UQ 2020 Winter Research Scholarship Projects

Faculty of Medicine

Read about the program on the Winter Research Program page, and apply online from 16 March – 26 April 2020 via https://employability.uq.edu.au/node/159/2#2. Projects commence on 22 June and to conclude by 24 July 2020.

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

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

Child Health Research Centre
1. Ablative fractional CO2 laser for children with burn scars
2. High frequency oscillatory ventilation combined with intermittent sigh breathes in neonates compared with standard high frequency ventilation – effects on lung volume monitored by electric tomography impedance.

Centre for Health Services Research
3. Using citizen science to create supportive, safe and inclusive transport alternatives for older people
4. Satisfaction with 3D total body photography for melanoma early detection
5. Digital Health: Remote monitoring (e.g. Wearable devices) for Palliative Care
6. Rethinking the model of outpatient diabetes care utilising Digital Health
7. Digital phenotyping patients for customising digital health interventions
8. Queensland Stroke Telemedicine: Determining the way forward for service establishment

QIMR Berghofer Medical Research Institute
9. Chimeric Antigen Receptor (CAR) T cells for the treatment of cancer
10. Understanding the immunological mechanisms that regulate increased susceptibility to respiratory syncytial viral infection after stem cell transplantation.
11. Understanding the similarities in immune responses in autoimmunity and chronic graft-versus-host disease.
12. Therapeutic strategies to limit graft-versus-host disease after stem cell transplantation

School of Biomedical Sciences
13. Promoting anti-tumour immunity in ovarian cancer

School of Clinical Medicine, Northside Clinical Unit
14. Understanding the effect of nitric oxide on the haemostatic system during extracorporeal membrane oxygenation (ECMO): Part of the NECTAR-KIDS Trial
15. Osteoporosis prevalence in lung cancer screening scans
16. Screening for lung cancer, The International Lung Screen Trial (ILST)
School of Clinical Medicine, Princess Alexandra Hospital Clinical Unit

17. What factors predict a patient’s clinical response to clozapine

School of Public Health

18. Online and media representations of the health and environmental effects of sunscreens
19. Systematic literature search on clinical trials

UQ Centre for Clinical Research

20. Defining the ovarian function in uterine anomalies

UQ Diamantina Institute

21. How tumour immunosuppressive pathways prevent natural killer cell activation?
22. Phenome-wide association analysis of the genetically predisposed supertaster status
23. Targeted depletion of hematopoietic stem cells

Important: These projects are located at multiple sites at St Lucia and Herston campuses and hospitals in Brisbane, Ipswich, and a number of rural and remote area facilities throughout the rest of the state. Find out more about our research sites and research in our clinical schools and hospital sites.
### 01 Project title: Ablative fractional CO2 laser for children with burn scars

**Primary Supervisor**
Dr Zephanie Tyack Senior Research Fellow  
z.tyack@uq.edu.au; p: 0427 462 286

**Project duration:**
Length of project: 4 weeks  
Hours expected per week: 36 hours

**Location**
Centre for Children’s Health Research Building and Queensland Children’s Hospital, South Brisbane

**Description:**
This project is part of a randomised controlled trial that aims to determine the effectiveness of ablative fractional CO2 laser to treat burn scars in children. Ablative fractional CO2 laser acts by creating microscopic holes in the dermis of the skin and has the potential to remodel scar tissue. The treatment will be delivered early after a burn injury under general anaesthetic. The student will be part of a multidisciplinary clinical and research team during their winter scholarship and will be actively involved in data collection and analysis. The team involved include burn surgeons, occupational therapists, and scientists. The student will engage with this team throughout the winter scholarship by attending clinical and research meetings and attending outpatient clinics.

Options available for this project include a focus on laboratory data, the cost of delivering the intervention, and a qualitative component to understand patient experiences of the intervention.

**Expected outcomes and deliverables:**
The student involved in this project will:
1. gain skills in data collection and management
2. have an opportunity to work on a publication
3. gain experience working in a collaborative clinical and research environment
4. gain an understanding of quantitative as well as qualitative research

**Suitable for:** Undergraduate students in a health-related field who have an interest in understanding patient experiences of treatment and medical students.

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

### 02 Project title: High frequency oscillatory ventilation combined with intermittent sigh breathes in neonates compared with standard high frequency ventilation - effects on lung volume monitored by electric tomography impedance.

**Primary Supervisor**
Professor Andreas Schibler  
a.schilber@uq.edu.au

**Secondary contact**
Dr Judy Hough  
j.hough@uq.edu.au

**Project duration:**
Length of project: 4 weeks  
Hours expected per week: 20 hours

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

**Description:**
Despite recent advances in antenatal and postnatal management, a large number of newborn babies will require invasive mechanical ventilation during their admission to the neonatal intensive care unit (NICU). The majority of babies exposed to mechanical ventilation are preterm babies with immature lungs, and although mechanical ventilation is essential to their survival, it can cause injury to the neonatal lung in several ways. High frequency oscillatory ventilation (HFOV) is an alternative ventilatory mode that has been used to reduce the risk of lung injury in ventilated preterm babies. However results from randomized controlled trials comparing HFOV with conventional ventilation have been conflicting and meta-analyses have not shown clear evidence that HFOV is safer or more effective than conventional ventilation.
Combining intermittent recruitment sigh breaths at a rate of 3-5 breaths/minute with HFOV could be an alternate way delivering HFOV as it could assist in maintaining or normalising functional residual capacity (FRC). This could in theory lead to quicker weaning, less oxygen exposure and potentially reduced lung injury. A concern however could be, that the intermittent sigh breaths will lead to intermittent increased pressures in distal airways and large tidal volumes providing no benefit at all. To our knowledge, this approach has not been tested in a controlled human trial. The purpose of this study was to determine whether HFOV combined with intermittent recruitment sigh breaths at a rate of 3/min (HFOV-sigh) was better than HFOV only at improving end expiratory level (EEL), regional ventilation distribution and respiratory physiological variables in preterm infants. We hypothesize that during HFOV-sigh the oxygenation, ventilation distribution and EEL will improve compared with HFOV only.

