UQ Summer Research Scholarship Projects in the Faculty of Medicine 2019-20

Read about the program on the https://employability.uq.edu.au/get-experiences/research-opportunities/uq-summer-research-program/apply-summer-research-program page, and apply online from 5 August 2019 - 8 September 2019 via https://employability.uq.edu.au/node/159/2#2

Please take note of where each project is located. Projects are listed under the unit names on the application page (CareerHub).

Scholars can select from one of the following to see the associated projects:

Child Health Research Centre
01 Relationship between strength, muscle power, mobility and patterns of physical activity in young people with CP between 8-12 years of age
02 Using accelerometers to detect and classify activities in toddlers and pre-schoolers with cerebral palsy
03 Exploring profiles of young people referred for threat assessment with an adolescent forensic mental health service
04 What do they need, what do we have, what is received? Looking at health service provision following a concussion in Queensland
05 Neuromodulation and cortical excitability in Children with Persistent Symptoms following a Concussion
06 The effectiveness of ablative fractional CO2 laser and medical needling for burn scars
07 Using patient-reported outcome measures in clinical consultations with children with life-altering skin conditions

Centre for Health Service Research
08 Digital Palliative Care Support for the Queensland Ambulance Service
10 A systematic review of the non-health related benefits of smoking cessation among Australia’s priority populations
11 Do frail hospitalised patients have an Advance Health Directive?
12 Quality Indicators for the Aged
13 Establishing a baseline for healthcare practice change
14 Health economics in pharmacy
15 Is sitting related to brain health?
16 Telepaediatric screening for ear disease in an indigenous population
17 Testing the effectiveness of interactive and personalised text messages for improving sun protection behaviours in young to mid-aged adults
18 Data-oriented approaches to alcohol-related violence

Ochsner Clinical School – New Orleans, USA
19 Optimization of seizure control after completion of diagnostic work up during hospital stay in the EMU
20 Molecular analysis of renal cell carcinoma metastasis using fluorescent ubiquitination-based cell cycle indicator tagged tumor cells in patient-derived orthotopic xenograft models
21 Immune check point inhibition therapy for solid cancers using patient-derived orthotopic xenograft mouse models
22 Use of antithrombotic medicines in elderly patients
23 Prevalence, Risk factors, and Short Term Impact for infection with Carbapenem Resistant Enterobacteriaceae among inpatients at a Tertiary Hospital in Bangladesh01
24 Prevalence And Predictors Of Provera Associated Weight gain; The PAP-O-PAW study
25 The impact of patient education to define value in cardiovascular imaging.
26 Improving outcomes for spinal cord stimulation at Ochsner Health System - A preliminary retrospective study to establish an Interdisciplinary Neuromodulation Approach
27 Addressing Social Determinants of Health in Primary Care - Health Literacy and Medication Adherence
28 Synvisc
29 Determining the incidence of Cryptococcus and post-transplant outcomes in cirrhotic patients
30 Pseudohypobicarbonatemia due to Hypertriglyceridemia
31 Validation and acceptance of 3D printing and Virtual Reality Modeling in the Neurosciences

QIMR Berghofer Medical Research Institute
32 Heart rate variability as a biomarker of neurological function in neonates.
33 A precision medicine approach for treating neurodegenerative disease
34 Investigating MAIT cell expansion strategies and function
35 Spatial localization of immunoglobulin A in the gastrointestinal tract.
36 Investigating melanoma heterogeneity
37 How does the brain’s blood vessel properties affect normal blood flow?
38 Using hookworm-derived products to protect from asthma and inflammatory bowel disease
39 Immunology and immunotherapy in blood cancers
40 Cognitive changes in those at high genetic risk of Alzheimer’s disease
41 Targeting the Th17/Th22 differentiation axis in psoriatic skin disease.
42 Flicking the Switch: Determining if a Novel MicroRNA Controls Drug-Resistance in Late Stage Melanoma
43 Making better Chimeric Antigen Receptor (CAR) T cells

Rural Clinical Unit
44 A review of machine learning approaches used in cancer prognosis and survival
45 Barriers and enablers for indigenous women accessing regular antenatal care
46 Antenatal models of care in rural and regional areas

School of Biomedical Sciences
47 Treating impairments in energy metabolism in models of epilepsy
48 Enhancing antigen presentation in ovarian cancer

SoCM, Greenslopes Clinical Unit
49 Evaluating the impact of hospital management of out-of-hospital cardiac arrests.

SoCM, Mater Clinical Unit
50 Use of cervical mucus enhancers to facilitate achieving pregnancy

SoCM, Northside Clinical Unit
51 Extracellular vesicles as a novel biomarker for detection of COPD exacerbations
52 Biomarkers for lung cancer
53 Dietary Fibre Supplementation in COPD disease
54 Screening for lung cancer, the ILST Study
55 Understanding factors associated with lung transplant outcomes

SoCM, PAH Clinical Unit
56 A retrospective study of aspirin poisoning across Queensland.
57 Clozapine/Norclozapine ratio and cognitive deficits in schizophrenia: A systematic review and meta-analysis
58 Barriers to uptake of Point-of-Care Ultrasound training in ED; a qualitative approach.
59 Development of the Queensland Emergency Airway Registry
60 Quantification of 2D in-vivo spectroscopy data using ‘ProFit’

SoCM, Royal Brisbane Clinical Unit
61 Incidence of iron deficiency (ID) and iron deficiency anaemia (IDA) in chronic pain patients
Child Health Research Centre

<table>
<thead>
<tr>
<th>Project title</th>
<th>Relationship between strength, muscle power, mobility and patterns of physical activity in young people with CP between 8-12 years of age</th>
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</table>
| Project duration | Length of project: 8 weeks  
| | Hours expected per week: 36 hrs |

| Description | Cerebral palsy (CP) is a disorder of posture and movement that is caused by a non-progressive lesion to the developing foetal or infant brain. Children with CP face barriers to participating in physical activities, and there is some evidence to suggest that their patterns of accumulation of physical activity and sedentary time are different to typically developing children. We think that this may put them at risk for cardiovascular diseases and advanced musculoskeletal ageing. |

In young people with CP, physical activity behaviours are commonly measured with tri-axial accelerometers, including ActiGraph GT3X+. There are different methods of processing accelerometer data in order to produce clinically relevant information about intensity and duration of physical activity and sedentary behaviour. The most popular and accessible methods involve applying ‘cut points’ (thresholds) to proprietary count data, which then classifies a particular window of time (epoch, commonly 15 seconds) as belonging to a particular intensity e.g. sedentary, light, moderate or vigorous physical activity. Unfortunately, cut point methods
may misclassify activity intensity for youth with CP who have greater mobility limitations and higher energy costs of movement.

We have access to newly developed methods of processing, including Gross Motor Function Classification System (GMFCS)-specific cut-points, and activity classification (detection) methods. We would like to apply these newer methods in a large, prospective, population-based cohort of children with CP and explore the relationships between physical activity behaviours and a number of variables including:

- Mobility performance (PEDI-CAT, FMS)
- Functional strength
- Muscle power
- Walking endurance
- Gross motor capacity (GMFM)
- Sport participation
- Community participation

Particularly, we would like to explore new relationships between type, frequency, duration and bouts of activities engaged in (comfortable walking, brisk walking, standing, and sedentary behaviours) and the above.

<table>
<thead>
<tr>
<th>Location:</th>
<th>Centre for Children’s Health Research, South Brisbane</th>
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<tbody>
<tr>
<td>Expected outcomes and deliverables:</td>
<td>What you will do:</td>
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<tr>
<td></td>
<td>• Be trained in use of accelerometers for collection of free-living physical activity data</td>
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<tr>
<td></td>
<td>• Clean and process physical activity data in conjunction with our research team and colleagues</td>
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<td></td>
<td>• Perform statistical analyses and interpret the results in collaboration with our research team and statistician</td>
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<td></td>
<td>• Assist the research team to write up the results</td>
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<td></td>
<td>What you will deliver (minimum):</td>
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<tr>
<td></td>
<td>• Cleaned and processed dataset</td>
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<td></td>
<td>• Statistical analysis of data and interpretation of results</td>
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<td></td>
<td>• Write-up of the results</td>
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<td>You could also have a chance to:</td>
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<td></td>
<td>• Observe real-life study data collection in a clinical population (if you are able and willing to be vaccinated for vaccine-preventable diseases)</td>
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<td></td>
<td>• Present your findings at a conference</td>
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<td></td>
<td>• Contribute to a peer-reviewed publication with your research</td>
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<td>Suitable for:</td>
<td>Please note that this project is ONLY suitable for students enrolled in the following courses/majors:</td>
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<tr>
<td></td>
<td>• Physiotherapy</td>
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<td></td>
<td>• Exercise Science (Exercise and Nutrition Sciences and Exercise and Sport Sciences)</td>
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<tr>
<td></td>
<td>• Clinical Exercise Physiology</td>
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<tr>
<td></td>
<td>• Biomedical Engineering (Electrical and Biomedical Engineering)</td>
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<td></td>
<td>• Health Sciences</td>
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<td></td>
<td>• Health, Sport and Physical Education</td>
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<td></td>
<td>• Medicine (MD)</td>
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<tr>
<td>02 Project title:</td>
<td>Using accelerometers to detect and classify activities in toddlers and preschoolers with cerebral palsy</td>
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<tr>
<td>Project duration:</td>
<td>Length of project: 8 weeks&lt;br&gt;Hours expected per week: 36 hrs</td>
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<tr>
<td>Description:</td>
<td>Cerebral palsy (CP) is a disorder of posture and movement that is caused by a non-progressive lesion to the developing foetal or infant brain. Children with CP face barriers to participating in physical activities, and there is some evidence to suggest that their patterns of accumulation of physical activity and sedentary time are different to typically developing children. We think that this may put them at risk for cardiovascular diseases and advanced musculoskeletal ageing. Currently, we also know that children with CP, relative to their typically developing peers, have:&lt;br&gt;• High energy cost of movement (it takes a lot of energy expenditure to move the same amount)&lt;br&gt;• Different ways of moving (for example, by using mobility aids and powered mobility)&lt;br&gt;• Very high sedentary behaviour, especially for children who have significant motor impairment&lt;br&gt;• Similar amounts of moderate-vigorous physical activity, especially in early childhood and for children who can walk independently&lt;br&gt;Furthermore, we know that sedentary time in children with CP peaks very early (4-5 years), but most interventions are aimed at older children (8-12 years+), which could be “too late” to prevent changes to physical activity behaviours that could be detrimental to health. This paints a picture that we may need to provide much earlier interventions, possibly before school age.&lt;br&gt;Unfortunately, we don’t have good ways to detect and measure change resulting from physical activity health behaviour interventions in toddlers and pre-schoolers (3-5 year olds) with CP. Our current method of processing accelerometer data for toddlers and pre-schoolers with CP is not able to detect clinically relevant changes in type and duration of activities independent of energy expenditure. For example, the current method may not detect:&lt;br&gt;• Increases in floor mobility&lt;br&gt;• Increased number of transitions&lt;br&gt;• Increased duration of standing&lt;br&gt;Which are all important indicators of improved physical activity behaviours in a child with CP.</td>
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We have collected video of 3-5 year old children with CP completing a motor assessment called the Gross Motor Function Measure (GMFM), which tests gross motor function in 5 domains. During this assessment, participants have worn an ActiGraph triaxial accelerometer on their back. It is possible to code the video assessments for clinically relevant ‘activity classes’ (for example, walk, run, stand, transition, floor mobility etc.), match this coding data with the raw accelerometry data, and subsequently create a training dataset to train machine learning algorithms. These algorithms could then be applied to novel free-living data to detect the frequency and duration of these clinically relevant activities. This will enable us to perform outcome measurement in a clinical trial of a physical activity behaviour intervention in young children with CP.

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<tr>
<th>Location:</th>
<th>Centre for Children’s Health Research, South Brisbane</th>
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| Expected outcomes and deliverables: | “What you will do:  
- Be trained in coding process using Observer XT software  
- Code assessment videos using Observer XT software  
- Match date-stamped, coded assessment videos with raw (GT3x) data files  
- Perform basic summary statistics on this sample using Stata, SPSS and/or R  
- Perform background research (review of literature) relevant to the project  
- Contribute to next stage of research as willing/able, including training of algorithms under the direction of our research colleagues  

What you will deliver (minimum):  
- Fully coded, time/date stamped, matched dataset  
- Basic literature review  
- Basic summary statistics of training dataset  

You could also have a chance to:  
- Observe real-life study data collection in a clinical population (if you are able and willing to be vaccinated for vaccine-preventable diseases)  
- Present your findings at a conference  
- Contribute to a peer-reviewed publication with your research” |
| Suitable for: | Please note that this project is ONLY suitable for students enrolled in the following courses/majors:  
- Physiotherapy  
- Exercise Science (Exercise and Nutrition Sciences and Exercise and Sport Sciences)  
- Clinical Exercise Physiology  
- Biomedical Engineering (Electrical and Biomedical Engineering)  
- Health Sciences  
- Health, Sport and Physical Education  
- Medicine (MD)  
  - pre-medical provisional students interested in MD-HDR pathway who have completed subjects in human movement  
- Occupational Therapy |
### Project title:
Exploring profiles of young people referred for threat assessment with an adolescent forensic mental health service

### Project duration:
- Length of project: 8 weeks
- Hours expected per week: 20 hrs

### Description:
This research project will involve a retrospective, cross-sectional investigation of young people referred to the Forensic Child and Youth Mental Health Service (CYMHS) for a threat or risk assessment. Drawing from case file data, the research aims to better understand the presentation and profiles of young people identified as posing a specific threat to others and explore how they may differ from young people referred for assessment of general violence risk. The research will use descriptive analysis and multivariate modelling to understand the similarities and differences of these groups. The research will then focus exclusively on young people referred for a threat assessment and use descriptive and cluster analysis to explore threat profiles of young people assessed. It is anticipated that this research will deepen our understanding of young people who may pose a specific threat to others, in order to inform assessment and intervention strategies. As the research is exploratory in nature, specific hypothesis have not been developed.

**Research question one: Who is being referred for assessment?**
This research question will explore the demographics of young people referred for assessment, and what behaviours referrers identify as indicators of concern. This research will then explore how these identified behaviours are associated with the Typology of Warning Behaviours. It is anticipated that this research will provide insight into service need, as well as potential areas for referrer education.

**Research question two: Do young people referred for a risk assessment differ from young people referred for a threat assessment?**
This research question will explore how young people referred for risk assessment may differ from those referred for posing a specific threat to others. This research will use multivariate models to determine whether case history can predict a referral for a threat assessment or violence risk assessment. It is anticipated this research will contribute to understanding whether there may be a distinct group of young people at risk of engaging in a targeted attack, that are not well understood by reference to the violence literature.

**Research question three: What Warning Behaviours do young people referred for a threat assessment demonstrate?**
This research question will explore the prevalence and frequency of each of the eight warning behaviors identified in a thorough assessment with young people, as well as describe how these warning behaviours are manifested across the cases. Possible behaviour clusters will be explored to determine if Warning Behaviours may be helpful in identifying sub-groups of threat types. This will support training for referrers to better
identify warning behaviours in young people they work with.

*Research question four: What is the ACTION profile of young people referred for a threat assessment?*

This research question will explore the profile of Attitudes, Capacity, Threshold crossing, Intent, Other’s Reactions and Noncompliance in young people referred for a threat assessment. Possible profile clusters will also be explored to determine if there may be sub-groups of threat types. This research will provide insight for further possible areas of enquiry to better understand threat assessment, as well as provide valuable information for training of future clinicians.

**Location:** Child and Youth Mental Health Service, Level 10, 199 Grey Street, South Brisbane

**Expected outcomes and deliverables:** It is anticipated that the student will gain experience using an administrative database to collect research data, analysis of descriptive data and exposure to multivariate modelling techniques, and writing for publication in the project. Students will be expected to make a significant contribution to the data collection and disseminate preliminary research findings to the Forensic CYMHS team through an oral presentation at the conclusion of the placement.

**Suitable for:** This project is suitable for students with an interest in criminology, social science, social work, psychology, policing or human services

**Primary Supervisor:** Christel Middeldorp  
c.middeldorp@uq.edu.au

**Further info:** The supervisor CAN be contacted by students prior to submission of an application

**Project title:** What do they need, what do we have, what is received? Looking at health service provision following a concussion in Queensland

**Project duration:** Length of project: 10 weeks  
Hours expected per week: 25 hrs

**Description:** Program background: Concussion is a common diagnosis in childhood and can lead to long-term problems that impede returning to school and sport participation. Over the last decade, researchers and healthcare providers have increasingly realized the significant morbidity associated with concussion. Once thought to be a “trivial” injury, the healthcare needs are increasingly recognized as well as the potential short-falls in healthcare systems. Although some rehabilitation interventions are time- and resource-intensive, there are also cheaper intervention strategies that can help the majority of children. As part of our program to improve the outcome of childhood concussion and traumatic brain injury throughout Queensland, the aim of this summer research project is to investigate its healthcare needs and associated costs in Queensland children. We hypothesize that there will be considerable heterogeneity in the services children receive and that there will be considerable sociodemographic variability with children in poorer and more remote areas being at risk of not receiving both low cost (education) and intervention(high cost) strategies they need. Approach: The successful candidate will be part of a healthcare utilization team (neurologist, physiatrist, economist, and allied health professionals), investigating needs and costs associated with Traumatic Brain Injury in Children. A funded cross-sectional study is
The student project will be vital to the program an focus on mild TBI and concussion. During this 10 week project the student will help collect vital health service utilization and outcome data on children with TBI focusing on mild injuries. This topical project has the potential to inform local and national governing bodies.

**Location:** Centre for Children’s Health Research, South Brisbane

**Expected outcomes and deliverables:** The successful applicant can expect multiple useful outcomes that will help them plan their future career. Firstly, the student will be quickly integrated into the ABiC research team (A/Prof Barlow, research nurse Rachel, health economist Kim Nguyen, neuropsychologist Owen Lloyd and Allied Health coordinator and researcher Penny Ireland). He/she will gain unique experience in methodologies to assess health service utilization and associated economic costs. We expect the student to be able to analyze data (with supervision and help) to produce a working draft of a research paper focusing on mild TBI and concussion by the end of the summer studentship. He/she will be able to be intimately involved in the subsequent processes necessary to get this paper to publication. The student will be expected to present the results of their work firstly at an informal lab meeting and then at a centre research presentation in February 2020.

