THE UNIVERSITY of ADELAIDE

2011 Annual Report

# Robinson Institute

robinsoninstitute.edu.au

Robinson Institute | Life IMPACT

*Jen Coleman with daughter Samantha Coleman*

The Robinson Institute bridges the gap between research discoveries and medical practice...

# Who we are

The Robinson Institute's driving focus is giving and sustaining life. By focusing on the earliest stages of life, research in the Robinson Institute targets disease prevention and enhanced health in children and adults across generations.

Led by Professor Robert Norman, the Robinson Institute brings together a unique blend of over 400 researchers and clinicians with wide-ranging expertise, from cellular and molecular biology through to epidemiology, public health and health services research.

Our research covers the whole life spectrum:

- *Conception and Fertility*, with a focus on helping people realise their hopes of starting a family;
- *Healthy Start to Life*, centered on healthy pregnancies and infants' early years and;
- *Regenerative medicine*, targeting the use of stem cells to cure a number of illnesses and disabilities including stroke and cystic fibrosis.

The Robinson Institute bridges the gap between research discoveries and medical practice, with many of the Institute's senior researchers being leading clinicians or clinically orientated scientists in their fields. This enables a strong translation of research discoveries from the laboratory to the clinic which provides immeasurable benefits to society now and for future generations.

The University of Adelaide was the only university in Australia to achieve a maximum score of 5 in the research area of paediatrics and reproductive health, ranking it the highest in the nation under the 2010 Federal Government's Research for Australia initiative; this highlights the Robinson Institute's strength in this important research area.

In 2010 two Foundations were established within the Robinson Institute to support our research: the Robinson Foundation and the Peter Couche Foundation.

The Robinson Institute is driven by the belief that our research has major life impacts, not only in Australia, but all over the world.

## Contents

# Chairman and Director's Report

## Professor Robert Norman and Mr Mark Coleman

The year 2011 was a year of consolidation following an independent review of the Institute's first three and a half years. We requested the review in order to identify the areas that required improvement, and to encourage the University of Adelaide to further commit to the future of the Robinson Institute.

The review was conducted by Professors Brandon Wainwright (Institute for Molecular Biosciences, Queensland), Terry Dwyer (Murdoch Children's Research Institute, Victoria) and James Paton (University of Adelaide, South Australia). The review concluded that the Institute was performing well but it was advised to address the possibility of becoming more theme-based, explore how collaboration could be improved among members, increase engagement with the new South Australian Health and Medical Research Institute (SAHMRI), develop the research precinct around the Women's and Children's Hospital, and commence a Scientific Advisory Committee in order to move towards a visionary strategic plan.

The University of Adelaide responded positively to this review, and guaranteed funding for the Institute from 2011 until October 2018 and committed to increase funding for 2012. We now feel a sense of security, we have the motivation to plan for the future, and we have the confidence to encourage world-class researchers to join us. As the current Director will be retiring in October 2013, the University's commitment allows us to guarantee a strong future for a new and energetic Director to join in the second half of 2013.

There have been many achievements for the Robinson Institute this year. Among the accomplishments there are several key findings that are likely to change the course of science in our discipline. One noteworthy highlight is the discovery by Professor Julie Owens with her collaborators in Sydney and published in *Nature*, indicating that chronic high fat diet in male rodents, programs beta cell dysfunction in their female offspring – the first clear evidence of non-genomic transference of environmentally-induced paternal characteristics to the offspring. This area has further been developed by Professor Owens' group working together with Dr Michelle Lane, looking at the impact of diet and obesity on embryo and fetal development, as well as multi-generational impacts. It appears that some of these effects can be reversed by diet and exercise. The research has since received significant support from the NHMRC and the Bill and Melinda Gates Foundation.

Another area of note is the strengthening of data suggesting that stem cells may assist in the early management of stroke. The work of Associate Professor Simon Koblar in this field has been consistently supported by the Peter Couche Foundation, managed by the Robinson Institute. In addition, major NHMRC guidelines have been developed in the past 12 months including those for administering magnesium sulphate antenatally in pre-term labour for neuro-protection of the fetus and the reduction of cerebral palsy.

Members of the Robinson Institute have also been involved in developing the first international guidelines for Polycystic Ovary Syndrome through the PCOS Alliance, consisting of the Jean Hailes for Women's Health organisation in Melbourne and the Robinson Institute in Adelaide together with many other medical and community members interested in this condition. Professor Caroline Crowther was awarded the prestigious Anne Anderson award by the Cochrane Collaboration in October 2011, recognising 3 decades of ground-breaking research.

The South Australian Health and Medical Research Institute (SAHMRI) is gradually emerging from the ground of North Terrace as a physical building, but has already been active for the past few years in planning and developing medical research for the state. The inaugural Director, Professor Steve Wesslingh, and his Scientific Advisory Group have determined that one of the SAHMRI themes will be 'Healthy mothers, babies and children' and the Robinson Institute will be integral to the development of this area. The scope of this relationship between the Institute and SAHMRI has yet to be determined but the parties are working together most enthusiastically.

In 2011, Professor Raymond Rodgers joined our team as Deputy Director of the Institute and has made a significant contribution, particularly in developing our themes. Professor Rodgers is a senior NHMRC Fellow with an excellent research reputation and has been President of the Australian Endocrine Society, as well as a member of the NHMRC Academy.

Ms Joanna Close contributed three brilliant years to the Robinson Institute and in February 2012 moved on to form her own research consultancy business, based on her experience at the Robinosn Institute as well as her prior involvement in Bio Innovation SA and Flinders University. Much of the success of the Robinson Institute must be attributed to her enthusiasm, vision, cheerfulness and sheer ability. Ms Alissa Nightingale who joined us three years ago as the Marketing Manager has performed outstandingly in her contributions to the research foundations, media, marketing and the annual report. Alissa has now changed career paths; we wish Alissa all the best in her new endeavours. The Robinson Institute look forward to welcoming a new Institute Manager for 2012, namely Kate Irving who will be a fantastic asset to the Robinson Institute.

We would like to thank the Board of the Robinson Institute for their unfailing support and excellent ideas in charting the direction of this young Institute. With over 400 members, 12 NHMRC Senior Fellows and a number of career development and postdoctoral fellows, the Robinson Institute is well placed to deliver on its goals in the future. There are few Institutes in human and animal fertility and reproduction in the world that cover the pipeline from basic science through to health policy and delivery. We are excited about the future of the Robinson Institute and of the people in it.

# Board of Governors

**Mr Mark Coleman**
Independent Director, Chairman

**Professor Justin Beilby**
Executive Dean, Faculty of Health Sciences
University of Adelaide

**Professor Michael Brooks**
Deputy Vice-Chancellor and Vice-President
(Research), University of Adelaide

**Dr Marie Dziadek**
Executive Officer, Garvan Institute of
Medical Research

**Professor Jock Findlay**
Head, Female Reproductive Biology Group
Prince Henry's Institute

**Professor Tanya Monro**
Director, Institute for Photonics and
Advanced Sensing

**Professor Jonathon Morris**
Associate Dean and Head, Medical School
Northern, University of Sydney

**Mr Ian Nightingale**
Chair, Robinson Foundation
(January – September 2011)

**Ms Mary Patetsos**
Chair, Robinson Foundation
(October 2011 – Present)

**Mr Phil Robinson**
Executive Director Acute Services
Children, Youth and Women's Health Service

**Professor Paul Rolan**
Clinical Pharmacology, University of Adelaide

**Professor Bik To**
Clinical Director, Haematology, SA Pathology

## Invited to Attend

**Professor Robert Norman**
Director, Robinson Institute

**Ms Joanna Close**
Previous Institute Manager,
Robinson Institute

# Management Committee

**Professor Robert Norman**
Director, Robinson Institute

**Professor Raymond Rodgers**
Deputy Director, Robinson Institute

**Ms Joanna Close**
Previous Institute Manager,
Robinson Institute

**Professor Julie Owens**
Head, School of Paediatrics and Reproductive Health; Co-Director, Research Centre for Early Origins of Health and Disease

**Associate Professor Michael Ridding**
Co-Director, Research Centre for
Early Origins of Health and Disease

**Associate Professor Michael Davies**
Co-Director, Research Centre for
Early Origins of Health and Disease

**Professor Sarah Robertson**
Co-Director, Research Centre for
Reproductive Health

**Dr Darryl Russell**
Co-Director, Research Centre for
Reproductive Health

**Professor Caroline Crowther**
Co-Director, Australian Research Centre for Health of Women and Babies

**Professor Jodie Dodd**
Co-Director, Australian Research Centre for Health of Women and Babies

**Ms Philippa Middleton**
Co-Director, Australian Research Centre for Health of Women and Babies

**Professor Stan Gronthos**
Co-Director, Centre for Stem Cell Research

**Associate Professor Mark Nottle**
Co-Director, Centre for Stem Cell Research

*Neil Howells, Mary Patesos, and Ian Nightingale*

# Robinson Foundation Report

The Robinson Foundation was established in February 2010 to support the life-giving research of the Robinson Institute, with the aims of:

- Raising vital funds required to seed new areas of innovative research, to support the development of our next generation of scientists, and to fund special enabling equipment. This will form an integral part of building the capacity of the institute.
- Raising public awareness of the clinical and policy benefits of the work of the Robinson Institute in order to enhance the uptake of research findings from the Institute by the community.

In 2011 the Foundation delivered on fundraising programs and community engagement activities, and continued to grow our enthusiastic and committed Board.

The Foundation also made its first call for applications for funding from researchers of the Institute, distributing over $100,000 to support the Robinson Institute's research.

## Details of this support follow below.

The institute participated in a series of events during 2011 to raise awareness and further engage with the general public. Researchers from the Robinson Institute presented in a range of forums to showcase the research being conducted at the Institute and to further raise awareness in the community about the health outcomes from our research. These included Professor Sarah Robertson presenting in May 2011 at Research Tuesday; Researchers joined Dr Rosemany Stanton OAM at the public seminar in September 2011 – Eating for Two.

At the end of 2011 the Robinson Foundation had accumulated over $178,000 in Fundraising activities, donations, and bequests. This includes funds of over $136,000 raised by the Peter Couche Foundation, which sits within the Robinson Foundation.

The Robinson Foundation has been ably led by the Inaugural Chair Mr Ian Nightingale. In September 2011, Ian, while remaining on the Foundation Board handed the reins of Chair to Ms Mary Patetsos. Mary has continued to bring energy and ideas to the Foundation as it continues to build and grow in strength and purpose. The Foundation is still in its infancy and is grateful for the significant support of the Foundation Board members who contribute their valuable time and expertise on a voluntary basis.

The Foundation is also grateful for the significant support received from the community to date. Our generous donors are recognised on page 62.

In 2012, the Foundation will see a renewal in focus to align with the strategic direction of the Robinson Institute around research themes, and community and corporate engagement. We look forward to the developments and opportunities these bring.

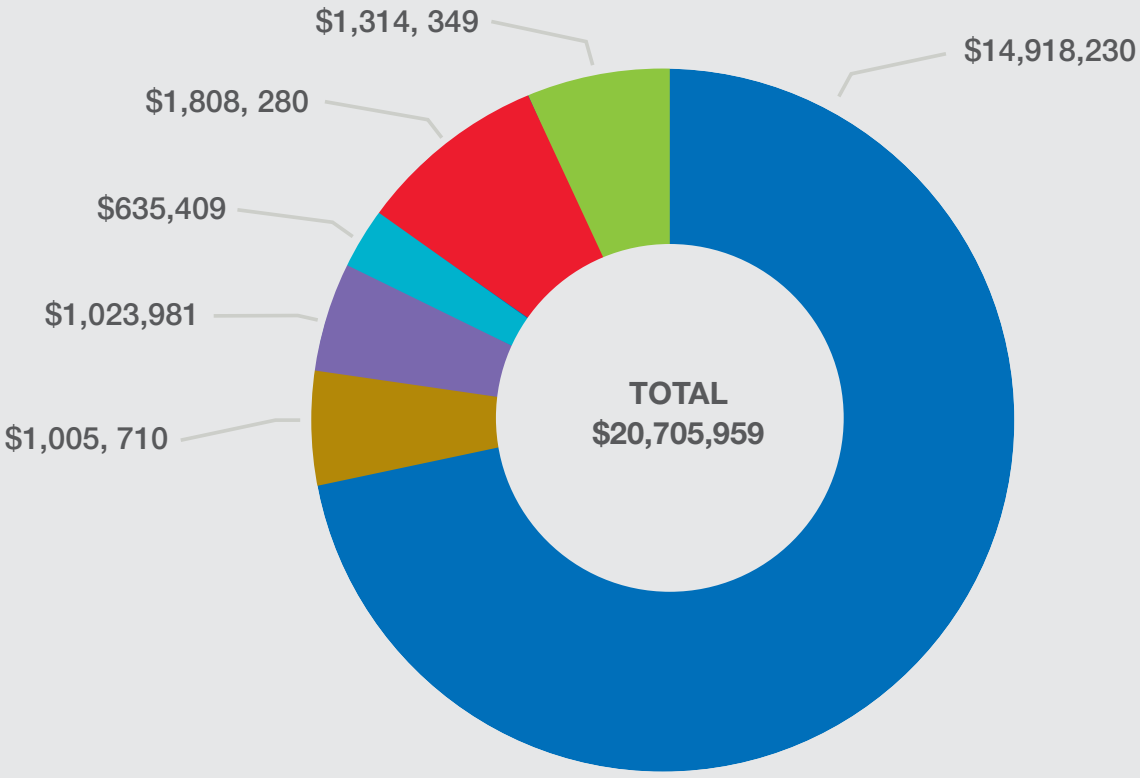
# Financials

## Growth in Publications and Funding

Over 200 papers were published, many in high impact factor journals including The Lancet, Nature Genetics, Blood, Journal of Clinical Investigation and Federation of American Societies for Experimental Biology (FASEB).

