

PhD and Masters Opportunities

*Our mission is to
create knowledge that
transforms lives...*

griffith.edu.au/gridd



Griffith
UNIVERSITY

TABLE OF CONTENTS

GRIDD Institute snapshot.....	4
Message from the Director.....	5
Message from HDR Convenors.....	5
About GRIDD.....	7
Advantages of a GRIDD Honours Program.....	8
Student experiences.....	10
PhD students and outcomes	11
Research groups and current projects.....	13

Griffith
Institute
for Drug
Discovery

Herston Bank
Herston Bank
Comprehensive
Clinical Research
Centre
N75

GRIDD Institute Snapshot



140+
Institute members



Major research themes

- Cancer
- Infectious diseases
- Neurological disorders
- Spinal cord injury repair



Unique Resources

- Compounds Australia/ACRF Centre for Compound Management and Logistics
- NatureBank
- Discover Biology High Throughput Screening
- Mass Spectrometry Screening Platform
- NeuroBank



Research Centres

- Clem Jones Centre for Neurobiology and Stem Cell Research
- Centre for Cell Factories and Biopolymers
- Centre for Cancer Cell Biology



>30
industry connections and partnerships



320+
publications in past 3 years
1800+
citations in past 3 years



>\$7.5 million
income in 2019

~\$30 million
in funding in past 5 years



65
PhD and Masters completions in past 5 years

~45
PhD and Masters current cohort



Message from our Director

Carrying out a research project at the Griffith Institute for Drug Discovery (GRIDD) gives you the chance to make a difference by studying important diseases and looking for ways to improve people's lives with new therapies or knowledge.

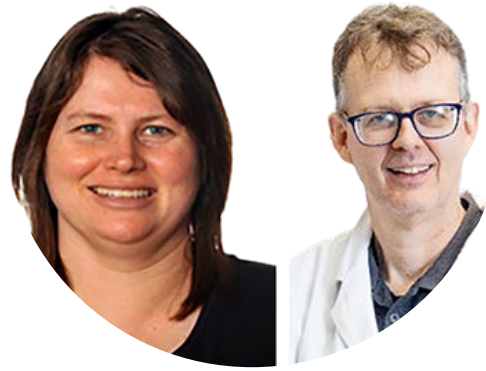
At GRIDD you will work with world-class experts, have access to superb facilities and be at the cutting edge of early phase cross-disciplinary drug discovery.

As a GRIDD research student, we will provide you with a very supportive and enriching environment. In addition to excellent research opportunities, all GRIDD students are supported to develop strong professional and personal attributes, including communication and leadership skills.

I encourage you to examine the exciting research opportunities currently available at GRIDD and to talk to students (past and present) and potential supervisors to discuss what will work best for you.

We look forward to welcoming you soon on your research journey with us.

Professor Katherine Andrews
Director, Griffith Institute for Drug Discovery



Message from our HDR Convenors

Higher Degree Research (HDR) convenors are here to support you during your PhD journey

At the Griffith Institute for Drug Discovery (GRIDD) your HDR studies will be supported by a network of individuals located within the institute and the broader university community. As HDR Convenors, we will be there to guide you through your candidature and to support you and your supervisory team. This includes ensuring that you have the resources needed to complete your studies, assisting you with thesis submission, helping you with candidature variations and guiding you in the completion of your milestones.

HDR candidates are required to complete three candidature milestones, an early candidature review, a confirmation and a thesis and candidature review, and we will be there to support you through each of these. We have an open-door policy and look forward to talking with our HDR candidates about their research progress, milestones, career plans or any other concerns that they may have. We also encourage prospective candidates to contact us if they have any concerns or questions regarding completing a PhD at Griffith University.

We look forward to discussing potential HDR research projects and options with you and supporting you in your PhD journey at the Griffith Institute for Drug Discovery.

Associate Professors Todd Houston
Associate Professor Deanne Skelly
HDR Convenors, Griffith Institute for Drug Discovery



Researcher Profile – Professor Emeritus Alan Mackay-Sim

GRIDD's Professor Emeritus Mackay-Sim was made Australian of the Year in 2017 for his world leading work in spinal cord injury research using nasal olfactory cells. He led a team from Brisbane in a world-first clinical trial in which the patient's own olfactory cells were transplanted into their injured spinal cord in the first stages of a therapy to treat human paraplegia.

About GRIDD

GRIDD researchers focus on:

- Seeking new therapeutic approaches for breast, prostate and pancreatic cancer
- Discovering novel drugs for Parkinson's disease and tuberculosis
- Finding treatments for malaria, and other major parasitic diseases
- Repairing spinal cord injuries
- Overcoming drug resistance

Here are just a few examples of our work

Finding cures for cancer

Cancer is a leading cause of death in Australia, and few families remain unaffected. GRIDD has several teams leading innovative projects to find new treatments. Professor Vicky Avery's team is exploring breast, prostate and pancreatic cancer. Using 3D culturing techniques and high content imaging systems, they are investigating how cancer cells interact, grow and progress in order to find new prevention strategies. Associate Professor Rohan Davis' team is investigating prostate cancer, collaborating with Australia's Translational Research Institute (TRI) since 2012. This team recently identified natural product compounds with a unique mechanism, a key progress indicator. A team led by Professor Sally-Ann Poulsen has identified a mechanism to combat drug-resistant brain cancer.

Clinical resources lend strength to battle neurological diseases

Professor George Mellick is exploring the puzzle of Parkinson's disease—focusing on what causes it and strategies for treatment. His team's research is supported by access to the Queensland Parkinson's Project (including samples and information from more than 5,000 people). Dr Alex Cristino's research focuses on the development of systems-based methods that integrate high-throughput cellular and molecular data to identify disease-associated gene networks and pathways that can serve as biomarkers for drug screening and personalised treatment.

Fighting infectious diseases

Infectious diseases cause significant morbidity and mortality globally. Professor Kathy Andrews' team is focused on the discovery and development of new drug leads to prevent and treat malaria, a disease that kills

more than 60,000 every day. Professor Vicky Avery has developed innovative high throughput, high content imaging assays for neglected diseases, including malaria, trypanosomiasis and leishmaniasis. Associate Professor Tina Skinner-Adams' research focuses on new drugs for malaria and giardiasis. Former Foundation Director Professor Ronald Quinn, is seeking a cure for tuberculosis, among the top 10 causes of death globally.

Continuing the work of Professor Emeritus Alan Mackay-Sim

Up to 500,000 people globally have spinal cord injuries (World Health Organisation). Researchers at GRIDD's Clem Jones Centre for Neurobiology and Stem Cell Research are investigating cell transplantation approaches to restore motor function and sensation to those with injured spinal cords. Led by Associate Professor James St John, this work is founded on the ground-breaking research of 2017 Australian of the Year, Professor Emeritus Alan Mackay-Sim, whose clinical trial showed transplantation of nasal cells into the spinal cord was possible and safe.

Cell factories and biopolymers

Professor Bernd Rehm leads the Centre for Cell Factories and Biopolymers within GRIDD. The Centre's mission is to research and develop innovative materials and technologies that can provide solutions for global health and environmental challenges. Professor Rehm's research focuses on the design and biotechnological production of bio-based materials for use as drug delivery systems, vaccines and diagnostics for conditions including HCV, TB, and cancer. The research of Dr Frank Sainsbury, also part of the Centre, focuses on biomolecular engineering, protein self-assembly, plant biotechnology and nanotechnology.

Advantages of a GRIDD PhD

Achieve your career goals and reach your potential with a PhD at the Griffith Institute for Drug Discovery.

Benefits of postgraduate (Honours) study

Postgraduate study at Griffith provides a wide range of benefits for the duration of your study, upon graduation, and well into the future. Whether you're interested in broadening your skills, becoming a specialist or changing careers, we offer an extensive range of postgraduate study options. You might be more qualified to study a postgraduate degree than you think; we recognise the knowledge gained through work experience, as well as prior study. And with full-time, part-time, online and accelerated study options, you can tailor your study to fit in with your lifestyle.

Advance your career

Be prepared for new job opportunities and take the next step in your career. Gain the broad knowledge needed to step into management roles or hone your skills to take on work as a specialist. Depending on your field, a postgraduate qualification may be needed for professional accreditation or registration, opening the door to more opportunities.

Change careers

Further study can be the catalyst for you to move into a new career.

Increase your earning capacity

A postgraduate degree is an investment in your future earning potential. According to the Australian Government Department of Education and Training 2018 Graduate Outcomes Survey, people with a postgraduate qualification earn an average of \$22,000 a year more

than those with a bachelor degree. Plus, 2017 CEO Tracker reports that more than half of Australia's highest-earning and highest profile CEOs have completed postgraduate studies.

Build your network

Studying at postgraduate level is a great way to make valuable contacts that can lead to job opportunities and lifelong friendships.

Develop skills for life

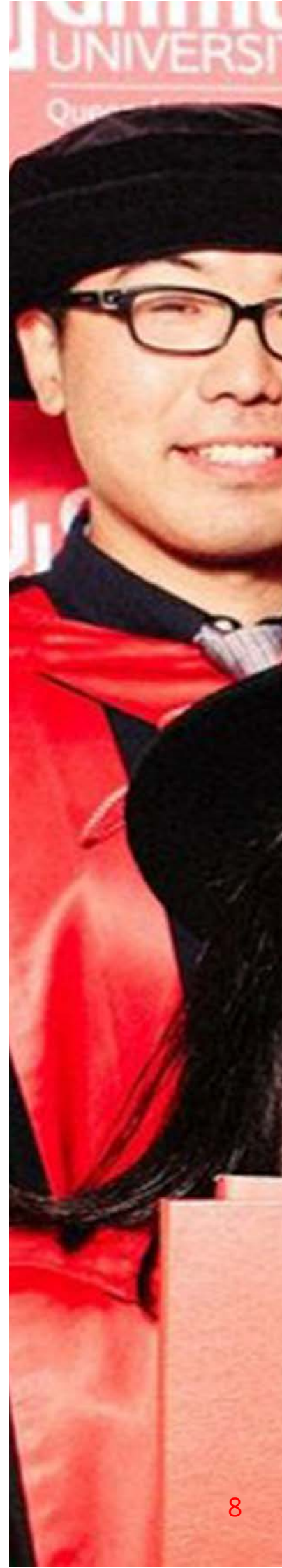
As well as financial and career benefits, postgraduate study is a stimulating experience and can introduce new concepts and ways of thinking that you can apply in all aspects of your life.

