

The Anaesthesia and
Pain Medicine Foundation
Research Highlights 2011



Dedicated to raising funds that will help
advance medical research and education

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In 2007, the Australian and New Zealand College of Anaesthetists launched the ANZCA Foundation. Following the launch, steps were taken to establish the identity and purpose of the foundation with College Fellows, medical colleagues, industry, philanthropic organisations and individuals.

During 2010, it was decided to change the name of the foundation so that its identity and purpose could be more easily understood. The foundation is now known as The Anaesthesia and Pain Medicine Foundation.

The objectives of the foundation remain the same:

1. To raise funds for medical research and education in Australia, New Zealand and internationally.
2. To foster contributions to the foundation from Fellows, medical colleagues, industry, philanthropic organisations and individuals.
3. To support the College's international research projects and activities.
4. To promote and raise awareness of anaesthesia, perioperative medicine and pain medicine research and education.

“The foundation is dedicated to raising funds for medical research. The support of people and organisations in the past have permitted the College to provide grants that have contributed to important research outcomes. By giving your support you will be ensuring that we can continue to fund vital research projects.”

Dr Leona Wilson, ONZM, FANZCA

A foundation patron and board member and past president of ANZCA



Introduction

Anaesthesia is widely recognised as one of the greatest advances in medicine. Australians and New Zealanders enjoy the world's safest anaesthesia and the best outcomes from their medical care. Fellows of the Australian and New Zealand College of Anaesthetists (ANZCA) and Fellows of the Faculty of Pain Medicine (FPM) of ANZCA are leaders internationally in the anaesthesia and pain medicine research required to underpin these great results.

ANZCA is a non-profit organisation responsible for training specialists in anaesthesia and pain medicine, continuing professional development of these specialists, professional standards and medical research. ANZCA has some 5000 Fellows in Australia, New Zealand, Hong Kong, Singapore and Malaysia and more than 1500 trainees.

ANZCA has established The Anaesthesia and Pain Medicine Foundation to attract funding for research to attain three specific goals:

- To increase the safety and comfort of patients undergoing anaesthesia and sedation.
- To improve outcomes for critically ill patients following surgery or trauma.
- To improve the treatment of acute pain, cancer pain and persistent non-cancer pain.

More than two million people in Australia and New Zealand have anaesthesia for medical procedures every year. Increasingly, these patients are elderly and require anaesthesia for advanced operative procedures. More research directed at improving intermediate and long-term outcomes after anaesthesia in the elderly is required. Likewise, younger patients are looking to recover from anaesthesia and surgery and return to work faster. Research must continue into newer and more targeted anaesthesia techniques to ensure such demands can be safely met.

One in five Australians suffers from severe persistent pain. This means that at some time in our lives each of us will experience, either directly or through loved ones, the trauma of pain. It affects patients after surgery, patients with cancer and a large number of people with chronic pain conditions. Unrelieved severe pain has long-lasting effects – physical, emotional, social and spiritual – on patients and their families and carers. Yet pain can be managed. Only a lack of funds holds back research into better outcomes for people with pain.



By supporting The Anaesthesia and Pain Medicine Foundation, you will be helping us to undertake vital research and education that will have far-reaching significance for the well-being and happiness of every one of us.

ANZCA, and in turn The Anaesthesia and Pain Medicine Foundation, has deductible gift recipient status under the Australian Income Tax Assessment Act 1997. In New Zealand, the College and foundation are registered charities under the Charities Act 2005 and donations can be claimed as a deduction.

Please help support this life-changing work.

The Foundation Board

The foundation is governed by a community-based board under the patronage of Her Excellency Ms Quentin Bryce, AC, Governor-General of the Commonwealth of Australia.



Mr John Astbury is a Director of Woolworths and chair of their Audit, Risk Management and Compliance Committee and the Corporate Governance Committee. He was previously a director of AMP and of Insurance Australia Group (IAG). His previous roles include Finance Director of Lend Lease Corporation and Chief General Manager, National Australia Bank.



Dr Roderick Deane PhD, BCom (Hons), FCA, FCIS, FNZIM, honorary LL.D has had an extensive career in business as chairman and director of a number of major New Zealand and Australian companies and senior roles in the public sector and central banking. He has also had a substantial involvement with charitable and cultural organisations.



Mr Neil Batt AO, is Executive Director of the Australian Centre for Health Research Limited. He has had a substantial career in politics having held Tasmanian ministerial portfolios for transport, education, economic development and forestry and concluding his political career as Tasmanian Deputy Premier and Treasurer. In addition, he was the national president of the Australian Labor Party. Mr Batt has been active in charitable activities including Chairing the International Diabetes Institute. He has also been chair of a number of companies including Airlines of Western Australia, CSL and Heine Management Ltd.



Mr Michael Gorton AM, is a principal with solicitors Russell Kennedy with experience in corporate and commercial law and a special interest in health law. He has qualifications in law and commerce and has an extensive background in the community sector. Mr Gorton has honorary fellowships with the Royal Australasian College of Surgeons and ANZCA.

The Foundation Board (continued)



Ms Yvonne Kenny AM, is one of the most distinguished sopranos of her generation. She was born in Sydney and, after achieving a BSc in Biochemistry, studied voice in London. She made her operatic debut in 1975 after which she joined the Royal Opera House, Covent Garden, where she remained a member of the company until 1994. She was made a Member of the Order of Australia in 1989 for services to music and also was conferred an honorary doctorate in music by the University of Sydney in 1999.



Mr Geoff Linton was an audit partner with Ernst & Young in the financial services industry for 25 years. Upon his retirement from Ernst & Young, he became secretary of the Collier Charitable Fund. He is a company director and audit committee member.