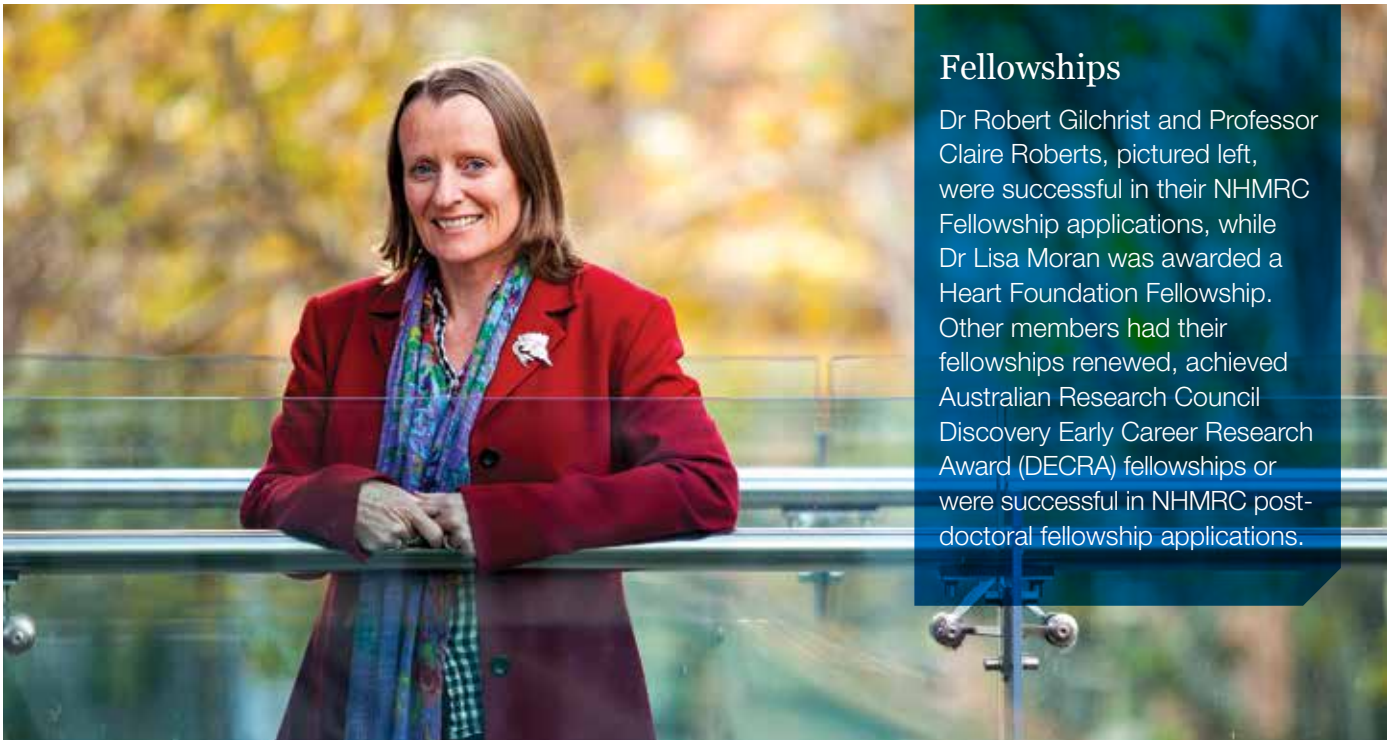
The year 2011 was a funding success for our members, with over $20 million received in income (Higher Education Research Data Collection), primarily from Commonwealth funding schemes. Highlights include the following:

- Dr Kylie Dunning received $375,000 in DECRA funding for her project entitled 'Biomimetic systems for species preservation and fertility restoration';
- Professor Caroline Crowther was awarded $1,978,760 for an NHMRC Project Grant to conduct a randomised control trial investigating whether antenatal magnesium sulphate given to women at risk of preterm birth between 30 and 34 weeks gestation reduces the risk of death or cerebral palsy in their children; and
- Dr Carmel Collins received an NHMRC Project Grant of $1,870, 914 for her study entitled 'DHA for the reduction of broncho-pulmonary dysplasia in pre-term babies'.




*The financial information presented is for the Robinson Institute department only, and therefore exclude research income earned directly by our members. Further information on income of our members can be found throughout the Annual Report.*

# Research Highlights



## Fellowships

Dr Robert Gilchrist and Professor Claire Roberts, pictured left, were successful in their NHMRC Fellowship applications, while Dr Lisa Moran was awarded a Heart Foundation Fellowship. Other members had their fellowships renewed, achieved Australian Research Council Discovery Early Career Research Award (DECRA) fellowships or were successful in NHMRC post-doctoral fellowship applications.

*Professor Claire Roberts*

## Awards

In October 2011, Professor Caroline Crowther was presented with the International Inaugural Anne Anderson award at the 19th Cochrane Colloquium in Madrid, Spain. The goal of the award is to recognise and stimulate individuals contributing to the enhancement of women's visibility and participation in the Cochrane leadership. The award is given to a member of the Cochrane collaboration who has contributed meaningfully to the promotion of women as leaders and contributors to the Cochrane Collaboration.

## Stillbirth Series and The Lancet

Phillipa Middleton from ARCH was a co-author on three articles in The Lancet relating to stillbirth, an ongoing problem towards which ARCH researchers have made major research contributions in South East Asia and internationally.

## Retirement for Professor Alastair MacLennan

Professor MacLennan has left full time employment with the University of Adelaide after several decades of outstanding contributions in perinatology, menopause and reproductive endocrinology. Professor MacLennan's initial work on relaxin, a hormone of unknown function was groundbreaking, and his other contributions addressed menopause, cerebral palsy, medical education and community engagement in education.

## Robinson Foundation and Peter Couche Foundation

The Institute's two philanthropic arms contributed significantly to our research funding in 2011, of particular success was the *Don't Speak – Silence for Stroke* campaign designed by the Peter Couche Foundation and run by the Robinson Institute.

The campaign encouraged the sponsorship of people who nominated to refrain from speaking for an hour on the 16th September. The success of the campaign in 2011 means that the Foundation can continue to grow and make a substantial contribution to the Stroke Research Program and also that Don't Speak – Silence for Stroke can be repeated in 2012.

## Guideline development

Members of the Institute were key contributors to the PCOS Guideline document 'Evidence-based guideline for the assessment and management of polycystic ovary syndrome' which was approved by the NHMRC; the Beyond Blue 'Clinical Practice Guidelines for depression and related disorders – anxiety, bipolar disorder and puerperal psychosis - in the peri-natal period' as well as informing the overall NHMRC Australian Dietary Guidelines.

## Institute Review

The review of the Robinson Institute was successfully concluded, with funding from the University of Adelaide guaranteed until 2018.

# Annual Celebration

## On November 4 2011, members and supporters of the Robinson Institute came together to celebrate the year's achievements and recognise individuals for their outstanding contributions to the Institute.

*Philippa Middleton*

The event was attended by special guests Emeritus Professor Jeffrey Robinson, Professor Ossie Petrucco (sponsor of the Petrucco Scholarships), Stephen Couche (Chair of the Peter Couche Foundation) and Foundation board members Mary Patetsos (Chair) and Tim Hughes. The occasion was an opportunity to bring researchers from across the Centres together to network and hear about the important work being undertaken within the Institute.

Throughout the evening, individuals who significantly contributed to the institute were formally recognised for their achievements.

The highlight of the evening was the announcement of the 2011 Robinson Institute Director's Award which was awarded to Professor Philippa Middleton.

Philippa is the Co-Director of the Australian Research Centre for Health of Women and Babies (ARCH), with a long involvement in evidence-based medicine and methodologies for conducting clinical trials and systematic reviews. She is ARCH's principal consultant on the NHMRC Panel of 'Providers with expertise relevant to the development and presentation of health advice'.

Philippa is also the Assistant Director of the Australian Cochrane Centre, and Associate Director of the UK Cochrane Centre.

Philippa has published 35 papers in the last two years, three of which are NHMRC-approved clinical practice guidelines. In addition, she has authored and/or updated over 40 Cochrane reviews, is an editor for PLoS Medicine and PLos One and is a frequent reviewer for national and international journals and granting bodies.

In 2011, Philippa was involved in the special Stillbirth series published in the highly acclaimed journal The Lancet. Congratulations Philippa!

"This award reflects excellence in making sure that evidence-based conclusions are reflected in real health practice", says Professor Rob Norman.

# Retirement of Professor Alastair MacLennan, Officer of the Order of Australia

In 2011, Professor Alastair MacLennan retired from his role as Head of Obstetrics and Gynaecology, formally ending an impressive four decade University of Adelaide career that revolutionised the practice of obstetrics/gynaecology and feto-maternal medicine through key contributions to clinical research, policy and practice.

At the age of 16 Alastair entered the Glasgow University Medical School, graduating in 1968 and moving to the United States before commencing studies at Oxford University, United Kingdom, where his interests in reproductive endocrinology and feto-maternal medicine emerged.

Moving to the University of Adelaide in 1977, Alastair began his innovative clinical work which led to many ground breaking policy changes in our hospital system including welcoming fathers and family to support the labouring mother and insisting that pubic shaves, enemas and hospital gowns (with the gap at the back!) were not necessary.

He also ceased the practice of doctors and midwives wearing masks at births, and encouraged 'rooming in' of babies post-delivery. Over the years Alastair personally delivered over 5,000 babies and was responsible for the care of many more pregnant women.

Always a popular and entertaining teacher, Alastair won many teaching plaudits over the years, particularly for his teaching innovations, including the use of video education. With his academic and marital partner Alice, Alastair made over 30 educational videos/DVDs.

Alastair's dual interests in feto-maternal medicine and reproductive endocrinology have led to over 350 peer reviewed publications and five books. His research grants have topped $10 million and he continues to be awarded NHMRC funding. Alastair has also strongly contributed to the field of obstetrics and gynaecology through conducting numerous randomised controlled trials of new therapies for the management of menopause. In particular, he led the Australian arm of WISDOM, the world's second largest trial of Hormone Replacement Therapy.

More recently, Alastair has been focusing on scientific and medico-legal work showing that cerebral palsy is rarely due to 'birth asphyxia' and is mostly a process beginning in pregnancy or even at conception. His current research addresses the genetics of cerebral palsy and possible interactions of genetic susceptibility with environmental triggers during pregnancy.

Throughout his career Alastair has been appointed to many prominent positions, including President of the Perinatal Society of Australia and New Zealand and the Australasian Menopause Society, as well as Editor-in-Chief of the European Menopause Journal Maturitas (5 years) and founding Editor-in-Chief of Climacteric, The Journal of the International Menopause Society (10 years).

Alastair has received many prestigious awards during his career, but undoubtedly the most impressive was the honour Alastair received on Australia Day in 2011, when he was made an Officer in the Order of Australia, being cited for "distinguished service to medicine as a leading researcher and practitioner in the areas of obstetrics and gynaecology and the causes of cerebral palsy, to medical education and professional development".

Despite retirement, Alastair will continue on at the University of Adelaide working part-time with Emeritus status with the Cerebral Palsy Group.

*Professor Alastair MacLennan with Matthew Reinertsen*

# Research Highlights

# Wishing for a brighter future for Pre-term Babies

As advanced as our society appears to be, pre-term births and associated complications, still account for over 20,000 births on average in Australia each year.

In Australia over 1500 women annually will give birth to very pre-term babies, born between 22 and 37 weeks of gestation; 15% of these babies are at high risk of dying in the first weeks of life.

Babies who survive prematurity have greater risk of neurological impairments such as cerebral palsy, blindness, deafness and cognitive dysfunction, as well as an elevated risk of physical disability. We know that every week of gestation is important in ensuring normal brain development.

The good news is that research within the Robinson Institute giving mothers magnesium sulphate immediately prior to a very pre-term birth improves the chances of the baby surviving, and lowers the risk of cerebral palsy.

Magnesium sulphate has been widely used as a maternal medication in pregnancy for decades. It is only more recently that clinicians realised that it may reduce illness in preterm babies. In particular, good quality research has shown that magnesium sulphate offers 'brain protection' to babies born very preterm.

This focus led to the establishment of the WISH Project (Working to Improve Survival and Health for babies born very preterm). The WISH Project assists Australian and New Zealand tertiary obstetric units adopt the NHMRC guidelines and improve the uptake of antenatal magnesium sulphate as a neuroprotective therapy immediately prior to imminent early preterm birth (less than 30 weeks gestation).

"The WISH Project will gather data from a cohort of mothers and their babies born very early, which will allow monitoring of the use of a new therapy for the prevention of cerebral palsy, as well as assessment of the changes in mortality and morbidity resulting from uptake of the new treatment," says project investigator Philippa Middleton.

> "Once the antenatal magnesium guidelines were endorsed and disseminated by the NHMRC, we focused on addressing the implications of implementing these guidelines, since very few obstetric units are currently using magnesium sulphate for fetal, neonatal and infant protection."

**Professor Caroline Crowther**
Director of the Robinson Institute's Australian Research Centre for Health of Women and Babies (ARCH)

"Furthermore, it will provide clinical indicators for care that can be used for quality improvement within participating hospitals."

The WISH Project was fortunate to receive funding from the Cerebral Palsy Alliance to progress this important study.

# Collaboration could unlock genetic causes of Cerebral Palsy

## Cerebral palsy (CP) is the most common physical disability in childhood, affecting over 15,000 Australians.

In Australia a child is diagnosed with CP every 15 hours. CP can also be accompanied by intellectual disability, autism and epilepsy, with the causation for the majority of cases remaining largely unknown.

Research at the Robinson Institute is taking a fresh approach to investigating the causes of cerebral palsy, proposing that a considerable proportion of cases can be explained by both inherited and spontaneous mutations in different genes – these can now be detected using innovative Next Generation Sequencing technologies.

The human genome contains over 20,000 genes. Next Generation Sequencing has made it possible to sequence all these genes simultaneously, either by whole exome sequencing (analysing only the protein-coding portions of the genome) or whole genome sequencing (analysing the entire genome).

More broadly, this technology has already led to dramatic improvement in disease gene identification and clinical diagnosis, cancer gene identification and personalised cancer treatment.

To address the possibility of a role for genes in CP, the Robinson Institute's Cerebral Palsy group has been invited to collaborate with Dr Richard Gibbs who is the founder of the Baylor College of Medicine, Human Genome Sequencing Center (BCM) in Houston, USA.

