NHMRC Centre
of Research Excellence

Improving the Immediate and Longer Term Outcomes of Preterm Infants

ANNUAL REPORT 2013-2014
Our Centre of Research Excellence is a multi institutional research and education collaboration focused on improving outcomes for the 15 million babies born prematurely around the world each year.
In 2013, the National Health and Medical Research Council (NHMRC) awarded a Centre of Research Excellence (CRE) for Improving Immediate and Long-Term Outcomes of Preterm Infants to a multi-institutional and multi-disciplinary team of scientists and clinicians. The Centre, administered by The University of Western Australia, employs a holistic approach to solving problems faced by infants born preterm. We are undertaking both preclinical and clinical research, and are actively pursuing translation of our research as well as outreach and education.

Our research involves the critical major areas of neonatal health:

- Infection and immunology
- Nutrition and gastrointestinal health
- Cardiac and respiratory systems
- Neurodevelopment

Instead of examining these areas separately, CRE researchers recognise that the preterm infant will frequently present with health issues in more than one area due to the complex interplay between different body systems. Our research, therefore, must not focus on one area at the exclusion of others as an integrative, ‘whole baby’ approach will be of greater relevance to outcomes for preterm infants. Collaboration of experts from multiple research groups is fundamental to this integrative approach, and is a central component of our Centre of Research Excellence.
Directors’ Report

We are extremely proud to present this report on the first year of activities undertaken by our NHRMC CRE. The CRE grew from recognition of the significant burden imposed on the health system by infants and children born preterm and the urgent need to adopt a holistic approach to maximise benefits of new advances in care. We also recognised the need for iterative links between discovery, evidence development in clinical practice, and translation of that evidence to policy development and widespread adoption of new practices on an international scale.

The five year CRE funding from the NHMRC commenced in October 2013. Fortunate to have significant existing research funding that was suited to value-add collaborative studies, the CRE has had an active year in its research activities. Our presence is growing on the national and international stages, due in part to the high profile enjoyed by many of our Chief and Associate Investigators and extensive preterm infant networks. We have also used the last twelve months to establish many of the CRE structures, policies and research support personnel essential to both good governance, and streamlining of research process. To date we have appointed a Research Manager, a Database Manager, a Manager for the Preclinical Intensive Care Research Unit, a Biostatistician (early 2015 commencement) and a Clinical Trials Coordinator (early 2015 commencement). We have established a website and look forward to further development of that site for use by the community and researchers in subsequent years.

With innovative translational research and discovery underlying all activities, the CRE has focused strongly on developing the research capacity of emerging clinicians and basic scientists and attracting the most promising students to work in our research programs, described in detail in later parts of this report. Key strategies have included the provision of equipment, small starter grants, scholarship and fellowship support across the preclinical and clinical spheres, as well as encouraging professional development opportunities including conducting national workshops and skill development.

Education and translation of research findings is essential to achieving real improvement in preterm infant outcomes. A major focus of the first year of the CRE was the establishment of the Graduate Diploma and Masters in Neonatology, offering further education and professional development for neonatal clinicians in training as well as those established clinicians wanting to further develop their skills. National interest in the program is growing, including from the Royal Australasian College of Physicians.

With further successful grants awarded at the end of 2014, we are looking forward to yet another busy year on the research front. At the governance level, we will use the second year of CRE funding to develop a comprehensive strategic plan for the CRE to ensure that we meet our key performance outcomes, and effectively engage with the research and general Australian community. Inclusion of community representatives on the CRE Advisory Board and programs that specifically address the needs of our community stakeholders will be a key focus of the second year of our program.

The success of the CRE over the first twelve months is due in no small part to the generosity of spirit and time of its members, and the collaborative spirit that has prevailed between the key investigators. Involvement in a collaborative meeting of nine Centres of Research Excellence in Melbourne in October 2014 provided an opportunity to share experience and insights into the value of the CRE program: we look forward to implementing some of these new strategies in our own Centre over the next few years as we cement and build our collaborative research program and expand our research partnerships both nationally and internationally. We would like to thank all the members of the CRE for their active participation in working towards the goal of improving the immediate and longer-term outcomes of preterm infants.
What is the Preterm Infant CRE?

The number and proportion of premature infants born each year is increasing globally, imposing a growing burden on neonatal and later paediatric and adult health care service delivery. Fifteen million babies are born prematurely each year, and over 1 million children die each year due to complications of preterm birth. In 2009, over 8% of all Australian babies were born prematurely (<37 weeks completed gestational age); very preterm infants (<32 weeks gestational age) accounted for 1.5% of all births.

Infants born preterm who survive the initial period of hospitalisation, suffer health and educational problems that impact significantly on their long-term potential. The risk of these pervasive adverse outcomes is inversely related to gestational age at birth. Survivors of preterm birth may have multiple health issues that reduce their quality of life and exert physical, financial, social and psychological hardship on the infant/child and his/her family.

Although treatment of extremely premature infants (born <28 weeks gestational age) is routine in many tertiary neonatal centres, the adult health consequences of extremely preterm infants remain largely unknown. Reducing the very significant human and economic costs of the consequences of preterm birth is of national and international concern.

In addition to undertaking outstanding and innovative research, the CRE is specifically targeting the development of research capacity, and the translation of research findings to the clinical setting through education, practical workshops and development of clinical guidelines. We have developed an iterative process of identifying a relevant clinical question, exploring mechanisms and obtaining supporting evidence through preclinical studies, testing new treatments and therapeutic approaches in the clinical setting, then either progression to clinical practice implementation or returning to the laboratory to further refine the treatment.
Our Centre team is comprised of internationally-renowned Chief and Associate Investigators from across Australia and overseas. As the CRE grows, the collaborative network continues to extend.

Our Organisations

Our Objectives

1. Innovative and outstanding research that improves the immediate and long-term outcomes for preterm infants
2. Transformative translation and education to ensure that research findings are translated to changes in clinical guidelines and practice
3. Develop research leadership skills and network links in our early career researcher colleagues
4. Develop and strengthen new and existing collaborations to maximise research outputs and impact
5. Engage with the community in the development, communication and translation of our research
6. Cement and enhance the international reputation of our research and our colleagues for leadership in improving outcomes of preterm infants
Our People

Chief Investigators

Co-Director
Jane Pillow BMedSci (Dist), MBBS, PhD (Dist), FRACP
The University of Western Australia
Prof Pillow is a clinical academic neonatologist and NHMRC Senior Research Fellow based at King Edward Memorial Hospital and the School of Anatomy, Physiology and Human Biology at The University of Western Australia. She is internationally renowned for her research in neonatal ventilation and respiratory physiology, and has extensive clinical and preclinical research programs.

Co-Director
Karen Simmer PhD, FRCPCH(UK), FRACP, FAICD
The University of Western Australia
Prof Simmer has research interests in neonatal nutrition, inflammation and infection. She has an international reputation in the areas of human milk, long chain polyunsaturated fatty acids and preterm nutrition. Prof Simmer established the Human Milk Bank in WA which was awarded the Premier’s prize for outstanding contribution to the community of Western Australia in 2008.

Prof Patole  MBBS, MD, DCH, FRACP, MSc, DrPH
The University of Western Australia
Prof Patole is internationally acclaimed for his research in prevention of feed intolerance, prevention and treatment of necrotising enterocolitis (NEC), probiotics, prebiotic supplementation, and nutrition in preterm neonates. Prof Patole’s innovative work has enabled a change in clinical practice in favour of routine probiotic supplementation for preterm very low birth weight neonates.