Associate Professor David A. Scott FANZCA, FFPMANZCA, PhD, is Director of Anaesthesia at St Vincent's Hospital in Melbourne, an ANZCA councillor, Chair of the Quality and Safety Committee, Deputy Chair of the Research Committee. He has also served as Chair of the Cardiothoracic, Vascular and Perfusion Special Interest Group and as a member of the Australian Drug Evaluation Committee of the Therapeutics Good Administration (now the Advisory Committee on Prescription Medicines). He is active in anaesthesia and pain medicine research.



Professor Alan Merry ONZM, FANZCA, FFPMANZCA, FRCA, is Head of the School of Medicine, University of Auckland, an ANZCA councillor and is Chair of the College's Research Committee. He has also served as Chair of the College's Quality and Safety Committee. He is Chair of the Quality and Safety of Practice Committee of the World Federation of Societies of Anaesthesiologists. Professor Merry is co-author of the publication *Errors, Medicine and the Law* (CUP, 2001) and is active in quality and safety research.



Professor Kate Leslie MBBS, MD, MEpi, FANZCA, FAICD, is the President of ANZCA and staff specialist and Head of Anaesthesia Research at The Royal Melbourne Hospital. She has served as Chair of the College's Research Committee (2004-2008), is an active member of the ANZCA Trials Group and has published more than 100 research papers and book chapters.



Dr Leona Wilson ONZM, FANZCA, FAICD, is a past president of ANZCA (2008-2010). As a Fellow of the College and a member of council, Dr Wilson has contributed to a wide range of College activities including Chair of the Education and Training Committee and the Hospital Accreditation Committee. Dr Wilson was the first female anaesthetist to be elected president of ANZCA and the first New Zealander to hold the position.

Message from the ANZCA President



Professor Kate Leslie
MBBS, MD, MEpi, FANZCA, FAICD

Anaesthesia is one of the miracles of modern medicine, allowing patients to undergo surgical procedures in complete oblivion and with a high degree of safety. However, we are still not sure exactly how general anaesthetics work or what their long-term effects are, particularly in babies and in the elderly. As millions of Australians and New Zealanders have surgical procedures requiring anaesthesia every year, we all have an interest in solving these puzzles so that anaesthesia for ourselves and our families is as safe as possible. Millions of people in our region also suffer from acute or chronic pain as a result of injury or disease, but many lack effective treatments. As pain affects all our lives, we all have an interest in supporting endeavours to find solutions.

In this publication, you will read about some ground-breaking research by anaesthetists and pain medicine specialists from ANZCA that has been supported by donations to The Anaesthesia and Pain Medicine Foundation. Many of these internationally-recognised researchers were first supported by the foundation as young investigators. Supporting young investigators is vital so that their enthusiasm for research in anaesthesia and pain medicine is captured and sustained. The foundation provides specific grants and scholarships to young investigators so they can follow their dream of a career in anaesthesia and pain medicine research.

The foundation has also been instrumental in establishing and supporting the ANZCA Trials Group – a multi-national collaboration of anaesthesia and pain medicine researchers that is unique in the world. Through collaboration, research projects can be much broader in scope and have a much bigger impact. Already, through support from the foundation, the ANZCA Trials Group has explored awareness during anaesthesia, the long-term effects of nitrous oxide ("laughing gas"), the prevention of heart attacks during heart surgery, and the effects of anaesthesia on premature babies. These trials have changed the practice of anaesthesia and pain medicine around the world.

Finally, you will read about the important contribution foundation supported researchers have made to the safety of anaesthetic practice in our region and around the world through their work on preventing wrong site surgery and drug errors. Without the support of donors to The Anaesthesia and Pain Medicine Foundation, this important work would not be possible.



Message from the Foundation Board

Research in the fields of anaesthesia and pain medicine has been a neglected area of medical research. Until recently, these two key medical specialties received close to the lowest amount of funding from Australia's National Health and Medical Research Council (NHMRC) – despite the obvious importance of both for the health of patients in our region. With the “priming” help of The Anaesthesia and Pain Medicine Foundation and the ANZCA Trials Group, ANZCA and FPM Fellows have begun to attract a larger share of NHMRC funding – thus breaking a vicious cycle of continuing low levels of funding.

ANZCA President, Professor Leslie, has outlined some of the outstanding areas of anaesthesia-related research and outcome research that are world class. We will focus on pain medicine research.

Pain medicine became a specialty approved by the Australian Government in 2005. Acute, chronic and cancer pain are now recognised as among the most prevalent and poorly treated problems in all of medicine. Everyone, from the very young to the elderly, will require pain management at some time. Yet pain is not even a category in the NHMRC list of research categories. For far too long, pain research has been neglected.

ANZCA researchers have shown that poor treatment of acute pain, after surgery or trauma, is associated with adverse long-term outcomes. In addition, inadequate treatment of acute pain increases the risk of chronic pain. Thus improved acute pain treatment is a “hot” topic for the foundation's research support. Chronic and cancer pain is now the third most costly health problem in our region.

However, the erosion of every aspect of life by chronic pain poses a moral imperative for pain relief as a basic human right. This is why The Anaesthesia and Pain Medicine Foundation needs your help and financial support. Improved management of pain is long overdue and will benefit millions of patients in our region. Along with the advances that are now being made in anaesthesia, the potential for improved pain relief makes a powerful case for support.

The Foundation Board would like to thank all of those who have supported the foundation so far, particularly the “Founder Sponsors”—Mundipharma, Pfizer and St Jude Medical. We also warmly thank ANZCA Fellows for their support and our staff for their dedication and support.

The ANZCA Research Committee

Its purpose and composition

The ANZCA Research Committee was established by the College to promote investigation and research in anaesthesia, pain medicine and related sciences and branches of medicine in Australia, New Zealand, Hong Kong, Malaysia and Singapore.

Membership of the committee includes an ANZCA councillor who is the chair, a representative of the Faculty of Pain Medicine, the chair of the ANZCA Trials Group, a community representative and up to 10 other members with an interest in research who are appointed by the College council.

