Research grant success rate jumps for 2020

There has been a big increase in the success rates for fellows and trainees applying for ANZCA research grants.

The ANZCA Research Committee was pleased that researchers applying for grants for new projects, first-time applicants, and women leading new studies, all experienced significantly higher success rates in the 2020 ANZCA grant round compared to 2019.

The increase in ANZCA funding available for new grants in 2020 was made possible by reducing multi-year commitments. In 2018, the committee decided to cap future multi-year grants to a maximum of $A120,000 over two years, reducing second-year and removing third-year funding commitments. This will enable more future applicants to access research grants.

Of 55 new project grant applications received for 2020, 23 (42 per cent) were successful, compared to 16 (26 per cent) of 61 applications for 2019.

Of 17 applications from first time applicants, nine (53 per cent) succeeded, versus only five (20 per cent) of 25 such applications in 2019.

Female principal investigators submitted 23 (42 per cent) of the 55 applications received, with nine (39 per cent) succeeding, versus only seven of 26 (27 per cent) succeeding in 2019.

For 2020, the committee awarded funding of just over $A1.66 million through the ANZCA Research Foundation for research grants, including the Academic Enhancement Grant and Simulation/Education Grant, 19 new project grants, six continuing project grants, three novice investigator grants, and an allocation of $A30,000 for CTN pilot grants. The committee will continue to monitor and report on the outreach of our research grants program, including the diversity of researchers and the location of grant applicants.

Overall, 30 investigators and teams will be supported in 2020. Their important research will be carried out in leading hospitals and universities in Australia, New Zealand and Hong Kong, and are a vital part of ANZCA's continuous advancement of safe, high-quality patient care in anaesthesia, intensive care, perioperative medicine and pain medicine, through high quality medical research and translation to clinical practice.

The foundation is very appreciative of all of its supporters and sponsors, especially those who provide the named research awards: Mrs Ann Cole, the families of the late Dr Robin Smallwood, the late Dr John Boyd Craig, the estate of the late Dr Lillian Elaine Kluver, CSL Behring, the Medibank Better Health Foundation, and Waitemata District Health Board.

Above: Dr Angela Tognolini, Foundation grant recipient, Royal Brisbane and Women's Hospital

Named research awards

Harry Daly Research Award – Associate Professor Paul Soeding

The Harry Daly Research Award was established by the Faculty of Anaesthetists, Royal Australasian College of Surgeons, in 1981. The award may be made in any of the college's research grant categories provided the project is judged to be of sufficient merit. The award is made each year to the grant ranked most highly by the ANZCA Research Committee.

Understanding MRGPRX2-dependant, life-threatening anaphylaxis during anaesthesia: Towards prediction and prevention

The risk of anaphylaxis during surgery continues to concern clinicians, particularly since this adverse reaction is often unpredictable and life threatening. Anaphylaxis, while rare, is an acute hypersensitivity response often occurring within minutes following exposure to a provoking agent. The clinical response is typically characterised by development of an erythematous rash and urticaria, airway swelling, bronchospasm and hypotension. In severe reactions, cardiovascular collapse can result in cerebral injury and death. Provoking agents during anaesthesia are most commonly neuromuscular blocking agents (NMBAs) such as rocuronium.

In anaphylactic reactions, the body generates an antibody, immunoglobulin E (IgE) that interacts with the allergic substance to stimulate special immune cells called mast cells. These mast cells then release chemicals such as histamine that produce the severe symptoms of anaphylaxis. While this IgE mechanism is important to some drug allergy it does not explain all the cases. New work has excitingly identified a mast cell receptor called MRGPRX2 than can be directly activated by common muscle relaxant agents (as well as other drugs that share related structures). These findings provide mechanistic support to a non-IgE-mediated, "anaphylactoid" or "pseudo-allergic" process being important in anaphylaxis triggered by muscle relaxants.

The investigators will build on their results from a prior ANZCA-supported grant and will test if natural polymorphisms in MRGPRX2, identified in drug-sensitive individuals, render the receptor a) more active or b) better at activating certain mast cell signalling pathways ("signalling bias"). They will also establish mast cell culture from peripheral blood progenitor cells to validate their findings in patient-derived mast cells.

Results from this study will establish the importance of MRGPRX2 polymorphisms and intracellular signalling to neuromuscular blocking drug (NMBD) anaphylaxis, particularly rocuronium, with a focus on answering the question "Why does this reaction only occur in a relative few"? In so doing, it is envisaged that the results might lead to the establishment of a predictive test or biomarker quantification to avoid occurrence of this potentially deadly adverse reaction. Support for the validation/predictive value of such a test would be sought from larger funding agencies.

Associate Professor Paul Soeding, Dr Jeremy McComish, The Royal Melbourne Hospital; Dr Graham Mackay, The University of Melbourne.

$A69,115

Above: Associate Professor Paul Soeding, Dr Jeremy McComish and Dr Graham Mackay

John Boyd Craig Research Award – Dr Philip Finch

The John Boyd Craig Research Award was established following generous donations from Dr John Boyd Craig to the ANZCA Research Foundation to support pain related research by fellows, particularly Western Australians.

Molecular evidence of chronic inflammation in complex regional pain syndrome

Complex regional pain syndrome (CRPS) is a chronically-painful condition that occasionally develops after tissue injury (for example, a fracture or sprain) or after injury to a peripheral nerve. Instead of healing normally, inflammation persists longer than necessary and pain sometimes spreads to involve the whole limb and other parts of the body. Unfortunately, medical treatments for CRPS are often unsuccessful because the mechanisms that underlie the pain are not well understood.

In this project, the investigators will examine the role of the alpha-1 adrenoceptor (α_1-AR), a target of the sympathetic nervous system neurotransmitter noradrenaline, in the inflammation that appears to underpin CRPS. Among other sites, this molecule is present in skin cells, cells involved in scar tissue formation, in peripheral nerve fibres and in white blood cells. Preliminary findings by the investigators suggest that stimulating the α_1-AR aggravates inflammation and pain by increasing the production of interleukin-6, a key inflammatory mediator. Conversely, substances manufactured during inflammation increase the production of α_1-AR. Furthermore, their preliminary work suggests that this cycle is amplified in a subgroup of CRPS patients with high basal levels of the α_1-AR. The investigators wish to verify these preliminary observations in a range of cells involved in inflammatory responses (skin cells, repair cells, nerve cells and white blood cells) obtained from people with CRPS and from a comparison group of pain-free people.

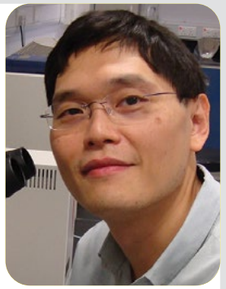
The investigators will also explore the consequences of this inflammation on the immune system. Their preliminary work indicates that white blood cells, and antibodies produced by these cells to destroy bacteria and viruses, are more abundant in people with CRPS than in pain-free controls. Unfortunately, over-production of antibodies sometimes results in autoimmune responses and chronic inflammation. The investigators hypothesise that over-stimulation of the α_1-AR in CRPS triggers over-production of interleukin-6, ultimately resulting in chronic inflammation and autoimmune responses. To explore this, the investigators wish to determine whether interleukin-6 induces white blood cells to release an excessive quantity of antibodies in people with CRPS.

Options for treating CRPS are limited because mechanisms are not well understood. It is hoped that the studies conducted in this project will help to clarify the pathophysiology of CRPS, and that this will lead to new treatment approaches for patients with this intractable disease.

Dr Philip Finch, Professor Peter Drummond, Murdoch University, Western Australia.

$A63,000

The Russell Cole Memorial ANZCA Research Award – Professor Matthew Chan



The Russell Cole Memorial ANZCA Research Award was established following a generous ongoing commitment to the ANZCA Research Foundation from Mrs Ann Cole, in memory of the late Dr Russell Cole, to support a highly ranked pain-related research grant.