Tobias Strunk  MD, PhD, FRACP
The University of Western Australia
Dr Strunk is active in several related fields in neonatal immunology/infection and the effects of early-life exposure to inflammation. These projects will (i) further our understanding of the long-term implications of preterm birth on infectious diseases susceptibility and neurodevelopment; (ii) define previously under-recognised at-risk populations, and characterise maturation of the immune system of preterm infants beyond the neonatal period and; (iii) explore new modalities of treatment and interventions to prevent invasive infection.

Timothy Moss  PhD
Monash Institute of Medical Research
Our research is directed at understanding the causes and consequences of exposure to inflammation around the time of birth, and developing treatments to prevent diseases associated with inflammation and preterm birth. Research in The Perinatal Inflammation Lab centres around three themes:
- Identification of mechanisms whereby inflammation affects development
- Determination of the long-term health consequences of perinatal inflammation
- Development of amnion epithelial cell therapy for prevention and treatment of inflammatory disease in newborns

David Burgner  BSc (Hons) MBChB DTM&H MRCP MRCPCH FRACP PhD
Murdoch Childrens Research Institute
Prof David Burgner’s work is focused in perinatal and early life inflammation and infection. He is particularly interested in why some preterm infants develop severe infection and what factors might influence this risk and improve treatment. He is also interested in how early life inflammation and infection might affect the very early development of atherosclerosis and cardiovascular risk.
Andrew Whitehouse  PhD  
Telethon Kids Institute  
Prof Whitehouse directs the Autism and Related Disorders research team, who investigate the genetic and neurodevelopmental causes of developmental disorders such as autism and language impairment, and conduct clinical intervention trials into these conditions.

Susan Prescott  BMedSc, MB, BS, PhD, FRACP  
The University of Western Australia  
Prof Prescott is one of the leading researchers in the area of allergy and early immune development. Her studies on early immune development have already been translated into novel concepts and lead to a paradigm shift in the pathogenesis of allergic disease. She runs an interdisciplinary research team which examines not only immune effects of early life environmental exposures and dietary interventions, in the context of allergic disease, but also neurodevelopmental and cardiometabolic outcomes.

David Tingay  PhD  
Murdoch Childrens Research Institute  
Dr Tingay’s research interests are in the respiratory management of infants needing intensive care. His primary research involves exploring the physiological mechanisms occurring in the diseased lung and improving how clinicians treat newborn infants and children with severe respiratory failure using assisted mechanical ventilation. His research focuses on better understanding the physiological responses to mechanical ventilation, using complex feedback and imaging tools, to develop ventilation strategies that improve lung function and prevent long-term injury.

Andrew Gill  FRACP CCPU  
The University of Western Australia  
A/Prof Gill’s main research interest revolves around the assessment and management of cardiac function during transition and early neonatal life. He is part of an international collaboration re-examining the physiology of transition, in particular the interdependence of cardiac and respiratory function on cerebral perfusion. A/Prof Gill’s other areas of interest include the epidemiology of nosocomial infection and relationship to antibiotic prescribing patterns in the nursery. He also leads neonatal outreach education in WA.

Associate Investigators

Andrew Currie  PhD  
Murdoch University  
Dr Currie is Senior Research Fellow and Senior Lecturer in Immunology at Murdoch University, Australia, with over 14 years of experience in the fields of paediatric innate immunity, inflammation, and infectious disease. He has a particular interest in studying the development of the infant innate immune system in humans and animals. He conducted his post-doctoral training at the BC Children's Hospital in Vancouver, Canada and currently co-heads the Newborn Immunology Group with Dr Tobias Strunk at the Children's Clinical Research Facility, Princess Margaret Hospital for Children, WA.

Noel French  FRACP  
The University of Western Australia  
Dr Noel French is a neonatal and developmental paediatrician who has led the Neonatal Follow Up Program from King Edward Hospital and the State Child Development Centre since the early 1980’s. His major interest is in the long term outcome of children born extremely preterm, and current research interests include cerebral palsy in these infants, assessment of long term voice disorders in children following prolonged neonatal intubation, and later school/learning problems in extremely preterm children.

Martin Kluckow  PhD, FRACP  
University of Sydney  
A/Professor Kluckow is a Senior Staff Specialist in Neonatology at Royal North Shore Hospital in Sydney and an Associate Professor in Neonatology at the University of Sydney, Australia. With his Sydney based research group, he has led the development of neonatal haemodynamics and point of care ultrasound in the neonatal unit for the past 20 years, publishing over 70 peer reviewed articles. His research has centered around the physiology and transitional circulation of infants born prematurely, the time frame of changes and the relationship of these changes to complications of prematurity.
Graeme Polglase  PhD
Monash University
Dr Polglase is a perinatal physiologist and NHMRC career development fellow based at The Ritchie Centre, MIMR-PHI Institute of Medical Research and Department of Obstetrics and Gynaecology, Monash University. He is establishing an international reputation for his work on the interaction between neonatal ventilation, cardiopulmonary-cerebral circulation and lung and brain injury.

Girish Deshpande MSc, FRACP
University of Sydney
Dr Deshpande is a senior neonatologist at Nepean Hospital Sydney. Dr Deshpande’s research interests include early neonatal nutrition, particularly probiotics, parenteral nutrition, intravenous lipids, evidence based medicine, and systematic reviews. His current research is focused on neonatal nutrition, probiotics and meta-genomics, randomised controlled trials of newer intravenous lipids and evaluation of body composition after selective early nutritional interventions in preterm neonates.

Peter Davies PhD, R. Nutr.
University of Queensland
Prof Davies is Director of the Children’s Nutrition Research Centre at the University of Queensland in the Faculty of Medicine and Biomedical Science. He has more than 400 publications in the field of growth, development and nutrition both in health and disease. Davies leads national and internal studies relating to growth and development and nutrition and has had roles on advisory groups within the food and pharmaceutical industries.

Ross Haslam AO, FRACP
University of Adelaide
Clin Assoc Prof Haslam is Chairman of the Australian and New Zealand Neonatal Network. He was previously the Director of the Neonatal Intensive Care Unit at Women’s and Children’s Hospital, Adelaide.

Debbie Chiffings  RN, Grad Dip HSM
The University of Western Australia
Ms Chiffings is the Nursing Director of the Neonatal Intensive Care Unit at King Edward Memorial Hospital and Princess Margaret Hospital. She is also the Clinical Coordinator for Transition at the new Fiona Stanley Hospital. Her research includes recruitment of PIFS (Preterm Infant Follow-up Study WA) due for assessment as young adults.

Kurt Albertine PhD
University of Utah
Prof Albertine is Professor of Pediatrics at University of Utah School of Medicine. His research interest is acute and chronic lung disease, with emphasis on neonatal chronic lung disease. The focus of his studies is identification of molecular mechanisms that disrupt lung development in the preterm neonate who requires prolonged mechanical ventilation. Current studies are testing hypotheses about the effect of preterm birth and prolonged mechanical ventilation on retinoid signaling pathways, vascular growth factor signaling pathways, cell turnover signaling pathways, and surfactant apoprotein signaling pathways.

Michael Anderson  PhD
Murdoch University
Prof Anderson is Professor of Psychology and Dean of the School of Psychology and Exercise Science at Murdoch University WA. He is one of the lead investigators of Project Kids (assessment of intelligence and executive function of ex preterm children born in WA at school age).