The research committee is responsible for developing policy on research issues; assessing applications for project grants, novice investigator grants, academic enhancement grants and simulation/education grants; and adjudicating distinguished professorships. The committee also mentors or counsels prospective and/or unsuccessful applicants and provides recommendations to the ANZCA Council on the awarding of grants.

“Pioneering research undertaken by ANZCA Fellows is showing the way to the world, and Australian and New Zealand anaesthetists have set the benchmark for safety internationally. I am confident that in the coming years, the foundation can make an important contribution to better anaesthesia, better intensive care and the discovery of new ways to fight pain.”

Dr Walter Thompson, FANZCA, FJFCM
Foundation patron and past president of ANZCA



The Anaesthesia and Pain Medicine Foundation Board



Professor Paul Myles
Director, Department of Anaesthesia and Perioperative Medicine, Alfred Hospital and Monash University

Research highlights

Many of the advances in healthcare in Australia, New Zealand, Hong Kong, Malaysia and Singapore that are crucial to the safety and well-being of patients in acute care and life-threatening situations owe their origins to pioneering research undertaken by ANZCA and FPM Fellows. The following projects highlight some of the vital work being done by these Fellows. This research has contributed to significant improvements in patient safety and to medical research worldwide.

“Pain medicine” – Professor Michael Cousins

“Awareness and dreaming during anaesthesia” – Professor Kate Leslie

“Safe surgery saves lives” – Professor Alan Merry

“ENIGMA-I and II” – Professor Paul Myles

“The REASON study” – Associate Professor David Story

“Warning signals in spinal surgery” – Professor Matthew Chan and Professor Tony Gin

“The GAS study” – Associate Professor Andrew Davidson

“Drug errors in anaesthesia” – Professor Alan Merry

“Cognitive decline in elderly patients after surgery”
– Associate Professor Brendan Silbert

“Regional anaesthesia complications audit” – Dr Michael Barrington

Pain medicine research



“Pain is one of the biggest health issues in Australia today – every bit as big as cancer, AIDS and coronary heart disease.”

Professor Michael Cousins AM, Director,
Pain Management Research Institute, Sydney

Overview

Professor Cousins' research covers mechanisms and treatment of acute, chronic and cancer pain; pharmacology and toxicology of anaesthetic and analgesic drugs; development of novel routes of delivery of analgesic drugs; epidemiology of chronic pain; and impact of pain on the individual and society. In particular, ANZCA has awarded funding for three specific areas of his research into developing therapies to treat pelvic pain, anti-migraine drugs and experimental strategies for preventing persistent post surgical pain.

A new strategy to inhibit visceral pain

Visceral pain means pain originating in an organ or hollow structure, such as the stomach or the gall bladder. This project focuses on a common and debilitating chronic pain caused by bladder inflammation (interstitial cystitis). For most patients with interstitial cystitis, there is no treatment for the pain that they suffer. Professor Cousins and colleague Professor Janet Keast are investigating how a naturally occurring protein, Semaphorin 3A, modulates and inhibits bladder nerve receptor structure and function.

Research Highlights

- Bladder levels of S-3A are reduced by bladder inflammation.
- Receptors for S-3A are not expressed by sensory neurons but instead by autonomic neurons.
- Loss of inhibitory control of autonomic neuron S-3A may be the trigger for conditions such as interstitial cystitis. This is the basis of further studies.

Making migraine drugs better drugs

Migraine headaches are a common and often debilitating disorder which affect 10 to 15 per cent of the population a year. For about 40 to 50 per cent of people, migraines can be effectively treated with a class of anti-migraine drugs called triptans. However in many patients, the headaches recur in a 24 hour period, and for others, using them for extended periods leads to a loss of effectiveness. More disturbingly, it has been noted that a significant proportion of triptan users develop a syndrome known as medication-overuse headache, whereby headaches become more common than one every 48 hours.

Research Highlights

- Professor Cousins and colleague Professor Mark Connor created model nerve cells expressing the serotonin receptor proteins that anti-migraine drugs act on. They are using these cells to see how the drugs affect the receptors over the time taken for these drugs to work – and sometimes stop working – in humans.

Experimental strategies for preventing persistent post surgical pain

Common operations can lead to persistent, often severe pain, in 10 to 50 per cent of individuals. In most affected patients, post surgical chronic pain resembles neuropathic pain, a type of pain which is caused by damage to the nervous system. Damage to the nervous system appears to be associated with neuroplastic changes, which represent a “disease process”, located within the central nervous system. Thus new drugs are being developed that target this unfavourable neuroplasticity, rather than merely providing symptomatic relief with drugs such as morphine.

Neuronal growth factors are chemicals produced by tissues in the body that promote regeneration of nerves damaged by trauma or as an unavoidable consequence of surgery. Nerve growth factor (NGF) was the first of these molecules to be identified and characterised. However NGF does not simply promote regeneration of peripheral nerves but it also increases the sensitivity of nociceptors, which are specialised nerves that only respond to stimuli that cause pain. The motivation for this study was to identify other neuronal growth factors that could promote nerve regeneration and functional sensory recovery without causing pain.

Research Highlights

- The research looked at GDNF (glial derived neurotrophic factor), neurturin and artemin, which belong to a family of neuronal growth factors that is quite different to NGF family.
- Professor Cousins and Dr Peregrine Osborne set out to study neurturin but in the course of studies made discoveries that redirected attention to artemin.
- The research established that most NGF-sensitive nociceptors are also sensitive to artemin. However, artemin has different effects. Artemin initiates regeneration of these nerves, but has a reduced capacity to cause neuroplastic changes causing pain.
- These studies support a growing body of evidence that suggests therapies that use or mimic the effect of artemin could provide a way of restoring loss of sensory function after trauma or surgical damage, without increasing the risk of pain.