**Suitable for:** Students seeking to do Honors, MSc, PhD and Medical degrees.

**Primary Supervisor:** Karen M Barlow  
k.barlow@uq.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application.

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**Project title:** Neuromodulation and cortical excitability in Children with Persistent Symptoms following a Concussion

**Project duration:** Length of project: 10 weeks  
Hours expected per week: 25 hrs

**Description:** Program background: Concussion is a common diagnosis in childhood and can lead to long-term neurological and psychological problems that impede returning to school and sport participation. Rehabilitation interventions are time- and resource-intensive with significant healthcare and family out-of-pocket expenses. We use advances in developmental neuroscience to probe how whole-brain network function relates to clinical symptoms. Further, in our state of the art KidStim lab we also employ non-invasive brain stimulation methods to both probe pathogenic mechanisms and modulate brain networks (“re-wire the brain”) to improve outcome of concussion. The aim of this summer research project is to explore the use of transcranial magnetic stimulation (TMS) to investigate the relationships between clinical phenotypes, brain excitability, and recovery profiles following childhood concussion. We hypothesize that pre-injury migraine will influence cortical excitability, and that this is a key pathogenic mechanism impeding recovery following concussion. Approach: The successful candidate will gain hands-on experience in the KidStim lab and will examine cortical excitability in children with persistent post-concussion syndrome (PPCS) using the MagStim TMS device and the Visor2 neuronavigation system. He/she will analyse previously acquired clinical and TMS data on 99 children with PPCS to determine the influence of phenotype on outcome and cortical excitability. During this 10 week
<table>
<thead>
<tr>
<th><strong>project</strong></th>
<th>The student will be expected to integrate into the KidStim Team and help collect vital TMS and clinical outcome data on children enrolled in a randomized controlled clinical trial of TMS to treat Childhood PPCS.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location:</strong></td>
<td>Centre for Children’s Health Research, South Brisbane</td>
</tr>
<tr>
<td><strong>Expected outcomes and deliverables:</strong></td>
<td>The successful applicant can expect multiple useful outcomes that will help them plan their future career. Firstly, the student will be quickly integrated into the KidStim research team (A/Prof Barlow, research fellow Kartik Iyer, research assistant Jasmine, research nurses Rebecca and Amanda, and research coordinator Hema Moench). He/she will gain unique experience in neuronavigation, and TMS methodologies to assess cortical excitability. Although the student will not have primary responsibility for applying these techniques they will be able to assist in the lab in the assessment of children with PPCS and their participation in a trial using repetitive TMS (a form of neuromodulation therapy). These skills are unique and invaluable if applying to neuromodulation labs internationally. Using data already collected, we expect the student to be able to analyze data (with supervision and help) to produce a working draft of a research paper by the end of the summer studentship. He/she will be able to be intimately involved in the subsequent processes necessary to get this paper to publication. The student will be expected to present the results of their work firstly at an informal lab meeting and then at a centre research presentation in February 2020.</td>
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<tr>
<td><strong>Suitable for:</strong></td>
<td>Students interested in honors projects, MSc or PhD in developmental neuroscience.</td>
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</table>
| **Primary Supervisor:** | Karen M. Barlow  
k.barlow@uq.edu.au |
| **Further info:** | The supervisor MUST be contacted by students prior to submission of an application |

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<tr>
<th>06 <strong>Project title:</strong></th>
<th>The effectiveness of ablative fractional CO2 laser and medical needling for burn scars</th>
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</table>
| **Project duration:** | Length of project: 8 weeks  
Hours expected per week: 36 hrs |
<p>| <strong>Description:</strong> | The project will be part of a 3-arm, pilot randomised trial, involving 36 children aged 0 to 16 years with hypertrophic burn scars (identified using ultrasound). Three interventions for children with hypertrophic scars are being compared: medical needling, ablative fractional CO2 laser and standard care. Data collection is currently occurring at the Queensland Children’s Hospital. Follow-up will occur up to 12-months after the intervention has commenced. The aim is to determine whether the laser therapy or medical needling therapy is more effective than Care As Usual in improving ultrasound scar thickness, health-related quality of life and cost-effectiveness, and other outcomes. |
| <strong>Location:</strong> | Centre for Children’s Health Research, South Brisbane |
| <strong>Expected outcomes and deliverables:</strong> | Scholars will gain experience collecting and cleaning study data, contributing to clinical register data collection and preparation of a publication, and will attend clinical and research meetings as part of an interdisciplinary research team. The student will likely contribute to cost-effectiveness data preparation, laboratory analyses and analysing and writing up preliminary work on which the trial has been based (e.g., reliability of ultrasound testing and health-related quality of life measures). |</p>
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<tr>
<th>Suitable for:</th>
<th>Highly suitable for pre-medical students interested in MD-HDR pathway, students with experience working in interdisciplinary teams, and students with a biomedical science or science background.</th>
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</table>
| Primary Supervisor: | Zephanie Tyack  
z.tyack@uq.edu.au |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

**Project title:** Using patient-reported outcome measures in clinical consultations with children with life-altering skin conditions

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 36 hrs

**Description:**
The completion of patient-reported outcome measures (PROMs) by patients and feedback of this information to patients and health professionals has been shown to be beneficial. PROMs are questionnaires completed by patients about their health condition. Few rigorous studies using PROMs have been conducted in children. This project will be part of a randomised trial with children and caregivers attending outpatient clinics with a range of skin conditions, to determine whether completing questionnaires about the child’s quality of life is beneficial, acceptable, and cost-effective. Students will work as part of a research team including clinical medical specialists, a health economist, statistician, research fellows and occupational therapists.

**Location:** Centre for Children’s Health Research, South Brisbane

**Expected outcomes and deliverables:** Scholars will gain skills in recruiting patients for a study, collecting data for a study, contributing to clinical registry data collection, contributing to preparing a publication, and participating in relevant clinical and clinical research meetings.

**Suitable for:** The project will be particularly suited to pre-medical provisional students interested in MD-HDR pathway, but also to students who may have qualifications or experience working in interdisciplinary teams or with allied health or nursing disciplines.

| Primary Supervisor: | Zephanie Tyack  
z.tyack@uq.edu.au |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

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**Project title:** Digital Palliative Care Support for the Queensland Ambulance Service

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 30 hrs

**Description:** Palliative care is defined by the World Health Organization as “an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical,
psychosocial and spiritual” (World Health Organization, 2019). One way to support quality of life for people with life-limiting illnesses is to promote care that is consistent with the person’s wishes and values. Fulfilling a person's wish to die at home is not only important for the person dying, but also assists family and friends in the grieving process. However, more clinical support is needed to facilitate palliative care in the home. When clinical uncertainties or stresses arise it is often ambulatory services that get called. A paramedic service with real-time links to a palliative care service may be able to facilitate support and advice at the time when carers are unsure of how to proceed or when pain relief is needed. Aligning with best evidence based practice, a collaboration between the Queensland Ambulance Service (QAS) and the Palliative Care Service at the Gold Coast Hospital and Health Service has been formed to assist in the appropriate referral and management of palliative care patients who request emergency response by the QAS. This collaboration will provide real time, in home videoconference advice, in support of the attending paramedics, by the Palliative Care Service. Through interviews and online surveys, this study will examine paramedics’ acceptance and adoption of telehealth-facilitated consultations with the GCHHS Palliative Care Telehealth Service. It will evaluate the impact of the consultation model on patient outcomes, clinician perspectives and paramedics' self-efficacy in palliative care.

Location: Building 33, Princess Alexandra Hospital, Woolloongabba

Expected outcomes and deliverables: Scholars will have the opportunity to work within a multidisciplinary research centre and observe how research on online health is undertaken. They will gain access to a rich clinical research environment based at the PA hospital and including the state of the art PA Telehealth Centre.

As part of this project, in collaboration with the student's wishes, the student may gain skills in qualitative and/or quantitative research methods (including interviewing, survey distribution and analysis, literature searches and contribution to a research manuscript. Depending upon contribution, the student may have the opportunity to be authored on a peer reviewed journal article.

Students may be asked to produce a report or an oral presentation at the end of their project.

Suitable for: Essential: The scholar is expected to have good computer literacy, able to competently use Microsoft software (e.g. Word, Excel). They need to be conscientious and have good attention to detail.

Primary Supervisor: Helen Haydon
h.haydon@uq.edu.au

Further info: The supervisor MUST be contacted by students prior to submission of an application


Project duration: Length of project: 8 weeks
Hours expected per week: 28 hrs

Description: The Global Drug Survey is the largest anonymous survey of drug users around the world. We have annual data spanning 2013-2018 (with almost
We have respondents from over 30 countries completed a survey of their drug use: ever, last 12 months and recent use. We have data on over 100 different types of drugs: on the less typical drugs for example GHB, ketamine, and many Novel Psychoactive Substances (NPS) and the more common drugs for example cocaine, methamphetamines, cannabis and synthetic cannabis, and alcohol. If you are interested in drug and alcohol research, this project is for you.

We are looking for a highly motivated scholar to prepare one paper of which you will be authored analysing the GDS data. If you want to know more see (http://www.globaldrugsurvey.com/)

**Location:** Princess Alexandra Hospital, Woolloogabba

**Expected outcomes and deliverables:** The scholar will gain experience working in an active health-related research environment, and will be included in all day-to-day activities in the Centre for Health Services Research. The scholar will develop essential skills relating to conducting comprehensive literature reviews, quantitative data analysis and in drafting academic articles for publication. The scholar will have an opportunity to be a named author on a journal article.

**Suitable for:** This project is suitable for students with a background in any health-related field of study. This would particularly suit an individual with a strong interest in substance use research.

**Primary Supervisor:** Jason Ferris
j.ferris@uq.edu.au

**Further info:** The supervisor CAN be contacted by students prior to submission of an application

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**Project title:** A systematic review of the non-health related benefits of smoking cessation among Australia's priority populations

**Project duration:** Length of project: 8 weeks
Hours expected per week: 28 hrs

**Description:** While smoking has declined in the general Australian population, it remains highly prevalent in some priority subpopulations, such as people living in rural and remote areas, Aboriginal and Torres Strait Islander populations, people who experience incarceration, and people with mental illness. There is also a lack of available evidence around the non-health related benefits of quitting smoking among marginalised populations, and in particular the financial, social and psychological costs of smoking as motivating factors for individuals to quit smoking. This is important to understand considering that many smokers consider the cost of smoking as a more motivating reason to quit than the known impacts of smoking on health, and that the rate of smoking cessation among the Australian population has levelled out in recent years, suggesting that new and innovative perspectives on smoking cessation strategies are needed. The proposed project is a systematic review of the available peer-reviewed literature on the non-health related benefits of smoking cessation. The results of this study will be used to recommend innovative and evidence-based strategies to promote smoking cessation among priority groups of the Australian population.

The project co-ordinator has already completed database searches for relevant articles. The successful scholar will assist in updating the search,
and will then extract all relevant data from these articles by compiling a spreadsheet of relevant measures and outcomes. As time permits, the scholar will then assist in creating a first draft of the article, and will be a named co-author on the manuscript when it is submitted for publication.

| Location: | Princess Alexandra Hospital |
| Expected outcomes and deliverables: | The scholar will gain experience working in an active health-related research environment, and will be included in all day-to-day activities in the Centre for Health Services Research. The scholar will develop essential skills relating to systematic reviews (e.g. database searches, data extraction) and in drafting academic articles for publication. The scholar will have an opportunity to be a named author on a journal article. |
| Suitable for: | This project is suitable for students with a background in any health-related field of study. This would particularly suit an individual with a strong interest in health research and particularly in interventions for smoking cessation. |
| Primary Supervisor: | Cheneal Puljevic <c.puljevic@uq.edu.au> |
| Further info: | The supervisor CAN be contacted by students prior to submission of an application. |

| 11 Project title: | Do frail hospitalised patients have an Advance Health Directive? |
| Project duration: | Length of project: 6 weeks Hours expected per week: 20 hrs |
| Description: | The Centre for Health Services Research (CHSR) has a dataset of approximately 7000 cases referred for specialist geriatric consultation. The data collected on each patient uses the interRAI Acute Care-Comprehensive Geriatric Assessment. This instrument surveys a large number of domains, including cognition, communication, mood and behaviour, activities of daily living, continence, nutrition, skin condition, falls, medications and medical diagnosis, which can be used to calculate a Frailty Index [1]. Also collected is whether the patient has in place an Advance Health Directive. The aim of the project will be to investigate the proportion of patients that have an Advance Health Directive and whether this varies by frailty status and carer support. |
| Location: | Princess Alexandra Hospital, Woolloongabba |
| Expected outcomes and deliverables: | Applicants can expect to gain knowledge in data cleaning and analysis of large datasets will be expected to present their findings to the Ageing and Geriatric Medicine Research Group in CHSR. |
| Suitable for: | UQ Students studying health related subject areas |
| Primary Supervisor: | Nancye Peel <n.peel@uq.edu.au> |
| Further info: | The supervisor CAN be contacted by students prior to submission of an application |

| 12 Project title: | Quality Indicators for the Aged |
| Project duration: | Length of project: 6 weeks |

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### Project 1

**Description:**
Quality of Care is an international priority in health service delivery. Our Centre provides a unique methodology for the development of quality indicators. We aimed to develop outcome, process and structure quality indicators in relation to common geriatric syndromes and function for the care of the frail aged hospitalised in acute general medical wards and the emergency department. A formal approach was taken for the development of quality indicators, including expert opinion, field study data and a formal voting process. We are at the concluding end of this project where involvement provides unique insight into the methodology for developing quality indicators and manipulating complex datasets.

**Location:** Building 33, Princess Alexandra Hospital, Woolloogabba

**Expected outcomes and deliverables:**
"Small literature searches will be completed to update the evidence on geriatric syndromes relating to the quality indicators to assist in finalising the documentation for publication. Some data checking will be carried out. There will be an opportunity to manipulate the dataset using SPSS to provide some frequency data and prepare some tables.

A sophisticated voting system has been used with the expert panels to finalise these QIs. A round of voting will be undertaking during this period. The scholar will have the opportunity to facilitate the voting which will be a unique learning experience."

**Suitable for:**
An individual with a keen eye for detail, and a willingness to learn new skills. All information will be explained on the job so no prior experience is required

**Primary Supervisor:** Melinda Martin-Khan
m.martinkhan@uq.edu.au or 3176 6966

**Further info:** The supervisor CAN be contacted by students prior to submission of an application

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### Project 2

**Project title:** Establishing a baseline for healthcare practice change

**Project duration:** Length of project: 6 weeks
Hours expected per week: 25 hrs

**Description:**
The CHSR is conducting translation research around the transformation of patient assessment practices in acute care settings, supported by the introduction of new technology. The impact of these changes cannot be measured without an accurate baseline. Establishing baseline measurements in complex healthcare settings is challenging and requires the adoption of validated practices as well as the ability to understand and assess the current environment. During the time of this Summer Scholarship, we will be collecting baseline data for three large public hospitals and in late stage planning for baseline data collection in several others. The successful candidate will work with the research team on an assigned component of the evaluation methodology to identify, collect and report appropriate baseline measures for a state-wide change to patient assessment practices.

**Location:** Building 33, Princess Alexandra Hospital
**Expected outcomes and deliverables:** Applicants will gain a working knowledge of the challenges involved in accurately capturing work practice and compliance with approved practices in a healthcare system with devolved management and manual procedures. Scholars will be asked to review current literature to identify commonly reported measures and data collection challenges; collaboratively design strategies for collecting baseline data in an assigned content area; assist with data collection; and have the opportunity to contribute content for inclusion in a scientific publication on the evaluation methodology. Students will also be asked to produce an oral presentation at the end of their project.

**Suitable for:** Applicants with an interest in applying theory in complex practical settings. A background in public health, nursing or allied health studies is desirable.

**Primary Supervisor:** Alyssa Welch  
a.welch1@uq.edu.au or 0438 629 310

**Further info:** The supervisor CAN be contacted by students prior to submission of an application.

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### Project title: Health economics in pharmacy

**Project duration:** Length of project: 8 weeks  
Hours expected per week: 20-36 hrs

**Description:** Dr Centaine Snoswell is a health economist at the Centre for Health Service Research (CHSR). Prior to specialising in health economics Dr Snoswell was a hospital pharmacist, and she continues to maintain one day a week at the Princess Alexandra Hospital. This project will involve assisting Dr Snoswell with her health economic projects focused on data from her pharmacy work. Depending on the maturity of the data by the start of the summer semester this summer scholars project may include an economic analysis evaluating the implementation of a pharmacist into a transit care hub or resuscitation role, or an alternate data set from one of Dr Snoswell’s other pharmacy-focused projects. Given the health economic focus of this project it is likely that tasks will include literature review, data analysis of deidentified data, health economic modelling, regression analysis, and manuscript preparation. Students with some or all of their skills are welcome to apply. This project will not be based in the hospital but at UQ CHSR, and will be very data focused.

**Location:** Princess Alexandra Hospital, Woolloogabba

**Expected outcomes and deliverables:** Students will assist was data analysis and literature review. It is expected that the results will be used to craft a conference abstract or publication in the future.

**Suitable for:** Students interested in health economics, health service delivery, data analysis, writing and literature review procedures. Health economics knowledge and advanced statistics or data analysis skills desirable but not essential.

**Primary Supervisor:** Centaine Snoswell  
c.snoswell@uq.edu.au

**Further info:** The supervisor CAN be contacted by students prior to submission of an application.

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### Project title: Is sitting related to brain health?

**15 Project title:** Is sitting related to brain health?
Project duration: Length of project: 7 weeks
Hours expected per week: 32 hrs

Description: As well as being the second leading cause of death in Australia, dementia confers a large personal, social and economic cost. In the absence of an effective cure, there is a real need for strategies that can prevent or delay the onset or dementia. Dementia is characterized by a decline in cognition involving one or more domains (learning and memory, language, executive function, complex attention, perceptual-motor, social cognition) so declines in cognitive function are often used as a proxy for dementia, however it is recognised that not all people who experience cognitive decline will develop dementia.

An extensive body of evidence shows that good sleep and physical activity confers many benefits for brain health, however most adults do not participate in sufficient levels of activity to receive these benefits. There is strong evidence to demonstrate that time spent sitting is detrimentally associated with multiple chronic diseases, however, less is known about the impact of sitting time on brain health.

This project is a systematic review and meta-analysis to examine the evidence on sitting time and brain health.

Aims
1. To explore the relationship between total sedentary behaviour time and cognitive function and/or cognitive impairment in mid-age and older adults.
2. To explore the relationship between the type of sedentary behaviour and cognitive function and/or cognitive impairment in mid-age and older adults

Location: R wing, Princess Alexandra Hospital, Woolloogabba

Expected outcomes and deliverables: The student will gain experience in developing a search protocol, searching electronic databases, reviewing papers for quality, and extracting data. The student will be an author on publications relating to this systematic review.

Suitable for: A background in medicine, psychology or public health would be an advantage. Experience in literature searching and conducting systematic reviews will be beneficial.