Graham Hall  PhD, CRFS, FANZSRS
Telethon Kids Institute
Prof Hall is the head of the Paediatric Respiratory Physiology research group at the Telethon Kids Institute. One of his research focuses is the impact of preterm birth on the development of the lung and respiratory outcomes in later childhood. Prof Hall has a strong interest in bringing new lung function techniques to clinical practice and on better understanding how these tests can help manage breathing problems in children.
Research Staff

Siavash Ahmadi-Noorbakhsh, Preclinical Intensive Care Research Unit Manager
Dr Siavash Ahmadi Noorbakhsh is a veterinarian and veterinary surgical specialist with background in laboratory animal research. He now manages the day to day activities of the Preclinical Intensive Care Research Unit (PICRU) at The University of Western Australia.

Di Arnott, Research Manager
Ms Arnott began a career in science with a BSc in Microbiology and an MSc in Zoology, and then put her science skills toward a career in administration. She has worked in marketing, website development, fundraising, and research centre management. She now manages the day-to-day operation of the Preterm Infants CRE, as well as oversees the Graduate Diploma and Master of Neonatology taught at The University of Western Australia.

Nawshin Khan, Database Manager
Ms Khan has a Bachelor in I.T. majoring in Information Management and has worked on different research and administrative projects in organisations including Johns Hopkins University, USA and UNSW@ADFA, Canberra. Currently she is involved in setting up the web-based database, REDCap, for CRE research projects. She is also responsible for maintaining policies and confidentiality regarding the Health Information Privacy Act, preparing training materials and assisting with database systems training for research students and CRE staff.

Postdoctoral Scientists

Catherine Campbell (The University of Western Australia)
Dr Catherine Campbell is a Clinical Psychologist and an adjunct research fellow at UWA and Murdoch University. She has a particular interest in neurodevelopmental outcomes of children with vulnerable neonatal histories, including very preterm birth and in the psychological wellbeing of their mothers. Currently Catherine coordinates a number of research collaborations that examine the neuropsychological sequelae of children born at gestations less than 32 weeks, those with neurological conditions and complex mental health presentations from school-age through to young adulthood.

Ben Hartmann (The University of Western Australia)
Dr Ben Hartmann currently manages the PREM Milk Bank (Perron Rotary Express Mother’s Milk Bank) and is an Adjunct Lecturer at the University of Western Australia. He is internationally recognised as one of the leading experts in the establishment and safe operation of donor human milk banks in Neonatal Intensive Care. He completed a PhD at the UWA (Plant cell metabolism and ecophysiology) and has a current research interest in the bacterial ecophysiology of human milk and the infant gut. He also collaborates with Dr David Baldwin in a project to develop novel uses for 3D scanning and printing technology in NICU.

Megan Lloyd (The University of Western Australia)
Dr Megan Lloyd is a Research Associate with extensive experience in cytomegalovirus pathogenesis in both animals and people. Recently, she has been investigating the association between cytomegalovirus and breast milk, with a particular interest in determining the true risk of cytomegalovirus infection to very premature infants and in the rapid and accurate identification of those infants at risk of infection. Dr Lloyd currently also works in the PREM Milk Bank and is interested in milk composition and in improving the quality of the pasteurized donor human milk provided to very preterm infants whose mothers have an insufficient milk supply.
Postdoctoral Scientists  cont...

Gemma McLeod (The University of Western Australia)
Dr Gemma McLeod is a Senior Clinical Research Dietitian in the Women and Newborn Health Service and a Senior Clinical Lecturer at The University of Western Australia, with over 14 years experience working in neonates and paediatrics. Gemma has a particular interest in the nutritional needs of preterm infants, growth and body composition. Gemma is currently leading the Centre's pilot urine metabolomics preterm study.

Suzanne Meldrum (The University of Western Australia)
Dr Meldrum is an early career researcher at The University of Western Australia, along with a Lecturer in Speech Pathology at Edith Cowan University. Suzanne has a particular interest in the fields of early life experiences on later speech and language development, particularly the role of nutrition and prematurity. She works collaboratively with a number of other CRE researchers, including Prof Karen Simmer, Clin Assoc Prof Noel French and Dr Catherine Campbell, and supervises two PhD students, Alexandra Heaton and Victoria Reynolds.

Shannon Simpson (The University of Western Australia)
Dr Simpson is an NHMRC Peter Doherty Research Fellow and UWA adjunct Research Fellow based in the Paediatric Respiratory Physiology group at the Telethon Kids Institute. Her research interests are strongly embedded in understanding normal development of the respiratory system and how insults such as preterm birth or disease pathophysiology after growth and development of the respiratory system. She works collaboratively with a number of CRE researchers including Graham Hall and Jane Pillow and co-supervises a PhD student (Nada Townsi) and Honours student (Rhea Urs) within the CRE.

Yong Song (The University of Western Australia)
Dr Yong Song graduated with an M.D. degree and Master degree in Respiratory Medicine in 1999. Dr Song's research focuses on neonatal respiratory biology. He is particularly interested in the molecular mechanisms underlying functional and phenotypic changes of the neonatal respiratory system in response to prenatal and postnatal injuries. He has extensive experience in developmental regulation, molecular signalling, cellular pathways, oxidative stress, epigenetic regulation and mitochondrial dysfunction, which render him capable of deciphering the fundamental mechanisms of newborn respiratory diseases.

Alana Westover (Monash Institute of Medical Research)
Dr Alana Westover is a first year post-doctorate in A/Prof Tim Moss’s research group in The Ritchie Centre at the Hudson Institute of Medical Research. She completed her PhD at MMR-PHI on the role of prostaglandins in the fetal pulmonary response to intrauterine inflammation using an in vivo sheep model. She is continuing this research with a focus on prostaglandin signaling pathways in an in vitro model.

Clinical Research Fellow

Jenny Svedenkrans
Dr Svedenkrans is a research associate at UWA and a registered PhD student at Karolinska Institute, Stockholm Sweden. She is also clinically active in neonatology. She has come to UWA to work with Prof Jane Pillow on the PIFCO study as a part of her thesis. Her particular interests are lung function and cardiovascular function in preterm infants as well as long-term follow-up of preterm infants.
Postgraduate Research Students

Yahya Almutawif
The University of Western Australia
Product safety in human milk banking: Development of a cell-based biosensor for screening pathogens and toxins in donated human milk

Christine Astell
The University of Western Australia
Influence of postnatal glucocorticoid use on structure and function of the fetal diaphragm

Risha Bhatia
University of Melbourne
Optimising continuous positive airway pressure in preterm infants

Amy Chang
The University of Western Australia
Fetal origins of obstructive airway disease – preterm birth complications

Emma de Jong
Murdoch University
Transcriptome-wide profiling of the neonatal monocyte response to invasive pathogens

Melinda Dolan
Monash Institute of Medical Research
Identifying the mechanisms underlying inflammation-induced lung maturation in the fetus

Alexandra Heaton
The University of Western Australia
The effects of fish oil supplementation during early infancy on neurodevelopment at six years of age

Tanzila Mahzabin
The University of Western Australia
Impact of antenatal chorioamnionitis, postnatal steroids and mechanical ventilation on the preterm diaphragm

Karen McCall
University College Dublin, MD
Influences on the response to a sustained inflation at birth in the preterm lung

Maria Nguyen
Monash University
The effect of intrauterine inflammation on the development of atherosclerosis