Awareness and dreaming during anaesthesia



“Awareness during anaesthesia is a rare event, but dreaming during anaesthesia is common. Our goals were to determine the effects of awareness and dreaming on patients and then determine how to prevent them.”

Professor Kate Leslie, staff specialist and Head of Anaesthesia Research, The Royal Melbourne Hospital

Overview

Professor Kate Leslie and her colleagues have looked at prevention and long-term effects of awareness during anaesthesia and the link between dreaming, awareness and sleep. Their studies are the first large-scale and detailed investigations on this topic and were supported by ANZCA project grants and the ANZCA Douglas Joseph Professorship.

The initial study involved 2463 patients who were at high risk of awareness during anaesthesia and who were having general anaesthesia for surgery (“the B-Aware Trial”). The study showed that awareness was less common in patients with whom a depth-of-anaesthesia monitor, known as a BIS monitor, was used. This study resulted in a change in practice worldwide. In a follow-up study, Professor Leslie found that patients who had experienced awareness were highly likely to develop post-traumatic stress disorder, making prevention of awareness an important objective for anaesthetists.

Dreaming was common in patients in the B-Aware Trial, especially in those with awareness. In a follow-up study, Professor Leslie recruited 300 healthy young patients who were undergoing elective surgery requiring general anaesthesia and who were monitored with a BIS monitor. Nearly a quarter of the patients reported dreaming after the operation, but patients who were lightly anaesthetised were no more likely to report dreaming than patients who were deeply anaesthetised. Professor Leslie concluded that dreaming during anaesthesia was not usually a sign of suppressed memories of anaesthesia and surgery, but could be a result of sleep-like activity during recovery from anaesthesia.

Finally, the investigators explored in another 300 patients whether there were similarities between the brain electrical activity of patients reporting dreaming under anaesthesia and sleep. During surgery, the brain electrical activity of patients who reported dreaming after the operation was similar to patients in “REM” sleep when the majority of dreaming occurs.

Research Highlights

- Awareness is a distressing complication of anaesthesia that may result in long-term psychological sequelae and may be prevented by BIS monitoring.
- Dreaming during anaesthesia is a common side effect of anaesthesia that is unrelated to the depth of anaesthesia in nearly all cases.
- Patients can be reassured that dreaming does not usually represent suppressed memories of surgery and anaesthesia.

Safe surgery saves lives



“The Safe Surgery Checklist is a very simple clinical tool that will have an enormous impact on how medical teams prevent mishaps and associated complications. More importantly it will save lives.”

Professor Alan Merry ONZM, Head of the School of Medicine, The University of Auckland

Overview

In 2008, the World Health Organization (WHO) developed the Safe Surgery Checklist to make surgery safer by reducing errors and improving teamwork. It was evaluated in a study involving almost 8000 patients at eight sites around the world including Auckland, Toronto, New Dehli, Manila and London. The study showed that the checklist reduced patient harm and saved lives. The checklist is used at three critical phases in patient care: before anaesthesia is administered, immediately before incision, and before the patient is taken out of the operating room. Teamwork has been identified as important in reducing rates of adverse events and the checklist is designed to improve teamwork and communication between all operating room staff as well as ensuring that key facts and patient requirements are checked.

Auckland City Hospital was one of the centres involved in the development of the WHO checklist. Although the study was not designed for individual sites to have enough patients to see significant benefits locally, the trends were generally consistent with the combined results. The standard of medical care in New Zealand is already very high (as it is in Australia), but even in the high income sites improvements were seen in safety practices and in patient outcomes. In Australia and New Zealand, the checklist is just one more step in the ongoing pursuit of excellence in anaesthesia and surgery.

In a new study funded by ANZCA, Professor Alan Merry and colleagues, using the same measures as those in the WHO study, will compare patient outcomes for 2006-2007 (before the checklist was introduced) with those in 2009-2010 (after its adoption) at the Auckland City Hospital. This study will have enough patients to evaluate the benefit of the checklist in clinical use in an Australasian setting.

Anaesthetists are intimately involved with many aspects of the patients' journey and initiatives such as these maintain our speciality's ongoing commitment to improving patient care.

Research Highlights

- This study will provide locally relevant data on the value of the WHO Safe Surgery Checklist and on its place in preventing surgical complications and harm to patients in Australia and New Zealand.
- It highlights the importance of simple, targeted measures for improving the quality and safety of patient care.



“The results of the study showed no benefit in using nitrous oxide in anaesthesia, but did identify some possible adverse effects, in particular a possible increase in heart attack and stroke.”

Professor Paul Myles, Director,
Department of Anaesthesia and Perioperative Medicine,
Alfred Hospital and Monash University



“This study will draw on a network of paediatric anaesthetists worldwide to determine the long term effects of general anaesthetic versus spinal drugs on the brain.”

Associate Professor Andrew Davidson,
Department of Anaesthesia and Pain Management,
The Royal Children's Hospital, Melbourne

Overview

Nitrous oxide (“laughing gas”) has had remarkable longevity as an anaesthetic, having been used worldwide for more than 160 years. However despite this longevity, there has never been a definitive trial to test its overall safety and effectiveness. Professor Paul Myles and colleagues therefore established the ENIGMA I trial which was a large multi-centred randomised controlled trial involving more than 2000 patients in 30 hospitals around the world, particularly Australia, New Zealand, South East Asia and Europe. The aim of the trial was to investigate the effectiveness and safety of nitrous oxide in anaesthesia.

The results of the study showed no short-term benefit in using nitrous oxide in anaesthesia, but did suggest that nitrous oxide may prevent the development of chronic pain. The study identified some possible adverse effects of nitrous oxide, in particular a possible increase in heart attack and stroke. When nitrous oxide was not used there were significant reductions in the rate of severe nausea and vomiting, wound infections and pneumonia in patients. Of note, nitrous oxide is also a “greenhouse” gas which contributes to depletion of the ozone layer.

