



Flinders  
University

FHMRI

Study with us:

**Pathways to research.**

Projects for students.

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  - Clinical Sciences
  - Public Health

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# Introduction to Flinders Health and Medical Institute (FHMRI)

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

**Researchers in the College of Medicine & Public Health operate within the Flinders Health and Medical Research Institute (FHMRI).**

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

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

The Institute brings together diverse research and education strengths, across a wide range of health and medical interests.

## 1. Medical 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 Sciences

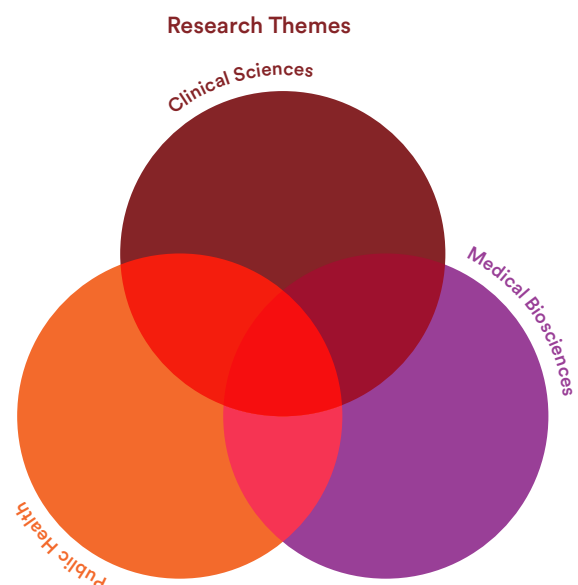
Our clinical researchers work to develop and implement new methods for the prevention, diagnosis and treatment of disease to improve health.

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. Public Health

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.







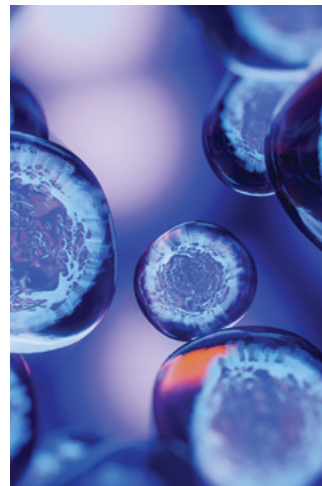
The future of  
**MEDICAL**  
**RESEARCH**  
is **HERE**

# Flinders Health & Medical Research Building

**The new Health and Medical Research Building (HMRB) enables researchers, practitioners and industry partners to work together more closely than ever before, creating a hub of health and medical research collaboration.**

HMRB provides a focus for education and life-long learning, leveraging academic and research opportunities, and providing platforms for innovation and the exchange of knowledge.

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



To learn more visit:





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# Research Education and Development (RED)

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

**FHMRI-RED 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 FHMRI-RED support our students?

FHMRI-RED 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.



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# Become a FHMRI researcher and join our vibrant research community:

## Professional Placement

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Whatever your interests, there will be a Professional Placement research training position for you in one of our multidisciplinary research teams.

**Incorporating real world experience into academic study is one of the best ways to maximise learning outcomes and enhance career opportunities. Professional Placement provides the opportunity to do this.**

MDSC3102 Professional Placement Medical Science is a 9unit topic (equivalent of 2 topics) that can be taken in either Semester 1 or Semester 2 of Year 3 of the BMS degree. Click [here](#) to visit the MDSC3102 Handbook.

Researchers in the College of Medicine & Public Health operate within the Flinders Health and Medical Research Institute (FHMRI). They have designed a range of Professional Placement research projects for students to develop skills that will help them to improve their employment prospects and bridge the gap between study and work.

Research is conducted in areas from cancer, pharmacology, biochemistry, biotechnology, neuroscience, eye and vision, sleep health, epidemiology, public health, psychology 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 encourage students to seek out a supervisor in an area of research that interests them. 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.

This booklet contains projects that may be available. Contact potential supervisors directly to discuss projects for Professional Placement in Medical Science.

### What is the process for organising Professional Placement ?

**1. Contact supervisor(s) of interest via email.** To help you best approach potential supervisors to organise a meeting we suggest this email template; click [here](#) to download.

**2. Meet with the supervisor(s) to discuss potential projects and visit the facilities where the research will be conducted.**

At this meeting you can explain why you're interested in research and what it is about this particular area that is appealing. If you are approaching several researchers to learn about the opportunities, let them know you are talking to others and will get back to them when you have decided which Placement to accept. Supervisors understand this process, so the key is to communicate openly.

**3. Once you have organised a supervisor and enrolled in the topic MDSC3102**

(A) Complete the student form, click [here](#), and email to [cmph.enquiries@flinders.edu.au](mailto:cmph.enquiries@flinders.edu.au)

(B) Complete the Workplace Health & Safety induction form, click [here](#) and load to InPlace.

4. Use the pre-placement compliance checklist to ensure all required documents have been uploaded to InPlace. This is essential prior to beginning placement. Click [here](#) to access checklist.

5. Further details, including the date of the student orientation and Statement of Assessment Methods (SAM) will be available from the MDSC3102 topic site closer to the start of semester.

Additional information about Professional Placement MDSC3102: At the start of the project all students will participate in an introductory orientation workshop which will provide key information about the topic. Students will spend the equivalent of 2 days a week fulltime for 12 weeks working on their project with their host research group. In the final week, students will be required to present their project findings as an oral presentation with question time. Students will also be required to prepare a written report on their research project and present their laboratory notebooks for assessment.

Prize for Research Excellence: This annual prize will be awarded to the student who has achieved research excellence and demonstrated exemplary professional contribution in the topic MDSC3102 Professional Placement in Medical Science.



Scan here for online version of this booklet and to access links.

#### For further information contact:

Professor Briony Forbes and  
Dr Lauren Thurgood  
MDSC3120 Topic Coordinators  
[briony.forbes@flinders.edu.au](mailto:briony.forbes@flinders.edu.au)  
[lauren.thurgood@flinders.edu.au](mailto:lauren.thurgood@flinders.edu.au)

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# Become a FHMRI researcher and join our vibrant research community:

## Honours

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

**FHMRI researchers conduct research in areas from cancer, pharmacology, biochemistry, biotechnology, neuroscience, eye and vision, sleep health, epidemiology, public health, psychology 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.

We encourage students to seek out a supervisor in an area of research that interests them. 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.

This booklet contains Honours projects currently being offered by FHMRI researchers. Contact them to discuss potential project opportunities for Honours.

For information about the Honours course click [here](#) or go to the [CMPH Honours website](#)

### What is the process for enrolling in Honours?

**1. Contact supervisor(s) of interest via email** To help you best approach potential supervisors to organise a meeting we suggest this email template; click [here](#) to download.

**2. Meet with the supervisor(s) to discuss potential projects and visit the facilities where the research will be conducted.**

At this meeting you can explain why you're interested in research and what it is about this particular area that is appealing. If you are approaching several researchers to learn about the opportunities let them know you are talking to others and will get back to them when you have decided which Placement to accept. Supervisors understand this process, so the key is to communicate openly.

**3. Make sure you meet the eligibility criteria for Flinders University (you should discuss this with your potential supervisor as well). Check eligibility requirements [here](#):**

[students.flinders.edu.au/my-course/course-rules/undergrad/hbms](https://students.flinders.edu.au/my-course/course-rules/undergrad/hbms)

**4. Apply.**

Click [here](#) to apply.



Scan here for online version of this booklet and to access links.

### For further information contact:

Dr Amy Wyatt  
Honours Topic Coordinator  
[amy.wyatt@flinders.edu.au](mailto:amy.wyatt@flinders.edu.au)





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# Become a FHMRI researcher and join our vibrant research community:

## Master of Biotechnology

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Whatever your interests, there will be a Master of Biotechnology research training position for you in one of our multidisciplinary research teams.

**The Biotechnology Research project (BRP) is a research-based topic that requires 8-9 months of project time and is critical for the fulfillment of master's degree in biotechnology. It is a major project in which each student engages in individually supervised research and presents results as a thesis and seminar presentation.**

. It is expected that this project will be conducted in research laboratories where adequate facilities and immediate supervision exist, either at Flinders University or Flinders Medical Centre. All areas of contemporary biotechnology are open so that any research activity with a clearly identified biotechnology focus can be undertaken.

By joining this research project, you will have the chance to collaborate with renowned experts in the field, work alongside fellow passionate students, and gain invaluable hands-on experience. This is not just an opportunity to enhance your academic portfolio but also to develop critical thinking, problem-solving, and research skills that will serve you well throughout your academic and professional endeavors. The BRP topic provides the perfect ecosystem to explore and pursue your scientific aspirations.

The BRP will officially start on the first day of Semester 1 in March, and end in November of the same year. For mid semester intake (S2), it will start on the first day of Semester 2 in July, and end in May of the following year.

This booklet specifically provides information on many of the research projects offered at FHMRI and researchers

appropriate for BRP topics are indicated. Contact listed supervisors and talk to them about your research interests and their projects.

### What is the process for organising a Biotechnology Research project ?

**1. Contact supervisor(s) of interest via email.** To help you best approach potential supervisors to organise a meeting we suggest this email template; click [here](#) to download.

**2. Meet with the supervisor(s) to discuss potential projects and visit the facilities where the research will be conducted.**

At this meeting you can explain why you're interested in research and what it is about this particular area that is appealing. If you are approaching several researchers to learn about the opportunities, let them know you are talking to others and will get

back to them when you have decided which project to accept. Supervisors understand this process, so the key is to communicate openly.

**3. Once you have organised a supervisor and enrolled in the topic BTEC 9200A or 9200B**, complete the student form, click [here](#), and email to [munish.puri@flinders.edu.au](mailto:munish.puri@flinders.edu.au)



Scan here for online version of this booklet and to access links.

#### For further information contact:

Associate Professor Alistair Standish  
Master of Biotechnology Coordinator  
[alistair.standish@flinders.edu.au](mailto:alistair.standish@flinders.edu.au)



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# Become a FHMRI researcher and join our vibrant research community: Higher Degree by Research (HDR)

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

**FHMRI researchers conduct research in areas from cancer, pharmacology, biochemistry, biotechnology, neuroscience, eye and vision, sleep health, epidemiology, public health, psychology 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](https://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](https://flinders.edu.au/study/apply/apply-research-degree/scholarships-fees)**

Keep in mind that the major round of scholarship applications closes on October 1st.