Study design:
In this randomised cross over study, sixteen preterm neonates requiring HFOV respiratory support were recruited from a tertiary Neonatal Critical Care Unit (NCCU).

Intervention:
Infants were randomised to receive either HFOV-only or HFOV-sigh initially. After a period of 2 hours, they will be changed over to the other ventilator mode for a further 2 hours before repeating the sequence twice.

Measurements:
A Gottingen GoeMF II tomograph (VIASYS Healthcare, Netherlands) was used to measure EEL, amplitudes and regional ventilation distribution via sixteen conventional electrocardiography (ECG) electrodes (Kendall, Kittycat 1050NPSM, Tyco Healthcare Group, Mansfield, Massachusetts) placed circumferentially around the infants’™ chest at nipple level. A three-minute Electrical Impedance Tomography (EIT) measurement was performed with a frame rate of 44 Hz whilst the baby was on baseline HFOV settings. This period will be used for referencing of all following measurements. Three-minute measurements were then taken at 8 different time points, 30 minutes after each ventilator setting change. Software provided with the equipment was used for data acquisition and will be use to reconstruct functional relative EIT images. Data will be further analysed off-line using Matlab 7.7 (R2008b, The MathWorks Inc, Natick, MA, USA).

Statistics:
Mixed linear models (MLM) will be used to analyse the impact of HFOV-sigh on EEL, regional ventilation distribution and physiological variables compared with HFOV-only. All statistical analyses will be performed using SPSS (v15.0, Lead Technologies, Inc., Chicago, IL, USA).

Expected outcomes and deliverables:
Scholars will gain skills in EIT data analysis and statistical analysis and programming to assist with this analysis. They will have the opportunity to assist in drafting the manuscript for publication, particularly with respect to data analysis.

Suitable for:
Preferably students with a background in computer science.

Further info:
The supervisor MUST be contacted by students prior to submission of an application.
### Project 3: Using citizen science to create supportive, safe and inclusive transport alternatives for older people

**Primary Supervisor:** Dr Paul Gardiner  
[Email](mailto:p.gardiner@uq.edu.au)

**Project duration:** Length of project: 5 weeks  
Hours expected per week: 36 hours

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

**Description:** Australia like most developed countries has an ageing population. In order to maintain health into older age, it is important for people to be active, maintain their connections to the neighbourhoods and have social interactions. However, these factors can be impacted by lifestyle changes such as stopping driving. The aims of the project are to investigate ways to keep older people active and engaged in their communities, to promote safe mobility, to explore attractive and safe alternatives to the car. This project will use the Our Voice Citizen Science Framework to ask new and existing public transport users to discover things that help or hinder them to use public transport, using a mobile application on a tablet that allows them to record geo-stamped images and audio. They will then come together to discuss the positive attributes of public transport and also to brainstorm solutions to the negative features they identified. These solutions will be presented to decision makers within relevant bodies, e.g. Brisbane City Council (for buses) or Queensland Rail (for trains). This project will result in older adults, who are often an overlooked group of the community, having a voice to improve public transport for their peers. This will be a quasi-experimental pre-post study.

**Expected outcomes and deliverables:** The student will gain skills in data collection using mobile technology, they will gain insights into facilitating focus groups and analyzing qualitative and quantitative data. The student will be an author on any publications resulting from this project.

**Suitable for:** A student enrolled in a clinical degree such as psychology, physiotherapy etc. or health sciences. Experience in working with older people would be an advantage.

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

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### Project 4: Satisfaction with 3D total body photography for melanoma early detection

**Primary Supervisor:** Prof Monika Janda  
[Email](mailto:m.janda@uq.edu.au)

**Project duration:** Length of project: 4 weeks  
Hours expected per week: 36 hours

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

**Description:** Early detection of melanoma has been shown to be essential in improving survival rates and reducing morbidity. The Mind Your Moles study was a 3 year study that asked participants to have repeated imaging conducted using 3D total body photography for the early detection of skin cancer. This project will involve data analysis of surveys administered to participants about their satisfaction with the 3D total body photography technology.

**Expected outcomes and deliverables:** Quantitative and qualitative data analysis of online surveys including preparing a journal article for publication.