Butyrate for the prevention and treatment of chemotherapy-induced neuropathic pain

Chemotherapy-induced neuropathic pain adversely affects 10-30% of patients receiving anti-cancer therapy. It is a particularly notable clinical issue for those treated with platinum-based chemotherapeutics. While motor and autonomic nerves are generally unaffected, sensory neurons seems to be vulnerable. Patients suffering from chemotherapy-induced neuropathic pain often present with devastating and long-lasting symptoms, including numbness, tingling and pain during, and up to 18 months, after therapy. With an increasing number of patients receiving adjuvant chemotherapy associated with increasing incidence of cancer, chemotherapy-induced neuropathic pain represents a significant problem not only leading to a profound impact on patients' quality of life, but also adversely affecting the treatment outcomes due to dosage limitation and premature treatment discontinuation.

Oxaliplatin is one of the principal chemotherapeutic agents used for various types of cancer. It is also commonly administered in the palliative settings. However, oxaliplatin produces irreversible neurotoxicity in approximately 20-30% of patients, leaving persistent sensory neuropathy and neuropathic pain. Importantly, disabling neuropathy and neuropathic pain are treatment-limiting factors for oxaliplatin-based therapy. In this regard, pain as one of the most severe neuropathic syndromes, must be resolved to ensure adequate dosage of chemotherapy could be administered to improve survival and quality of life.

Butyrate is a commonly used dietary supplement with minimal side effects. It is also taken up into circulation by the host after natural production by specific bacteria in the colon. Butyrate is also one of the most studied histone deacetylase-1 (Hdac1) inhibitors. The investigators preliminary data suggest that butyrate potentially exerts analgesic effect in chemotherapy-induced neuropathic pain. Administration of butyrate or butyrate-producing probiotics will alleviate pain response in the mouse model of oxaliplatin-induced pain. Downregulation of pain-related potassium channels and the reduced potassium conductance by oxaliplatin in DRGs will be reversed by knockdown of Hdac1, butyrate or the butyrate-producing probiotics. These agents will also reduce the occupancy of Hdac1 on the promoters of genes encoding these potassium channels.

Recently, butyrate has attracted attention as a neuroprotective drug for brain injury. It has been shown to enhance memory, produce neuroprotection, and restore cognitive function in various neurological disease models. Human data has also shown that intraluminal administration of butyrate (in physiological relevant dose) into the distal colon of healthy subjects significantly decreases visceral pain, suggesting butyrate may also produce analgesia.

We envisage the findings will not only shed new insight on the mechanism through which Hdac1 mediates potassium channels repression in chemotherapy-induced pain, but also potentially open up novel prophylactic and therapeutic avenues. In long term, it can alleviate the treatment-limiting effect of chemotherapy and the quality of life of cancer patients.

Professor Matthew Chan, The Chinese University of Hong Kong.

$A55,960

Robin Smallwood Bequest – Dr Jennifer Reilly

The Robin Smallwood Bequest was established following a generous bequest from the late Dr Robin Smallwood to support a highly ranked grant in anaesthesia, intensive care or pain medicine.

The Clinical Outcomes Measurement in Perioperative Medicine, Anaesthesia & Surgery Study (COMPASS): Development of a perioperative mortality risk prediction model for adults undergoing non-cardiac surgery in Australia

The aim of the Clinical Outcomes Measurement in Perioperative Medicine, Anaesthesia and Surgery Study (COMPASS) is to develop a generalisable perioperative mortality risk calculator for adults undergoing non-cardiac surgery in Australia.

The UK 2011 National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report Knowing the Risk observed that 80% of perioperative deaths occurred in 20% of patients. The report made key recommendations on the identification and care of high-risk surgical patients and have led to two major perioperative initiatives in the UK that are impacting clinical practice in Australia. These include the development of a perioperative mortality risk calculator for the UK, and the integration of perioperative risk prediction into routine clinical practice, as evidenced by replication of the National Emergency Laparotomy Audit (NELA) in Australia and New Zealand as the ANZELA-QI project.

COMPASS will be the first major Australian study of internationally used risk calculators for surgery. Evidence suggests that risk prediction models cannot be "exported" to other countries without being adjusted for local health systems and differences in ethnicity. The risk prediction models currently being used in Australia have not been validated here and are unlikely to be accurate without local adjustment. Recent external validation of the Surgical Outcome Risk Tool (SORT) in New Zealand by Associate Professor Doug Campbell and colleagues found that the model under-predicted mortality five-fold in New Zealand.

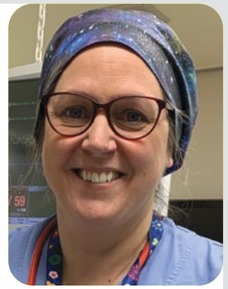
The investigators plan to externally validate SORT in Australia and update the predictive equation based on Australian data. They will undertake a prospective multi-centre observational study of adults undergoing inpatient noncardiac surgery and match baseline data with the national death index to determine mortality at 30 days, one year and two years.

The results have the potential to significantly impact surgery and anaesthesia in Australia by making risk calculators available for routine use; helping shared decision making between patients, families, general practitioners and specialists; and providing a foundation for larger clinical trials of perioperative care. Importantly, the calculator will include data from patients undergoing surgery in private hospitals, where over half of all surgery is performed in Australia.

Dr Jennifer Reilly, Professor Wendy Brown, Professor Belinda Gabbe, Professor Carol Hodgson, Professor Paul Myles, Dr Eldho Paul, Alfred Health and Monash University, Melbourne.

$A90,000 including scholarship

The Elaine Lillian Kluver ANZCA Research Award – Dr Terasa Bulger



The Elaine Lillian Kluver ANZCA Research Award was established following a generous gift to the ANZCA Research Foundation from the estate of the late Dr Elaine Kluver to support a highly ranked pain-related research grant.

Increasing the number of diagnostic variants for MH-susceptibility

Patients susceptible to Malignant Hyperthermia (MH) can suffer a life-threatening reaction when exposed to the inhalational anaesthetic drugs or muscle relaxants most commonly used in general anaesthesia.

However, MH reactions can be avoided if diagnosis of MH susceptibility takes place prior to general anaesthesia. For patients from MH susceptible families, it is critical that pre-symptomatic diagnosis of susceptibility is carried out. While the "gold-standard" diagnostic test is the in vitro contracture test (IVCT) using a large muscle biopsy, DNA testing can be used where familial variants have been demonstrated as pathogenic for MH.

The main hurdle for implementing DNA tests to replace the IVCT is the requirement that genetic variants be functionally characterised. Previous work carried out by this research team has enabled DNA-based diagnosis for almost half of the New Zealand families susceptible to this inherited disorder. As a result, many individuals can now avoid the invasive and morbid muscle biopsy test, but this is not the case for others where a causative genetic variant has not been identified. More recently, the team has identified novel genetic variants in many of the remaining families. Similar work by Australian colleagues has also identified a number of additional novel variants. But before DNA testing can be used with these new variants, the research team needs to show that each variant causes MH-susceptibility in an established experimental system. This research is designed to show experimentally that 38 new RYR1 genetic variants are actually responsible for MH. Therefore, it has the potential to almost double the number of genetic variants that can be used in DNA-based diagnostic tests for MH-susceptibility.

This will increase the number of DNA-based tests that can be offered to MH-susceptible families in New Zealand and Australia as well as worldwide. It will also shed new light on the molecular mechanisms underlying MH-susceptibility. This research project will have direct clinical outcomes and will also generate new skills and new knowledge, which will have wider implications in biomedical research. It will also provide safer alternatives for anaesthesia and ultimately patient outcomes.

Dr Terasa Bulger, Palmerston North Hospital, New Zealand; Professor Kathryn Stowell, Massey University, New Zealand.

