provided below:

- Antibacterial coatings for orthopaedic devices
- Antibacterial coatings for catheters and wound dressings
- Antithrombogenic coatings for vascular devices i.e. heart valves, stents
- Role of adsorbed proteins on inflammatory responses to biomaterials
- Role of surface on stem cells senescence
- Guidance of stem cells differentiation via surface properties
- Platforms for controlled and targeted drug delivery
- 3D engineering scaffolds for hard and soft tissue regeneration
- Methods for diagnosis of infections and cancers

All projects will be designed jointly with the student taking into consideration their interests and the capacity of the laboratory to support that. Where possible, the project will involve clinicians and medical practitioners as advisors/co-supervisors to provide the clinical input. Many of our projects involve national and international collaboration.

Skills students will gain:

The student will gain knowledge and expertise in the areas of biomedical devices, technologies and materials, and the associated methods and techniques for analysis and fabrication. The student may have the opportunity to work on projects associated with biomedical industry. Clinical input in the projects will be provided by clinicians involved in the projects as co-supervisors/advisors. Additional input will be provided by advisors from the biomedical industry (where applicable).

Collaborators associated with projects:

Dr Vi Khanh Truong

Dr Dennis Palms

Dr Ruvini Dabare

Dr Duy Quang Pham

Dr Richard Bright

Dr Andrew Hayles

flinders.edu.au/people/krasimir.vasilev

Location: Health Sciences Building



Supervisor name:

**Associate Professor
Craig Wallington-Gates**

Supervisor email:

craig.wallingtongates@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.

Collaborators associated with projects:

Dr Lauren Thurgood
Ms Rachel Mynott
Mr Ali Habib
Professor Stuart Pitson
Professor Claudine Bonder
Dr Manjun Li.

**flinders.edu.au/people/craig.
wallingtongates**

Location: Flinders Centre for Innovation in Cancer

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Dr Jean Winter

Supervisor email:

jean.winter@flinders.edu.au

Name of research group: Bowel Health Services

Description of research area and interests:

Dr Winter is a Research Associate within the Bowel Health Services team, located at the Flinders Centre for innovation in Cancer. The team's work focuses on the development and clinical translation of non-invasive diagnostic tests for detection of gastrointestinal cancers. The work includes improving screening options for people in the community and monitoring for risk of cancer recurrence during and after treatment. Our primary interest is to enhance cancer prevention strategies and improve cancer patient outcomes using non-invasive and cost-effective strategies. This involves collaboration of large and multidisciplinary teams of basic molecular biologists, clinicians, gastroenterologists, nurses, consumers, industry partners and epidemiologists.

Outline of projects:

The team is currently working on multiple projects that are funded by category 1 grants (NHMRC and MRFF). The projects available will be to develop novel non-invasive DNA methylation biomarker tests, as well as translate a methylated DNA blood biomarker test into the clinic for monitoring for the effectiveness of treatment in patients with gastrointestinal cancers. The work will be implementing contemporary genomic technologies in patient clinical samples and integrating this with machine learning practices to identify the best biomarkers to detect cancers and pre-cancerous lesions.

Skills students will gain:

- Molecular biology wet lab (DNA/RNA extraction, bisulphite conversion, multiplex qPCR, sequencing)
- Big data and statistical analysis (Genome, methylome, microbiome, metabiome)
- Clinical trial experience (patient recruitment, consent, ethics, data management)
- Epidemiology (data linkage, cancer registries)

Collaborators associated with projects:

Associate Professor Erin Symonds

Dr Molla Wassie

Ms Geri Laven-Law

Ms Marie Lowe.

flinders.edu.au/people/jean.winter

Location: Flinders Centre for Innovation in Cancer



Supervisor name:

Dr Amy Wyatt

Supervisor email:

amy.wyatt@flinders.edu.au

Name of research group: Protein Homeostasis in Health and Disease

Description of research area and interests:

Proteins are the molecular machinery responsible for carrying out the multitude of functions that are essential to living things. To sustain life, proteins must be present at the correct concentration and location, have the correct three-dimensional structure (known as a fold) and undergo the correct post-translational modifications. These are core elements of protein homeostasis that are disrupted in a large number of human diseases and disorders such as Alzheimer's disease, preeclampsia, arthritis, cancer, type II diabetes, autism and attention-deficit hyperactivity disorder.

Our research focuses on understanding the relationship between protein homeostasis and inflammation in human health and disease, with the end goal of contributing to the framework for novel therapeutic and diagnostic strategies. Our laboratory is a friendly and inclusive environment, and we encourage applications from students with diverse backgrounds.

Outline of projects:

Here are some examples of possible projects, but we encourage students to come and have a chat about their specific interests.

- Characterising pregnancy-associated protein homeostasis
- Elucidating the role of protein misfolding in the pathology of preeclampsia
- Characterising the multifaceted role of hypochlorite in protein homeostasis



- Characterising the role of human alpha-macroglobulins in controlling cell growth and the pathology of cancer
- Characterising the role of human alpha-macroglobulins in controlling infection
- Identifying neurotrophic factors that underpin autism spectrum disorder
- Characterising molecular links between neurodevelopmental disorders and dementia

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
- Science communication

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youtu.be/unqkQ6sGTkk

Location: Flinders Medical Centre

Supervisor name:

**Associate Professor
Vladimir Zagorodnyuk**

Supervisor email:

vladimir.zagorodnyuk@flinders.edu.au

**Name of research group: Urogenital
laboratory**

Description of research area and interests:

Our team investigates neural control of bladder function and mechanism of sensation from the bladder in normal and pathophysiological conditions such as overactive bladder and interstitial cystitis (painful bladder syndrome). We use clinically relevant animal models for these common bladder disorders.

Our research focuses on identifying the role of ion channels and pro-inflammatory mediators' involvement in augmenting excitability of bladder spinal sensory neurons, that innervate the bladder, during bladder inflammation (cystitis). This hypersensitivity of sensory nerves leads to generation of lower urinary tract symptoms such as urinary frequency, urgency, nocturia and pain.

Outline of projects:

- Role of TRP channels in sensory mechanisms underlying bladder dysfunction in cystitis
- Investigation of potential role of endogenous and exogenous cannabinoids for safe and effective treatment of the bladder pain
- Determining the basic processes behind the circadian rhythm control of voiding which are important for understanding mechanisms of nocturia

Skills students will gain:

- Electrophysiological single unit extracellular recordings from sensory nerves ex vivo
- EMG recording in vivo during visceromotor responses
- Antero- and retrograde tracing techniques combined with immunohistochemistry
- Cystometric techniques combined with pharmacological tools.

Collaborators associated with projects:

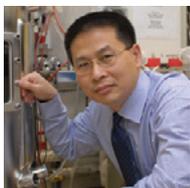
Dr Stewart Ramsay.

flinders.edu.au/people/vladimir.zagorodnyuk

Location: Flinders Medical Centre

Research Supervisors and their projects

Molecular Biosciences



Supervisor name:

Professor Wei Zhang

Supervisor email:

wei.zhang@flinders.edu.au

Name of research group: Centre for Marine Bioproducts Development (CMBD)

Description of research area and interests:

The ocean contains unknown varieties of new marine bioresources, spawning innovation in food production, health and nutrition, and fuel and energy alternatives. We are diving deep, developing new marine bioproducts and the latest bioprocess technologies, focussing on green and circular manufacturing. We are globally recognised as research leaders on Australia's marine bioresources – up to 95% of which are not found anywhere else in the world.

The CMBD conducts R&D on marine bioprocess, bioproducts and biotechnology in collaboration with a wide range of disciplines including medicine, health and disease treatment and prevention, food sciences, agriculture, aquaculture, environmental protection and management, renewable energy and biotechnological engineering.

We are developing novel marine bioproducts for sustainable and profitable seafood and functional foods, marine nutraceuticals and cosmeceuticals, marine bioproducts and biomaterials, preventive medicines and pharmaceutical industries, and the advanced manufacturing processes to manufacture them in the circular economy context.

Outline of projects:

1) Food and nutraceutical developments from marine bioresources

This project will develop green and clean extraction processes to efficiently produce

various marine bioproducts using emerging and patented advanced technologies. The extracted products will be characterised and analysed in composition, functionalities, bioactivities, and nutritional values to determine their potential applications in food, functional food and nutraceutical product development toward commercialisation to make an impact on industry and community health through nutritional intervention.

2) Marine microbial natural products development for industry application

The project focuses on biodiscovery research from marine microbes and microalgae and their derived product development for industry application using diverse biotechnological approaches. Microbes are sourced from diverse marine organisms, such as marine sponges and macroalgae, and microalgae are mainly focused on edible species. Industrial applications primarily target food such as plant-based proteins for meat analogues, and pharmaceutical industries. The in-house developed microbiome analysis approach using advanced Next Generation Sequencing will provide a distinctive technical advantage for microbiome-based research.

3) Novel 3D-bioprinting marine-derived biomaterials and bioinks

The research aims to develop a comprehensive design and fabrication process flow diagram, in-depth physiochemical characterisation of marine biomaterial to address Critical Quality Attributes (CQA) of products and Quality by design (QbD) of the 3D bioprinting industry. The projects will involve innovative technologies from functional chemistry, biochemistry and biomedical science to develop biomaterials for artificial scaffolds for tissue and organ regeneration. The

application of novel biomaterial will focus on 3-D printing of skin tissues and neuronal organoids for the discovery and development of potent bioactives for skin health and aging health products.

4) Development of Australian seaweed-based functional foods and biodegradable bioplastics

The first research project area will focus on South Australian seaweeds for developing a variety of targeted vegan-friendly food and functional food products with commercialization potentials for the Australia market. The second project area will develop seaweed-based novel bio-composite materials as biodegradable bioplastics for environmentally friendly plastics products such as food packaging films.

5) Functional food product development from marine and terrestrial bioresources

The project focuses on researching and developing functional food products from edible medicinal bioresources of both marine and terrestrial environments, based on the "Edible medicines theory and practice". The integration of traditional nutritional and medicinal knowledge and modern biotechnology will be the key technology platform to enable the complementary formulation of bioactive and functional ingredients from both marine and terrestrial bioresources. We are aiming to uncover the scientific basis to develop a series of functional foods and preventive medicinal products with these active ingredients that add more than just nutrition, to improve the quality of life and for better overall health and wellbeing of the human population.

Skills students will gain:

The CMBD research scope is diverse, aiming to develop sustainable and profitable seafood and functional foods, marine nutraceuticals and cosmeceuticals, marine bioproducts and biomaterials, biomedicine and marine biofuels industries, and the advanced manufacturing processes to manufacture them in the circular economy context.