**Suitable for:** Undergraduate (including honours), masters by coursework students

**Further info:** The supervisor MUST be contacted by students prior to submission of an application.
<table>
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<tr>
<th>05 Project title:</th>
<th>Digital Health: Remote monitoring (e.g. Wearable devices) for Palliative Care</th>
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| Primary Supervisor | Dr Helen Haydon  
h.haydon@uq.edu.au |
| Project duration: | Length of project: 5 weeks (negotiable)  
Hours expected per week: Approximately 30 hours |
| Location | Building 33, Princess Alexandra Hospital, Woolloongabba |
| Description: | As a life limiting illness (previously referred to as a terminal illness) progresses, a person's mobility can be impaired. The "all too frequent" medical reviews that involve hours waiting for a hospital outpatient appointment can be an added source of stress. One way of monitoring symptoms and improving quality of care is to use telemetry or remote monitoring devices in the home. These can be purpose built machines or an app on a phone. Like wearable devices (e.g. fitbits, smart watches), palliative care telemetry can send biometric data that measures heart rate, blood pressure, oxygen levels etc. to hospitals so that a person can be monitored for intervention when needed. See [https://www.youtube.com/watch?v=xlbIEQIN6E2U&feature=youtu.be](https://www.youtube.com/watch?v=xlbIEQIN6E2U&feature=youtu.be) for a slightly dated example of remote monitoring. This winter research project involves a scoping / literature review to a) examine the research literature regarding palliative care remote monitoring and b) explore current devices available that can facilitate in home palliative care. Discussion between the student and the supervisor will shape the scope and type of review. |
| Expected outcomes and deliverables: | Scholars will gain practical supported experience in undertaking a scoping or literature review. They 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.  

Students will be asked to synthesise their findings in a comprehensive written format. |
| 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.  
Desirable: Although the scholar will be supervised when undertaking project tasks, it is ideal that they have some research knowledge (i.e. understands research principles). An interest in online health or palliative care is desirable, but not essential. |
| Further info: | The supervisor MUST be contacted by students prior to submission of an application |

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<tr>
<th>06 Project title:</th>
<th>Rethinking the model of outpatient diabetes care utilising Digital Health</th>
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| Primary Supervisor | Dr Anish Menon  
a.menon@uq.edu.au |
| Project duration: | Length of project: 5 weeks  
Hours expected per week: 28 hours |
| Location | Building 33, Princess Alexandra Hospital, Woolloongabba |
| Description: | There is a need to review diabetes models of care in light of the number of people with diabetes not achieving recommended targets (50%), workforce shortages and increasing prevalence of diabetes. To manage this increasing burden, empowering people with diabetes to better self-manage their condition, will reduce the risk of complications and future preventable utilisation of healthcare resources. For better educating patients and sustaining their self-management, we have developed, based on digital health principles, an innovative Mobile-based Diabetes Management System. |
The proof-of-concept, feasibility and pilot trials of the Mobile Diabetes Management System (MDMS) that we have completed have demonstrated a significant improvement in blood glucose levels, a high degree of consumer satisfaction and a good proportion of conventional in-person visits being substituted in a tertiary diabetes service at the Princess Alexandra Hospital, Brisbane. We plan to trial this system in multiple care settings: different hospital settings, community centres and regional areas - the latter being the focus of this project.

The aim of the project is to implement and assess the clinical and cost-effectiveness of an innovative mobile diabetes management system in regional and rural Queensland.

**Expected outcomes and deliverables:**

The scholar will gain skills relating to literature review and drafting academic articles for publication. Depending upon the contribution, the scholar may have the opportunity to be authored on a peer reviewed journal article. The scholar will be able to attend project meetings to experience the real-world implementation of digital health into health systems.

As part of this project, the scholar can choose to can gain experience in quantitative research methods. If interested, the scholar might have an opportunity to consider pursuing a higher degree research associated with other possible projects that are either in the planning stage or currently underway such as diabetes stakeholder perspectives to better integrate diabetes care, MDMS implementation trial in specialist care settings and telediabetes care.

**Suitable for:**

This project is suitable for students with a background in any health-related field of study. A background in chronic disease related fields, public health, and/or digital health will be an advantage.

**Further info:**

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

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<tr>
<th>07 Project title:</th>
<th>Digital phenotyping patients for customising digital health interventions</th>
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<tr>
<td>Primary Supervisor</td>
<td>Dr. Ronald Dendere, Reserach Fellow - Health Informatics <a href="mailto:r.dendere@uq.edu.au">r.dendere@uq.edu.au</a></td>
</tr>
<tr>
<td>Project duration:</td>
<td>Length of project: 4 weeks Hours expected per week: 30 hours</td>
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<tr>
<td>Location</td>
<td>Building 33, Princess Alexandra Hospital, Woolloongabba</td>
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<tr>
<td>Description:</td>
<td>In medicine, a phenotype refers to a set of measurable biological, behavioural or cognitive markers that are found more often in individuals with a particular disease or condition than in the general population. Patient phenotypes captured to enhance health and wellness will soon extend to human interactions with technology: a new and growing phenomenon known as 'digital phenotype'. Digital phenotypes have potential to expand our ability to identify and diagnose health conditions. For example, through social media, forums and online communities, wearable technologies and mobile devices, there is a growing body of health-related data that can shape our assessment of human illness. The aim of this project is to conduct a literature review to uncover evidence of how digital phenotypes (through use of technologies such as social media, wearable and mobile devices) can be used to diagnose, treat and manage chronic diseases.</td>
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<tr>
<td>Expected outcomes and deliverables:</td>
<td>Expected deliverables include: 1. Completion of database searches for articles relevant to the aims of this project in medical and healthcare journal databases (PubMed, Medline, CINAHL, Embase etc). 2. Completion of screening of search results according to set criteria for inclusion in the review.</td>
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Depending on the number of articles identified during the search, the student may also be expected to review some of the articles and perform data extraction. The student will be listed as a co-author on the manuscript resulting from this work for submission to a journal. The student will gain essential research skills related to systematic reviews, analysing and synthesizing research data and academic writing.