5. Apply.

### For further information contact:

Dr Tim Schultz  
HDR Coordinator  
[timothy.schultz@flinders.edu.au](mailto:timothy.schultz@flinders.edu.au)









# Page index of potential supervisors



| Name                 | Key     | Page | Name                | Key     | Page | Name                 | Key     | Page |
|----------------------|---------|------|---------------------|---------|------|----------------------|---------|------|
| Hossein Afzali       | ●       | 76   | Claire Jessup       | ● ●     | 34   | Elke Sokoya          | ● ● ●   | 50   |
| Cedric Bardy         | ● ● ● ● | 22   | Billingsley Kaambwa | ● ● ●   | 84   | Michael Sorich       | ● ● ● ● | 52   |
| Karissa Barthelson   | ● ● ●   | 22   | Jonathan Karnon     | ● ● ●   | 86   | Brooke Spaeth        | ● ●     | 92   |
| Ashlea Bartram       | ● ●     | 77   | Damien Keating      | ● ● ● ● | 34   | Nick Spencer         | ● ● ● ● | 52   |
| Giles Best           | ● ● ● ● | 23   | Sonja Klebe         | ● ● ● ● | 35   | Jacqueline Stephens  | ● ●     | 93   |
| Niranjana Bidargaddi | ● ● ●   | 78   | Bogda Koczwar       | ●       | 68   | Erin Symonds         | ● ● ●   | 53   |
| Shailesh Bihari      | ● ● ●   | 62   | Bryone Kuss         | ●       | 36   | Noemi Tari-Keresztes | ● ●     | 94   |
| Billie Bonevski      | ● ● ●   | 78   | Nicole Lovato       | ● ● ● ● | 69   | Kirilly Thompson     | ● ●     | 94   |
| Jacqueline Bowden    | ● ●     | 79   | David Lynn          | ● ● ● ● | 36   | Lauren Thurgood      | ● ●     | 54   |
| Bryce Brickley       | ● ●     | 80   | Arduino Mangoni     | ●       | 38   | Sara Tommasi         | ●       | 38   |
| Norma Bulamu         | ● ● ●   | 80   | Alyce Martin        | ● ● ● ● | 38   | Charlotte Toomes     | ● ● ●   | 54   |
| Kootsy Canuto        | ● ●     | 81   | Dusan Matusica      | ● ● ●   | 40   | Joshua Trigg         | ● ● ●   | 95   |
| Jill Carr            | ● ● ● ● | 24   | Robyn Meech         | ● ● ● ● | 40   | Vi Khanh Truong      | ● ● ● ● | 55   |
| Peter Catcheside     | ● ● ●   | 62   | Michael Michael     | ● ●     | 41   | Andrew Vakulin       | ● ● ●   | 72   |
| Yee Lian Chew        | ● ● ●   | 24   | Gorica Micic        | ● ● ●   | 70   | Krasimir Vasilev     | ● ● ● ● | 56   |
| Jamie Craig          | ● ●     | 64   | Brad Mitchell       | ●       | 71   | Anthony Venning      | ●       | 96   |
| Simon Conn           | ● ● ● ● | 26   | Murthy Mittinty     | ● ● ●   | 87   | Jenny Walker         | ● ● ●   | 74   |
| Chris Delaney        | ● ● ●   | 65   | Pramod Nair         | ● ●     | 42   | Jing Wang            | ●       | 29   |
| Dani-Louise Dixon    | ● ● ●   | 66   | Karin Nordström     | ● ● ● ● | 42   | David Watson         | ●       | 74   |
| Kelsi Dodds          | ● ● ●   | 26   | Michael O'Callaghan | ● ● ●   | 71   | Mihir D Wechalekar   | ● ● ●   | 74   |
| Danny Eckert         | ● ● ●   | 66   | Yoichiro Otsuka     | ● ● ● ● | 44   | Alan Wigg            | ● ●     | 75   |
| Laura Edney          | ● ● ●   | 82   | Nicola Parkin       | ● ● ●   | 88   | Annabelle Wilson     | ● ● ●   | 96   |
| Nicholas Eyre        | ● ● ● ● | 27   | James Pearce        | ●       | 71   | Jean Winter          | ● ● ●   | 57   |
| Kate Fairweather     | ●       | 83   | Janni Petersen      | ● ● ● ● | 44   | Amy Wyatt            | ● ● ● ● | 58   |
| Briony Forbes        | ● ● ● ● | 28   | Munish Puri         | ● ● ● ● | 45   | Vladimir Zagorodnyuk | ● ● ●   | 60   |
| Jonathan Gleadle     | ● ● ●   | 28   | Claire Roberts      | ● ● ●   | 46   | Wei Zhang            | ● ● ● ● | 58   |
| Tom Gordon           | ●       | 29   | Louise Roberts      | ●       | 71   | Anna Ziersch         | ● ● ●   | 97   |
| Stephen Gregory      | ● ● ●   | 30   | Geraint Rogers      | ● ●     | 46   |                      |         |      |
| Kalinda Griffiths    | ● ●     | 84   | Mary- Louise Rogers | ● ● ●   | 47   |                      |         |      |
| Luke Grundy          | ● ● ●   | 30   | Andrew Rowland      | ● ● ● ● | 47   |                      |         |      |
| Luke Grzeskowiak     | ● ● ●   | 67   | Courtney Ryder      | ● ● ●   | 88   |                      |         |      |
| Ashley Hopkins       | ● ● ●   | 31   | Tim Schultz         | ● ● ●   | 90   |                      |         |      |
| Anna Hudson          | ● ● ●   | 68   | Luke Selth          | ● ● ● ● | 48   |                      |         |      |
| Arne Ittner          | ● ● ●   | 32   | Joseph Selvanayagam | ● ● ●   | 72   |                      |         |      |
| Michael Jackson      | ● ● ●   | 32   | James Smith         | ● ●     | 91   |                      |         |      |
| Harald Janovjak      | ● ● ●   | 33   | Justine Smith       | ● ● ● ● | 49   |                      |         |      |

Contact supervisors to discuss the range of research projects they offer and check the key below for the research courses they may supervise. Please consider this information as a general guide only as availability of supervisors and appropriate projects can change over time.

#### KEY

● Placement ● Honours ● Masters Biotech ● HDR

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# Overview of FHMRI research

## Medical Biosciences

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### PROJECTS

#### CANCER

##### 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

**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**

#### NeuroUrology

- Investigate the mechanisms of BCG induced bladder pain, and test novel prophylactic therapies to prevent the development of pain during bladder cancer treatment
- Test innovative nanoparticle drug delivery systems for the treatment of chronic pelvic pain

**Dr Luke Grundy**

##### Precision Medicines

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

**Associate Professor Ashley Hopkins**

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

**Professor Andrew Rowland**

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

**Professor Michael Sorich**

##### Immunomodulation

- Modulation of immune cell activation during Type 1 diabetes and transplant rejection
- Checkpoint inhibitors as an immunotherapy for cancer

**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

**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**

##### 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**

### **Cancer Cell Metabolism**

- 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**

- Determining the clinical significance of novel Multiple Myeloma biomarkers
- Characterising the Multiple Myeloma tumour microenvironment
- Assessing the efficacy of targeting adhesion proteins in Multiple Myeloma

#### **Dr Charlotte Toomes**

## **NEUROSCIENCE**

### **Human Neurophysiology and Genetics**

- Neurobiotechnologies
- Cancer Neuroscience
- Adult and Pediatric neurodegenerative disorders
- Computational Neuroscience

#### **Professor Cedric Bardy**

### **Childhood Dementia**

- Contrasting disease associated mechanisms in cell or animal disease models of Sanfilippo syndrome childhood dementia and/or Alzheimer's disease

#### **Dr Karissa Barthelson**

### **Visceral Neurophysiology**

- 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**

- 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

#### **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

#### **Associate Professor Arne Ittner**

### **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**

- Defining how gut bacteria regulate metabolism: a role for gut serotonin
- Uncovering the pathway between gluten immunity and adverse symptoms in coeliac disease and gluten sensitivity

#### **Dr Alyce Martin**

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# Overview of FHMRI research

## Medical Biosciences

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### PROJECTS

#### 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

- Understanding the brain circuitry of emotional autonomic responses
- Exploring the effects of psychoactive drugs on the brain circuits

**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

**Associate Professor Vladimir Zagorodnyuk**

### INFECTION & IMMUNITY

#### Virology

- Mosquito borne: the effect of zika virus on the developing eye and brain & impact of dengue virus on macrophages and the endothelium
- Norovirus and enteric adenoviruses
- The impact of proteins of SARS-CoV-2 on inflammatory responses in the lung

**Professor Jill Carr**

- 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 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

**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 eubiosis: can we re-define rheumatoid arthritis treatment?

**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

**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

**Professor Harald Janovjak**

## Systems Immunology

- The impact of the microbiota on responses to vaccination
- The impact of the microbiome on cancer immunotherapy efficacy and toxicity
- How do vaccines induce memory responses in the innate immune system?

**Professor David Lynn**

## Pregnancy Health and Beyond

- Effects of micronutrients on placental function
- Bioinformatic analyses of multi-omic profiling of the placenta across gestation
- Role of circRNA in placental development and function and pregnancy outcome

**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
- Methods for diagnosis of infections and cancers

**Professor Krasimir Vasilev**

## Protein Homeostasis in Health and Disease

- Characterising pregnancy-associated protein homeostasis
- Elucidating the role of protein misfolding in the pathology of preeclampsia
- Characterising molecular links between neurodevelopmental disorders and dementia

**Dr Amy Wyatt**

## Centre for Marine Bioproducts Development

- Food and nutraceutical developments from marine bioresources
- Novel 3D-bioprinting marine-derived biomaterials and bioinks
- Development of Australian seaweed-based functional foods and biodegradable bioplastics

**Professor Wei Zhang**



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# Overview of FHMRI research

## Clinical Sciences

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

##### Professor Shailesh Bihari

- Investigation into the physiological and immunological outcomes of bacterial and viral induced respiratory inflammation

##### Associate Professor Dani-Louise Dixon

#### Sleep Health

- Environmental noise impacts on sleep, functioning and health
- The use of circadian-system guided lighting strategies
- Improved methods for assessing personal protective equipment (PPE) mask resistance, leak and filtration performance effectiveness

##### Professor Peter Catcheside

- 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

##### Associate Professor Nicole Lovato

- Investigate the causes and treatments of sleep disorders (namely, circadian rhythm disorders and insomnia), the overlap within different sleep disorders and their impact on mental health. Development of better diagnostic approaches, treatment evaluation and clinical implementation

##### 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 Pharmacoepidemiology

- 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

#### Paramedicine

- Paramedic education
- Paramedic culture
- Workplace violence

##### Mr Brad Mitchell

- Prehospital clinical care
- Paramedic education
- Reporting and clinical practice guidelines

##### Mr James Pearce

- Mental health care
- Legal and ethical issues in mental health

care and clinical practice guideline development including mental health legislation and powers under the Mental Health Act

**Dr Louise Roberts**

## 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

**Professor Alan Wigg**

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# Overview of FHMRI research

## Public Health

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### PROJECTS

#### Health Economics

- Improving methods for the evaluation of new health technologies

##### Professor Hossein Afzali

- Understanding the costs, quality of life and patient reported outcomes of different treatment and surveillance programs for patients with cancer

##### Dr Norma B. Bulamu

- 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 (NCETA)

- 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

##### Dr Ashlea Bartram

##### Professor Jacqueline Bowden

##### Dr Kirrilly Thompson

#### 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

##### Professor Nirnanjan Bidargaddi

#### Behavioural

- Where do people in rural and remote communities go for help to improve health risk behaviours, eg, stopping smoking, reducing alcohol, cancer screening?
- Improving the physical health of people with mental ill health
- How to incorporate preventive health care into routine health services

##### 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
- The conceptualization of Guided Self-Help Material for common mental health disorders
- The acceptability of Low Intensity CBT in cancer survivorship

##### Anthony Venning



## Rural & Remote Health

- Developing and evaluating innovative health promotion programs that empower men to foster and sustain healthy behaviours in the Northern Territory

### Dr Bryce Brickley

- Methods & models for developing rural health workforce

### Dr Nicola Parkin

- The adaptation and trial of an online social and emotional wellbeing education and support program for young Aboriginal and Torres Strait Islander males
- A health promotion intervention trial with male football fans
- Evaluation of alcohol policy reforms in the NT

### Professor James Smith

- Recovery of persons with mental health challenges, alcohol and other drug issues, and gambling harm in the Northern Territory
- 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

## Biostatistics

- Measures used in identifying health inequalities
- Application of data visualisation techniques to study the patterns in traumatic brain injury.
- Application of mathematical models to study traumatic brain injury among Parkinson patients

### Associate Professor Murthy N. Mittinty

## Injury Studies

- Coolamon Study and Safer Pathways Project exploring the care of Aboriginal & 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)

### Associate Professor Courtney Ryder

## Point of Care Testing

- Field-based evaluation of a point-of-care testing device in remote primary health care
- Health economics evaluation of models of care involving point-of-care testing in rural and remote primary health care settings
- Consultation with Aboriginal communities to evaluate the appropriateness of new models of care

### Dr Brooke Spaeth

## 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

- Co-develop policies and processes by which individual and aggregated genomic and health data are represented and accessed for research and clinical use that reflect the priorities of Aboriginal and Torres Strait Islander communities

### Associate Professor Kalinda Griffiths

## Population Health

- Ear and hearing health; Develop strategies to support ear & hearing health screening, diagnosis & management
- Kidney health; using data linkage to investigate the complex interplay between sociodemographic factors, healthcare utilisation
- Infectious disease epidemiology; Investigate the epidemiology of HIV, hepatitis, and other communicable infections

### Associate Professor 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

### Associate Professor Annabelle Wilson

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

### Professor Anna Ziersch

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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**Professor Cedric Bardy**

**Supervisor email:**

**cedric.bardy@flinders.edu.au**

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

### **Description of research area and**

**interests:** Our lab bioengineers 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 adult and pediatric neurodegenerative disorders and brain cancer.