We provide great training programs and generous scholarships for talented students to conduct their research projects. The techniques cover a wide range of areas of science and technology, including Biochemistry (enzyme assays and bioactive assays), Biotechnology, Green Chemistry (supercritical fluid extraction, microwave-assisted extraction, ultrasound-assisted extraction, pulse electric field, and vortex fluid device), Molecular Biology (NGS sequencing, metagenomics, and bioinformatics), Cell Biology (cell and tissue cultures), Analytical Technology (UPLC, LC-MS etc), 3D-Bioprinting, and Microscopy techniques.

Collaborators associated with projects:

Associate Professor Kirsten Heimann
Professor Colin Raston
Associate Professor Justin Chalker
Dr Michael Conlon
Dr. Zhongfan Jia.

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flinders.edu.au/centre-marine-bioproducts-development

anzmbs.asn.au

mbcrc.com

tcgcm.com.au

Scholarships:

PhD: CMBD will offer 'Top-up scholarship' of an additional \$5,000 per year (tax-free) for those PhD applicants who have secured other scholarships. For PhD students who have demonstrated outstanding performance, the Top-up scholarship will be offered at \$10,000 per year for year 2 and year 3. The CMBD also offers a research project-based scholarship at the standard rate for excellent PhD candidates.

Masters (Honours) of Biotechnology: CMBD will offer a scholarship of \$5,000 per student for outstanding Masters/ Honours of Biotechnology students who have gained a minimum GPA 6.0 (out of 7.0) and/or demonstrated academic excellence and research potential.

Location: Health Sciences Building

Research Supervisors and their projects

Clinical Translation



Supervisors' names:

Associate Professor

Shailesh Bihari

Professor Peter Catchside

Supervisors' emails:

shailesh.bihari@flinders.edu.au

peter.catchside@flinders.edu.au

Name of research group: ICCU and FHMRI

Sleep Health collaborative research group

Description of research area and interests:

The Flinders Intensive and Critical Care Unit (ICCU) and FHMRI Sleep Health research groups have strongly overlapping research interests. This includes a new approach for assessing breathing effort and timing in patients with breathing problems in sleep and in mechanically ventilated patients in an ICCU setting. Another area of interest is in assessing the impact of the noisy ICCU environment on sleep and health outcomes such as delirium, where sleep disturbance could play an important role in promoting sub-optimal health outcomes in hospital care.

Outline of projects:

Potential projects could focus around evaluating aspects of a new respiratory-mechanics based method for assessing breathing effort and timing in ICCU or in a Sleep Health context. Alternatively, projects could focus on new methods for assessing noise impacts on sleep and health outcomes.

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 in reporting and publishing research

Collaborators associated with projects:

Professor Karen Reynolds
Miss Julia Demura
Dr Branko Zajamsek
Dr Kristy Hansen
Professor Bob Adams
Dr Nicole Lovato.

flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health

flinders.edu.au/people/peter.catchside

flinders.edu.au/people/shailesh.bihari

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



Supervisor name:

Associate Professor

Shailesh Bihari

Supervisor email:

shailesh.bihari@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 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.

**Skills students will gain:**

Animal handling and surgical skills, protein analysis methods including ELISAs, histological staining and analysis, cell culture and general lab techniques.

Collaborators associated with projects:

Associate Professor Dani-Louise Dixon
Dr James McEvoy-May.

flinders.edu.au/people/shailesh.bihari

Location: Flinders Medical Centre

Supervisor name:

Professor Peter Catcheside

Supervisor email:

peter.catcheside@flinders.edu.au

Name of research group: FHMRI: Sleep Health**Description of research area and interests:**

The FHMRI: Sleep Health group is one of the leading sleep research laboratories in Australia with broad research interests spanning a range of sleep problems and impacts on daytime functioning and health.

Research is mainly focused on advancing evidence-based approaches to better diagnose and manage sleep problems through

- a. Understanding mechanisms and consequences of sleep disturbances.
- b. The development and testing of novel measurement and treatment approaches strategically designed to improve sleep problem identification and management.
- c. Randomised controlled trials to definitively establish causal mechanisms and the clinical utility of new versus current best practice methods.

The FHMRI: Sleep Health group has extensive collaborations across the College of Science and Engineering, College of Education, Psychology and Social Work, Flinders Medical Centre (Respiratory and Sleep Medicine and the Intensive and Critical Care Unit ICCU) amongst other groups and initiatives.

Outline of projects:

Current research interests and potential future research directions include projects to investigate

- Environmental noise impacts on sleep and daytime functioning and health.

- The use of circadian-system guided lighting strategies to accelerate circadian realignment to shift-work.
- Use of a new respiratory-mechanics based method for assessing breathing effort and timing in ICCU or in a Sleep Health context.
- The use of new under-mattress and other sleep monitoring technology for helping to improve sleep in patients with motorneurone disease.
- Respiratory load sensory mechanisms.
- The use of novel EEG recording methods for examining auditory-evoked responses.
- Improved methods for assessing personal protective equipment (PPE) mask resistance, leak and filtration performance effectiveness.

Skills students will gain:

- A comprehensive understanding of human sleep and respiratory physiology and health and relevant measurement approaches
- Skills in research design and methodology
- Statistical knowledge
- Skills in reporting and publishing research

Collaborators associated with projects:

Professor Bob Adams
Professor Danny Eckert
Dr Gorica Micic
Dr Branko Zajamsek
Professor Karen Reynolds.

flinders.edu.au/people/peter.catcheside

flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health

Location: Mark Oliphant Building

Research Supervisors and their projects

Clinical Translation



Supervisor name:

Professor Jamie Craig

Supervisor email:

jamie.craig@flinders.edu.au

Name of research group: Eye and Vision

Description of research area and interests:

Our goal is to improve outcomes for all people with, and at risk of, blinding eye conditions, with a focus on inherited eye diseases. Our focus is on the nexus between vision and health, a major issue in Australia and international communities with an ageing population. Our approaches include programs in basic biomedical science, and the fields of applied, clinical, translational, genetic and health services management research. One of our strategies is to train the next generation of clinicians and researchers. We have a particular interest in industry-related student projects.

Outline of projects:

- Glaucoma: Better identification of people at high risk of glaucoma, through genetic screening, would result in an overall reduction of preventable blindness by identifying those at risk and treating the condition before serious sight loss has occurred. Our group has established world-leading registries on advanced glaucoma and glaucoma progression that have been instrumental in the discovery of novel genetic risk factors and the development of better predicting tools.
- Predicting the genetic risk of glaucoma: Our research focuses on the identification of genetic and clinical risk factors for glaucoma development and progression, across all types of glaucoma, from primary to secondary and from congenital to late onset. This will enable the development of risk modelling and

comprehensive genetic testing programs to identify at-risk individuals before irreversible blindness occurs. Our group has developed a polygenic risk score for glaucoma which demonstrated improved prediction accuracy over traditional risk factors. We are now looking at ways to implement polygenic risk testing into clinical practice and communicate risk results effectively to patients.

- Diabetic retinopathy: Diabetic retinopathy is an ocular complication of diabetes and is the leading cause of blindness in working age adults worldwide. Further understanding of the genomic and social determinants of disease progression will assist in reducing the associated disease burden in the future by paving the way for more effective intervention. Our research has identified associations between several genes and higher rates of diabetic retinopathy. Although not typically associated, both inflammation and abnormal blood vessel development are characteristics of diabetic retinopathy. Research within the department is exploring the intersection between these two components, with a specific focus on the evaluation of inflammatory molecules and their novel role in abnormal retinal blood vessel development.

Skills students will gain:

- Knowledge of ophthalmology and genetics
- Design and execution of research projects
- Development of written and oral communication skills
- Bioinformatics skills
- Genetic analysis and interpretation
- Complex data sets analysis and interpretation

- Molecular approaches
- Recruitment and communication with research participants

Collaborators associated with projects:

Dr Owen Siggs

Dr Emmanuelle Souzeau

Dr Joshua Schmidt

Dr Daniel Thomson

Ms Bronwyn Ridge.

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anzrag.com.au

Location: Flinders Medical Centre



Supervisor name:

**Associate Professor
Chris Delaney**

Supervisor email:

christopher.delaney@flinders.edu.au

**Name of research group: Vascular Surgery
Atherosclerosis Research and Biobank**

Description of research area and interests:

Peripheral arterial disease (PAD) is a highly prevalent age-related condition with substantial morbidity and mortality. A major risk factor is age. Despite an estimated 230 million adults affected world-wide PAD remains underdiagnosed and undertreated. It is primarily due to atherosclerosis, a complex inflammatory disease in which the build-up of plaque occurs in the vessel wall, particularly the intima. Whilst it's known that vascular endothelial cell perturbation, lipid accumulation, immune cell infiltration (mediated by chemokines and proinflammatory cytokines), macrophage foam cell formation, smooth muscle changes, calcification and fibrosis all play a role, the underlying cellular and molecular mechanisms are still not fully understood. This is illustrated by the current lack of consensus about what constitutes a stable versus unstable plaque, and the role of calcification.

We have recently established a comprehensive Atherosclerosis Biobank comprising diseased atheromatous tissue or plaque (obtained by endarterectomy), blood; stool; urine and saliva from patients with PAD. Importantly, this clinically validated biological repository has now been strengthened by blood, saliva, urine and stool specimens from 30 healthy age- and gender-matched controls.

Outline of projects:

Objective 1 – Cellular senescence, defined as a state of irreversible cell cycle arrest, is a hallmark of ageing. Senescent cells (SC) contribute to age-related tissue inflammation and dysfunction. SC persist and accumulate in tissues (largely by evading immune surveillance) thereby interfering with tissue- integrity and tissue -renewal processes. Moreover, SC also turn on a senescence-associated proinflammatory secretory phenotype (SASP) releasing a cocktail of potent pro-inflammatory molecules. Accumulating evidence shows SC are present in vascular endothelial, smooth muscle cells and macrophage foam cells in vessel walls suggesting that senescence is associated with atherosclerosis. To understand the role SC play in atherosclerosis we aim to identify and quantify SC in diseased tissue from our patient cohort using immunohistochemistry and well-defined antibody probes.

This has strong clinical overtones because recent evidence indicates that SC can be specifically eliminated by a new range of therapeutics called senolytics.

Hypothesis: We hypothesize that senescent cells and senescent cell-derived pro-atherogenic proteins accumulate in the inflamed vessel wall and play key roles in initiating and sustaining peripheral arterial disease (PAD) associated atherosclerosis.