Make your experience count

If you don't have formal qualifications, you may be eligible for entry to a Griffith postgraduate degree based on your personal, work and life skills. You can also apply for credit for prior learning, which can reduce the time it will take to complete your degree. Credit can be awarded for formal study, non-formal learning such as workplace training, and informal learning such as work, social, family, hobby and leisure activities.

Continuing professional development

Postgraduate study refreshes your qualifications by providing the latest skills and knowledge and can count toward your Continuing Professional Development (CPD) points.





Student experiences

Ben (right) is working with Professor Bernd Rehm at the Centre for Cell Factories and Biopolymers on a PhD focusing on an innovative biomaterials platform technology that can provide break-through solutions for drug screening and vaccines. Ben says:

"I chose to pursue a PhD here at the Institute because I was extremely fascinated by the research that GRIDD undertakes. The research that goes on here is not only extremely cutting edge but also very diverse. My experience here has left me feeling valued and welcomed as everyone here is so friendly and supportive, you really feel like part of a community. The institute is a great place to develop my skills and career and I look forward to spending more time here in the future."

Ben Evert - PhD student



Eva (left) works with Professor Kathy Andrews, a recognised expert in infectious diseases. Eva's project focuses on the function of histone deacetylase proteins in malaria and could one day lead to discovering novel malaria drugs. Eva says:

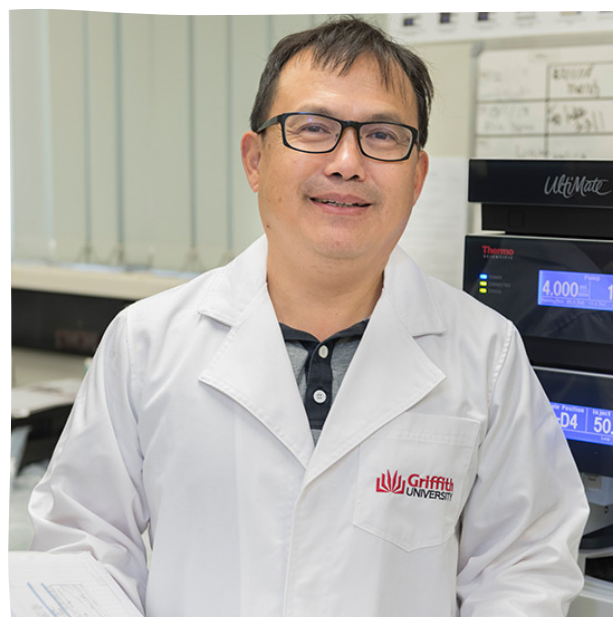
"I first came to GRIDD on a 3 month internship as part of my Master's program in Germany and then returned for my PhD the following year. The main factor that drew me back was the opportunity to work with Kathy. It's not just her ability to lead us in our scientific work, she is really caring and calls herself "our mum in the Southern hemisphere". My project combines both biology, which I am doing at GRIDD, and chemistry, which I will be doing back in Germany in the group where I was working before. This exciting international collaboration is supported by an Australia-Germany Joint Research Cooperation Scheme travel award that was awarded to myself, Kathy and my Associate Supervisor in Germany."

Eva Hespings - PhD student

William (right) is part of Associate Professor Yun Feng's group, specialising in Traditional Chinese Medicine. His project investigates the underlying mechanisms of Parkinson's disease using traditional Chinese herbal medicines as molecular probes. This will help better understand the biology of this most challenging disease and could lead to new drugs and diagnostics. William says:

"For over 15 years, I worked as a bench chemist in a number of pharmaceutical companies in Sydney and Brisbane. Over time, the work became quite routine and in 2016 I decided to take on a new challenge - a PhD program at GRIDD. Leaving a secure career was a big step but I am happy to be in this much more engaging environment. I am hoping to take my PhD experience into a teaching career or a more entrepreneurial career in pharmaceuticals industry. The best thing about GRIDD is its very collaborative culture: students can work on both chemistry and biology aspects opening ways to multidisciplinary research for early drug discovery."

William Mao - PhD student



PhD graduates and outcomes

Dr Michael Todorovic

Michael's doctoral candidacy was in the field of Clinical Neuroscience, focusing on molecular cell biology and genetic risk traits in neurological diseases. "Throughout my PhD in Clinical Neuroscience, GRIDD offered me a collaborative and supportive environment to communicate science. This has led me to communicate science via the classroom, on YouTube, Podcasts, and a regular spot on ABC Radio!"

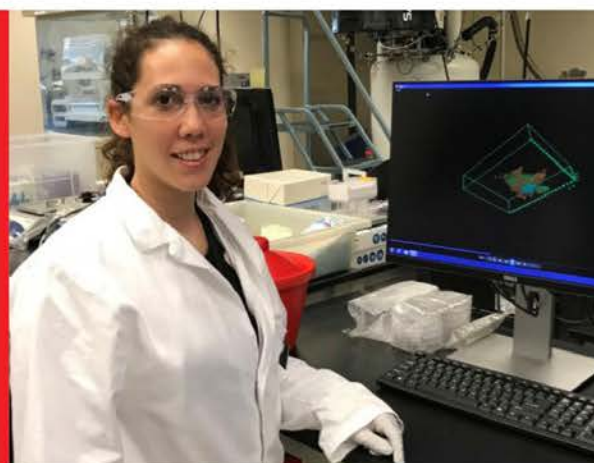


Dr Deborah Sneddon

2016 PhD graduate Dr Deb Sneddon is now a postdoc at the University of Oxford "Studying at GRIDD, I was able to tailor my project to my interest areas, and was helped to form collaborations that gave me the skills to work here at the PET Radiopharmacy Centre in Oxford"

Dr Liliana Pedro

2017 PhD graduate Dr Liliana Pedro, now holds a postdoctoral position at Novartis Institutes for BioMedical Research (Novartis Pharmaceuticals). "The experience I gained with mass spectrometry during my PhD has definitely been an asset. Having been surrounded by biologists also paid off!"



Dr Prashant Mugumdar

2017 PhD graduate Dr Prashant Mujumdar is now working at the Monash University Institute of Pharmaceutical Sciences. "My visiting student experience and then PhD at GRIDD provided me with a biomedically oriented publication portfolio (13 publications: 9 first author). This helped me tremendously to land my first postdoc position."



“

What I cherished most from my PhD is the independence and freedom I had with my research, and the mentorship I received from my supervisor

Dr Susitha Premarathne, GRIDD PhD Graduate

”

Research Groups and Current Projects

Andrews Group

Group Leader

Professor Katherine Andrews

Research Field

Malaria drug discovery and target identification



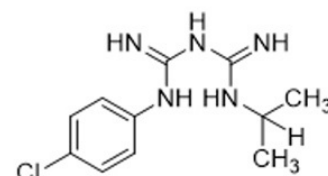
Research Synopsis

The aim of our research is to contribute to improving and saving the lives of people suffering from malaria. Malaria is a parasitic disease that causes ~200 million clinical cases and >400,000 deaths each year. There is currently no broadly effective malaria vaccine and while antimalarial drugs are a frontline defence, they are continually under threat because malaria parasites can develop resistance. This means that there is an urgent and unmet need for new drugs to prevent and treat malaria. Our research is focused on the discovery and pre-clinical development of new drug leads for the prevention and treatment of malaria, especially those with unique ways of killing the parasite compared to current drugs. This can help overcome parasite drug resistance. We do this by carrying out research that utilizes state-of-the-art techniques and cross-disciplinary approaches and by working together with excellent national and international collaborators.

Currently Available Projects

Investigation of cyclization-blocked proguanil analogues for malaria

We have made the exciting discovery that the clinically used antimalarial drug proguanil has much more potent activity than previously thought. Proguanil has been used for decades in combination with the cytochrome bc1 inhibitor atovaquone (as Malarone®). The activity of proguanil has up until now been thought to be due to its in vivo cyclization metabolite cycloguanil, a DHFR inhibitor, and by potentiating atovaquone activity. In this project, cyclization blocked analogues of proguanil will be investigated as potential new combination partners for atovaquone. Approaches will include in vitro growth inhibition assays, combination studies, time of kill assay and in vivo efficacy testing in murine models of malaria.



Proguanil chemical structure

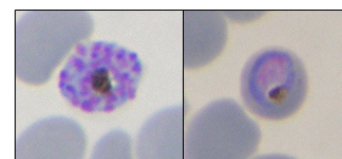
Primary supervisor: Professor Katherine Andrews

Other supervisor: A/Prof Tina Skinner-Adams, Dr Gillian Fisher

To apply: Contact Prof Katherine Andrews with your CV at k.andrews@griffith.edu.au

Investigation of HDAC inhibitors as antimalarial drug leads

Histone deacetylase (HDAC) enzymes play key roles in regulating important cellular processes and are potential new drug targets for malaria. We have developed unique assays for HDAC inhibitor drug discovery, including an in silico quantitative structure activity relationship (QSAR) model and hyperacetylation ELISA. This project will focus on in vitro and in vivo testing of new HDAC inhibitors and in vitro mode of action studies including evolution of resistant parasites combined with whole genome sequencing to assess target/resistance mechanisms. CRISPR/Cas9 and other reverse genetics approaches will be used for target validation.



Malaria parasites (purple) inside human red blood cells

Primary supervisor: Professor Katherine Andrews

Other supervisor: A/Prof Tina Skinner-Adams, Dr Gillian Fisher

To apply: Contact Prof Katherine Andrews with your CV at k.andrews@griffith.edu.au

Avery Group

Group Leader

Professor Vicky Avery

Research Field

DRUG DISCOVERY: Cancer & Parasitology



Research Synopsis

Professor Vicky Avery and her team have made significant contributions to Drug Discovery, both in industry and academia, resulting in new clinical candidates and innovative image-based techniques. She is a world-recognised expert in high throughput screening and high content imaging (HCI), with a global network of collaborators and has published extensively. The challenges in drug discovery are considerable. Whilst active compounds are readily found in vitro, success in translating this to the clinic is limited. Thus, more complex predictive in vitro models, relevant to the disease, are required. Her team's primary objective is the design of physiologically relevant assays to identify and characterise molecules for the treatment of disease, and ultimately to understand the mechanisms involved. Eg 3D culture models representing the complexity and heterogeneity of the tumour micro-environment. Her team pioneered HCI for neglected disease drug discovery, providing unique platforms to screen multiple lifecycle stages for multiple parasitic diseases, simultaneously.