$A58,312

CSL Behring ANZCA Research Award – Associate Professor Laurence Weinberg

The CSL Behring ANZCA Research Award is a biannual award made to a highly ranked grant in the areas of interest which include research on the current practice for the management of bleeding in patients who present with significant haemorrhage or urgent surgery while receiving direct oral anticoagulants and other examples of surgical areas of interest including liver, gastric and orthopaedic procedures.

A prospective randomised controlled pilot trial of preoperative microvascular protection in patients undergoing major abdominal surgery

All blood vessels in the body are coated with a thin and delicate layer of proteins called the endothelial glycocalyx layer (EGL). This protein layer plays an important role in modulating the functions of the blood vessel wall, such as permeability to fluid, blood vessel tone and clotting. During major surgery, the body experiences an inflammatory response that can damage this protein layer and in turn impair the function of the microvasculature (the smallest blood vessels in the body). To date little is known about the degradation of the EGL during surgery and whether any of the common therapies used during surgery have an impact on its function.

Albumin and dexamethasone are often administered to patients undergoing major surgery. Albumin is an intravenous fluid made up of a normal physiological protein (albumin) in a salt solution. Dexamethasone is a steroid medication, used in many types of surgery to reduce the risk of nausea and vomiting. Both medications are Therapeutic Goods Administration approved and readily available in Australia. These medications have been shown in smaller studies to reduce the inflammatory effect of surgery and its impact on the EGL.

This pilot study aims to examine if giving albumin and dexamethasone immediately prior to surgery can reduce the inflammatory response from surgery and the resulting damage to the EGL, thereby preserving the function of the microvasculature. Describing the rate and extent of change in biomarker levels will allow for quantification of EGL damage and identify if intervening with dexamethasone and albumin as a microvascular protective strategy reduces EGL breakdown. If this pilot study is successful in showing a reduction in glycocalyx breakdown with a simple perioperative intervention, this would justify a larger clinical trial to investigate potential clinical outcome benefits from such a treatment.

These exploratory findings will be critical in designing and powering a larger clinical outcome study that will evaluate if the same invention can minimise perioperative complications (acute kidney injury, major adverse cardiac events, postoperative respiratory complications, surgical site infection etc) and reduce length of hospital stay after major abdominal surgery.

Improved preservation of the EGL in the perioperative period may have a beneficial impact on endothelial function and in turn on end-organ perfusion and function. If shown to reduce EGL shedding, this would justify further larger trials to investigate if this translates to a difference in clinical outcomes or improvement in perioperative organ function.

Associate Professor Laurence Weinberg, Dr Shervin Tosif, Austin Health, Melbourne; Dr Ken Yee, Tauranga Hospital, New Zealand.

$A50,253

Darcy Price ANZCA Regional Research Award – Dr Wais Sekandarzad

This ANZCA novice grant was made possible by a generous donation to the ANZCA Research Foundation from the Department of Anaesthesiology and Perioperative Medicine, Waitemata District Health Board, New Zealand in memory of Dr Darcy Price to support a project involving regional anaesthesia.

A novel regional anaesthetic technique for rib fracture pain

Rib fractures are common injuries and can result in significant morbidity and mortality. More than 40% of major blunt trauma patients will have rib fractures and up to a third of these patients will develop respiratory complications as a result. The impact of rib fractures on long term outcomes including chronic pain and chronic disability is significant, with some studies reporting up to 50% of patients at six months had chronic disability and 20% were complaining of chronic pain.

Among the common regional anaesthetic techniques to treat rib fracture and related acute pain are thoracic epidurals and paravertebral catheters. Each of these techniques has their advantages and disadvantages. Epidural analgesia poses its challenges and may be contraindicated in this group of patients, as they may suffer from low blood pressure and competing injuries, which can be exacerbated by epidural related sympathetic blockade. Both epidural and paravertebral blockade can be technically difficult to perform in the context of spine injuries and contraindicated when anticoagulants are administered to this patient cohort which is common, in order to prevent thromboembolism.

A novel regional anaesthetic technique, the erector spinae block (ESP) first described in patients which chronic chest wall pain, is an emerging low risk alternative to the above mentioned traditional blocks. The erector spinae block involves injecting local anaesthetic between the posterior surface of the erector spinae muscle and transverse process, both of which can be visualized by ultrasound imaging.

The aim of this study is to show whether continuous erector spinae catheter technique is effective in improving respiratory outcomes (spirometer volumes) at baseline before and after catheter placement for up to two days in patients with greater than three unilateral rib fractures compared to a placebo (normal saline) controlled continuous erector spinae catheter group. Secondary outcome measures are measurement of meaningful clinically important differences in verbal numeric rating scale (VNRS), opioid consumption, incidence of nausea and vomiting, hospital length of stay, quality of recovery scores, patient satisfaction and the incidence of persistent postsurgical pain and functional impairment at three months measured via the brief pain inventory short form (BPI).

The investigators hope to demonstrate that continuous erector spinae block is effective in improving pulmonary function, pain scores and other related outcomes in patients who have sustained more than three contiguous unilateral rib fractures.

Dr Mir Wais Sekandarzad, Alfred Health, Melbourne.

$A20,000

Medibank Better Health Foundation Regional Anaesthesia Outcomes Grant – Professor Philip Peyton

This grant was made possible by a collaboration between the ANZCA Research Foundation and the Medibank Better Health Foundation related to major joint replacement, regional anaesthesia, and patient-centred outcomes.

Developing a predictive risk model of unplanned critical care utilisation following elective hip and knee arthroplasty

Total joint replacement is the definitive treatment for end-stage osteoarthritis, offering significant improvement in both physical function and quality of life in the majority of recipients. An ageing population is driving increasing demand for hip and knee arthroplasty. This is placing an increasing burden on healthcare systems, with lengthening waiting lists for surgery.

Despite improvements in orthopaedic surgery and anaesthesia, our ageing population has a greater incidence of comorbidities which present a risk for perioperative complications. These patients have longer hospital stays and are less likely to be discharged home, thus incurring higher costs. In addition, this can result in patients requiring postoperative critical care intervention, including critical care admission. Due to the much greater cost and more limited availability of critical care, anticipated need for critical care support in higher risk patients significantly adds to waiting list times and increases the proportion of burden of elective hip and knee arthroplasty placed on higher acuity centres.

Planned intensive care (ICU) or high-dependency unit (HDU) admission is a pre-emptive approach to reducing and managing postoperative complications. However, determining the rate of and reasons for unplanned ICU admission is vital in order to forecast for additional critical care resources required. Preoperative risk factors and perioperative complications that have been associated with intensive care unit admission must also be established. Identification of these variables by risk stratification models allows patients at higher risk to be triaged to higher acuity centres with intensive care facilities for their surgery, leading to a decreased rate of unplanned critical care admission or need for emergency transfer between lower and higher acuity hospitals.

The investigators will conduct a retrospective multicentre study, across three Melbourne public hospitals, in patients who have undergone elective hip and knee arthroplasty, of readily measurable preoperative patient factors, type of anaesthesia (regional versus general), type and site of surgery, and subsequent need for unplanned postoperative critical care utilization, including Medical Emergency Team attendance (MET Call and Code Blue equivalent), and admission to ICU, over a seven year period up to 2019. Data from approximately 4000 surgeries will allow powerful and reliable statistical analysis.

The results of this will inform clinical practice and resource allocation with an Australian urban context for one of the commonest major surgical groups, help reduce waiting list times for patients requiring hip and knee replacement, reduce avoidable healthcare costs and minimize patient risk. With a reliable predictive model that allows for improved allocation of perioperative resources and orthopaedic services, patient outcomes would be optimised and the financial burden of unplanned ICU admission would be reduced.

Professor Philip Peyton and Dr Dominique Grant, Austin Health, Melbourne.