Objective 2 – In collaboration with Professor Rob Edwards (acting as co-supervisor), we aim to examine plaque tissue for the presence of viral, particularly bacteriophage, and bacterial DNA using genomic sequencing. This is a novel undertaking. Bacteria and viruses can translocate through the intestinal barrier and migrate to the lymph, peripheral blood and internal organs. Bacteriophages, therefore, could also translocate, a

phenomenon which could have functional consequences, given phage may exert immunobiological activities, for example, in inflammation and atherosclerosis. Inflammatory conditions may contribute to the increased permeability of the vascular endothelium to phage.

Professor Edwards is the Matthew Flinders Fellow in Bioinformatics and FAME Director of Bioinformatics and Human-Microbe Interactions, College of Science & Engineering.

Skills students will gain:

Laboratory techniques will include at least some of these platforms: enzymatic digestion of tissue, purification of single cells, cryopreservation, immunohistochemistry, immunophenotyping by flow cytometry, extraction of RNA, RT/PCR analysis, genomic sequencing and protein extraction. Experience working in a clinical surgical Department and research laboratory.

Collaborators associated with projects:

- Dr Ian Beckman
- Ms Kaye Beckman
- Dr James Chan
- Professor Rob Edwards
- Dr Sarah Giles.

flinders.edu.au/people/christopher.delaney

Location: Flinders Medical Centre

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 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 innate immunology associated with acute and chronic lung injury including ALI/ARDS, infant bronchiolitis, 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.

Collaborators associated with projects:

Associate Professor Shailesh Bihari
Dr James McEvoy-May.

flinders.edu.au/people/dani.dixon

Location: Flinders Medical Centre



Supervisor name:

Professor Danny Eckert

Supervisor email:

danny.eckert@flinders.edu.au

Name of research group: FHMRI 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

**Collaborators associated with projects:**

Professor Peter Catcheside
Professor Bob Adams
Associate Professor Andrew Vakulin
Associate Professor Sutapa Mukherjee
Dr Amal Osman
Dr Jayne Carberry
Lab manager and support members Carolin Tran and team.

flinders.edu.au/people/danny.eckert

flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health

Location: Mark Oliphant Building

Supervisor name:

**Associate Professor
Luke Grzeskowiak**

Supervisor email:

luke.grzeskowiak@flinders.edu.au

**Name of research group: Paediatric,
Reproductive and Perinatal
Pharmacoepidemiology Group**

Description of research area and interests:

Nearly all women take medications during pregnancy or lactation, but greater than 90% of medications lack adequate information on efficacy or safety in this setting. Due to this lack of knowledge, thousands of unborn children are exposed to harmful medications every day, resulting in adverse pregnancy outcomes (e.g. miscarriages, preterm birth, birth defects, and growth restriction) and long-term effects on child health and development (e.g. metabolic disorders, neurodevelopmental disorders), whereas other women deliberately avoid safe pharmacological treatment for illnesses that may jeopardize maternal and infant health if left untreated.

My research is focused on improving maternal and child health through the development and promotion of safer, more effective and personalised approaches to pharmacotherapy. My research utilises a range of methodologies including conducting clinical trials, utilising 'big data' to undertake large observational studies, and qualitative methods (e.g. consumer interviews and/or surveys).

Outline of projects:

Potential projects but open to discussion of topics covered above

- Provide evidence surrounding medication utilisation to understand patterns of consumer and prescriber behaviour, and

identify and address evidence-practice gaps

- Generate robust and reliable outcome estimates to facilitate informed decision-making regarding the potential benefits, risks, and uncertainties of medication use
- Identify the common characteristics of individuals at greatest likelihood of experiencing medication harms or benefits, to enable improved targeting of treatment interventions

Possible areas of research include:

- Asthma management during pregnancy
- Iron deficiency anaemia in pregnancy
- Management of common lactation problems including lactation insufficiency and mastitis
- Antibiotic dosing in pregnancy
- Postpartum pain management
- Antidepressant use in pregnancy or in young people
- Medication utilisation in primary care
- Medication safety interventions in neonatal care

Skills students will gain:

Skill development focusses on the basics of:

- Obstetric and neonatal pharmacology
- Pharmacoepidemiology
- Clinical epidemiology
- Clinical trials & cohort studies
- Evidence-based medicine

Collaborators associated with projects:

Dr Tamara Varcoe
Professor Tim Green
Associate Professor Alice Rumbold
Associate Professor Rosalie Grivell
Dr Scott Morris
Ms Aline Kunnel
Dr Kelly Hall
Professor Claire Roberts.

flinders.edu.au/people/luke.grzeskowiak

Location: Flinders Medical Centre

Research Supervisors and their projects

Clinical Translation



Supervisor name:

Dr Anna Hudson

Supervisor email:

anna.hudson@flinders.edu.au

Name of research group: FHMRI Sleep Health

Description of research area and interests:

The respiratory muscles are rhythmically activated all day, every day by the central nervous system to ventilate the lungs. My research investigates how activation of the respiratory muscles is optimised in health and the changes that occur in healthy ageing, lung disease and injury. I also investigate general motor control, e.g. in the limb muscles, to inform my research in respiratory muscles. My goal is to understand respiratory muscle control to improve health outcomes when it fails. To do this, I use neurophysiological techniques to measure muscle activity and brain activity and I assess respiratory muscle mechanics using ultrasound. This integrated approach is the only way to assess human respiratory muscle control.

Outline of projects:

Multiple projects are on offer. These include assessment of the efficiency of breathing in health and disease and determining the underlying mechanisms of muscle activation in movement control and strategies for rehabilitation.

Skills students will gain:

- A comprehensive understanding of respiratory physiology.
- Clinical research experience
- Skills in study design and research techniques
- Understanding of data and statistical analysis

- Skills in the preparation and presentation of research findings

Collaborators associated with projects:

Professor Danny Eckert

Professor Peter Catchside

Associate Professor Sutapa Mukherjee

Dr Thomas Altree.

flinders.edu.au/people/anna.hudson

Location: Mark Oliphant Building



Supervisor name:

Professor Bogda Koczwara

Supervisor email:

bogda.koczwara@flinders.edu.au

Name of research group: Cancer Survivorship

Description of research area and interests:

Our research aims to improve health outcomes for cancer survivors through examination of burden of disability and unmet needs after cancer diagnosis and development and implementation of new models of care for cancer patients and survivors such as systematic collection of patient reported outcomes (PROs).

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:

Multiple projects are available.

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.



Collaborators associated with projects:

Ms Reegan Knowles
Dr Huah Shin Ng
Dr Emma Kemp.

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Location: Flinders Centre for Innovation in Cancer

Supervisor name:

Dr Nicole Lovato

Supervisor email:

nicole.lovato@flinders.edu.au

Name of research group: FHMRI 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 focused on evaluating the efficacy of personalised 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:

A comprehensive understanding of sleep health and its relationship with physical and mental health

- Skills in research design and methodology
- Statistical knowledge
- Skills in reporting and publishing research

Collaborators associated with projects:

Professor Robert Adams
Associate Professor Andrew Vakulin

Dr Gorica Micic

Dr Amy Reynolds

Dr Hannah Scott.

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flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health

Location: Mark Oliphant Building

Research Supervisors and their projects

Clinical Translation



Supervisor name:

Dr Gorica Micic

Supervisor email:

gorica.micic@flinders.edu.au

Name of research group: FHMRI 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

Skills students will gain:

Methodological research implementation, translation of findings and publishing

- Applied research and clinical skills
- Inter-disciplinary collaboration
- Statistical knowledge
- Understanding of human-based research in the laboratory and ambulatory settings
- Work with diverse clinical groups including healthy and vulnerable individuals
- Extensive sleep laboratory skills including set-up of Polysomnography (PSG) and administration of psychological, neurocognitive and other day and night time performance and functioning assessments

Collaborators associated with projects:

Professor Peter Catcheside
Dr Nicole Lovato
Professor Leon Lack
Dr Branko Zajamsek
Dr Kristy Hansen, Associate Professor
Andrew Vakulin
Dr Alexander Sweetman
Dr Ranjay Chakraborty
Dr Sarah Appleton
Dr Yohannes Melaku.

flinders.edu.au/people/gorica.micic

flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health

Location: Mark Oliphant Building



Supervisor name:

Associate Professor Michael O'Callaghan

Supervisor email:

michael.ocallaghan2@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-PCCOC. 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.

Collaborators associated with projects:

Research & clinical staff from the Flinders Medical Centre Urology Unit.

flinders.edu.au/people/michael.ocallaghan

Location: Flinders Medical Centre



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.

Collaborators associated with projects:

Co-supervisor Dr Rajiv Ananthakrishna.

flinders.edu.au/people/joseph.selvanayagam

Research Supervisors and their projects

Clinical Translation



Supervisor name:

**Associate Professor
Andrew Vakulin**

Supervisor email:

andrew.vakulin@flinders.edu.au

**Name of research group: FHMRI Sleep
Health**

Description of research area and interests:

Falls

Falls are a major cause of preventable injury, hospitalisation, morbidity, loss of independence and mortality in older adults and represent a significant healthcare burden. Emerging evidence, including from our team, indicates that poor sleep health and sleep disorders (e.g., insomnia; obstructive sleep apnoea) are common (~50%) in older people, and are risk. Despite this sleep health is currently completely ignored in falls prevention and rehabilitation clinical practice and guidelines. We seek to understand the impact of sleep and circadian disorders on falls risk in older people, and importantly we are investigating if sleep disorder treatment is a feasible and effective approach to reduce falls risk.

Driving

Excessive sleepiness significantly increases the risk of a motor vehicle accident. There is currently no objective 'roadside' test to identify the sleepiness levels of a driver. Previous research has demonstrated that vestibular-ocular (balance/eye movement) motor screenings (VOMS) can be susceptible to sleep deprivation and sleepiness. However, these assessments have required specialised rooms and therefore can't be conducted in the roadside scenario. Our research is seeking to repurpose and apply a portable virtual reality headset device, the Neuroflex® to perform VOMS to detect driver sleepiness.

The Neuroflex® device is already being utilised to objectively measure neurological function after a traumatic brain injury. We expect that performing VOMS with the Neuroflex® will provide critical data for in-field trials towards roadside driver sleepiness assessments.