BCM is a world leader in human genome sequencing, having sequenced a major proportion of the first human genome.

The Robinson Institute researcher, Gai McMichael, will spend two months in 2012 working alongside Dr Gibbs and his team of geneticists and bioinformaticians.

"This is an amazing opportunity to realise the genetic contribution to cerebral palsy. This collaboration, using the latest genomic technology, has created a unique opportunity to determine the likely genetic causes of CP.

*Gai McMichael with Matthew Reinertsen*

As far as we are aware, no other group is using whole exome sequencing to determine CP causation," says Gai.

Gai will perform whole exome sequencing in families where there is more than one CP-affected individual and families with isolated CP cases.

"As part of our Cerebral Palsy DNA BioBank we have collected blood samples from over 200 families, including affected and unaffected individuals and their parents (600 participants altogether). It is these samples that are being sequenced at BCM," she says.

The research will help address an international issue of significant importance to human health. Research findings could translate into fundamental outcomes in both the science, practice of clinical medicine and public health.

> "The identification of mutated genes will facilitate mutational screening studies of our existing buccal swab DNA samples at the Robinson Institute, which will help determine the pathogenicity of the genes involved in CP."

# Improving heart health for women and their children

**Dr Lisa Moran was awarded the SA Cardiovascular Research Development Program Fellowship in 2011 by the National Heart Foundation and SA Health to look at the most effective ways of reducing heart disease in women and their children.**

*Dr Lisa Moran*

Lisa will spend the next three years assessing lifestyle options during pregnancy that can lower the risk of cardiovascular disease, obesity and diabetes.

"Cardiovascular disease and diabetes have been identified as key priority areas for women's health in Australia, and obesity is associated with an increased risk of both these conditions," says Lisa.

"Women of reproductive age are at especially high risk of obesity. Our goal is to facilitate lifestyle changes that ensure they maintain a healthy diet during this period and do not gain excess weight. As well as body weight impacting on their own health, there is a high chance that obese women will give birth to children who are also at greater risk of these diseases."

Putting on excess weight in pregnancy often leads to gestational diabetes and Type 2 diabetes which are precursors to heart disease.

Up to 8% of pregnant women in Australia develop gestational diabetes in the third trimester of their pregnancy, but the most alarming statistics concern Type 2 diabetes, which now affects more than 780,000 people across the country.

Heart disease is one of the leading causes of death in Australia, due to conditions such as angina, blocked arteries and heart attacks.

Dr Amanda Rischbieth, the Heart Foundation's Chief Executive, said "Funding will help stimulate and enhance the local research community in South Australia, and we are thrilled to support such a high quality project. Dr Moran's research will no doubt lead to improvements in heart health."

Lisa was a finalist in the 2011 South Australian Tall Poppy Awards which recognise and celebrate intellectual and scientific excellence among the State's young researchers.

Lisa has extensive experience in assessment and treatment of the causes of infertility among women and is an expert in polycystic ovary syndrome, which has also been linked to obesity.

> "Our goal is to facilitate lifestyle changes that ensure they maintain a healthy diet during this period and do not gain excess weight."

# Applying cutting edge robotic surgery techniques in Gynaecology

*Professor Martin Oehler*

The Robinson Institute's Associate Professor Martin Oehler initiated the first Australian robotic surgery program in gynaecology and gynaecological oncology in 2008.

Robotic surgery provides superior visualisation and dexterity, and allows the surgeon to perform complex tasks that would exceed their abilities with conventional laparoscopy and decreases the likelihood of morbidity.

Martin's prospective case series analysis of the first 71 patients operated by robotic surgery at the Royal Adelaide Hospital from August 2008 to May 2010 was published in the Australian and New Zealand Journal of Obstetrics and Gynaecology in 2011. This research provided evidence on the safety and feasibility of performing gynaecological robotic surgery at an Australian public hospital. The study data showed that robotic surgery drastically improves patient outcomes by reducing postoperative pain, complications and length of stay in hospital, and enables patients to return to their family and professional activities much faster.

The robotic system is comprised of three components illustrated in Figure 1 where the patient side surgical cart, the surgeon console, and the video tower with a high definition 3D vision system can be seen. The surgeon sits away from the patient at the console and has a stereoscopic viewer, hand manipulators and foot pedals that allow him to control the camera and the robotic instruments within the patient.

The surgeon's movements are translated in real-time to the robotic instruments, and are scaled and processed to reduce tremor and increase precision. The vision system provides a 3D image through a 12-mm endoscope containing a stereoscopic camera. The surgical cart is composed of four arms for controlling the camera and two or three surgical instruments.

The surgical cart is 'docked' to laparoscopic trocars placed in the patient's abdomen. The robotic instruments have a wrist-like mechanism that enables intra-abdominal articulation, thereby providing 7 degrees of freedom compared to 5 degrees of freedom of traditional laparoscopy (Figure 2).

Robotic surgery has opened up a range of new minimally invasive surgical options for Australian women needing treatment for benign and malignant gynaecological diseases.

*Figure 2*

*Figure 1*

# Exploring the impact of shiftwork on health and fertility

## Researchers at the Robinson Institute are a step closer to understanding how shiftwork impacts on health, fertility and the long-term health of the children of shiftworkers.

More than 17% of the Australian workforce is engaged in shiftwork which may disrupt hormone and sleep rhythms, interfere with eating patterns and prevent normal light exposure.

The Circadian Physiology Group, led by Professor David Kennaway, is investigating the relationship between daily rhythmic changes in gene expression in various organs with physiological functions, and the consequences of disrupting the rhythmicity.

"There is strong evidence that shiftwork increases the risks of developing metabolic syndrome (obesity, insulin resistance and cardiovascular disease), as well as impairing fertility and increasing the risks of certain cancers," David says.

"Our broad research area is the circadian system, and how it regulates diverse physiological processes including reproduction, metabolism, immunity and neurobehaviour.

Given the increased frequency of shift work in our society, our research is focused on understanding and ameliorating the impact of disrupted rhythmicity on health and wellbeing."

An understanding of why this occurs will help develop new drugs and intervention strategies to reduce one of the important environmental triggers for poor health and impaired fertility.

A highlight for the group in 2011 was the publication of their paper in the high impact journal PLoS One, which discussed the effects of circadian rhythm disruption during gestation on the long-term health of the offspring.

"We showed for the first time that altering the light day cycle during pregnancy in a manner similar to that experienced by people working 12 hours shifts, resulted in the offspring having increased adiposity, glucose intolerance and insulin resistances when they were adults" says co-author Dr Tamara Varcoe.

Together with their collaborators at the University of South Australia, through an Australian Research Council Discovery Grant, the group recently conducted the first study in human volunteers on the importance of time of day and sleep duration on a range of neurobehavioural responses.

"These results have provided us with insight into the consequences of sleep deprivation on performance and fatigue, which is critical to shift workers," David says.

*Dr Tamara Varcoe and Professor David Kennaway*

# Determining predictive biomarkers for preeclampsia

## Preeclampsia is the most common complication during pregnancy, affecting approximately 20,000 pregnancies in Australia each year.

*Professor Claire Roberts (left) and Ms Wee-Ching Kong*

Preeclampsia is the leading cause of maternal death in developed countries.

Maternal complications arising from preeclampsia can include low blood platelets, liver rupture, kidney failure, severe stroke and seizures. Fetal complications include growth restriction, pre-term delivery and neonatal problems such as respiratory distress and jaundice.

Health problems stemming from these antenatal and neonatal complications can then develop for the offspring, including increased risk of cerebral palsy, learning disabilities, Type 2 Diabetes, hypertension and cardiovascular disease.

"Currently, the exact origin of preeclampsia remains unknown, but we know it only occurs in the presence of the placenta", says Professor Claire Roberts, head of the Institute's Placental Development Group.

"There is currently no method to predict women at risk of preeclampsia until symptoms begin to manifest, by which time it is too late to prevent its onset."

Existing evidence suggests that impaired early placental development, prior to the onset of symptoms, is where the pregnancy complications begin.

Robinson Institute PhD candidate Ms Wee-Ching Kong has been investigating the role of microRNAs in placental development.

MicroRNAs play a vital role in the development of tissues and are an essential molecule in the regulation of genes.

"MicroRNAs were only recently discovered and hence their role in the development and function of many organs remains unknown. We have found that microRNA expression is quite dynamic throughout gestation and is distinct in different functional zones on the placenta," says Wee-Ching.

Wee-Ching's recent work has focused on assessing the potential of circulating microRNAs as predictive biomarkers for preeclampsia.

As part of the Screening for Pregnancy Endpoints (SCOPE) study, led by the Institute's Professor Gus Dekker and Professor Claire Roberts, blood was collected from healthy women at the 15-week time-point of their first pregnancy. These women were monitored throughout their pregnancy to determine who developed preeclampsia. Once the pregnancy outcomes were known, circulating microRNAs were then examined in 12 healthy women and 12 (body mass index-matched) women who later developed severe preeclampsia.

"Our findings showed that 19 microRNAs were present at different levels in women that developed severe preeclampsia; these were then assessed as potential predictors of severe preeclampsia."

"Identifying a predictive marker would allow us to plan appropriate medical care and monitor at-risk women to reduce the severity of their symptoms," Wee-Ching says. "A predictive marker would also allow us to test the efficacy of potential preventative treatments of women at risk earlier in pregnancy."

# First comprehensive report of higher risk of birth defects from assisted reproduction

In the most comprehensive study of its kind in the world, Robinson Institute researchers have compared the risk of major birth defects for each of the reproductive therapies commonly available internationally, such as: In vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI) and ovulation induction.

Worldwide, more than 3.7 million babies are born annually as a result of assisted reproductive technology and it is usually invasive, expensive, and deals with matters of intense emotional content.

"While assisted reproductive technologies are associated with an increased risk of major birth defects overall, we found significant differences in risk between available treatments," says Associate Professor Michael Davies.

Researchers linked a census of more than 6100 assisted reproductive technology births in South Australia to a registry of more than 300,000 births and 17,000 birth defects. They compared risks of birth defects across all infertility treatments to pregnancies in women with no record of infertility. They also compared successive pregnancies for women.

Previous studies have identified an increased risk of birth defects associated with infertility treatment, but this is the first study to compare all forms of available treatment. This is also the first study to compare pregnancies within women by the treatments received.

"The unadjusted risk of any birth defect in pregnancies involving assisted conception was 8.3% (513 defects), compared with 5.8% for pregnancies not involving assisted conception (17,546 defects)," Michael says.

"The risk of birth defects for IVF was 7.2% (165 birth defects); and the rate for ICSI was higher at 9.9% (139 defects).

"A history of infertility, either with or without assisted conception, was also significantly associated with birth defects. While factors associated with the causes of infertility explained the excess risk associated with IVF, the increased risk for a number of other treatments could not readily be explained by patient factors. ICSI, for instance, had a 57% increase in the odds of major defect, although the absolute size of the risk remained relatively small," he says.

Associate Professor Davies says cryopreservation (freezing) of embryos was associated with a substantially reduced risk of birth defects, particularly for ICSI. "This may be due to developmentally compromised embryos failing to survive the freeze/thaw process," he says.

Also of concern was the tripling of risk of subsequent birth defects in women using clomiphene citrate to stimulate ovulation outside of a closely supervised clinical setting.

The study now needs to be expanded to include more recent years of treatment, as the reproductive technologies have undergone continual innovation that may influence the associated risks of treatment.

The results were published in 2012 in the prestigious *New England Journal of Medicine*.

*Associate Professor Michael Davies*

> "A history of infertility, either with or without assisted conception, was also significantly associated with birth defects."

# Unnecessary birth induction increases risk of complication

A new study has revealed that inducing labour in pregnant women when it's not medically necessary is more likely to result in complications at birth.

Elective induction is becoming more common around the world, with many women being induced for social and other non-medical reasons.

Dr Rosalie Grivell from the Robinson Institute's Australian Research Centre for Health of Women and Babies (ARCH) studied the data of more than 28,000 births from across South Australia in 2006-2007. She compared cases in which women had undergone spontaneous onset of labour, induction of labour for recognised medical reasons, and induction of labour for "non-recognised" reasons.

Compared with women who entered labour spontaneously, induction for non-recognised reasons was associated with a 67% increased chance of requiring a caesarean section.

It also significantly increased the chance of the newborn infant requiring nursery care in a Special Care Baby Unit (an increased risk of 64%) or requiring treatment (an increased risk of 44%) compared with infants born following spontaneous onset of labour.

"Our research is aimed at better understanding the optimal timing and management of labour and birth for women with an uncomplicated pregnancy," Rosalie said.

"We hope our findings will increase awareness of the potential harmful effects that elective induction can have on both women and their infants. In the absence of serious maternal or fetal problems or a medical recommendation, induction of labour is best avoided."

*Dr Rosalie Grivell*

Dr Grivell said the lowest risk of adverse complications both for mother and baby occurred with the spontaneous onset of labour between 38 and 39 weeks.

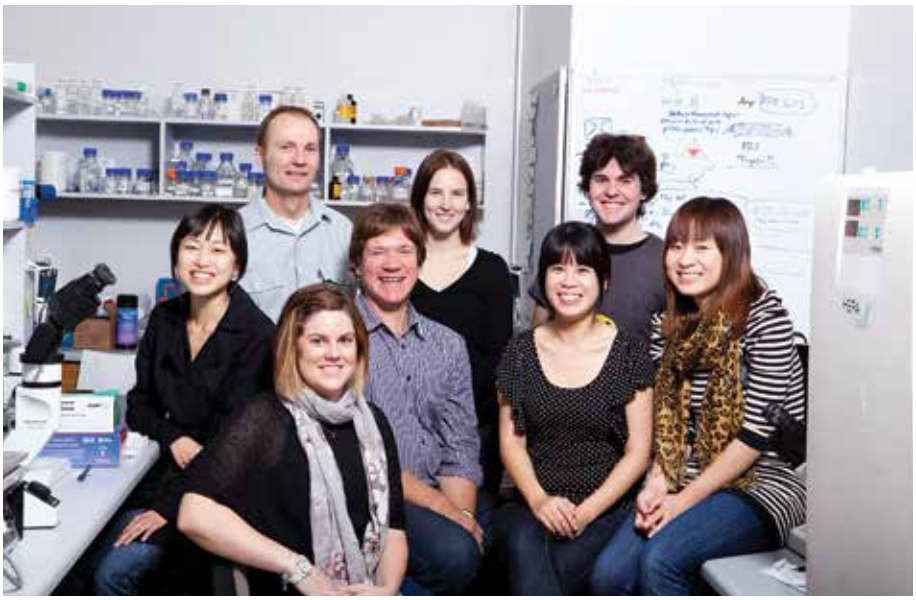
"While a natural birth is not always possible for women who already have complications in pregnancy, the results of this study suggest that for women whose pregnancy is uncomplicated, awaiting the spontaneous onset of labour is best," she said.