Currently Available Projects

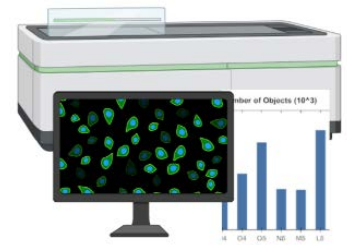
Understanding the role of the tumour microenvironment in pancreatic cancer drug resistance

Pancreatic cancer (PanCa) patients face ~5-year survival of <5%. Resistance to current chemotherapy is a major problem. The tumour microenvironment during disease progression plays a key role in mediating drug resistance. This project aims to model the bio-physical and cellular microenvironment of PanCa to understand how they impact on drug resistance. 2D and 3D PanCa spheroid-co-cultures will be established to assess drugs under normoxic and hypoxic conditions.

Primary supervisor: Professor Vicky M Avery

Co-supervisor: Dr Elke Kaemmerer

To apply: Contact VICKY AVERY with your CV at v.avery@griffith.edu.au



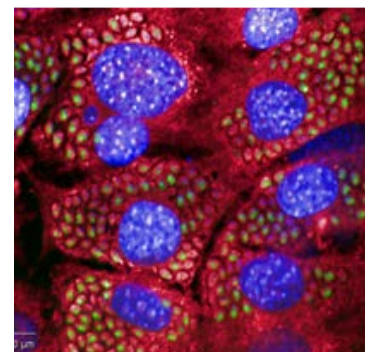
Gut inflammation and parasite persistence in Chagas disease

This project aims to understand the impact of inflammation on parasite persistence, using in vitro models of *T. cruzi* gut infection. Inflammation will be mimicked using exogenous inflammatory mediators eg TNF α , IFN- γ . Fluorescence image-based techniques to assess parasite replication. Inhibitors that modulate the effects of inflammation on *T. cruzi* infection and replication will be assessed as future treatments for chronic infection.

Primary supervisor: Professor Vicky M Avery

Co-supervisor: Dr Melissa Sykes

To apply: Contact VICKY AVERY with your CV at v.avery@griffith.edu.au



Cristino Group

Group Leader

Dr Alex Cristino

Research Field

Neurological disorders, Blood cancer, Gene regulation, Bioinformatics, Functional Genomics

Research Synopsis

Dr Alex Cristino is focused on developing a multi-disciplinary research approach which integrates computational and experimental methods to map gene networks and molecular mechanisms associated with neurological and immune-related diseases. The over-arching goal is to identify disease-associated genes and cellular pathways that can be used as biomarkers for discovery of new drugs and therapeutic strategies. Alex completed his PhD at the University of Sao Paulo and moved to the Queensland Brain Institute to develop systems-based analyses to unravel gene networks in neurological disorders. In 2015-2019, he was the group leader of the Functional Genomics and Systems Biology Laboratory at the UQ Diamantina Institute.

Currently Available Projects

Identifying gene networks associated with neurological disorders: the key to better diagnostics and treatments

Neurological disorders such as schizophrenia and dementia are caused by a 'perfect storm' of unique combinations of genetic and environmental factors. Such complex combination of events leads to disruptions in gene networks and biological pathways that alter cell functions and consequently influence disease risk. New approaches in genomic technologies, computational models and experimental systems could potentially lead to personalised treatment based on an individual's genetic composition. This project aims to map molecular networks and cell functions affected in patient-derived stem cells to help discover new therapeutic strategies tailored based on patient's molecular and cellular signatures.

Primary supervisor: Dr Alex Cristino

Other supervisor: Emeritus Professor Alan Mackay-Sim

To apply: Contact Dr Alex Cristino with your CV at a.cristino@griffith.edu.au



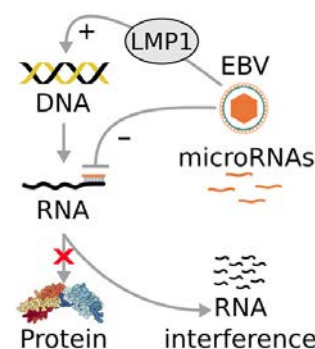
Developing RNA-based treatment to enhance immune response against cancers

This project aims to investigate the epigenetic regulation via microRNA gene silencing adopted by Epstein-Barr virus (EBV) to "hack" the genetic program of human B-lymphocytes (B-cells). We use a novel EBV/B-cell model system to characterize the functional role of viral microRNAs in the micro-management of cellular pathways associated with persistent B-cell infection. We propose a systems-based approach to model EBV infection in human B-cells in vitro. Our integrated platform will contribute to better understanding of fundamental molecular and cellular processes underpinning viral infection, immune escape and proliferation. The overarching goal is to produce a system-based platform to understand the mechanisms of epigenetic regulation by microRNA gene silencing associated with virus-host interactions and human cell infection.

Primary supervisor: Dr Alex Cristino

Other supervisor: Professor Maher Gandhi (Mater Research)

To apply: Contact Dr Alex Cristino with your CV at a.cristino@griffith.edu.au



Davis Group

Group Leader

Associate Professor Rohan Davis



Research Field

Natural Products, Medicinal Chemistry, Drug Discovery, Biodiscovery

Research Synopsis

A/Prof. Rohan Davis is Head of the Natural Product Chemistry and Biodiscovery group at the Griffith Institute for Drug Discovery, and is the Academic Lead of GRIDD's unique biodiscovery platform, NatureBank. He is an internationally recognised natural product chemist and was made a Fellow of the Royal Australian Chemical Institute in 2018. His research involves: (i) the isolation and structure elucidation of new bioactive natural products from Australian biota; (ii) the design and synthesis of drug discovery and chemical probe libraries based on natural product scaffolds; and (iii) biodiscovery involving high-throughput screening against cells and molecular targets. Rohan has authored 152 publications, and holds two patents. He has led both industry and academic research projects that have resulted in the isolation and structure determination of >1000 natural products along with the semi-synthesis and medicinal chemistry of >200 natural product derivatives.

Currently Available Projects

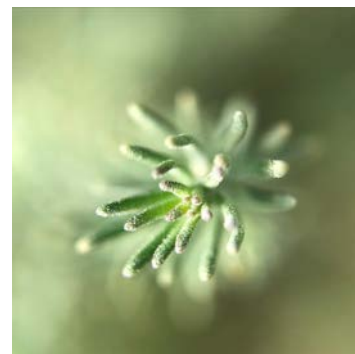
Hunting for new bioactive natural products from Australian rainforest and desert plants

Humans have utilised plants since the dawn of time for therapeutic purposes. Many important and well-known drugs (e.g. taxol, morphine) come from plants. Endemic Australian rainforest and desert plants have yielded many new and bioactive natural products, but remain under-investigated. This project will result in the purification and characterization of new bioactive compounds, and that will impact biodiscovery.

Primary supervisor: A/Prof. Rohan Davis

Other supervisor(s): Prof. Ian Tietjen (Wistar Institute), Prof. Robin Gasser (Melbourne Uni), Prof. Colleen Nelson (Queensland University of Technology), A/Prof. James St. John

To apply: Contact A/Prof Rohan Davis with your CV at r.davis@griffith.edu.au



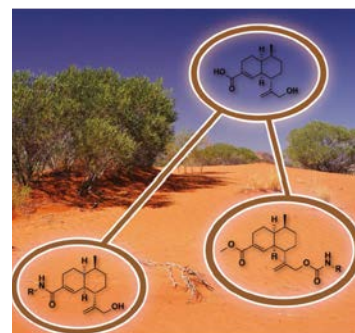
The use of natural product scaffolds in the generation of novel chemical libraries for drug discovery and chemical biology research

Natural products display chemical complexity and diversity and they inherently interact with biomolecules (e.g. proteins, DNA), making them an ideal source of unique scaffolds for screening library synthesis. This medicinal chemistry project will generate unique biodiscovery libraries that will be fully characterised using spectroscopic methods before being screened in anti-infective, anti-cancer, or ion channel functional assays.

Primary supervisor: A/Prof. Rohan Davis

Other supervisor(s): Prof. Ian Tietjen (Wistar Institute), Prof. Robin Gasser (Melbourne Uni), Prof. Colleen Nelson (Queensland University of Technology), Dr. Linlin Ma

To apply: Contact A/Prof Rohan Davis with your CV at r.davis@griffith.edu.au



Discovery of new anti-infective drugs from the sea

Nature provides unlimited inspiration for innovation in the pharmaceutical and agrochemical sector. The Nobel Prize-winning discovery of the anti-parasitic drugs avermectin and artemisinin has renewed interest in exploring natural products for new anti-infective drugs. This project will result in the identification, semi-synthesis and full characterisation of new molecules that display anti-viral, anti-microbial or anti-parasitic activity.

Primary supervisor: A/Prof. Rohan Davis

Other supervisor: Prof. Ian Tietjen (Wistar Institute), Prof. Robin Gasser (Melbourne Uni), Prof. Tony Carroll

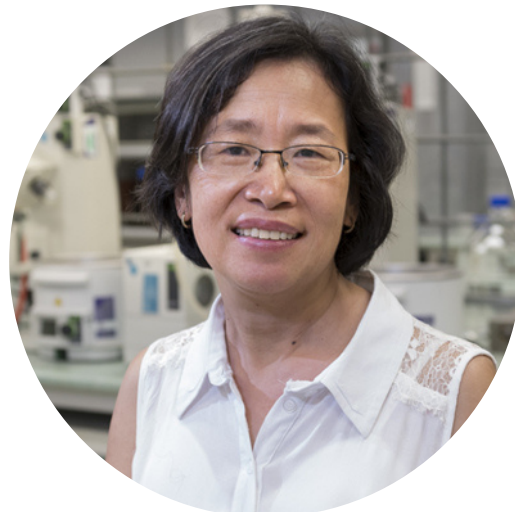
To apply: Contact A/Prof Rohan Davis with your CV at r.davis@griffith.edu.au



Feng Group

Group Leader

Associate Professor Yun Feng



Research Field

Natural product chemistry, Traditional Chinese medicine

Research Synopsis

A/Prof Yun Feng is a natural products chemist and is recognized for her expertise in modernizing traditional Chinese medicine (TCM). Her research expertise is to combine the massive chemical diversity and biological relevance of TCM with the power of high throughput/high content screening to expedite the search for biologically active compounds. Yun has more than 80 publications, 61 C1 journal articles, and the leading/senior author for two top ranking publications on Natural Product Reports (impact factor of 10.99). She is the principal investigator for over 15 industry drug discovery projects, and the deputy director of GRIDD-SIMM (Shanghai Institute of Materia Medica) joint laboratory in TCM research. She currently leads a research group investigating TCM with neuroprotective function, skin pigmentation and antimicrobial activities. Her research has to date provided a proof-of-concept to translate TCM to modern western medicines.