$A49,950

Optimising perioperative blood pressure measurement in obese patients – Associate Professor Victoria Eley

The Department of Anaesthesia and Perioperative Medicine, Royal Brisbane and Women's Hospital is an academic anaesthetic department affiliated with The University of Queensland (UQ) which provides adult anaesthesia services and anaesthesia care for maternity services. The department has strong streams of research, teaching and quality assurance and recruits for ANZCA CTN multicentre trials. Associate Professor Victoria Eley was awarded her PhD in February 2017 and the impact of her leadership as departmental research lead is reflected by five years of increasing research output. In 2018, the department produced a record number of publications; supervised nine post-graduate research students; participated in departmental-led research projects while also collaborating with universities and research institutions.

The Department of Anaesthesia and Perioperative Medicine has identified knowledge deficits in three particular aspects of the care of obese patients when they have surgery and have developed a program of research to improve the care of obese patients in our institution. These three aspects include: "Optimising pharmacokinetics in obese patients", "Optimising oxygenation in obese patients" and "Optimising blood pressure measurement in obese patients". The academic enhancement grant application is centred around the theme of "Optimising blood pressure measurement".

Anaesthetists are caring for more obese patients than before. As the size of our patients increase, the limitations of standard equipment have become apparent. Accurate blood pressure monitoring is essential throughout the perioperative period. When patients have very large or cone-shaped arms, blood pressure monitoring applying a standard rectangular cuff is known to provide inaccurate results, be difficult or impossible. Invasive monitoring can be used intraoperatively, however in most contexts of healthcare, including the preoperative clinic and postoperative ward, non-invasive blood pressure (NIBP) monitoring is the only option.

This program of research aims to optimise the perioperative measurement of blood pressure in obese patients. The investigators will assess the size and shape of the arms of our patient population (pregnant and non-pregnant) and identify anatomical features that may be used to predict arm conicity, and explore alternatives to standard oscillometric non-invasive blood pressure (NIBP) and determine if these are accurate in obese patients. They will determine if there is an accurate anatomical predictor (such as arm conicity, arm circumference or body mass index) which could alert clinicians to the fact that an upper arm rectangular NIBP cuff would result in an inaccurate blood pressure reading. This would be of use to anaesthetists in selecting perioperative monitoring techniques and would assist other clinicians in identifying patients in whom oscillometric NIBP monitoring is likely to be inaccurate.

This research is heavily patient-focused and the results will have implications for the quality of perioperative care provided to obese patients, by anaesthetists.

Associate Professor Victoria Eley, Royal Brisbane and Women's Hospital, Queensland; Associate Professor Ban Leong Sng, KK Women's and Children's Hospital, Singapore.

$A100,000

Novice investigator grants

Comparison of the neuroprotective potential of xenon and sevoflurane anaesthesia and their effects on the processed electroencephalogram: A randomised trial – Dr Steven McGuigan

In recent decades there has been growing evidence that many of the volatile and intravenous anaesthetics currently in use may have neurotoxic effects. The ageing brain appears particularly vulnerable to these effects and cognitive dysfunction following anaesthesia and surgery is associated with greater morbidity and mortality. Half of all patients over the age of 65 will require surgery during their lifetime. Given the demographic changes in Australia and the devastating impact of cognitive dysfunction on the individual, identifying anaesthetic agents which are devoid of neurotoxicity, or indeed are neuroprotective, is a priority.

There is compelling preclinical evidence that xenon has less neurotoxic potential and has neuroprotective abilities beyond that of other general anaesthetic agents. This project will identify if xenon is superior to sevoflurane in reducing the neural injury associated with anaesthesia and surgery and if its use leads to less deterioration in cognitive function postoperatively.

For the study, patients undergoing a minor surgical procedure will have a general anaesthetic with either xenon or sevoflurane. Blood tests will measure proteins in patients' blood which indicate harm to brain cells to identify if one anaesthetic results in less damage than the other. The Montreal Cognitive Assessment, a screening test for mild cognitive impairment, will be performed before and after the procedure to assess the effect of both xenon and sevoflurane anaesthesia on brain function.

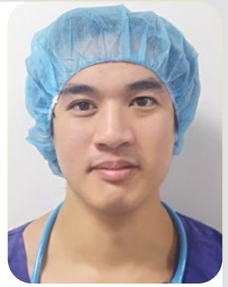
The investigators will also compare the ability of two different depth of anaesthesia monitors, the Bispectral Index (BIS) and the Brain Anaesthesia Response (BAR), to identify emergence from xenon and sevoflurane anaesthesia. Identifying a reliable method of monitoring is key to xenon's safe use as a sole anaesthetic.

This project will identify if there is evidence of a neuroprotective effect of xenon when used as the sole anaesthetic agent for surgery in the form of improved biomarkers and improved cognition postoperatively when compared to sevoflurane. The project will also contribute significantly to our understanding of depth of anaesthesia monitoring for xenon and inform its safe use as a general anaesthetic.

Dr Steven McGuigan, St Vincent's Hospital, Melbourne.

$A18,818

Does intravenous fat emulsion adequately suppress 18-fludeoxyglucose uptake in myocardium for glucose-loaded healthy volunteers undergoing cardiac positron emission tomography: A randomised crossover trial – Dr Michael Li



Myocardial infarctions (heart attacks) are common after operations, but it is difficult to identify one that requires invasive treatment with usual investigation methods. Cardiac complications (including heart attacks) occur in one-third of the post-operative populations. Cardiac ^{18}F-fludeoxyglucose (FDG) positron emission tomography (PET) is an emerging tool for the use of myocardial ischaemia. Current preparation methods for cardiac FDG PET remain lengthy, with variable physiological uptake of FDG by the myocardium. This study will investigate the feasibility of a novel intravenous fat emulsion, Intralipid, as a faster, more reliable alternative agent to the usual fasting and high fat diet protocol.

This study will be conducted as a pilot randomised crossover trial in healthy volunteers, who will receive two FDG PET scans each; one with Intralipid (intervention) and the other without Intralipid (control). Both groups will receive a glucose load before administration of the intervention/control and the scan to ensure that patients are unfasted. They will subsequently have the intervention or control followed by FDG injection and PET scan.

Faster and improved myocardial uptake may provide access to cardiac FDG PET for patients who are not able to fast, tolerate high fat diet, or who require cardiac FDG PET in a timely fashion (postoperative patients). The use of intravenous fat emulsion may widen applicability of cardiac FDG PET in detecting and stratifying myocardial ischaemia.

Dr Michael Li, Peter MaCallum Cancer Centre, Melbourne.

$A20,000

Simulation/Education grant

Desire paths: Enhancing programmatic assessment in competency-based medical education from the bottom up – Professor Jennifer Weller

Much has been achieved in the move towards competency-based anaesthesia training, with the curriculum expressed in terms of the work that needs to be done, supported by a system of workplace based assessments (WBAs). However, the implementation of the formal curriculum does not always proceed as intended. Through their previous research, the investigators have identified that the use of WBAs for the purpose of making decisions on trainee progression is not entirely as intended, and informal parallel systems of assessment have emerged in many training departments. Variability in approaches to workplace-based assessment and decisions on progression lead to lack of standardisation, potential unfairness to trainees, sub-optimal feedback to trainees, and ongoing difficulties with identification and remediation of underperforming trainees.

Using the principle of co-design, the investigators aim to explore and build on existing local practices on gathering information about trainees' performance in the workplace in order to develop a pragmatic but robust system of assessment that fulfils the needs of supervisors of training and ANZCA.

While more can be done to educate our fellows and trainees on how to interpret and use the existing system of WBAs, sociological theory suggests that when the existing structures do not meet the needs of individuals or groups, "desire paths" emerge, and these common paths can provide an orienting frame to shape policy, programs and improvement. This could address some of the critical issues around implementation of competency-based medical education in ANZCA and more generally across postgraduate medical education.

Incorporating perspectives from international colleagues from Canada, Ireland, the UK and Europe would ensure the international relevance of this study beyond ANZCAs own training programme.