Outline of projects:

Falls

We are aiming (1) examine the impact of sleep disorders and their treatment on gait and falls risk in older people; and (2) use sensor technology to monitor gait and sleep in the home environment for prolonged periods before and after sleep disorder treatment. Our specific aims include:

- Prospectively compare fall risk profiles and gait quality between age- and gender-matched older people with and without a sleep disorder
- Establish if sleep disorder therapy improves fall risk profiles and gait quality at 3-, 6- and 12-month follow-up in older people
- Investigate if novel in-home monitoring technology effectively identifies temporal relationships between sleep quality, circadian phase and continuous gait quality measurements

Driving

Determine the viability of using VOMS assessed with the Neuroflex® device to identify driver sleepiness in healthy individuals and the subsequent relationship with impaired driving performance. Vestibular (balance) and ocular (eye movement) reflexes that we will assess include:

- eye-tracking (smooth pursuit): how well the eye can track a specific stimulus
- vestibular-ocular reflex: how well the eyes compensate for head movement to maintain focus on a stimuli

- saccades: how quickly both eyes can simultaneously move between two or more stimuli
- increased nystagmus: where the eyes make more repetitive, uncontrolled movements

Top up PhD stipend is available with this project.

Skills students will gain:

- Sleep study data collection and interpretation of electrophysiological signals
- Sleep physiology and psychology
- Circadian physiology
- Research data collection, processing, and analysis
- Sleep disorders, clinical gait and balance physiology and assessment (Falls research)
- Human performance (Driving research)

Collaborators associated with projects:

Dr Nicole Lovato

Falls research

Dr David Stevens

Associate Professor Sutapa Mukherjee

Associate Professor Ching Li Chai-Coetzer

Dr Alexander Sweetman

Dr Chris Barr

Dr Daina Sturnieks

Driving research

Professor Robert Adams

Emeritus Professor Leon Lack

Associate Professor Clare Anderson

Associate Professor Mark Howard

Dr Jennifer Cori

Ms Kelsey Bickley .



flinders.edu.au/people/andrew.vakulin
flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health-academic.oup.com/biomedgerontology/article/75/12/2450/5732393

Location: Mark Oliphant Building

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): disease activity, pathophysiology, and target tissue (the joint lining or synovial tissue (ST)) biology. We run a synovial tissue biobank, the only such facility in Australia & one of the very few world-wide.

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 clinically 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 pathobiological approach based on target-organ [synovial tissue (ST), the joint lining] biopsy analyses. ST 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 naive 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.

Collaborators associated with projects:

Ms Annabelle Small.

flinders.edu.au/people/mihir.wechalekar

Location: Flinders Medical Centre

Research Supervisors and their projects

Clinical Translation



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, focussing 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 (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 context.

This is being addressed by:

- Developing, testing and applying biomarker panels which have potential to detect early cancer and high-grade dysplasia in Barrett's oesophagus;
- Evaluating cancer progression within Barrett's oesophagus surveillance programs to identify individuals at high vs low risk of cancer progression to better target endoscopy surveillance to those at risk, and to remove from surveillance individuals unlikely to develop cancer;
- Devising and testing new surveillance strategies within a health economics framework to determine cost-effectiveness and cost-utility of new strategies for clinical practice;
- Working with collaborators in general practice to identify and test opportunities for screening for individuals at high risk of oesophageal adenocarcinoma.

This research entails developing new clinical and genomic data and integrating these outcomes within a health economic 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.

Outline of projects:

Blood biomarkers (eg miRNA, DNA methylation) for diagnosis and treatment prediction

- Breath biomarkers for diagnosis and treatment prediction
- Clinical outcomes and strategies to improve these outcomes
- Health Economic modelling to identify strategies to improve cost-effectiveness of intervention strategies
- Patient preferences for treatments and interventions

Skills students will gain:

Molecular biology, clinical outcomes measures, health economics modelling.

Collaborators associated with projects:

Dr Damian Hussey
Dr Norma Bulamu
Dr Roger Yazbek.

flinders.edu.au/people/david.watson

Location: Flinders Medical Centre



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:

Applying new therapies for hepatocellular carcinoma, investigating new models of liver care for remotely living Aboriginal peoples, investigating heart disease in patients with cirrhosis.

Skills students will gain:

Literature review, writing skills, data analysis and presentation, biostatistics, health economics.

Collaborators associated with projects:

Dr Kaye Muller
Dr Jeyamani Ramachandran.

flinders.edu.au/people/alan.wigg

Location: Flinders Medical Centre



Research Supervisors and their projects

Healthy Communities



Supervisor name:

**Associate Professor
Hossein Afzali**

Supervisor email:

hossein.afzali@flinders.edu.au

**Name of research group: Health
Economics**

Description of research area and interests:

The FHMRI Health Economics group includes 10 researchers, who work on a wide range of research projects. Our focus is on the use of the economic evaluation to inform decision-making within the health system. Economic evaluation provides information to decision makers on the value of tests and treatments, but also on alternative approaches to the organisation and delivery of health care.

Associate Professor Afzali is a health economist with a broad area of expertise relating to cost-effectiveness analysis of new healthcare interventions to inform public funding decisions. In terms of applied research, his main research activity is the design, conduct and analysis of economic evaluations alongside clinical studies. This also includes the application of decision analytic models to extrapolate the findings beyond the observed data in order to estimate lifetime costs and outcome of new interventions. The main focus of his methodological research is on the improvements in the decision-making process with a view to better inform public funding decisions. Examples include the development of diseases-specific models and model structuring.

Outline of projects:

Improving methods for the evaluation of new health technologies. In recent years, public funding of health technologies (e.g., medical services) has been a major driver of health spending in Australia. This spending represents significant opportunity costs, with inevitable health impacts on patients, families, and the broader community. This highlights the importance of the process and criteria by which national funding bodies determine the value of health technologies. This program of research involves projects to improve the health technology assessment (HTA) processes to better inform public funding decisions.

These projects involve the review of submissions to national funding bodies to identify current gaps and generate new knowledge to improve evaluation of new technologies. Examples of these projects include the development of new model development process to estimate costs and effects of health technologies and enable HTA decision making to systematically represent public values to inform funding decisions. These projects can also involve collaboration with consumer groups and HTA key stakeholders.

Skills students will gain:

Students will work collaboratively with the health economics group and other FHMRI researchers to gain a range of research skills that are highly sought after in private industry, academia, and in government roles including health services and policy roles. Specific skills could include:

- Experience in application and methods of economic evaluation to inform decision making in the health system,
- Methods for conducting formal literature reviews, including systematic, umbrella and scoping reviews,

- Quantitative and qualitative data collection,
- Advanced skills in quantitative/ econometric data analysis including analysis of health systems data, large linked datasets and primary data, for example, quality of life data,
- Co-designing and evaluating new models of care, collaborating with local health service clinicians and consumers including patients,
- An understanding of evidence-based practice and knowledge translation,
- Publishing research in peer reviewed journals.

Collaborators associated with projects:

Health Economics team and collaborating researchers.

flinders.edu.au/people/hossein.afzali

Location: Health Sciences Building



Supervisor name:

**Associate Professor
Niranjan Bidargaddi**

Supervisor email:

niranjan.bidargaddi@flinders.edu.au

**Name of research group: Digital Health
Research Lab**

Description of research area and interests:

Niranjan's research lab has implemented innovative technologies that together are providing the building blocks of health care in the future. Developed using co-design and participatory approaches with consumers and tested with different populations the solutions address three needs:

- (a) specific guidance from trusted gateways when people seek health related information online
- (b) navigators which audit digital footprints with different parts of the health system particularly in people with chronic and ongoing conditions and use nudges to ensure subsequent appointments, medications, referrals happen appropriately in the community
- (c) support people enact health behaviours by pushing advice in smaller chunks at opportune moments in daily life.

In parallel the lab also aims to understand and identify solutions to harmful digital mediations in everyday life. By optimising the process of mediation, the living research lab can develop and implement digital health systems that improve the clinical capacity to predict, identify, treat and prevent debilitating health issues in general and clinical populations. Developed in this way, emerging technologies are already being employed to advance the care of mental health, endometriosis, & ageing.

Outline of projects:

Optimise digital mediation processes to enhance health care outside the clinic.

- AI2: A service that automates the retrieval of Medicare Data to enable health care professionals to streamline the ways that they can monitor and assess patient care. This project is in the trial phase in conjunction with SA Health. It requires students to work in collaboration with project partners in order to analyse patient and clinician interactions via this service.
- Endometriosis Platform: provides a platform co-created with those seeking to accurately identify symptoms, share stories and support each other to fast-track diagnosis and treatments.
- MINDtick: A diagnostic tool that combines self-monitoring with enhanced intelligence to interact with and support mental health care beyond the clinic.

Skills students will gain:

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

Collaborators associated with projects:

- Mr Wenhao Li
- Dr Bronwin Patrickson
- Ms Anna Logounov
- Ms Melissa Beljic
- Ms Svetlana Ast
- Mr Dan Thorpe
- Mr John Fouyaxis.

**flinders.edu.au/people/niranjan.
bidargaddi**

Location: Tonsley/SAHMRI

Research Supervisors and their projects

Healthy Communities



Supervisor name:

Professor Billie Bonevski

Supervisor email:

billie.bonevski@flinders.edu.au

Name of research group: Public Health

Description of research area and interests:

Chronic diseases such as cardiovascular disease, cancer, diabetes, respiratory diseases place the greatest health burden on the Australian community. Many of these conditions are preventable and share common health behaviour risk factors such as smoking, alcohol consumption, physical inactivity and poor nutrition or low levels of screening. Our research is focussed on understanding health behaviours and using this knowledge to design, evaluate and scale up health behaviour change interventions for the primary and secondary prevention of chronic diseases. One feature of our research is targeting population groups who are at increased risk of chronic diseases due to socioeconomic, cultural, or clinical factors. For example, both prevalence of health risk factors and chronic disease outcomes are worse in rural and remote areas than in the cities. Our interventions aim to change behaviours at individual, organisational and community levels to promote health. Much of our research involves community-based partners and stakeholders including health providers and services, non-government organisations and consumers to increase the reach of our research impact.

Outline of projects:

- Design and evaluation of a health mobile phone app for pregnant Aboriginal and Torres Strait Islander mothers and their children under 5 years.
- Where do people in rural and remote communities go to seek information on reducing alcohol consumption?

- Designing tobacco control messages for people with mental ill health.
- Pilot testing elements in the Wellbeing SA Aboriginal Health Promotion Plan.
- Best practice/evidence regarding online youth engagement to support meaningful social connection and protective behaviours.
- Addressing youth social isolation through co-design.
- Evaluation of Wellbeing SA Wellbeing Hubs – possible projects could look at medium term impact and/or the use of citizen science in evaluation.
- Conducting an Aboriginal Health needs assessment for SA.
- Co-design of messages to prevent youth vaping uptake.