Primary Supervisor: Paul Gardiner
p.gardiner@uq.edu.au

Further info: The supervisor MUST be contacted by students prior to submission of an application.

16 Project title: Telepaediatric screening for ear disease in an indigenous population

Project duration: Length of project: 8 weeks
Hours expected per week: 36 hrs

Description: The Centre for Online Health is the premier research unit for telehealth services in Australia. We are seeking one or two Summer research students to assist with literature review and data analysis for ongoing projects. This project will focus on the epidemiological analysis of a data set from a paediatric health screening program operated in regional Queensland. We
have a comprehensive data set containing from ten years of screening activity and would like to offer a student/s with advanced data analysis skills to examine the prevalence of chronic ear disease and it’s recurrence over time. Students will be given the opportunity to analyse de-identified data and produce descriptive statistics, propose and perform analysis, and perform a narrative analysis on literature in the area.

**Location:** Princess Alexandra Hospital, Woolloongabba

**Expected outcomes and deliverables:** Students will assist with data analysis and literature review. It is expected that the results will be used to craft a conference abstract or publication in the future.

**Suitable for:** Students interested in health service delivery, telehealth, paediatric services, data analysis, and literature review procedures. Ideal for a student with advanced data analysis and epidemiology knowledge.

**Primary Supervisor:** Anthony Smith

**Secondary Contact:** Dr Centaine Snoswell - c.snoswell@uq.edu.au

**Further info:** The supervisor CAN be contacted by students prior to submission of an application.

### 17 Project title: Testing the effectiveness of interactive and personalised text messages for improving sun protection behaviours in young to mid-aged adults

**Project duration:** Length of project: 8 weeks  
Hours expected per week: 25hrs

**Description:** Background: The University of Queensland researchers want to help reduce the number of sunburns in young Queenslanders. We also want to find unique, effective and contemporary ways of delivering health behaviour messages to young people.

Research Aim: The purpose of this research is to assess the effectiveness of SMS text messages in improving sun protection behaviours in young to mid-aged adults (18-40 years).

**Location:** Building 33, Princess Alexandra Hospital, Woolloongabba

**Expected outcomes and deliverables:** Participants will be asked to assist with data collection, including online survey distribution. You will be asked to conduct data analysis using Statistical Software to assist generating and writing publications and reports.

**Suitable for:** Students enrolled in a Health degree

**Primary Supervisor:** Monika Janda  
m.janda@uq.edu.au

**Further info:** The supervisor CAN be contacted by students prior to submission of an application.

### 18 Project title: Data-oriented approaches to alcohol-related violence

**Project duration:** Length of project: 8 weeks  
Hours expected per week: 28hrs

**Description:** In 2016, the state government in Queensland implemented the multi-faceted Tackling Alcohol-Fuelled Violence (TAFV) policy. The policy’s introduction was prompted by community concerns around high levels of
alcohol-fuelled violence in Queensland. Key elements of the TAFV policy include a ban on the sale of high alcohol-content drinks after midnight, and the introduction of networked ID scanners in licensed premises open after midnight located in Safe Night Precincts, such as Fortitude Valley. Our research team (www.QUANTEM.org) was tasked with the evaluation of this policy, drawing on over 30 sources of data to understand the policy’s impact, making it one of Australia’s largest alcohol policy evaluations to date. These 30 datasets include official police, ambulance, hospital admissions, courts, and coronial data, as well as surveys with patrons and key stakeholders. Although the evaluation’s findings are still under embargo with the Queensland government, this position will allow for a student to analyse and draft a manuscript based on one aspect of the project. The specific focus of the project will be developed in consultation with the successful candidate. The findings of this project will provide policy makers and other key stakeholders with an improved understanding of the intended and unintended consequences of policies aiming to reduce alcohol-related harms.

| Location: | Princess Alexandra Hospital, Woolloongabba |
| Expected outcomes and deliverables: | The scholar will gain experience working in an active health-related research environment, and will be included in all day-to-day activities in the Centre for Health Services Research. The scholar will develop essential skills relating to conducting comprehensive literature reviews, quantitative data analysis and in drafting academic articles for publication. The scholar will have an opportunity to be a named author on a journal article. |
| Suitable for: | This project is suitable for students with a background in any health-related field of study. This would particularly suit an individual with a strong interest in health research and particularly in alcohol-related violence and/or alcohol policy. |
| Primary Supervisor: | Jason Ferris  
j.ferris@uq.edu.au |
| Further info: | The supervisor CAN be contacted by students prior to submission of an application. |

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### Ochsner Clinical School

<table>
<thead>
<tr>
<th>19 Project title:</th>
<th>Optimization of seizure control after completion of diagnostic work up during hospital stay in the EMU</th>
</tr>
</thead>
</table>
| Project duration: | Length of project: 8 weeks  
Hours expected per week: 25 hrs |
| Description: | During a diagnostic evaluation in the epilepsy monitoring unit (EMU) for seizure localization and characterization, the patient’s anti-epileptic drugs (AEDs) are often tapered down or discontinued. This can be associated with a short term increased risk of seizures. Once the diagnostic evaluation is complete it is imperative to restart anti-seizure therapy. However, the taper of home AED(s) regimen disrupts the pharmacokinetic steady state of the AED(s) and can lead to a prolonged risk of breakthrough seizures that may persist for several days. There are no standard or universally accepted guidelines on how to mitigate this risk. At Ochsner we have incorporated 3 strategies (often used in combination): Initiation of an |
additional oral AED(s), Intravenous loading of AED(s), and oral benzodiazepine course for up to 7 days.

This outcomes research project will have 2 goals:
(1) We will assess the success of individual optimization strategies in rapid seizure control. We will perform a sub analysis of the outcomes of these strategies in relation to patient characteristics including refractoriness of epilepsy to AEDs, AED titration patterns in the EMU, and seizure occurrences in the EMU.
This answers the questions: “How can seizure control be optimized in patients in the EMU at the time of discharge?” “How can we minimize the risk of seizures following hospital discharge?”
(2) Analyze the additional length of stay (LOS) needed to execute the optimization strategies and ensure a safe discharge.
This will answer the question: “What is the optimal expected LOS for patients in the EMU?” We will perform an in-depth retrospective chart review of patients with epilepsy managed in the Ochsner EMU during 2014-2019 (5 years).

Location: Ochsner Main Campus - Neurology clinic, New Orleans, USA

Expected outcomes and deliverables:
The student shall benefit from development of research skill set(s), research publications, and will allow him/her to be a competitive applicant for residency. The student is encouraged present his/her research results at a scientific meeting.

Suitable for: Motivated students with basic experience using Excel

Primary Supervisor: Fawad A. Khan
fakhan@ochsner.org

Further info: The supervisor CAN be contacted by students prior to submission of an application
### Project 21

**Project title:** Immune check point inhibition therapy for solid cancers using patient-derived orthotopic xenograft mouse models

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 36 hrs

**Description:**
Solid cancer metastasis is a complex and multistep process. Programed cell death-1 (PD-1) and programed cell death ligand-1 (PD-L1) antibodies have shown great promise in treating many cancers through boosting the immune response. However, the anti-metastatic properties of combination of PD-1/PD-L1 antibodies with conventional cancer treatment in solid cancers for individual cancer patient have not yet been well studied. Therefore, our aims are 1) to expend human immune system cells in vitro while retain their immune response activities, and 2) to study if the combination of PD-1/PD-L1 antibodies with conventional cancer therapies can significantly improve the inhibition of solid cancer growth and metastasis by using patient-derived orthotopic xenograft (PDOX) models in humanized Rag2-IL2rg Double Knockout (Rag2) mice.

**Location:** Laboratory of Translational Cancer Research, Ochsner Clinic Foundation, Benson Cancer Center, 1N505, 1514 Jefferson Highway, New Orleans, LA 70121

**Expected outcomes and deliverables:**
Student will gain biological research experimental skills in participation of this project. He/she will have opportunities to generate report such as abstract(s)/poster(s) or podium presentation(s) at local and regional research conferences from their research, e.g., Ochsner Research Day abstract/poster; LCRC Science Retreat abstract/poster; and/or Southern Regional Meeting abstract/podium presentation.

**Suitable for:**
This project is open to applications from UQ/Ochsner Medical students with previous wet laboratory experiences preferred.

**Primary Supervisor:**
Stephen Bardot  
sbardot@ochsner.org

**Further info:**
The supervisor MUST be contacted by students prior to submission of an application

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### Project 22

**Project title:** Use of antithrombotic medicines in elderly patients

**Project duration:**
- Length of project: 6 weeks
- Hours expected per week: 30 hrs
### Description:
In patients with cardiovascular disease, treatment commonly includes antiplatelet therapy and/or oral anticoagulant therapy. Past prospective and retrospective studies provide evidence that very elderly patients (age ≥75 years old) have increased risk of bleeding when treated with these agents, but the efficacy of antithrombotic therapy in this population is controversial. What has not been examined in these patients is the baseline demographic and/or clinical characteristics these patients possess and whether or not this plays a role in selection of therapy and/or selection of therapy. Frequently, inappropriate antithrombotic therapy (or no therapy) is chosen for elderly patients based on perceived risk and/or cost of the therapy. However, the extent to which this happens, and the patient factors behind these decisions is currently unknown.

This project will use the EMR at Ochsner to characterize the demographic and clinical profile of very elderly patients (age ≥75 years old) treated with anticoagulant therapy, antiplatelet therapy, or both. Clinical characteristics of very elderly patients who are prescribed antithrombotic therapy alone will be compared with younger patients (age < 60 years old) as well as patients in between (age ≥60 - < 75 years old). Additionally, bleeding rates in these patients will be characterized by age and antithrombotic agent and qualitatively compared.

The results of these analyses should give insights into the use of these agents to allow for more effective and safer use of these agents in the very elderly population.

### Location:
Ochsner Clinical School, New Orleans, USA

### Expected outcomes and deliverables:
The student will work with a Cardiology fellow, information scientist, and statisticians to create a database of patients according to various diagnoses requiring antithrombotic therapy. The patient data will then be sorted by antithrombotic agent and the data analyzed for insights into the use of antithrombotic therapy. The student will be expected to coordinate the various personnel involved, shepherd the data handling from beginning to end, and preparing abstracts for major meetings and manuscripts for publication.

The student will be mentored on design and approach to observational research, underlying scientific background to this research question, data interpretation, and presentation of the data.

### Suitable for:
Incoming 3rd or 4th year students

### Primary Supervisor:
Mark B. Effron  
mark.effron@ochsner.org

### Further info:
The supervisor CAN be contacted by students prior to submission of an application

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<table>
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<tr>
<th>23 Project title:</th>
<th>Prevalence, Risk factors, and Short Term Impact for infection with Carbapenem Resistant Enterobacteriaceae among inpatients at a Tertiary Hospital in Bangladesh01</th>
</tr>
</thead>
</table>
| Project duration: | Length of project: 8 weeks  
Hours expected per week: 36 hrs |
| Description:     | Carbapenem resistant enterobacteriaceae (CRE) has emerged as a major public health concern globally. The overall prevalence and the number of countries reporting CRE from clinical isolates has increased dramatically |
over the past decade. The Centers for Disease Control (CDC) defines CRE as Klebsiella sp, Escherichia coli and Enterobacter sp that are resistant to carbapenem antibiotics. CRE infections are associated with high rates of mortality and create a high financial burden on health systems. This is largely due to the limited availability and access to antibiotics that are effective against CRE.

A number of studies have looked at risk factors for CRE in different geographic settings. Risk factors associated with CRE in published studies include prior hospitalization within 90 days, antibiotic use within 90 days, longer hospital stay, immunocompromised patients and history of surgical procedures. Due to limited active surveillance in Bangladesh, there is little data on prevalence and risk factors for CRE in Bangladesh. This information would be invaluable to the design of programs to decrease rates of CRE infections. We propose a study to assess the prevalence of CRE at a tertiary facility in Bangladesh.

Primary objective
To determine the prevalence of CRE infections in blood, urine and wound cultures among hospitalized patients at a tertiary facility in Bangladesh.

Secondary objectives
To determine risk factors associated with CRE infections among hospitalized patients.
To determine the proportion of CRE isolates that are carbapenemase producers.
To determine the type of carbapenemase enzymes present among carbapenemase producing CRE (CP-CRE) isolates recovered in culture.

Location: Ochsner Medical Center, New Orleans, USA

Expected outcomes and deliverables: Results from this study will help guide public health policy in Bangladesh. Knowledge of prevalence and risk factors for CRE infections will be useful for developing programs to decrease the rate of CRE infections.

Suitable for: Applicants interested in global health. Students who are passionate about public health and healthcare in resource constrained environments are preferred.

Primary Supervisor: Obinna Nnedu onnedu@ochsner.org

Further info: The supervisor MUST be contacted by students prior to submission of an application.
progestogen based contraceptives in medical practice. This is because of its ease of administration, cost, wide availability and generally favorable tolerability profile. One significant adverse effect of provera use that has recently become more recognized is its capacity to cause significant weight gain in a subset of women using it for contraceptive purposes. Details as to the prevalence of this adverse effect and predictors/risk factors of its onset are largely unknown. The rising prevalence of obesity and its attendant complications and comorbidities has made the appreciation of medication associated weight gain and obesity a particularly important public health and clinical issue. The widespread use of provera in women of reproductive age thus makes a better detailing of the prevalence and predictors of this very importance. To provide preliminary data in this regard about provera associated weight gain (PAW) we propose a retrospective chart analysis over a 3 year observation period of premenopausal women within the Ochsner system who were prescribed provera either as oral tablets or depot injections and identifying a subset among these women who experienced PAW. This cohort will then be compared to the rest of the general cohort of provera treated women over the same period to estimate the prevalence of this condition and characterize its demographic and clinical parameters and predictors.

Aims and objectives
1. To determine the prevalence of PAW as defined as > 5% weight gain from baseline weight after commencing provera within the first year since commencement over a period of 3 years (Jan 2016-Jan 2019).
2. To determine over the observation period the prevalence of development of obesity and other cardiometabolic risk surrogates including development of the metabolic syndrome in women who develop PAW over the study period.
3. To determine if route of administration, dose and concomitant estrogen based contraceptive use modulate the prevalence and severity of PAW.
4. To compare and contrast the cohort of women with PAW over the study period with other women treated with provera who remained essentially weight neutral to elucidate if there are any demographic, historical and/or clinical parameters that distinguish both cohorts so as to provide clinically useful predictors of PAW development. Among parameters to be compared would include age, ethnicity, parity, baseline BMI, associated comorbid conditions like polycystic ovarian syndrome, hirsutism, diabetes, concomitant obesogenic medication use, tobacco use, alcohol use, indices of socioeconomic status etc.

Hypotheses;
1. That PAW will have a prevalence of >10% of the provera treated population
2. That obesity among PAW patients will be more prevalent than among the general population of provera treated women.
3. That depot provera will be more associated with PAW than oral provera use.
4. That PAW will be associated with cardiometabolic risk surrogates decline compared to provera using women without significant weight gain.
5. That there will be clinically useful predictor identifiable that can inform prospective risk stratification of premenopausal women for future risk of PAW.
Methods/approach
The EPIC records of the Ochsner health system from Jan 2016 to Jan 2019 is to be interrogated with the assistance with our data mining and biostatistician colleagues to identify the group of premenopausal women with initiation of provera (medroxyprogesterone acetate) over this period.

Using their baseline weight and BMI at the time of commencing provera, this identified cohort of premenopausal women will then be interrogated to identify those who gain at least 5% more weight following the start of provera within at least a year of prospective follow up and such women will constitute the cohort of women with PAW.

The basic demographics including age, ethnicity, BMI, parity, presence of cardiometabolic comorbidities (essential hypertension, diabetes, prediabetes, hyperlipidemia, polycystic ovarian syndrome, obstructive sleep apnea, hirsutism presence, fatty liver, tobacco and alcohol use as well socio-economic indices, insurance type and concomitant obesogenic medication use will be obtained from both the PAW and non PAW cohorts. Chronic kidney and heart disease, history of cancer and other chronic diseases such as pulmonary and liver disease if present will also be documented as important potential covariates and confounders of the derived data. In addition the baseline and yearly cardiometabolic surrogate measures over the observation period (blood pressure, pulse rate, lipid profile, HBA1c, insulin levels (where available), fasting glucose, waist circumference (where available), urine microalbumin, uric acid, AST, and ALT will also be obtained for both cohorts.

Using this derived data from both cohorts the prevalence of PAW is to be computed and then the two cohorts are to be compared with parametric and regression modelling statistical analyses to identify any significant predictors / distinctions between both cohorts that may serve to inform prospective predictive capacity for PAW in future premenopausal women being considered for this therapy.

| Location: | Ochsner Main Campus, Academic Center Research Division (2nd floor), New Orleans, USA |
| Expected outcomes and deliverables: | It is anticipated that the data generated by this project should result in abstract publications and presentations at Ochsner Research day as well as the national Obesity week meeting for November 2020. It is also possible depending on our findings that additional abstracts may be submitted to the National Endocrins Society and American Diabetes Association Meeting. It is also anticipated the findings of this project should also lead to at least one peer reviewed clinical manuscript for publication in a medline cited journal and the medical student involved in the project would be a co-author and possibly even first author on such a manuscript. It is also anticipated that the process of working on this project will enable the medical student gain valuable experience working with data analysts and biostatisticcians as well with developing and populating a study driven clinical data base. Some experience in data analysis is also expected to be derived from involvement in the project. |
| Suitable for: | Suitable for students interested in Endocrinology, female contraception, weight gain determinants and who have a interest in clinical research. |
| Primary Supervisor: | Gabriel I. Uwaifo  
gabriel.uwaifo@ochsner.org |
<table>
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<tr>
<th><strong>Further info:</strong></th>
<th>The supervisor CAN be contacted by students prior to submission of an application</th>
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<table>
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<tr>
<th><strong>25 Project title:</strong></th>
<th>The impact of patient education to define value in cardiovascular imaging.</th>
</tr>
</thead>
</table>
| **Project duration:**  | Length of project: 8 weeks  
Hours expected per week: 36hrs |
| **Description:**       | We have developed a non-proprietary educational video that explains exercise capacity, biological age/mortality, and demonstrates different activities and lifestyle changes people can make to improve their exercise capacity. We will use the video as well as a non-proprietary handout to educate patient on their biological age to improve patient engagement and affect behaviors that could have a positive impact an individual’s exercise capacity.  
Brief description of the theoretical and empirical goals of the study:  
Educate patients about the value of their imaging test including exercise capacity and individualized information about their biological age.  
Test if this education changes patient engagement via a patient activation measure questionnaire as well as exercise capacity measured on a follow up exercise stress test. |
| **Location:**          | Ochsner Main Campus, New Orleans, USA |
| **Expected outcomes and deliverables:** | Enrolment of patients and evaluation of data of first 50 patients |
| **Suitable for:**      | 3rd year medical school students |
| **Primary Supervisor:**| Nichole Polin  
sashah@ochsner.org |
| **Secondary Contact:** | Sangeeta Shah  
sashah@ochsner.org |
| **Further info:**      | The supervisor MUST be contacted by students prior to submission of an application |

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<tr>
<th><strong>26 Project title:</strong></th>
<th>Improving outcomes for spinal cord stimulation at Ochsner Health System - A preliminary retrospective study to establish an Interdisciplinary Neuromodulation Approach</th>
</tr>
</thead>
</table>
| **Project duration:**  | Length of project: 8 weeks  
Hours expected per week: 25-30 hrs |
| **Description:**       | Background: Spinal cord stimulation (SCS) can be an effective treatment for chronic and refractory neck, back or extremity pain resulting after laminectomy or spinal fusion. SCS is also used to relieve neuropathic pain caused by chronic regional pain syndrome or brachial plexus injury. With the advancements of novel stimulation paradigms and the increased clinician awareness about the efficacy of SCS, an increasing number of patients are being offered SCS to treat their chronic pain syndrome. |

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SCS has been shown to offer superior pain relief and inferior long-term healthcare costs when compared to conservative medical management. However, the long-term success rate of SCS can negatively be affected by poor patients selection methods, perioperative complications and lack of post-procedure follow-up or programming. Reports of relatively high explantation rates during the first year after implantation suggest that there is a need to standardize the practice and to come with meaningful guidelines.