Sharon Perrella
The University of Western Australia
The effect of different types of nutrition on the gastrointestinal response of the preterm infant

Abhijeet Rakshasbhuvankar
The University of Western Australia
Intrapulmonary administration of vitamin A to improve respiratory outcomes of extremely preterm infants (IAVARO study)

Victoria Reynolds
The University of Western Australia
Dysphonia in very preterm children: incidence, pathology and responsiveness to therapy

Stephanie Trend
The University of Western Australia
Innate immune properties of breast milk for the preterm neonate

Nada Townsi
The University of Western Australia
The clinical and functional impact of early respiratory viral infections among preterm infants

Sanjay Gehlot
The University of Western Australia
Masters of Clinical Research – Consumption of human milk oligosaccharides by probiotic bacterium B breve in premature infants

Honours Students

Andrew Currie
Graeme Wan
Tim Moss
Dasom Kim
Tammy Mai Ern Lim
Vy Nguyen
Paris Papagianis
Our Advisory Board

Professor Vicki Anderson  
Theme Director, Clinical Sciences Research  
Murdoch Childrens Research Institute  
Prof Anderson is a paediatric neuropsychologist and brings her strengths in neurodevelopment to the Board. Prof Anderson also has extensive executive-level experience with various Institutes, Boards and Societies which will be invaluable to the Preterm Infants CRE as we develop.

Professor Jonathan Carapetis  
Director  
Telethon Kids Institute  
Prof Carapetis is an infectious disease specialist with particular focus in the area of Indigenous health. The ‘big picture’ approach that he has brought to the Telethon Kids Institute will assist the Centre in ensuring our translation and outreach outputs have a broad reach.

Professor Graham Jenkin  
Deputy Director  
The Ritchie Centre  
Prof Jenkin specialises in fetal and neonatal wellbeing. He has extensive collaborations with industry, which will be of particular value to the Centre as we investigate technology transfer opportunities.

Professor David Mackey  
Managing Director  
Lions Eye Institute  
Prof Mackey is an internationally renowned genetic ophthalmologist. His experience with previous and current major research centres, including the current NHMRC Centre of Research Excellence in genetic eye research, will assist the development of our Centre.
The CRE is organised around activities undertaken by three steering groups covering Basic Science & Preclinical Translation, Clinical Research, and Health Policy. Each steering group focuses on integrative research and education within the core themes of the CRE: Neurodevelopment; Cardiorespiratory; Infection, Inflammation & Immunology; and Lactation, Nutrition, Gastrointestinal and Metabolic issues.

Preclinical Steering Group

A major focus of the Preclinical Steering Group in 2014 was the successful establishment and commissioning of the Preclinical Intensive Care Research Unit (PICRU). This national collaborative facility is based at the Large Animal Facility at The University of Western Australia and aims to provide contemporary state of the art neonatal intensive care to preterm lambs and piglets. CRE researchers (Pillow, Moss, Gill, Polglase, Currie) were successful in collective applications for over $3 M in research project funds to undertake translational research projects in the facility. The grants included two major NHMRC-funded Project Grants that will address controversial issues such as the postnatal use of steroids to treat lung disease, as well as the use of stem cells to reduce inflammation and prevent the development of bronchopulmonary dysplasia. A key feature of studies undertaken in the PICRU is the ability to examine long-term outcomes, which are essential to influencing clinical practice and selecting which treatments are most promising for subsequent clinical application.

A unique feature of the PICRU is the opportunity to provide a real-life teaching/research nexus. The PICRU employs undergraduate students to assist in managing the preterm lambs while they require intensive care. Over 35 students were employed in the facility in 2014, gaining experience in mechanical ventilation, blood sampling, recording and interpretation of physiological signals, and nasogastric feeds, amongst many other experiences. These students received an exciting opportunity to bring their learning to life and see it applied in a clinical setting.

Other studies within the preclinical steering group focus on understanding the mechanisms of inflammatory processes involved in chronic diseases like bronchopulmonary dysplasia, abnormal diaphragm function that results in the need for assisted (mechanical) breathing, and the mechanisms and potential prevention and treatment of insults to the brain in the early postnatal period. Recent work led by the Monash team (including CI Moss and Al Polglase) is leading the way in revolutionising resuscitation of the premature baby at delivery, and easing transition into postnatal life.
As we move into the second year of the CRE, the Preclinical Steering Group will commence work on developing tools for education and training of basic scientists and clinicians interested in acquiring preclinical research skills. The Steering Group also aims to develop an inventory of techniques, models and equipment to enhance collaboration between CRE researchers and awareness of opportunities for enhanced research outcomes.

**Major Projects**

**Long-term cardiorespiratory and neurodevelopmental outcomes after postnatal steroids**

**Clinical Steering Group**

The Clinical Steering group oversees randomised interventional and observational cohorts in CRE-associated Neonatal Intensive Care Units. In addition, separate funding allows for patients to be followed up longer term by neonatal follow-up teams.

**Multicentre Randomised Controlled Trials:**

The clinical steering group has been busy in 2013-14 with several large RCTs being conducted at NICUs across the Preterm CRE network, and also undertaking follow up programs. These studies include:

- N3RO (n-3 fatty acids for improvement of respiratory outcomes) – University of Adelaide
- NEST (neonatal electrographic seizure trial) – Murdoch Childrens Research Institute
- APTS (Australian Placental Transfusion Study) – University of Sydney

**Single–centre Randomised Controlled Trials:**

- PIFCO (Preterm Infant Functional and Clinical Outcomes Study), a large NHMRC-funded study, has currently recruited over 100 preterm infants <32 weeks and will continue to recruit for the next few years with a goal of 500 recruits
- Metabolomics and development of metabolic disease in preterm infants will complete recruitment in 2015 and is a collaborative project with Imperial College, London (UWA Collaborative Award)
- CHAMPS is assessing the level and function of antimicrobial proteins and peptides in preterm infant blood
- GenMove is currently recruiting extremely preterm infants and evaluating their general movements to potentially predict future normal or abnormal movement development

**Observational Cohort Studies of Preterm Infants:**

- PIFCO (Preterm Infant Functional and Clinical Outcomes Study), a large NHMRC-funded study, has currently recruited over 100 preterm infants <32 weeks and will continue to recruit for the next few years with a goal of 500 recruits
- Metabolomics and development of metabolic disease in preterm infants will complete recruitment in 2015 and is a collaborative project with Imperial College, London (UWA Collaborative Award)
- CHAMPS is assessing the level and function of antimicrobial proteins and peptides in preterm infant blood
- GenMove is currently recruiting extremely preterm infants and evaluating their general movements to potentially predict future normal or abnormal movement development
COMO (Consumption of Human Milk Oligosaccharides by the Probiotic Strain B. breve (M16V) in preterm neonates) and COMET (Characterisation of Milk after Preterm Birth) have both completed recruitment with samples currently being analysed and some data already published in PLOS ONE.

DANCE (Development of Atherosclerosis in Neonates exposed to Chorioamnionitis), Recruitment at Royal Women’s Hospital, VIC, 2013-4. Analysis and write-up ongoing.

**Prospective Cohort Studies of Preterm and Term Infants with Antenatal Recruitment:**
The CRE is collaborating in two large studies aimed at understanding the increasing burden of non-communicable diseases (NCDs). Mounting evidence implicates environmental exposures experienced early in life (including in utero) in the aetiology of many NCDs, though the cellular/molecular mechanism(s) underlying this elevated risk across the life course remain unclear. Epigenetic variation has emerged as a candidate mediator of such effects.