The study has been published in 2012 by the journal Acta Obstetricia et Gynecologica Scandinavica.

> "Our research is aimed at better understanding the optimal timing and management of labour and birth for women with an uncomplicated pregnancy."

# Novel research providing new hope for stroke sufferers

## Stroke is the leading cause of disability and the second leading cause of mortality in Australia, with over 60,000 Australians suffering a stroke each year.



*Associate Professor Simon Koblar and the Stem Cell Research Group*

After suffering a stroke, two in three individuals will survive for up to one year or more with neurological disability.

The Robinson Institute's Stroke Research Program has recently completed a three-year study investigating the effects of injecting human Dental Pulp Stem Cells (DPSCs) into the brain 24 hours after suffering a stroke. The research will be published in the journal Stem Cells Translational Medicine in April 2012.

Human stem cells can be harvested from adult teeth and appear to have an intrinsic ability to form brain cells and interact with the nervous system. Recently, the research group found that when these cells were injected into the brain 24 hours following a stroke, this led to improved limb function.

Research has suggested that stem cells may assist in re-wiring the damaged brain, assisting the intact parts of the brain to take over from damaged areas through a process called 'neuroplasticity'.

The study, led by Associate Professor Simon Koblar, has indicated that dental pulp stem cells may perform better than other types of stem cells for future clinical use of neurological repair.

"Firstly, they do not have the ethical and political issues that are inherent to embryonic stem cell use. Secondly, they are easily obtained from the tooth and have a natural potential to form brain cells and interact with the brain," said Simon. There is also no evidence that adult stem cells have a risk of tumour formation, which is present for embryonic stem cells.

"In 2012 we will work towards comparing our results from direct injection of DPSCs into the brain 24 hours following a stroke, with new work investigating intravenous injections. This is important, as it will be much safer for patients to have an injection of stem cells into the arm vein rather than in the brain following a stroke. In our studies this year we will also investigate if later intravenous injection of stem cells (2 weeks after a stroke) will be effective."

The group has also established a collaboration with the University of Cambridge's Centre for Brain Repair. Simon says, "We are working together to try and understand how stem cells may repair the brain. Answering this fundamental question is crucial, as it will allow us to improve ways to use stem cells in the future. We are currently investigating three possible 'mechanisms of action', including neuroplasticity, angiogenesis and immune-modulation."

> "Along with my colleagues Professors Stan Gronthos and Andrew Zannettino at the Robinson Institute's Centre for Stem Cell Research, we are excited about the potential of this area and the impact our studies may have."
>
> Professor Simon Koblar

# New approach to help stroke patients who can't swallow

## A simple function that most of us take for granted - swallowing - is the focus of research that could help thousands of stroke sufferers around the world.

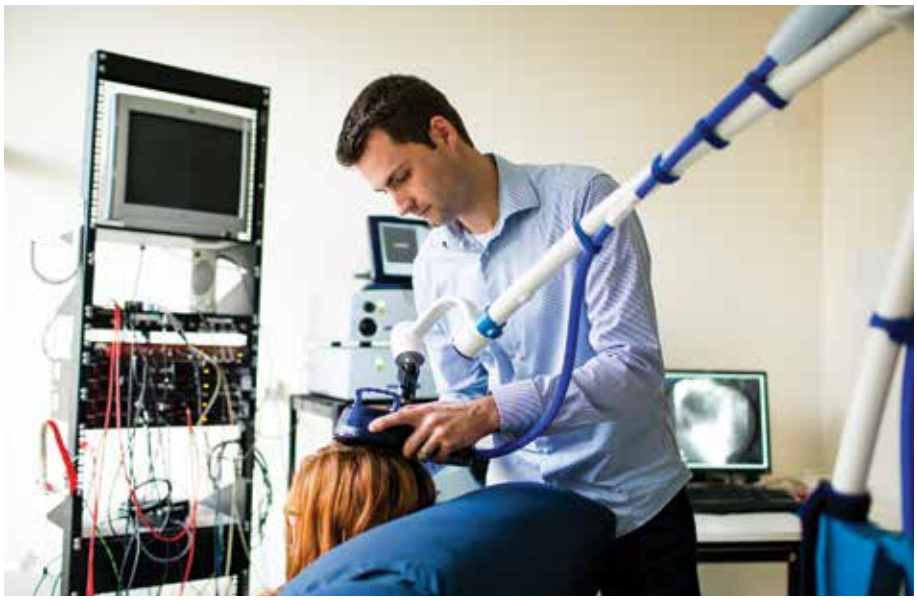
Robinson Institute researchers are using magnetic stimulators to 'jump-start' the brain after a stroke and repair swallowing functions that break down in more than 50% of stroke patients.

Speech pathologist Dr Sebastian Doeltgen, of the Robinson Institute's Neuromotor Plasticity and Development Group, was awarded $300,000 in Federal Government funding to investigate revolutionary techniques to treat swallowing disorders.

"About 60,000 people suffer strokes each year in Australia alone, with more than 35,000 of these initially experiencing problems with swallowing. That is a huge part of the stroke population who have difficulty eating or drinking and may have to be fed through a tube," Sebastian says.

"There are up to 32 muscle pairs involved in swallowing and all have to work in perfect harmony to get food and drink from the lips down into the stomach. This activity places a huge demand on the brain.

"When a person suffers a stroke the part of the brain that controls the muscles in the mouth and throat may be damaged and we have to find ways to reactivate these regions. Using the magnetic stimulators we can create electrical currents in the brain that stimulate the nerve cells which we believe help control swallowing," he says.



*Dr Sebastian Doeltgen*

The group's research is the only example of its kind in Australia. Indeed, even on a global scale only a few teams of scientists and clinicians are using magnetic stimulation and brain exercises to develop new rehabilitation approaches for swallowing disorders.

"As strokes are a leading cause of disability worldwide the cost to the health care system as well as quality of life of those affected is enormous," Dr Doeltgen says.

"Swallowing disorders form a large part of these disabilities but no one ever thinks about swallowing. It is like breathing. We take it for granted but imagine the impact on your life if you couldn't swallow anymore. It's huge."

Not only are swallowing problems a very common result of strokes, but they also often accompany a range of neuro-degenerative disorders, such as multiple sclerosis, Parkinson's disease, Huntington's disease and Alzheimer's disease.

> "About 60,000 people suffer strokes each year in Australia alone, with more than 35,000 of these initially experiencing problems with swallowing."

# New Research Groups

# Neonatal Medicine

*Associate Professor Dominic Wilkinson (centre right), Dr Michael Stark (far right), and Colleagues*

There are 15 million babies worldwide born prematurely each year. Prematurity is the leading cause of death in newborns worldwide. Infants born early also have a higher risk of cerebral palsy and other developmental and learning problems. Furthermore, the cost to care for a pre-term baby in hospital is approximately $3,000 per day. If a baby is born severely pre-term the total cost could reach over $200,000 by the time they leave hospital, not to mention the significant stress and anxiety for the family involved.

The Robinson Institute's Neonatal Medicine group was established in 2011 within the Women's and Children's Hospital, and is dedicated to analysing and generating research evidence relevant to the care of newborn infants. This scope includes bringing basic science to the bedside to inform the care of critically ill newborn infants.

Led by Associate Professor Dominic Wilkinson and Dr Michael Stark, the group comprises a team of clinical neonatologists with a strong academic background, and specific expertise in a number of areas including clinical trials, placental function, medical ethics, haemodynamics and neonatal nutrition.

"Our research projects are developing novel and important insights into the use of blood transfusions in pre-term infants, nutritional supplements to improve the health, growth and development of extremely small infants, and a ground-breaking resource for parents facing ethical dilemmas in intensive care," says Dominic.

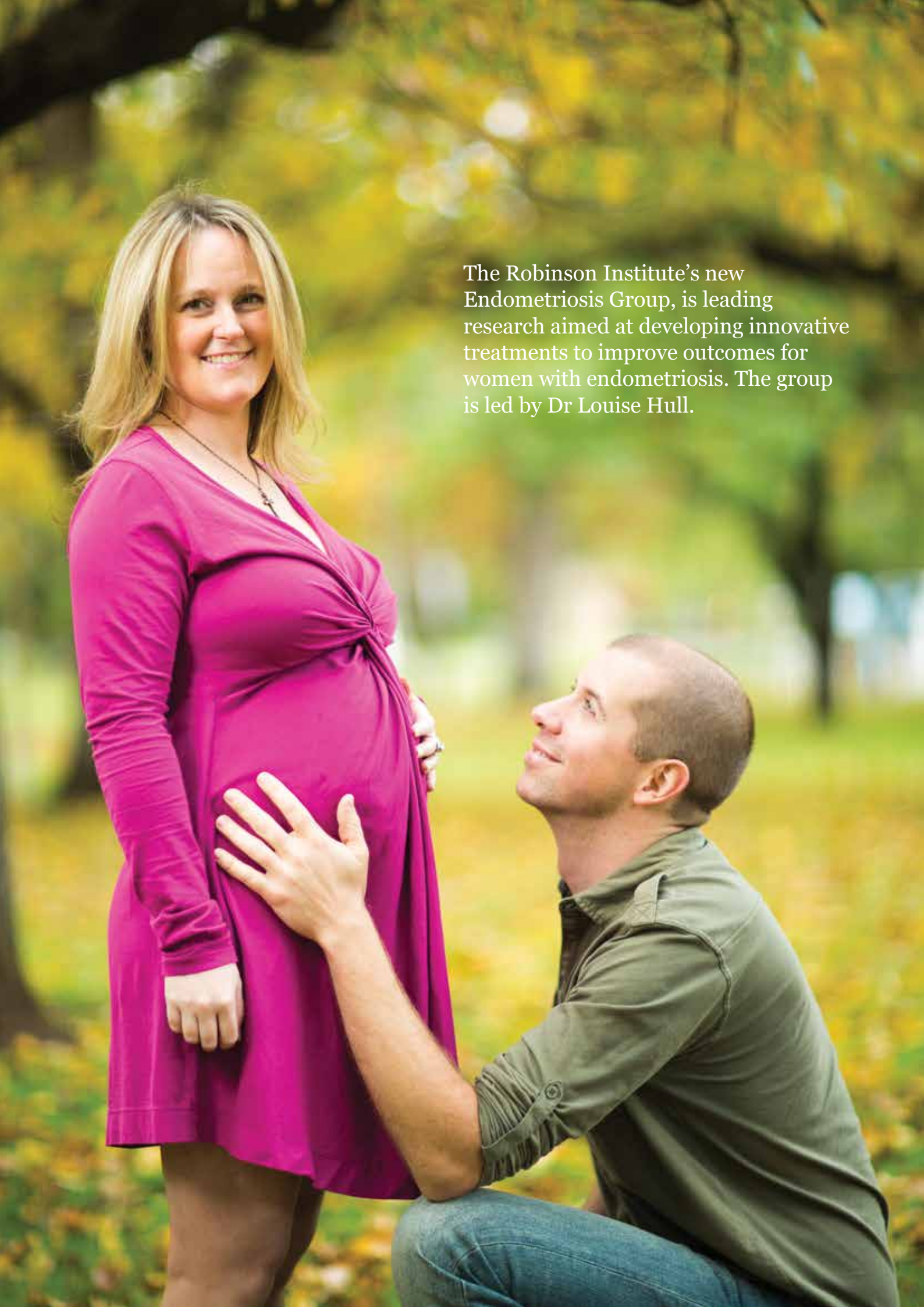
The Neonatal Medicine research group focuses on:

- Reducing brain injury and impairment for infants born extremely prematurely;
- Improving weight gain and long term developmental outcome for extremely low birth weight infants;
- Improving ethical decision-making during pregnancy and the newborn period; and
- Supporting families facing difficult ethical decisions about their fetus or newborn infant.

Dominic says the group is working to establish a Centre of Excellence in neonatal research.

In 2011, Dominic also established the Perinatal Ethics and Decision-Making Group, which is focused on investigating the ethical questions arising from advances in perinatology, including the care of fetuses and newborn infants at the borderline of viability, those diagnosed with severe congenital malformations, and those with acquired brain injury.

> "We want to establish a fellowship program for trainees in neonatal medicine to obtain vital skills in research. We are seeking national funding for ongoing and new research projects."



The Robinson Institute's new Endometriosis Group, is leading research aimed at developing innovative treatments to improve outcomes for women with endometriosis. The group is led by Dr Louise Hull.

# Endometriosis


*Dr Louise Hull*

Endometriosis is a condition where the lining of the womb grows at non-typical sites in the pelvis, causing period pain and subfertility for 6-10% of reproductive aged women.

"At present, effective diagnosis of the condition is inadequate and is predominately based on a clinician's opinion and confirmed with exploratory surgery. Sufferers then often require repetitive and chronic treatment for this condition," Louise says.

Because doctors and patients try to avoid the risks, costs and relatively low diagnostic utility of exploratory surgery, diagnosis of endometriosis is typically delayed for six to 12 years. During this time, a patient will make repeated General Practitioner visits and suffer from poor fertility, pain and psychological problems. Taking into account the overall use of the medical system during this diagnostic delay, a reasonable estimate of the total cost of diagnosing a single endometriosis case is up to $46,000.

New research from the Endometriosis Group has shown that small genetic markers (microRNAs) are implicated in the pathogensis of endometriosis and appear to interact with gene polymorphisms to influence disease susceptibility.