Aim/Methods: The goal of this study is to retrospectively review all cases of SCS trials and permanent implants performed at Ochsner Health System in the last 20 years to assess indications, complications, pain outcomes assessment methods, explantation rates and incidence of subsequent spine surgery. The gathered data will allow development of regional institutional SCS practice guidelines to be implemented during interdisciplinary neuromodulation board conferences.

Location: Ochsner Health System, Main Campus, New Orleans, USA

Expected outcomes and deliverables: The scholar will have the opportunity to participate in a neurosurgery research and quality improvement program. She/he will have the opportunity to be part of a research team and to collaborate with Ochsner neurosurgery and pain management staff and Tulane University/Ochsner neurosurgery residents during this research project. The scholar will gain skills in data collection, review of electronic medical records. She/he will also be encouraged in preparing oral or poster presentations for regional/national or international meetings at the end of their project. Participation in journal article redaction will also be encouraged.

Suitable for: This project is open to applications from students having an interest for neurosciences, neurology, neurosurgery, anesthesia or pain medicine.

Primary Supervisor: Cuong Bui

Secondary Contact: Daniel Denis MD
daniel.denis@ochsner.org

Further info: The supervisor MUST be contacted by students prior to submission of an application.
Clinic include Pharmacy Pill-Packing, Lyft Health, Hospice and Palliative Care, and Home-Based Primary Care.

For this project, we are looking for a student who has interest in working with the MedVantage Clinic and our Pharmacy Pill-Packing intervention. This intervention provides a pharmacy-packed blister-pack of pills and education during appointments regarding the importance of medication adherence for patients with poor medication compliance. Some studies have shown factors such as number of prescribed medications, changes to doses, complexity of medication regimen, and psychological stress all contribute to poor compliance. This study’s protocol is currently being finalized and length of time for data collection is still being determined. The student may be working with patient education, data collection, cleaning, analysis, and publication writing. Other work for this project includes assisting with patient social determinants of health capture as well as other clinical research duties as related to the MedVantage Clinic.

Location: Ochsner Center for Primary Care and Wellness, New Orleans, USA

Expected outcomes and deliverables:

In general, applicants may gain skills in data collection, barriers to patient care, publication writing, and improving patient outcomes.

Applicants will also have opportunities to learn about humanism in medicine, how to improve appropriate utilization of medical services, develop a deeper understanding of barriers to patient care, and how to design a research project and participate in quantitative and qualitative research.

Expected deliverables may include patient-care projects, generating data, and contributing to ongoing research. Additional potential opportunities include poster development and presentations in the community.

Suitable for:

This project is open to any applicants. Those with an MPH or particular interest in health disparities research, geriatric populations, or translational science are strongly encouraged to apply.

The ideal applicant would be proactive, able to think critically and creatively, and communicate effectively in a small interdisciplinary care-team.

Primary Supervisor: Gerald Denton v-rl1@ochsner.org
Secondary Contact: Kathy Jo Carstarphen
Further info: The supervisor CAN be contacted by students prior to submission of an application

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**28 Project title:** Synvisc

**Project duration:** Length of project: 8 weeks
Hours expected per week: 36 hrs

**Description:** The objective of this retrospective analysis is to corroborate Waddell et al findings by determining whether intra-articular injection of Synvisc®/hyylan G-F 20 is associated with delay in time to TKR in patients with OA when compared to conventional pharmacologic therapies (non-HAs).

**Location:** Elmwood, New Orleans, USA
| Expected outcomes and deliverables: | Manuscript development  
Data Collection  
Podium Presentation  
Abstracts  
Grant Money  
Data Base Management  
Publications |
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<td>Suitable for:</td>
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| Primary Supervisor:              | Deryk Jones  
djones@ochsner.org |
| Secondary Contact:               | Maria Latsis |
| Further info:                    | The supervisor CAN be contacted by students prior to submission of an application |

### 29 Project title: Determining the incidence of Cryptococcus and post-transplant outcomes in cirrhotic patients

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 28 hrs

**Description:**
The student will be expected to carry out testing of banked blood samples from liver transplant patients for Cryptococcus. Results will be added to demographic and outcomes data pulled from patient charts. Data analysis and interpretation will be used for publications or posters.

**Location:**
Ochsner Medical Center, Jefferson Highway, New Orleans, USA

**Expected outcomes and deliverables:**
Gain laboratory research skills as well as analytical insights into a patient population. Students are expected to produce a manuscript and submit it to an appropriate journal.

**Suitable for:**
Students interested in a laboratory component of research.

**Primary Supervisor:**
Julia Garcia-Diaz

**Secondary Contact:**
Amy Feehan  
amy.feehan@ochsner.org

**Further info:**
The supervisor CAN be contacted by students prior to submission of an application

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### 30 Project title: Pseudohypobicarbonatemia due to Hypertriglyceridemia

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 30 hrs

**Description:**
Background: Pseudohypobicarbonatemia, i.e., spurious reduction in serum carbon dioxide (CO2) level, has been reported to occur in patients with extreme hypertriglyceridemia when specific chemical analyzers (Abbott) are utilized. The Abbott analyzer is used at our institution (Ochsner Medical Center, OMC). However, the extent of the problem has not been previously examined.

Specific Aims: 1. To determine the incidence of pseudohypobicarbonatemia at OMC. 2. To develop an institutional protocol to reduce the number of spuriously low CO2 levels reported by our clinical laboratory.
Hypothesis: Pseudohypocarbonatemia is often unrecognized and can lead to unnecessary diagnostic and therapeutic interventions.

Methods: We will extract EMR-based data from OMC for the last 5 years (already IRB-approved) to determine the incidence of pseudohypobicarbonatemia among patients with serum triglycerides > 1000 mg/dL and we will determine the number of events that resulted in inadequate administration of sodium bicarbonate or unnecessary measurement of serum lactate. Subsequently, in collaboration with Dr. Wu from the Clinical Laboratory, we will institute an institutional protocol to pre-filter lipemic specimens with high likelihood of resulting in spuriously low CO2 by the Abbot analyzer.

Location: Ochsner Main Campus, New Orleans, USA

Expected outcomes and deliverables: skills in data collection, statistical analyses, oral presentation, manuscript preparation, in-hospital protocol development

Suitable for: Word, Excel, Power Point skills

Eagerness to learn

Curiosity

Initiative

Prompt communication

Primary Supervisor: Juan Carlos Q Velez

juanCarlos.velez@ochsner.org

Further info: The supervisor MUST be contacted by students prior to submission of an application

31 Project title: Validation and acceptance of 3D printing and Virtual Reality Modeling in the Neurosciences

Project duration: Length of project: 8 weeks

Hours expected per week: 20 hrs

Description: Specific Aims

Back pain is the fifth most common reason for all physician visits in the United States and world-wide, creates more disability than any other condition[1]. Degenerative disease of the spine is a leading cause of back pain and radiculopathy and is a frequent indication for spine imaging and ultimately surgery. Although more than half of visits for low back pain are to primary care physicians, low back pain constitutes the most common reason for visits to orthopedists and neurosurgeons[2]. Spinal surgery for degenerative diseases has increased over 6 fold in the last two decades, from 61,000 procedures in 1993 to 450,000 procedures in 2011 with an estimated $100 billion in annual direct costs [3]. Despite this growth, overall efficacy of spine surgery in functional optimization remains highly variable, and a great number of questions about spinal surgeries remain unanswered due to insufficient evidence [4].

Patient selection, surgical decision making, and even outcome measurement remains inconsistent in spine surgery [5, 6]. Multiple randomized trials comparing lumbar vertebral fusion and non-surgical treatment have not shown clinically meaningful differences in disability outcomes in chronic low back pain resulting in further medical care and functional impairment [7]. The U.S. population ≥65 years of age is
estimated to grow from 46 million in 2014 to 88 million in 2050[8]. With an aging population, the prevalence and associated costs and morbidity of spine disease will continue to increase requiring more efficient and effective interventions to prevent disability.

The rapid emergence of 3D printing (3DP) and virtual reality (VR) has created exciting opportunities in medical education, patient engagement, and clinical care delivery. Degenerative spine pathologies are an ideal application of advanced visualization due to the inherent three-dimensional nature of the disease process and intervention. The ability of 3-D printing to produce highly customized models has shown promise as a valuable tool in such diverse fields as neurosurgery, orthopedics, otolaryngology, and cardiac surgery [9-13]. Utilizing patient customized models can improve pre-operative planning, which could potentially decrease operative time and cost while improving clinical outcomes. There is little evidence, however, examining the efficacy of customized 3DP and VR models to enhance patient experience, improve clinical outcomes and optimize resource utilization. This work will contribute to understanding how these technologies can serve as effective tools in health care delivery rather than interesting but superfluous toys. There is a great need to systematically investigate if and how using advanced visualization techniques like 3DP and VR can improve clinical care delivery in complex spine pathologies requiring surgical intervention. This knowledge gap prevents the wide-spread adoption of 3DP and VR in planning and conduct of complex surgical interventions of the spine and relegates this promising technology to the realm of curiosity.

The long-term goal of my research is the application of advanced modeling using 3DP and VR to create more personalized and effective interventions for neurologic disorders including degenerative spine disease. The overall objective of the proposed study, which is the next logical step in achieving my long-term goal, is to facilitate the validation of advanced modeling and lay the groundwork for future studies looking to apply patient-specific models for clinical triage, procedural selection and planning for spine disease requiring surgery. Creating a frailty index specifically for spine disease that predicts poor surgical outcomes is necessary to facilitate appropriate selection and stratification of eligible participants for a future randomized controlled trial. To accomplish this objective, we will leverage a comprehensive institutional spinal surgery registry that collates time-based, utilization metrics, and clinical outcome metrics. Prospectively, we will address this knowledge gap by achieving the following specific aims (see below).

| Location: | Ochsner Main Campus, New Orleans, USA |
| Expected outcomes and deliverables: | Specific Aim#1. We will characterize current clinical outcomes of spine surgery in our comprehensive spine surgery registry including clinical findings (neurological deficits), functional status (Oswestry Disability Index [ODI]) and neck disability index (NDI), as well as imaging findings to develop and quantify a frailty index for degenerative spine disease. |
| | Specific Aim #2. We will validate the metric in another large health system (Kaiser) by examining the scale characteristics of the frailty index, including its sensitivity, specificity, area under the curve in prediction of spine surgical outcomes. |
Specific Aim#3. We will examine feasibility of automating image procurement and processing allowing for increased volume and an appropriately powered analysis of the efficacy 3DP and VR in complex spine surgery and assess the adoption of these tools by clinicians and patients using a validated technology acceptance model (TAM).

The impact of the proposed study will be to develop the necessary tools that are required to support a randomized controlled trial evaluating the efficacy of 3DP and VR models on outcomes of complex spine surgery.

### Suitable for:
Interested in the Neurosciences as well able to quickly learn and deploy evolving technologies.

### Primary Supervisor:
Korak Sarkar  
korak.sarkar@ochsner.org

### Further info:
The supervisor CAN be contacted by students prior to submission of an application

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### QIMR Berghofer Medical Research Institute

<table>
<thead>
<tr>
<th>32 Project title:</th>
<th>Heart rate variability as a biomarker of neurological function in neonates.</th>
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| **Project duration:** | Length of project: 8 weeks  
Hours expected per week: 36 hrs |
| **Description:** | Birth is a relatively short, but risky, journey. A critical physiological parameter that, ideally, is monitored during birth is the effective oxygenation of the brain. While the fetus is highly resistant to depletion in oxygenation saturation (asphyxia), there is a point where it becomes injurious and intervention is required. Monitoring physiological function in the fetus before, during and after birth is not a trivial task. We are developing a potential surrogate of neurological function, heart rate variability (HRV). HRV is a manifestation of autonomic function which originates from brain areas that are compromised during asphyxia. Accurate knowledge of brain function can assist clinicians during labour, and |
| **Location:** | QIMR Berghofer, Herston |
| **Expected outcomes and deliverables:** | Methods and code for the extraction of HRV from the ECG. Methods and code for the calculation of features of HRV that correlate with neurological function. Code will be posted on open access repositories such as Github. |
| **Suitable for:** | Students with experience in scientific programming, modelling physiological signals and an interest in medical diagnostics. (Medical physics or Biomedical Engineering). |
| **Primary Supervisor:** | James Roberts |
| **Secondary Contact:** | Dr Nathan Stevenson  
nathan.stevenson@QIMRBerghofer.edu.au |
<p>| <strong>Further info:</strong> | The supervisor MUST be contacted by students prior to submission of an application |</p>
<table>
<thead>
<tr>
<th>33 Project title:</th>
<th>A precision medicine approach for treating neurodegenerative disease</th>
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<tr>
<td>Project duration:</td>
<td>Length of project: 8 weeks&lt;br&gt;Hours expected per week: 36 hrs</td>
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| Description: | The current therapeutic strategies for treatment of Alzheimer’s disease have yet to make an impact on the disease course in people with the disorder. New approaches to treatment are urgently needed and one of the major areas of research is the development of compounds to control the inflammatory changes in the brain during the disease. This abnormal immune response in the Alzheimer’s patient brain is driven largely by altered behaviour of microglia, the resident immune cell of the brain. However, lack of access to patient microglia has greatly impeded research in this field.

A new approach has been developed that allows the generation of microglia-like cells from human blood-derived monocytes. This is a rapid process producing cells within 14 days that express a highly ramified microglia morphology, together with strong expression of microglia-specific markers. Consequently, these cells offer an important insight into microglial function in Alzheimer’s patients that cannot be gained through any alternative approach. Due to the ease of generation, this approach is highly suited to examination of patient and healthy control microglia on a larger scale, and can provide real-time information on patient microglia responses to potential drug compounds.

In this project, we will collect blood samples from people with Alzheimer’s disease, as well as those at risk, and healthy controls. From the blood samples, we will isolate monocytes and culture these cells for up to three weeks in medium containing specific cytokines. This will allow us to generate mature cultures of patient and control microglia-like cells.

We will compare the inflammatory response of the patient and control cells in a range of tests to help understand how each patient’s microglia respond to different inflammatory stimuli. We will also assess how the patient microglia respond to different compounds aimed to modulate the inflammatory response to determine if some patients respond differently to certain compounds. This will allow us to develop a proof-of-concept that patient-derived microglia can be used in a personalized screen for potential therapeutic compounds to regulate neuroinflammation. Finally, we will perform an RNA analysis on collected patient microglia to determine the gene expression profile of each. This will provide us with a readout that in future can be used to determine if a patient should respond to a particular immune-modulatory compound based on the gene profile of their microglia.

This project has the potential to revolutionize the approach to personalized inflammatory modulation for people with Alzheimer’s disease. It will allow us for the first time to measure an individual patient’s microglial response and potential therapeutic action of inflammatory modulators within a short time frame (weeks). This proof of concept can subsequently be expanded for screening of larger libraries of potential inflammatory modulation compounds currently in clinical use to provide individualized patient treatment options. Techniques will include microglia
culture, molecular studies (i.e. RT-PCR), microscopy (confocal imaging), various biochemical assays (i.e. cytokine bead arrays) and protein analysis (western blot).

**Location:** QIMR Berghofer, Herston

**Expected outcomes and deliverables:** The student can expect to participate in cutting edge neuroscience research and potentially contribute to journal publications. The student will also learn state-of-the-art human cell culture procedures and common laboratory techniques as well as an insight into dementia and the development of new approaches to understand brain disorders. Students may give a short report or oral presentation at the end of their project.

**Suitable for:** This project is suitable for students with a biomedical background and an interest in neuroscience, brain diseases, inflammation, cell culture, or neurotherapeutics.

**Primary Supervisor:** Anthony White  
tony.white@qimrberghofer.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application

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**Project title:** Investigating MAIT cell expansion strategies and function

**Project duration:** Length of project: 8 weeks  
Hours expected per week: 36 hrs

**Description:** Background  
Blood cancers, which include leukaemia, lymphoma and myeloma account for 10% of all cancers and 9.4% of cancer deaths. Stem cell or bone marrow transplantation is the predominant curative therapy for these diseases. However, the major complication is graft-versus-host disease (GVHD) in which the gastrointestinal tract, skin, lung and liver are preferentially damaged by the transplanted donor immune system, limiting the therapeutic potential of this treatment. Importantly, given the severe immunosuppression in these patients, infections are common and often fatal. Thus, there is a pressing need for new treatment approaches to improve transplant outcome for these patients.

Mucosal associated invariant T (MAIT) cells make up >5% of T-cells in humans. They respond to vitamin B-derived microbial metabolites, presented by the MHC class I-like molecule MR1, to rapidly secrete effector cytokines. These riboflavin-based precursors are produced by a range of bacteria, yeast and fungi but not mammalian cells. MAIT cells reside within the lamina propria of the gastrointestinal tract and are therefore well positioned to respond to the microbiome. Critically, increasing evidence shows MAIT cells can be activated by MR1-independent mechanisms, namely via cytokine-mediated pathways. MAIT cells have been shown to possess potent anti-microbial functions primarily due to their rapid, diverse and expansive cytokine production, particularly IL-17A.