- The Barwon Infant Study (BIS) is a population-derived birth cohort study of 1,074 participants in Melbourne. The overarching objective of the BIS is to generate new knowledge about how to provide babies with a healthy start to life.
- The ORIGINS project is aiming for >10,000 participants from north Perth over a five year period. RCTs will be nested within the ORIGINS project, the first of which aims to follow the development of allergic disease by modifying maternal diet.

**Long-term Follow-up Studies:**
- DINO7 (Docosahexaenoic acid for the improvement of neurodevelopmental outcome in preterm infants - follow up at age 7), a multicentre RCT 7-year follow-up study was completed in 2014 and has been accepted for publication in the British Medical Journal
- PREDICT – four year follow-up of immune development
- VOICE – follow up of voice characteristics in 5-12 year olds born preterm who experienced multiple endotracheal intubations
- PIFS (Preterm Infant Follow-Up Study) – a feasibility study has commenced to assess the practicalities of reviewing young adults born preterm. These people had extensive data collected from birth to 6 years of age and were recruited in 1990-2 contemporaneously with the Raine cohort. The early data are promising and a formal proposal will complement current clinical studies in determining the long-term outcomes of preterm infants.

**Nets WA (Newborn Emergency Transport Service WA)** has several research projects underway including the assessment of cerebral oxygenation during air retrieval of preterm infants using Near Infrared Spectroscopy (NIRS)

**Data Linkage Projects:**
- Late-onset sepsis after chorioamnionitis
- Hospital readmission with infection rates after chorioamnionitis
- Neurodisability rates after chorioamnionitis
- Effects of birth weight and gestational age on rehospitalisation with infection throughout childhood
Education, Outreach and Translation Steering Group

The Education, Outreach and Translation Steering Group is involved in Preterm CRE teaching activities, outreach to various groups (community, regional centres), translation of research findings into practice, and guideline development.

Graduate Diploma and Masters of Neonatology

While CRE investigators and associated staff are involved in wide-reaching educational activities, the major educational outcome of 2013-2014 was the establishment of a Graduate Diploma and Master of Neonatology at The University of Western Australia. These courses were taught for the first time in 2014, with three students completing the requirements of their courses (one in the Graduate Diploma, two in the Master). These students will graduate in early 2015.

Both courses are designed for practicing neonatologists who wish to add a professional qualification to their experience.

The Graduate Diploma is a four-unit course, offering students a choice of subjects in nutrition and lactation, evidence-based medicine, neonatal surgery, neonatal respiration and ventilation, and infection and immunology.

The Master of Neonatology involves the units taken to complete the Graduate Diploma, plus additional clinically-based subjects in cardiology, practicum, and transport medicine. Students may also choose to complete a research dissertation as part of their course.

The subjects are taught by a large team of clinicians and researchers from across the University as well as King Edward Memorial Hospital and Princess Margaret Hospital. The experience and dedication of these lecturers is vital to the successful delivery of the courses.

In 2015, the Graduate Diploma will be taught online, allowing us to enhance the education and experience of neonatologists worldwide. In future years we will accredit other institutions to teach the clinical units in the Master of Neonatology, allowing us to fill a currently-empty niche in neonatology education.

Workshops

The Preterm CRE coordinated and sponsored two workshops around the 18th Congress of the Perinatal Society of Australia and New Zealand, held in March 2014 in Perth.

‘Writing a Scientific Manuscript’ was facilitated by Preterm CRE Associate Investigator Prof Kurt Albertine, who has led more than 20 courses on scientific writing worldwide. This one-day workshop was attended mainly by postgraduate students and early career researchers from institutions across Australia and New Zealand.

“I thought the workshop was great and very accessible to all participants. I have recommended it and used the materials quite a bit already. Thanks for putting it on. It’s the best writing workshop I’ve been to.”
We also held a two-day workshop entitled ‘Advanced Mechanical Ventilation in Neonates’, facilitated by Preterm CRE Chief Investigators Prof Jane Pillow and A/Prof David Tingay. This workshop was co-sponsored by our industry partners Device Technologies, Draeger, and Maquet Getinge Group who generously allowed workshop participants to gain exposure to each company’s ventilators.

The second day of the workshop was held at The University of Western Australia’s Large Animal Facility, and allowed participants a hands-on experience with mechanical ventilation.

“This was the best two days I’ve spent in 10 years, or more. I am really keen to put my nurse practitioner, my senior nurse educator, a couple of fellows and all of my fellow consultants through this exercise over the next year of two so please keep me informed re subsequent courses.”

Other Education, Translation and Outreach Accomplishments in Collaboration with WA Department of Health

Western Australian Neonatal Resuscitation Program
In 2014 this program taught resuscitation skills at 35 WA hospitals, including regional and metropolitan hospitals. The program has a wide reach, educating medical staff, midwives, nurses, and medical students. A total of 561 people attended NRP workshops in 2014.

Western Australia Neonatal Outreach Program
This program teaches stabilisation and management of the sick neonate, as well as neonatal emergency care at regional hospitals. In 2014 four regional hospitals took part in the two-day program, with 81 attendees.

Western Australia Neonatal ICU Nursing Courses
The Masters of Clinical Nursing (neonatal intensive care) is taught through Curtin University of Technology, and based at King Edward Memorial Hospital and Princess Margaret Hospital Neonatal Intensive Care Units. In 2014 there were eight graduates.

Western Australia Neonatal Summer Symposium
The 2014 Neonatal Summer Symposium featured presentations on neonatal research, such as CPAP vs high-flow oxygen in preterm neonates, maternal and neonatal vitamin D deficiency, and glucose gel for neonatal hypoglycaemia. Prof William Tarnow-Mordi gave the keynote address on translation of trial results into future treatments. The symposium had over 90 attendees.

Neonatal Advanced Trainees (RACP)
King Edward Memorial Hospital/Princess Margaret Hospital is the largest training centre for advanced trainees with five doctors gaining their Fellowships in 2013-2014 and successfully applying for posts as neonatal consultants. Royal Children’s Hospital in Melbourne also has a highly sought after training program.

Books Edited/Published by CRE Members
People Support Funding

In order to achieve our outcomes, the Preterm CRE offers funding under various schemes to our investigators and their staff and students. Our funding rounds are held twice a year and include research and people support funding.

Research Support Funding

- Equipment (to $10,000)
- Collaborative Travel (to $10,000)
- Project Seed Funding (to $10,000)
- Honours Scholarships (to $7,000)
- PhD Stipend Top-Up Scholarships ($5,000 per year for up to three years)
- Clinical Fellowship Supplements ($13,900 for up to two years)
- Postdoctoral Fellowship Supplements ($13,900 for up to two years)

The first funding round was held in May 2014 and we awarded $143,869 for research and people support. Our second round of funding was held in October/November 2014, when we awarded $132,789 in Research Support funding and $88,900 in People Support funding.