### **Outline of project:**

- Neurobiotechnologies: Design innovative biotechnologies to reverse engineer the human brain in vitro.
- Cancer Neuroscience: Studying the influence of the human brain on glioblastoma plasticity and sensitivity to therapeutics.
- Adult and Pediatric neurodegenerative disorders: Discover neurological treatments with automated drug screens on brain cells derived from induced pluripotent stem cells donated by Parkinson's patients and kids with childhood dementia.

- Computational Neuroscience: Programming and software development for the bioinformatic analysis of electrophysiology and genomics data integrating machine learning and AI.

### **Skills students will gain:**

Our laboratory located at SAHMRI is equipped with cutting-edge robotics with drug screening and cellular phenotyping. Students will be exposed to various projects in the lab and gain knowledge in Neuroscience, Cancer, Stem Cells, Electrophysiology, high-content microscopy, transcriptomics, bioinformatics, Programming, Software development and Human tissue culture.

Our team is highly collaborative and provides a flourishing environment to build critical thinking and research skills for a career in academic research or industry.

Computer scientists and bioinformaticians (and others), even without biology background are strongly encouraged to apply.

Scholarships available for specific projects.

### **Collaborators associated with projects:**

We have a team of ~12 full-time researchers highly experienced in supervising research students.

**flinders.edu.au/people/cedric.bardy**  
**bardylab.com**

**Location:** SAHMRI



**Supervisor name:**

**Dr Karissa Barthelson**

**Supervisor email:**

**karissa.barthelson@flinders.edu.au**

**Name of research group: Childhood  
Dementia Research Group**

### **Description of research area and**

**interests:** Alzheimer's disease (AD) has been researched for over a century. To date, the complexity of this disease has been difficult to completely capture in animal models. Consequently, treatments originally developed in animals are not particularly effective in all AD cases.

Dementia is not only a disease of the elderly. 1 in 2,800 Australian babies will develop childhood-onset dementia. This is a significant burden, yet the existence of childhood dementia is not nearly as recognised as AD. Unlike AD, the genetic bases of the childhood dementias are very well defined, and reliably representative animal models exist. There is a large degree of overlap in the brain and behavioural changes between AD and the childhood dementias. These shared disease-associated mechanisms between the childhood dementias and AD could present as an opportunity to design therapeutics with clinical benefit for both types of dementia.

### **Outline of projects:**

The project will involve contrasting disease associated mechanisms in cell or animal disease models of Sanfilippo syndrome childhood dementia and/or Alzheimer's disease. For cell and mouse work, this would be performed in the Childhood Dementia Research Group in FMC.



For zebrafish work, this will be performed collaboratively with the Alzheimer's Disease Genetics Laboratory at the University of Adelaide (North Terrace Campus).

#### **Skills students will gain:**

Depending on the project, students will gain experience in one or more of the following:

- Molecular biology techniques such as nucleic acid extraction and PCR
- Microscopy and image analysis
- Cell culture
- Animal handling (zebrafish and/or mice)
- Behavioural testing of animal models
- Bioinformatic analysis of 'omics data (e.g. RNA-seq, proteomics) using bash and R

#### **Collaborators associated with projects:**

Professor Kim Hemsley  
Associate Professor Michael Lardelli.

**[flinders.edu.au/people/karissa.barthelson](https://flinders.edu.au/people/karissa.barthelson)**

**Location:** Health and Medical Research Building

#### **Supervisor name:**

**Dr Giles Best**

#### **Supervisor email:**

**[giles.best@flinders.edu.au](mailto: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 Appukuttan  
Dr Stephen Gregory.

**[flinders.edu.au/people/giles.best](https://flinders.edu.au/people/giles.best)**

**Location:** Health and Medical Research Building

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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**Professor Jill Carr**

**Supervisor email:**

**jill.carr@flinders.edu.au**

**Name of research group: Carr Virus Research Laboratory**

### **Description of research area and interests:**

The Carr Virus Research Laboratory has interests in fundamental virology and the way viruses interact with the host. This includes changes in host cell expression of various genes, such as those that are part of immune responses and morphological and functional changes in tissues. Viruses of interest include significant human pathogens such as the mosquito-borne flaviviruses, dengue and zika virus, respiratory pathogens such as SARS-CoV-2 and enteric pathogens such as norovirus and adenovirus.

### **Outline of projects:**

We currently have working models and active projects to investigate:

- The effect of zika virus on the developing eye and brain. This currently has a focus on the role of the complement system (part of innate immune responses).
- The impact of dengue virus on macrophages and the endothelium. This is a major contributory to the vascular leak syndrome that is seen with severe dengue infection. Our current focus is on the role of Vav proteins in driving macrophage inflammation and endothelial cell dysregulation.
- Norovirus and enteric adenoviruses, which are one of the leading causes of diarrhoeal disease, with a focus on viral replication and impact on gut function.
- The impact of proteins of SARS-CoV-2 on inflammatory responses in the lung and in particular macrophages.

### **Skills students will gain:**

Expertise in cell biology techniques such as mammalian cell culture, isolation of primary cells, and use of PCR and microscopy to analyse proteins in cells. Additionally, some projects involve small laboratory animal work and tissue analysis.

### **Collaborators associated with projects:**

Ms Evangeline Cowell and Ms Amy Green are key support staff in the laboratory, who both hold Bachelor degree's with honours.

**[flinders.edu.au/people/jill.carr](https://flinders.edu.au/people/jill.carr)**

Virology in Australia is linked by the Australian Virology Society **[avs.org.au](https://avs.org.au)** and is part of broader microbiology **[theasm.org.au](https://theasm.org.au)**

**Location:** Health and Medical Research Building



**Supervisor name:**

**Dr Yee Lian Chew**

**Supervisor email:**

**yeelian.chew@flinders.edu.au**

**Name of research group: Learning and neurological disease using a nematode model, 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 naïve 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](http://flinders.edu.au/people/yeelian.chew)  
[chewwormlab.wordpress.com/](http://chewwormlab.wordpress.com/)

Want to know more about worms?  
[wormbook.org/](http://wormbook.org/) or [youtube.com/watch?v=zjqLwPgLnV0&ab\\_channel=OpenWorm](http://youtube.com/watch?v=zjqLwPgLnV0&ab_channel=OpenWorm)

**Location:** Health and Medical Research Building

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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**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:**

Associate Professor Luke Selth  
Dr Vanessa Conn  
Mrs Kirsty Kirk  
Dr Brett Stringer  
PhD students in the Conn lab  
National & international researchers

**[flinders.edu.au/people/simon.conn](http://flinders.edu.au/people/simon.conn)**

**Location:** Flinders Centre for Innovation in Cancer



**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](http://flinders.edu.au/people/kelsi.dodds)

[flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/visceral-neurophysiology](http://flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/visceral-neurophysiology)

**Location:** Health and Medical Research Building

**Supervisor name:**

**Dr Nicholas Eyre**

**Supervisor email:**

[nicholas.eyre@flinders.edu.au](mailto: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:**

Professor Jill Carr

Associate Professor Tim Chataway

Dr Alex Colella.

[flinders.edu.au/people/nicholas.eyre](http://flinders.edu.au/people/nicholas.eyre)

**Location:** Health and Medical Research Building



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# Research Supervisors and their projects

## Medical Biosciences

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**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.

**flinders.edu.au/people/briony.forbes**

**Location:** Health and Medical Research Building



**Supervisor name:**

**Professor Jonathan Gleadle**

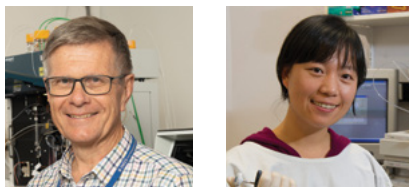
**Supervisor email:**

**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.bleadle](https://flinders.edu.au/people/jonathan.bleadle)

**Location:** Health and Medical Research Building

#### **Supervisors' names:**

**Professor Tom Gordon**  
**Dr Jing Wang**

#### **Supervisors' emails:**

[t.gordon@flinders.edu.au](mailto:t.gordon@flinders.edu.au);  
[jingjing.wang@flinders.edu.au](mailto: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](https://researchnow.flinders.edu.au/en/persons/tom-gordon-2)

[researchnow.flinders.edu.au/en/persons/jing-jing-wang-2](https://researchnow.flinders.edu.au/en/persons/jing-jing-wang-2)

**Location:** Health and Medical Research Building

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# Research Supervisors and their projects

## Medical Biosciences

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**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:** Health and Medical Research Building



**Supervisor name:**

**Dr Luke Grundy**

**Supervisor email:**

**luke.grundy@flinders.edu.au**

**Name of research group: NeuroUrology Research Group**

### **Description of research area and**

**interests:** Chronic pelvic pain is a common and debilitating side effect of cancer treatment. 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. Our research program focuses on understanding the epidemiology and impact of chronic pain following treatment for cancer, 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:**

- **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 enthusiastic Honours and PhD 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. Projects are also available to understand the epidemiology of BCG induced side effects in patients currently or previously undergoing treatment for bladder cancer.



- **Nanoparticle 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. Projects are available for enthusiastic Honours and PhD students to test innovative nanoparticle drug delivery systems for the treatment of chronic pelvic pain in the absence of side effects.

#### **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 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:**

Dr Steven Taylor  
Dr Sophie Plagakis.