Recently, we demonstrated that recipient MAIT cells, at least in part by IL-17A, act to control barrier function to attenuate pathogenic T-cell responses specifically in the colon and thereby protect against the development of acute GVHD (Varelias A et al., JCI 2018). Importantly, based on RNAseq analysis of colon tissue from wildtype, IL-17A/- and MR1/- mice at steady-state, we showed comparable downregulation of metabolism-related gene expression in IL-17A/- and MR1/- colon tissue.
compared to wildtype. This data suggests that MAIT cells may harbor intrinsic differences in metabolic capacity that is IL-17-dependent. A better understanding of MAIT cell biology will provide a logical rationale for targeting this critical cell population during acute GVHD.

**Aim**
To test reagents/compounds for their ability to expand MAIT cells in ex vivo cultures and examine their cytokine and metabolic function.

**Approach**
Ex vivo MAIT cell cultures will be employed to test compounds for their ability to expand MAIT cells. Cytokine production will be assessed by flow cytometry and cytokine bead array assays; metabolic function will be assessed using Seahorse extracellular flux assays (Glycolysis and Cell Mito stress tests).

**Location:** QIMR Berghofer, Herston

**Expected outcomes and deliverables:** The student will gain practical laboratory experience and further his/her knowledge in this research field. He/she will have the opportunity to observe and learn a variety of new techniques/skills, in addition to those required for this project. Specifically, this project will involve tissue culture, flow cytometry, cytokine bead array assays and Seahorse extracellular flux assays (time permitting). The student will work in a supportive environment that will facilitate and enable completion of the research project. He/she will be expected to display good laboratory practice, maintain a detailed and accurate laboratory notebook and write a brief report upon completion.

**Suitable for:** This project is suitable for undergraduate students enrolled in Science, Medical Laboratory Science, Medicine or equivalent degrees. A background in Immunology/Microbiology is preferable; prior laboratory experience is desirable; enthusiasm and a sense of humour is essential. Applicants will need to be goal focused and flexible with their working hours.

**Primary Supervisor:** Antiopi Varelias
antiopi.varelias@qimrberghofer.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application.
mucosal surface in the gastrointestinal tract. It is transported across mucosal epithelia into the lumen by the epithelial glycoprotein, polymeric immunoglobulin receptor (pIgR). IgA serves as a first-line barrier limiting the access of intestinal antigens to the gut mucosa. Importantly, IgA is a key mediator of intestinal immunity, dampening pro-inflammatory immune responses and shaping the composition of the microbiota. IgA regulates the composition and metabolic function of the gut microbiota by promoting symbiosis between bacteria and acting as a mediator of bacterial colonization of mucosa. Of major relevance, serum IgA levels have been noted to be deficient in patients during the first 6 months after SCT, with those who develop acute or chronic GVHD remaining chronically IgA-deficient. A detailed understanding of the role of IgA in GVHD, particularly in the context of the gut microbiome, is currently lacking yet of critical importance.

Aim
To establish an immunofluorescence staining protocol for the detection and spatial localization of IgA production in tissue sections of the gastrointestinal tract at steady-state and during GVHD.

Approach
Building on existing immunofluorescence approaches for the detection of mucin production and bacteria, this project will develop a staining protocol for the detection and spatial localization of IgA in tissue sections of the gastrointestinal tract and enable multi-parameter immunofluorescence confocal images to be generated.

| Location: | QIMR Berghofer, Herston |
| Expected outcomes and deliverables: | The student will gain practical laboratory experience and further his/her knowledge in this research field. He/she will have the opportunity to observe and learn a variety of new techniques/skills, in addition to those required for this project. Specifically, this project will involve histological techniques (immunofluorescence staining, bacterial fluorescence in situ hybridization (FISH)) and confocal microscopy. The student will work in a supportive environment that will facilitate and enable completion of the research project. He/she will be expected to display good laboratory practice, maintain a detailed and accurate laboratory notebook and write a brief report upon completion. |
| Suitable for: | This project is suitable for undergraduate students enrolled in Science, Medical Laboratory Science, Medicine or equivalent degrees. A background in Immunology/Microbiology is preferable; prior laboratory experience is desirable; enthusiasm and a sense of humour is essential. Applicants will need to be goal focused and flexible with their working hours. |
| Primary Supervisor: | Antiopi Varelias |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

### Project title: Investigating melanoma heterogeneity

| Project duration: | Length of project: 8 weeks  
Hours expected per week: 36 hrs |
| Description: | Melanoma cells within a single tumour have very diverse characteristics, this is described as heterogeneity. The diversity of traits giving rise to |
heterogeneous tumours include genetic (gene/protein expression) and non-genetic (cell growth, movement, size) characteristics. The Cancer Drug Mechanisms group researches heterogeneity in melanoma and how it impacts disease progression (spread) and response to treatment.

The aim of this project is to investigate how heterogeneity changes between cultured melanoma cell lines and patient tumours.

Cultured melanoma cell lines will be grown as 2D or 3D cultures and as tumours in mice. Multiplex immunofluorescence will then be used to compare protein expression in individual cells across the 3 different culture methods and in patient tumours.

**Location:** QIMR Berghofer, Herston

**Expected outcomes and deliverables:**

The student will learn skills in mammalian cell culture, and fluorescent microscopy. Time permitting the student will utilise computer software to analyse microscopy results.

On completion of the project the student will be required to provide publication quality figures of data generated.

Data generated from this project will be utilised to apply for a major grant on melanoma heterogeneity in the 2020 national grant round.

**Suitable for:** Previous laboratory experience is beneficial. Participation in practical classes on aseptic technique is also desirable.

**Primary Supervisor:** Glen Boyle

**Secondary Contact:** Dr Jacinta Simmons

jacinta.simmons@qimrberghofer.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application.

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**Project title:** How does the brain’s blood vessel properties affect normal blood flow?

**Project duration:** Length of project: 8 weeks
Hours expected per week: 36 hrs

**Description:** The brain comprises an intricate architecture of neurons and blood vessels, with normal brain function relying heavily on the physical properties of these entities. In particular, structural damages in blood vessels have been shown to be related to cognitive impairments, for example, during aging or disease (e.g., dementia). Hence, it is important to quantify the extent of these damages to better understand the physiological underpinning of normal and diseased brain.

The project aims to understand how the properties of vessels, e.g., stiffness, regulate the brain’s blood flow response. In particular, a computational model that predicts hemodynamic changes in the brain will be used to investigate how its physiological parameters affect blood flow. The project will involve modelling and data analysis.

**Location:** QIMR Berghofer, Herston

**Expected outcomes and deliverables:** Students will gain skills in mathematical modelling and computational neuroscience. Students will be expected to write a short report by the end of the project, detailing their findings. If successful, the work will form part of a future publication.
### Project title:
Using hookworm-derived products to protect from asthma and inflammatory bowel disease

### Project duration:
Length of project: 8 weeks  
Hours expected per week: 36 hrs

### Description:
Nearly one billion people globally suffer from allergies, representing a considerable social and economic impact, significant morbidity and reduced quality of life. Allergic diseases most commonly develop in infancy, meaning that children are exposed to life-long treatments that can cause considerable and irreversible side effects. Compelling evidence suggests that sensitisation occurs within the first two years of life when the gut microbiome establishes. Over this period, a delicate balance linking the microbiome and the immune system exists, which, if perturbed, results in heightened allergen-specific Th2 responses. These observations imply a “window of susceptibility” for the development of sensitisation that could be explored as an intervention opportunity to prevent atopy.

We have recently described that a hookworm recombinant protein, named Anti-Inflammatory Protein (AIP)-2, is able to suppress allergic responses in both mice (in vivo) and humans (ex vivo), and to promote sustained immune regulation in mice. We have found that AIP-2 administered via breastmilk (BM) within the first week of life, modified the composition of the gut microbiome and protected pups from asthma onset into adulthood. Our central hypothesis is that AIP-2 and BM co-factors prevent sensitisation by modifying the immune and microbiome landscape promoting sustainable tolerance.

The project is designed around the characterisation of the responses induced in lung and intestinal epithelial cells when exposed to hookworm-derived products. The techniques employed to determine these responses will be: aseptic cultures, gene and protein expression, flow cytometry, confocal microscopy, real-time PCR/gene arrays/nanostring.

### Location:
QIMR Berghofer, Herston

### Expected outcomes and deliverables:
This project is suitable for up to 3 three students.

Students will gain extensive knowledge in immunology, allergy and chronic inflammatory disorders, as well as drug development. The skills employed for this project are sought-after know-hows for any higher professional degrees in research. Students will be provided skills for efficient literature search and analysis.

Students will participate in routine journal club/lab meetings and will be
asked to present an original article as part of the journal club, as well as a project plan and final placement presentations.

**Suitable for:**

Students with basic laboratory skills, a good understanding of wet-lab-based research and aseptic methods, interest in immunology/chronic diseases/drug development.

**Primary Supervisor:**

Severine Navarro
Severine.navarro@qimrberghofer.edu.au

**Further info:**

The supervisor MUST be contacted by students prior to submission of an application

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### Project title:

**Immunology and immunotherapy in blood cancers**

**Project duration:**

Length of project: 8 weeks
Hours expected per week: 36 hrs

**Description:**

Immunotherapy has emerged as a new pillar in cancer treatment. Our research team is investigating how we can improve anti-tumor immune responses against blood cancers. Specifically, we aim to understand immunosuppressive mechanisms in the tumor microenvironment. Students are expected to perform cancer immunology research using blood cancer models with support from staffs.

**Location:**

QIMR Berghofer, Herston

**Expected outcomes and deliverables:**

In the proposed project, the student will learn basic knowledge in cancer immunology and following research techniques:

- cell culture, molecular biology
- standard assays in immunology (flow cytometry, ELISA, immunoblots)
- animal experiments (including bioluminescence imaging)

**Suitable for:**

Students who would like to learn basic laboratory skills in life science, particularly in cancer immunology field.

**Primary Supervisor:**

Mark Smyth

**Secondary Contact:**

Dr Kyohei Nakamura
Kyohei.Nakamura@qimrberghofer.edu.au

**Further info:**

The supervisor MUST be contacted by students prior to submission of an application

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### Project title:

**Cognitive changes in those at high genetic risk of Alzheimer’s disease**

**Project duration:**

Length of project: 8 weeks
Hours expected per week: 36 hrs

**Description:**

Dementia affects an estimated 353,800 Australians, with up to 80% being diagnosed with Alzheimer’s disease (AD). Despite a major research effort, an effective treatment is not available. The pathogenic process of AD begins decades prior to the clinical onset, so it is likely that treatments need to begin early in the disease process to be of benefit.

The PISA study (the Prospective Imaging Study of Ageing: Genes, Brain and Behaviour) uses genetic risk prediction to identify individuals who are at high risk of AD, a subset of which will be in a prodromal disease stage. We
are using online cognitive testing to assess subtle cognitive changes in those who are at high risk of developing AD later in life.

The identification of cognitive changes associated with AD risk and prodromal disease will give 1) important insights into mechanisms of AD development throughout the life span; 2) the opportunity to investigate prodromal markers, and allow selection of individuals for early treatment strategies.

**Location:** QIMR Berghofer, Herston

**Expected outcomes and deliverables:** Scholars will gain skills in data cleaning and statistical association analysis. They will have the opportunity to carry out literature review and have their own input into the project design with the data available. They may have an opportunity to generate a publication form their individual research, or contribute to a broader publication. Students may also be asked to produce a report or oral presentation at the end of their project.

**Suitable for:** Skills in statistical analysis would be advantageous e.g. use of SPSS, R or STATA. This is an analysis based project and would suit those with an interest in psychology and/or population genetics in the area of dementia and aging.

**Primary Supervisor:** Nick Martin

**Secondary Contact:** Dr Michelle Lupton
Michelle.Lupton@QIMRBerghofer.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application.

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**Project title:** Targeting the Th17/Th22 differentiation axis in psoriatic skin disease.

**Project duration:** Length of project: 8 weeks
Hours expected per week: 36 hrs

**Description:** Background: In murine models of donor stem cell transplantation (SCT), mice develop T cell-mediated graft-versus-host disease (GVHD) in the skin. Cutaneous GVHD shares similar pathological features to autoimmune Psoriasis and Th17/Th22-mediated pathways of disease induction. Our recent observations in these systems on the links between IL-6 receptor signalling modalities and Th17/Th22 differentiation have important implications for Psoriasis pathophysiology.

Aims: In this study we will 1) explore Th17/Th22 differentiation in murine models of autoimmune Psoriasis and translate our findings more broadly across skin disease, and 2) trial a novel therapeutic approach to targeting IL-17/IL-22 in Psoriasis.

**Location:** QIMR Berghofer, Herston

**Expected outcomes and deliverables:** Students will develop skills in techniques relevant to immunology research and exposure to in vivo models of inflammatory disease. The main goal of this project will be to optimise and test a model of cytokine driven skin disease and provide the rationale for therapeutic interventions.

**Suitable for:** We are looking for students with a strong interest in immunology who are keen to learn new techniques relevant to the field, e.g. flow cytometry, histology, immune cell isolation etc.
### 42. Flicking the Switch: Determining if a Novel MicroRNA Controls Drug-Resistance in Late Stage Melanoma

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 36 hrs

**Description:**
Treatment for late-stage melanoma is challenging due to the frequent occurrence of resistance with current therapies. One mechanism of drug-resistance that has been identified and which largely remains misunderstood, is the switching of cell-states (defined as the relative genes expressed in a cell at any given point in time). In order to determine how melanomas can switch from a drug-sensitive to a drug-resistant cell state, we have analyzed large scale multi-omic datasets performed on a series of melanoma cell lines. Intriguingly, we have identified a novel microRNA that is specific to drug-resistant melanomas. This project will determine if this microRNA is responsible for controlling cell-states, and if so, explore whether we can use this information to improve therapies by delaying or overcoming drug-resistance.

| Location: | QIMR Berghofer, Herston |
| Expected outcomes and deliverables: | Applicants will gain knowledge surrounding the biology and current therapeutic intervention strategies of melanoma; gain expertise in a variety of molecular biology techniques and; may have the opportunity to generate data that will contribute toward a publication. Applicants will be expected to maintain a lab book, follow directions as given by supervisor, analyse results, and generate appropriate figures or graphs relating to their findings. A final report or oral presentation summarising their results may be required at the conclusion of the project. |
| Suitable for: | This project is open to applications from students with a background in Biomedical Science, Biochemistry and Molecular Biology and have an interest in Cancer Biology. |
| Primary Supervisor: | Nicholas Hayward |
| Secondary Contact: | Dr Ken Dutton-Regester Ken.dutton-regester@qimrberghofer.edu.au |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

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### 43. Making better Chimeric Antigen Receptor (CAR) T cells

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 36 hrs

**Description:**
Chimeric Antigen Receptors (CARs) are genetically engineered molecules that can redirect T cells, which is a type of immune cell, to recognise and kill cancer cells. T cells that carry CAR targeting CD19 have been effective in treating B cell blood cancers, and are now the first gene therapy products to be granted FDA and TGA approval for use in routine clinical practice. This exciting technology is one of the biggest breakthroughs in cancer therapy this decade but many challenges remain. These include cancer
relapse due to loss of CAR T cells or antigen escape; and a lack of
significant success to date with CAR T cells targeting other cancers. This
project involves developing and testing new concepts in CAR T cell
engineering to improve their effectiveness, safety and applicability.

The techniques used in this project include: molecular biology (PCR,
cloning, designing knock-in and knock-out, bacterial culture), gene
technology (retroviral packaging and transduction), in vitro immunological
assays (cytokine assay by ELISA and bead array, multiparametric flow
cytometry, CFSE proliferation assay, cytotoxicity assay etc.) and animal
models (tumour model, bioluminescence).

Location: QIMR Berghofer, Herston

Expected outcomes and deliverables: The scholar will have an opportunity to undertake a small element of the overall project. It is anticipated that the scholar will focus on one particular assay or technique, which often includes multiple steps (e.g. sample preparation, running the assay, analysing the data). The assay in focus will be the learning point for the scholar to learn about the principles and practice of scientific assays, as well as good research practice, and how to troubleshoot and problem-solve. The student will also be exposed to the broader range of techniques being used in the project, and the big picture of the overall research.

Suitable for: This project suits students who have some basic laboratory skills (e.g. able to follow instructions to set up a PCR assay, prepare and run agarose gel). It is especially suitable for highly motivated students who are contemplating a formal research degree (Honours or PhD)

Primary Supervisor: Siok Tey
siok.tey@qimrberghofer.edu.au

Further info: The supervisor MUST be contacted by students prior to submission of an application

Rural Clinical School

44 Project title: A review of machine learning approaches used in cancer prognosis and survival

Project duration: Length of project: 6 weeks
Hours expected per week: 20 hrs

Description: Cancer, in recent years is considered a ‘problem of prediction’ and decision making is influenced by predicted probability of future events, and developing cancer prognostic prediction algorithms and decision support tools is complex. It is an “element fraught with complex and conflicting variables, diagnostic and therapeutic uncertainties, patient preferences and values, and costs”3. Newer biomarkers, identification of genomic and molecular characteristics of various tumour types, complex interactions of prognostic factors, conflicting findings from clinical trials and ever-changing clinical practice guidelines make it difficult for clinicians working in multi-disciplinary environment to come up with optimal therapeutic pathways.

Even though there has been an active growth of prediction models in the field of oncology, only few studies have explored the option of using machine learning approaches in developing prognostic models and their
### Project 45
**Project title:** Barriers and enablers for indigenous women accessing regular antenatal care  
**Project duration:** Length of project: 7 weeks  
Hours expected per week: 30 hrs  
**Description:** In conjunction with a local Hospital Service, this project will rigorously review state-of-the-art evidence for factors that influence indigenous women’s participation in antenatal care in regional and rural areas.  
**Location:** Rural Clinical School Toowoomba or PACE Woolloongabba but suitable for remote/distance supervision via teleconferencing.  
**Expected outcomes and deliverables:** By joining this existing project, the summer scholar will gain experience with appraising published literature, extracting data for analysis from published literature, conducting data analysis and writing a manuscript for a peer review journal. The student may also have an opportunity to assist with another similar project.  
**Suitable for:** This project is suitable for students interested in factors affecting access to antenatal care or an interest in conducting systematic reviews and publishing in a peer-reviewed journal.  
**Primary Supervisor:** Remo Ostini  
r.ostini@uq.edu.au  
**Further info:** The supervisor CAN be contacted by students prior to submission of an application.

### Project 46
**Project title:** Antenatal models of care in rural and regional areas  
**Project duration:** Length of project: 7 weeks  
Hours expected per week: 30 hrs  
**Description:** In conjunction with a local Hospital Service, this project will review evidence for state-of-the-art models of care for antenatal care in regional and rural areas. This project has a particular interest in models of care that are effective with indigenous populations.  
**Location:** Supervised from Rural Clinical School Toowoomba or PACE Woolloongabba but suitable for remote/distance supervision via teleconferencing.  
**Expected outcomes and deliverables:** By joining this existing project, the summer scholar will gain experience with appraising published literature, extracting data for analysis from published literature, conducting data analysis and writing a manuscript for a peer review journal. The student may also have an opportunity to assist with another similar project.
### Suitable for:
This project is suitable for students interested in antenatal models of care or an interest in conducting systematic reviews and publishing in a peer-reviewed journal.