Skills students will gain:

- Conducting critical appraisal of the literature and conducting systematic reviews
- Qualitative research skills such as interviewing and focus groups
- Co-design methods
- Quantitative research skills including cross-sectional surveys, pilot trials and other trial designs
- Statistical analysis techniques
- Implementation science methods

Collaborators associated with projects:

Dr Joshua Trigg

Dr Kate Fairweather

Academics in the public health and rural remote health disciplines.

flinders.edu.au/people/billie.bonevski

Location: Health Sciences Building



Supervisor name:

Professor Jacqueline Bowden

Supervisor email:

jacqueline.bowden@flinders.edu.au

Name of research group: National Centre for Education and Training on Addiction (NCETA)

Description of research area and interests:

NCETA is an internationally recognised research centre in the alcohol and other drugs field. Our core areas of research focus are:

- The promotion of workforce development principles, research and evaluation of effective practices
- Investigating the prevention, prevalence and effect of alcohol and other drugs use in society
- Development and evaluation of intervention programs and resources for workplaces and other organisations

Outline of projects:

Potential projects include:

- Analysis of parents' perspectives on alcohol supply to adolescents to inform messaging that can change this behaviour.
- News media representations of non-drinkers.
- What is the impact of paid versus unpaid overtime on the wellbeing of alcohol and other drug workers?
- What measures are available to assess drug- and alcohol-related presenteeism and can they be applied in Australia?
- Alcohol, tobacco and other drug screening and brief interventions in health and social care settings.



- Scoping research on what alcohol, tobacco and other drug topics are available in medical and health sciences degrees.
- Personal and professional values of medical and health science students towards alcohol, tobacco and other drug use.

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.

Collaborators associated with projects:

Dr Jane Fisher

Dr Alice McIntee

Dr Ashlea Bartram.

flinders.edu.au/people/jacqueline.bowden

nceta.flinders.edu.au

Location: Health Sciences building

Supervisor name:

Dr 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 practicalities of remote primary health care and is culturally appropriate to meet the needs of local communities. There are a number of research opportunities associated with the RPHCM project including qualitative research and systematic reviews.

Outline of projects:

The RPHCM are updated on a regular review cycle with the current edition published in 2022. Research projects are available throughout the review cycle and can be offered as Honours or Masters level projects. Supervision can be provided by the RPHCM project team or in collaboration with other research groups.

Skills students will gain:

- Conduct critical appraisal of literature and systematic reviews
- Co-design methods and qualitative research skills
- Translation of evidence to practice
- Protocol and guideline development
- Stakeholder collaboration and management
- Cross-cultural communication

Collaborators associated with projects:

RPHCM Project Officers, dependent on topic area other Flinders Rural and Remote Health Academics.

flinders.edu.au/people/anthea.brand
remotephcmmanuals.com.au

Location: Flinders Rural and Remote Health SA & NT, Alice Springs. Students do not need to be located on site. Some travel may be required dependent on research topic.

Research Supervisors and their projects

Healthy Communities



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 intent and actual outcome.

The existing data set comprises 586 records of allied health professionals with an interest and/or experience in rural and remote employment. Variables in the 2010 data set include gender, profession, role, work location by RA code, length of employment in RA code and intended length of employment in RA code, year of graduation, rurality of background (childhood/adulthood/education); influences on work location decisions, attitude to remote work, meaningfulness of work; personality profile (Temperament and Character Inventory).

Depending on the level and interests of the student undertaking the research, this project could potentially also include medicine and nursing participants from other research projects to which Narelle is connected.

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

Collaborators associated with projects:

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

flinders.edu.au/people/narelle.campbell

Location: Anywhere – I work from the Flinders Northern Territory campus (Darwin). However, 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 preferred. We are planning a PhD scholarship which could potentially provide some financial support.



Supervisor name:

**Associate Professor
Kootsy Canuto**

Supervisor email:

kootsy.canuto@flinders.edu.au

Name of research group: Rural and Remote Health – NT Research Team

Description of research area and interests:

Unapologetically, all my research occurs with Aboriginal and Torres Strait Islander males. My primary interests include primary health care service utilisation, fatherhood, and social and emotional wellbeing. I am an experienced researcher with skills in the facilitation of yarning groups, focus groups and one-on-one interviews, qualitative analysis and importantly developing and nurturing trusting relationships with Aboriginal and Torres Strait Islander people and organisations. Over the years, I have developed strong and meaningful relationships with Aboriginal and Torres Strait Islander Elders, Traditional Owners, leaders of Aboriginal and Torres Strait Islander communities and community organisations across the country. These relationships are of the upmost importance and will continue to guide all elements of my research and personal development.

Outline of projects:

Our NHMRC research involves codesigning, implementing and evaluating continuous quality improvement (CQI) approaches between primary health care services and the Aboriginal and Torres Strait Islander males of the community. This research project will (a) evaluate the scope and quality of men's health and wellbeing programs; (b) investigate health service systems supports for men's health programs; (c) introduce CQI approaches to improve access and quality of services for

men and (d) evaluate the CQI approaches including the feasibility, accessibility and efficacy of services that supports men's health. Project dates: 2020 Jan - 2024 Dec.

Our MRFF social and emotional wellbeing (SEWB) research aims to provide co-ordinated responses to the SEWB needs of Aboriginal and Torres Strait Islander men. This research project will (a) assess the acceptability of Aboriginal and Torres Strait Islander men's SEWB programs; (b) identify and implement strategies to optimise referrals to SEWB in Aboriginal Community Controlled Health Services (ACCHSs) and Aboriginal Medical Services (AMSs); (c) co-design a culturally appropriate SEWB program with local Aboriginal and Torres Strait Islander men in partnership with their respective health service and (d) pilot and evaluate the co-designed SEWB program for acceptability and effectiveness. Project dates: 2021 June - 2026 June.

Associate Professor Kootsy Canuto is available as co-supervisor only. Prospective students must identify primary supervisor.

Skills students will gain:

- An almost unparalleled understanding of Aboriginal and Torres Strait Islander male health and wellbeing from a community up perspective.
- The opportunity to be co-supervised by one of Australia's most promising Aboriginal and/or Torres Strait Islander male health researchers.
- An in-depth knowledge of Australia's socio-political landscape, and how this continues to disadvantage Aboriginal and Torres Strait Islander people – particularly Aboriginal and Torres Strait Islander males – and possible ways forward.

Collaborators associated with projects:

Ms Celina Gaweda (Adelaide – SAHMRI based)

Ms Rosie Neate (Adelaide – SAHMRI based)

Mr Jason Bonson (Darwin – Flinders R&RH NT)

Mr Corey Kennedy (Adelaide – SAHMRI based)

Dr Oliver Black (Darwin – Flinders R&RH NT)

Associate Professor Karla Canuto (Darwin – Flinders R&RH based)

Professor James Smith (Darwin – Flinders R&RH based).

flinders.edu.au/people/kootsy.canuto

Location: Flinders Rural and Remote Health (Darwin): Yellow Building – Charles Darwin Campus

Note: Available as co-supervisor only.

Research Supervisors and their projects

Healthy Communities



Supervisor name:

Dr Zhaoli Dai-Keller

Supervisor email:

zhaoli.daikeller@flinders.edu.au

Name of research group: Public Health

Description of research area and interests:

Dr. Dai-Keller is a nutritional epidemiologist and population health scientist (PhD in epidemiology from National University of Singapore in 2015). Her research interests include the role of nutrition in ageing and health across populations from diverse ethnic and cultural backgrounds. Other interests include health policy assessment and research integrity. Her research has been covered in mass media, including the NY Times (2017), CNN (2021), The Australian Science Media Exchange (2021), and Sydney Morning Herald (2022), among others.

She has published over 40 publications, including in high-impact medical journals such as the BMJ, Annals of Rheumatic Diseases, and PLOS Medicine. In addition, she is an associate editor for Nutrition Journal and an editorial board member for BMC Geriatrics.

Dr. Dai-Keller welcomes students interested in food/nutrition and chronic disease prevention research topics. These may include quantitative research using cohorts or survey data, conducting systematic reviews (including narrative reviews), and using open-access resources in novel research.

Outline of projects:

Current planning on

- Migrant women's health
- Diet quality through a cultural lens
- Use of cannabis in pain management.

Skills students will gain:

Depending on the study design of the project, students will learn how to use a statistical program to conduct statistical analysis for descriptives and/or regression modeling, systematic review methods and evidence synthesis.

flinders.edu.au/people/zhaoli.daikeller

nytimes.com/2017/05/24/well/eat/high-fiber-diet-tied-to-less-knee-arthritis.html

edition.cnn.com/2021/09/22/health/dairy-cardiovascular-disease-intl-scli-wellness-scn/index.html

scimex.org/newsfeed/formula-milk-trials-not-reliable,-study-finds

Location: Health Sciences building



Supervisor name:

Dr Laura Edney

Supervisor email:

laura.edney@flinders.edu.au

Name of research group: Health Economics

Description of research area and interests:

The FHMRI Health Economics group includes 10 researchers, who work on a wide range of research projects. Our focus is on the use of the economic evaluation to inform decision-making within the health system. Economic evaluation provides information to decision makers on the value of tests and treatments, but also on alternative approaches to the organisation and delivery of health care.

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 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:

Evaluating the costs and health outcomes of different diagnostic and treatment pathways including from primary care through to tertiary care for patients with cancer. Projects could involve evaluating specific models of care, such as the use of multidisciplinary team meetings for patients diagnosed with upper gastrointestinal cancer or could involve evaluating the costs and patient health outcomes from the use of new pharmaceuticals for specific patient groups. These projects would draw on the large, linked cancer dataset outlined in the above description of research and would involve working collaboratively with several members of the health economics group, key clinician stakeholders from the Flinders Medical Centre and consumer groups. Extensions to the analysis of this dataset could involve capturing patient preferences for addressing their care needs and developing implementation frameworks to adapt evidence-based interventions to the local context to reduce variation in health outcomes for cancer patients.

Skills students will gain:

Students will work collaboratively with the health economics group and other FHMRI researchers to gain a range of research skills that are highly sought after in private industry, academia, and in government roles including health services and policy roles. Specific skills could include:

- Experience in application and methods of economic evaluation to inform decision making in the health system,
- Methods for conducting formal literature reviews, including systematic, umbrella and scoping reviews,
- Quantitative and qualitative data collection,
- Advanced skills in quantitative/

econometric data analysis including analysis of health systems data, large linked datasets and primary data, for example, quality of life data,

- Co-designing and evaluating new models of care, collaborating with local health service clinicians and consumers including patients,
- An understanding of evidence-based practice and knowledge translation,
- Publishing research in peer reviewed journals.