[flinders.edu.au/people/luke.grundy](https://flinders.edu.au/people/luke.grundy)  
[youtu.be/EV9gWyKul5M](https://youtu.be/EV9gWyKul5M)

**Location:** Health and Medical Research Building

#### **Supervisor name:**

**Associate Professor  
Ashley Hopkins**

#### **Supervisor email:**

[ashley.hopkins@flinders.edu.au](mailto: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](https://flinders.edu.au/people/ashley.hopkins)

**Location:** Health and Medical Research Building

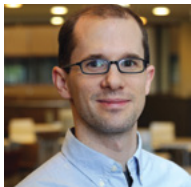


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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**Associate Professor  
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:** Health and Medical Research Building



**Supervisor name:**

**Dr 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](http://flinders.edu.au/people/michael.jackson)

**Location:** Flinders Medical Centre

#### **Supervisor name:**

**Professor Harald Janovjak**

#### **Supervisor email:**

[harald.janovjak@flinders.edu.au](mailto: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

[flinders.edu.au/people/harald.janovjak](http://flinders.edu.au/people/harald.janovjak)  
[janovjak-lab.com](http://janovjak-lab.com)

**Location:** Flinders Centre for Innovation in Cancer

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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**Dr Claire Jessup**

**Supervisor email:**

**claire.jessup@flinders.edu.au**

**Name of research group:**

**Immunomodulation (iMOD) Laboratory**

### **Description of research area and**

**interests:** Our team 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:**

- Can we modulate immune cell activation during type 1 diabetes and transplant rejection? Along with collaborators in Victoria (St Vincent's Institute) and the UK (Oxford University) we use an antibody engineering approach to trigger inhibitory immunoreceptors on T cells to treat autoimmunity (type 1 diabetes) and prevent transplant rejection (in islet allograft models).
- How can checkpoint inhibitor therapies be improved for ovarian, pancreatic and renal cancer? Checkpoint inhibitors have had breakthrough success for treating some cancer types (like melanoma). With our clinical collaborators onsite here at FMC (SALHN), in Adelaide (Centre for Cancer Biology, UniSA and the University of Adelaide) we are investigating the profile of immune cells in different cancer types and how checkpoint inhibition approaches may be adjusted to make them effective for a broader range of cancers.

### **Skills students will gain:**

- Immunoassays analysing T cell activation, proliferation and cytokine production
- Cell isolation from patient tissue and blood samples
- Cellular analysis techniques including multicolour flow cytometry and confocal microscopy
- Bioinformatics and single cell RNA analysis
- Molecular techniques including real-time PCR and cloning
- Antibody engineering and protein production
- Islet transplantation, diabetes and cancer disease models

**[flinders.edu.au/people/claire.jessup](https://flinders.edu.au/people/claire.jessup)**

**[flinders.edu.au/health-medical-research-institute/discovery-biosciences/neuroscience/research-groups/imod-lab](https://flinders.edu.au/health-medical-research-institute/discovery-biosciences/neuroscience/research-groups/imod-lab)**

**Twitter: @betacellgirl and @iMOD\_lab**

**Location:** Health and Medical Research Building



**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](http://flinders.edu.au/people/damien.keating)

[flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/gut-sensory-systems](http://flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/gut-sensory-systems)

**Location:** Health and Medical Research Building

#### **Supervisor name:**

**Professor Sonja Klebe**

#### **Supervisor email:**

[sonja.klebe@flinders.edu.au](mailto: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 innovate 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.

Scholarships may be available for specific projects.

#### **Collaborators associated with projects:**

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

[flinders.edu.au/people/sonja.klebe](http://flinders.edu.au/people/sonja.klebe)

**Location:** Flinders Medical Centre



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# Research Supervisors and their projects

## Medical Biosciences

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**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.



**Supervisor name:**

**Professor David Lynn**

**Supervisor email:**

**david.lynn@flinders.edu.au**

**Name of research group: Systems**

**Immunology**

### **Description of research area and**

**interests:** Professor David Lynn is Head of the Systems Immunology Laboratory and a Program Director in the SAHMRI Precision Medicine Theme; Scientific Director of SA Genomics Centre; and Professor in Systems Immunology at Flinders University. He leads a nationally and internationally regarded research program in systems immunology investigating how microbes (pathogenic and commensal) modulate the immune system in a range of contexts from infection (including COVID-19) to infant immunisation and cancer immunotherapy. He also has a strong interest in vaccine non-specific effects and trained immunity. Recent discoveries include uncovering the role of the microbiota in vaccine responses (Cell Host Microbe 2018; Nature Reviews Immunology 2022), mammalian longevity (Cell Reports, 2021) and cancer immunotherapies (Cell Reports Medicine 2021). His team were the first to show that, in mice, antibiotic exposure in early life leads to impaired responses to 5 different infant vaccines that are administered worldwide, leading to an NHMRC-funded study in infants and significant funding from international vaccine company, GSK, in this area. Professor Lynn also leads a number of other clinical studies including the COVID-19 vaccine immune responses study (Cell Reports Medicine 2022); and the NHMRC-funded antibiotics and vaccine immune responses study (AVIRS) and Vaccimum studies. Professor Lynn was

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

also the PI in South Australia for the Gates Foundation-funded (~\$17M) BRACE BCG vaccine RCT (New England Journal of Medicine, 2023). Professor Lynn is also a leader in genomics and computational biology research. His research team routinely apply a range of “omic” approaches including RNAseq, small RNAseq, epigenomics, and metagenomics. His computational resources, such as InnateDB.com, are used by tens of thousands of researchers globally. Professor Lynn also led the establishment of and is Scientific Director of the SA Genomics Centre, an NCRIS-supported state-wide genomics facility in SA.

#### **Outline of projects:**

- The impact of the microbiota on responses to vaccination.
- 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 infectious diseases, vaccine biology, immunology; microbiology; cancer biology; computational or systems biology.

#### **Skills students will gain:**

- Preclinical models; germ-free mice; analysis of clinical samples, vaccine biology; immunology; microbiome analysis; flow cytometry; range of animal handling techniques; epigenetics; ELISA; gene expression analysis; Bioinformatics; systems biology; network analysis; programming.

#### **Collaborators associated with projects:**

Dr Simone Barry  
 Professor Helen Marshall  
 Professor Deb White  
 Dr Susan Woods  
 Dr Stephen Blake  
 Dr Todd Norton  
 Dr Natalie Stevens  
 Dr Miriam Lynn  
 Dr Feargal Ryan.

[flinders.edu.au/people/david.lynn](https://flinders.edu.au/people/david.lynn)

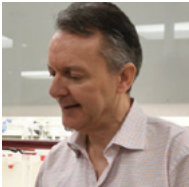
**Location:** SAHMRI

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# Research Supervisors and their projects

## Medical Biosciences

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**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 Alyce Martin**

**Supervisor email:**

**alyce.martin@flinders.edu.au**

**Name of research group: Gut Hormones in Health and Disease**

### **Description of research area and**

**interests:** The gut is a unique internal environment exposed to constant changes that can have a major impact on how our body functions. However, our understanding of how our body senses and responds to this environment is still limited. Our lab is eager to understand how specialized serotonin-secreting enterochromaffin (EC) cells sense and respond to the internal environment and how this impacts our physiology. We're particularly interested in understanding how bacteria and nutrients within the gut cause serotonin release, which then impacts energy metabolism and gut function. This is relevant for multiple disease states such as obesity, diabetes and gut disorders (Coeliac disease and IBS).

We have a method to isolate EC cells as a single cell population, allowing us to study their functional biology in detail. We combine this with an array of techniques such as flow cytometry, PCR, and cell culture assays to understand how these cells function under different conditions, and how they may be altered with different diseases.

### **Outline of projects:**

#### **a. Defining how gut bacteria regulate metabolism: a role for gut serotonin.**

This project aims to evaluate how bacteria impact our metabolism via communicating with enterochromaffin cells in the gut. The specific aims of the project are:

- I. Using mouse and human gut tissue to identify which bacteria-derived metabolites rapidly increase serotonin and what the cellular mechanisms for this.
- II. Evaluate the long-term effects of gut bacteria on gut serotonin, and the consequences of this for fat storage and metabolism.
- III. Determine whether different dietary nutrients (such as a high fat diet) change gut serotonin levels by altering gut bacteria composition.

**b. Uncovering the pathway between gluten immunity and adverse symptoms in coeliac disease and gluten sensitivity.**

Dietary gluten can be a major cause of lifestyle restriction, fear, and low quality of life for people with coeliac disease. However, how, and why gluten triggers coeliac symptoms are still unknown. Our lab is contributing toward this project by examining EC cell responsiveness in coeliac disease and non-coeliac gluten sensitivity using our established method in isolating and studying EC cells.

**Skills students will gain:**

Students will gain a wide variety of transferrable skills. These include but are not limited to:

- Tissue culture techniques with stable cell lines, mouse tissue and human surgical specimens.
- Isolation of primary EC cells and generation of intestinal organoids.
- Animal handling and experimental techniques.
- Molecular biology techniques, including RNA isolation and PCR arrays, ELISA assays and flow cytometry.

- Microscopy techniques including labelling with fluorescent antibodies and imaging using standard and high-resolution confocal microscopy.

Additional skills:

- Working within teams, organisational skills and how to set up a successful experiment.
- How to critically analyse, dissect and interpret a research paper.
- How to communicate your science effectively (both verbally and written).

**Collaborators associated with projects:**

Jessica Chao  
Rosie Coleman  
Associate Professor Jason Tye-Din  
Dr Melinda Hardy.

[flinders.edu.au/people/alyce.martin](http://flinders.edu.au/people/alyce.martin)

[amartingutlab.com](http://amartingutlab.com)

[twitter.com/AMartinGutLab](https://twitter.com/AMartinGutLab)

**Location:** Health and Medical Research Building



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# Research Supervisors and their projects

## Medical Biosciences

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**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

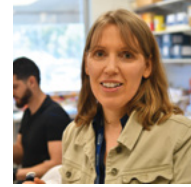
Associate Professor Michael Z Michael

**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:** Health and Medical Research Building



**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](https://flinders.edu.au/people/robyn.meech)

**Location:** Health and Medical Research Building

**Supervisor name:**

**Associate Professor  
Michael Michael**

**Supervisor email:**

[michael.michael@flinders.edu.au](mailto: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](https://flinders.edu.au/people/michael.michael)

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

**Location:** Flinders Centre for Innovation in Cancer

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# Research Supervisors and their projects

## Medical Biosciences

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**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, chemoinformatics, 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.