### Primary Supervisor:
Remo Ostini<br>r.ostini@uq.edu.au

### Further info:
The supervisor CAN be contacted by students prior to submission of an application

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### School of Biomedical Sciences

#### 47 Project title:
Treating impairments in energy metabolism in models of epilepsy

#### Project duration:
- Length of project: 8 weeks
- Hours expected per week: 20-36 hrs

#### Description:
The project will investigate the mechanism of metabolic treatments regarding energy metabolism in models of epilepsy.

#### Location:
Room 423, Skerman Building, UQ St Lucia Campus

#### Expected outcomes and deliverables:
- Scholars will gain skills in data collection, experimental design and reporting. Students will also be asked to produce a report or oral presentation at the end of their project.

#### Suitable for:
This project requires a good background in chemistry and biochemistry, including glycolysis and the Krebs cycle as well as excellent writing skills.

#### Primary Supervisor:
Karin Borges<br>k.borges@uq.edu.au

#### Further info:
The supervisor MUST be contacted by students prior to submission of an application

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#### 48 Project title:
Enhancing antigen presentation in ovarian cancer

#### Project duration:
- Length of project: 8 weeks
- Hours expected per week: 36 hrs

#### Description:
We are interested in developing novel nano-therapeutic methods to overcome immune suppression in ovarian cancer. Ovarian cancer is the most deadly type of gynaecologic disease with more than 1500 new cases being diagnosed each year in Australia. The high recurrence rate is a major challenge in the clinical management of high grade serous ovarian cancer. While stimulating our own immune system to recognize and attack tumour cells represents an attractive means to facilitate complete elimination of tumours, emerging data suggest that many of the immunotherapy tools, such as immune checkpoint inhibitors, are minimally active in ovarian cancer. We aim to develop effective strategies to enhance the infiltration and function of cytotoxic T lymphocytes in ovarian tumours and to develop clinically feasible means to monitor T-lymphocytes activity in tumours following therapy. Ultimately, strategies developed in this project could harness the power of the immune system to eliminate tumours and significantly increase the survival of patients with ovarian cancer.

#### Location:
McGregor Building, UQ St Lucia Campus
Expected outcomes and deliverables: We are seeking a motivated undergraduate student who is interested in contributing to a large project involving nanotechnology and cancer biology, and who is eager to learn how to develop effective strategies to enhance anti-tumour immunity. The student will learn critical laboratory skills and knowledge needed to develop new strategies to enhance the infiltration and function of cytotoxic T lymphocytes in ovarian tumours. In addition, the student will gain experience in developing novel nanoparticle platforms for tumour-targeted delivery. He/She will gain experience in working in a multidisciplinary environment, obtain hands-on training from the lab head and a postdoctoral fellow, and contribute to an exciting project in the area of cancer nanomedicine and immunology.

Suitable for: This project is open to applications from students with a background in biomedical sciences, pharmacy, or biomedical engineering, who is interested in exploring research as a career path.

Primary Supervisor: Sherry Wu
sherry.wu@uq.edu.au

Further info: The supervisor MUST be contacted by students prior to submission of an application

School of Clinical Medicine – Greenslopes Clinical Unit

<table>
<thead>
<tr>
<th>49 Project title:</th>
<th>Evaluating the impact of hospital management of out-of-hospital cardiac arrests.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project duration:</td>
<td>Length of project: 8 weeks</td>
</tr>
<tr>
<td></td>
<td>Hours expected per week: 24-36 hrs</td>
</tr>
<tr>
<td>Description:</td>
<td>Sudden death due to cardiac arrest is responsible for 15-20% of all deaths in western societies. When cardiac arrest occurs, blood flow to the brain and other organs ceases and death rapidly follows unless cardiac function is rapidly restored. Emergency Department (ED) management of patients in cardiac arrest follows protocolised national and international guidelines for advanced cardiac life support with the aim of restoration of blood flow and maintenance of organ function. A recent retrospective audit of patients who suffered an out of hospital cardiac arrest (OHCA) and were managed through the Princess Alexandra Hospital ED identified that there may be benefit from developing a standardised proforma to enable prospective data collection in order to better understand the key management prioritise and decisions that may make a difference to people’s chance of survival.</td>
</tr>
</tbody>
</table>

The aim of this study is to review the impact of the intervention on understanding the management and outcomes of patients presenting to the PAH Emergency Department with cardiac arrest during the 6 months period from 1 of August 2019 through to the 1st of January 2020. Data on patient demographics, resuscitation procedures, post resuscitation processes, and outcomes will be collated from Intervention Template based on the Utstein Resuscitation Registry Template for OHCA, and used to assess adherence to resuscitation guidelines, compared to reported survival outcomes, and identify areas where improvements may be made to increase rates of positive outcomes for patients. Results from this study can then be used as a benchmark for future performance within the ED.
**Location:** Princess Alexandra Hospital Emergency Department, Woolloongabba

**Expected outcomes and deliverables:** The PAH ED places a strong emphasis on learning about the entire research process. Activities will include a) literature review, b) development of a research proposal, c) knowledge of ethics application, d) collection and analysis of data, and e) reporting and dissemination of findings. Minimum expected outcomes are a project report and presentation to the ED research group. All previous summer scholars have also made at least one conference presentation or poster. Several have been co-authors on peer reviewed publications. Similar outcomes are expected in 2019.

**Suitable for:** Any MD student with interest in developing research skills. No prior research experience is necessary as a primary objective of this exercise is to learn about the research process.

**Primary Supervisor:** Kim Gill

**Secondary Contact:** Dr Rob Eley r.eley@uq.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application.

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**School of Clinical Medicine – Mater Clinical Unit**

<table>
<thead>
<tr>
<th>50 Project title:</th>
<th>Use of cervical mucus enhancers to facilitate achieving pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project duration:</td>
<td>Length of project: 8 weeks</td>
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<tr>
<td></td>
<td>Hours expected per week: 32 hrs</td>
</tr>
</tbody>
</table>

**Description:** The Natural Fertility Services unit of the Mater Mothers’ Hospital (Brisbane) has been treating couples presenting with infertility using: fertility-awareness, mucus enhancers, and restorative reproductive medical and surgical techniques, with the goal of achieving pregnancy. The aim of this project is to assess the current stepwise approach to the enhancement of cervical mucus, and whether this has a beneficial effect on the quality and quantity of cervical mucus and reduction in time to pregnancy. Assessment of mucus will be drawn from charts of the woman’s menstrual cycle using the Symptothermal method of fertility-awareness. Data has been collected over the past 6 years and couples are still being recruited at this tertiary referral service for the current and other sub-projects. This is a sparsely researched clinical area and the results of this project are expected to provide useful knowledge in the field of reproductive medicine at both primary (General Practice) and referral (Specialist) levels.

**Location:** Natural Fertility Service, Mater Mothers’ Hospital, South Brisbane

**Expected outcomes and deliverables:** Scholars will gain experience in data collation and interrogation in a tertiary hospital environment. Research will be supported by a multidisciplinary team including Specialist Obstetrician/Gynaecologist, GPs, Midwives, and Fertility-Awareness Teachers. The scholar will gain insight into current fertility awareness methods and restorative reproductive medicine. Expected research findings will be novel, with the aim of producing a written report as the basis for a peer-reviewed publication. There may be the opportunity for findings to be presented at a clinical/research conference.
### Suitable for:
Medical students in years 3-4 at UQ with an interest in fertility/infertility, or those with a previous research background including undergraduate Honours and/or postgraduate qualifications. Other UQ students with experience in fertility awareness methods.

### Primary Supervisor:
Luke McLindon  
lukemclindon@bigpond.com 0438 760 265

### Secondary Contact:
Dr Joseph Turner, Senior Lecturer - Rural Clinical School

### Further info:
The supervisor MUST be contacted by students prior to submission of an application

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**School of Clinical Medicine – Northside Clinical Unit**

<table>
<thead>
<tr>
<th>51 Project title</th>
<th>Extracellular vesicles as a novel biomarker for detection of COPD exacerbations</th>
</tr>
</thead>
</table>
| Project duration | Length of project: 8 weeks  
Hours expected per week: 36 hrs |
| Description      | COPD exacerbations have been attributed to excessive morbidity and mortality; however it still remains unclear as to why certain patients will experience a higher number of exacerbations that others. In this project, we will address the overall question: Can a unique COPD exacerbation signature be detectable and distinguishable from stable state in patients' blood, sputum and urine using information obtained from extracellular vesicles? We will identify this signature by obtaining blood, sputum and urine samples from patients who are hospitalised with an exacerbation of COPD, once these patients are clinically recovered, and compare to stable patients. Characterising an exacerbation signature will provide clinicians with a useful tool to help identify an exacerbation in its early stages, identify which patients are at high risk for future exacerbations, as well as having the potential to prevent an exacerbation from occurring, further reducing disease progression. |
| Location         | UQ Northside Clinical Unit, The Prince Charles Hospital, Chermside West |
| Expected outcomes and deliverables | Scholars will gain experience in sample collection, Data collection, research methodology and analyses. Students will have an opportunity to do an oral presentation at the end of the project |
| Suitable for     | Biomedical students, Medical Students, Science Students |
| Primary Supervisor | Ian Yang |
| Secondary Contact | Hannah O'Farrell  
hannah.ofarrell@uq.net.au |
| Further info     | The supervisor MUST be contacted by students prior to submission of an application |

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<table>
<thead>
<tr>
<th>52 Project title</th>
<th>Biomarkers for lung cancer</th>
</tr>
</thead>
</table>
| Project duration | Length of project: 8 weeks  
Hours expected per week: 36 hrs |
| Description: | This project will investigate the use of extracellular vesicles (including microvesicles and exosomes) from minimally invasive bio-fluids (blood, urine and bronchoscopy washings) to enable the detection of lung cancer biomarkers using modern technologies. The use of extracellular vesicle-derived nucleic acid may overcome the limitations associated with current liquid biopsy approaches as the present a rich source of biomolecules to profile biological information that is key to both early diagnosis and precision medicine. Students may gain skills in sample collection and biobanking, data collection, research methodology and analyses or have an opportunity to help generate data for presentation. |
| Location: | UQ Northside Clinical Unit, The Prince Charles Hospital, Chermside West |
| Expected outcomes and deliverables: | Students will gain skills in sample collection, Data collection, Research Methodology and Analyses. Have an opportunity to do an oral presentation at the end of the project |
| Suitable for: | Biomedical students, Medical Students, Science Students |
| Primary Supervisor: | Kwun Fong |
| Secondary Contact: | Brielle Parris b.parris@uq.edu.au |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

### Project title: Dietary Fibre Supplementation in COPD disease

| Project duration: | Length of project: 8 weeks Hours expected per week: 36 hrs |
| Description: | This project aims to investigate the relationship between the dietary habits, gut microbiome and short chain fatty acid production of chronic obstructive pulmonary disease (COPD) patients. This project is a sub-study in a randomized control trial investigating the effects of daily fibre supplementation on airway inflammation in COPD patients |
| Location: | UQ Northside Clinical Unit, The Prince Charles Hospital, Chermside West |
| Expected outcomes and deliverables: | Laboratory skills, Data collection. Students will attend the UQTRC Lab meetings and do an oral presentation at the end of the project |
| Suitable for: | Biomedical Students and Science Students |
| Primary Supervisor: | Annalicia Vaughan |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

### Project title: Screening for lung cancer, the ILST Study

| Project duration: | Length of project: 8 weeks Hours expected per week: 36 hrs |
| Description: | The International Lung Screen Trial (ILST) is recruiting smokers and former smokers at risk of cancer (https://clinicaltrials.gov/ct2/show/NCT02871856). It is testing the |
hypothesis that granular risk stratification will improve efficacy of screening compared to standard approaches of risk stratification

Location: UQ Northside Clinical Unit, The Prince Charles Hospital, Chermside West

Expected outcomes and deliverables: Data Collection and Analysis. Student will present at UQTRC Lab Meeting and do Oral Presentation to the team

Suitable for: Medical Student, Biomedical Student

Primary Supervisor: Henry Marshall
Henry.Marshall@health.qld.gov.au

Further info: The supervisor MUST be contacted by students prior to submission of an application

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Project title: Understanding factors associated with lung transplant outcomes

Project duration: Length of project: 8 weeks
Hours expected per week: 20-36 hrs

Description: The Queensland Heart and Lung Transplant Unit was formed in June 1996 with the addition of lung transplantation to the established Heart Transplant Unit. The first lung transplant was performed in Queensland in September 1996 and approximately 30-35 lung transplants are now performed each year. Over 300 lung transplant operations have been performed to date and approximately 200 outpatients are cared for by the Queensland Lung Transplant Program.

Our Unit has a fully equipped laboratory on site at The Prince Charles Hospital campus and is a world recognised leader in research in the areas of lung transplantation and pulmonary hypertension medicine. The research program aims to improve patient outcomes post-transplant by better understanding the cell biology of the allograft and clinical factors that are associated with transplant outcomes. Due to the unique nature of our research program, which is embedded within the clinical program, we have unprecedented access to patient samples and clinical histories.

A summer research scholarship is available to investigate factors associated with transplant outcomes, such as a history of infection (viral, fungal and bacterial), reflux disease and immune responses. Pre-defined information will be collected from chart reviews and other clinical databases, compiled and associations with patient outcomes assessed. It is anticipated that the student will be embedded within the clinical and research programs to gain a good understanding of all aspects of our translational research.

Location: The Prince Charles Hospital, Clinical Sciences Building, Chermside West

Expected outcomes and deliverables: Students will gain an understanding of data collection and how to source the required data. This will be used to identify factors associated with patient outcomes and the students will gain an understanding of the analysis plans used in clinical research. It is likely that this data collection will result in authorship on a publication. Finally, the students will be embedded within the clinical and research programs of our group which will allow them to gain a better understanding of translational and clinical research and the processes involved.
### School of Clinical Medicine – Princess Alexandra Hospital Clinical Unit

<table>
<thead>
<tr>
<th>56 Project title:</th>
<th>A retrospective study of aspirin poisoning across Queensland.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project duration:</td>
<td>Length of project: 8 weeks</td>
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<tr>
<td></td>
<td>Hours expected per week: 24-36 hrs</td>
</tr>
<tr>
<td>Description:</td>
<td>The project will use existing datasets to assess whether the dose of aspirin ingested is predictive of toxicity as measured by presence of respiratory alkalosis/metabolic acidosis, use of urinary alkalinisation or dialysis.</td>
</tr>
<tr>
<td>Location:</td>
<td>Princess Alexandra Hospital Emergency Department, Woolloongabba</td>
</tr>
<tr>
<td>Expected outcomes and deliverables:</td>
<td>The PAH ED places a strong emphasis on learning about the entire research process. Activities will include a) literature review, b) development of a research proposal, c) knowledge of ethics application, d) collection and analysis of data, and e) reporting and dissemination of findings. Minimum expected outcomes are a project report and presentation to the ED research group. All previous summer scholars have also made at least one conference presentation or poster. Several have been co-authors on peer reviewed publications. Similar outcomes are expected in 2019.</td>
</tr>
<tr>
<td>Suitable for:</td>
<td>Any MD student with interest in developing research skills. No prior research experience is necessary as an objective of this exercise is to learn about the research process.</td>
</tr>
<tr>
<td>Primary Supervisor:</td>
<td>Katherine Isoardi</td>
</tr>
<tr>
<td>Secondary Contact:</td>
<td>Dr Rob Eley</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:r.eley@uq.edu.au">r.eley@uq.edu.au</a></td>
</tr>
<tr>
<td>Further info:</td>
<td>The supervisor MUST be contacted by students prior to submission of an application</td>
</tr>
</tbody>
</table>

### 57 Project title: Clozapine/Norclozapine ratio and cognitive deficits in schizophrenia: A systematic review and meta-analysis

| Project duration: | Length of project: 8 weeks  |
|                  | Hours expected per week: 20-36 hrs |
| Description:     | This project will entail a Cochrane style systematic review and meta-analysis, with the expectation that the project will lead to the submission of a manuscript to a peer reviewed journal. |
|                  | Clozapine is the most effective medication for treatment refractory schizophrenia. |

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schizophrenia, however it is associated with significant side effects. Clozapine, and its metabolite nor-clozapine can have an impact on cognitive function. This project will systematically review the literature on the clozapine/norclozapine ratio, examining its impact on cognitive function.

**Location:** Princess Alexandra Hospital, Woolloongabba

**Expected outcomes and deliverables:** The student will undertake a Cochrane style systematic review and meta-analysis, with the expectation that the project will lead to the submission of a manuscript to a peer reviewed journal.

**Suitable for:** A student with an interest in mental health, and with an interest in learning how to undertake critical appraisal of literature

**Primary Supervisor:** Dan Siskind
d.siskind@uq.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application

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### Project title: Barriers to uptake of Point-of-Care Ultrasound training in ED; a qualitative approach.

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 24-36 hrs

**Description:** Despite good access to high quality ultrasound equipment, freely available education modules, wide tertiary-level case-mix and senior staff availability for supervision at the bedside, few Emergency Medicine trainees complete logbooks in Point-of Care Ultrasound (POCUS) during their terms at the PA ED. There is high demand for places in-house formal ultrasound training courses in essential techniques such as EFAST (extended focused abdominal sonography in trauma) and abdominal aortic aneurysm (AAA) scanning, and enthusiasm in the post course feedback; however, this does not translate into completion of logbooks of proctored scans which would contribute to accreditation in these procedures. POCUS plays an increasingly important role in the practice of Emergency Medicine, so it is necessary to understand the barriers that exist, in order to address these and facilitate trainees’ acquisition of essential ultrasound experience. Brief interviews will be conducted with trainees (training senior house officers and registrars) to ascertain the perceived barriers a) to their use of ultrasound in their work in ED, and b) to completion of log books as part of the accreditation process.

**Location:** Princess Alexandra Hospital Emergency Department, Woolloongabba

**Expected outcomes and deliverables:** The PAH ED places a strong emphasis on learning about the entire research process. Activities will include a) literature review, b) development of a research proposal, c) knowledge of ethics application, d) collection and analysis of data, and e) reporting and dissemination of findings. Minimum expected outcomes are a project report and presentation to the ED research group. All previous summer scholars have also made at least one conference presentation or poster. Several have been co-authors on peer reviewed publications. Similar outcomes are expected in 2019.