This trial raised some important results and questions for the investigators. More and more elderly patients with health problems are presenting for major surgery, and heart attack and stroke are significant risks for these patients. Yet, effective means of reducing these risks have not been established. For that reason, a large, five-year follow up study, called ENIGMA II, has commenced with 7000 patients in about 40 hospitals around the world. This trial is focusing on the cardiovascular side effects identified in ENIGMA-I, in particular the long term effects of nitrous oxide in patients with coronary artery disease undergoing major surgery. Both studies have been funded by ANZCA project grants.

Research Highlights

- Nitrous oxide offers no short-term benefits to patients and is a greenhouse gas.
- Nitrous oxide has adverse side effects, particularly cardiovascular complications.
- Removal of nitrous oxide may lead to better cardiovascular outcomes after surgery.

Overview

The GAS (general anaesthesia versus spinal) study is an international study designed to determine whether a general anaesthetic given to newborn babies undergoing surgery results in any injury to the developing brain.

Determining the long term effects of drugs on the developing brain is difficult, but vitally important. Drugs used in babies should be tested for long term effects before being used routinely. Anaesthetic drugs should be no exception. The study will determine whether different types of anaesthesia, spinal versus general, have the same neurodevelopment outcome in babies. General anaesthesia renders the patient unconscious whereas spinal anaesthesia just numbs the lower half of the patient's body. Many hospitals routinely use both forms of anaesthetic, but it is not clear whether one is superior to the other. The study will draw on the network of paediatric anaesthetists worldwide to answer this important question. This is one of the first large multi-site anaesthesia trials to be attempted in children.

A total of 660 babies requiring surgery to repair a hernia will be recruited to the study from hospitals in Australia, New Zealand, the UK, the US, Italy and Canada. The babies are allocated to having the surgical procedure carried out under general or local anaesthetic. The children are then monitored for five years to determine whether there are differences in their neurological development. They undergo a detailed neuropsychological assessment and neurological examination at two and five years of age. The data from these assessments will measure any difference between those who received a spinal versus a general anaesthetic providing valuable information on the safety of general anaesthesia in babies. These results will have far-reaching implications for patients and their families.

Research Highlights

- One of the first large multi-site trials in paediatric anaesthesia.
- This study will provide strong evidence with respect to the question of whether or not general anaesthetic drugs cause significant injury to the developing brain.

- This study has been acknowledged as important by the Commonwealth Government by being awarded an NHMRC project grant. The study has also been supported by substantial grants from the US, UK and Canadian governments.



Drug errors in anaesthesia



“The new system consists of a set of rules and devices for organising the anaesthetic workspace which includes specialised trays, colour and bar-coded labelling of syringes and prefilled syringes for the most commonly used anaesthetic drug.”

Professor Alan Merry ONZM,
Head of the School of Medicine,
The University of Auckland

Overview

Drug administration error has been identified as a leading cause of patient injury and/or harm and this is of particular concern in anaesthesia because of the large number of drugs that anaesthetists are required to administer. Drugs are recorded in the anaesthesia record, which is usually handwritten by the anaesthetist. This record is often incomplete or inaccurate. Professor Merry and colleagues have developed an integrated injectable drug administration and automated anaesthetic record system (IDAARS) with the aim of improving patient safety and reducing drug administration error and facilitating easy and accurate record keeping.

The new system consists of a set of rules and devices for organising the anaesthetic workspace which includes specialised trays (which promote a clean and well-organised anaesthetic workspace), colour and bar-coded labelling of syringes (which facilitate the selection and tracking of drugs), and prefilled syringes for the most commonly used anaesthetic drugs. A computer and barcodes are used to verify both visually and verbally the name of each drug prior to its administration.

Before trialling this new system with patients, it was compared with the conventional methods of drug administration by anaesthetists using an anaesthesia human-patient simulator. The human-patient simulator has a pulse, breath sounds, trachea and lungs that can be ventilated by an anaesthetist. The simulator is connected to standard equipment for the monitoring of an anaesthetic and is incorporated into a simulated operating theatre. Ten anaesthetists were involved in this trial and all deemed the system acceptable for use with patients and significantly safer than conventional methods of administering drugs during anaesthesia.

In a study funded by ANZCA, Professor Merry and colleagues are undertaking a simulation-based trial to replicate a large scale clinical trial involving 1000 patients in which the new system was compared with conventional methods of delivering anaesthesia at Auckland City Hospital. This study is the first to compare the findings of a large randomised clinical trial with those of a comparable study in a simulator situation, thereby evaluating the validity of simulation as a research tool.

Research Highlights

- The study will evaluate the validity of simulation as a research tool in anaesthesia safety.
- It will also contribute to improving the safety of drug administration in anaesthesia.

Warning signals in spinal surgery



“The expected results will provide concrete evidence for establishing guidelines on warning criteria for nerve monitoring to detect impending injury during spinal surgery.”

Professor Matthew Chan and Professor Tony Gin,
Department of Anaesthesia and Intensive Care,
Chinese University of Hong Kong, Prince of Wales Hospital

Overview

Nerve monitoring is an established technique to provide real time information on the functional status of the nervous system during spine surgery. The utility of monitoring is to detect impending injury so that timely intervention can be applied before permanent damage occurs. Clearly, this requires early recognition of the “warning signals”. Unfortunately, the current recommendation for these critical thresholds has not been validated.

With funding from ANZCA, Professors Chan and Gin have gathered a team of experienced anaesthetists, neurosurgeons, radiologists and physiologists interested in the neurophysiology of spinal cord injury to conduct a systematic study to determine the threshold changes of monitoring signals, beyond which neurologic deficit occurs in a pig model of spinal cord injury.