Louise and her Robinson Institute colleagues, Professor Sarah Robertson and Dr Vicki Nisenblat, have identified these in human blood. Working with their collaborator Associate Professor Cristin Print (University of Auckland, NZ), they are now looking to clinically validate these blood-based biomarkers in order to produce a prototype diagnostic blood test for endometriosis.

Louise says, "A significant market opportunity exists for a non-invasive, accurate and low cost diagnostic test for endometriosis. If successful, this would address many of the shortcomings of existing endometriosis diagnosis, and significantly reduce diagnostic delays, patient morbidity and public health costs associated with the condition."

In addition to her research with the Robinson Institute, Louise is a fertility specialist with Fertility SA and the Women's and Children's Hospital. During this time she has helped many couples conceive and is committed to promoting the development of improved fertility treatments for her patients and the wider community.

> "At present, effective diagnosis of the condition is inadequate and is predominately based on a clinician's opinion and confirmed with exploratory surgery."

# Early Childhood Health and Development

## Improving the health and development outcomes for children is the focus of the new Robinson Institute research group Early Childhood Health and Development, led by Professor John Lynch.

This interdisciplinary group of population health scientists complements the strengths of the Robinson Institute in basic and clinical sciences and forms an important role in informing how early life influences future health.

The group's research interests are focused around early childhood development, life-course processes, health and social inequalities, population health information systems, evidence-based public health and improving the public health research-policy-practice nexus.

"Our group is committed to building an evidence base to inform what are the best decisions in policy and practice to improve overall levels and reduce social inequalities in healthy child development," John says.

The group relies on using multiple research platforms to address their goals. These include data linkage, randomized controlled trials, natural experiments, cohort studies, advanced statistical techniques and dynamic microsimulation.

In 2011 the group was successful in bringing together the first South Australian data set using linked administrative data from perinatal, child health record, hospitalisation, emergency department, school readiness and education sources. This defined all South Australian births from 1999-2005, involving linkages across 11 different administrative datasets.

John joined the University of Adelaide in 2011 and is a Professor of Public Health with the School of Population Health and Clinical Practice. John is an internationally recognised scholar in epidemiology and public health, with more than 200 publications. In 2009 he was awarded a prestigious NHMRC Australia Fellowship and has been an associate editor of the International Journal of Epidemiology since 2005. John has held academic appointments in the Department of Epidemiology at the University Michigan (USA) and was a Canada Research Chair in the Department of Epidemiology and Biostatistics at McGill University in Montreal (Canada).

*Professor John Lynch's Research Group*

> "Our group is committed to building an evidence base to inform what are the best decisions in policy and practice..."

# Breast Biology and Cancer

Breast cancer is the most common cancer among Australian women, and accounts for 27% of all cancer diagnoses.

The Robinson Institute's Breast Biology and Cancer Group is working to gain greater knowledge about how the breast functions through reproductive life to improve our understanding of why the breast is the most prevalent and susceptible part of the body for cancer growth.

Research leader, Associate Professor Wendy Ingman, says, "The long-term goal of the research is breast cancer prevention. If we can find the underlying cause of breast cancer, then we can take the steps to reduce the susceptibility and incidence of the disease."

Wendy completed her PhD with the University of Adelaide in 2002 and went on to receive a fellowship to study at the Albert Einstein College in New York. Learning and developing new and vital skills in biological research in this way enabled her to return to Adelaide in 2005 and build her research group.

In 2011, Wendy was awarded a Michell McGrath Breast Cancer Fellowship by The Hospital Research Foundation and has established her research group at both The Queen Elizabeth Hospital and the Robinson Institute.

Wendy says "The Queen Elizabeth Hospital is establishing an exciting new research direction. We are setting up a novel clinical approach which will allow us to collect tissue from women having breast surgery. We can then apply what we have learnt in the laboratory to gain a better understanding of what is happening in the breast, and what could increase a women's risk of getting breast cancer."

"It is very exciting to think about improving our knowledge of the big picture with breast cancer, and extend our understanding of the disease to potentially have a major impact on the future of women's health."

# Commercial Development

In 2011, members of the Robinson Institute generated significant funds in contract research and consulting income through relationships with a wide variety of industry partners which supplemented the extensive competitive grant funding that the Institute typically attracts and allowed researchers to benefit from commercial engagement, intelligence and feedback.

*Dr Rebecca Robker*

## Industry Engagement

A number of researchers in the Institute have continued to engage commercially to translate research developments into practice. There is further strong commercial engagement with many researchers in the Robinson Institute.

## Launch of EmbryoGen®

A collaborative partnership between the University of Adelaide, Adelaide Research & Innovation, and ORIGIO a/s, a world leader in Assisted Reproductive Technology (ART) solutions, resulted in the development of EmbryoGen®. EmbryoGen® offers a novel treatment option for women undergoing in vitro fertilisation (IVF) after a history of one or more previous miscarriages.

The EmbryoGen® approach is unique as it focuses on the culture medium used to grow embryos in the laboratory. The registered technique is the culmination of more than two decades' work by Professor Sarah Robertson showing that the natural growth factor, Granulocyte-Macrophage Colony-Stimulating Factor (GM-CSF), supports the development of embryos in vitro and improves the success of IVF treatment. Attracted by the science, and convinced of the commercial applicability of the technology, ORIGIO a/s licensed the intellectual property for the culture medium, and undertook the world's largest fertility media study to verify Professor Robertson's findings, and develop the world's first natural growth factor medium with proven effect.

Launched in mid-2011 and now available in over 40 countries, EmbryoGen® is making a real difference to the lives of families trying to conceive. ORIGIO a/s has received letters from grateful embryologists all around Europe, who have been able to help people as a result of this technology.

## Development of diagnostic for pregnancy complications

As part of the SCOPE (Screening for Obstetrics & Pregnancy End Points) Program, Robinson Institute researchers Professor Gus Dekker and Professor Claire Roberts have formed a collaboration with international diagnostic-based health care company Alere. The collaboration is targeted at developing a commercial test for pregnancy complications such as pre-eclampsia and pre-term birth.

## Embryo selection technology for IVF

Dr Darryl Russell and Dr Kathryn Gebhardt have developed an embryo selection test designed to identify IVF embryos that have the best developmental potential. This technology is being developed in collaboration with an IVF provider whose clinicians are validating the technology in the commercial IVF setting.

## Treatment for female infertility connected to obesity or PCOS

Australia has one of the highest obesity rates in the world, costing $1.5 billion in direct healthcare costs. An astounding 52% of Australian women are classified as overweight or obese, and this figure is continuing to rise.

The incidence of obesity has been found to occur at greater rates in younger women, and has been linked with the onset of Polycystic Ovary Syndrome (PCOS). Obesity is believed to be the main contributing factor to PCOS, and the majority of patients with the condition has insulin resistance and/or is obese.

> "At present, obese women who are sub-fertile, including those with PCOS, are encouraged to lose weight or they are treated with drugs such as clomiphene citrate to stimulate ovulation."

"However, this treatment is often ineffective in obese women, and produces side effects such as hot flushes, breast tenderness, mood swings, and nausea," says Robinson Institute research leader Dr Rebecca Robker.

"Most importantly though, clomiphene citrate treatment can lead to multiple ovulation, which subsequently increases the chance of twins (10% of births instead of the normal ~1%)."

As the prevalence of obesity rises, assisted reproduction technologies such as IVF are increasingly required to achieve pregnancies. Unfortunately, even with these invasive 'treatments', the oocytes of women with obesity and/or PCOS frequently fail to develop to the blastocyst stage.

"Further, research has indicated that offspring conceived in obese mothers, even when gestated in non-obese surrogates, have increased fat mass as neonates and adults. There is an urgent need to develop strategies to break this self-perpetuating cycle", says postdoctoral researcher Linda Wu.

Through their research, Linda and Rebecca have identified a family of compounds that is able to restore normal ovulation rates in obese mice. It has been demonstrated that these same compounds have the potential to restore normal fertilisation and embryo development rates in vitro.

In October 2011 Adelaide Research & Innovation filed a provisional patent to protect applications claiming the use of the technology to improve oocyte developmental competence both in vitro and in vivo.

"The potential applications of this technology are in the treatment of sub-fertility caused by obesity or PCOS, both as an alternative pharmaceutical intervention to clomiphene citrate or as an IVF medium additive," says Rebecca.

## IVF Vet Solutions

Led by Associate Professor Jeremy Thompson, the IVF Vet Solutions business unit provides various services to the IVF market, including the mouse embryo assay (MEA) - a quality assurance test for media and other products used in IVF. The unit is also developing a suite of bovine IVF media, supported by Adelaide Research & Innovation's Commercial Accelerator Scheme. Under the development program, IVF Vet Solutions is producing and supplying research media to collaborating commercial bovine IVF providers, with the goal of validating the media suite in a commercial setting.

## Expert Panel to the NHMRC

A team from the Australian Research Centre for Health of Women and Babies (ARCH) is continuing to provide services to an NHMRC Panel of Providers with Expertise Relevant to the Development and Presentation of Evidence Based Health Advice. Specifically, ARCH have developed dietary guidelines for pregnant and breastfeeding women, as well as obesity guidelines.

## Collaboration with Cook Medical to improve in vitro maturation of oocytes in humans

A collaborative relationship is ongoing between Associate Professor Jeremy Thompson and Dr Robert Gilchrist with the company Cook Medical in Brisbane, Australia and Bloomington, IL, USA, on technologies to improve the in vitro maturation of oocytes in humans.

## Production and supply of antibodies.

Professor David Kennaway has a commercial relationship with Buhlmann Laboratories involving the supply and use of melatonin antibodies. These antibodies are incorporated into commercially available kits to be used in the laboratory for the detection of melatonin, naturally occurring compound found in animals most commonly associated with the sleep – wake cycle.

## Clinical Trials

A number of Robinson Institute researchers are conducting sponsored clinical trials including testing contraceptive delivery using a skin patch for Bayer and pharmaceutical testing for Servier Laboratories.

## Relationship with the Pork CRC

In collaboration with the Pork Cooperative Research Council, Dr Sean O'Leary is developing innovative technologies to improve animal production in the Australian Pork Industry.

## New patent filings

A continuing strong culture of commercial innovation in the Robinson Institute is demonstrated by the filing of several new patent applications in the fields of infertility prevention and diagnostics.

# Clinical Research and the Community

The Robinson Institute has continued to bridge the gap between research discovery and medical practice, with many of the Institute's senior researchers also leading clinicians. The translation from laboratory to medical practice has provided immeasurable benefits to society now and for future generations.

The Robinson Institute has conducted a range of significant clinical trials in 2011 with the aim of providing the best evidence about healthcare options to inform recommendations for clinical practice and further research. New clinical trials and studies stemming from the Robinson Institute in 2011 have included:

- LIGHT Study - Live birth rate in vitro fertilisation and Growth Hormone Treatment;
- MAGENTA Trial - Magnesium sulphate at 30 to 34 weeks' gestational Age for neuroprotection;
- IRIS Trial - Different Infusion Rates of Magnesium Sulphate Before Preterm Birth for neuroprotection;
- AMICABLE - Antenatal Magnesium IPD International Collaboration: assessing the benefits for babies using the best level of evidence;
- WISH Study - Working to Improve Survival and Health for Babies Born Very Preterm;
- PRECISE Study - Prenatal Repeat Corticosteroid International IPD Study Group: assessing the effects using the best level of Evidence;
- Asthma Action Plan;
- IMPART Study - The links between IVF-born Children, Obesity and Diabetes; and
- MOSCAD Study - The Maturation of Motor Inhibitory Pathways in the Brain.

In addition to clinical trials and studies, the Robinson Institute has retained a strong commitment to delivering cutting-edge, reviewed science directly for the benefit of patients and training of future doctors.

The 2011 establishment of the Adelaide Women's Health Centre by the Robinson Institute's Dr Jane Elliott, has been an important step in this direction. The Centre is the first of its kind in South Australia.

## LIGHT Study

Almost all women who go through one or more cycles of in vitro fertilisation (IVF) receive injections of a follicle-stimulating hormone; this enables the ovaries to produce several eggs that can be fertilised in order to create more than one embryo in any single cycle.

A number of women respond poorly to this drug and produce very few eggs, creating few embryos and thereby reducing their chance of becoming pregnant through IVF.

The LIGHT Study is examining whether human growth hormone administered to a woman who has not responded well in a previous IVF cycle improves the chance of pregnancy in a subsequent cycle.

Study leaders Professor Robert Norman and research nurse Helen Alvino says, "This is a collaborative study among 9 IVF units in Australia and New Zealand. Together we are seeking to gain a definitive answer regarding the value of human growth hormone in IVF and its ability to increase the chance of pregnancy by IVF."

While human growth hormone has been administered in high doses for short-term use in IVF, it is not yet recognised as a proven treatment for women who are poor responders in an IVF cycle. The LIGHT Study is based on a review of several trials in which women who received growth hormone showed a trend towards an improvement in the outcome of their IVF cycle.

The growth hormone administered to patients in the LIGHT Study is the same as the hormone found naturally in our bodies, but it is made in a laboratory. Growth hormone is normally used for children and adults who have a deficiency of natural growth hormone as well as in girls with Turner Syndrome.

In the LIGHT Study, women who are interested and eligible to be a participant will be given either injections of growth hormone or a placebo as part of their regular IVF treatment cycle.

When the study is finished, all participants will be able to find out what drug they received, and will receive a summary of the overall results.

"We are hoping data from the LIGHT Study will answer an important question for women who have had a poor response to ovarian stimulation in an IVF cycle. We can address the question does the addition of growth hormone increase the chance of having a livebirth as a result of the IVF cycle?," says study coordinator Helen Alvino.

"Current research to date suggests a trend to improving the outcome of IVF for this group of women but this is not proven yet. We hope the LIGHT Study will address this gap in our knowledge."

For more information visit the LIGHT Study webpage www.adelaide.edu.au/light-study/


Samantha Coleman

## Asthma Action Plan

Asthma is the most prevalent complication to affect human pregnancy in Australia, affecting 12% of pregnant women. Prevalence is expected to increase to 20% in the next five years.