**Suitable for:** Any MD with interest in developing research skills. No prior research experience is necessary as a primary objective of this exercise is to learn about the research process.

**Primary Supervisor:** Georgia Livesay
### Development of the Queensland Emergency Airway Registry

<table>
<thead>
<tr>
<th>Project title:</th>
<th>Development of the Queensland Emergency Airway Registry</th>
</tr>
</thead>
</table>
| Project duration: | Length of project: 8 weeks  
Hours expected per week: 30 hrs |
| Description: | Endotracheal intubation in the Emergency Department (ED) is a high-risk procedure in a high-risk environment that is associated with significant morbidity and mortality. There is a growing body of evidence regarding best practice however this is not uniformly translated in practice.  
The Princess Alexandra Hospital ED is in the process of setting up the Queensland Emergency Airway Registry (QEAR) to create an integrated electronic medical record (iEMR) based form to collect clinical data regarding current practice in endotracheal intubation in multiple EDs across the state. The goal of this will be to decrease unwarranted variation in practice and contribute to current best evidence-based practice data to contribute to the current literature pool.  
The student will be involved in the next stage of the project which will be a literature review and audit of current local practices as we progress towards a local trial of the QEAR iEMR form. As the database development continues there will be further opportunities for involvement in research on current standards of practice in multiple centres and additional projects and publications. |
| Location: | Princess Alexandra Hospital Emergency Department, Woolloongabba |
| Expected outcomes and deliverables: | The PAH ED places a strong emphasis on learning about the entire research process. Activities will include a) literature review, b) development of a research proposal, c) knowledge of ethics application, d) collection and analysis of data, and e) reporting and dissemination of findings. Minimum expected outcomes are a project report and presentation to the ED research group. All previous summer scholars have also made at least one conference presentation or poster. Several have been co-authors on peer reviewed publications. Similar outcomes are expected in 2019. |
| Suitable for: | Any MD or allied health student with interest in developing research skills. No prior research experience is necessary as a major objective of this exercise is to learn about the research process. |
| Primary Supervisor: | Claire Karrasch |
| Secondary Contact: | Dr Rob Eley  
 r.eley@uq.edu.au |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |
**Description:**

Background:
Spectroscopy is a technique that allows for metabolites (such as Creatine, GABA, glutamine) to be non-invasively measured using a conventional MRI scanner. The most common technique used is 1D spectroscopy. However, this technique has limitations, such as the accuracy in which metabolites can be resolved. In conventional 1D spectroscopy, intensity (y-axis) is plotted against frequency (x-axis), whereas in 2D spectroscopy, intensity is plotted against two frequency variables [Keeler, 2010]. The introduction of 2D in vivo spectroscopy has allowed researchers to make unambiguous metabolite assignments, that previously could not have been made using 1D spectroscopy [Thomas et al., 2001, Ramadan et al., 2010, Mountford et al., 2015], with 2D localized Correlation SpectroscopY (2D L-COSY) being shown as a reliable method for in vivo detection of brain metabolites [Arm et al., 2018].

There are multiple ways in which the spectroscopic peaks can be measured. The first method involves putting a box over the peak and integrating underneath this box. The second method involves ‘fitting’ the peaks using a ‘basis set’ of metabolites which are expected to be in the sample. A programme has previously developed (‘ProgFit and Profit-2’) to do just this for 2D-spectroscopy. This programme was developed for a technique known as ‘J-PRESS’.

Aim:
The aim of this project is to take the existing Matlab programme which was developed for ‘J-PRESS’ and develop the programme for ‘2D-L-COSY’ another technique used for spectroscopy. The project will be supervised by a clinician researchers and programmers at the Translational Research Institute.

<table>
<thead>
<tr>
<th>Location:</th>
<th>Translational Research Institute, Woolloongabba</th>
</tr>
</thead>
</table>
| Expected outcomes and deliverables: | • Develop skills in a highly exciting area of imaging research, with many clinical applications.  
• Update an existing Matlab programme to handle new data input and quantify and fit that spectroscopic data accordingly.  
• There will be opportunities pro |
| Suitable for:                | • Students who apply will need a background in programming, commuter science, physics, maths or engineering to be able to get this project done in the available time.  
• Perfect for students who may be considering HDR research in medicine / medical imaging |
| Primary Supervisor:          | Scott Quadrelli scott.quadrelli@uq.edu.au |
| Further info:                | The supervisor CAN be contacted by students prior to submission of an application |

**School of Clinical Medicine – Royal Brisbane Clinical Unit**

<table>
<thead>
<tr>
<th>61 Project title:</th>
<th>Incidence of iron deficiency (ID) and iron deficiency anaemia (IDA) in chronic pain patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project duration:</td>
<td>Length of project: 8 weeks</td>
</tr>
</tbody>
</table>
**Description:** Background: Iron deficiency (ID) is very common but often overlooked, especially in people with chronic conditions. Patients with chronic pain can present with chronic inflammatory conditions and often experience a reduced quality of life. Iron deficiency, even in the absence of anaemia, can be debilitating, and exacerbate any underlying chronic disease, leading to increased morbidity and mortality. It is believed that ID can be a cause for pain. Around 30% of the world population is anaemic. Iron deficiency is the main cause for anaemia and its treatment a major public health goal.

Aim: We aim to assess the incidence of iron deficiency (ID) and iron deficiency anaemia (IDA) in chronic pain patients presenting at the Persistent Pain Clinic at the RBWH. To our knowledge this incidence has not been assessed before.

Hypothesis: The ratio of iron deficiency in the chronic pain population is larger than in the general population. Treatment of ID and IDA will improve patient outcomes.

Method: Recruitment of 50 chronic pain patients and assessing their anaemia and iron status. Patients will be consented for blood tests and bloods will be taken during their scheduled Persistent Pain Clinic appointment.

Summary: Outcome of this study will inform clinicians about the incidence of ID and IDA in the chronic pain population and provide guidance on its need for treatment. In future studies we will assess Patient Reported Outcomes (PROM) and Patient Reported Experiences (PREM) after administration of iron where ID and IDA exists.

**Location:** Royal Brisbane and Women’s Hospital, Herston

**Expected outcomes and deliverables:** Students will learn how to screen and consent patients for participation in the study. Patient data collection and analysis will be the main part of the placement. A literature review pertinent to the topic and a short presentation of preliminary results will be part of the project.

**Suitable for:** This project is best suited for medical students interested in assessment chronic conditions.

**Primary Supervisor:** Kerstin Wyssusek
kerstin.wyssusek@health.qld.gov.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application.

**62 Project title:** Measuring anatomical parameters of a difficult central venous access in morbidly obese patients

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 30 hrs

**Description:** Central venous access devices (CVAD) are often used during general anaesthesia for surgery, to allow measurements (haemodynamic variables) and treatment (delivery of IV fluids and medication). Access to the internal jugular vein can be complicated by accidental intra-arterial cannulation instead of venous cannulation, which results in adverse effects for the patient (potential complications include e.g. haemorrhage, stroke, damage to the arterial vessels, infection, extra therapy, e.g. retrieval and...
sealing of the inadvertently placed catheter) and comes to an extra cost to the hospital.

We see these complications in normal weight patients, but more often in morbidly obese patients. The latter often have restricted access due to anatomical changes (less space in the neck area, more fatty tissues overlying the region, obscured anatomical landmarks). Improvements are made by using ultrasound-guided insertion of the central line in the internal jugular vein.

We aim to measure parameters in a group of normal weight patients (BMI 20-25 kg.m\(^{-2}\)) and in a group of morbidly obese patients (BMI > 40 kg.m\(^{-2}\)). Parameters measured will include: 1. weight/height/BMI; 2. neck circumference; 3. distance between angle of the jaw and the mid-clavicular bone; 4. The position of the vein in relation to the carotid artery (using an ultrasound probe), whereby the patient is in the supine position with both arms positioned alongside the body and the shoulders depressed maximally downwards; and 5. the diameter and cross-sectional area of both sides the internal jugular veins and carotid arteries.

**Location:** Anaesthesia Research Group: Centre for Excellence and Innovation in Anaesthesia, RBWH, Dept of Anaesthesia and Perioperative Medicine, Herston Campus

**Expected outcomes and deliverables:** UQ Medical Students will gain the following: a) how to design a protocol and conduct research; b) participation during regular meetings of the Anaesthesia Research Team, RIGA (research interest group in anaesthesia) and other educational meetings; c) the UQ medical student will closely work together with their supervisor to realise the goals of the research; d) at the same time professional skills will be learned (anatomy of the neck region, use of ultrasound-guided anatomy of the neck region, measurement of the IJV and carotid arteries).

**Suitable for:** Any medical student that has an interest in gaining research experience – knowledge of the anatomy of the cervical region is beneficial.

**Primary Supervisor:** André Van Zundert
vanzundertandre@gmail.com - 0417654348

**Further info:** The supervisor CAN be contacted by students prior to submission of an application

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**63 Project title:** Patient Reported Outcome Measures of Pain in the Emergency Department

**Project duration:** Length of project: 8 weeks
Hours expected per week: 36hrs

**Description:** Pain is the most common symptom in emergency departments (EDs), with 65-70% of patients presenting with pain. Despite its frequency, ED clinicians often do not have a good understanding about how their patients experience the pain and how best to manage this experience. A major problem is that there are currently no validated tools that measure patient-reported outcomes (PROs) with respect to ED patients’ perception of their pain and the effectiveness/quality of the clinical care provided. This limits the ability to optimise and individualise pain care and to conduct research on new/improved therapeutic options.
Current measures available for measuring the effectiveness and quality of pain care in the ED include time to first analgesic medication, unidimensional pain rating scales, and general patient satisfaction and experience surveys. These general surveys are limited and cannot be used to drill down into PROs related to specific symptoms such as pain.

Patient reported outcome measures (PROMs) generally take the form of standardised and psychometrically validated questionnaires. A validated PROM of pain care in the ED would reduce the reliance on secondary metrics and their generalisability to patient care, especially in the research and quality improvement space. Such a PROM also has the potential to be a useful clinical tool, putting the patient at the centre of the outcome and enabling pain care to be more effectively guided by patient feedback.

In this project, we aim to psychometrically validate a widely used acute pain care PROM (the American Pain Society patient outcome questionnaire or APS-POQ-R) that we have modified for use in EDs. We will recruit 200 adult ED patients with acute pain of general aetiology and 200 with primary headache associated pain. After their usual clinical care, participants will be asked to complete the modified APS-POQ-R. The responses to the questionnaire will be collated and undergo internal consistency analysis via Cronbach’s alpha, construct validity testing via exploratory factor analysis and assessment of its ability to differentiate different groups of patients in the ED. If the modified APS-POQ-R is found to be psychometrically valid in the ED, then we will have both a clinically- and academically-useful tool that integrates patient-reported outcomes into ED models of care. After validating the PROM, we will demonstrate its application using linear modelling to examine the interplay between time to first analgesic medication, PROM data and patient experience of care.

| Location: | Royal Brisbane and Women's Hospital, Herston |
| Expected outcomes and deliverables: | The successful applicant will gain experience in the conduct of research within the busy emergency department environment. They will be interacting with patients, actively recruiting patients and administering a number of questionnaires to ascertain the quality of the pain care delivered. In addition to direct patient recruitment, the successful applicant will complete data extraction and entry from the medical record and will be involved in analysis and reporting of results. There will be the opportunity to contribute to publications stemming from this project and deliver presentations to appropriate settings on the work. |
| Suitable for: | No special skills are required for this project. Knowledge of basic data handling and cleaning would be an advantage. |
| Primary Supervisor: | Kevin Chu |
| Secondary Contact: | Dr James Hughes  
james.hughes@health.qld.gov.au |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

School of Public Health
<table>
<thead>
<tr>
<th>Project title:</th>
<th>Informing communication in relation to climate change mitigation policies</th>
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| Project duration: | Length of project: 8 weeks  
Hours expected per week: 30 hrs |
| Description:      | This project builds on groundbreaking research undertaken by the School of Public Health in which community attitudes towards different nutrition policies were assessed. This research involved initiating brief discussions with community members in rural and regional towns about their views on particular interventions to improve nutrition. This gave an opportunity to also explore the most appropriate ways to communicate about these interventions in a way that garners community support.  
While a high proportion of the Australian community accepts the science about human-induced climate change, there is not a high degree of agreement about appropriate mechanisms of climate change mitigation, particularly in relation to electricity generation and coal mining. This is particularly the case in outer metropolitan and rural and regional Australia.  
The aim of this project is to explore community attitudes to coal mining and coal combustion among people living in outer metropolitan areas in South east Queensland with view to developing communication strategies that will facilitate better understanding and support for the need for CO2 reduction strategies.  
We are seeking two students who will work together to informally approach and interview people in places where people gather (eg shopping centres, parks etc. In our experience in Regional areas, people were very willing to talk. It is difficult to know whether this would be the case in outer metropolitan areas of Brisbane. With the support of their supervisors, students will then analyse their results.  
We are requesting two students for student safety and to enhance the student experience. |
| Location:         | School of Public Health, Herston Campus |
| Expected outcomes and deliverables: | A report and a draft for publication in relation to communicating potential policy initiatives for climate change mitigation in Queensland.  
This report will inform organisations campaigning for stronger climate change action, particularly those campaigning against new coal mines and for the closure of coal fired power stations. |
| Suitable for:     | Students with an interest in social determinants of health, qualitative research methods, climate change and health. |
| Primary Supervisor: | Katherine Cullerton |
| Secondary Contact: | A/Prof Linda Selvey  
l.selvey@uq.edu.au, 33655281 |
| Further info:     | The supervisor CAN be contacted by students prior to submission of an application |

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<table>
<thead>
<tr>
<th>Project title:</th>
<th>Systematic review of mental health service models for young adults aged 18-24</th>
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<tbody>
<tr>
<td>Project duration:</td>
<td>Length of project: 8 weeks</td>
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Back to top
### Hours expected per week: 20 hrs

| **Description:** | Mental disorders are commonly experienced by young adults (i.e., aged 18-24 years) and can have lifelong impacts. Mental illness affects 20% of Australia’s population in any one year and young people aged 16-24 have the highest prevalence of mental illness as compared to all other age groups [1]. This coincides with a period when young people are completing their education, beginning training for employment, and learning how to live independently. When young people are affected by mental illness, their life trajectory may be altered in such a way that they struggle with economic and social participation, even long past their current episode of mental illness.  
There has been considerable investment in Australia in the clinical care needs of young adults with mental illness. The Medicare subsidised program Better Access provides psychological treatment for all Australians including close to half a million young people (15-24 years) last financial year [2]. Although many young people are receiving clinical services for their mental illness, emerging evidence also suggests that many see no improvements in their functioning (e.g. their mental health problems still interfere with their education, employment and relationships) after several months of primary care treatment [3].  
In order to determine the optimal models for mental health services for young adults that can address their clinical and functional recovery needs, we are undertaking a systematic review of peer-reviewed and grey literature.  
This project is 8 weeks with the possibility of extension to 10 weeks (to be discussed with the student and supervisor). |
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<td><strong>Expected outcomes and deliverables:</strong></td>
<td>Students will learn how to design and execute a systematic review, including design of a search strategy, academic database searching, search result screening, data extraction and analysis of included publications. There will be opportunities to contribute to peer reviewed publications as a result of the project. Additionally, students will gain exposure to a busy research environment at the intersection of academia and policy.</td>
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<tr>
<td><strong>Suitable for:</strong></td>
<td>Students with a psychology or public health background. An understanding of mental health services is desirable.</td>
</tr>
<tr>
<td><strong>Primary Supervisor:</strong></td>
<td>Kate Gossip</td>
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</table>
| **Secondary Contact:** | Charlotte Woody  
c.woody@uq.edu.au or 07 3271 8706 |
### 66 Project title: Medical Application of infrared sensors

| Project duration: | Length of project: 8 weeks  
| | Hours expected per week: 36 hrs |
| Description: | The application of Raman and infrared spectroscopy techniques such as near and mid infrared in the medical field is a novel research area. We are looking for a summer student to help collate all studies, using published literature related to the medical application of Raman and infrared sensors and identify gaps in the area for future research |
| Location: | School of Public Health Building 877, Herston |
| Expected outcomes and deliverables: | The student is expected to achieve the following aims:  
| | 1) Identify all areas of research involving the medical application of Raman/infrared spectroscopy using literature search  
| | 2) Summary of key findings  
| | 3) Determine gaps for future research |
| Suitable for: | Open to UQ students |
| Primary Supervisor: | Maggy Lord  
| | maggy.lord@uq.edu.au |
| Further info: | The supervisor CAN be contacted by students prior to submission of an application |

### 67 Project title: Optimising Care: Supporting you to be active and eat well.

| Project duration: | Length of project: 10 weeks  
| | Hours expected per week: 20-36 hrs |
| Description: | Physical activity and a healthy, well-balanced diet have been shown to be beneficial for women with early stage breast cancer, however very few studies have looked at whether addressing physical activity and dietary intake can improve the well-being and physical health of women with metastatic breast cancer. The aim of this pilot study is to determine the suitability and safety of an exercise and dietary program for women with metastatic breast cancer, and to evaluate whether the program improves women’s quality of life, well-being and physical health. Approximately 35 women will take part in this pilot study. The program will include 8 sessions with an Accredited Exercise Physiologist and 8 sessions with an Accredited Practising Dietitian over a 16-week period. The intervention will be designed and tailored to the participant. The participants will take part in 3 study assessments: at the start of the program; end of the program (16-weeks later), then 6-months later. A range of measures (weight, body composition, strength and fitness, physical activity, dietary adherence, and psychosocial outcomes) will be explored. Assessment methods will include qualitative interviews, online questionnaires, DEXA scans and accelerometers.  
| | We are looking for a student to assist in data collection and entry, and transcribing qualitative interviews with participants that take place at the end of the intervention. |
| Location: | School of Public Health, Herston |
**Expected outcomes and deliverables:**
Students will gain hands on experience in processing both quantitative and qualitative data from the baseline and end of Intervention assessments of the project described above. They may also participate in additional data collection as needed. Expected outputs from this project will include building skills for gathering qualitative and quantitative data for diet and exercise behaviour interventions.

**Suitable for:**
This project is open to applications from students with a background in health sciences (or other health related degrees), specifically undergraduate students in their 2nd or 3rd year of study or postgraduate students.