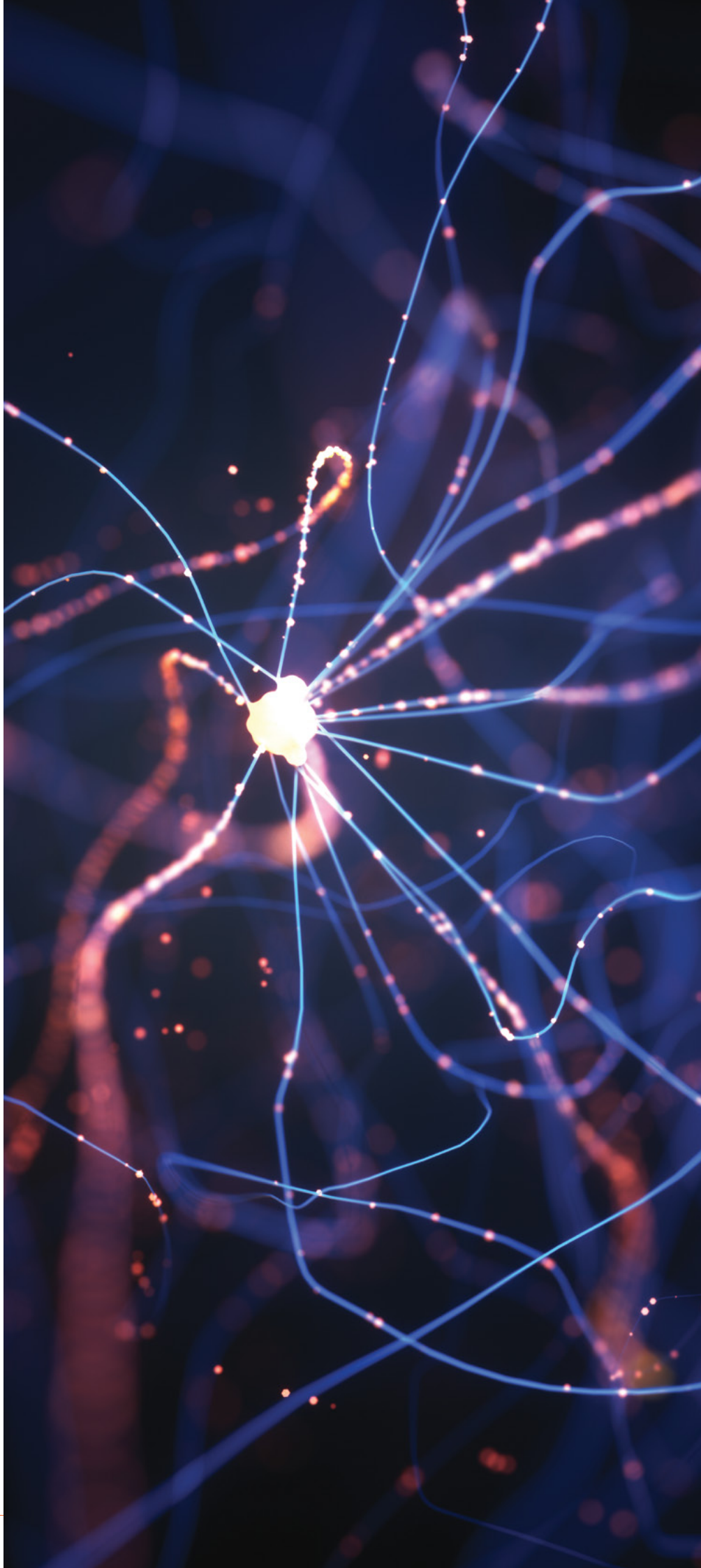
**Collaborators associated with projects:**

Dr Yuri Ogawa  
Dr Joseph Fabian  
Mrs Sarah Nicholas.

[flinders.edu.au/people/karin.nordstrom](http://flinders.edu.au/people/karin.nordstrom)

[hoverflyvision.weebly.com](http://hoverflyvision.weebly.com)

**Location:** Health and Medical Research Building





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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**Associate Professor  
Yoichiro Otsuka  
(Yoichriou Ootsuka) (YoYo)**

**Supervisor email:**

**yoichiro.otsuka@flinders.edu.au**

**Name of research group: Integrative  
Neuroscience Laboratory**

### **Description of research area and**

**interests:** Have you ever experienced the physiological reactions of increased body temperature (known as psychogenic fever), elevated heart rate, or looking pale (caused by constriction of skin arteries) when faced with stressful situations? These responses occur independently of our conscious will, as they are initiated by the brain through the autonomic nervous system (specifically, the sympathetic nervous system). These reflexes are vital for our survival, as they prepare our bodies for imminent challenges. However, when these changes become excessive, they disrupt our daily lives and can lead to an illness condition known as autonomic dysfunction. While autonomic dysfunction is a widely recognised health issue, its underlying mechanisms remain poorly understood, and therefore, effective treatments are still lacking. To tackle this problem, it is crucial to establish the fundamental brain neural circuits that trigger normal autonomic physiological responses to emotional signals. Unfortunately, these circuits remain largely uncharted territory. This is where our laboratory steps in! We combine state-of-the-art biotechnology techniques with physiological and neuroanatomical experiments involving conscious and anesthetized animal models to delve into the neural circuits responsible for psychogenic autonomic responses.

### **Outline of projects:**

- Understanding the brain circuitry of emotional autonomic responses.
- Exploring the effects of psychoactive drugs on the brain circuits.

### **Skills students will gain:**

The project will fall into Brain Neuroscience research field. HDR and Honours students will have opportunities to learn general animal surgery and the following major techniques;

- Recording vital bio-physiological signals such as brain and heart electrical signals, blood pressure and body temperature in conscious live animals.
- Immunohistochemistry to visualise responsive brain circuitries.
- Controlling neuronal activity with state-of-the-art techniques including Optogenetics and Chemogenetics
- Computer programming to analyse bio-physiological signal data with specialized signal process software.

### **Collaborators associated with projects:**

Emeritus Professor William Blessing.

**flinders.edu.au/people/yoichiro.otsuka**

**Location:** Health and Medical Research Building



**Supervisor name:**

**Professor Janni Petersen**

**Supervisor email:**

**janni.petersen@flinders.edu.au**

**Name of research group: Cancer Cell  
Metabolism**

### **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:**

Associate Professor Sean Humphrey  
Associate Professor Jon Oakhill  
Associate Professor John Scott  
Professor Iain Hagan  
Dr Ayla Orang  
Ms Tingting Wang  
Ms Bridget Mooney  
Ms Nadine Smith  
Ms Ari Gillespie.

[flinders.edu.au/people/janni.petersen](http://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](mailto: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.

- 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.

#### **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](http://flinders.edu.au/people/munish.puri)

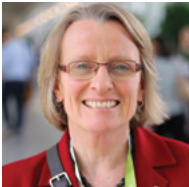
**Location:** Health Sciences Building

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# Research Supervisors and their projects

## Medical Biosciences

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**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 psychosocial 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:** Health and Medical Research Building



**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 clinical studies to investigate:

- Environmental exposures and asthma risk in children
- The role of the gut microbiome in age-associated cognitive decline
- Multi-drug resistant organism screening during pregnancy
- Strategies to reduce airborne healthcare associated infection risk
- Host and microbiome factors that influence urinary tract infection risk

### **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  
Dr Andrew Shoubridge.

**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](http://flinders.edu.au/people/mary-louise-rogers)**

**[flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/mnd-neurotrophic-lab](http://flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/mnd-neurotrophic-lab)**

**Location:** Health and Medical Research Building



**Supervisor name:**

**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 resolved 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 Honours and Placement 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

Associate Professor Ashley Hopkins.

**[flinders.edu.au/people/andrew.rowland](http://flinders.edu.au/people/andrew.rowland)**

**[sites.flinders.edu.au/precision-medicine-group/](http://sites.flinders.edu.au/precision-medicine-group/)**

**Location:** Health and Medical Research Building

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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**Associate Professor  
Luke Selth**

**Supervisor email:**

**luke.selth@flinders.edu.au**

**Name of research group: Prostate  
Cancer Research Group**

### **Description of research area and**

**interests:** Prostate cancer will affect approximately 1:7 Australian men and results in >3,000 deaths per annum in this country alone. To improve outcomes for men with this disease, the Prostate Cancer Research Group at Flinders University undertakes basic research to characterise the mechanisms by which prostate tumours metastasise 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.

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](http://flinders.edu.au/people/luke.selth)**

**[scholar.google.com.au/  
citations?user=IfXWSaQAAAAJ&hl=en](https://scholar.google.com.au/citations?user=IfXWSaQAAAAJ&hl=en)**

**Location:** Health and Medical Research Building





**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

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# Research Supervisors and their projects

## Medical Biosciences

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**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:**

One in every two Australians has a chronic illness such as cardiovascular disease, diabetes, depression or an autoimmune disease. The common denominator underlying these conditions is a dysregulated immune system fuelling systemic inflammation. Current standard medical care attempts to control symptoms but does not address the root cause. The approach of the Chronic Disease Research Laboratory is to understand the drivers of chronic disease and to provide a framework for restoring health.

### **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 firstly at baseline and secondly after reducing inflammation with standard of care medication. In future studies, we will directly target the leaky gut in RA patients and determine whether this can diminish inflammation, thereby providing the potential for tapering medications.

- **Prioritising eubiosis: can we re-define rheumatoid arthritis treatment?**

Autoimmune diseases begin with a dysregulated immune system. Around 70% of our immune system is in our gut and accumulating evidence shows that commensal microbial imbalance, or dysbiosis, is prevalent in RA. A body of research has shown that specific diet and lifestyle choices can make a positive impact on our microbiome and intestinal lining. In this study, we will develop a lifestyle protocol for normalising commensal microbial balance, or eubiosis, and determine whether intestinal permeability is restored.

### **Skills students will gain:**

- A comprehensive understanding of the main drivers of chronic disease
- Clinical research experience, including the use of REDCap, a clinical database platform
- Exposure to state-of-the-art techniques such as metabolomics
- Experience in using patient samples to identify treatable targets

### **Collaborators associated with projects:**

Associate Professor Mihir Wechalekar  
Associate Professor Jenny Walker.  
[flinders.edu.au/people/elke.sokoya](https://flinders.edu.au/people/elke.sokoya)  
[elkesokoya.wixsite.com/cdrlab](https://elkesokoya.wixsite.com/cdrlab)

**Location:** Flinders Medical Centre





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# Research Supervisors and their projects

## Medical Biosciences

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**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:**

Associate Professor Ashley Hopkins

**flinders.edu.au/people/michael.sorich**

**Location:** Health and Medical Research Building



**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 Kyloh  
Mr Lee Travis.

[flinders.edu.au/people/nicholas.spencer](https://flinders.edu.au/people/nicholas.spencer)

[flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/visceral-neurophysiology](https://flinders.edu.au/health-medical-research-institute/molecular-biosciences/neuroscience/research-groups/visceral-neurophysiology)

**Location:** Health and Medical Research Building

#### Supervisor name:

**Associate Professor  
Erin Symonds**

#### Supervisor email:

[erin.symonds@flinders.edu.au](mailto: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

Clinicians (gastroenterologists, oncologists and surgeons).

[flinders.edu.au/people/erin.symonds](https://flinders.edu.au/people/erin.symonds)

[flinders.edu.au/cancer/preventing-cancer-and-detecting-it-early](https://flinders.edu.au/cancer/preventing-cancer-and-detecting-it-early)

**Location:** Flinders Centre for Innovation in Cancer



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# Research Supervisors and their projects

## Medical Biosciences

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**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](https://flinders.edu.au/people/lauren.thurgood)**

**Location:** Health and Medical Research Building



**Supervisor name:**

**Dr Charlotte Toomes**

**Supervisor email:**

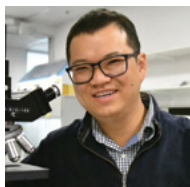
**charlotte.toomes@flinders.edu.au**

**Name of research group: Multiple Myeloma Translational Research Laboratory**

### **Description of research area and**

**interests:** The Multiple Myeloma Translational Research Laboratory aims to develop novel diagnostic methods and treatments for multiple myeloma (MM). MM is an incurable bone marrow malignancy characterised by the uncontrolled growth of plasma cells. It is the second most common blood cancer worldwide, with >175,000 new cases diagnosed annually, including ~2,600 Australians. Despite improvements in therapeutic strategies and supportive care, only 17% of patients survive 10-years post diagnosis with a median overall survival of 6 years.