Currently Available Projects

Antimicrobial probiotics and mechanism study

Probiotics are living non-pathogenic microorganisms that confer a health benefit and improve physiological conditions in the host when administered in adequate amounts. The inclusion of probiotic in animal feeds have proven to be beneficial to animal health. The project is a collaborative research program between Griffith University and Bioproton, aiming at investigating the mechanism of action of probiotics that have antimicrobial activity. The outcome of the project will lead to scientific discovery on the antimicrobial behaviours of probiotics. The active *Bacillus* strains can be used as effective antimicrobial agent in animal feed materials.

Primary supervisor: Associate Professor Yun Feng

Other supervisor: Dr Wendy Chen (Bioproton Pty Ltd)

To apply: Contact Associate Professor Yun Feng with your CV at y.feng@griffith.edu.au



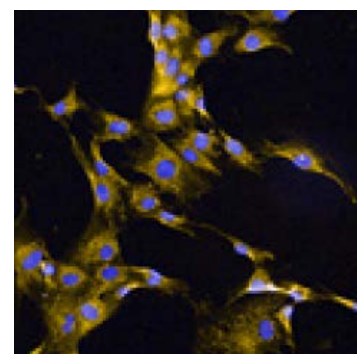
Traditional Chinese Medicine (TCM) and brain function

Many TCMs have a neuroprotective effect; that is, they protect the central nervous system against damage or degeneration due to diseases such as Parkinson's disease. Working with TCMs with a known neuroprotective effect, we can isolate and identify the major constituents of selected TCM and test the compounds against cell-based models of Parkinson's disease. By analysing and testing TCMs, we can determine their mechanism of action and develop new ways to treat neurological diseases.

Primary supervisor: Associate Professor Yun Feng

Other supervisor: N/A

To apply: Contact Associate Professor Yun Feng with your CV at y.feng@griffith.edu.au



Giacomotto Group

Group Leader

Dr Jean Giacomotto

Research Field

Neurological and degenerative diseases, Disease modelling and Drug discovery

Research Synopsis

Dr Giacomotto started his career in the pharmaceutical industry in Paris. He worked at developing cellular models and screening assays to find drugs against degenerative diseases. He then joined the academic and has been a pioneer in the development of genome editing tools and in the development of phenotypic screening based on the zebrafish. The principle is to bypass the need for a molecular target and, instead, genetically engineer this animal to recapitulate human disorders and run drug discovery programs based on the associated phenotypes (ex. Stopping degeneration). Jean's programs have already led to the translation of drugs for patients. He is now working on developing innovative zebrafish models of neurological diseases and using those models to i) better understand the underlying pathologic mechanisms and ii) find relevant treatments. Dr Giacomotto is also using zebrafish and phenotypic screening to explore nature's chemical diversity to find novel bioactive molecules/compounds.

Currently Available Projects

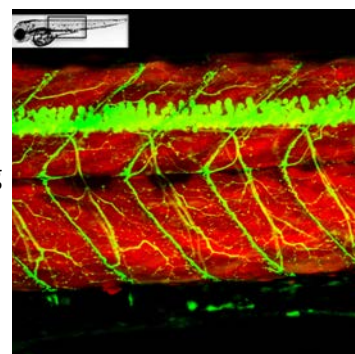
Modelling neurodegeneration in the zebrafish and drug discovery

This project aims at establishing new zebrafish models of motoneuron degeneration or neurodegeneration per se. We will use state-of-the-art genome editing tools (optimised CRISPR/Cas9 approach) to manipulate selected genes of interest to both validate their predicted pathogenicity and generate animals developing neurodegeneration. These models will further be used to investigate the underlying degenerative mechanisms and establish drug screening/discovery programs.

Primary supervisor: Dr Jean Giacomotto

Other supervisor: TBA

To apply: Contact Dr Jean Giacomotto with your CV at j.giacomotto@griffith.edu.au



Zebrafishing for novel bioactive molecules

Whilst many current drugs are derived from nature, many more bioactive molecules have still to be discovered. To help speed up discovery, we will develop i) a unique multipurpose zebrafish model combining different transgenic fluorescent markers/sensors and ii) automated assays to screen existing diverse chemical libraries for bioactive molecules. Validated assays will then be used to screen natural product libraries.

Primary supervisor: Dr Jean Giacomotto

Other supervisor: TBA

To apply: Contact Dr Jean Giacomotto with your CV at j.giacomotto@griffith.edu.au



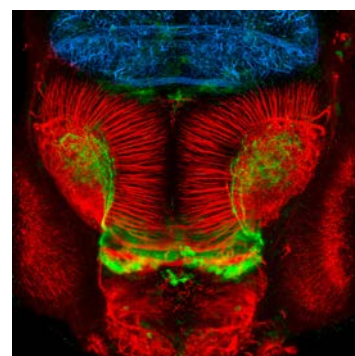
Unveiling the normal and pathogenic role of neurexins in the developing brain

Neurexins are a family of genes that have been associated with several neurological diseases. We have generated a series of innovative zebrafish CRISPR-mutants that should allow to better understand the role of these genes in the developing brain. We will combine single-cell transcriptomics studies, high-end imaging, and behavioural approaches to highlight their critical function in brain development and plasticity.

Primary supervisor: Dr Jean Giacomotto

Other supervisor: TBA

To apply: Contact Dr Jean Giacomotto with your CV at j.giacomotto@griffith.edu.au



Kamato Group

Group Leader

Dr Danielle Kamato



Research Field

Target identification to prevent and treat heart disease

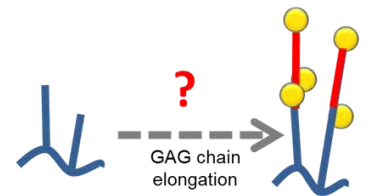
Research Synopsis

Cardiovascular disease, manifesting as heart attacks and strokes is the leading cause of mortality. The major underlying pathology is the formation and life-threatening rupture of atherosclerotic plaques. Therapeutics currently available to treat atherosclerosis are restricted to targeting the risk factors, but the efficacy of these drugs is limited to 30 per cent. Thus, there is a clinical need for the discovery of drugs that will target other key events. To find new, we must first understand how the disease develops. The major driver of atherosclerosis is the binding of cholesterol on the walls of sticky blood vessels which over time leads to the formation of atherosclerotic plaques. Our research is focused on understanding the cellular pathways that make blood vessels sticky. A greater understanding of the cellular processes will allow for the identification of novel targets that can be used to prevent cholesterol from sticking and accumulating in the blood vessels.

Currently Available Projects

Identification of a vessel wall directed therapy to treat heart disease

The cells of blood vessels produce sticky molecules called proteoglycans and once modified can bind and retain cholesterol. Zebrafish express all the major receptors, lipoproteins and enzymes involved in atherosclerosis and a complete set of genes to proteoglycan synthesis and modification. This project will develop a high-fat diet-induced zebrafish model of atherosclerosis to allow for screening of potential vessel wall directed therapies to prevent cholesterol binding. Approaches will include cellular signalling, molecular biology, pharmacology and invivo studies.



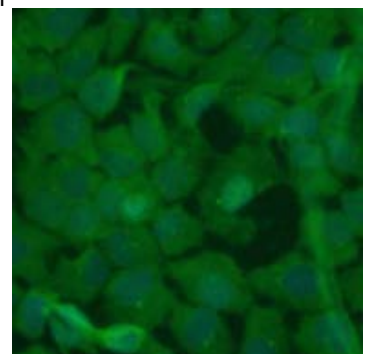
Primary supervisor: Dr Danielle Kamato

Other supervisor: Dr Jean Giacomotto

To apply: Contact Dr Danielle Kamato with your CV at d.kamato@griffith.edu.au.

Mechanistic insights into heart disease and inflammatory bowel disease

Well defined risk factors such as high cholesterol, smoking, and high blood pressure worsen the burden of atherosclerosis. Patients with inflammatory bowel disease (IBD) present with a lower prevalence of classic risk factors, however, have at least a 2-fold higher risk of heart disease. Elevated inflammatory cytokines and an altered microbiome are observed in patients with IBD. This project seeks to define the biological link between IBD and heart disease by assessing the role of inflammatory cytokines and bacteria-derived toxins on vascular cells. Approaches will include cellular signalling, receptor pharmacology and molecular biology.



Primary supervisor: Dr Danielle Kamato

Other supervisor: TBC

To apply: Contact Dr Danielle Kamato with your CV at d.kamato@griffith.edu.au.

Ma Group

Group Leader

Dr Linlin Ma



Research Field

Ion channels and neurological diseases

Research Synopsis

Dr Ma focuses on understanding the pathological roles of interested ion channel proteins in related channelopathies, particularly neurological diseases. Ion channels are a group of fascinating proteins that can conduct ions (such as Na^+ , K^+ , Ca^{2+} , Cl^-) across the otherwise impermeable cell membranes in a highly regulated manner. They play a key role in every physiological system in humans, especially in the nervous system. Using molecular biology, electrophysiology, cell biology, and protein biochemistry methods, the Ma lab aims to decode how ion channels of interest contribute to the pathogenesis of Parkinson's disease and epilepsy at the molecular, cellular and whole-animal levels. We are also set to identify and characterise novel ion channel modulators from natural resources as potential drug leads.