**Primary Supervisor:**
Marina Reeves
marina.reeves@uq.edu.au

**Secondary Contact:**
Jenny Job
j.job@uq.edu.au

**Further info:**
The supervisor MUST be contacted by students prior to submission of an application.

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<table>
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<tr>
<th>68 Project title:</th>
<th>Living Well after Breast Cancer: supporting younger women pilot weight management intervention</th>
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| **Project duration:** | Length of project: 8-10 weeks  
Hours expected per week: 20-36 hrs |
| **Description:** | We know weight loss is important for reducing and managing a range of chronic diseases including cardiovascular disease and type 2 diabetes mellitus. Weight loss may also be important for women following treatment for breast cancer. However, we know that, younger women diagnosed with breast cancer experience additional challenges which can result in greater weight gain during and after treatment. Moreover, some evidence suggests young women with breast cancer face greater difficulty losing weight using traditional weight management approaches. Very little research to date has focused on how to best support younger women diagnosed with breast cancer to manage their weight. This project involves evaluating a partial meal replacement diet as a weight management intervention. The trial has recruited two groups of women: young (premenopausal) women with breast cancer and postmenopausal women with breast cancer. This pilot trial will improve our understanding of the impact of a partial meal replacement diet on weight loss and body composition differences of between pre- and postmenopausal women with breast cancer. A range of measures (weight, body composition, resting energy expenditure, dietary adherence, physical activity and psychosocial outcomes) will be explored and differences compared between groups.  
We are looking for a student to assist in data collection and entry. There is also scope to be involved in qualitative interviews with participants that take place at the end of the intervention. There will be an opportunity to attend a body composition lab where assessments take place and better understand measurements such as DEXA scans. |
| **Location:** | School of Public Health Building, Herston |
| **Expected outcomes and deliverables:** | The student will gain a better understanding of breast cancer and lifestyle management as well as learn how a clinical trial is conducted, data is collected and processed. |
| Suitable for: | This project is open to applications from students with a background in health sciences (or other health related degrees), specifically undergraduate students in their 2nd year onwards of study or postgraduate students. |
| Primary Supervisor: | Marina Reeves |
| Secondary Contact: | Zoe Thomson  
z.thomson@uq.edu.au |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

**Project title:** Understanding the knowledge, attitudes and practices surrounding the use of ozone and UV disinfection technologies for the control of gastrointestinal illness

**Project duration:** Length of project: 8 weeks  
Hours expected per week: 30 hrs

**Description:** Cryptosporidium, a parasitic protozoa that causes gastroenteritis in humans is one of the leading causes of death in children under five years of age. Cryptosporidium is transmitted via the faecal-oral route with the most significant source of infection in Australia associated with swimming pools. Currently, contamination of swimming pools occurs by accidental faecal releases that are managed by superchlorination of pool water, or by emptying, disinfecting and refilling the pools. However, these approaches are expensive and have been shown to be ineffective. Ozone and UV disinfection are the most effective options for the control of Cryptosporidium. However, here is a lack of published information describing the uptake of and barriers preventing ozone and UV disinfection technologies from being installed in most swimming pools. Understanding how pool managers view the use of ozone and UV disinfection technologies in the control of gastrointestinal illness would be useful in formulating strategies to increase the uptake of the technologies and prevent the spread of Cryptosporidium.

The aim of this project is to gain an understanding of the knowledge, attitudes and practices of pool managers in Australia surrounding the use of ozone and UV disinfection technologies in the control of gastrointestinal illness.

An online questionnaire to gather data on the knowledge, attitudes and practices regarding ozone and UV disinfection systems has been designed and validated during 2019. It will be distributed to swimming pool owners (private and local government owned) and swimming pool managers via email identified through personal contacts and industry associations. Data from the online questionnaire will compiled, cleaned and subjected to descriptive and non-parametric statistical analysis. The activities involved in the project are:

1. Conversion of questionnaire to the Checkbox platform available at UQ  
2. Email and phone contact with key informants who can facilitate distribution of the questionnaire.  
3. Distribution of questionnaire and monitoring of progress  
4. Extraction and analysis of data (with supervisor support) at survey
5. Drafting of a scientific report in publication format (with supervisor support/input)

Location: School of Public Health, Herston Campus

Expected outcomes and deliverables: The expected outcomes of this project is that a national survey will have been completed, and the data compiled, analysed and written into a publishable paper that is co-authored by the summer scholar. It is anticipated that this paper will be submitted for publication at the end of the scholarship period.

The benefits of this project are largely associated with a potential to improve policy associated with the prevention of gastrointestinal disease associated with public aquatic facilities. This in turn should lead to a reduction in GI disease, especially in children.

Suitable for: Postgraduate students (MPH/MEpi) or Bsc./BHlthSci students at the end of their second year of study.

Primary Supervisor: Simon Reid
simon.reid@uq.edu.au

Further info: The supervisor MUST be contacted by students prior to submission of an application

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Project title: Examining the connection between SDG 3 (Health & Wellbeing) achievement and international humanitarian law

Project duration: Length of project: 8 weeks
Hours expected per week: 20 hrs

Description: Limited literature exists on the nexus between health, sustainable development, and international humanitarian law. However, many MPH and MIPH graduates will become public health practitioners in fragile and conflict-affected states on graduation, and thus an understanding of international humanitarian law – and how it impacts these graduates in such environments – will be crucial. How can state and non-state actors protect and maintain health care systems in conflict-affected states, and also meet their SDG 3 (Health and Wellbeing) and inter-related SDG commitments, especially SDG 16 (Peace, Justice and Strong Institutions) commitments? What are the potential enablers to protect public health and medical practitioners in these settings, and critically protect the infrastructure that supports the underlying determinants of health? How can SDG ambition be enabled?

This Summer Scholarship will advance a discrete piece of research around international humanitarian law, SDG 3 (Health and Wellbeing), emergency medicine, and private and public health service provision in fragile states and conflict zones. The UQ Summer Scholar will conduct a desktop review of the grey and peer-reviewed literature on this cross-cutting topic, and identify recommendations for advancing future research on SDG 3 and SDG 16 implementation. A peer-reviewed publication will be the expected outcome. The Summer Scholar will work closely with Dr Claire E Brolan, Centre for Policy Futures, in developing the peer-reviewed publication. Dr Brolan is also the Medical Sector Representative on the Red Cross (Queensland Branch) International Humanitarian Law Committee.
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<tr>
<th><strong>Location:</strong></th>
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<tr>
<td>Centre for Policy Futures UQ, Building 20 (Global Change Institute), St Lucia campus</td>
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<table>
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<tr>
<th><strong>Expected outcomes and deliverables:</strong></th>
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<tbody>
<tr>
<td>Peer-reviewed publication</td>
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<th><strong>Suitable for:</strong></th>
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<tr>
<td>MPH or MIPH student with interest in the Sustainable Development Goals and background in the social sciences and/or law</td>
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<tr>
<th><strong>Primary Supervisor:</strong></th>
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<tbody>
<tr>
<td>Claire E Brolan</td>
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<td><a href="mailto:c.brolan@uq.edu.au">c.brolan@uq.edu.au</a></td>
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<th><strong>Secondary Contact:</strong></th>
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<td>Yibelta Alemu</td>
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<td>The supervisor CAN be contacted by students prior to submission of an application</td>
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### UQ Centre for Clinical Research

**71 Project title:** Understanding circadian rhythm dysfunction in Motor Neurone Disease

**Project duration:**
- Length of project: 8 weeks
- Hours expected per week: 20-36 hrs

**Description:**

Project Background: Motor Neurone Disease (MND) is a fatal neurodegenerative disease. Traditionally considered a disease of upper and lower motor neurons, it is now accepted that for many MND patients this is a disease of the wider brain. Although the precise mechanisms that lead to MND remain unclear, the consensus is that MND is the pathological outcome of a combination of genetic and environmental factors.

A feature of neurodegenerative disease is a disruption in circadian rhythm. This is characterised by the loss of daily patterning of sleep and wakefulness and alterations to a number of other biological rhythms. While circadian rhythm disruption in MND is not routinely considered, evidence suggests that disruptions to the sleep/wake cycle, activity/rest and metabolic rhythms exist. We hypothesise that circadian rhythm disruption occurs in MND, and that this manifests as a disruption of circadian patterning of activity/rest, sleep and other behaviours that are governed by 24hr rhythms.

Aims and significance of project: We will pursue the following aim to determine the degree of circadian rhythm dysfunction in MND. This study will be one of the first to assess components of the circadian system in MND patients in a clinical setting, and will enhance our understanding of the fundamental processes influencing circadian rhythmicity, and to what extent this may occur in MND.

Aim 1: Assess circadian rhythm disruption in MND.

Experimental approach and methods to be used by student: The student will analyse data collected from wrist worn activity monitors to objectively assess patterns of day and night activity. This project requires a student with knowledge of statistics, data analysis, and familiarity with R, Prism and/or genstat software.

**Location:**
- UQCCR (Herston) and AIBN (St Lucia). Enrolment will be via SBMS.
<table>
<thead>
<tr>
<th>Expected outcomes and deliverables:</th>
<th>The applicant will gain skills in data collection, analysis, and interpretation specific to a clinical setting.</th>
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<tr>
<td>Suitable for:</td>
<td>Pre-medical provisional students interested in MD-HDR pathway or third year Science students with knowledge of statistics and data analysis using Prism, R and/or Genstat software.</td>
</tr>
<tr>
<td>Primary Supervisor:</td>
<td>Frederik Steyn <a href="mailto:f.steyn@uq.edu.au">f.steyn@uq.edu.au</a></td>
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<tr>
<td>Further info:</td>
<td>The supervisor MUST be contacted by students prior to submission of an application</td>
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72 Project title: **Augmenting methods for detection and profiling antimicrobial resistance of Mycobacterium abscessus complex bacteria**

Project duration: Length of project: 8 weeks  
Hours expected per week: 28 hrs

Description:

**Background**

The Mycobacterium abscessus complex is a group of bacteria that can cause life-threatening respiratory infections, especially in people with underlying lung conditions. It is now considered one of the most serious and difficult-to-treat respiratory infections affecting children with cystic fibrosis.

The rapid increase in the number of patients infected with this organism in recent years is of considerable clinical concern, as these bacteria are resistant to commonly used antibiotics and current culture-based methods for detection and resistance profiling can take weeks. This leaves doctors with little information to guide treatment decisions or implement infection control measures.

**Approach**

The Microbial Diagnostics and Characterisation group at UQCCR focuses on enhancing the capacity of clinical laboratories to diagnose, identify and characterise resistance of bacteria.

This student project is part of the Mycobacterium in Children with Cystic fibrosis (MiCCy) study, which aims to develop new molecular tests that can help inform treatment by rapidly detecting Mycobacterial infection and associated antimicrobial resistance directly in respiratory samples.

Location: UQ Centre for Clinical Research, Herston

Expected outcomes and deliverables: This project may involve developing clinical laboratory skills in conventional microbiology (e.g. handling cultured bacteria) and molecular microbiology (e.g. detecting antimicrobial resistance genes). Students may also gain skills in the collection and analysis of clinical data.

Students may have the opportunity to generate publications from their research. Students may be asked to produce a report or oral presentation at the end of their project.
### Suitable for:
This project is open to applications from students with a background in microbiology and/or an interest in and applications of clinical molecular microbiology research (e.g. molecular microbiology students interested in undertaking Honours/Masters/PhD studies, or pre-medical provisional students interested in the MD/PhD pathway).

| Primary Supervisor: | David Whiley  
d.whiley@uq.edu.au |
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<td>Further info:</td>
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## UQ Diamantina Institute

**Project title:** Analysis of Image Data in Preventative Dermatology

| Project duration: | Length of project: 8 weeks  
Hours expected per week: 35 hrs |
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<td>Description:</td>
<td>The Vectra ® WB360 System (Canfield Scientific Inc, Parsippany, NJ, USA) uses 92 cameras to simultaneously take standardized polarized images of the whole body, allowing monitoring of the complete skin surface. Much data can be extracted from these images including the distribution of pigmented lesions, and the extent of sun damage within our screened populations. Currently The University of Queensland is the only University in the Southern Hemisphere to have access to this type of longitudinal data. Successful applicants will work with a multidisciplinary team within the Dermatology Research Centre at the Translational Research Institute. Broadly, the project will involve the analysis of image data to contribute to the broad field of preventative dermatology. We have data on individuals at high risk of melanoma, as well as a general population cohort. In addition to image data we have demographic, clinical and survey data on sun behaviors. The project can be exploratory or hypothesis driven and the specifics of the project can be catered to combine the interests of the successful applicant with those of the Dermatology Research Center.</td>
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<tr>
<td>Location:</td>
<td>Translational Research Institute, Woolloongabba</td>
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<tr>
<td>Expected outcomes and deliverables:</td>
<td>This project will allow the participant to gain experience working within a multi-disciplinary team. The participants will gain data analysis skills in the statistical software R. The project will likely lead to a publication either on its own, or as part of publication from the larger research group.</td>
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<tr>
<td>Suitable for:</td>
<td>This project is suitable for a student with a background in statistics, data science, bioinformatics or similar and an interest in medical research OR a medical science student with an interest in data analysis, and upskilling in this area.</td>
</tr>
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</table>
| Primary Supervisor: | Brigid Betz-Stablein  
b.betzstablein@uq.edu.au |
| Further info:     | The supervisor MUST be contacted by students prior to submission of an application |

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**Project title:** 3D Trafficking of Immune Cells into Tumors

| Project duration: | Length of project: 8 weeks  
Hours expected per week: 34 hrs |
Description: The immunotherapy of cancer has made significant strides in the past few years due to improved understanding of the underlying principles of tumor biology and immunology. However, the fate of immune cells in complex tumour microenvironments is still unclear until now. In this project, we will investigate the migration of single immune cell in in vitro and ex vivo 3D tumour microenvironments using state-of-the-art live cell 3D microscopy. Imaging data will be used for developing the first biomathematical model for 3D migration of single immune cell. Success of this project will provide fundamental understanding of the migration of immune cells in cancer treatment to improve the efficacy of current cancer immunotherapy.

Location: Translational Research Institute, Woolloongabba

Expected outcomes and deliverables: Student will gain a good understanding of cancer biology and immunology as well as skills in state-of-the-art 3D live cell imaging and modelling techniques. Students may have an opportunity to generate co-authored publications from this project.

Suitable for: Students with a background in biomedical science, biomedical, pre-medical/medical students or students interested in honours, PhD or MD-HDR pathway.

Primary Supervisor: Haolu Wang
h.wang21@uq.edu.au

Further info: The supervisor MUST be contacted by students prior to submission of an application.

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75 Project title: Oxidative stress in chemotherapy activated hepatic stellate cells drives liver cancer progression and chemoresistance

Project duration: Length of project: 8 weeks
Hours expected per week: 30 hrs

Description: Liver cancer is the second leading cause of cancer death in the world. The most common types of primary and secondary liver cancer are hepatocellular carcinoma (HCC), and colorectal cancer liver metastases (CLM), respectively. Despite significant advances in the treatment of liver cancer, response rates of current chemotherapy are still low. Thus, understanding the mechanisms of chemoresistance is imperative to improve treatment in liver cancer.

It has been reported that chemotherapy can increase the activation of α-smooth muscle actin-positive (αSMA+) myofibroblast-like cells in colorectal, pancreatic and breast cancer. Chemotherapy may serve as a “double-edged sword” due to effects on the activation of myofibroblast-like cells which promote the growth of residual tumours and renew the tumour microenvironment. In this context, hepatic stellate cells (HSCs) in the tumour microenvironment can undergo a phenotypic transformation from quiescent cells to activated myofibroblast-like cells and exhibit biological functions that influence the onset and the progression of HCC. Activated HSCs are key components of the liver cancer microenvironment, and have been shown to play an important role in tumour growth, chemoresistance and metastasis. Activated HSCs may promote tumour progression through the secretion of growth factors and cytokines which is associated with an increased production of reactive oxidative species (ROS). It has also been reported that the increased oxidative stress in the
tumour microenvironment can affect cancer cell behaviour. Therefore, the oxidative stress may drive the crosstalk between liver cancer cells and activated HSCs to promote liver cancer chemoresistance and migration.

**Location:** Translational Research Institute, Woolloongabba

**Expected outcomes and deliverables:** This project will elucidate the effects of chemotherapy-treated HSCs on the tumour microenvironment and provide the therapeutic implications of targeting activated HSCs. The success of this proposed project will address deficiencies in key basic concepts underpinning our understanding of tumour progression, cancer treatment and chemoresistance. It will provide a new strategy to improve the response to chemotherapy and prevent the relapse of liver cancer.

**Suitable for:** This project is open to applications from students with a background in cell biology or pharmacology, especially for students interested in HDR pathway.

**Primary Supervisor:** Xiaowen (Tina) Liang
x.liang@uq.edu.au

**Further info:** The supervisor MUST be contacted by students prior to submission of an application

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**76 Project title:** Enhancing natural killer (NK) cell responses for cancer immunotherapy

**Project duration:** Length of project: 8-10 weeks
Hours expected per week: 30 hrs

**Description:** Background: Despite advances in treatment and earlier detection, cancer is still a main cause of cancer death worldwide. Natural killer (NK) cells are circulating innate lymphocytes that naturally protect against tumour spread (metastasis), and recently showed by our group as dysfunctional in environment (niche) established by cancers at distant organs for future metastatic spread. Yet, despite knowing that NK cells do control cancer metastasis, our knowledge of how cancer cells evade NK cell control is still very poor. This project aims to examine several immune suppressive pathways that cancers likely manipulate to avoid NK cells and spread. These molecules have great potential to suppress the normally high killing and anti-metastatic activity mediated by NK cells, but to date we have no idea how relatively important each pathway might be.

Proposed research program: The intrinsic NK cell function under suppressive factors stimulation will be assessed with NK cells purified from mouse spleen (wild type) by cell sorter, and in vitro challenge with activating cytokines (IL-12, IL-15 and IL-18), and different suppressive factors in which specific inhibitors will also be used as controls. Aim-1: Which suppressive factor is a major inhibitor of NK cell killing activity? This aim will be screened by killing activity of NK cells versus target tumour cells in co-culture systems. Aim-2: Which suppressive factor is a major inhibitor of NK cell cytokine secretion? This aim will assess NK cell cytokine production by intracellular IFN-gamma staining (flow cytometry) and secreted IFN-gamma from culture supernatants (ELISA); Aim-3: What is the cellular signalling status under suppressive conditions? The identification of altered cellular signalling will be screened by intracellular staining of phosphorylated signalling molecules (e.g.: phosphor(p)-AKT, p-SMAD2,3, p-STAT4, and p-STAT5).

For more info regarding NK cells, please read:
| Expected outcomes and deliverables: | This project will pharmacologically validate targets found in a recent proteomics screening, and determine which is the most important suppressive pathway in inhibiting NK cell functions. Information we obtain from this work will allow us to design rationale approaches to increase NK cell function in immunotherapies. | | Suitable for: | Pre-medical provisional students interested in MD-HDR pathway with strong interest in immunology | | Primary Supervisor: | Fernando Guimaraes | f.guimaraes@uq.edu.au | | Further info: | The supervisor MUST be contacted by students prior to submission of an application |