Research Support Funding

Equipment

- Linear ultrasound probe to measure abdominal aorta intimal thickness. This extends the Barwon study already running in Victoria (on which CRE CI D Burgner is a CI) into the PIFCO and N3RO cohorts funded by NHMRC Project Grants. (A Gill, D Burgner)
- 3-dimensional imager and printer for development of individualised ancillary devices for preterm infants. The equipment will be used to develop a prototype CPAP mask that can be developed uniquely for each infant, providing an improved seal to the nose and less risk of septal injury. (B Hartmann, D Baldwin)
- Matching funds to help secure an NHMRC Equipment Grant to purchase an ultrasound machine for the Preterm Intensive Care Research Unit (PICRU) based at The University of Western Australia. Securing this equipment will facilitate the continuation of currently funded preclinical work in our lamb facility and support the studies funded in the 2014 NHMRC Project Grant funding round (CIA Moss). (A Gill, T Moss, J Pillow)
- Oesophageal catheter with multipair electrode design to enable measurements of diaphragm activity to be made during the entire contractile cycle. Insight gained from these measurements will be used to develop best practice for postnatal glucocorticoid use with regard to reducing respiratory morbidity and mortality associated with premature birth. (C Astell)

Collaborative Travel

- Support bringing Prof John Sinn to Perth to meet with the team involved in the new University of Western Australia postgraduate Neonatology courses. John Sinn has extensive experience with online teaching, which is how our Graduate Diploma will be offered in 2015. (K Simmer, D Arnott)
- Prof Peter Ghazal from University of Edinburgh to Perth and Melbourne to meet with CRE researchers. Prof Ghazal’s division has pioneered techniques, statistical approaches and pipelines to directly understand the pathways involved in neonatal sepsis, a research area with which CRE researchers are now getting involved. (A Currie, T Strunk, D Burgner)
- Ophthalmologist Dr Anand Vinekar to Perth to meet with local neonatologists interested in telemedicine screening for retinopathy of prematurity. Dr Sam Athikarisamy will commence a PhD project in this area in 2015. (S Athikarisamy)
- Travel costs for UWA Bachelor of Philosophy (Hons) student to attend the NEOMUNE meeting in Guangzhou, China, 2014. (M Duong)
- Support for a visit to Prof Per Sanglid’s group in Copenhagen to develop a collaboration on the preterm piglet model for studying antimicrobial proteins/peptides. During the visit we will also map out a PhD project and develop grant proposals which will allow us to establish a preterm piglet model in Western Australia. (T Strunk)
- Preterm CRE Associate Investigator Graeme Polglase to Perth to attend a large animal echocardiography workshop led by Preterm CRE Chief Investigator Andy Gill, and additional time spent in Perth working with the preterm lamb research team. This visit will further develop collaboration within the CRE Cardiovascular node. (G Polglase)
• Funds to facilitate travel for CRE Chief Investigator Tim Moss and Associate Investigator Graeme Polglase to travel to Perth for a face-to-face meeting with Chief Investigator Jane Pillow. The group discussed specific collaborative research projects conducted within the auspices of the CRE and other preclinical steering group matters. (J Pillow, T Moss, G Polglase)

• To support a visit to Perth by Prof Albertine’s Senior Lab Director, which will (1) allow Prof Pillow to gain further skills in clinical management of chronically ventilated preterm lambs and (2) allow Prof Albertine’s Senior Lab Director to gain skills in ultrasound/echo studies of the heart and great vessels of preterm lambs. (J Pillow, K Albertine)

Seed Funding

• Pilot study to investigate the role of vitamin D in preterm infants. Data from this study will be used to develop grant proposals for randomised controlled trials into the effects of vitamin D on very low birth weight and extremely low birth weight infants. (J Tan)

• Funds were awarded to support the visit of Perth-based early career researcher Dr Yong Song to a collaborator’s lab in Boston, USA to learn about the Boston group’s cell stretch apparatus, and to purchase equipment. We wish to utilise this equipment to test our hypotheses about breast milk production, and will use knowledge gained on this visit to develop future grant proposals. (Y Song)

• A feasibility study to evaluate the potential resources required for a long-term follow-up of young adults born very preterm (<33 weeks gestation). Proposed participants of the study are those who were enrolled in the Preterm Infant Follow-up Study (PIFS) between 1990-1992, which included 728 surviving infants. Funds will be used to employ an Administrative Officer. (C Campbell, N French, K Simmer)

• Funds to develop a rapid and accurate bedside diagnostic test to help improve outcomes of neonatal sepsis. We have developed a metabolomics strategy which we now wish to optimise for preterm infants using previously biobanked samples. These funds will support a Research Associate who will perform the analyses, as well as the costs of the assays. (A Currie, T Strunk)

• The development of a new nested PCR method for cytomegalovirus detection. Funds will be used for consumables to test samples previously collected. (M Lloyd, K Simmer)

• Funds for consumables for assays that will allow detection of the signalling protein involved in increasing surfactant production in preterm infants exposed to inflammation or infection in utero. (A McDougall, T Moss)

• Support for an Honours project examining nanoparticle administration to the lungs of allergen-challenged mice, a technique that has recently been shown to produce a potent anti-inflammatory effect. Funds will be used for sheep, consumables, and analyses. (I Inocencio)

• A project to develop a clinically relevant animal model of intrauterine ureaplasma infection in a small animal species (spiny mice) particularly suited to studies of development and long-term follow up. (T Moss)
People Support Funding

Honours Scholarships

Tammy Lim
**Supervisors: Tim Moss and Graeme Polglase**
Approximately 9% of children born between 24 to 32 weeks gestational age are diagnosed with cerebral palsy, which occurs as a result of a hypoxic insult to the brain, or brain inflammation or injury. In my Honours project I will investigate the effect of mechanical ventilation with positive end-expiratory pressure (PEEP) on brain inflammation and cerebral haemodynamics. This research will help elucidate the effect of PEEP on brain injury and inflammation to reduce the incidence of cerebral palsy in children.

Vy Nguyen
**Supervisor: Tim Moss**
Although mechanical ventilation is essential for the survival of many preterm infants, it has been shown to cause inadvertent lung injury, termed ventilation-induced lung injury (VILI). VILI is further associated with development of the chronic lung disease, bronchopulmonary dysplasia (BPD). In my Honours research I will study the direct mechanism of inflammatory processes observed in chronic inflammatory diseases such as BPD. This is essential to determine new therapeutic targets and approaches to reduce mortality and morbidity rates associated with preterm birth. This scholarship will be used for my university fees as I am a full-fee paying student.

Stacey Osborne
**Supervisor: Andrew Whitehouse**
Early parent-based language intervention (focused stimulation) has been used effectively with late-talking toddlers and preschool aged children with developmental delays. Considering the potential for parents of preterm children to have a sub-optimal interaction style, it may be likely that such an intervention could have similar positive outcomes for preterm children. For my Honours project I will study whether focused stimulation is warranted in preterm infants, and allow clinical recommendations to be formed. Funds will be used for a statistical course in conducting systematic reviews and meta-analysis, and travel funding to attend a domestic research conference to present findings and engage with the research community. (Awarded 2014 for 2015).

Paris Papagianis
**Supervisors: Tim Moss and Graeme Polglase**
Continuous Positive Airway Pressure (CPAP) is used to provide respiratory support to approximately 15% of preterm infants worldwide. Optimisation of CPAP may increase its use and improve outcomes for millions of preterm babies. In my Honours project I will study the optimisation of Bubble-CPAP, which can be administered safely and effectively by trained nurses, rather than highly paid clinicians. The findings of my study therefore have the potential to improve the outcomes for Australian preterm infants, and provide a safe and cost-effective option for supporting breathing of babies in developing countries.