**Suitable for:** The project is suitable for students with any background in any health-related field but would particularly benefit those with an interest in the application of digital technologies in healthcare delivery.

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

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**08 Project title:** Queensland Stroke Telemedicine: Determining the way forward for service establishment

**Primary Supervisor**
Dr Emma Thomas, Research Fellow  
e.thomas2@uq.edu.au; p: 07 3176 5356

**Project duration:**  
Length of project: 4-5. Weeks (negotiable)  
Hours expected per week: up to 36 hours

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

**Description:** Background: Stroke is a leading cause of death and disability in Australia. In acute management of stroke "time is brain" meaning that the quicker a person is able to access effective treatment, the better their outcomes will likely be. One highly effective and proven therapy is thrombolysis or 'clot dissolving therapy'. Thrombolysis can reduce disability and improve survival if delivered in a time-critical period.

In Queensland, access to thrombolysis is limited to geographical areas that have a stroke specialist (mostly metropolitan areas). Consequently, many people in regional and remote Queensland are unable to access this evidence-based intervention. To increase access to this proven acute stroke therapy, many countries and some Australian states have established telestroke services. These services connect regional and remote hospitals with stroke specialists. Videoconferencing between the patient, the local health care provider (e.g. emergency physician) and a stroke specialist enables rapid stroke assessment. Additionally, CT images are shared with the stroke specialist to enable an informed decision as to whether the person is eligible for thrombolysis.

Whilst a national leader in telehealth, Queensland is the last state to invest in a stroke telemedicine project. Before implementing a telestroke service in Queensland, it is crucial that models of care and implementation barriers faced by other telestroke services are understood.

**Aim:** To describe how telestroke has been implemented in various settings internationally and identify barriers and facilitators to service establishment, management and sustainability. These lesson will facilitate the careful design of an appropriate telestroke service in Queensland.

**Approach:** A systematic review of the telestroke literature will be undertaken.

Search methods for identification of studies: The following databases will be searched: Cochrane, Medline, EMBASE, CINAHL. The search strategy will include terms relating to stroke and telemedicine. A pre-defined criteria will be used for selecting studies to be included in the review. Original research articles and grey literature (e.g., telestroke service websites) will be eligible for inclusion if they describe the establishment or evaluation of a telestroke service. There will not be any exclusion criteria based on study design (reviews, commentaries and opinion pieces relating to the implementation of a telestroke service will be included). Articles must be available in...
Data collection and analysis: Data will be extracted into a pre-prepared table in order to describe service characteristics and barriers/facilitators of service establishment, on-going management and evaluation. Extracted information will include: a description of the service, ethical and legal considerations, staffing requirements, technology used, funding source, training and development processes and any considerations, barriers and or facilitators to service establishment and sustainability. Data extraction will be undertaken by one researcher and findings will be described narratively in broad themes such as: 1) models of care; 2) technology used; 3) finance and cost; 4) organisation and service design; 5) policy, governance and legislation and 6) additional perceived barriers and facilitators.

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. Student can expect to learn skills related to systematic literature reviews. 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.
- Desirable: An interest in online health or stroke care is desirable, but not essential.

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

<table>
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<tr>
<th>Project title:</th>
<th>Chimeric Antigen Receptor (CAR) T cells for the treatment of cancer</th>
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| Primary Supervisor | Dr Siok Tey  
siok.tey@qimrberghofer.edu.au |
| Secondary contact | Dr Angela Trieu  
angela.trieu@qimrberghofer.edu.au |
| Project duration: | Length of project: 6 weeks  
Hours expected per week: 36 hours |
| Location | QIMR Berghofer Medical Research Institute, Herston |
| Description: | Chimeric Antigen Receptor (CAR) T cells are genetically modified immune cells that can recognise and kill cancer cells. They are a type of cancer immunotherapy that can be very effective against certain types of blood cancers and are now approved for use in patients. However, CAR T cells can only benefit a very small proportion of cancer patients at present. The aim of this project is to develop new types of CAR T cells that are more effective and can target other types of cancer. The project involves using molecular biology techniques to clone new types of CAR T cells and using immunology assays to test the function of these new CAR T cells. It will provide exposure to the fields of cancer immunotherapy, genetic engineering and biotechnology, with a focus on clinical translation. |
| Expected outcomes and deliverables: | Scholars will gain exposure to molecular cloning, gene modification with retroviral vectors, cell culture and immunological assays, such as flow cytometry. Scholars are expected to learn at least one or two techniques and be proficient in basic laboratory procedures at the end of their project. Scholars will also participate in lab meetings and seminars. |
| Suitable for: | Students who are interested in cancer immunotherapy, biotechnology and clinical translation.  
Students who are interested in pursuing Honours or research higher degree are particularly encouraged to apply. |
Further info: The supervisor CAN be contacted by students prior to submission of an application