They believe it is not feasible to conduct the same experiment in humans, but their data in pigs will provide the best possible information on the changes of neurophysiologic signals during spinal cord injury. In the absence of valid human data, the expected results will provide concrete evidence for establishing guidelines on warning criteria for nerve monitoring. This will stimulate further research in the field.

Appropriate interpretation of these signals will be important to avoid inadvertent spinal cord injury. The impact on patients, their families and society as a whole in terms of decreasing the number of patients who become paraplegic after spine surgery will be socially and economically significant.

Research Highlights

- Results will provide insight and evidence for establishing guidelines on warning criteria.
- Appropriate interpretation of signals is critical to avoid inadvertent spinal cord injury.
- The research in the porcine model will stimulate further research in humans.

The REASON study

Research into Elderly Patient Anaesthesia and Surgery Outcome Numbers

Cognition and anaesthesia



“As Australia and New Zealand have ageing populations who increasingly are presenting for surgery, these results have major implications for health resource management.”

Associate Professor David Story,
Head of Research, Department of Anaesthesia,
Austin Health, Melbourne



“Our studies are aimed at more fully describing how anaesthesia and surgery may influence memory and thinking, especially in the elderly.”

Associate Professor Brendan Silbert,
Department of Anaesthesia,
St Vincent's Hospital, Melbourne

Overview

Elderly surgical patients suffer remarkably high rates of morbidity and mortality. In 2004, three Melbourne hospitals undertook a prospective observational study of all patients aged 70 years or older having non-cardiac surgery. In this study, the investigators wanted to determine the incidence of postoperative complications, including the 30-day mortality rate and the need for intensive care unit admission in older patients. The results showed that Australians aged 70 years and older had a high mortality rate and experienced many complications, which placed a high demand on critical care services and family members. A risk scoring system was developed from this study (the POM score) that highlights the preoperative factors and postoperative factors predicting poorer outcomes in elderly patients having non-cardiac surgery.

As a follow up from the initial study, the investigators sought further evidence to introduce changes in perioperative practice (that is, care before, during and after surgery), particularly an anaesthetist-led model to improve patient outcomes. ANZCA's Perioperative Medicine Committee joined with the ANZCA Trials Group to conduct a larger study called the REASON (Research into Elderly patient Anaesthesia and Surgery Outcome Numbers) study. This study confirmed that elderly patients in Australia and New Zealand suffered similar rates of postoperative mortality and complications to patients in the three-hospital study. Older patients (more than 80 years of age) and those with significant health problems before surgery were much more likely to run into problems. As Australia and New Zealand have ageing populations who increasingly are presenting for surgery, these results have major implications for health resource management. The REASON audit was supported by an ANZCA project grant and a special grant from ANZCA Council.

Research Highlights

- After surgery, Australians aged 70 years and older have a higher mortality rate and experience considerable morbidity.
- Identification of variables for preoperative assessment and management which should be more widely used.
- Better detection of postoperative complications is warranted.
- Overall management strategies require further study to include possible system changes to improve patient care.

Overview

Cognitive change after anaesthesia remains an issue of high importance that urgently requires investigation. Each year more than 2.5 million anaesthetics are administered in Australia and New Zealand to an increasingly ageing population. This is important as it is the elderly who are most susceptible to cognitive change after anaesthesia and it is this group that receives the highest number of anaesthetics. Cognitive decline already represents a major health issue in the aged, but exacerbation of this problem by surgery and anaesthesia cannot be underestimated.

The first study builds on previous work which documented the incidence of cognitive decline after cardiac surgery. The ANTIPODES (Australian National Trial Investigating Post-Operative Deficit, Early extubation and Survival) trial investigated the incidence of postoperative cognitive deficit after coronary artery bypass graft (CABG) surgery. The study included 350 patients aged 55 years or older who underwent CABG surgery. This trial resulted in the collection of cognitive test results from more than 320 patients.

In a follow-up study funded by ANZCA, the investigators will use the same methods in the ANTIPODES trial to test this group of patients five years after the initial surgery to identify how many patients suffer from difficulties in thinking and memory. The study will go even further and see if any of these patients have deteriorated so much that they have progressed to dementia. Documenting the natural history after cardiac surgery is an important step as it will allow those patients at risk to be identified – a vital precursor to implementing preventive strategies.

In a complementary study, Associate Professor Silbert and colleagues will examine thinking and memory after hip replacement surgery which is a common operation in the elderly. In particular, the study is measuring the number of small particles that find their way to the brain during an operation. These small particles have generally been believed to be harmless, but there is recent evidence that suggests they may play a part in diminishing brain function. It is planned to measure the particles using a special ultrasound machine which, when placed over the skull, is able to detect the type and number of particles that travel in the arteries to the brain. If there is a positive relationship between the particles and deterioration in memory and thinking, measures to prevent the particles going to the brain can be implemented.

Research Highlights

- Define long-term cognitive outcomes in the aged after cardiac surgery.
- Investigate if small particles released into the circulation during hip replacement surgery decrease brain function.

Regional anaesthesia



“We are setting up a clinical registry known as AURORA to monitor peripheral nerve blocks (PNBs) in a range of healthcare settings.”

Dr Michael Barrington, Staff Specialist,
Department of Anaesthesia,
St Vincent's Hospital, Melbourne

Overview

Regional anaesthesia allows pain free surgery without loss of consciousness. This type of anaesthesia includes techniques described as peripheral nerve blocks (PNBs) where local anaesthetic is injected adjacent to nerves. The advantages of regional anaesthesia include improved pain relief and recovery following surgery, potentially reducing both hospital stays and healthcare costs. An additional advantage specific to the elderly is the avoidance of general anaesthesia, which is associated with the risk of postoperative cognitive decline.