Renita Whittle
**Supervisor: Jane Pillow**
Disturbance of circadian clock gene expression is associated with a number of adverse long-term outcomes including cancer and obesity. Consequently, disturbed circadian rhythm in the very immature infant has potential for adverse long-term outcomes. How these rhythms are additionally impacted by antenatal inflammation and postnatal dexamethasone is unknown. My Honours research will obtain longitudinal samples of mononuclear cells from arterial blood and cells from buccal smears in preterm and term lambs with and without antenatal exposure to lipopolysaccharide and with and without postnatal exposure to dexamethasone. (Awarded 2014 for 2015).

Tabitha Woodman
**Supervisors: Andrew Currie, Tobias Strunk, Karen Simmer**
Probiotic supplementation of preterm infants is a safe, effective and proven approach for reducing neonatal morbidity and mortality. However, probiotic supplementation alone does not reduce the risk of late-onset sepsis in preterm infants. Therefore, innovative approaches are needed to explore novel agents, such as antimicrobial peptides and proteins (APP) to complement and expand the beneficial effects of probiotics. However, APP by their nature, are antibacterial and may directly interfere with probiotic viability. Conversely, many commensal bacteria can avoid and inactivate APP activity. Breast milk is known to contain many APP and commensal microbes and may be the main source of infant gut colonisation. Therefore, breast milk may provide the ideal substrate to combine beneficial probiotics and APP which will provide enhanced protection against NEC and sepsis. (Awarded 2014 for 2015).
In addition to these Honours scholarships, we have also offered funding to be used in recruiting particularly talented students to projects in the following areas:

- The impact of postnatal steroids and antenatal chorioamnionitis on preterm infant immune development
- Investigating the role of PGE2 EP receptors in LPS-induced surfactant production

**PhD Top Up Scholarships**

**Christine Astell**
**Supervisors: Gavin Pinniger, Jane Pillow**

In order to successfully wean preterm infants from mechanical ventilation, and reduce the severity of associated respiratory illness, it is vital that the effect of postnatal glucocorticoid treatment on the diaphragm is evaluated. My project will, for the first time, investigate the effects of postnatal glucocorticoid administration on the structure and function of the fetal diaphragm. These findings may be useful in a clinical setting to improve cardiorespiratory disease in preterm infants, thereby providing the potential for a healthier start to life.

**Amy Chang**
**Supervisors: Peter Noble, Jane Pillow**

My PhD research will lead to advancement in knowledge of how clinical interventions associated with preterm birth can impact structural and functional properties of the airway wall in early life, increasing the susceptibility to airway disease in later life. Understanding the nature of the changes to the airway wall that occur in the preterm individual, beginning from the day of birth, will ultimately lead to new treatments mitigating airway abnormalities and thereby improving respiratory health throughout life.

**Emma de Jong**
**Supervisor: Tobias Strunk**

Infants born prematurely are very prone to serious infections in the first few weeks of life. We still don’t know why these preterm infants can’t defend themselves against these bacteria, or even how healthy, full-term infants manage to control infection. In my PhD research I will measure the responses of all 22,000 human genes to bacterial challenge at one time, to determine which immune responses are absolutely needed to control infections in neonates. Knowing this would pave the way for new treatments that can reduce infections, or even prevent them in the first place.

**Tanzila Mahzabin**
**Supervisors: Jane Pillow, Yong Song**

Successfully weaning extremely preterm infants from mechanical ventilation is a major clinical challenge. In the presence of clinically relevant stressors that may disrupt the fragile diaphragm integrity, my PhD research will provide unique information on the susceptibility of the preterm diaphragm to various injuries and the underlying mechanisms.

**Sherrianne Ng**
**Supervisors: Tobias Strunk, Andrew Currie**

My PhD project will combine the use of metabolomics and transcriptomics to: (i) profile over 1000 different metabolites in blood plasma and RNA sequences from peripheral blood cells of preterm infants with suspected sepsis (neonatal intensive care unit at King Edward Memorial Hospital); and (ii) interrogate data using bioinformatics technology to discover a specific set of metabolite and RNA biomarkers capable of identifying confirmed sepsis in neonates. As an international student, these funds will be used to cover my expenses during my studies. (Awarded 2014 for 2015).
Postdoctoral Fellowship Supplements
Dr Yong Song
Having concentrated purely on the diaphragm for the last three years, my role is evolving more into leadership of the laboratory team and particularly the investigation of molecular mechanisms associated with respiratory diseases in the preterm animal. Thus while my diaphragm work will continue as supervisor of two new PhD students (Ms Christine Astell and Ms Tanzila Mahzabin), I will also develop new expertise in the analysis of lung and airway tissue from the preterm lambs studied as part of the recently successful NHMRC Project Grant on mechanical ventilation and postnatal steroids.

Dr Robert Galinsky
I wish to develop skills in MRI analysis and interpretation in collaboration with Dr Stephen Back, Professor of Pediatric Neurology at Oregon Health Science University, USA. These skills will be applied to my research in preterm brain injury. Professor Back and his team are internationally renowned experts in MRI for detection of brain injury. Funds are requested to cover expenses associated with travel to Professor Back’s Laboratory (including flights, accommodation and living expenses) and costs associated with establishing, optimising and applying MRI modalities for detection of preterm brain injury in our preclinical studies. The expertise gained during my time in the USA will set me up to excel at the Ritchie Centre when I return to Australia. (Awarded 2014 for 2015).
Key Performance Indicators

Research Grant Funding Received

Blackwell, J., Simmer K., Baynam, G., Laing, N., Dickinson, J., Goldblatt, J., Lassmann, T.
SeqNextGen: Improving diagnosis of rare genetic diseases from next generation sequencing data and developing an improved Model of Care
Telethon Perth Children’s Hospital Research Fund
$241,947
2015-2017

Burgner, D.
NHMRC Senior Research Fellowship (Level A)
$601,420
2014-2017

Edmond, K., Atkinson, D., Marriott, R., Marley, J., Trust, S., Simmer, K., Fitzpatrick, J., Jacoby, P.
Improving primary care for Aboriginal mothers and babies in the Kimberley Region of Western Australia
NHMRC Project Grant
$1,969,771
2015-

Moss, T.J., Lim, R., Polglase, G., Pillow, J.J.
Human amnion epithelial cell therapy for Bronchopulmonary Dysplasia
NHMRC Project Grant
$1,008,691
2015-2018

Patole, S., Jape, G.
Single or multiple-strain probiotic for neonates: a randomised controlled trial
Telethon
$77,160
2015-2017

Pillow, J.J.
A nationally collaborative preclinical facility to improve immediate and longer term outcomes of preterm birth
The Ian Potter Foundation.
$60,000
2014

Pillow, J.J.
Understanding and improving treatment of premature infants to improve long term outcomes
NHMRC Senior Research Fellowship (Level A)
$611,645
2015-2019

Pillow, J.J., Blache, D., Albertine, K., Noble, P., Gill, A., Black, M., Rubenson, J.
Separating the adverse neurodevelopmental consequences of mechanical ventilation and postnatal steroids in preterm lambs
NHMRC Project Grant
$1,689,652
2014-2017

Polglase, G., Miller, S., Sehgal, A., Allison, B., Malhotra, A.
Reducing morbidities in preterm growth restricted neonates
NHMRC Project Grant
$665,517
2015-2018

Rao, S., Jape, G.
Effect of single- vs multi-strain probiotic supplementation on the time to full enteral feeds in preterm neonates.
PMH Foundation
$94,050
2015

Sharp, M.
GenMove study: general movements in extremely preterm infants
Telethon grant
$29,733

Simpson, S.J.
NHMRC Early Career Fellowship
$304,596
2014-2017

Strunk, T.S.
Antimicrobial peptides and neonatal immunity
Channel 7 Telethon
2014
Research Grant Funding Received continued...