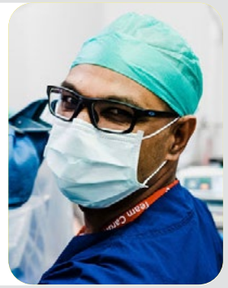
This project will add to the current international body of knowledge on implementation of competency-based medical education, build on the existing body of research exploring the function of our WBAs, and create new knowledge to inform the ongoing evolution of programmatic assessment in anaesthesia training with the purpose of improving the quality and experience of our graduates.

Professor Jennifer Weller, Dr Yan Chen, University of Auckland, New Zealand; Dr Damian Castanelli, Monash Medical Centre, Melbourne; Dr Jennifer Woods, Christchurch Hospital, New Zealand.

$A69,767

Project grants

Preservation of hearts donated after circulatory death using gaseous persufflation – a rodent model – Dr Warren Pavey



Heart transplantation is the final treatment option for those patients with end stage heart disease. A shortage of donors coupled with the fact that not all donated hearts are suitable for transplant mean that many patients must wait for many months or years for a suitable organ and some may die waiting. Better methods of resuscitating hearts after removal from donors and preserving them while transported to a recipient would allow more hearts to be used and more lives saved.

Gas persufflation refers to the passage of gas rather than fluid or blood through the coronary vasculature. The experienced team will investigate the novel technique of using gas instead of blood to resuscitate and support donated organs before transplantation. Gas persufflation of organs may provide a more effective, simpler and cheaper method of resuscitation and storage than machines circulating fluid or blood through the heart while outside the body.

The investigators seeks to develop gas persufflation towards a technique suitable for translation to human transplantation and explore the use of ultrasound technology, Shear Wave Elastography to predict functional recovery of rodent hearts subjected to a non-beating donor model. If Elasticity is shown to correlate with heart performance outcomes, it may allow assessment of organs prior to transplant, enabling consideration of marginal organs and better planning of perioperative care.

The investigators plan to use data from this project to inform a NHMRC grant application. This project is likely to allow progression to test gas persufflation in a large animal model and on unused donated DCD human hearts. The results of shear wave testing may be directly applied to human study. The ultimate aim is to translate this work into a simple, cheap and effective method of preserving human hearts donated after circulatory death.

Dr Warren Pavey, Fiona Stanley Hospital, Western Australia; Associate Professor Livia Hool, University of Western Australia; Associate Professor Kwok Ho, Royal Perth Hospital, Western Australia, Professor Luke Haseler, Curtin University, Western Australia.

$A81,161 including scholarship

Outcomes in males and females participating in large non-cardiac surgery studies: An exploratory post hoc analysis – Professor Kate Leslie

Sex and gender are important determinants of disease and injury. They may affect incidence and natural history, the utility of diagnostic tests and prognostic markers, the effectiveness and safety of prevention and treatment strategies, access to and use of healthcare, and the response of the healthcare system. Sex and gender also strongly interact with other social determinants of health, such as ethnicity, cultural identity, education, work and income. Humans experience the health-related effects of their sex and gender simultaneously, making it difficult to unravel the effects of sex and gender on the incidence of exposures and outcomes, and the incidence of outcomes given the exposures. Recently researchers and organisations that support research have become vitally interested in ensuring that research addresses the health needs of both women and men. Most research studies looking for new treatments are open to both women and men, yet women continue to be under-represented as participants in medical research.

The burden of disease is different in males and females, for example cardiovascular disease is less common in women, but women with cardiovascular disease continue to experience higher mortality than men. Women are more likely to suffer anaemia then men, usually due to iron deficiency. Sex and gender also affect all elements on the immune response pathway, through genetically-mediated responses and gender-based exposure to antigens, access to healthcare, and prioritisation of health needs. As a result women have more autoimmune disease than men but are less susceptible to sepsis, including in the perioperative period. There are also sex-based differences in the pharmacokinetics and dynamics of commonly used drugs and in the incidence of adverse drug reactions.

The Australian and New Zealand College of Anaesthetists (ANZCA) Clinical Trials Network (CTN) has led or participated in 11 large studies that have included nearly 55,000 patients presenting for major non-cardiac surgery. Information was collected about death and major complications within 30 days of the operation in each study. This unique collection of patients presents an outstanding opportunity to see whether women and men are participating equally, whether they are equally fit at baseline and whether outcomes are different. With several ANZCA CTN studies concluding soon and an explosion of interest in sex/gender issues in health and more generally, the time is right to undertake these exploratory analyses, generate new ideas and plan new studies.

Professor Kate Leslie, The Royal Melbourne Hospital, Melbourne; Dr Jessica Kasza, Monash University, Melbourne.

$A65,281

Using biomarkers of neurological injury to predict cognitive decline after cardiac and non-cardiac anaesthesia and surgery – Associate Professor Brendan Silbert

Since the introduction of general anaesthesia, more than 170 years ago, it has generally been assumed that the effects of anaesthesia and surgery on the brain are fully reversible, transient and leave no lasting effects. However, this assumption has been somewhat at odds with reported deterioration in thinking and behaviour which have been observed for more than 100 years. During the early days of anaesthesia, all efforts were focused on decreasing mortality and improving safety. Anaesthesia has been remarkably successful in this endeavour and is now focusing on longer term adverse outcomes. One of the most frequent is the impaired cognitive ability that follows anaesthesia and surgery in many individuals over the age of 65.

As part of our previous study funded by an ANZCA grant "Cognitive Decline after Anaesthesia and Surgery – the Role of Inflammation" (ARCADIAN), published in JAMA neurology (2018) we demonstrated an increase in two biomarkers, Neurofilament light (NFL) and tau after anaesthesia and surgery. These biomarkers are released when nerves in the central nervous system are injured. In our pilot study we observed that individuals undergoing cardiac surgery demonstrated greater increases in plasma NFL and tau than those undergoing non-cardiac surgery. Cardiac surgery has been identified as a procedure which is associated with a high incidence of delayed neurocognitive recovery.

The aim of this new study is to more formally clarify the changes in brain biomarker proteins with anaesthesia and surgery in cardiac and non-cardiac surgery, and their relationship to neurocognitive outcomes. We propose to assay the plasma biomarkers NFL and tau in serial blood samples taken from individuals over the age of 65 years scheduled for elective cardiac and non-cardiac surgery.

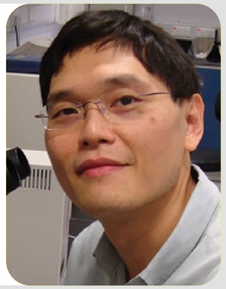
An integral part of our research has been in collaboration with associate investigators, Professors Blennow and Zetterberg at the Neurochemistry Laboratory at Sahlgrenska University Hospital, Mölndal, Sweden. Using Single Molecule Analysis (Simoa), this laboratory has developed an accurate and sensitive method of measuring proteins in the blood, replacing the need for samples of cerebrospinal fluid. Patient samples will be sent to Sweden to be assayed for NFL and tau.

We will also administer a cognitive test battery at baseline and again at three months in order to identify neurocognitive disorder and assess daily for delirium during hospital admission. In this manner we will have the ability to link these neurological biomarkers with cognitive outcomes and compare the biomarker and clinical phenotype between those undergoing cardiac and non-cardiac procedures.

Associate Professor Brendan Silbert, Associate Professor Lisbeth Evered, Professor David A Scott, St Vincent's Hospital, Melbourne.

$A68,847

Postoperative vascular complications in unrecognised Obstructive Sleep Apnea (POSA) – II trial: Effect of nasal high-flow therapy in major noncardiac surgery – Professor Matthew Chan



Worldwide, more than 300 million patients undergo surgery each year, with 10 million having a major cardiac complication in the first 30 days after surgery. Obstructive sleep apnea results in repeated episodes of partial or complete upper airway collapse during sleep, causing a lack of oxygen, which affects 11% of the surgical patients. Unfortunately, a majority of patients are not aware of the disease at the time of surgery.