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<tr>
<th>10 Project title</th>
<th>Understanding the immunological mechanisms that regulate increased susceptibility to respiratory syncytial viral infection after stem cell transplantation.</th>
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| Primary Supervisor | Dr Antiopi Varelias  
antiopi.varelias@qimrberghofer.edu.au |
| Secondary contact | Dr Angela Trieu  
angela.trieu@qimrberghofer.edu.au |
| Project duration | Length of project: 6 weeks  
Hours expected per week: 36 hours |
| Location | QIMR Berghofer Medical Research Institute, Herston |
| Description | Viral infection following allogeneic stem cell transplantation (alloSCT) is a common complication following this procedure, performed for the treatment of blood cancers. One such pathogen is respiratory syncytial virus (RSV), a common community-acquired infection that leads to significant morbidity in immunocompromised patients such as alloSCT patients. Current treatment strategies using anti-viral agents are ineffective and thus this complication remains a significant clinical problem where new treatments are desperately needed. To address this, a better understanding of the fundamental immunological mechanisms which underlie this complication is required. Thus, the overall aim of this project is to establish a preclinical murine model of RSV infection in the stem cell transplant setting using Pneumonia Virus of Mice (PVM), the murine relative of RSV, to enable the contribution of donor and host innate and acquired mucosal immune responses to the viral infection to be elucidated. |
| Expected outcomes and deliverables | The student will have the opportunity to experience working in a laboratory environment performing cutting-edge research. He/she can expect to gain a better understanding of the immunological basis of stem cell transplantation from participating in a larger ongoing project with defined experiments for the student to perform. Data generated may be used in publications and so a high standard of technical competence/compliance will be required. |
| Suitable for | This project would be suitable for students studying biomedical science or medicine. Prior laboratory experience would be highly desirable. Applicants may need to be flexible with their working hours in some instances. |
| Further info | |

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<tr>
<th>11 Project title</th>
<th>Understanding the similarities in immune responses in autoimmune and chronic graft-versus-host disease.</th>
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</table>
| Primary Supervisor | Dr Antiopi Varelias  
antiopi.varelias@qimrberghofer.edu.au |
| Secondary contact | Dr Angela Trieu  
angela.trieu@qimrberghofer.edu.au |
| Project duration | Length of project: 6 weeks  
Hours expected per week: 36 hours |
| Location | QIMR Berghofer Medical Research Institute, Herston |
| Description | Chronic graft-versus-host disease (GVHD) occurs in approximately 60-80% of long-term survivors of allogeneic stem cell transplantation (allo-SCT). This immunological complication is a major cause of morbidity and mortality and accounts for about one-quarter of the deaths in long-term transplant survivors. Clinical manifestations of chronic GVHD such as dry eyes, dry mouth and connective tissue disease closely resemble those of autoimmune disorders such as Sjogren's Syndrome. Focal lymphocytic infiltrates of exocrine tissues (eg salivary glands), a characteristic feature of the disease, leads to tissue pathology and gland dysfunction. Cytokines are known mediators in this process and are important in regulating the disease sequela. Given current cytokine-targeted therapeutic approaches are |

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ineffective, a better understanding of the pathophysiology of the disease is warranted. Using preclinical models of chronic GVHD, this project aims to define the role of novel cytokine and cellular interactions within host tissues and thereby identify new therapeutic targets/strategies.

**Expected outcomes and deliverables:** The student will have the opportunity to experience working in a laboratory environment performing cutting-edge research. He/she can expect to gain a better understanding of the immunological basis of stem cell transplantation from participating in a larger ongoing project with defined experiments for the student to perform. Data generated may be used in publications and so a high standard of technical competence/compliance will be required.

**Suitable for:** This project would be suitable for students studying biomedical science or medicine. Prior laboratory experience would be highly desirable. Applicants may need to be flexible with their working hours in some instances.

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

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**Project title:** Therapeutic strategies to limit graft-versus-host disease after stem cell transplantation

**Primary Supervisor**
Dr Kate Gartlan  
Kate.gartlan@qimrberghofer.edu.au

**Secondary contact**
Dr Angela Trieu  
angela.trieu@qimrberghofer.edu.au

**Project duration:** Length of project: 6 weeks  
Hours expected per week: 36 hours

**Location**
QIMR Berghofer Medical Research Institute

**Description:** Donor stem cell/bone marrow transplantation (allo-SCT/BMT) is an important curative therapy in the treatment of blood cancers, however its application is limited by serious complications such as graft-versus-host disease (GVHD) that have a significant impact on patient mortality and quality of life. Early inflammatory responses during preparative transplant conditioning initiate a cascade of adaptive immune responses that manifest as acute and/or chronic tissue damage in >50% of transplant recipients. GVHD treatment options are relatively limited and focused on immunosuppression and steroidal therapy, which are problematic due to opportunistic infection and refractory disease, therefore new therapies are urgently needed.

Cytokines have been extensively studied in GVHD within pre-clinical and clinical settings, and can act as both regulators and effectors of disease. In this study we will examine novel approaches to limit cytokine induced tissue damage and enhance regulatory networks post-transplant.

**Expected outcomes and deliverables:** Students will develop new skills in techniques relevant to immunology research and exposure to in vivo models of inflammatory disease. This is an ideal opportunity to gain experience in the laboratory and will aid in future career choices (e.g. Honours)

**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.

**Further info:** The supervisor CAN be contacted by students prior to submission of an application.
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<th>Hours expected per week: 36 hours</th>
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<th><strong>Location</strong></th>
<th>UQ St Lucia Campus</th>
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| **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. |

| **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:** | Undergraduate or Masters students with a background in biomedical sciences, immunology, and health. |

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

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**SoCM - Northside Clinical Unit**

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<th>14</th>
<th><strong>Project title:</strong> Understanding the effect of nitric oxide on the haemostatic system during extracorporeal membrane oxygenation (ECMO): Part of the NECTAR-KIDS Trial</th>
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| **Primary Supervisor** | Dr Katrina Ki <k.ki@uq.edu.au> |