Currently Available Projects

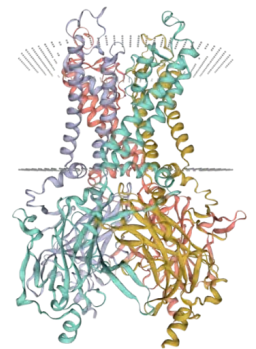
A new therapeutic model for Parkinson's disease: physiological and pathological roles of potassium channels

Parkinson's disease (PD) is an ageing-related, multifactorial neurological disorder featuring selective degeneration of dopaminergic neurons in the midbrain. The mechanism underlying the loss of dopaminergic neurons is complex and still elusive. However, ion channels have been shown to play an important role in neurodegeneration due to their fundamental functions in neuronal excitability. In this project, we aim to expand our recent finding of the potential pathological role of potassium channels in Parkinson's disease, and elucidate the underlying molecular mechanisms using dopaminergic neuron cell model and knockout mouse model.

Primary supervisor: Dr Linlin Ma

Other supervisor: Prof George Mellick

To apply: Contact Linlin Ma with your CV at Linlin.ma@griffith.edu.au



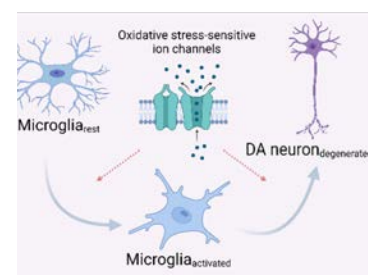
Ameliorating microglia-mediated neuroinflammation for Parkinson's disease therapy

Microglial cells, the CNS-resident macrophages, are privileged to be the immune-competent cells of the central nervous system. A large body of evidence supports that microglial cells play a crucial role in mediating neuroinflammation as a significant contributing factor in the progression of ageing-related neurological disorders, including Parkinson's disease (PD). As an essential trigger of abnormal microglial activation, oxidative stress is also a key pathological factor in PD. This project aims to explore how oxidative stress-sensitive ion channels contribute to microglia-mediated neuroinflammation in PD and whether targeting these ion channels may represent a neuroprotective approach to mitigate PD progression.

Primary supervisor: Dr Linlin Ma

Other supervisor: Prof George Mellick

To apply: Contact Linlin Ma with your CV at Linlin.ma@griffith.edu.au



Mellick Group

Group Leader

Professor George Mellick

Research Field

Parkinson's disease, Neurological diseases



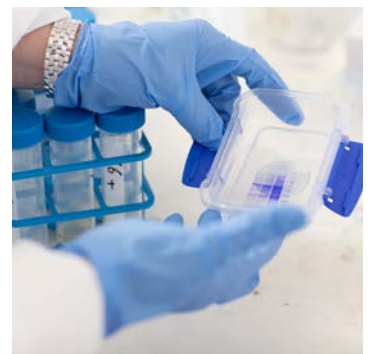
Research Synopsis

George is one of Australia's foremost researchers into Parkinson's disease. As head of the Queensland Parkinson's Project, Professor Mellick has been tireless in his pursuit of a cure for a disease that affects more than 80,000 Australians at a cost of more than \$10 billion annually. His team uses a multi-disciplinary approach to understand Parkinson's and integrates clinical and lab-based research. The QPP, biobank and register of medical and lifestyle information from more than 4,000 participants, is providing insightful clues about the cause and potential treatments. The project's bio-bank stores, combined with the resources of GRIDD's Neuro Bank and NatureBank, are pivotal towards a potential cure for Parkinson's. George is also the current President of Parkinson's Queensland and Vice-President of Parkinson's Australia, as well as the Head of School of Environment and Science at Griffith University.

Currently Available Projects

Identifying Biomarkers for Parkinson's Disease as a Step toward a Cure

Parkinson's disease (PD) is a complex, incurable, multifactorial neurological condition affecting over 65,000 Australians with an economic burden of \$10 billion per annum. With an aging population the disease related costs will rise unless we find better ways to identify those at risk, provide early diagnosis and treat the disease from an understanding of its causation in each individual. The development of robust biomarkers is essential to meeting these challenges. No biomarkers are available which is the major impediment to progress towards a cure. We have developed a cell model of PD using patients' own cells. Subjecting the cells to chemical stress reveals a different response between cells from PD patients and those from healthy individuals. We have several projects examining how we can use these stress tests to identify the underlying disease trigger in each patient. This is the first step toward personalised medicine for PD.



Primary supervisor: Professor George Mellick

Other supervisor: TBC

To apply: Contact Professor Mellick with your CV at g.mellick@griffith.edu.au

Exploring new biological targets for treating Parkinson's disease – from patients back to patients

Genetic factors constitute a major component in the aetiology of PD. Significant progress towards understanding the pathologic mechanisms involved in PD and developing new therapeutics has come from studies of rare families with inherited PD. We hold an advantaged position in this research field via access to the unique cohort of thousands of PD patients participating in the Queensland Parkinson's Project. Through sophisticated genetic studies, we have identified several novel genes from rare PD families, the encoded proteins of which have great potential in elucidating new pathologic mechanisms and providing novel treatment strategies. Using methods in molecular biology, cell biology, biochemistry and stem cell biology, we aim to shed new light on this progressive and devastating disease.



Primary supervisor: Professor George Mellick

Other supervisor: Dr Linlin Ma

To apply: Contact Professor George Mellick with your CV at g.mellick@griffith.edu.au

Poulsen Group

Group Leader

Professor Sally-Ann Poulsen

Research Field

Medicinal Chemistry, Chemical Biology



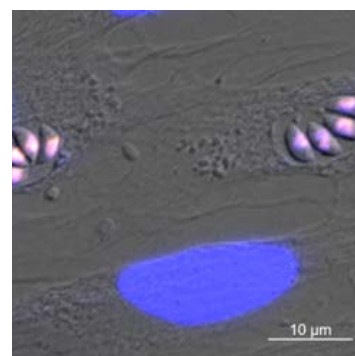
Research Synopsis

My research uses chemistry to develop new and interesting small molecules that interact with biology. These small molecules are of two types: (i) either drug-like compounds, or (ii) chemical probes. The drug-like compounds are aimed at improving the survival and quality-of-life for patients with drug resistant or hard-to-treat cancers, including brain cancers and bone cancers. The chemical probes are functional compounds or “tool compounds” that are used by biologists to study and understand complex or challenging biological systems, such as in disease-causing parasites that reside in human cells. These compounds will allow biologists to perform better assays supporting drug discovery for diseases such as malaria or toxoplasmosis. In a complementary area I have established the use of mass spectrometry to study proteins binding to small molecules to discover better starting compounds for drug development. I work with collaborators in Australia and internationally, both from academia and industry on these research projects that span both chemistry and biology.

Currently Available Projects

Development of Chemical Probes for Studying Malaria and related Parasites

The malaria parasite *Plasmodium falciparum* is the most lethal of the species that infect humans. To improve the health and well-being of millions world-wide, new drugs that are effective against malaria parasites at compliant doses while having limited activity against mammalian host cells are needed. However, current methods to identify and investigate the activity of new compounds with activity against parasites are constrained. New assay tools (chemical probes) which permit the rapid and reliable detection and quantification of parasite growth will be developed in this PhD project. These chemical probes will be superior to those currently available and will likely be adopted by malaria and other parasite researchers worldwide. There may be opportunity to travel to and work in our collaborators laboratory in Germany during candidature.



Primary Supervisor: Professor Sally-Ann Poulsen, s.poulsen@griffith.edu.au

Co-Supervisor: Professor Katherine Andrews, k.andrews@griffith.edu.au

Development of more stable novel siRNA treatments for COVID

RNA interference (RNAi) is changing the treatment and management of human diseases. In principle, small interfering RNA (siRNA) can silence any disease-related gene to have a therapeutic effect. Although siRNA has many advantages in drug development, several barriers limit widespread clinical application. Unmodified siRNA is vulnerable to our body's RNases and phosphatases and so has poor stability, unmodified siRNA may also trigger an innate immune response that limits its therapeutic uses. In this project you will synthesise a range of chemically modified siRNAs aimed at addressing the limitations found with using natural RNA building blocks. The chemically modified siRNAs will be designed to stop SARS-Cov-2 infection and will be evaluated to determine their in vitro and in vivo



Primary Supervisor: Professor Sally-Ann Poulsen, s.poulsen@griffith.edu.au

Co-Supervisors: Dr David Hilko, Prof Nigel McMillan (Infectious Diseases & Immunology Program, MHIQ)

Punyadeera Group

Group Leader

Professor Chamindie Punyadeera



Research Field

Liquid biopsy, saliva diagnostics, biomarker discovery, cancer and cardiovascular diseases

Research Synopsis

Australia spends \$120 billion annually on health care. This rapid growth in healthcare expenditure is set to increase with an ageing and a growing population and is not sustainable. To address this, we are developing clinically relevant biomarkers from concept through to commercialisation to accelerate precision health. Cancer diagnostics, prognostics and theranostics have changed the management of patients with cancer. Diagnostics of the future have the potential to advance the management of cancers even further, by combining multiple biomarkers in a high-throughput fashion either in a central hospital laboratory or at the patient's bedside. We are developing saliva and liquid biopsy based diagnostic tests to improve outcomes in patients with cancer and heart diseases to reduce healthcare expenditure. Liquid biopsies are minimally invasive tests that can detect tiny amounts of tumour derived circulating tumour DNA or ctDNA, circulating tumour cells and clusters and exosomes present in body fluids.

Currently Available Projects

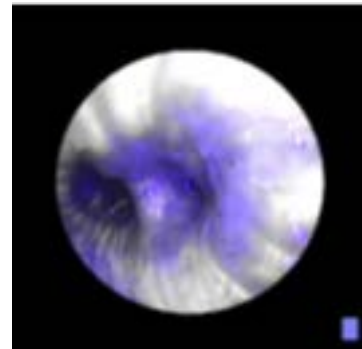
Saliva test to triage lung cancer nodules found on CT scans - a pilot study

About 15% of lung cancer patients survive beyond 5-years. CT screening to early detect lung nodules has been investigated, however false positive results, unnecessary radiation exposure are some of the drawbacks. We propose an innovative approach to identify nodules found on CT scans using breath analysis and liquid biopsies. This new multidisciplinary partnership will lay the foundation for future collaborations.