Our group collaborates closely with haematologists at Flinders Medical Centre (Dr Thomas Day) and the Vascular Biology and Cell Trafficking Laboratory (Prof Claudine Bonder, Centre for Cancer Biology, UniSA) to leverage our individual strengths and expertise. We use cell models and patient samples to investigate the molecular and cellular mechanisms of disease, and to determine the role of the tumour microenvironment in supporting progression. My research specifically focuses on identifying new biomarkers of disease progression (e.g. desmoglein-2) and investigating their potential to be targeted using novel therapeutic approaches.



#### Outline of projects:

- Determining the clinical significance of novel MM biomarkers
- Characterising the MM tumour microenvironment
- Assessing the efficacy of targeting adhesion proteins in MM.

#### Skills students will gain:

- Cell culture and various cell-based assays (cell proliferation and viability)
- Protein biology (western blotting and flow cytometry)
- Cell microscopy and imaging
- Molecular techniques (nucleic acid extraction and PCR)
- Isolation of cells from MM patient samples
- Skills in the design and execution of a research project
- Written and oral communication skills.

Scholarships may be available for specific PhD projects.

#### Collaborators associated with projects:

Dr Giles Best  
Professor Claudine Bonder  
Dr Lauren Thurgood  
Dr Thomas Day  
Dr Barbara McClure.

[flinders.edu.au/people/charlotte.toomes](https://flinders.edu.au/people/charlotte.toomes)

[linkedin.com/in/charlotte-toomes/](https://linkedin.com/in/charlotte-toomes/)

[flindersfoundation.org.au/news/improving-outcomes-for-patients-with-multiple-myeloma](https://flindersfoundation.org.au/news/improving-outcomes-for-patients-with-multiple-myeloma)

[doi.org/10.1002/1878-0261.13055](https://doi.org/10.1002/1878-0261.13055)

**Location:** Health and Medical Research Building

#### Supervisor name:

**Dr Vi Khanh Truong**

#### Supervisor email:

[vikhanh.truong@flinders.edu.au](mailto: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](https://flinders.edu.au/people/vikhanh.truong)

[news.flinders.edu.au/](https://news.flinders.edu.au/)

[blog/2022/05/03/big-step-in-hip-implants/](https://blog/2022/05/03/big-step-in-hip-implants/)

[bonezonepub.com/2022/05/09/researchers-develop-new-antibacterial-coating-combining-ha-and-gallium/](https://bonezonepub.com/2022/05/09/researchers-develop-new-antibacterial-coating-combining-ha-and-gallium/)

[medicaldesignbriefs.com/component/content/article/mdb/features/rand/40250](https://medicaldesignbriefs.com/component/content/article/mdb/features/rand/40250)

**Location:** Health Sciences Building and Flinders Medical Centre

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# Research Supervisors and their projects

## Medical Biosciences

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**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](http://flinders.edu.au/people/krasimir.vasilev)**

**Location:** Health Sciences Building



**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](http://flinders.edu.au/people/jean.winter)**

**Location:** Flinders Centre for Innovation in Cancer

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# Research Supervisors and their projects

## Medical Biosciences

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**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
- 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

**flinders.edu.au/people/amy.wyatt**

**youtu.be/unqkQ6sGTkk**

**Location:** Health and Medical Research Building



**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](http://flinders.edu.au/people/vladimir.zagorodnyuk)**

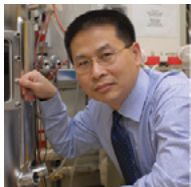
**Location:** Flinders Medical Centre

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# Research Supervisors and their projects

## Medical Biosciences

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**Supervisor name:**

**Professor Wei Zhang**

**Supervisor email:**

**wei.zhang@finders.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.

### **Outline of projects:**

- 1) Food and nutraceutical developments from marine bioresources.
- 2) Marine microbial natural products development for industry application.
- 3) Novel 3D-bioprinting marine-derived biomaterials and bioinks.
- 4) Development of Australian seaweed-based functional foods and biodegradable bioplastics.
- 5) Functional food product development from marine and terrestrial bioresources.

### **Skills students will gain:**

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.

**[finders.edu.au/people/wei.zhang](http://finders.edu.au/people/wei.zhang)**

**[finders.edu.au/centre-marine-bioproducts-development](http://finders.edu.au/centre-marine-bioproducts-development)**

**[anzmbs.asn.au](http://anzmbs.asn.au)**

**[mbcrc.com](http://mbcrc.com)**

**[tcgcm.com.au](http://tcgcm.com.au)**

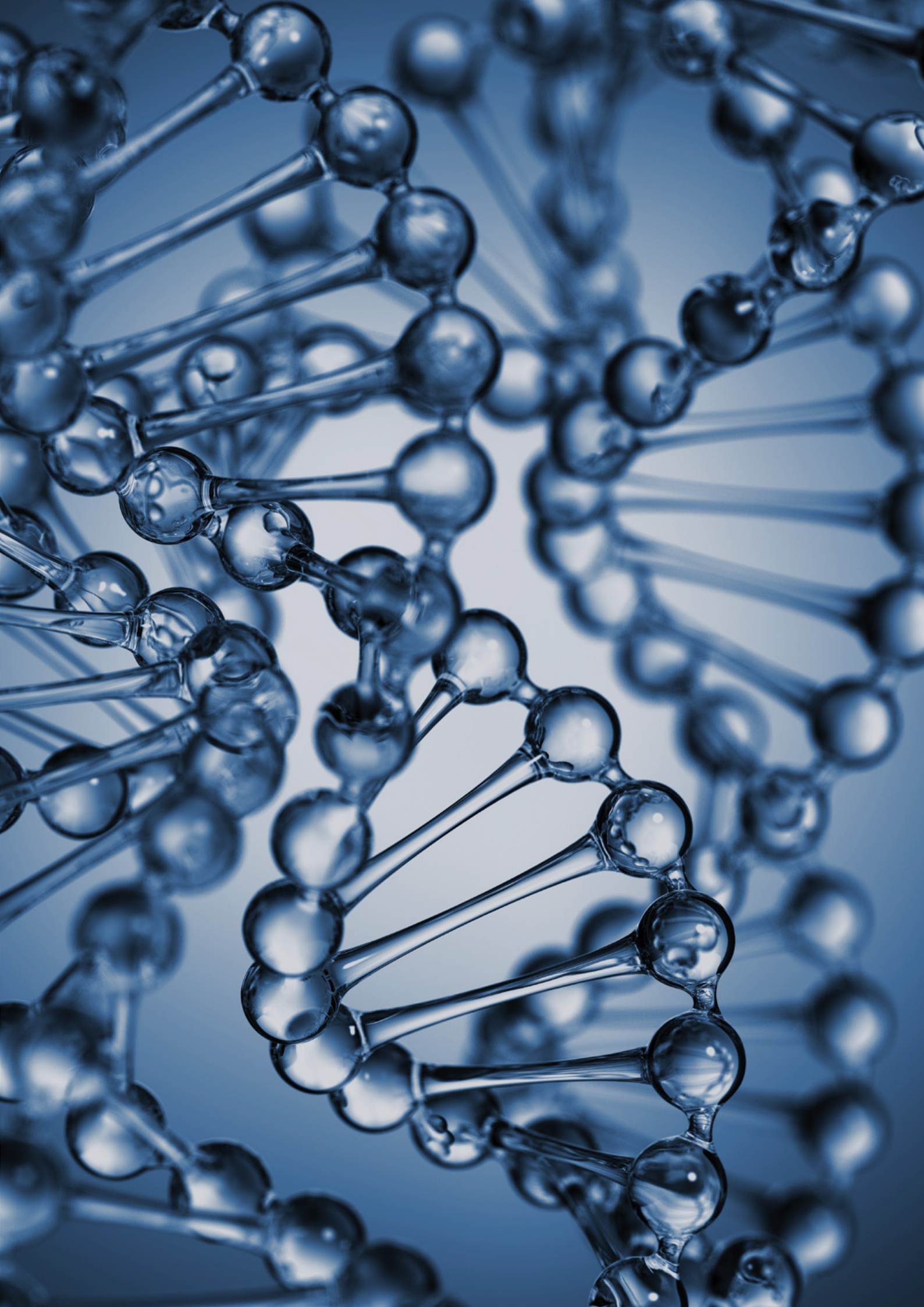
### **Scholarships:**

**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





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# Research Supervisors and their projects

## Clinical Sciences

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**Supervisor name:**

**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.

Other areas of interest, in an ICCU setting, include a new approach for assessing breathing effort and timing in patients with breathing problems in sleep and in mechanically ventilated patients, and assessing the impact of the noisy 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:**

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.

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:**

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

### **Collaborators associated with projects:**

Professor Peter Catcheside  
Associate Professor Dani-Louise Dixon  
Dr James McEvoy-May  
Professor Karen Reynolds  
Miss Julia Demura  
Dr Branko Zajamsek  
Dr Kristy Hansen  
Professor Bob Adams  
Associate Professor Nicole Lovato.

**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 motoneurone 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.
- New methods for assessing noise impacts on sleep and health outcomes.

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

**[flinders.edu.au/people/peter.catcheside](https://flinders.edu.au/people/peter.catcheside)**

**[flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health](https://flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health)**

**Location:** Mark Oliphant Building



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# Research Supervisors and their projects **Clinical Sciences**

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**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 Mark Hassall

Ms Bronwyn Ridge.

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**anzrag.com.au**

**Location:** Health and Medical Research Building



**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 established an on-going South Australia CardioVascular Biobank (SACVB)- a collaboration between SALHN, CALHN, Flinders University and SAHMRI. The SACVB biorepository comprises clinically validated tissue, blood, cells, urine and stool from patients with cardiovascular disease and PAD. These samples are accessible to researchers across various fields with an interest in atherosclerosis and vascular diseases.

**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

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# Research Supervisors and their projects

## Clinical Sciences

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**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:**

Professor Shailesh Bihari  
Dr James McEvoy-May.

**[flinders.edu.au/people/dani.dixon](https://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 Catchside  
 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](https://flinders.edu.au/people/danny.eckert)**

**[flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health](https://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](mailto: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

- Management of common obstetric problems (e.g. asthma, iron deficiency anaemia)

- Management of common lactation problems (e.g. lactation insufficiency, mastitis)
- Uptake of nutrition interventions in pregnancy
- Antibiotic dosing in pregnancy or neonates
- Medication safety interventions in neonatal care
- Medication utilisation in primary care (e.g. contraception)
- Interventions to reduce accidental exposure to teratogenic medications during pregnancy

**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:**

Professor Tim Green  
 Professor Maria Makrides  
 Professor Danielle Mazza  
 Professor Vivienne Moore  
 Professor Michael Davies  
 Associate Professor Alice Rumbold  
 Associate Professor Lynne Giles  
 Associate Professor Murthy Mittinty  
 Dr Kathryn Martinello  
 Dr Scott Morris  
 Dr Jessika Hu  
 Dr Mumtaz Begum.

**[flinders.edu.au/people/luke.grzeskowiak](https://flinders.edu.au/people/luke.grzeskowiak)**

**Location:** Flinders Medical Centre

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# Research Supervisors and their projects **Clinical Sciences**

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**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 human inspiratory muscles are arguably the hardest working skeletal muscles in the body. They contract rhythmically to ventilate the lungs ~30 000 times a day. In health, this is usually effortless. For a person with lung disease, every breath is a big effort, causing distress, inadequate ventilation, poor sleep and ultimately respiratory failure and hospitalisation.