Data from the SA Health Perinatal database suggests that maternal asthma contributes to 20% of all preterm births, 15% of all stillbirths and 15% of all growth restricted fetuses.

Furthermore, babies of asthmatic mothers are 25% more likely to require a prolonged stay in hospital (more than 28 days). Therefore, practical clinical solutions for reducing the burden of this disease on mother and baby are urgently required.

Research in the Robinson Institute's Pregnancy and Development Group has shown that pregnant women with asthma require a review of their asthma management during pregnancy.

However, unless these women are identified as having severe asthma, it is not known if the engagement of specialist physicians in the review of these patients is necessary to achieve improved outcomes for mother and infant, or if it is cost effective. An asthma management service conducted by a respiratory nurse provides an alternative approach for the introduction of education for asthma self-management skills and the provision of an asthma action plan.

"We are currently examining the differential cost and clinical effectiveness of models of enhanced service using a randomised controlled trial. Given the scarcity of available health resources, the estimation of the costs required to generate positive health benefits is important to establish whether our previous research findings can be translated into an effective clinical practice integrated with routine antenatal services," says research leader Associate Professor Vicki Clifton.

"We are trialing nurse-led preventative health care using specially trained respiratory nurses to provide essential components of an asthma management service in the antenatal clinic."

Importantly, the method could be applied for use in all disciplines of health. Nurse-led clinics may present a cost-effective means of managing most chronic diseases, therefore prioritising doctors' time and expertise to focus on more urgent and severe cases.

The development and promotion of nurse-led services is an initiative of the Federal government to address gaps in health care and streamline services and in so doing, to improve their cost-effectiveness.

The data generated from this study will provide strong evidence in support of new policies for the care of pregnant asthmatic women.

"The project will also provide evidence for models of health service delivery that can be introduced in any setting where pregnant women are cared for, which include hospitals, general practice offices and regional health services. Finally, the rigorous assessment of this model of service will influence policy on the scope of practice and education in nursing and midwifery," Vicki notes.

"We are currently examining the differential cost and clinical effectiveness of models of enhanced service using a randomised controlled trial."

# The Adelaide Women's Health Centre

In 2012 the University of Adelaide and Unicare opened The Adelaide Women's Health Centre at the Robinson Institute headquarters at 77 King William Street in North Adelaide. The Centre is the first of its kind in South Australia, bringing together some of the most highly qualified reproductive health specialists in the state to offer women's health services in a setting which facilitates research and clinical training for senior medical students.

Health services offered at the clinic will include contraception, pre-menstrual syndrome, polycystic ovary syndrome, sexually transmissible infections, pre-conception counseling, menstrual problems, low libido, menopause, osteoporosis and all psychological aspects of women's health.

The Centre will provide valuable clinical training opportunities for the next generation of doctors, matching fifth-year University of Adelaide surgical and gynaecology medical students with individual GP specialists on a rotational basis.

Clinical trials relating to obstetrics and gynaecology will also be undertaken at the Centre to ensure the latest research outcomes are put into practice.

"The breadth of services we are offering at the Adelaide Women's Health Centre is a first for this city," Dr Elliott says.

"It is important that women have access to holistic advice when seeking treatment for reproductive health issues. GPs with a special interest in women's health are in a good position to provide this, with support from specialist colleagues in the team."

The project is the brainchild of three of Adelaide's most experienced reproductive health care practitioners and research leaders at the Robinson Institute - menopause specialist Dr Jane Elliott, Professor of Obstetrics and Gynaecology Alastair MacLennan and endocrinologist Professor Rob Norman.

The Adelaide Women's Health Service is jointly run by the University of Adelaide and Adelaide Unicare, a University-owned general practice service.

"It has taken two years to get this project off the ground with the help of Federal Government funding. Individual women will be the biggest winners initially but this service will benefit the whole community in the long term," Dr Elliott says.

*Dr Jane Elliot Leader of AWHC*

# Key Collaborations

Important collaborative links are vital in building relationships and the research capacity of the Robinson Institute and for building on our networks with other researchers and the community.

Within the University of Adelaide, the Robinson Institute has strong collaborations with the School of Paediatrics and Reproductive Health, the Faculty of Health Science, and the Faculty of Sciences.

Furthermore, the Robinson Institute has numerous collaborations with external educational and research institutions both in Australia and internationally. Other key partners of the Robinson Institute include:

## Hospitals

The Robinson Institute and its research Centres are embedded in South Australia's health system; close affiliations exist with the Women's and Children's, the Lyell McEwin, The Queen Elizabeth, Modbury and the Royal Adelaide Hospitals. This ensures access to clinical material and health policy influence that is unique.

## SA Pathology and Hanson Institute

The Institute has a strong link to SA Pathology and the Hanson Institute through our Centre for Stem Cell Research.

## Children's Research Centre

The Children's Research Centre of the University of Adelaide is an affiliate research centre of the Robinson Institute. The Centre is an innovator in the prevention, treatment and cure of chronic childhood illness before it manifests as permanent adult disease.

Based within the Women's and Children's Hospital, the Centre focuses on research into the reversal of childhood diabetes, asthma, cystic fibrosis, allergy, and bone impairments. It also pioneers interventions for sleep, gut, mental health, neurological and immune disorders, and studies the safety of new and existing vaccines.

## Cook Medical

The University of Adelaide has a strong relationship with Cook Medical, a world leader in the production of reproductive technologies and products, through the Robinson Institute.

Cook Medical is a collaborator with our Institute on a number of projects including the Cook Medical Adelaide Fellowship, as well as collaborating with some of our researchers on a research project looking at reproductive technologies.

## Healthy Development Adelaide

Healthy Development Adelaide (HDA) is a Research & Innovation Cluster in South Australia. HDA promotes, facilitates and undertakes research that advances multidisciplinary understanding of healthy development by combining research strengths addressing high priority research issues. Its aim is to ensure the physical, psychological and social health of Australian infants, children and adolescents.

HDA has over 150 members and fosters research in over 20 disciplines across the state with a focus on developing a portfolio for South Australia in developmental health research. HDA crosses many sectors including government, health service, university, allied health, associations, and the general community. In 2009, HDA was the winner of the Excellence in Research Collaboration at the SA Science Excellence Awards.

HDA was established in 2004 as an initiative of the University of Adelaide and was led by Professor Robert Norman (Director of the Robinson Institute), Professor Caroline McMillen (formally University of South Australia, now at University of Newcastle) and Professor Michael Sawyer (University of Adelaide / Women and Childrens' Health Network). HDA has developed very strong research links within the Robinson Institute, with around 22% of members researching within the areas of reproductive biology through to child health. These research links have enhanced HDA's capacity in these areas. For more information on HDA and our partners see www.adelaide.edu.au/hda

## Jean Hailes Foundation for Women's Health

The Robinson Institute collaborates with the Jean Hailes Foundation for Women's Health through the establishment of the National Alliance on Polycystic Ovarian Syndrome (PCOS). The initiative brings together multidisciplinary clinicians, women with PCOS, researchers and government.

The National PCOS Alliance is designed to provide a single voice for polycystic ovarian syndrome and has agreed on a vision to improve the lives of Australian women with PCOS through education, research and evidence-based health care.

## Institute for Photonics and Advanced Sensing

In 2010, the Robinson Institute began collaborating with the University of Adelaide's Institute for Photonics and Advanced Sensing to develop new technologies to advance reproductive health research and practice. This followed a successful grant from the Premier's Science and Research Fund from the South Australian Government of $700,000.

## Fertility clinics

Researchers of the Robinson Institute are involved in clinical practice at and research development of two leading fertility clinics in Adelaide: Fertility SA and Repromed.

## Women's and Children's Health Research Alliance

The Robinson Institute is party to an ongoing discussion between the Women's and Children's Hospital, Women's and Children's Hospital Foundation, Women's and Children's Health Research Institute, SA Pathology, and other research groups at the Women's and Children's Hospital. This alliance seeks to improve the research outcomes on the site by ensuring appropriate research facilities and collaborations.

## Fertility Coalition

The Fertility Coalition, comprised of The Robinson Institute working with the Victorian Assisted Reproductive Treatment Authority (VARTA), Jean Hailes for Women's Health and Andrology Australia was established in 2011 to launch Your Fertility. The campaign aims to provide accurate, evidence-based information about fertility to people who want to conceive. The Coalition is supported by funding from the Australian Government Department of Health and Ageing under the Family Planning Grants Program. For more information visit www.YourFertility.org.au


# Your Fertility

The Robinson Institute is part of a new national campaign that hopes to raise the public's understanding of the basics behind fertility. The Your Fertility campaign aims to empower those who want children, or more children, to make lifestyle choices that will help them conceive and have healthy babies.

Your Fertility is run by the Fertility Coalition, a partnership between the Robinson Institute and the Victorian Assisted Reproductive Treatment Authority (VARTA), Andrology Australia and Jean Hailes for Women's Health.

The Your Fertility campaign is a response to an increasing number of Australians having a family later in life and experiencing fertility issues. In 2009, 23% of mothers giving birth in Australia were 35 years of age or older, compared with 17% of mothers in 2000.

"It is an obvious statement to make, but the ability to have children and to have healthy children affects both men and women – both parents need to know the facts about how age and key lifestyle factors can affect fertility," Professor Robert Norman, Robinson Institute Director says.

"A person's age, being over or underweight, smoking and heavy alcohol consumption can all reduce a person's fertility and put a baby's health at risk. While there is some general understanding about fertility issues in the community, there are many people who still do not understand some of the most basic factors in conceiving and having healthy babies."

In a national survey conducted for Your Fertility, only 20% of people could correctly identify that the fertility of women starts to decline when they are in their early 30s. Only 9% of Australians knew that men's fertility starts to decline post-45.

The Your Fertility website will include information about each of the key lifestyle factors, plus an ovulation calculator and an opportunity to test your fertility knowledge with the Your Fertility quiz. The Your Fertility blog, available at the site, will keep subscribers up to date with the latest news, research findings and tips about how to increase their chances of getting pregnant and having a healthy baby.

Visit www.yourfertility.org.au for further information.

# Australian Alliance delivers first evidence-based guideline for PCOS

The Robinson Institute has collaborated with other Australian experts to develop the world's first accessible evidence-based guideline for polycystic ovary syndrome (PCOS), a hormonal condition with reproductive, metabolic and mental health impacts.

The Evidence-based guideline for the assessment and management of polycystic ovary syndrome was funded by the Australian Department of Health and Ageing and is the culmination of two years of work from the PCOS Australian Alliance.

The guideline provides thirty-eight recommendations addressing four key areas:

- challenges of assessment and diagnosis
- assessment of emotional wellbeing
- lifestyle management
- fertility

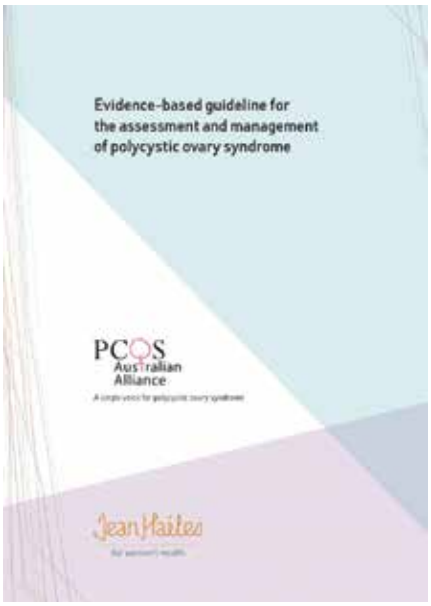
Importantly, the guideline addresses the long-term complications of PCOS including increased risk of diabetes, cardiovascular disease, obesity, depression and anxiety.

Jean Hailes and Professor Helena Teede led the guideline development and found the experience inspiring. "Bringing together an internationally renowned multidisciplinary team of experts with evidence synthesis experts, consumers and a strong translation team has led to the development of a guideline that should improve early diagnosis and clinical care in PCOS."

Robinson Institute Director, Professor Robert Norman, Chair of the PCOS Australian Alliance says, "the guideline will have significant benefits for women and their health professionals. For the first time, health professionals and patients can get unbiased, objective information on how to manage this condition."

"They can trust that their treatment plans are going to be effective, up-to-date and worth the money and effort. Health services can also determine the most valuable approached to provide care for these patients and structure services so health professionals can be most effective."

PCOS is one of the most common endocrine disorders, affecting 11% of Australian women of reproductive age and 21% of indigenous women. It is the most common cause of anovulatory infertility, often leading to IVF therapy for infertility and pregnancy complications. Up to 70% of women with PCOS remain undiagnosed.




# Murdoch collaboration on Aboriginal Families Study

The study invited over 600 mothers of Aboriginal babies from across South Australia to talk about pregnancy and birthing care, and the support they had from services during and after pregnancy.

Research leader Stephanie Brown says "The Aboriginal Families Study aims to ensure that the voices of Aboriginal women and families are accessible to policymakers, health service managers and service providers as evidence to inform ongoing efforts to strengthen services."

Compared with non-Aboriginal infants, Aboriginal babies are three times more likely to die before their first birthday, twice as likely to be of low birth weight, almost three times more likely to suffer fetal growth restriction, and almost twice as likely to be born preterm. Furthermore, Aboriginal women are approximately five times more likely to die in childbirth or from childbirth-related causes compared to non-Aboriginal Australian women.

"The project addresses a major evidence-policy-practice gap and is at the forefront of efforts to work across the interface of policy, health services and community to design and implement strategic, policy relevant research needed for Australia to achieve sustained improvements in the health of Aboriginal women and children," Stephanie said.

The project is being conducted in partnership with the Aboriginal Health Council of South Australia, involving collaborations within SA Health and the Robinson Institute, and is funded by the National Health and Medical Research Council, Rio Tinto Aboriginal Fund and SA Health.

*Stephanie Brown*

Researchers from the Murdoch Children's Research Institute were based at the Robinson Institute in 2011 to conduct landmark research into indigenous health.

# Supporting our Researchers

## Funding Programs

The New Directions funding scheme aims to diversify research proposals from the Robinson Institute. The overall goal is to reduce competition for funds amongst Robinson Institute members by supporting applications to alternate funding bodies or NHMRC assessment panels.