Regional anaesthesia is evolving with the use of ultrasound imaging to locate nerves. Because ultrasound imaging allows the anaesthetist to see the needle, nerve and surrounding structures it is possible that it may improve both the safety and quality of regional anaesthesia. To determine if this is true, Dr Barrington and his colleagues designed and implemented a web-based database and performed a prospective audit of more than 7000 PNBs. This study featured clearly defined clinical outcomes and robust follow up of all patients providing the basis for accurately determining the cause and incidence of complications. The results indicate that the incidence of serious complications, including neurological, after PNB are uncommon.

ANZCA has provided funding for Dr Barrington and colleagues to build on the preliminary audit and set up a clinical registry known as AURORA (Australian and New Zealand Registry of Regional Anaesthesia). Registries in medicine are growing in popularity and are important for monitoring and benchmarking the quality of clinical care, improving clinical practice and are “powerhouses” for driving clinical research. AURORA monitors a common anaesthetic therapy (PNB) performed in a diverse range of health care settings. Using state of the art informatics technology to facilitate collaboration and accurate data collection from a large number of patients, AURORA measures a wide range of outcomes to determine how effective PNB is in routine clinical practice. These outcomes are direct markers of the quality and performance of our clinical care.

Monitoring the quality and safety of an evolving therapy – ultrasound-guided PNB compared to traditional techniques – is important for clinical decision-making, development of practice guidelines and healthcare funding. AURORA aims to obtain the incidence of infrequent adverse effects with the precision required for informed consent. Such is the breadth of information that AURORA collects that it will not only inform clinical practice but, potentially, may have important public health relevance. ANZCA has provided this opportunity for Australian and New Zealand anaesthetists to be world leaders in assessing the quality of this therapy in an objective, co-ordinated and systematic way.

Research Highlights

- Improving the quality and safety of regional anaesthesia.
- Improving patient outcomes after surgery.
- When completed, the project will be of value to anaesthetists worldwide.

Financial highlights

The Anaesthesia and Pain Medicine Foundation (formerly the ANZCA Foundation) was established as a committee of the Australian and New Zealand College of Anaesthetists.

The powers and purpose of the Foundation Board are:

- To advise the ANZCA Council in relation to the promotion, management and activities of the foundation.
- To undertake promotional activities to support the foundation.
- To assist the College in seeking contributions to the foundation from Fellows, medical colleges, industry and philanthropic organisations.
- To enhance the profile of the foundation.

- To otherwise provide advice in relation to the foundation at the request of the College.

The Anaesthesia and Pain Medicine Foundation operates as a department within the College. The operating costs associated with running the foundation are met by the College. Thus every dollar that is raised by the foundation goes to supporting medical research and education.

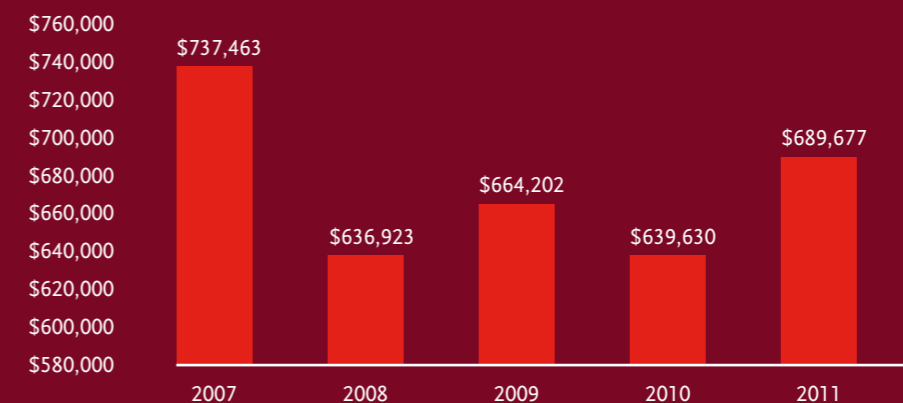
Both the College and the foundation have deductible gift recipient status under the Australian Income Tax Assessment Act 1997. In New Zealand, the College and the foundation are registered charities under the Charities Act 2005 and donations can be claimed as a deduction.

Each year 10 per cent of the subscriptions paid by College Fellows go to supporting the research and education programs of ANZCA and the Faculty of Pain Medicine. In 2010, the value of this support was \$A614,070.

The foundation has an investment portfolio that at May 31, 2011 was valued at \$A4,374,414. Capital gains and losses of the foundation funds will be applied to the corpus of those funds. In years where there is a capital loss, dividends and interest income will not be available to be distributed as grants in order to assist in preserving the corpus.

The Foundation Board has set a target of establishing the corpus at \$5 million dollars by January 2013.

Over the past five years, the foundation has made the following annual grants:





Looking forward

Grants provided in 2011

The College council approved grants totalling \$A689,677 for research projects in 2011. The research projects are:

Project grants

Dr D Belavy, Royal Brisbane and Women's Hospital, Queensland. "Ultrasound transmission gel – an assessment of neurotoxicity." (\$19,318)

Associate Professor T Corcoran, Royal Perth Hospital, Western Australia. "Lymphocyte populations and innate immunity in the perioperative period – the effect of anti-emetic doses of dexamethasone." (\$53,419)

Dr E O'Loughlin, Fremantle Hospital, Western Australia. "Physico-chemical compatibility of intravenous paracetamol with commonly used analgesic drugs." (\$10,624)

Professor J Sleigh, Waikato Hospital, New Zealand. "A genome wide association study on the genetics of anaesthetic awareness." (\$60,000)

Dr E Hessian, Western Health, Victoria. "The analgesic efficacy of transverses abdominis plane (TAP) Ropivacaine infusions following abdominal surgery." (\$12,178)

Dr A Weatherall, The Children's Hospital at Westmead, NSW. "Does gabapentin reduce itch in children with severe burns? A prospective double blind RCT." (\$27,430)