Collaborators associated with projects:

Health Economics team and collaborating researchers.

flinders.edu.au/people/laura.edney

Location: Health Sciences building

Research Supervisors and their projects

Healthy Communities



Supervisor name:

Dr Kate Fairweather

Supervisor email:

kate.fairweather@flinders.edu.au

Name of research group: Public Health

Description of research area and interests:

My research has a broad scope, but the uniting elements revolve around health and wellbeing.

My expertise is essentially in psychiatric epidemiology, and typically focuses on the following topic domains:

- Suicidality
- Transdiagnostic models of health. It is relatively common for people with one illness to have another, concurrently
- Epidemiological risk factor models addressing diseases and disorders
- Social psychological models of health cognition and behaviour
- Genetic and environmental influences on health outcomes, and the impact of their interactions (Twin studies)
- Health translation research

I am interested in strategic identification of data, which, through collaborative team formation, can enable investigation of an extensive range of factors related to an outcome of interest.

These data may be analysed independently, or combined through data 'harmonisation' to 'value-add' a meta-dataset.

Further, while I am interested epidemiological designs and analytical approaches, I am keen to talk to students who may be curious in studying twins data.

Prior knowledge of R and/or Stata programs would be useful, but not essential.

Outline of projects:

Potential projects, but open to discussion of topics covered above

- Investigating the suicidality-smoking nexus
- Social identity (and stigma) and its role in health care contexts
- The application of nuclear family twin models to understand the role of genes and environment in health outcomes.

Skills students will gain:

- Interdisciplinary approach to understanding health issues and potential resolutions.
- Use of varied (transdisciplinary) analytical methods to investigate research questions (can combine both quantitative and qualitative approaches).
- Discovering science can be awe-inspiring, and that innovation occurs when we 'think outside the box'.

Collaborators associated with projects:

Collaborators who have expertise in the particular scientific domain of investigation.

flinders.edu.au/people/kate.fairweather

youtube.com/watch?v=99RJ3Z-M6Y8

Location: Health Sciences Building



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-pharmacological 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-pharmacological 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

Collaborators associated with projects:

Dr Abraham Kuot
Dr Mohammad Hamiduzzaman
Dr Daya Ram Parajuli.

flinders.edu.au/people/vivian.isaac

Location: Renmark campus

Research Supervisors and their projects

Healthy Communities



Supervisor name:

**Associate Professor
Billingsley Kaambwa**

Supervisor email:

billingsley.kaambwa@flinders.edu.au

**Name of research group: Health
Economics**

Description of research area and interests:

The FHMRI Health Economics group includes 10 researchers, who work on a wide range of research projects. Our focus is on the use of the economic evaluation to inform decision-making within the health system. Economic evaluation provides information to decision makers on the value of tests and treatments, but also on alternative approaches to the organisation and delivery of health care.

- Measurement of quality of life outcomes
- Estimation of healthcare costs
- Economic evaluation
- Statistical and Econometric modelling

Outline of projects:

- Quality of life (QoL) is an indicator of how healthy, comfortable, and able to participate in or enjoy life events individuals are. Within sleep research, QoL can be measured using sleep-specific or generic measures. Using a large dataset, this project will assess the performance and validity of using sleep-specific quality of life outcome measures in economic evaluation relative 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.

- Determining which components or attributes of health interventions are preferred by patients, their carers, health professionals, and other stakeholders helps design services that will achieve the greatest uptake. Using Discrete Choice Experiment (DCE) methodology, this project will determine the relative importance to stakeholders of existing and 'non-existing but plausible' (potential) health interventions for chronic conditions, including sleep disorders, obesity, heart disease and cancer.

Skills students will gain:

Students will work collaboratively with the health economics group and other FHMRI researchers to gain a range of research skills that are highly sought after in private industry, academia, and in government roles including health services and policy roles. Specific skills could include:

- Experience in application and methods of economic evaluation to inform decision making in the health system,
- Methods for conducting formal literature reviews, including systematic, umbrella and scoping reviews,
- Quantitative and qualitative data collection,

- Advanced skills in quantitative/ econometric data analysis including analysis of health systems data, large linked datasets and primary data, for example, quality of life data,
- Co-designing and evaluating new models of care, collaborating with local health service clinicians and consumers including patients,
- An understanding of evidence-based practice and knowledge translation,
- Publishing research in peer reviewed journals.

Collaborators associated with projects:

Health Economics team and collaborating researchers.

flinders.edu.au/people/billingsley.kaambwa

Location Health Sciences Building



Supervisor name:

Professor Jonathan Karnon

Supervisor email:

jonathan.karnon@flinders.edu.au

Name of research group: Health Economics

Description of research area and interests:

The FHMRI Health Economics group includes 10 researchers, who work on a wide range of research projects. Our focus is on the use of the economic evaluation to inform decision-making within the health system. Economic evaluation provides information to decision makers on the value of tests and treatments, but also on alternative approaches to the organisation and delivery of health care.

Our research often involves the development and evaluation of new models of care that are designed to improve the health system, for example, home infusions for people with multiple sclerosis, hospital avoidance programs, or strategies to reduce Emergency Department overcrowding and access block. We are interested in how to positively change healthcare delivery and outcomes for patients, for example by encouraging the use of evidence in clinical practice, by addressing patient safety concerns, or by testing new roles in the healthcare team, such as new roles for nurses and allied health professionals.

Outline of projects:

Developing and implementing methods for the economic evaluation of local health service interventions. Currently we are involved in the evaluation of interventions to reduce Hospital Acquired Complications and to relieve pressure on the demand for hospital services in the Emergency Department and for inpatient beds. These projects involve the analysis of health systems data to estimate expected costs

and benefits, but also close collaboration with and elicitation of clinicians' interpretation of the findings due to the risk of bias in the analytic outputs. These projects may also involve collaboration with patients/consumers to incorporate their perspective and experiences in the representation of the costs and benefits.

Skills students will gain:

Students will work collaboratively with the health economics group and other FHMRI researchers to gain a range of research skills that are highly sought after in private industry, academia, and in government roles including health services and policy roles. Specific skills could include:

- Experience in application and methods of economic evaluation to inform decision making in the health system,
- Methods for conducting formal literature reviews, including systematic, umbrella and scoping reviews,
- Quantitative and qualitative data collection,
- Advanced skills in quantitative/ econometric data analysis including analysis of health systems data, large linked datasets and primary data, for example, quality of life data,
- Co-designing and evaluating new models of care, collaborating with local health service clinicians and consumers including patients,
- An understanding of evidence-based practice and knowledge translation,
- Publishing research in peer reviewed journals.

Collaborators associated with projects:

Health Economics team and collaborating researchers.

flinders.edu.au/people/jonathan.karnon

Location: Health Sciences Building

Research Supervisors and their projects

Healthy Communities

**Supervisors' names:**

Dr Chris Rissel

Ms Annie Farthing

Supervisor email:

annie.farthing@flinders.edu.au

Name of research group: Qualitative exploration of the decision making of nursing and allied health students and recent graduates of urban universities about rural practice

Description of research area and interests:

Access to quality health care providers continues to be challenging in rural and remote regions of Australia with resultant gaps in health outcomes and life expectancy. There has been some focus on medical practitioner shortages in these areas, however there is limited understanding of how nursing and allied health students and early career practitioners choose locations to practice.

Outline of projects:

This project will analyse existing data to provide additional information about the decision making process nursing and allied health students and recent graduates undertake when they consider rural and remote practice. There will be a focus on identifying differences in intention considering geographic practice location

Skills students will gain:

- Understanding of data collection and qualitative analysis methods
- Preparation of research documentation (eg ethics applications, research reports, manuscripts for publication)
- Research project presentation experience

flinders.edu.au/people/chris.rissel

flinders.edu.au/people/annie.farthing

flinders.edu.au/flinders-nt

Location: Centre for Remote Health, Flinders Northern Territory. Possibility to carry this out remotely.

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, and requires health professionals to work in multidisciplinary teams and collaborate. Allied Health, nursing and medical student placements are important for training health professionals, and also to expose them to a positive experience working in a remote setting. Evaluating their placements and tracking their workplace locations is an important aspect of building the remote health workforce.

Outline of projects:

- Analyse data from the process evaluation of student placements in the Northern Territory
- Collect and analyse annual data on workplace location of student placement alumni
- Prepare papers for peer-reviewed publication and present results

Skills students will gain:

- Literature reviewing
- Understanding of data collection and analysis methods
- Preparation of research documentation (eg ethics applications, research reports, manuscripts for publication)
- Research project presentation experience

Collaborators associated with projects:

Associate Professor Narelle Campbell

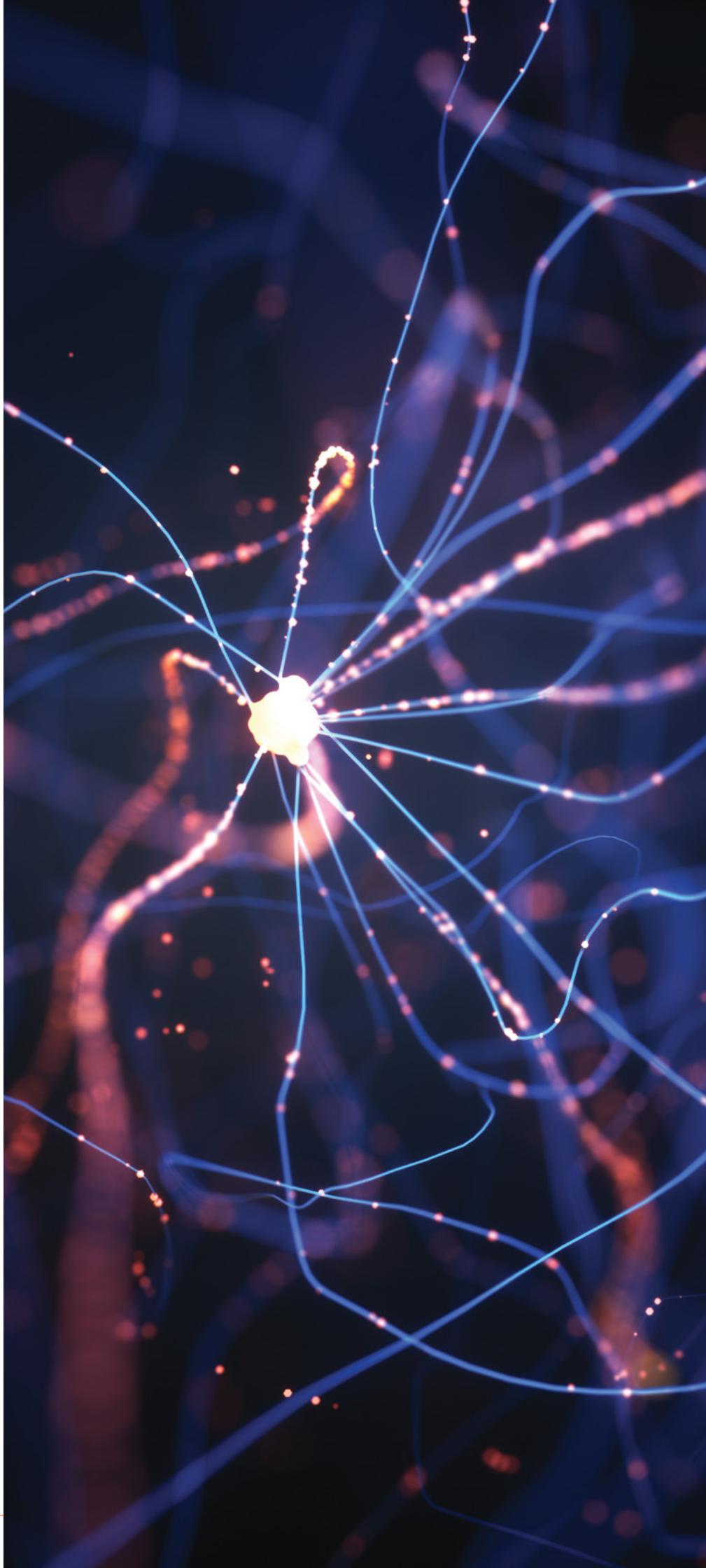
Associate Professor Sue Lenthall

Ms Annie Farthing.

flinders.edu.au/people/chris.rissel

flinders.edu.au/flinders-nt

Location: Flexible. Supervisor is based Flinders Northern Territory campus (Darwin) but experienced with supervision via distance.



Research Supervisors and their projects

Healthy Communities



Supervisor name:

Dr Courtney Ryder

Supervisor email:

courtney.ryder@flinders.edu.au

Name of research group: Injury Studies

Description of research area and interests:

Injury is a major global public health problem and one of the leading causes of mortality and disability worldwide. Traffic accidents, drowning, burns and falls are common unintentional injuries, with neglect, physical violence and suicide being intentional forms. In injury I have a particular passion on equity, where my work is leading new ways of working with Indigenous Data through knowledge interface methodology and Indigenous Data sovereignty to change the deficit discourse surrounding Aboriginal and Torres Strait Islander health statistics.

My research uses knowledge interface methodology, bringing together a variety of research methodologies; quantitative, qualitative, Indigenous knowledges, to critically analyse data and reshape the way in which we contextualise outcomes focussing on health equity. The areas of injury of which I am primarily focussed include burns, falls, traumatic brain injury and traffic accidents. In this I have a particular focus on Aboriginal and Torres Strait islander communities across the life course. Other areas of expertise include out-of-pocket healthcare expenditure and Indigenous knowledges in the curriculum.

My research work involves collaborations with researchers and communities associated with The George Institute for Global Health, University of New South Wales, Westmead Hospital, Monash University, Alfred Trauma Centre and the University of Melbourne.

Outline of projects:

Burns injuries

- Coolamon Study: This explores the care of Aboriginal and Torres Strait Islander children with burns in Queensland, New South Wales, South Australia and the Northern Territory. Researchers followed children for two years post burn to understand the impact and cost of burns, to understand patient experience, and to find better ways of caring for children with burns. coolamonstudy.org.au
- Safer Pathways: This project works in partnership with an Aboriginal Health worker, Westmead burn unit team members and families to develop a specific patient-centred discharge and follow-up planning service. The aim is to develop a model of care that will be integrated in the burns clinic and will enhance health care for Aboriginal and Torres Strait Islander children and their families.

Falls

Ironbark Trial: The Ironbark trial aims to show that the Ironbark: Standing Strong and Tall program reduces the rate of falls in Aboriginal people 45 years and older, compared to people who participate in the Ironbark: Healthy Community program. ironbarkproject.org.au

Traumatic Brain Injury

ATBIND: The Australian Traumatic Brain Injury National Data project aims to identify the key determinants of outcomes for patients with moderate to severe traumatic brain injury (TBI) across Australia. ATBIND uses current and extended data, to analyse the impact of variations in location, demographics, injury mechanism, system-level processes of (TBI) patient referral, transfer, prehospital care, emergency department reception and hospital care on hospital discharge

disposition. This work will include the establishment of a data-based set of national clinical quality indicators, targeting the identified key gaps (including for the health of Aboriginal and/or Torres Strait Islander communities).

Skills students will gain:

- Research based project management skills
- Stakeholder and community engagement experience
- Aboriginal and Torres Strait Islander health research including Indigenous knowledges, methodologies and methods
- Application of Knowledge interface methodology
- Qualitative research methods, targeted on big data, survey psychometrics and registries
- Scoping and/or systemic literature review
- Academic writing skills for publications

Collaborators associated with projects:

Professor James Harrison

Professor Rebecca Ivers

Dr Juliann Coombes

Staff located in the Population Health, Health Economics, Rural and Remote Health, and Aboriginal and Torres Strait Islander Health Discipline.

flinders.edu.au/people/courtney.ryder

Location: Health Sciences Building



Supervisor name:

Dr Tim Schultz

Supervisor email:

timothy.schultz@flinders.edu.au

Name of research group: Health Economics Team

Description of research area and interests:

The FHMRI health economics group includes 10 researchers, who work on a wide range of research projects. Our focus is on the use of the economic evaluation to inform decision-making within the health system. Economic evaluation provides information to decision makers on the value of tests and treatments, but also on alternative approaches to the organisation and delivery of health care. Economic evaluation is routinely used to inform the value of health technologies funded by the Commonwealth government, but it is less commonly used within local health services.

Our research around economic evaluation is both applied and methodological. Our applied research includes collaborations with a wide range of collaborators to undertake economic analyses alongside clinical trials. We also work closely with our local health service - the Southern Adelaide Local Health Network (SALHN), the network that manages Flinders Medical Centre. Our work with SALHN 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.

Our research often involves the development and evaluation of new models of care that are designed to improve the health system, for example, home infusions for people with multiple sclerosis, hospital avoidance programs, or strategies to reduce

Emergency Department overcrowding and access block. We are interested in how to positively change healthcare delivery and outcomes for patients, for example by encouraging the use of evidence in clinical practice, by addressing patient safety concerns, or by testing new roles in the healthcare team, such as new roles for nurses and allied health professionals.

Outline of projects:

Evaluating the impact of innovation in the healthcare system. New clinical roles, new models of care and other innovations such as information technology are continually being implemented to seek to improve the health system. It is essential to evaluate whether these interventions are effective and safe for patients, do not have unintended consequences on the health system and are at least no more expensive than current care. Examples of some recent and current projects include extended scope of practice allied health staff or advanced practice nurses working in emergency departments, the delivery of hospital-level care for patients in their own home, or the use of real-time emergency and specialist consultations for paramedics on scene with a patient. These questions can be answered through systematically reviewing the literature, collecting data from electronic hospital records systems, conducting experimental trials and mixed methods research.

Skills students will gain:

Students will work collaboratively with the health economics group and other FHMRI researchers to gain a range of research skills that are highly sought after in private industry, academia, and in government roles including health services and policy roles. Specific skills could include:

- Experience in application and methods of economic evaluation to inform decision making in the health system,
- Methods for conducting formal literature reviews, including systematic, umbrella and scoping reviews,
- Quantitative and qualitative data collection,
- Advanced skills in quantitative/ econometric data analysis including analysis of health systems data, large linked datasets and primary data, for example, quality of life data,
- Co-designing and evaluating new models of care, collaborating with local health service clinicians and consumers including patients,
- An understanding of evidence-based practice and knowledge translation,
- Publishing research in peer reviewed journals.

Collaborators associated with projects:

Health Economics team and collaborating researchers.

flinders.edu.au/people/timothy.schultz

Location: Health Sciences Building

Research Supervisors and their projects

Healthy Communities

**Supervisor name:**

Professor James Smith

Supervisor email:

james.smith@flinders.edu.au

Name of research group: Rural and Remote Health NT

Description of research area and interests:

Professor Smith has an eclectic academic background spanning health promotion, men's health, Indigenous health, Indigenous higher education, health equity, alcohol and gambling, and Indigenous evaluation. He is involved in a broad range of local and national research projects related to these topics and invites interested Honours and HDR students to discuss research possibilities, particularly those relating to the NT context. These can be in partnership with other areas of the university, such as Public Health, NCETA, or the Centre for Social Impact. Research projects could be across the Flinders footprint in the NT, including Nhulunbuy, Darwin, Katherine, Tennant Creek and Alice Springs. Professor Smith has previous experience in supervising Masters and PhD students.

Outline of projects:

Some of his current projects include:

- The adaptation and trial of an online social and emotional wellbeing education and support program for young Aboriginal and Torres Strait Islander males (funded by Movember)
- Commissioning of the evaluation of Indigenous health programs (funded by the NHMRC)
- A health promotion intervention trial with male football fans (funded by the Heart Foundation)
- The development of men's health

education and training resources for health professionals across Australia (funded by the Australian Government Department of Health)

- Evaluation of alcohol policy reforms in the NT (funded by the ARC)
- Gender and alcohol harm minimisation
- Indigenous student experiences of higher education.

Professor Smith has provisions to allocate two HDR scholarships in both 2022 and 2023.