**In 2011 the following members received this funding:**

**Researchers:** Dr Annette Osei-Kumah and Associate Professor Vicki Clifton (EOHaD)

**Project:** 'Characteristics of maternal immune phenotypes associated with worsening of asthma during pregnancy'.

**Awarded:** $15,000

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**Researchers:** Dr Emily Steele and Associate Professor Vivienne Moore (EOHaD)

**Project:** 'Economic barriers to childbearing: from evidence to policy considerations'

**Awarded:** $14,946

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**Researchers:** Dr Julia Pitcher and Associate Professor Michael Ridding (EOHaD)

**Project:** 'Genetic influences on cortical connectivity and neuromotor plasticity'.

**Awarded:** $13,842

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**Researchers:** Dr Rosalie Grivell, Dr Lisa Moran and Professor Jodie Dodd (ARCH)

**Project:** 'Pre-pregnancy dietary and lifestyle intervention for women who are overweight or obese to improve pregnancy outcomes: a randomised trial'.

**Awarded:** $15,000

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**Researchers:** Dr Tamara Varcoe and Professor David Kennaway (RCRH)

**Project:** 'Circadian aspects of the immune response to mating'.

**Awarded:** $14,315

The Collaborative Research Program aims to encourage collaboration amongst RI research groups, harness the capabilities of research groups across areas and drive the development of new and highly competitive research projects that answer major research questions.

**In 2011 the following members received this funding:**

**Researchers:** Professor David Kennaway, Dr Rebecca Robker and Dr Darryl Russell

**Project:** 'Identification of the circadian transcriptome in the mouse oviduct during the pre-implantation period'.

**Awarded:** $12,097

**Outcome:** This program encouraged three research groups to collaborate to investigate a significant aspect of reproductive biology. Researchers involved in this collaboration are confident that results will be publishable and offer a greater insight into the processes which occur during the pre-implantation period. In the future these results may also lead to significant external grant funding

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**Researchers:** Associate Professor Michael Davies, Associate Professor Leonie Heilbronn, Professor Robert Norman & Professor Julie Owens

**Project:** 'Does IVF impair insulin sensitivity?'

**Awarded:** $10,000

**Outcome:** From this project researchers in this collaboration have discovered that IVF-born individuals are more likely to be more insulin resistant and have notably higher fasting insulin following overfeeding with a high fat diet. With this data the researchers were able to attract a 2012 Channel 7 Research Foundation Funding and now have plans to extend this project.

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**Researchers:** Associate Professor Michael Davies and Dr Catherine Gibson

**Project:** 'Is loss of co-twin a risk factor for birth defects in singletons born following infertility treatment?'.

**Awarded:** $10,000

**Outcome:** This project identified that the loss of a co-twin by 6-8 weeks of pregnancy is related to birth defects in the survivor. Twins without fetal loss seem to not to be at an overall increased risk of birth defects compared to singleton pregnancies.

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**Researchers:** Associate Professor Simon Koblar and Associate Professor Michael Ridding

**Project:** 'Transcranial Magnetic Stimulation of stem cells in the mammalian brain'.

**Awarded:** $12,000

**Outcome:** This funding has encouraged the set up of a new collaboration and research initiative. If encouraging results are obtained from this project then further grant applications to large, external funding bodies will be able follow, with potential for further studies to take place.

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**Researchers:** Dr Claire Jessup, Associate Professor Toby Coates and Dr Claudine Bonder

**Project:** 'Endothelial progenitor cells and sphingosine kinase in islet transplantation'.

**Awarded:** $12,000

**Outcome:** This program allowed for the strengthening of collaboration between three co-investigators and their research that will potentially impact the outcomes for Type 1 diabetic patients in the future.

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**Researchers:** Dr Wendy Ingman, Dr Carmella Ricciardelli, Dr Darryl Russel and Dr David Sharkey

**Project:** 'Extracellular matrix-macrophage crosstalk in the mammary gland'.

**Awarded:** $12,000

**Outcome:** This project initiated new collaborations with the Memorial Sloan Ketrering Cancer Centre (USA), the University of Southern California (USA) and Dame Roma Mitchell Cancer Laboratories (South Australia). The project is now being funded by a National Breast Cancer Foundation Novel Concept Award. This project has attracted other researchers to the team who hold skills needed for this project.

The Collaborative Research Program aims to encourage collaboration amongst RI research groups, harness the capabilities of research groups across areas and drive the development of new and highly competitive research projects that answer major research questions.

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**Researchers:** Professor David Kennaway, Dr Rebecca Robker and Dr Darryl Russell

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**Project:** 'Extracellular matrix-macrophage crosstalk in the mammary gland'.

**Awarded:** $12, 000

The Early Career Researcher (ECR) grant aims to support applications to national competitive funding bodies, whilst providing seed funding for the recipient to investigate new research areas. The grant aims to attract Honours and higher degree research students to provide them with an opportunity for professional growth.

In 2011 this was awarded to Dr Michael Stark from the Centre of Early Origins of Health and Disease for his project 'Role of the placental heme-oxygenase pathway in regulating preterm neonatal cardiovascular function'.

Robinson Institute Scholarships are aimed at attracting high quality students to the research programs of The Institute and its constituent Centres. Successful recipients in 2011 were:

- Emily Bain (Centre of Health and Women and Babies) for her project 'Antenatal magnesium sulphate: different regimens for fetal neuroprotection and maternal adverse effects of treatment'. Supervision by Professor Caroline Crowther.
- Sam Buckberry (Research Centre for Reproductive Health) for his project 'Gene specific methylation in pregnancy complications'. Supervision by Professor Claire Roberts.
- Anna Ehmann (Research Centre for Reproductive Health) for her project 'Evolution and regulation of retrovirus derived placentation genes in mammals'. Supervision by Professor Frank Grutzner.

## Professional Development Programs

In 2011, six research groups participated in the Navigate to Publication Success Program, a joint initiative of the Robinson Institute and School of Paediatrics and Reproductive Health. The aims of the program were to:

- Support and develop research groups of the Robinson Institute and School of Paediatrics and Reproductive Health;
- Introduce strategic planning into the publication process, including addressing how team and individual resources can be managed to improve publication productivity;
- Create an energized and motivational ethos and mindset within the organization by focusing on the creation of a positive and supportive atmosphere. This philosophy will contribute to overall staff efficiencies and effectiveness in the use of resources and publication productivity; and
- Improve work-life balance by reducing workload and stress.

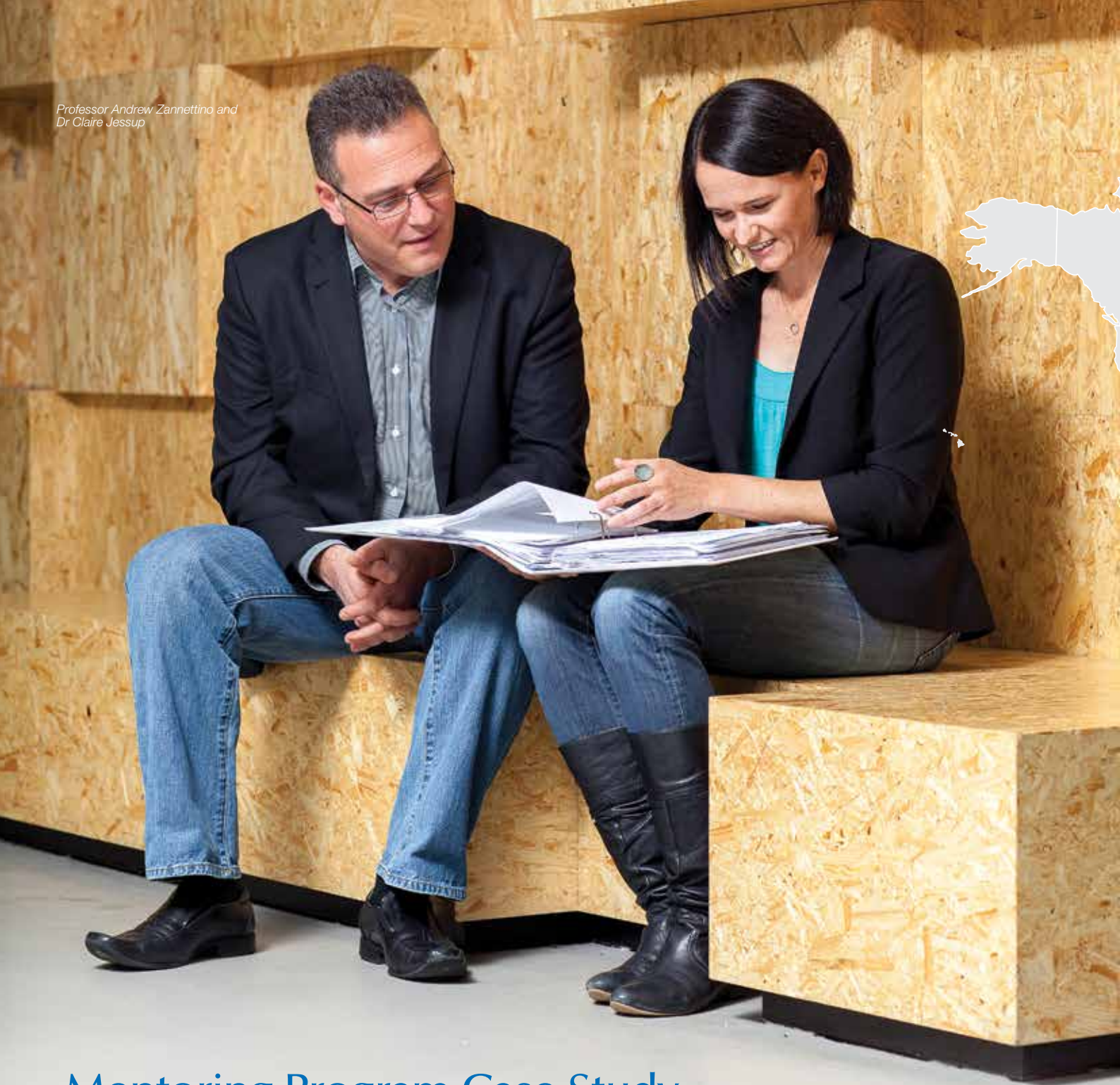
## The Mentoring Program (11 Mentors and Mentees)

The mentoring program has been established as an important step to career orientation and personal development for members of the Robinson Institute. Mentors, typically senior researchers or research leaders, volunteer their time to mentor early-career researchers and offer to support them in further developing their career pathways and skill sets. The mentoring program has also created an opportunity for researchers to build networks for potential future collaborations and has provided an opportunity for members to engage in leadership roles. Mentees are matched with Mentors according to their research interests and specific requirements . The program has now run for two years and has proven to be of great benefit to both Mentees and Mentors.

In 2011, the Robinson Institute offered sessions on professional skills as part of their Personal Growth Program, aiming to:

- provide a professional development program for all members and staff of the Institute that goes beyond the scope of traditional research skills and extends personal growth in areas such as leadership, innovation, communication and collaboration;
- create an interactive environment that promotes cohesion amongst members and builds professional and personal relationships;
- encourage member engagement in the development and implementation of new Institute strategies;
- inspire members to make significant and innovative contributions in their teams, their organisations and their communities; and
- build a dynamic and productive working environment within the Robinson Institute, where members are engaged, motivated, passionate and proud.

In 2011, the Robinson Institute continued to support high school and university students with the opportunity to participate in work experience. The Work Experience Program provides mutual benefit to both the Institute and its members. We welcome students to apply and encourage the support of students by our members.



*Professor Andrew Zannettino and Dr Claire Jessup*

# Mentoring Program Case Study

Postdoctoral Research Fellow Dr Claire Jessup was mentored by Professor Andrew Zannettino (Head of the Myeloma Research Laboratory, Centre for Stem Cell Research) in 2011, and found the program beneficial to her research career.

"Being a postdoctoral researcher within a clinically-based department, I sometimes found it difficult to access mentoring from senior researchers. As a dedicated, successful researcher Andrew was able to provide me with direction, and often a fresh perspective, when I needed advice during some decision-making periods this year."

The program assists Robinson Institute members to gain an understanding of the broader Institute and its other departments, how they fit into the Institute and the value and potential of the work they do from a broader perspective.

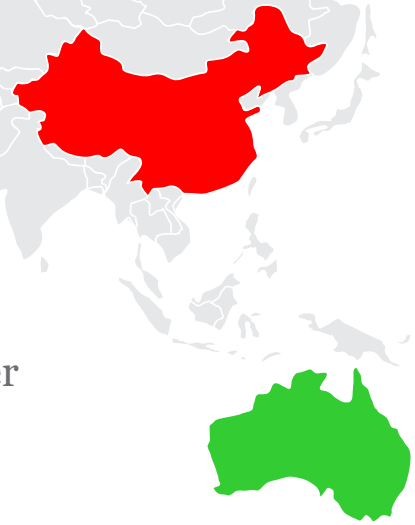
"Having Andrew 'on call' for mentoring and advice was extremely valuable for me. We were in frequent contact over the 8 months of the program. Andrew has provided feedback on my grant applications and acted as a reference for an Early Career Fellowship application, which I was successfully awarded. I'm very thankful I had such a dedicated mentor!"

The program also encourages research leaders to impart their knowledge to the next generation of scientists. Mentor Andrew said, "the mentoring program provided me with an opportunity to guide the career of an up-and-coming research scientist".

"The program provided me with an opportunity to reflect on my own career path and to determine the things that I could have done better. It has also helped me interact better with my own staff and students," Andrew says.

The Robinson Institute will continue the Mentoring Program in 2012.

# The Cook Medical Adelaide Fellowship



The Fellowship aims to build collaborations between the University of Adelaide and a number of women's health units in the People's Republic of China.

Cook Medical is a world leader in the production of new IVF technologies and products, including culture media, devices and equipment.

The aim of the fellowship program is to open the potential for new, ongoing and long-term collaborations between Adelaide and China in the future, including supporting prominent young researchers in both Australia and China and strengthening the depth and quality of the research programs within the Robinson Institute and respective universities and institutions in China. In 2011 Institute researchers Dr Rob Gilchrist and Dr Rebecca Robker were the successful fellowship recipients from the Robinson Institute.