Primary supervisor: Professor Chamindie Punyadeera

Other supervisor: Ms Juliana Bark, A/Prof David Fielding (RBWH) and Dr Sarj Vasani (RBWH)

To apply: Contact Professor Chamindie Punyadeera with your CV at c.punyadeera@griffith.edu.au



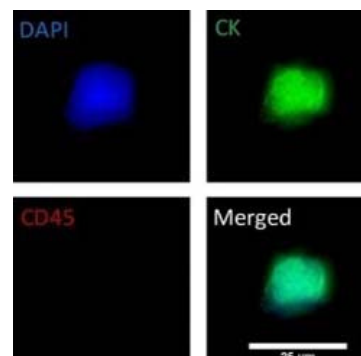
liquid biopsy-based biomarkers for oropharyngeal cancer

Oropharyngeal cancer (OPC) caused by human papillomavirus (HPV) is rapidly increasing globally, with an estimated 173,495 new cases in 2018. Approximately ~10-25% of patients develop recurrences within 2-years. The aim of this NHMRC funded project is to develop a microfluidic chip to permit capture of high-purity and viable circulating tumour cells (CTCs) to early detect recurrences in HPV driven OPC.

Primary supervisor: Professor Chamindie Punyadeera

Other supervisor: Professor Ian Papautsky (USA), Dr Sarj Vasani and Prof Liz Kenny (RBWH)

To apply: Contact Professor Chamindie Punyadeera with your CV at c.punyadeera@griffith.edu.au



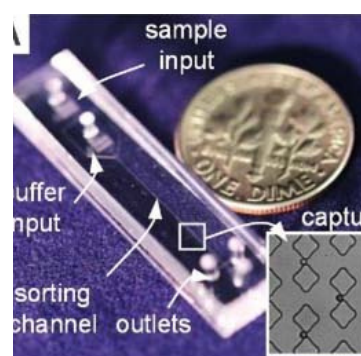
Oral microbiome as a biomarker to early detect heart failure

Heart failure is a major global pandemic affecting more than 38 million people worldwide. It has been suggested that poor oral hygiene and periodontal diseases are related to a higher risk of developing cardiovascular disease. However, the underlying cause of this phenomenon has not yet been investigated. We are aiming to profile the oral microbiome content in patients with heart failure.

Primary supervisor: Professor Chamindie Punyadeera

Other supervisor: Prof John Atherton (RBWH) and Dr Wendy

To apply: Contact Chamindie Punyadeera with your CV at c.punyadeera@griffith.edu.au



Quinn Group

Group Leader

Professor Ronald J. Quinn

Research Field

Native Mass Spectrometry, Natural Product Drug Discovery, Infectious Diseases

Research Synopsis

Prof Quinn's research aims to establish an advanced platform for accelerated drug discovery of natural products. He has authored over 300 refereed journal articles. His work has been cited 7,875 times. The 11 most cited papers have been referenced at least 100 times. He has trained 41 PhD students and 63 post-doctoral fellows. He was elected to the Australian Academy of Technology and Engineering (ATSE) in 2003 and is a Member of the Order of Australia (AM). We use native mass spectrometry to detect complexes between small molecules and proteins of therapeutic relevance to screen compound libraries, extracts / fractions and in fragment-based drug discovery. We aim for a comprehensive multidisciplinary approach to explain the function and understand the complexity of TCM. We explore the opportunity for Artificial Intelligence to predict the function of metabolites. The over-arching research objective is the grand challenge to find a function for every metabolite produced by Nature.



Currently Available Projects

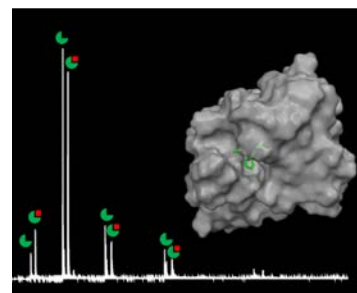
Molecular Targets Program: Rapid Response to Pandemics

The Molecular Targets Program identifies ligands for any cloned and purified protein of therapeutic significance. We have developed native Magnetic Resonance Mass Spectrometry (MRMS) to fast track identification of compounds that can be used for therapy. As viruses contain very few proteins, this platform allows rapid response to viral pandemics. e.g. the discovery of anti-COVID19 anti-virals.

Primary supervisor: Prof Ronald J. Quinn, Dr Miaomiao Liu

Other supervisor: N/A

To apply: Contact Prof Ronald J. Quinn with your CV at r.quinn@griffith.edu.au



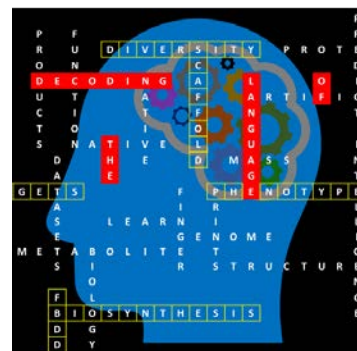
Decoding the Language of Nature: Artificial Intelligence

The project will address one of chemistry's grand challenges: to find a function for every metabolite produced by Nature. Develop a method using artificial intelligence to predict the function of a compound produced by nature by looking at its chemical structure. Build a database of scaffolds embedded in bioactive natural products and correlate ligand-protein interactions.

Primary supervisor: Prof Ronald J. Quinn, Dr Miaomiao Liu

Other supervisor: Alan Wee-Chung Liew, Can Wang

To apply: Contact Prof Ronald J. Quinn with your CV at r.quinn@griffith.edu.au



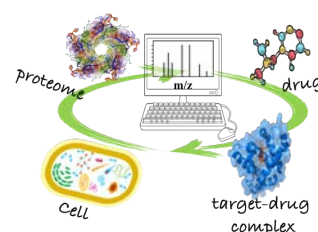
Label-Free Target Identification

Developing a new therapeutic requires both a cellular (phenotype) activity and the identification of the molecular target. The exquisite sensitivity of mass spectrometry will be used to identify specific ligand-protein complexes in cell lysates. Bioactive compounds will be mixed with the proteome components to identify the protein target. A specific advantage is that it is label-free method.

Primary supervisor: Prof Ronald J. Quinn, Dr Miaomiao Liu

Other supervisor: N/A

To apply: Contact Prof Ronald J. Quinn with your CV at r.quinn@griffith.edu.au



Rehm Group

Group Leader

Professor Bernd Rehm



Research Field

Bioengineering, Biotechnology, Biomaterials

Research Synopsis

Prof Bernd Rehm is the Director of the Centre for Cell Factories and Biopolymers. He is author and co-author of over 200 scientific publications, which have been cited over 10,000 times. Professor Rehm is also an inventor or co-inventor on 58 patent applications, 25 of which are granted patents. The mission of the Centre for Cell Factories and Biopolymers is to research and develop innovative functional materials and technologies that can provide solutions for global health and environmental challenges. Bernd's core platform technology is based on the ability of bio-engineered bacterial and yeast cells to generate biopolyester beads displaying well-defined protein sequences on the surface and suitable for vaccine, diagnostics, bioseparation and other applications.

Currently Available Projects

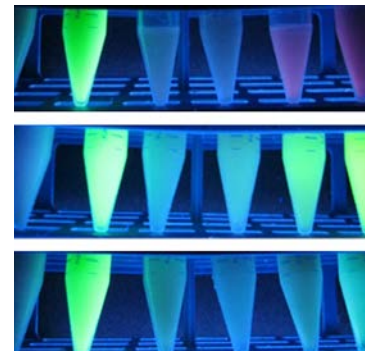
Protein engineering of protein switches for development of diagnostics tools

Sensitive and specific detection of serum antibodies is often used to diagnose infections. This project aims to develop a simple qualitative/quantitative device for detection of antibodies of interest. It will involve protein engineering of protein switches to incorporate antigens while attached to biomolecular scaffolds. Binding of the antibodies to the antigens will activate the protein switch which will result in release of a signal. The project combines advanced protein engineering with materials science and biotechnology.

Primary supervisor: Prof Bernd Rehm

Other supervisor: N/A

To apply: Contact Prof Bernd Rehm with your CV at b.rehm@griffith.edu.au



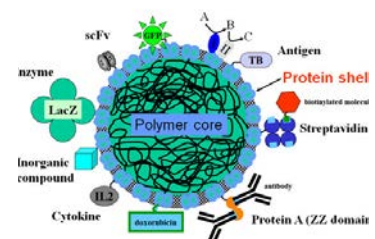
Precision-engineering of core-shell structures for prevention and treatment of diseases

This project harnesses the biosynthesis capacity of microbial cells to produce polymeric self-assemblies that can be engineered to incorporate protein functions such as antigen, binding domains and enzymes. This approach uses metabolic engineering and protein engineering to exploit the vast biomaterials design space for generation of innovative smart materials that form core-shell structures and exhibit advantageous properties toward such as uses as antigen carrier in vaccine applications or for targeted delivery of active compounds.

Primary supervisor: Prof Bernd Rehm

Other supervisor: N/A

To apply: Contact Prof Bernd Rehm with your CV at b.rehm@griffith.edu.au



Richardson Group

Group Leader

Professor Des R. Richardson

Research Field

Cancer

Research Synopsis

Prof Richardson's research regards the discovery of breakthrough anti-cancer drugs (such as Dp44mT [Fig. 1] and DpC) for the treatment of belligerent, intractable tumours (e.g., breast, skin, brain, lung, pancreas, prostate, colon, etc). Prof Richardson holds the position of Alan Mackay-Sim Distinguished Chair of Cancer Cell Biology at Griffith University and is a National Health and Medical Research Council (NHMRC) of Australia Senior Principal Research Fellow. He is also the Director of the Centre for Cancer Cell Biology. He has published >460 articles, reviews, etc and his work has been cited >43,000 times. He is Executive Editor of BBA-General Subjects and has served on the Ed. Boards of 49 international journals. As a major translational research achievement, he has developed the anti-cancer and anti-metastatic drug, DpC, which overcomes P-glycoprotein-mediated drug resistance and regulates the potent metastasis suppressor, NDRG1.