My research investigates how activation of the respiratory muscles by the central nervous system is optimised in health and the changes that occur in healthy ageing, lung disease and injury. The 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 lung disease, 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
- Opportunity to present their research as published outputs and/or presentations
- Working in a great team of dedicated researchers

**Collaborators associated with projects:**

Professor Peter Catcheside  
Professor Danny Eckert  
Associate Professor Sutapa Mukherjee  
Dr Thomas Altree.

**[flinders.edu.au/people/anna.hudson](https://flinders.edu.au/people/anna.hudson)**

**[flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health/sleep-apnoea-and-respiratory-physiology](https://flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health/sleep-apnoea-and-respiratory-physiology)**

**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.

**flinders.edu.au/people/bogda.koczwara**

**Location:** Flinders Centre for Innovation in Cancer

**Supervisor name:**

**Associate Professor Nicole Lovato**

**Supervisor email:**

**nicole.lovato@flinders.edu.au**

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

**Description of research area and interests:**

Associate Professor 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. Associate Professor 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

Associate Professor Amy Reynolds

Dr Hannah Scott.

**flinders.edu.au/people/nicole.lovato**

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

**Location:** Mark Oliphant Building

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# Research Supervisors and their projects

## Clinical Sciences

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**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, Research Fellow and Clinical Coordinator 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:**

- Investigate targeted treatments for circadian rhythm disorders and insomnia
- Examine co-morbidities in sleep disorders
- Establish the psychological and physiological impacts of sleep disruption
- Investigate the underlying causes and mechanisms of circadian rhythm (body clock) misalignment
- Improve sleep and daytime functioning through optimised light and noise interventions

- 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:**

Associate Professor Nicole Lovato  
Associate Professor Amy Reynolds  
Professor Robert Adams  
Professor Peter Catcheside  
Professor Leon Lack  
Professor Danny Eckert  
Associate Professor Andrew Vakulin.

**flinders.edu.au/people/gorica.micic**

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

**Location:** Mark Oliphant Building



**Supervisor name:**

**Mr Brad Mitchell**

**Supervisor email:**

**brad.mitchell@flinders.edu.au**

**Name of research group: Paramedicine**

**Description of research area and interests:**

Paramedic education and the student experience, work integrated learning, paramedic culture, and workplace violence.

**flinders.edu.au/people/brad.mitchell**

**Location:** Sturt Campus

**Note:** Available as Honours supervisor only.



**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:**

**Mr James Pearce**

**Supervisor email:**

james.pearce@flinders.edu.au

**Name of research group: Paramedicine**

**Description of research area and**

**interests:** Prehospital clinical care, paramedicine education, scoping reviews, case reports, reporting guidelines and clinical practice guidelines.

**flinders.edu.au/people/james.pearce**

**Location:** Sturt Campus

**Note:** Available as Honours supervisor only.



**Supervisor name:**

**Dr Louise Roberts**

**Supervisor email:**

louise.roberts@flinders.edu.au

**Name of research group: Paramedicine**

**Description of research area and**

**interests:** Mental health care in education, clinical practice of emergency service first responders. Legal and ethical issues in mental health care and clinical practice guideline development including mental health legislation and powers under the Mental Health Act.

**flinders.edu.au/people/louise.roberts**

**Location:** Sturt Campus

**Note:** Available as Honours supervisor only.

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# Research Supervisors and their projects

## Clinical Sciences

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**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.

### Amyloid projects

- Monoclonal antibody trials to deplete Amyloid protein the AL and ATTR Amyloid
- T-Rex trial

### 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 Ranjit Shah  
Dr Rebecca Perry  
Dr Majo Joseph.

**[flinders.edu.au/people/joseph.selvanayagam](http://flinders.edu.au/people/joseph.selvanayagam)**

**Location:** Health and Medical Research Building



**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:**

Associate Professor 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](https://flinders.edu.au/people/andrew.vakulin)

[flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health](https://flinders.edu.au/health-medical-research-institute/clinical-translation/sleep-health)

[academic.oup.com/biomedgerontology/article/75/12/2450/5732393](https://academic.oup.com/biomedgerontology/article/75/12/2450/5732393)

**Location:** Mark Oliphant Building



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# Research Supervisors and their projects

## Clinical Sciences

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**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

**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](http://flinders.edu.au/people/david.watson)

**Location:** Flinders Medical Centre

**Supervisor name:**

**Professor Alan Wigg**

**Supervisor email:**

[alan.wigg@sa.gov.au](mailto: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](http://flinders.edu.au/people/alan.wigg)

**Location:** Flinders Medical Centre

# Research Supervisors and their projects

## Public Health



**Supervisor name:**

**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.

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:**

**Dr Ashlea Bartram**

**Supervisor email:**

**ashlea.bartram@flinders.edu.au**

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

**Collaborators associated with projects:**

Professor Jacqueline Bowden.

**flinders.edu.au/people/ashlea.bartram  
nceta.flinders.edu.au**

**Location:** Health Sciences Building

**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

Within NCETA's broader remit, I am particularly interested in research related to alcohol and other drug policy and the prevention of harms from alcohol and other drug use.

**Outline of projects:**

Current projects are related to:

1. Parental supply of alcohol to adolescents
2. Zero-alcohol beverages
3. Non-drinkers
4. Telehealth in alcohol and other drug treatment organisations.

**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.

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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**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:**

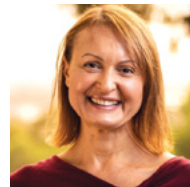
Skills in systematic reviews, Digital Health, qualitative interview and analysis skills, project planning, multidisciplinary work experience.

### **Collaborators associated with projects:**

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

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

**Location:** Health and Medical Research Building



**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](https://flinders.edu.au/people/billie.bonevski)

**Location:** Health Sciences Building

#### **Supervisor name:**

**Professor Jacqueline Bowden**

#### **Supervisor email:**

[jacqueline.bowden@flinders.edu.au](mailto: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](https://flinders.edu.au/people/jacqueline.bowden)

[nceta.flinders.edu.au](https://nceta.flinders.edu.au)

**Location:** Health Sciences building

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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**Dr Bryce Brickley**

**Supervisor email:**

**bryce.brickley@flinders.edu.au**

**Name of research group: Men's Health – Rural and Remote Health Northern Territory**

**Description of research area and interests:**

My research focuses on developing and evaluating innovative health promotion programs that empower men to foster and sustain healthy behaviours, leading to improved health and wellbeing. Situated in the context of the Northern Territory, my research aims to reduce health inequities by increasing access to programs, advancing health literacy and supporting priority populations.

**Outline of projects:**

Gender is known to play a critical role in determining physical activity and healthy eating behaviours that can prevent illness, including cardiovascular diseases (CVD). Yet, health behaviour change programs designed specifically for men with or at risk of CVD are scarce. There is also a significant need for heart health behaviour change programs tailored to support priority populations, such as men experiencing socio-economic disadvantage, men living in rural and remote areas, and Aboriginal and Torres Strait Islander males. The Australian Fans in Training (Aussie-FIT) engages men through their passion for Australian Football as a 'hook' to attract and retain men in the 12-week physical activity and healthy eating program. The program is currently being tested in the Darwin region (CIA – Professor James A. Smith) among men with or at risk of CVD, and this is anticipated to be completed by 2025.

A version of the Aussie-FIT program may be adapted and scaled up to remote Aboriginal and Torres Strait Islander communities in the Northern Territory.

**Skills students will gain:**

Exposure to program planning, implementation and evaluation; health behaviour change strategies and evidence, gender-sensitised health promotion programs, public health disease prevention research, rural and remote health research, community engagement, and cross-cultural research.

**Collaborators associated with projects:**

Professor James Smith  
Associate Professor Kootsy Canuto  
Associate Professor Karla Canuto  
Dr Oliver Black  
Dr Himanshu Gupta.

**flinders.edu.au/people/bryce.brickley**  
**aussiefit.org**

**Location:** Northern Territory – Darwin campus, or remote supervision



**Supervisor name:**

**Dr Norma B. Bulamu**

**Supervisor email:**

**norma.bulamu@flinders.edu.au**

**Name of research group: Health Economics**

**Description of research area and interests:**

My broad research area is in health economics, and specifically in cancer. This involves understanding the costs of different treatment and surveillance programs for patients with cancer, understanding the quality of life and more broadly patient reported outcomes associated with these programs as well as understanding patient preferences for these programs. My current research is around gastrointestinal cancers, oesophageal adenocarcinoma and colorectal cancer, and prostate cancer.

**Outline of projects:**

- Understanding the patient reported outcomes and utility associated with the different stages of cancer.
- Understanding the health care costs and out-of-pocket costs incurred by patients with different cancers.

**Skills students will gain:**

Undertaking systematic literature review and meta-analysis. Statistical analysis of cost and patient reported outcomes data.

**Collaborators associated with projects:**

Dr Molla Wassie  
Dr Jean Winter  
Associate Professor Erin Symonds  
Associate Professor Billingsley Kaambwa.

**flinders.edu.au/people/norma.bulamu**

**Location:** Flinders Centre for Innovation in Cancer



**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.

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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**Dr Laura Edney**

**Supervisor email:**

**[laura.edney@flinders.edu.au](mailto: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](http://flinders.edu.au/people/laura.edney)**

**Location:** Health Sciences building



**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 in 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](https://flinders.edu.au/people/kate.fairweather)**

**[youtube.com/watch?v=99RJ3Z-M6Y8](https://youtube.com/watch?v=99RJ3Z-M6Y8)**

**Location:** Health Sciences Building



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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**Associate Professor Kalinda Griffiths**

**Supervisor email:**

**kalinda.griffiths@flinders.edu.au**

**Name of research group: Poche SA+NT**

### **Description of research area and interests:**

This program will work to develop a national Indigenous genomics architecture – at the interface of genomic science, health research, health care delivery, data sciences, ethics, policy and Indigenous knowledge systems– that centres and empowers Aboriginal and Torres Strait Islander people to lead genomic research for the benefit of all Australians.

### **Outline of projects:**

Co-develop policies and processes by which individual and aggregated genomic and health data are represented and accessed for research and clinical use that reflect the priorities of Aboriginal and Torres Strait Islander communities. Some potential project options include:

1. What are the common descriptors, vocabulary and the associated ontologies, thesauruses and catalogues required in Indigenous genomics.
2. Identify ways to harmonise existing genomics programs and publicly available genomic data.
3. Develop and implement standard operating procedures and analytical workflows across Aboriginal and Torres Strait Islander genomics programs.

### **Skills students will gain:**

- Expanded problem solving capabilities improving creative & critical thinking.
- Intercultural context improving cultural competence.

- Real world experiences working on relevant projects and programs allowing theoretical learning to be applied.
- Working in interdisciplinary teams facilitating deeper learning.
- Expanded technical skills and capabilities advancing workforce capacity.

### **Collaborators associated with projects:**

Professor Alex Brown  
Associate Professor Azure Hermes  
Professor Gregory Pratt  
Dr Oliver Black  
Dr Hardip Patel.

**flinders.edu.au/people/kalinda.griffiths**

**Location:** Poche SA+NT, either Darwin or Health and Medical Research Building, Adelaide



**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](http://flinders.edu.au/people/billingsley.kaambwa)

**Location** Health Sciences Building

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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**Professor Jonathan Karnon**

**Supervisor email:**

**[jonathan.karnon@flinders.edu.au](mailto: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](http://flinders.edu.au/people/jonathan.karnon)**

**Location:** Health Sciences Building



**Supervisor name:**

**Associate Professor Murthy  
N. Mittinty**

**Supervisor email:**

**murthy.mittinty@flinders.edu.au**

**Name of research group: Discipline of  
Biostatistics**

**Description of research area and**

**interests:** Areas of interest in statistical methods development research: missing data, longitudinal data analysis, mediation analysis, causal inference, survival analysis, and data visualisation.