Skills students will gain:

- Community engagement
- Ethics preparation
- Data collection and analysis skills, particularly those relating to qualitative research skills
- Applied research skills, including an ability to influence policy and practice
- Knowledge translation activities
- Support with academic writing (Professor Smith is currently the Editor in Chief of the Health Promotion Journal of Australia)

Collaborators associated with projects:

Associate Professor Kootsy Canuto
Associate Professor Karla Canuto
Dr Oliver Black
Dr Noemi Tari-Keresztes
Dr Himanshu Gupta
Professor Jaqui Hughes
Any other academic staff across the Flinders University footprint in the NT
Other academic staff from across Flinders University

Other academic staff from Deakin University, Curtin University, Menzies School of Health Research, Charles Darwin University, University of Michigan, and University of Saskatchewan (where Professor Smith has academic affiliations)

flinders.edu.au/people/james.smith

flinders.edu.au/flinders-nt/our-research

Location: Professor Smith is based in Darwin, but is happy to supervise any projects across the NT or SA



Supervisor name:

Dr Jacqueline Stephens

Supervisor email:

jacqueline.stephens@flinders.edu.au

Name of research group: Population Health

Description of research area and interests:

My research is focused on identifying and eliminating healthcare inequity. I am interested in the patient journey, patient decision-making, and factors influencing access to healthcare, particularly the geographical dispersion of healthcare and factors influencing access to healthcare.

I use a mixed methods approach to unpack and understand issues from multiple standpoints, using a range of methodologies including data linkage, cohort studies, geospatial analysis, interviewing, focus groups, cross-sectional surveys, and randomised controlled trials.

My research has a focus on child and adolescent health, including ear health, chronic disease (particularly kidney disease), and infectious diseases. My work has a particular focus on addressing the disproportionately impact of these conditions among Aboriginal and Torres Strait Islander communities and people living in rural and remote locations.

My research involves collaboration with researchers located across South Australia and New South Wales, involves working closely with Aboriginal Community Controlled Health Services, and networking with stakeholders across both public and private health sector.

Outline of projects:

Ear Health

A range of opportunities exist to develop strategies to improve ear health screening and the treatment pathway for children, particularly Aboriginal and Torres Strait Islander children who experience some of the highest rates of ear infections and hearing impairment globally. Research opportunities exist to revise, improve, and develop strategies to support ear and hearing health screening, diagnosis, and management.

Kidney Health

Aboriginal and Torres Strait Islander people are disproportionately impacted by diabetes and end-stage kidney disease. This disparity is not fully explained by the differences in diabetic prevalence or co-morbidities. The ARDAC Study is a longitudinal cohort study which aims to identify the complex interplay between age, gender, socio-economic status, and geography in the development of chronic disease among Aboriginal and Torres Strait Islander young people. There are opportunities for HDR students to participate in research associated with the ARDAC Study framework, including a PhD scholarship to co-create a culturally appropriate intervention for addressing chronic kidney disease; based in New South Wales.

Particularly, two scholarships exist to support two exemplary PhD candidates:

- 1) PhD Scholarship 1: A PhD opportunity to conduct epidemiological research using data linkage; based at Flinders University, South Australia.
- 2) PhD Scholarship 2: A PhD opportunity to co-create a culturally appropriate intervention for addressing chronic kidney disease; based in New South Wales.

Infectious Diseases

Research opportunities to investigate the epidemiology of HIV, hepatitis C, and sexually transmitted infections, as well as other communicable infections, including influenza, pertussis (whooping cough), and legionellosis.

Disaster Health

Opportunities exist to explore access to healthcare and healthcare decision making during disasters and emergencies, particularly for young people and minority groups.

Skills students will gain:

- Development and project management of research projects.
- Working with stakeholder organisations.
- Experience working within Aboriginal and Torres Strait Islander health.
- Quantitative research methods
- Qualitative research methods

Collaborators associated with projects:

Professor Jonathan Craig

ARDAC Investigator & Advisory Groups

Members of the Flinders University Aboriginal Health team.

flinders.edu.au/people/jacqueline.stephens

Location: Health Sciences Building

Research Supervisors and their projects

Healthy Communities



Supervisor name:

Dr Noemi Tari-Keresztes

Supervisor email:

noemi.tarikeresztes@flinders.edu.au

Name of research group: Rural and Remote Health, Northern Territory

Description of research area and interests:

Noemi is a Research Fellow (Lived Experience) at Flinders University, dedicated to Lived Experience research and evaluation projects. She has been working on projects that relate to personal recovery, peer support and education, social-emotional wellbeing, community mental health, alcohol and other drug (AOD) use, and gambling. She is a mixed-methods researcher, aiming to increase the degree of participation of Lived Experience people in research and evaluation. Given her background, she is also dedicated to researching the mental wellbeing of the Culturally and linguistically diverse (CALD) population. She works closely with the Lived Experience Network (Darwin) and developed genuine partnerships with other local services such as Northern Territory Mental Health Coalition, TeamHEALTH and TEMHCO. She is part of a research team that includes Professor James Smith and Dr Himanshu Gupta.

Outline of projects:

Noemi has been working on various projects relating to (1) the recovery of persons with mental health challenges and AOD issues, (2) the empowerment of Families and Friends of persons with AOD use issues, (3) the role of peer mentoring and peer support in completing a supported study pathway and securing a job, and (4) the lived experience of gambling issues among Aboriginal and Torres Strait Islander and CALD people.

Skills students will gain:

- Mixed-methods approach
- Lived Experience research
- Working with vulnerable populations (Mental health challenges, AOD use issues, Gambling issues)
- Personal Recovery and Empowerment
- Data collection
- Data analysis

Collaborators associated with projects:

Professor James Smith

Dr Himanshu Gupta

flinders.edu.au/people/noemi.tarikeresztes

menzies.edu.au/icms_docs/320338_Evaluation_of_a_Peer-Led_Education_Pilot_for_people_with_psychosocial_support_needs_in_Darwin_Northern_Territory.pdf

menzies.edu.au/icms_docs/330899_Follow-up_Evaluation_of_the_Peer-Led_Education_Pilot_in_Darwin.pdf

menzies.edu.au/icms_docs/330900_Evaluation_of_the_Two_Ways_Mentoring_Program.pdf

Location: Flinders Rural and Remote Health (Darwin): Yellow Building – Charles Darwin Campus

Note: Available as co-supervisor only.



Supervisor name:

Dr Joshua Trigg

Supervisor email:

joshua.trigg@flinders.edu.au

Name of research group: Public Health, Population Health

Description of research area and interests:

The Public Health Team conducts health impacts research on factors that contribute to, modify, or result from individual and social health in various population groups. Our work often involves analysis of health-focused data describing social conditions for health risks, risk reduction, and health promotion, to support preventive health initiatives.

I am very interested in better understanding how people think and behave in relation to health risks arising from the use of tobacco, alternative nicotine products (e.g., vaping), and other substances. This includes risk attitudes and behaviours regarding modifiable lifestyle risk factors, and how these affect physical health and psychological wellbeing. I have worked with older adults, in Aboriginal community and health settings, in disaster recovery contexts, and with local governments, non-profits and emergency services.

My main research methods include use of population health datasets, community and field interviewing, mixed-methods techniques, and structured evaluations.

**Outline of projects:**

Current project areas focus on vaping risk messaging, tobacco cessation support for people with disability, public engagement with tobacco endgame strategies (policy controls) including by priority populations. I'm also interested in project ideas in other areas of health risk, such as alcohol use, quality of life, risk attitudes and risk behaviour motivation.

Skills students will gain:

Development of research projects, working with stakeholder organisations, quantitative and qualitative data analysis, surveying and interviewing, academic writing, and presentation.

Collaborators associated with projects:

Professor Billie Bonevski
Dr Kate Fairweather

Public Health Team researchers and other collaborators.

flinders.edu.au/people/joshua.trigg

researchgate.net/profile/Joshua-Trigg

Location: Health Sciences Building

Supervisor name:

Dr Anthony Venning

Supervisor email:

anthony.venning@flinders.edu.au

Name of research group: Discipline of Behavioural Health (DBH)

Description of research area and interests:

My research is concerned with not letting the physical, social, psychological, and economic impacts of life changing events inhibit access to treatments for common mental health conditions. With this in mind, and in order to meet the demand for more non-traditional mental health support platforms, the DBH and our industry collaborators are involved in developing materials to be used by, and training health professionals to work within, both high and low intensity mental health settings.

Outline of projects:

I would be interested in supervising students in any project which seeks to increase / improve access to mental health support. Examples of previous and current projects include the acceptability of and engagement with Digital Mental Health Platforms, the conceptualization of Guided Self-Help Material for common mental health disorders, the acceptability of Low Intensity CBT in cancer survivorship, and the economic viability of telephone delivered psychotherapeutic services.

Skills students will gain:

Students could gain skills in both quantitative and qualitative methodologies, along with working within a collaborative training / research environment with industry partners.

Collaborators associated with projects:

Ms Paula Redpath
Dr Candice Oster
Ms Fiona Glover
Dr Lian Hill
Dr Kate Fairweather.

flinders.edu.au/people/anthony.venning

Location: Margaret Tobin Centre

Research Supervisors and their projects

Healthy Communities



Supervisor name:

**Associate Professor
Annabelle Wilson**

Supervisor email:

annabelle.wilson@flinders.edu.au

**Name of research group: Population
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 lead and/ or am involved in multiple projects including the role of Aboriginal Liaison Officers in hospitals, strengths-based approaches in Aboriginal and Torres Strait Islander health and nutrition, Aboriginal understandings of wellbeing within football and peer mentoring for dietitians working in Aboriginal and Torres Strait Islander health. I am an Advanced Accredited Practising Dietitian and am also involved in work related to the food system.

Skills students will gain:

- Qualitative research
- Aboriginal and Torres Strait Islander health research
- Social determinants and health equity research

Collaborators associated with projects:

Associate Professor Tamara Mackean
Dr Kim O'Donnell
Ms Liz Withall.

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Location: Health Sciences Building



Supervisor name:

**Associate Professor
Anna Ziersch**

Supervisor email:

anna.ziersch@flinders.edu.au

**Name of research group: Social
determinants of migrant and refugee
health research group**

Description of research area and interests:

Our multidisciplinary research examines the social determinants of health for people from migrant and refugee backgrounds. We use collaborative participatory research approaches drawing on qualitative and quantitative methods, as well as systematic evidence reviews, and have a focus on policy and practice impact.

Outline of projects:

Our research projects cover a broad range of areas of migrant and refugee health for children and adults including disability, employment, housing and neighbourhood, access to health services (oral, maternal and primary health), family and domestic violence, caring responsibilities, pain and sleep. Please get in contact to discuss involvement in a project that suits your specific interests and learning outcomes.

Skills students will gain:

Depending on research project involvement students will learn about participatory research approaches and working collaboratively with communities, qualitative methods (including interviews, focus groups, photovoice and mapping), quantitative survey methods, systematic literature reviews and policy and practice knowledge translation.

Collaborators associated with projects:

Dr Moira Walsh

Dr Emily Miller

Associate Professor Clemence Due.

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Location: Health Sciences Building



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FOR MORE INFORMATION,
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