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| **Location** | Critical Care Research Group/UQ lab within The Prince Charles Hospital, Chermside West |

| **Description:** | Extracorporeal membrane oxygenation (ECMO) is a life saving device used to treat critically ill patients with severe cardiac and/or respiratory dysfunction. In this critically ill children cohort, patients are often indicated with greater than 80% risk of mortality and are non-responsive to conventional management. This modality enables oxygenation of patient blood external to the body, serving as a bridge to organ recovery as well as a bridge to further interventions. However, children treated with ECMO are frequently reported with haemostatic abnormalities with a mortality rate around 30-40% in most centres around the world. Despite technological improvements and management, bleeding and clotting remain two of the leading complications in ECMO patients. These undesirable patient outcomes have been associated with exposure of patient blood to the foreign ECMO surfaces combined with a very critical underlying disease burden (organ injury) - resulting in dysfunction in platelets, coagulation and the inflammatory pathways. Studies further suggest that these are consequences of impaired nitric oxide production |

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SoCM - Northside Clinical Unit

14 Project title: Understanding the effect of nitric oxide on the haemostatic system during extracorporeal membrane oxygenation (ECMO): Part of the NECTAR-KIDS Trial

Primary Supervisor: Dr Katrina Ki <k.ki@uq.edu.au>

Project duration: Length of project: 5 weeks

Hours expected per week: 36 hours

Location: Critical Care Research Group/UQ lab within The Prince Charles Hospital, Chermside West

Description: Extracorporeal membrane oxygenation (ECMO) is a life saving device used to treat critically ill patients with severe cardiac and/or respiratory dysfunction. In this critically ill children cohort, patients are often indicated with greater than 80% risk of mortality and are non-responsive to conventional management. This modality enables oxygenation of patient blood external to the body, serving as a bridge to organ recovery as well as a bridge to further interventions. However, children treated with ECMO are frequently reported with haemostatic abnormalities with a mortality rate around 30-40% in most centres around the world. Despite technological improvements and management, bleeding and clotting remain two of the leading complications in ECMO patients. These undesirable patient outcomes have been associated with exposure of patient blood to the foreign ECMO surfaces combined with a very critical underlying disease burden (organ injury) - resulting in dysfunction in platelets, coagulation and the inflammatory pathways. Studies further suggest that these are consequences of impaired nitric oxide production
and increased consumption during ECMO. Given that nitric oxide is an essential substance produced by the body to help regulate the platelet/coagulation and inflammatory pathways. Yet, the effect of nitric oxide on platelets, the coagulation and inflammatory response during ECMO in children remain to be elucidated. Therefore, as a sub aim of the NECTAR-KIDS randomised control trial (looking at mortality), we seek to evaluate whether administering nitric oxide to the ECMO circuit in addition to the use of standard air/oxygen gas mixture will positively influence/regulate the haemostatic system.

**Expected outcomes and deliverables:** The Critical Care Research Group and the Paediatric Critical Care Research Group are recognised as frontier for basic and clinical ECMO research involving a broad range of disciplines. The scholar will therefore have the opportunity to work alongside experts in different fields (e.g. scientists, clinicians, nurses and engineers). Within the project, the scholar will gain practical experience in the laboratory, and acquire skills in blood sample processing, cell staining and using the flow cytometry.

**Suitable for:** Science or pre-medical provisional students interested in MD-HDR pathway

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

<table>
<thead>
<tr>
<th>15 Project title:</th>
<th>Osteoporosis prevalence in lung cancer screening scans</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Supervisor</strong></td>
<td>Dr Henry Marshall  <a href="mailto:henry.marshall@health.qld.gov.au">henry.marshall@health.qld.gov.au</a></td>
</tr>
<tr>
<td><strong>Secondary contact</strong></td>
<td>Maria Martins  <a href="mailto:mmartins@uq.edu.au">mmartins@uq.edu.au</a></td>
</tr>
<tr>
<td><strong>Project duration:</strong></td>
<td>Length of project: 5 weeks  Hours expected per week: 36 hours</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Department of Thoracic Medicine, The Prince Charles Hospital, Chermside West</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>This is a substudy of The International Lung Screen Trial (ILST). ILST is recruiting smokers and former smokers at risk of cancer (<a href="https://clinicaltrials.gov/ct2/show/NCT02871856">https://clinicaltrials.gov/ct2/show/NCT02871856</a>). This study is looking at leveraging non-lung data captured by CT scans to see if other comorbid conditions can be identified, thereby enhancing cost-effectiveness of screening.</td>
</tr>
<tr>
<td><strong>Expected outcomes and deliverables:</strong></td>
<td>Enhance understanding of data collection, data entry, medical imaging analysis. Students will be expected to produce a short oral presentation at the end of their project.</td>
</tr>
<tr>
<td><strong>Suitable for:</strong></td>
<td>Students with an interest in respiratory diseases or radiology (medical imaging) in particular. However students with an interest in clinical data, research and learning are welcome to apply. This demanding project will require a high level of diligence, focus and computer proficiency</td>
</tr>
<tr>
<td><strong>Further info:</strong></td>
<td>The supervisor MUST be contacted by students prior to submission of an application</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>16 Project title:</th>
<th>Screening for lung cancer, The International Lung Screen Trial (ILST)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Supervisor</strong></td>
<td>Dr Henry Marshall  <a href="mailto:henry.marshall@health.qld.gov.au">henry.marshall@health.qld.gov.au</a></td>
</tr>
<tr>
<td><strong>Secondary contact</strong></td>
<td>Maria Martins  <a href="mailto:mmartins@uq.edu.au">mmartins@uq.edu.au</a></td>
</tr>
<tr>
<td><strong>Project duration:</strong></td>
<td>Length of project: 5 weeks  Hours expected per week: 36 hours</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Department of Thoracic Medicine, The Prince Charles Hospital, Chermside</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>ILST is multicentre NHMRC funded International Lung Cancer Screening Trial, led by Prof Kwun Fong at The University of Queensland Thoracic Research Centre at The Prince Charles Hospital.</td>
</tr>
</tbody>
</table>
Study participants undergo CT screening at baseline and 2 years to look for early lung cancer. Sub studies address osteoporosis prevalence, smoking cessation and nodule measurement.