Currently Available Projects

Targeting the Major Killers in Cancer: Metastasis and Drug Resistance with Bespoke, Multi-Functional Drugs

The spread of cancer (metastasis) accounts for 90% of cancer deaths. Critically, this belligerent disease is highly resistant to conventional therapies, and new molecular targets and therapeutic avenues are urgently needed. Professor Richardson discovered innovative anti-cancer drugs that can increase the expression of a metastasis suppressor protein, NDRG1, that prevents tumour cell spread (Fig. 1). He also discovered these same drugs overcome resistance of cancers to chemotherapies by overcoming the drug efflux pump, P-glycoprotein. This project will involve examining the functions of NDRG1 and its targeting by our novel drugs to elucidate the molecular mechanisms involved in their anti-tumour activity. A range of state-of-the-art techniques will be used to maximise student training, including: tissue culture, western blot analysis, immunohistochemistry, medicinal chemistry, and confocal microscopy

Primary supervisor: Prof Des Richardson

Other supervisor: Dr. Mahendiran Dharmasivam

To apply: Contact Prof Des Richardson with your CV at d.richardson@griffith.edu.au

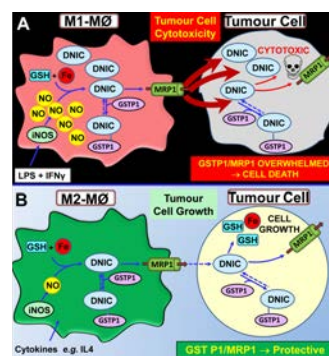
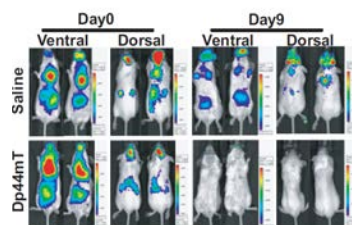
Harnessing the Immense Power of the Macrophage: Development of Innovative Anti-Cancer Drugs known as "MACA-ATTACKERS"

Despite the massive potential of pharmacologically harnessing the power of the macrophage (MØ), a lack of understanding basic molecular mechanisms led to a distinct absence of MØ-based anti-cancer therapies. MØs are powerful orchestrators of the response to tumours, making up to 50% of tumour mass. The MØ powerfully exerts tumour inhibition via either cytotoxic M1-MØs, or tumour promotion via the M2-MØ phenotype. However, a unifying model of how this occurs via nitric oxide (NO) has never been elucidated. Using our expertise in exploiting transporter pharmacology to develop innovative drugs from bench-to-bedside, we will assess the transporter, multidrug resistance-associated protein 1 (MRP1), to exploit NO transport between MØs and tumour cells (Figure 2) to develop frontier drugs ("MACA-ATTACKERS") to harness the immense power of the MØ.

Primary supervisor: Prof Des Richardson

Other supervisor: Dr. Mahendiran Dharmasivam

To apply: Contact Prof Des Richardson with your CV at d.richardson@griffith.edu.au



Sainsbury Group

Group Leader

Dr Frank Sainsbury

Research Field

Biomolecular engineering, Protein self-assembly, Plant biotechnology and Virology

Research Synopsis

Frank's research uses protein engineering and biophysical techniques to study the self-assembly of proteins as tools in basic science and technology. His lab is affiliated with the Centre for Cell Factories and Biopolymers, and he is an author on >50 scientific publications and inventor on 5 patents. Following his PhD in Plant virology in the UK, Frank worked with industry in Canada to help pioneer the use of synthetic biology to modify plants for vaccine production. In recent years, he has expanded his research program on virus-like particles and protein surfactants for the design of biomimetic and hybrid biomaterials. Frank is always interested in improving the tools available and uses a synthetic biology mindset to design new protein expression vectors and template the assembly of protein nanoparticles for applications in biomedicine and biocatalysis.

Currently Available Projects

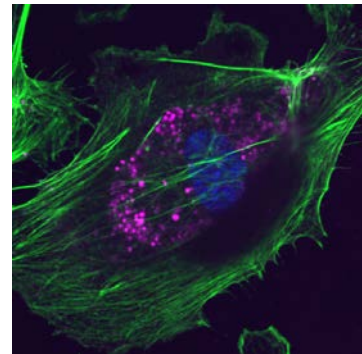
Virus-like particle cell entry mimics for antiviral drug discovery

Virus-like particles are non-infectious mimics of viruses that can often enter cells via the same receptor-mediated pathways as the viruses they resemble. Our work in this area includes the development of fluorescent analogues of important human pathogens and the creation of particles of different shape and size to understand the fundamentals of virus-cell interactions.

Primary supervisor: Dr Frank Sainsbury

Other supervisor: TBC

To apply: Contact Dr Frank Sainsbury with your CV at f.sainsbury@griffith.edu.au



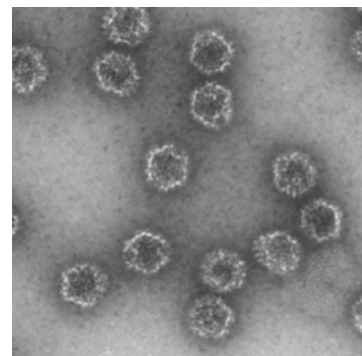
Protein cages in biocatalysis and biosensing

We have developed a number of virus-derived protein cages into robust containers for enzymes. In addition, we are constructing hybrid biomaterials with properties tailored to working with different classes of small molecules. There are a number of project opportunities on the application of biocatalytic protein cages in drug discovery and metabolism.

Primary supervisor: Dr Frank Sainsbury

Other supervisor: TBC

To apply: Contact Dr Frank Sainsbury with your CV at f.sainsbury@griffith.edu.au



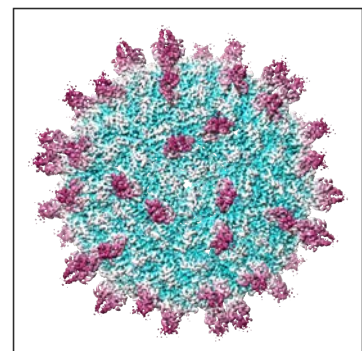
Biotechnology with persistent plant viruses

We have determined the first structure of a persistent plant virus. It is not clear what advantage these asymptomatic viruses confer in order to maintain the purported symbiotic relationship they have with their hosts. Understanding the form and function of persistent viruses through molecular and structural biology will open many possibilities for their use in plant biotechnology.

Primary supervisor: Dr Frank Sainsbury

Other supervisor: TBC

To apply: Contact Dr Frank Sainsbury with your CV at f.sainsbury@griffith.edu.au



Schirra Group

Group Leader

Associate Professor Horst Joachim Schirra



Research Field

NMR-based metabolomics, systems biology, metabolic regulation, agriculture and food

Research Synopsis

Horst's main field of research is Metabolic Systems Biology. He uses NMR-based metabolomics to investigate the basic principles of metabolic regulation and the role they play in fundamental biological processes, environmental change, and in the development of disease. His research has a further focus on agriculture. He is co-leader of the international research consortium WormJam, which joins leading *C. elegans* systems biology researchers. His research aims to integrate metabolomics with other -omics methods and metabolic simulations. Research areas include: (1) Using analytical systems biology to understand how external triggers, such as drugs influence an organism's metabolism. (2) Characterising the role dihydrolipoamide dehydrogenase in metabolic regulation. (3) Livestock science, food analysis, and food security research.

Currently Available Projects

C. elegans as a model system to characterise the role of a metabolic master regulator

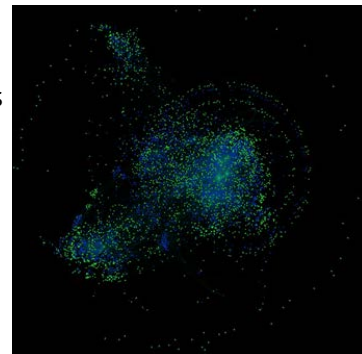
Previously we showed the enzyme dihydrolipoamide dehydrogenase (DLD) to be a metabolic master regulator. We now will characterise the role of DLD in the metabolic network of *C. elegans* by using metabolomics and biophysical techniques in isolated mitochondria, as well as curating the genome scale metabolic model of *C. elegans* in collaboration with the WormJam consortium and simulating the nematode's metabolism.

Primary supervisor: A/Prof Horst Joachim Schirra

Other supervisor: A/Prof Paul Ebert, Dr Steven Zuryn (UQ)

Collaborator: Dr Michael Witting (Helmholtz Centre Munich, Germany)

To apply: Contact A/Prof Horst Joachim Schirra with your CV at h.schirra@griffith.edu.au



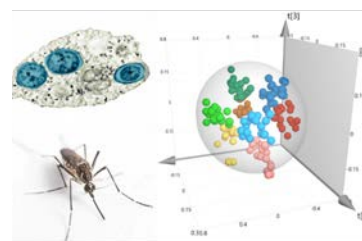
Who's in the driving seat? – systems biology characterisation of insect-symbiont interactions

The metabolic interactions between the endosymbiont Wolbachia and its insect hosts depend on the combination of Wolbachia strain and host organism and range from mutualistic symbiosis to parasitic interactions. With a combination of metabolomics and physiological techniques we want to characterise these interactions and the role they play in hindering the transmission of insect-borne virus diseases.

Primary supervisor: A/Prof Horst Joachim Schirra

Other supervisor: A/Prof Jeremy Brownlie

To apply: Contact A/Prof Horst Joachim Schirra with your CV at h.schirra@griffith.edu.au



Systems biology in environmental research, food analysis, food security, and livestock science

In collaboration with colleagues at QAAFI and other institutions we are using NMR-based metabolomics as analytical platform technology to characterise the composition of foods such as honey and native Australian fruits. This involves characterising the potential of native Australian fruits as commercial food sources and developing methods for the detection of food fraud especially in honey.

Primary supervisor: A/Prof Horst Joachim Schirra

Other supervisor: Prof Yasmina Sultanbawa (QAAFI), Prof Mary Fletcher (QAAFI)

To apply: Contact A/Prof Horst Joachim Schirra with your CV at h.schirra@griffith.edu.au



Skelly Group

Group Leader

Associate Professor Deanne Skelly (nee Hryciw)

Research Field

Role of essential fatty acids in health and disease

Research Synopsis

Associate Professor Deanne Skelly (nee Hryciw) is focused on understanding the role of essential fatty acid metabolism and transport in programming disease risk, and diseases where essential fatty acids are deficient. Her research approach broadly covers cell biology and whole animal studies. The over-arching goal is to identify the role essential fatty acid homeostasis plays in normal physiology and pathophysiology.