Surgical patients with untreated sleep apnea have an increased sensitivity to anesthetics, aggravating the upper airway collapse, and are therefore at higher risk of cardiovascular complications after surgery.

The POSA-II trial is a culmination of our research to prevent postoperative adverse outcomes in surgical patients with untreated obstructive sleep apnea (OSA). In our POSA study, severe untreated OSA had a two-fold increase in the risk of cardiovascular events, and were associated with a longer duration of oxyhemoglobin desaturation at night. Nasal high-flow is a new form of respiratory support where oxygen is delivered at higher flow rate generating a positive end-expiratory pressure. The key question is whether nasal high-flow will be effective in patients with untreated severe OSA by alleviating both airway obstruction and severe oxyhemoglobin desaturation. The primary objective is to determine whether nasal high-flow is more effective than usual care in preventing the oxyhemoglobin desaturation in surgical patients with untreated severe OSA undergoing major noncardiac surgery.

Continuous positive airway pressure (CPAP) therapy is a contemporary treatment for OSA. Many patients however, cannot tolerate CPAP postoperatively. Thus, it is critical that an alternate treatment that is easy to use for both patient and provider be identified. The introduction of minimally intrusive nasal interface with nasal high-flow (NHF) therapy greatly improves patient adherence, respiratory exchange and oxygenation.

The investigators propose to carry out the Postoperative vascular complications in unrecognized OSA (POSA)-II trial – a proof of concept trial to evaluate whether NHF therapy would avert oxyhemoglobin desaturation, presumably the causal mechanism for postoperative OSA-related adverse events. POSA-II will also collect important feasibility data for a large-scale international multicentre trial with adequate power to detect effects of NHF therapy on clinical outcomes.

If successful, the POSA-II trial will provide feasibility data for the performance of a subsequent large randomised trial focusing on clinical outcomes and cost effectiveness of the NHF among patients with OSA to the healthcare system.

Professor Matthew Chan, The Chinese University of Hong Kong.

$A69,968

Is PACU-delirium caused by uncoupling of brain regions? – Professor Jamie Sleigh

After surgery, many elderly patients experience delirium – a sudden disturbance in orientation and attention. Delirium incurs a high societal burden due to its association with many adverse outcomes, such as increased length of stay in the post-anaesthetic care unit (PACU), increased patient or staff injury, increased mortality, increased hospital stay, and functional and cognitive decline. Although there are known demographic correlations with delirium, the neural mechanisms remain poorly understood. Of particular importance to anaesthetists is delirium that presents within an hour or two after surgery in the PACU. PACU delirium is thought to be an early indicator of later onset postoperative delirium with similar longterm adverse outcomes; and there is evidence that the brain during anaesthesia contains clues to predicting and understanding the mechanisms of subsequent PACU delirium.

The actual causes and mechanisms for delirium(s) are poorly understood at present, but there is some evidence that delirium is associated with ineffective communication between different brain regions. In particular, the brain is unable to completely switch between attending to the outside environment, and its own internal "daydreaming" states. So the brain is unable to make sense of sights and sounds.

In this study, the investigators are particularly interested in the transition back to consciousness at the end of anaesthesia (the "emergence" phase), as there are obvious reconnections that occur in healthy subjects. Is there a failure to reconnect long-range connections after anaesthesia in delirious patients? If so, how do we ensure that these connections re-establish correctly and thus reduce delirium? It is a common observation that many delirious patients go back to sleep in PACU for a short time and them re-awaken completely lucid. This would suggest that the sequence of activation of different brain regions emergence is critical to the construction of normal wakeful state.

To undertake this, the investigators will develop and validate various statistical measures of electroencephalogram (EEG) patterns during and after anaesthesia to explore the regional brain network-level mechanisms of PACU delirium. With a better understanding of the actual neural mechanisms that cause delirium would allow for the rational future development of monitoring that could accurately predict delirium in PACU for individual patients; and allow specific preventative or treatment strategies to be put in place. Therefore a reduction in PACU-delirium will result in less distress for patients and their relatives, shorter PACU staying times, less admission to high care postoperatively, and less perioperative mortality.

Professor Jamie Sleigh, Waikato Hospital, New Zealand.

$A59,400

Biomarker determinants of ketamine response status in the ROCKet Trial – Professor Andrew Somogyi

Chronic postsurgical pain has a significant impact on the health of Australians. Post-surgery pain lasting for over a year can occur in 15-60% of patients which can severely impact a patient's quality of life. The drug ketamine is sometimes used to manage chronic pain that inadequately responds to opioids.

This project seeks to determine whether there are biological markers, which are associated with a patient responding to ketamine. These biomarkers include: a) blood levels: the body's exposure to the drug and its breakdown products which also have pain relieving properties; b) inflammation levels: ketamine reduces the levels of a key inflammation marker; c) genetics: a patient's genetic make-up can affect ketamine's blood levels, inflammation levels, and the activity of ketamine's target in the brain.

The NHMRC funded ROCKet (Reduction of Chronic post-surgical pain with Ketamine) trial is a double-blind, placebo-controlled, randomised Phase 3 trial assessing the effect of perioperative intravenous ketamine on the incidence and severity of acute and chronic post-surgical pain. The trial is led by CIB Peyton and aims to show if ketamine is effective and has an acceptable harm to benefit balance. Regulatory bodies such as the Food and Drug Administration (FDA) are strongly advocating complementary biomarker studies in clinical drug development to identify responders for drug efficacy and harm. This study will investigate biomarkers in a subgroup of the ROCKet trial participants that incorporate not only pharmacokinetic but also pharmaco-dynamic and -genomic factors in a comprehensive systems approach to allow for new regulatory-approved indications for ketamine.

Using the biomarkers, the investigators will determine whether a single marker or more likely a combination of markers have the potential to predict who will respond to ketamine in the acute phase (first 24 hours) and who will more likely not develop chronic post-surgical pain.

This research has the potential to develop precision medicine to improve targeted acute pain management and prevent chronic postsurgical pain. A presurgical blood sample may be all that is required. It will also have implications with respect to chronic pain per se including the increasingly recognised potential role of the innate immune system in the development of neuroinflammation.

Professor Andrew Somogyi, University of Adelaide; Professor Philip Peyton, Austin Health, Melbourne; Associate Professor David Foster, University of South Australia.

Top up funding for this grant received from The Russell Cole Memorial ANZCA Research Award.

$A63,000

High-flow oxygen for children's airway surgery: A randomised controlled trial protocol (HAMSTER) – Dr Susan Humphreys

Upper airway surgery in children with abnormal airways is a very common procedure but associated with a great risk for adverse events, such as hypoxemia (fall in oxygen levels in the blood). Surgery may need to be interrupted to correct this, which can potentially compromise the safety of the patient, prolong the procedure, increase exposure to anaesthetic treatment and affect the success of the surgery. In a recent review of the anaesthetic care of children undergoing airway surgery at the Queensland Children's Hospital, the investigators found that 34% of children experienced low oxygen levels one or more times during the procedure. A further 23% of surgeries had to be interrupted to correct oxygen levels.

Our research team has pioneered and developed a new mode of oxygen delivery for children undergoing anaesthesia called "High-Flow Nasal Oxygen" (High-Flow) as an alternative to improve oxygenation during tubeless upper airway surgery. In High-Flow, warm and humidified oxygen is delivered to the airway via nasal cannulae, at a rate determined by the child's weight. Matching the flow to the patient's breathing allows the anaesthetist to deliver oxygen to the child at the required concentration. Our recent studies have demonstrated High-Flow is an effective alternative technique for oxygen delivery that can be safely used in infants and children with abnormal airways.