Students will gain skills in data collection, extraction, cleaning, storage, research methodology and analyses and have opportunity to help generate data for presentation and publications.

<table>
<thead>
<tr>
<th>Expected outcomes and deliverables:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance understanding of data collection and clean up, data entry, risk models, media imaging analysis.</td>
<td></td>
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<tr>
<td>Students will be expected to produce a short or oral presentation at the end of their project.</td>
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</table>

<table>
<thead>
<tr>
<th>Suitable for:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Science students with an interest in respiratory diseases (especially lung cancer) or radiology (medical imaging) in particular. This demanding project will require a high level of diligence, focus and computer proficiency.</td>
<td></td>
</tr>
</tbody>
</table>

| Further info: | The supervisor MUST be contacted by students prior to submission of an application |
18 Project title: Online and media representations of the health and environmental effects of sunscreens

Primary Supervisor: Dr Kylie Morphett  
k.morphett@uq.edu.au

Project duration: Length of project: 5 weeks  
Hours expected per week: 30 hours

Location: Herston, SPH building

Description: There is increasing media coverage about the impact of sunscreens on individual health (absorption of ingredients into the bloodstream) and the environment (impact on coral reefs). However, any potentially negative impacts need to be weighed against the health benefits of sunscreen use in preventing skin cancers. This is extremely relevant in Queensland, the skin cancer capital of the world. This project will use qualitative methods (content analysis, thematic analysis) to analyse the messages that the public are receiving about the safety of sunscreens in the media and online.

Expected outcomes and deliverables: The student will learn qualitative research skills, including receiving training in the qualitative research software, NVivo.  
The outcome will be a report outlining findings, with the potential to turn this into a publishable paper, on which the student will be a co-author.

Suitable for: This project is open to students with an interest in public or environmental health. Interest in the use of qualitative research methods in public health would be beneficial.

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

19 Project title: Systematic literature search on clinical trials

Primary Supervisor: Dr. Darsy Darssan  
d.darssan@uq.edu.au

Project duration: Length of project: 5 weeks  
Hours expected per week: 30 hours

Location: Herston Campus, Public Health Building

Description: In this winter research project we will search for published primary articles of clinical trials over the past 10 years. We will use web of science for the literature search. The main article of completed trials with search criteria will be saved in a folder. The search key words will be “randomized controlled trial” (or “randomised controlled trial”) AND “survival analysis” (or “time-to-event”) AND ”primary outcome”. All the papers appearing will be downloaded. Papers satisfying inclusion criteria will be separated in a folder. You will be given instructions on every aspects of this work. Random checks of the work will be done in regards article selection. We will discuss the inclusion criteria of each selected publication.

Expected outcomes and deliverables: You will learn about systematic reviews, randomized control clinical trials, and mainly literature search criteria and search engines. Although the project description is short, you will be given the opportunity to come up with your own ideas and suggestions. You will gain skill in collecting data for systematic reviews. You will be asked to produce a short summary of your work at the end.

Suitable for: Public health students, statistics students.

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

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UQ Centre for Clinical Research

20 Project title: Defining the ovarian function in uterine anomalies

Primary Supervisor: Dr. Emanuele Pelosi  
e.pelosi@imb.uq.edu.au
Project duration: Length of project: 4 weeks  
Hours expected per week: 36 hours

Location  
UQCCR, Herston Campus

Description: Uterine anomalies affect up to 7% of women. The most severe uterine anomaly is Mayer-Rokitansky-Kuster-Hauser (MRKH) syndrome, which affects 1 in 4500 women and is characterized by incomplete development of uterus and/or vagina. Although women with MRKH syndrome are unable to carry a foetus, their ovaries are usually unaffected, making it possible to have biological children through assisted reproduction technology (ART) and surrogacy.

However, little is known about the real impact of uterine anomalies - including MRKH syndrome - on ovarian function. Understanding how oocyte quality and numbers are affected by the absence or incomplete development of the female reproductive tract becomes of critical importance for the management of fertility.

We have generated mouse models of MRKH syndrome and aim to study their ovarian biology and development by directly investigating morphology and gene expression profiles. The student will gain experience in histological and immunohistological staining, stereological principles, brightfield and confocal imaging, RNA extraction, and real-time PCR.

The results of this research will have a direct impact on the development of: 1) guidelines for decision making and family planning; 2) diagnostic tools for MRKH women undergoing ART treatment; 3) strategies to maximize ART success.

Expected outcomes and deliverables: Students will gain hands on experience in analysing morphology and protein and gene expression in mouse models of MRKH syndrome. They will have the opportunity to present the findings of their project.

Suitable for: Students with basic laboratory and computer skills and with an interest in cell biology, developmental biology or reproductive biology.