Application of statistical methods: cardio-vascular, gut and oral microbiome, oral epidemiology, infectious diseases, mental health, cancer, traumatic brain injury, injuries, birth defects, rare disease, and pain management.

**Outline of projects:**

- Project 1: Measures used in identifying health inequalities: Do they really measure inequality?
- Project 2: Story telling with data: Application of data visualisation techniques to study the patterns in traumatic brain injury.
- Project 3: Application of mathematical models to study traumatic brain injury among Parkinson patients.
- Project 4: Finding the super donor in gut and oral microbiome: An application of analytical hierarchy process.

**Skills students will gain:**

Students will gain an in depth understanding of

- How to frame a research question
- Analysing the data using a suitable method following the research question

- Identification of the effect measure of interest
- The conduct of the sensitivity analysis for unmeasured confounding
- Table two fallacy
- The concept of confounding
- The required statistical software
- Critical thinking and publication of research

**Collaborators associated with projects:**

For Honours and Master's thesis projects, PhD students within the group will be included as potential co-supervisors. For PhD projects, all ECRs and Post doctoral fellows within the group will be included as potential co-supervisors or primary supervisors.

**flinders.edu.au/people/murthy.mittinty**

**Location:** Health Sciences Building

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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**Dr Nicola Parkin**

**Supervisor email:**

**nicola.parkin@flinders.edu.au**

**Name of research group: Prideaux**

**Health Professions Education and Rural and Remote Health**

### **Description of research area and interests:**

My research is concerned with methods and models for developing our rural health workforce – especially, within community-based and community-engaged contexts for learning, teaching and researching.

I work with students and practitioners across diverse disciplines of health to:

- 1) discover and amplify the natural modes of learning and practicing that are already occurring in communities;
- 2) ask what 'quality' experiences might look like; and
- 3) consider what strategies rural communities and universities might do together that are mutually strengthening and invigorating.

One of the most powerful and natural means we have to become aware of and to share what matters is through telling stories of human experience with one another. We are also, as human beings, drawn to discover the deeper principles that order our lives and relations, and to imagine new ways of seeing and acting together. To work practically within this broad philosophical methodological framework, I combine visual mapping and dialogue-based methods.

### **Outline of projects:**

Ideally, projects will be based in, partner with and be co-supervised by rural community organisations. Ideas for

research projects that are focused on gathering, valuing and using community-context stories in health professions learning and practicing are very welcome, as are in-depth experiential accounts of learning and/or practicing in rural community contexts.

### **Skills students will gain:**

Researching in the community context. Qualitative research approaches.

### **Collaborators associated with projects:**

The research team will be appropriate to the project, and may include co-supervision by clinicians in the student's field.

**flinders.edu.au/people/nicola.parkin**

**Location:** Dr Parkin is located in Flinders Medical Centre, but projects can be undertaken at student's rural location. .



**Supervisor name:**

**Associate Professor  
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](http://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](http://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](http://flinders.edu.au/people/courtney.ryder)**

**Location:** Health Sciences Building

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# Research Supervisors and their projects

## Public Health

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**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



**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 HDR scholarships for specific projects.

**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](https://flinders.edu.au/people/james.smith)**

**[flinders.edu.au/flinders-nt/our-research](https://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

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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**Dr Brooke Spaeth**

**Supervisor email:**

**brooke.spaeth@flinders.edu.au**

**Name of research group: The**

**International Centre for Point-of-Care Testing (ICPOCT)**

### **Description of research area and**

**interests:** The International Centre for Point-of-Care Testing (ICPOCT) is an internationally recognised World Health Organisation (WHO) Collaborating Centre with point-of-care testing networks spanning the chronic disease, acute care and infectious disease fields. My research focusses on improving access to pathology services and improving health outcomes in rural and remote settings in Australia with a particular emphasis on Aboriginal and Torres Strait Islander health. I am an implementation scientist with a strong track record in research translation and am interested in designing and evaluating new and innovative models of care that improve health outcomes as well as the patient experience of health care and the operational and cost effectiveness of health care provision. Currently I am leading a long-term project aimed at improving the detection of sepsis in remote communities of the Northern Territory through the implementation of a new model of care incorporating point-of-care full blood examination testing.

### **Outline of projects:**

- A unique field-based evaluation of a point-of-care testing device in remote primary health care
- Health economics evaluation of models of care involving point-of-care testing in rural and remote primary health care settings

- Application of implementation science frameworks to evaluate a novel clinical trial
- Consultation with Aboriginal communities to evaluation the appropriateness of new models of care.

### **Skills students will gain:**

Students will work collaboratively with a multidisciplinary team and a range of health care stakeholders to gain a range of research skills that are foundational to any career in research. The specific skills could include:

- Research based project management skills
- Stakeholder and community engagement experience
- Aboriginal and Torres Strait Islander health research
- Quantitative and qualitative data collection and analysis
- Academic writing skills for publications
- Experience in the application of health economic evaluation methods
- Methods for conducting formal literature reviews, such as systematic and scoping reviews
- Evaluating new models of patient centred health care

Scholarships may be available for specific projects.

### **Collaborators associated with projects:**

Dr Emma de Courcy-Ireland  
Professor Jon Karnon  
Professor James Smith  
Associate Professor Jacqueline Stephens  
Associate Professor Shahid Ullah.

**[flinders.edu.au/people/brooke.spaeth](https://flinders.edu.au/people/brooke.spaeth)**

**[flinders.edu.au/international-centre-for-point-of-care-testing](https://flinders.edu.au/international-centre-for-point-of-care-testing)**

**Location:** Health and Medical Research Building, but happy to supervise any projects across SA or the NT.



**Supervisor name:**

**Associate Professor  
Jacqueline Stephens**

**Supervisor email:**

**[jacqueline.stephens@flinders.edu.au](mailto: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.

**Outline of projects:**

Ear Health

A range of opportunities exist to develop strategies to revise, improve, and develop strategies to support ear and hearing health screening, diagnosis, and management.

Kidney Health

Opportunities exist for HDR students to participate in research associated with the ARDAC Study: 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.

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:**

- Project management and leadership skills
- Development and conduct of research projects, including ethics, study design
- Working with stakeholder organisations
- Quantitative and/or Qualitative research methods

**Collaborators associated with projects:**

ARDAC Investigator & Advisory Groups

PATHWAYS Investigator & Advisory Groups

Members of the Flinders University Population Health.

**[flinders.edu.au/people/jacqueline.stephens](http://flinders.edu.au/people/jacqueline.stephens)**

**Location:** Health Sciences Building



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# Research Supervisors and their projects

## Public Health

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**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, AOD issues, and gambling harm, (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**

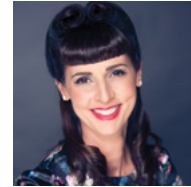
**menzies.edu.au/icms\_docs/320338\_Evaluation\_of\_a\_Peer-Led\_Education\_Pilot\_for\_people\_with\_psychosocial\_support\_needs\_in\_Darwin\_Northern\_Territory.pdf**

**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 Kirrilly Thompson**

**Supervisor email:**

**kirrilly.thompson@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

Within NCETA's broader remit, I am particularly interested in research related to alcohol and other drug policy and the prevention of harms from alcohol and other drug use.

### **Outline of projects:**

Qualitative projects about alcohol and other drugs (AOD), especially in relation to:

- Workforce development
- AOD prevention
- Workplace interventions
- Generational AOD use
- Harms of older people's drinking
- Irrelevant motivators for illicit drug use reduction
- AOD in sport (players or fans)



- Drug cultures and cultural aspects of AOD
- AOD and shift work (eg. Emergency services, FIFO etc)

#### **Skills students will gain:**

Students can gain a range of skills in qualitative research methodologies and analyses.

#### **Collaborators associated with projects:**

Professor Jacqueline Bowden.

[flinders.edu.au/people/kirrilly.thompson](https://flinders.edu.au/people/kirrilly.thompson)

[nceta.flinders.edu.au](https://nceta.flinders.edu.au)

**Location:** Health Sciences Building

#### **Supervisor name:**

**Dr Joshua Trigg**

#### **Supervisor email:**

[joshua.trigg@flinders.edu.au](mailto:joshua.trigg@flinders.edu.au)

#### **Name of research group: Public Health, Population Health**

#### **Description of research area and interests:**

I'm a Public Health Research Fellow who studies the factors that contribute to, modify, or result from individual and social health across different populations. My work often involves analysis of health-focused data that describes social conditions for health risks, risk reduction, and health promotion, to better support preventive health initiatives.

I am very interested in better understanding how people think and behave in relation to health risks arising from nicotine vaping, the use of tobacco, and use of other substances. My background is in Behavioural Science and risk decision making. This includes risk attitudes and behaviours regarding modifiable 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 research methods span the use of population health datasets, community and field interviewing, mixed-methods techniques, and structured evaluations. So, both quantitative and qualitative techniques of various sorts.

If you have a research idea (or one of my projects) that you want to discuss further, email or call me, I'm happy to discuss what interests you.

Find me on Twitter @JoshLTrigg

#### **Outline of projects:**

Current project areas focus on vaping risk messaging, tobacco cessation support for people with substance use problems, public engagement with tobacco and vaping policy, including by priority populations, and industry manipulation/influence on scientific discourse. 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. I manage a large project on youth vaping and the psychology of risk messaging, and have opportunities both in this space and relating to tolerance or resistance to risk communication. I also have disaster and emergency management research expertise, and am happy to discuss project ideas in this field.

#### **Skills students will gain:**

Topical public health work, working with stakeholder organisations, quantitative and qualitative data analysis, surveying, interviewing, focus groups, policy analysis, academic writing, and presentation.

#### **Collaborators associated with projects:**

Professor Billie Bonevski

Centre of Research Excellence on Achieving the Tobacco Endgame

National Centre for Education and Training on Addiction

Cancer Council South Australia

The Australian Prevention Partnership Centre

Public Health and Population Health collaborators.

[flinders.edu.au/people/joshua.trigg](https://flinders.edu.au/people/joshua.trigg)

[researchgate.net/profile/Joshua-Trigg](https://researchgate.net/profile/Joshua-Trigg)

**Location:** Health Sciences Building

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# Research Supervisors and their projects

## Public Health

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**Supervisor name:**

**Associate Professor  
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



**Supervisor name:**

**Associate Professor  
Annabelle Wilson**

**Supervisor email:**

**annabelle.wilson@flinders.edu.au**

**Name of research group:** Population  
Health

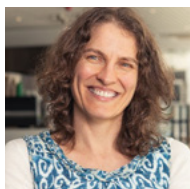
**Description of research area and  
interests:**

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.

**[flinders.edu.au/people/annabelle.wilson](https://flinders.edu.au/people/annabelle.wilson)**

**Location:** Health Sciences Building

**Supervisor name:**

**Professor Anna Ziersch**

**Supervisor email:**

**[anna.ziersch@flinders.edu.au](mailto: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.

**[flinders.edu.au/people/anna.ziersch](https://flinders.edu.au/people/anna.ziersch)**

**Location:** Health Sciences Building

# Notes







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For more information,  
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