Thomas, R.
Cuffed vs uncuffed endotracheal tubes for ventilation of neonates (>35/40) and infants in NICU and PICU
Telethon PMH Foundation Fellowship
$156,000
2015

Tingay, D., Dargaville, P., Dellaca, R.
Optimising lung protective ventilation at birth using the volumetric response of the lung in a preterm lamb model
NHMRC Project Grant
$590,000
2014-2016

Tingay, D., Rajapaksa, A., Zonneveld, E.
Defining ventilation perfusion matching in the preterm lung at birth using a novel non-invasive measurement algorithm.
Medical Research & Technology in Victoria Program
$24,280
2014

Tingay, D.
A non-invasive, radiation-free lung imaging tool to improve intubation safety in children
Driving Business Innovation Program (Victorian Government)
$75,000
2014-2015
International and National Invited Talks


David Burgner. ‘Communicable diseases meet non-communicable diseases: the infectious and inflammatory origins of cardiometabolic risk’. Monash University, Department of Pharmacology. September 2014. Melbourne, Australia.


Graham Hall. ‘Brief review of basic lung function tests in children (spirometry, DLCO, Pleth, MIP, MEP)’. Hong Kong Society of Paediatric Respirology Lung Function Workshop. October 18-19, 2014. Hong Kong.


Conference Presentations

Preterm CRE CIs and AIs attended conferences and gave presentations around the world. Some examples are:

- Society for Medical And Biological Engineering Victoria Workshop. 2014.
- Australasian Society for Immunology, Annual Scientific Meeting. December 1-5, 2014. Wollongong, NSW, Australia.

Publications


In utero LPS exposure impairs preterm diaphragm contractility.

Influences of Breastmilk Composition on Gastric Emptying in Preterm Infants.

Dysphonia in very preterm children: a review of the evidence.


NOD1 and NOD2 expression and function in very preterm infant mononuclear cells.


Fish Oil (SMOFlipid) and Olive Oil Lipid (Clinoleic) in Very Preterm Neonates.

Phagocytosis of neonatal pathogens by peripheral blood neutrophils and monocytes from newborn preterm and term infants.

Validation of ultrasound methods to monitor gastric volume changes in preterm infants.


Screening for retinopathy of prematurity (ROP) using wide-angle digital retinal photography by non-ophthalmologists: a systematic review.  

Physical activity programs for promoting bone mineralization and growth in preterm infants.  

Effect of Bifidobacterium breve M-16V supplementation on fecal bifidobacteria in preterm neonates—a randomised double blind placebo controlled trial.  

Late-onset group B streptococcal cellulitis.  

Infection-induced inflammation and cerebral injury in preterm infants.  

Circulatory responses to asphyxia differ if the asphyxia occurs in utero or ex utero in near-term lambs.  

Protective ventilation of preterm lambs exposed to acute chorioamnionitis does not reduce ventilation-induced lung or brain injury.  

Maintenance of human amnion epithelial cell phenotype in pulmonary surfactant.  

Exposure to intrauterine inflammation leads to impaired function and altered structure in the preterm heart of fetal sheep.  

Self-inflating bags versus T-piece resuscitator to deliver sustained inflations in a preterm lamb model.  


Re-analysis of the association between perinatal androgens and postnatal head circumference growth. 


Re-analysis of the association between perinatal androgens and pragmatic language ability. 


Measurement of androgen and estrogen concentrations in cord blood: accuracy, biological interpretation, and applications to understanding human behavioral development. 

Hollier LP, Keelan JA, Hickey M, Maybery MT, 

**Whitehouse AJ.**

Front Endocrinol (Lausanne). 2014 May 2;5:64.

Prenatal, perinatal, and neonatal risk factors for specific language impairment: a prospective pregnancy cohort study. 

**Whitehouse AJ, Shelton WM, Newnham JP.**


PD01 - Respiratory allergens in human milk; potential impact on susceptibility to allergic airway disease. 


Clin Transl Allergy. 2014 Feb 28;4(Suppl 1 3rd Pediatric Allergy and Asthma Meeting

Respiratory allergen from house dust mite is present in human milk and primes for allergic sensitization in a mouse model of asthma. 


Randomized controlled trial of fish oil supplementation in pregnancy on childhood allergy. 

Palmer DJ, Sullivan T, Gold MS, Prescott SL, Heddle R, Gibson RA, Makrides M. 


Pressure and flow waveform characteristics of eight high-frequency oscillators. 

Harcourt ER, John J, Dargaville PA, Zannin E, Davis PG, 

**Tingay DG.**


Optimal mean airway pressure during high-frequency oscillatory ventilation determined by measurement of respiratory system reactance. 


**Tingay DG.**


Surfactant before the first inflation at birth improves spatial distribution of ventilation and reduces lung injury in preterm lambs. 


Effect of sustained inflation vs. stepwise PEEP strategy at birth on gas exchange and lung mechanics in preterm lambs. 


Dräger VN500’s oscillatory performance has a frequency-dependent threshold. 

John J, Harcourt ER, Davis PG. 

**Tingay DG.**


Exposure to intrauterine inflammation leads to impaired function and altered structure in the preterm heart of fetal sheep. 


**Polglase GR.**


Respiratory support for premature neonates in the delivery room: effects on cardiovascular function and the development of brain injury. 

**Polglase GR, Miller SL, Barton SK, Kluckow M, Gill AW, Hooper SB, Tolcos M.**

A randomised placebo-controlled trial of early treatment of the patent ductus arteriosus.

Kluckow M, Jeffery M, Gill A, Evans N.

Long term follow up of high risk children: who, why and how?


A physiological approach to the timing of umbilical cord clamping at birth.

Hooper SB, Polglase GR, Te Pas AB.

School-age outcomes of very preterm infants after antenatal treatment with magnesium sulfate vs placebo.


The Efficacy of Surfactant Replacement Therapy in the Growth-Restricted Preterm Infant: What is the Evidence?


Post-implementation review of pulse oximetry screening of well newborns in an Australian tertiary maternity hospital.

Bhola K, Kluckow M, Evans N.

Use of ultrasound in the haemodynamic assessment of the sick neonate.

Kluckow M.

Intraventricular hemorrhage and neurodevelopmental outcomes in extreme preterm infants.


Weight corrected percentiles for blood vessel diameters used in flow measurements in preterm infants.

de Waal K, Kluckow M, Evans N.
Early Hum Dev. 2013 Dec;89(12):939-42.
A systematic review of infant feeding experience and hospitalisation in developed countries.

School-age outcomes of very preterm infants after antenatal treatment with magnesium sulfate vs placebo.

Reduction in developmental coordination disorder with neonatal caffeine therapy.

The International Network for Evaluating Outcomes of very low birth weight, very preterm neonates (iNeo): a protocol for collaborative comparisons of international health services for quality improvement in neonatal care.

Body positioning and medical therapy for infantile gastroesophageal reflux symptoms.

Role of histone deacetylases in regulation of phenotype of ovine newborn pulmonary arterial smooth muscle cells.

High-frequency nasal ventilation for 21 d maintains gas exchange with lower respiratory pressures and promotes alveolarization in preterm lambs.


Molecular determinants of lung development.

Authors’ reply: changes in risk factors for preterm birth in Western Australia 1984-2006.