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

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UQ Diamantina Institute

21 Project title: How tumour immunosuppressive pathways prevent natural killer cell activation?

Primary Supervisor  
Dr Fernando Souza-Fonseca-Guimaraes  
f.guimaraes@uq.edu.au

Project duration: Length of project: 5 weeks  
Hours expected per week: 36 hours

Location  
UQ DI, Level 5, Translational Research Institute, Woolloongabba

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 include factors the transforming growth factor (TGF) -β superfamily that are elevated in the tumour environment. 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 and suppressive factors.

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 YAC-1 target 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 (phosphor(p)-AKT, p-ERK1/2, p-p38, p-phospholipase C-gamma2, p-phosphotyrosine, p-SMAD2,3, p-STAT4, p-STAT5 and p-ZAP70).

These experimental tools will 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.

Expected outcomes and deliverables: The selected applicant will receive training:
- Techniques: cellular culture, cell sorter, flow cytometry, ELISA
- Experiment design and analysis (including raw data / statistics)

At the end of the project student will produce a report, and oral presentations will be given in lab meeting at the Experimental and Translational Immunology Laboratory / UQDI

Suitable for: MD, pharmacology or biomedicine students.

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

## 22 Project title:
Phenome-wide association analysis of the genetically predisposed supertaster status

<table>
<thead>
<tr>
<th>Primary Supervisor</th>
<th>Dr Daniel Hwang</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="mailto:d.hwang@uq.edu.au">d.hwang@uq.edu.au</a></td>
</tr>
</tbody>
</table>

**Project duration:**
Length of project: 5 weeks  
Hours expected per week: 30 hours

**Location**
UQ DI, Translational Research Institute, Woolloongabba

**Description:**
Taste perception plays a critical role in food preference and intake and thus having a long-term impact on health. It has been extensively studied that human taste responses to the bitter substance phenylthiocarbamide (PTC) and its structurally related chemical propylthiouracil (PROP) vary greatly between individuals. Approximately 30% of the population find these bitter chemicals tasteless and are often referred as non-tasters; the remaining 70% find them extremely bitter and are referred as tasters or supertasters. An individual's "supertaster status" is primarily determined by the genetic variation in the bitter taste receptor gene TAS2R38 that accounts for approximately half of the variance in taste response to PTC and PROP. Being a supertaster or not has been associated with phenotypes other than taste perception. For example, supertasters have a lower preference for dark green vegetables, in particular cruciferous vegetables such as Brussel sprouts, because they find these vegetables more bitter than non-tasters. Furthermore, supertasters tend to drink less alcohol and coffee and are less likely to be a smoker. Recent studies showed that the TAS2R38 bitter taste receptor is expressed in epithelial cells in the airway and the TAS2R38 genotype is associated with immune response to upper respiratory infection. This finding revealed the health impact of supertaster status beyond taste perception.
With the continuously increasing number of genome-wide association studies (GWAS) in humans, it is possible to assess the influence of supertaster status across the whole human phenome by examining the association with the TAS2R38 genotype in these GWAS results. As an exploratory study, we will use multiple online tools, including our own Complex-Trait Genome Virtual Lab (CTG-VL; https://genoma.io/), to assess the genetic association between the TAS2R38 genotype and > 1000 health and disease outcomes in publicly available GWAS results. The outcome will provide new insights into the health impact of the genetically predisposed supertaster status.

<table>
<thead>
<tr>
<th>Expected outcomes and deliverables:</th>
<th>Scholars would gain knowledge in the biology and genetics of taste perception, learn how to conduct genetic analyses using existing online resource, and have an opportunity to generate a publication from their research.</th>
</tr>
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<tbody>
<tr>
<td>Suitable for:</td>
<td>This project is open to applications from students with a background in genetics/nutrition/medicine.</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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</tbody>
</table>

**Expected outcomes and deliverables:**

**Suitable for:**

**Further info:**

<table>
<thead>
<tr>
<th>Project title:</th>
<th>Targeted depletion of hematopoietic stem cells</th>
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<tbody>
<tr>
<td>Primary Supervisor</td>
<td>A/Prof Raymond Steptoe</td>
</tr>
<tr>
<td><a href="mailto:r.steptoe@uq.edu.au">r.steptoe@uq.edu.au</a></td>
<td></td>
</tr>
<tr>
<td>Project duration:</td>
<td>Length of project: 4 weeks</td>
</tr>
<tr>
<td>Hours expected per week:</td>
<td>36 hours</td>
</tr>
<tr>
<td>Location</td>
<td>UQ DI, Level 6, Translational Research Institute, Woolloongabba</td>
</tr>
<tr>
<td>Description:</td>
<td>Targeted depletion of hematopoietic stem cells is an emerging therapeutic tool that will facilitate clinical application of genetically-modified hematopoietic stem cells as a cellular therapy for life-threatening diseases and also, perhaps, diseases where dysregulated immune responses are present. This project investigates aspects of the use of hematopoietic stem cell-targeted drugs with the goal of understanding how they may be applied for gene therapy.</td>
</tr>
<tr>
<td>Expected outcomes and deliverables:</td>
<td>Students would be expected to gain some fundamental laboratory skills and contribute to an overall laboratory project.</td>
</tr>
<tr>
<td>Suitable for:</td>
<td>A student with strong interest in immunology or gene therapy.</td>
</tr>
<tr>
<td>Further info:</td>
<td>The supervisor CAN be contacted by students prior to submission of an application</td>
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</table>