Deanne completed her PhD at the University of South Australia, and has Postdoctoral training at Johns Hopkins University, the University of Sydney and the University of Queensland. Deanne is the current Vice President of the Australia, New Zealand and Pacific Developmental Origin of Health and Disease society.

Currently Available Projects

Essential fatty acids in disease

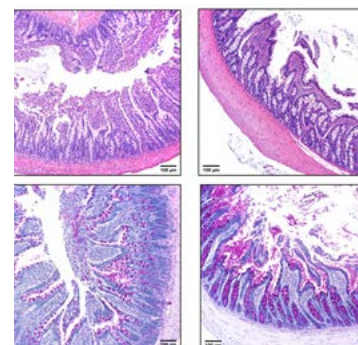
In Cystic Fibrosis, dysfunction in the chloride channel CFTR results in accumulation of a thick and sticky mucus in a number of tissues including the lungs and pancreas. In addition, there is a reduction in essential fatty acids leading to deficiency. Essential fatty acids are critical for normal functioning of the cell as they are required for normal cell shape and membrane function.

This project will determine the link between CFTR dysfunction and essential fatty acid deficiency. We will use cells in vitro, in addition to a rodent model of CF.

Primary supervisor: Deanne Skelly

Other supervisor: Linlin Ma

To apply: Contact Deanne Skelly with your CV at d.skelly@griffith.edu.au



Essential fatty acids in development

In Western cultures, we are eating elevated concentrations of the omega 6 fatty acid, linoleic acid. Omega 6 is proinflammatory, and in women of reproductive age, the consequences of this on her pregnancy outcomes are unknown. We have shown that in a rodent model, elevated omega 6 alters a key hormone that regulates development. Omega 6 and another class of polyunsaturated fatty acid omega 3 are metabolised by the same enzymes. Omega 6 and omega 3 metabolites are critical for development, however elevated omega 6 reduces the metabolism of omega 3.

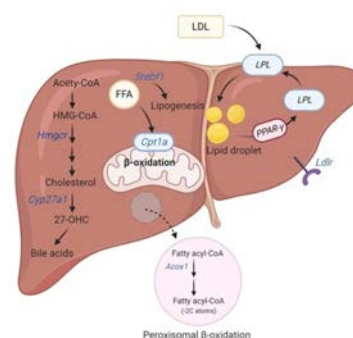
This project will determine the role of an elevated maternal omega 6 diet on development of her offspring. Specifically, we aim to investigate and understand how an elevated maternal omega 6 diet alters organ development, which increases the risk of disease.

<https://www.youtube.com/watch?v=oVMe9b4CGEU>

Primary supervisor: Assoc Prof Deanne Skelly (nee Hryciw)

Other supervisor: Prof Tony Perkins

To apply: Contact Deanne Skelly with your CV at d.skelly@griffith.edu.au



Skinner-Adams Group

Group Leader

Dr Linlin Ma

Research Field

Ion channels and neurological diseases

Research Synopsis

Dr Ma focuses on understanding the pathological roles of interested ion channel proteins in related channelopathies, particularly neurological diseases. Ion channels are a group of fascinating proteins that can conduct ions (such as Na⁺, K⁺, Ca²⁺, Cl⁻) across the otherwise impermeable cell membranes in a highly regulated manner. They play a key role in every physiological system in humans, especially in the nervous system. Using molecular biology, electrophysiology, cell biology, and protein biochemistry methods, the Ma lab aims to decode how ion channels of interest contribute to the pathogenesis of Parkinson's disease and epilepsy at the molecular, cellular and whole-animal levels. We are also set to identify and characterise novel ion channel modulators from natural resources as potential drug leads.

Currently Available Projects

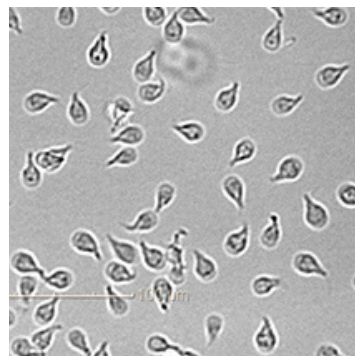
A new therapeutic model for Parkinson's disease: physiological and pathological roles of potassium channels

Giardia parasites infect ~1 billion people and cause >200 million cases of giardiasis each year. They also cause significant morbidity in animals. However, current treatments are inadequate, associated with resistance, treatment failures and collateral microbiota impacts. This project aims to improve the treatment of giardiasis by investigating the biological and pre-clinical activity of new anti-Giardia compounds. Studies will include investigating the mode of action of selected compounds using state-of-the-art molecular biology techniques and investigating structure activity relationships to guide lead selection and medicinal chemistry approaches. Further drug development studies including pre-clinical studies may also be pursued as appropriate.

Primary supervisor: A/Prof Tina Skinner-Adams

Other supervisor: Prof Katherine Andrews

To apply: Contact A/Prof Tina Skinner-Adams with your CV at t.skinner-adams@griffith.edu.au



Identifying new compounds active against Trichomonas vaginalis

Trichomoniasis is a neglected parasitic disease that causes significant morbidity in pregnant and elderly women (>100 million infections each year). However, the only FDA approved therapy for this disease is associated with treatment failures and adverse effects. This project aims to develop and implement a new medium to high-throughput assay to identify and investigate new drug leads for trichomoniasis. Studies will include screening selected Compounds Australia libraries for active compounds and investigating the mode of action and structure activity relationships of hit compounds. Further drug development studies may also be pursued as appropriate.

Primary supervisor: A/Prof Tina Skinner-Adams

Other supervisor: Prof Katherine Andrews

To apply: Contact A/Prof Tina Skinner-Adams with your CV at t.skinner-adams@griffith.edu.au



St John Group

Group Leader

Professor James St John

Research Field

Nervous system repair, neurodegeneration

Research Synopsis

Professor James St John is Head of the Clem Jones Centre for Neurobiology and Stem Cell Research. His research covers both discovery and translational research to develop cell transplantation therapies and drug treatments to repair the injuries and diseases of the nervous system, in particular spinal cord and peripheral nerve injuries, and neurodegeneration (Alzheimer's disease). He has over 100 publications in these fields. His research is strongly supported by government and philanthropy with over \$14 million in research funding since 2016. He leads a large team of 30 researchers from diverse backgrounds and he collaborates with numerous academics, clinicians and industry partners. The team is currently in the planning stages for a cell transplantation therapy for a human Phase I/IIa clinical trial for spinal cord repair. James was recently awarded the 2019 NHMRC Marshall and Warren Innovation award for the cellular nerve bridge technology that underlies the cell transplantation therapies.

Currently Available Projects

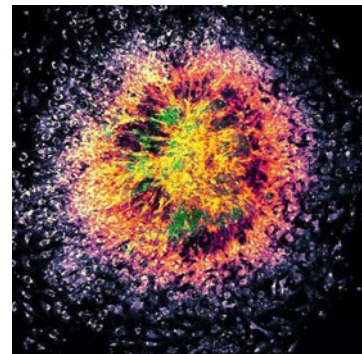
Cell transplantation therapy to repair spinal cord injury

Olfactory glial cell transplantation therapy is effective for repairing spinal cord injury, but the approach needs enhancing to improve outcomes. This project will determine the optimal combination of cell types needed to produce cellular nerve bridges for transplantation into the injury spinal cord. The project will develop new techniques for cell purification and three-dimensional cell nerve bridge production

Primary supervisor: Prof James St John

Other supervisor: Dr Mariyam Murtaza

To apply: Contact Prof James St John with your CV at j.stjohn@griffith.edu.au



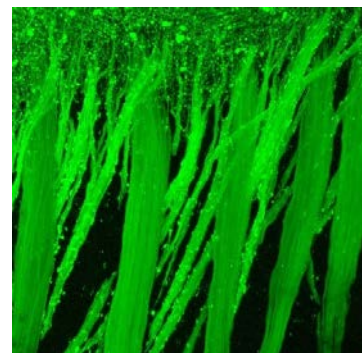
Cell transplantation and drug options for peripheral nerve repair

Peripheral nerve injuries are devastating as they can result in permanent paralysis. This project will use drug discovery and cell transplantation approaches to develop therapies to treat peripheral nerve injuries in animal models. The interaction of the transplanted cells with the host nerve will be examined and the functional outcomes will be addressed using behavioural and electrophysiological studies.

Primary supervisor: Prof James St John

Other supervisor: Dr Ronak Reshamwala

To apply: Contact Prof James St John with your CV at j.stjohn@griffith.edu.au



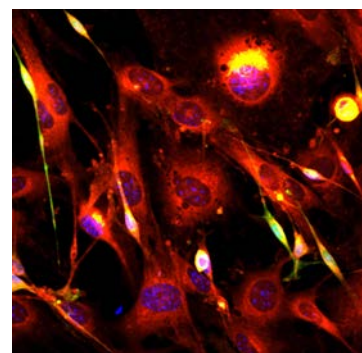
Drug discovery to treat Alzheimer's disease

Pathogens such as bacteria and viruses are likely contributors to the onset and progression of Alzheimer's disease. This project will use drug discovery to identify compounds that can stimulate glial cells of the nervous system to combat chronic pathogen infection of the brain. The project will use in vitro cell cultures and in vivo animal models of brain infection.

Primary supervisor: Prof James St John

Other supervisor: A/Prof Rohan Davis

To apply: Contact Prof James St John with your CV at j.stjohn@griffith.edu.au



Why Griffith?

Ranked in the top 2% worldwide*

Australia's most awarded teacher†

Exceptional student support

20+ years teaching online

Future-focused degrees

Flexible study options

Global study opportunities

Study on-campus or online

50,000 students of all ages

* Based on the International Association of Universities – World Higher Education Database, listing more than 18,500 institutions of higher education. Current as at June 2020.

† Based on the Department of Education, Skills and Employment Australian University Teaching Awards.

Important note: All information is correct as at June 2020, but is subject to change as content is reviewed and updated. For the most up-to-date information, including how to apply for a GRIDD PhD, visit griffith.edu.au/research-study