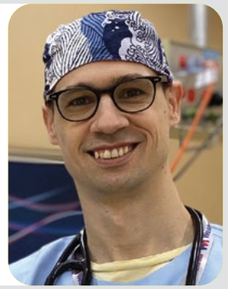
To date there have been no large-scale studies evaluating High-Flow in comparison to other oxygenation techniques during airway surgery in children. Therefore, the investigators aim to compare the two techniques using a randomised controlled trial in infants and children during airway surgery. If they can determine that High-Flow reduces the risk of low oxygen levels, this has the potential to both improve both the safety and the success of these surgeries for children.

This new approach will facilitate a more efficient surgical procedure with shorter time of anaesthesia. It is well anticipated that the new technique will impact other fields of paediatric anaesthesia for bronchoscopy and gastroscopy.

Dr Susan Humphreys, Associate Professor Andreas Schibler, Queensland Children's Hospital; Professor Andrew Davidson, Dr Ben Hallett, The Royal Children's Hospital, Melbourne; Associate Professor Justin Skowno, The Children's Hospital at Westmead, New South Wales; Associate Professor Kristen Gibbons, Centre for Child Health Research, Queensland.

$A63,000

Computerised decision support to improve efficiency and outcomes of massive blood transfusion – Dr Brenton Sanderson



Management of patients with major haemorrhage is extremely challenging due to its often unpredictable occurrence, requirement for multiple tasks to be completed simultaneously by a multidisciplinary team at a moment's notice and an increasing risk of patient morbidity and mortality. Providing blood products to institutions across Australia to support the management of haemorrhage wherever and whenever it occurs also represents a significant financial cost to the community, but hospital costs of managing a massive transfusion (MT) are essentially unknown.

MT requires a time-critical coordinated effort between front-line clinicians (anaesthetists, emergency physicians, and nursing staff), haematologists, and hospital blood bank staff, working in separate physical environments to expedite complex transfusion support requirements. Most hospitals organise this process through a locally adapted MT Protocol (MTP) that directs staff roles and activities, specifies the type and quantity of blood products, and provides guidance for ongoing laboratory investigation, markers for success of resuscitation and continuing management specific to the cause of bleeding.

To improve patient care in complex settings, clinical decision support systems (CDSS) have been developed that involve computerised application of evidence-based rules or algorithms to patient-specific information. These systems have been shown in non-critical transfusion settings to reduce both the amount of blood transfused and patient complications. To-date however, no such studies have been conducted to evaluate their efficacy in critical bleeding requiring MT. Therefore, it is imperative that additional approaches be investigated to address these problems and improve the efficacy and efficiency of this process and therefore improve patient outcomes.

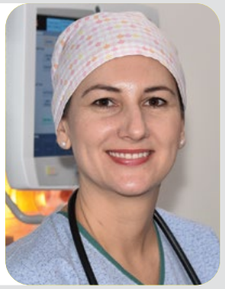
The aim of this study, which is part of Dr Sanderson's PhD, is to enhance decision-making processes during MT to improve efficiency and outcomes through the development of a CDSS for MT. Specifically, this research project will identify quality indicators and processes that represent optimised decision-making in MT and describe the barriers and risks of clinical decision-making processes in MT. To address these barriers and risks, the investigators will develop and evaluate a computerised CDSS to optimise clinical decision-making processes.

This project will support rational use of blood products during MT, help conserve this precious resource by establishing evidence-based quality indicators, and support institutions around the world to improve their own MTP quality processes. It will also describe anaesthetists' experiences in managing MT to ensure that proposed improvements to the process address the perceived barriers of its most common users. Finally, this project will establish the role of a CDSS for surgical MT and recommend whether such systems should be considered in clinical practice. Additionally, this project has the potential to help support clinicians in other life-threatening clinical contexts to provide evidence-based care via CDSS, improve outcomes, and reduce the cost of caring for vulnerable patient populations. Therefore a reduction in transfusion requirements should improve patient outcomes and reduce costs of healthcare.

Dr Brenton Sanderson, Westmead Hospital and Macquarie University, NSW; Professor Enrico Coiera, Macquarie University, NSW; Professor Erica Wood, Monash Univeristy, Melbourne; Dr Lise Estcourt, John Radcliffe Hospital, Oxford UK; Dr Jeremy Field, Westmead Hospital, NSW.

$A74,660 including scholarship

Intraoperative lignocaine infusions: Development of an optimised infusion dosing regimen for obese patients – Dr Angela Tognolini



The specialty of anaesthesia is continuing to cope with the global obesity epidemic. As more obese patients present for surgery, we are seeing not only an increased risk of complications for the individual patient, but also significant strain placed on healthcare resources, with escalating costs and decreased efficiency. It is vitally important that we constantly strive to improve anaesthetic care to combat these issues.

Intraoperative lignocaine infusions have the potential to improve perioperative outcomes by decreasing pain and opioid requirements, improving recovery, and reducing hospital length of stay. Despite these advantages, limitations exist regarding the safety and efficacy of lignocaine infusions in those with a high body mass index. There are significant inconsistencies in the literature, and current pharmacokinetic models and dosing guidelines do not cater for the obese population.

Patients who are obese may manifest markedly different pharmacokinetic parameters, and without detailed knowledge of the pharmacokinetics of lignocaine dosing in obesity we risk underdosing, with inadequate clinical effect, or dose adjusting inaccurately and overdosing, with the risk of toxicity. Clearly, both scenarios have the potential for significant adverse patient outcome.

The investigators aim to develop an efficacious and safe dosing regimen and guidelines for intraoperative lignocaine infusions in obese patients undergoing laparoscopic abdominal surgery at the Royal Brisbane and Women's Hospital. Initial studies will describe the plasma concentrations and pharmacokinetics of lignocaine in the obese. Subsequent data analysis and computer modelling will be used to determine a safe and effective dosing regimen for this population. This data is intended to be used for future multi-centre intervention studies to evaluate intraoperative lignocaine infusions on patient outcomes, including pain scores, opioid use, recovery and length of stay, in obese patients undergoing bariatric and non-bariatric surgery. This research has the potential to change clinical practice and improve the care and outcomes for obese patients. The community as a whole may benefit, due to reduced healthcare costs.

Dr Angela Tognolini, Dr Dwane Jackson, Professor Jason Roberts, Associate Professor Victoria Eley, Royal Brisbane and Women's Hospital, Brisbane.

$A22,500 scholarship

Diagnosing malignant hyperthermia from a needle muscle biopsy – Dr Robyn Gillies

Malignant hyperthermia (MH) is a potentially life-threatening event in response to anaesthetic triggering agents – volatile anaesthetics or depolarising muscle relaxants. It may be passed down through families from one generation to the next. Many people at risk of MH may be confirmed by a simple genetic test. However all other patients require a muscle biopsy, to have special functional testing to confirm they are at risk of MH, the in-vitro contracture test (IVCT). The muscle biopsy is taken from the leg, requiring a surgical operation and a general anaesthetic that is known to be safe with MH.

The aim of this study is to design a new, uncomplicated assay to diagnose MH susceptibility using isolated skeletal muscle fibres from a needle biopsy. Through this project, the investigators will show this simple less invasive technique is a reliable test to determine a patient's potential risk of MH.

Skeletal muscle fibres will be sectioned from the current skeletal muscle biopsies obtained from individuals presenting for the current diagnostic test (IVCT) at the Malignant Hyperthermia Units at The Royal Melbourne Hospital, Victoria and The Children's Hospital, Westmead, NSW. Muscle fibres from needle biopsies obtained under local anaesthesia will be assessed from patients with a previous IVCT MH diagnosis.

This study will have implications for contributing to phenotypic diagnosis of potential MH susceptible patients. By offering a simple investigation acceptable to the general population will encourage more potentially MH susceptible people to submit to testing to define their risk of MH. These studies will also allow the investigators to confirm pathogenicity of genetic variants, ultimately enhancing genetic diagnosis for MH family members, and will replace the invasive biopsy, general anaesthetic and IVCT that are currently in use. The new assay will be transferrable to local and international clinics responsible for diagnosing MH.