Professor M Chan, Chinese University of Hong Kong. "Genetic determinants of persistent pain after surgery." (\$30,000)

Dr M Chapman, Royal Adelaide Hospital, South Australia. "The effect of glucagon-like peptide (GLP-1) on glucose absorption in critically ill patients." (\$29,561)

Associate Professor J Weller, University of Auckland, New Zealand. "The effectiveness of video-based training to improve teamwork behaviours in acute care – an RCT." (\$50,000)

Dr M Lord, John Hunter Children's Hospital, NSW. "A double blind placebo controlled RCT of the efficacy of remifentanyl for procedural pain in neonates." (\$41,540)

Dr P Finch, Murdoch University, Western Australia. "Mechanism of adrenergic hyperalgesia in partial sciatic nerve ligation model of neuropathic pain." (\$59,588)

Associate Professor A Davidson, The Royal Children's Hospital, Victoria. "Outcomes from an RCT comparing regional and general anaesthesia for effects on neurodevelopmental outcome in infants." (\$60,000)

Dr D Canty, The Royal Melbourne Hospital, Victoria. "Investigating the applications of anaesthetist-performed TOE in non-cardiac anaesthesia."

Dr D Lindholm, Alfred Hospital, Victoria. "Does adjunctive therapy with minocycline improve pain in burns patients when initiated on admission to hospital – a prospective RCT." (\$21,019)

Professor D Hillman, Sir Charles Gairdner Hospital, Western Australia. "Airway collapsibility during sedation and anaesthesia in patients with and without obstructive sleep apnoea." (\$60,000)

Dr Michael Barrington, St Vincent's Hospital, Victoria. "The Australian and New Zealand Registry of Regional Anaesthesia (The AURORA study)," second-year funding. (\$70,000)

Simulation-education grants

Associate Professor J Weller, University of Auckland, New Zealand. "The impact of assessment on life and learning." (\$22,800)

Dr N Smith, Wollongong Hospital, NSW. "Reflective practice in anaesthesia trainees." (\$7,750)

Academic-enhancement grant

Associate Professor D Story, Austin Health, Victoria. "Innovations in perioperative physiology monitoring and care." (\$90,000)

Lennard Travers Professorship Grant

Associate Professor A Davidson, Royal Children's Hospital, Victoria. "PIMS Study (Paediatric Intravenous Maintenance Solution) – an RCT to compare two fluids for IV fluid maintenance in children." (\$30,000)

Our supporters

The contributions of our supporters make it possible for the foundation to support research and education projects which will continue to improve patient outcomes. We are enormously grateful for the valuable contribution made by these individuals and organisations and for their continuing commitment and support.

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Mr Gordon Moffat

Dr Ying Hung Mok

Dr Arthur Penberthy

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Associate Professor Richard Walsh

Dr Leona Wilson

On call Locums

Sponsors

The foundation was officially launched by the College on April 12, 2007. At that time, three companies agreed to become "Founder Sponsors" each contributing \$250,000 to the foundation over five years. With the support of these companies, an ANZCA research fellowship is awarded each year in recognition of their contribution.

The foundation is extremely grateful to these companies:

Mundipharma Pty Ltd

Pfizer Australia

St Jude Medical Australia Pty Ltd.

The foundation is also grateful for the support of MSD (formerly Schering-Plough.)

Donations received for 2010-2011

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The Anaesthesia and Pain Medicine Foundation is dedicated to raising funds that will help advance medical research and education.

There are a number of ways that you can support our activities, both as an individual or as an organisation.

Make a Donation

All donations made in Australia and New Zealand are tax deductible. In Australia you can make a donation by visiting the foundation website at www.anzca.edu.au/fellows/foundation.

You can download a donation form to return by post to the foundation in Australia or New Zealand.

Become a Patron

The foundation has established a Patrons Program to encourage and recognise those people who wish to support our medical research and education programs.

The entry level for a five-year membership of the Patrons Program is \$5000. This can be paid in a single payment or by an annual payment of \$1000 over five years. Patrons of the foundation will be listed in the ANZCA Annual Report, the December edition of the College's journal, the ANZCA Bulletin, and the foundation website.

Those making a donation of \$25,000 will be recognised as a Life Patron. This amount may be paid with a single payment or by an annual payment of \$5000 over five years. Life Patrons will be further recognised with their names being recorded on the foundation honour board at the College.

Those making a donation of \$100,000 will be recognised as a Governor of the foundation. Again, this amount may be paid with a single payment or by an annual payment of \$20,000 over five years. A Governor of the foundation will, in addition to the recognition afforded to a Life Patron, be invited to have a research grant award made by the College named in their honour. Such an award will be made each year for four years.

You can download an application to join the foundation's Patron Program at our website, www.anzca.edu.au/fellows/foundation.

Make a Bequest

A bequest to the foundation will greatly enhance ANZCA's ability to undertake important medical research that will significantly improve outcomes for the health of future generations.

You might consider a bequest to the foundation whether as a specific amount of money, a proportion of your estate, the residual of your estate, or other specific property.

Your will and financial planning are intensely personal and the foundation respects your privacy. However, if you wish to allocate an amount to the foundation, or to honour or commemorate a named individual, staff at the foundation are available to discuss it with you and provide assistance. All discussions will, of course, be confidential.

Naturally you are free to indicate how you would prefer your bequest to be used, and your wishes will be respected. However, we would appreciate the opportunity of consulting with you to ensure that we are able to carry out your wishes.

We strongly recommend that you seek professional advice regarding your will. A solicitor will help you make a clear, concise will, which is easily located and causes no misunderstanding.

Become a Sponsor

A number of organisations are supporting the foundation. If you would like to obtain information on how your organisation could support our medical research and education activities please contact:

Mr Robert Packer, General Manager
 The Anaesthesia and Pain Medicine Foundation

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