Therefore, confirmation of MH status will significantly contribute to the safety of anaesthesia in our community and provide an overall decrease in the cost to the healthcare system.

Dr Robyn Gillies, Associate Professor Andrew Bjorksten, The Royal Melbourne Hospital; Dr Margaret Perry, The Children's Hospital, Westmead, New South Wales; Associate Professor Bradley Launikonis, The University of Queensland.

$A56,000

OASIS: Oscillation mechanics And Sustained Inflation Study using FOT measurements of children under general anaesthesia – Professor Britta Regli von Ungern-Sternberg

Atelectasis, the collapse or closure of a lung area, is promoted by general anaesthesia and results in blood not taking up sufficient oxygen as it returns through the lungs. Lying flat, anaesthetic agents, insertion and removal of an airway device, and the use of muscle relaxants all increase the risk for atelectasis formation. Depending on the amount of the lung involved and presence of underlying lung disease it can result in low blood oxygen levels in the patient. It can take a number of hours to days for this to resolve after a major operation and contributes significantly to subsequent respiratory morbidity. During an operation an anaesthetist will typically use recruitment manoeuvres to re-open collapsed and poorly ventilated lung areas. However, the best technique to reopen a child's lungs is unclear and may be affected by whether the lungs are healthy or diseased, what the surgery is and the type of airway device used.

The forced oscillation technique (FOT) is a non-invasive method for assessing lung mechanics. It works by applying pressure waves down the multiple branching airway tracts and detecting/measuring the reflected waves, much like an ultrasound. In the past, this required a static system and could not be done while on a ventilator without interruption of the anaesthesia circuit. At the Politecnico di Milano University, a new FOT system has been pioneered, that allows for the first time a continuous assessment of respiratory mechanics while the child is on a breathing machine under general anaesthesia.

The aims of this study are to compare the effectiveness of two different recruitment manoeuvres to reopen or recruit the collapsed lung in children undergoing general anaesthesia with different airway devices (laryngeal mask vs cuffed tracheal tube) as measured by changes in respiratory mechanics via the new FOT system.

The results of this study will help paediatric anaesthetists to optimise lung recruitment and the ventilation strategy in children undergoing general anaesthesia with different airway devices. Additionally, successful implementation of continuous FOT measurements (assessment of respiratory mechanics) in the setting of different airway devices has the potential to change routine clinical practice by allowing anaesthetists to adapt ventilation to rapid changes in mechanics during anaesthesia which are particularly pronounced in young children. The results can be used to formulate new evidence-based ventilatory guidelines both nationally and internationally.

Professor Britta Regli von Ungern-Sternberg, Perth Children's Hospital, Western Australia; Professor Graham Hall, Telethon Kids Institute, Western Australia.

$A56,000

The CHEWY study: A randomised non-inferiority trial of chewing gum versus ondansetron to treat postoperative nausea and vomiting in female patients after breast and laparoscopic surgery – Dr Jai Darvall

Postoperative nausea and vomiting (PONV) is a significant complication of general anaesthesia, resulting in patient morbidity, delayed discharge, and cost burdens of anti-emetic rescue therapy and unanticipated hospital admission. Prophylaxis and treatment of PONV is effective, but is costly and has side effects. Pilot work by this team has confirmed the acceptability of chewing gum as treatment for PONV to patients and staff, and the feasibility of a large definitive trial. Chewing gum has merit as a first-line, drug-free treatment for established PONV, thus potentially introducing a cheap, novel and safe therapy applicable to high-, middle- and low-income countries.

The CHEWY trial is a large, multi-national randomised controlled trial to establish whether chewing gum is non-inferior to intravenous ondansetron for nausea and vomiting after general anaesthesia. In total 1185 women and girls having breast and laparoscopic surgery will be enrolled, to randomise 272 patients who experience PONV after surgery. Currently 51 patients have been randomised across eight sites in Australia and New Zealand, with this grant allowing the completion of the CHEWY trial in 2020.

If shown to be non-inferior to ondansetron in this definitive, multi-centre randomised controlled trial, chewing gum has the potential to revolutionise the treatment of PONV for millions of patients worldwide annually.

Dr Jai Darvall, Professor Kate Leslie, Dr Megan Allen, The Royal Melbourne Hospital, Vic; Professor Andrew Davidson, The Royal Children's Hospital, Melbourne.

$A56,000

ANZCA Research Committee members:

Professor David A Scott, Chair (Vic)
Professor David Story, Deputy Chair (Vic)
Dr Jane Baker (NSW)
Professor Matthew Chan (HK)
Associate Professor Alicia Dennis (Vic)
Dr Matthew Doane (NSW)
Associate Professor Lis Evered (Vic)
Dr Andrew Klein (UK)
Professor Alan Merry ONZM (NZ)
Professor Simon Mitchell (NZ)
Professor Philip Peyton (Vic)
Professor Tony Quail (NSW)
Professor Britta Regli-Von Ungern-Sternberg (WA)
Professor Stephan Schug (WA)
Professor Tim Short (NZ)
Professor Andrew Somogyi (SA)
Professor André van Zundert (Qld)
Dr Angela Watt, (Vic) Community representative
Professor Jennifer Weller (NZ)

On behalf of the college, the ANZCA Research Committee thanks all reviewers (listed on following page) who reviewed one, or often more, grant applications for their invaluable contributions to the award process.

Much effort goes into ensuring that the process is as fair and rigorous as possible. It starts each year with ANZCA Research Committee members reading all the grant applications. Three reviewers for each grant are then selected for their expertise around the project. One reviewer is the "spokesperson" and a member of the Research Committee, while the other two are usually from outside the committee. These reviewers include expert researchers from anaesthetics as well as other relevant specialties, and may be from overseas. The reviewer comments are sent back to the researcher applicant for response, and the spokesperson then collates the information (including the reviewer scores, comments, and applicant's responses) into a synopsis with a score. Each grant is then discussed by the whole Research Committee during a day-long face-to-face meeting, with their final scores determined by the averages of secret ballot scores (out of seven) from each committee member.

Conflicts of interest are declared and recorded and members of the committee are excluded from the room during consideration of any grants for which they have a conflict. The presence of Dr Angela Watt, our community representative adds an extra safeguard in this regard as does committee member, Dr Jane Baker and our external member, Dr Andrew Klein (UK, Editor in Chief of Anaesthesia). None of these three members actively compete for grants, and two are not eligible to do so.

Finally, funding is allocated to the grants in descending order of the final averaged committee member scores, within the limits of the funds available. Inevitably, in any competitive process some applicants are unsuccessful. As with most grant programs, detailed feedback is not provided to applicants after the committee has finalised its grant decisions, except to novice investigators. However, detailed feedback on grant applications is formally provided during the review process through reviewers' comments to applicants, which reflect most or all of the factors that will influence committee decisions. Most of the senior members of the committee have experienced many unsuccessful grant applications to ANZCA and other granting agencies such as NHMRC and HRC. This is usually considered an essential part of the development of grant writing skills for future success, and perhaps it is this persistent pursuit of continual improvement that most characterises all ANZCA grant applicants. The Research Committee recognises the very significant time and effort involved in writing research grants, and extends its thanks and encouragement to all applicants.

We are trialling an initiative this year of mentoring emerging researchers through examples of the research grant application process, so that they will have a better understanding of the way applications are considered and evaluated. Hopefully this will lead to more effective and successful grant applications with ANZCA and indeed other competitive grant applications.

Every year committee members, reviewers and ANZCA staff put a great deal of work into the maintenance and continuous improvement of our high-quality research grant process. For committee members and reviewers, this is often in their own time. We would like to express our very sincere thanks to all of them, and to the council and CEO of ANZCA for their ongoing commitment to research – as a vital contribution to continuous improvement in quality, safety and improved patient outcomes.

Professor David A Scott, Chair
ANZCA Research Committee