Dr Haito Zeng, from the Department of Obestetrics and Gynaecology, 3rd Affiliated Hospital of Sun Yat-Sen University, China, was the Chinese recipient of this Fellowship.

## Dr Rebecca Robker's Experience

Dr Rebecca Robker's research interests lie in understanding how obesity affects female fertility.

"There is fascinating new evidence showing that the earliest stages of embryo growth are controlled by the nutritional state of the mother at the time of conception, and my research team is finding that this is also true for obesity", Rebecca says.

"We have made discoveries in mice showing that obesity causes 'lipotoxicity' in the oocyte complex and that this damages the oocyte and leads to suboptimal embryo growth. Our goal now is to build on our results and determine whether lipotoxicity also occurs in the ovarian cells of obese women or women with Polycystic Ovary Syndrome (or PCOS), a common endocrine disorder associated with obesity and altered blood lipid levels. This information would allow us to define these cellular pathways and enable us to develop strategies to reverse lipotoxicity, restore embryo growth and alleviate female infertility".

In order to address these questions, Rebecca applied for the Cook Medical Adelaide Fellowship in order to set up a clinical collaboration with the Reproductive Medicine Centre of the Sixth Affiliated Hospital of Sun Yat-sen University, China. Rebecca had previously supervised PhD student Dr Xing Yang from this same University when he visited the Robinson Institute.

The clinic at the Chinese University is headed by Professor Xiang Liang and has a strong international reputation due to its achievement of the first successful assisted reproduction births in China. It is located in Guangzhou, a city with a population of well over 12 million, and attends to more than 200 patients each day.

"China is also one of the nations where obesity rates are climbing rapidly due to changing lifestyles. Thus, collaboration with this team would allow us for the first time to examine the extent of lipotoxicity in ovarian cells of Asian women and gain a much more global view of how obesity is impacting female reproductive health worldwide", says Rebecca.

During her visit to China, Rebecca visited Dr Yang and Professor Liang at the Reproductive Medicine Centre of The Sixth Affiliated Hospital of Sun Yat-sen University, and worked with staff to establish the clinical work-flow for tissue collections and for laboratory analysis.

Rebecca stated "because of the Fellowship I now have a 'formalised' and very active collaboration with a highly capable and respected group in China. I had the opportunity to meet the esteemed Professor Liang in person and see the running of her clinic first-hand".

*Dr Rob Gilchrist*

## Dr Robert Gilchrist's Experience

Dr Robert Gilchrist's research interests are in Oocyte Biology, particularly oocyte-somatic cell communication, as well as ovarian endocrinology, specifically preimplantation embryo development and oocyte in vitro maturation (IVM) as an alternative to clinical in vitro fertilisation (IVF) for the treatment of infertility.

Dr Gilchrist applied for the Cook Medical Adelaide Fellowship for the opportunity to strengthen current relationships and establish new relationships with key reproductive medicine units in China, to facilitate Australia-China collaborations and open up opportunities for clinical trials.

"China is investing heavily in biomedical and clinical research in an effort to establish itself as a country that conducts quality Western-style science and medicine and is making very rapid progress in this area. However, there are still significant resource and cultural barriers", he says.

"China is reaching out to Western countries to facilitate and partner in this process and there is a major opportunity for Australian universities in this regard. In terms of reproductive medicine, China has enormous IVF units, nearly all of which are university/public hospital based. This means that there are substantial opportunities to conduct large-scale pre-clinical or clinical trials in a university-based environment (compared to private IVF units in Australia)", Rob said.

During his stay Rob visited six institutes and was able to engage in a number of collaborative discussions. He felt that the highlight of his trip was "the collaborative discussions with Professor Xuefeng Huang and Professor Zhaojun Zhao at Wenzhou Medical College, and the potential to establish a large clinical trial with this unit in the near future".

"The Cook Medical Adelaide Fellowship has greatly strengthened the research profile of my own group, the Robinson Institute and the University of Adelaide in China. It has provided substantial opportunities for pre-clinical and clinical research trials to be conducted in partnership with a number of Chinese institutes, and secured three senior or post-doctoral scientists to join my research group this year for joint collaborative research projects".

*Dr Haito Zeng*

## Dr Haitao Zeng's Experience

Dr Zeng's work addresses the management and improvement of an applied research program with the objectives of improving oocyte IVM technologies in animals and women. This technology has important practical implications as an alternative to hormone-stimulated IVF as the predominate treatment of human infertility. Dr Zeng said that he applied for the Fellowship because "the Robinson Institute is one of the most famous reproductive research centres in the world, and has done a lot of work in basic and applied aspects of ovarian folliculogenesis, oocyte maturation and preimplantation embryo development".

Dr Zeng is currently working in the Oocyte and Early Embryo Development group under the supervision of Associate Professor Jeremy Thompson and Dr Robert Gilchrist.

"My work here in Adelaide, and Dr Gilchrist's visit in Guangzhou, opened the potential for new, ongoing and long-term collaborations between Guangzhou and Adelaide in laboratory and clinical studies in IVM and PCOS in the future. It strengthened the depth and quality of the research programs within the Robinson Institute and Sun Yat-sen Universities."

"In the next year, staff of the two universities are planning to apply for research funding supported by the government of China and Australia, and to continue our co-operational research work about in vitro maturation of oocytes in my reproductive centre in China and the Robinson Institute".

# Jeffrey Robinson Scholarship

## In 2011, the Robinson Institute offered a Scholarship in honour of Emeritus Professor Jeffrey Robinson to an outstanding Honours student Emily Bain.

Emily has a keen interest in public health research, with a particular focus on research that can lead to the prevention of illness, enhancement of health equality and improvement in population health.

Emily applied for the Jeffrey Robinson Scholarship to improve her research skills and experiences. In addition to the financial support that the Scholarship gave her, Emily also participated in the Robinson Institute Mentoring Program and was able to network and gain guidance from other researchers in the Institute – including Professor Robinson himself.

In her Honours year Emily worked with the Institute's Australian Research Centre for Health of Women and Babies (ARCH), on her project entitled 'Antenatal magnesium sulphate: different regimens for fetal neuroprotection, and maternal adverse effects of treatment'.

Alongside her supervisors Professor Caroline Crowther and Philippa Middleton, Emily developed skills in systematic review writing, research synthesis and conducted two systematic reviews – one Cochrane review, assessing 'Different magnesium sulphate regimens for neuroprotection of the fetus,' and one further review, assessing 'Maternal adverse effects of antenatal magnesium sulphate.'

"I feel very fortunate working as a part of the highly successful and internationally-recognised Robinson Institute and School of Paediatrics and Reproductive Health".

"The Jeffrey Robinson Honours Scholarship allowed me to more fully dedicate my Honours year to gaining research skills and experience. I was thrilled to achieve first-class Honours, and to be awarded the 'Most Outstanding Honours Student for the Discipline of Obstetrics and Gynaecology' in 2011."

Since completing her Honours year, Emily has continued working with the ARCH and had the opportunity to present her Honours work in Sydney at the 6th Annual Congress of the Perinatal Society of Australia and New Zealand in March 2012.

Emily is still a part of the Robinson Institute, working on the WISH Project (Working to improve survival and health for babies born very preterm), which is focused on improving national implementation of the Clinical Practice Guidelines on Antenatal magnesium sulphate prior to preterm birth for neuroprotection of the fetus, infant and child to reduce the risk of very preterm babies dying or having cerebral palsy. Emily also works in the field of research synthesis, supporting Australian authors to prepare and update Cochrane Pregnancy and Childbirth reviews.

# Collaborative Research Funding Scheme Case Study

The Collaborative Research Funding Scheme was established to foster and support new collaborations within the Robinson Institute by funding small projects that investigate new research ideas.

Associate Professor Leonie Heilbronn, Head of the Diabetes and Obesity group, was successful in receiving funding to investigate if in vitro fertilisation (IVF) impairs insulin sensitivity. Leonie collaborated with the Institute's Professors Robert Norman and Julie Owens, and Associate Professor Michael Davies on the study.

IVF accounts for approximately 3% of live births in Australia and this number is increasing with the rising prevalence of obesity, and as parents are delaying having children.

"There is emerging evidence to suggest that individuals conceived through IVF may be at increased risk of obesity and related conditions later in life, however this has not been well studied to date," Leonie says.

"The aim of this project was to examine whether individuals conceived through IVF have altered metabolism under standard diet conditions or in response to a high fat overfeeding diet designed to induce insulin resistance."

With the preliminary data, the group was successful in obtaining Channel 7 Research Foundation Funding and now plans to extend the project and take their findings to date into the laboratory to assess mechanisms (both epigenetic and insulin signaling pathways in muscle and adipose tissue) which predispose these individuals to insulin resistance.

> "The results from this study will help answer growing questions of the future health of IVF children."

Research Centres

# Australian Research Centre for Health of Women and Babies (ARCH)

**Centre Director**
Professor Caroline Crowther

**Co-Directors**
Professor Jodie Dodd
Philippa Middleton

# The vision of the Australian Research Centre for Health of Women and Babies (ARCH) is to attain the best health and wellbeing possible for women and their babies through excellence and leadership in research, education and knowledge transfer.

Guided by our strategic initiatives that are aligned with the University of Adelaide, ARCH research leaders and staff provide comprehensive expertise in research methods, clinical care of mothers and babies, study coordination, psychological assessment, data management, statistics, administration, research synthesis and knowledge translation.

ARCH is the national coordinating centre for the Cochrane Pregnancy and Childbirth Group (Australian Review Authors Group for the Cochrane Pregnancy and Childbirth Collaborative Review Group).

Our Centre conducts high quality and timely maternal and perinatal research encompassing the spectrum from preconception through pregnancy and childbirth, infancy and later life through its six research divisions:

- Research Synthesis
- Clinical Studies and Trials
- Translational Research
- Indigenous Maternal and Perinatal Health
- Research Networks and Education
- International Maternal and Perinatal Health

Through the Research Synthesis Division ARCH conducts, promotes and supports the preparation and updating of high quality systematic reviews of the existing evidence on questions of relevance to women and babies in Australia, regionally in South East Asia, and internationally.

Within the Clinical Studies and Trials Division ARCH focuses research around nine key themes; Preterm Birth, Obesity, Diabetes, Maternal and Fetal Medicine, Term Birth, Multiple Pregnancy, Cerebral Palsy, Obstetric Medicine and Perinatal Ethics and Decision Making.

ARCH's Translation Research Health Division focuses on promoting evidence-based practice in women's and babies' health by the dissemination and implementation of clinical research findings into clinical practice. We achieve this by participating in guideline development, guideline methods and conducting implementation studies.

Through the Indigenous Maternal and Perinatal Health Division ARCH has continued to maintain and build collaborations with indigenous organisations, has contributed to policy knowledge, and has endeavoured to seek collaborative research and evaluation opportunities.

In addition, ARCH has continued to provide high profile research opportunities by identifying research gaps and defining research questions of major importance in maternal and perinatal health through Research Networks and Education Division.

Within the International Maternal and Perinatal Health Division ARCH has widened its international network of collaborators through conducting individual participant data (IPD) meta-analyses. An integral component is the formation of an international collaborative group of researchers who can provide individual data from their trials, creating new knowledge that is not typically available through aggregated meta-analysis.

# 2011 Highlights

ARCH's new research initiatives for 2011 have focused on the priority themes of care for women with a high-risk pregnancy to improve health outcomes and care around preterm birth. Highlights for 2011 include:

- The acquisition of NHMRC funding to undertake the MAGENTA Trial, which aims to assess whether giving magnesium sulphate compared with placebo to women immediately prior to preterm birth between 30 and 34 weeks gestation reduces the risk of death or cerebral palsy in their children at two years of age.
- The continuation of nine major research studies for the evaluation of care during pregnancy and childbirth, care around preterm birth and care for women with a multiple pregnancy. The studies are known as A*STEROID, CLOSURE, IDEAL, IRIS, LIMIT, MCA Doppler, MPG, PROGRESS, and Twins.
- The continuation of three multicentre trials to follow-up children born following antenatal interventions, enabling the understanding of long-term implications of pregnancy care on infant and childhood development. The trials are known as IDEAL, MiG TOFU and LIMIT (funded by NHMRC project grants).
- Two international individual participant data (IPD) meta-analysis collaborations. The AMICABLE Collaboration is looking at the use of magnesium sulphate in women at risk of very preterm birth for neuroprotection of the fetus. The PRECISE Collaboration will clarify which women and babies will benefit most from repeat corticosteroids and what the optimal drug regimen might be.
- The active monitoring of the progress of over 200 Australian review authors who, in 2011, contributed to a third of all Pregnancy and Childbirth reviews and protocols published in The Cochrane Library.
- The award of a highly competitive grant to undertake a research synthesis addressing the role of nutrition in preventing maternal mortality, which relates to The United Nations Millennium Development Goal 5. For this endeavour we have been joined by colleagues from Vietnam and Pakistan, and we are also working with the Campbell Collaboration, a sister organisation to the Cochrane Collaboration;
- The receipt of funding from the Cerebral Palsy Alliance to conduct an implementation study known as the WISH Project to assist 27 Australian and New Zealand tertiary obstetric units adopt recommendations from the National Clinical Practice Guidelines on Antenatal magnesium sulphate prior to preterm birth for neuroprotection of the fetus, infant and child;
- The preparation of dietary guidelines relating to stillbirth guideline outcomes for dietary intakes of mothers before and during pregnancy and while breastfeeding (currently being integrated into the overall dietary guidelines for Australians).
- The arrival of Professor Stephanie Brown and her team as new members of ARCH to undertake the SA arm of their NHMRC-funded study 'Aboriginal Families Study: closing the gap in Indigenous maternal and child health outcomes'.
- The supervision of six PhD students, three Honours students, 14 Clinical Research Fellows and four Medical Students by ARCH staff throughout the course of 2011. ARCH also assisted a student from Pakistan to obtain a University of Adelaide International Postgraduate Research Scholarship (IPRS) to commence her PhD in 2012.
- The award of six new major grants, 13 significant awards, scholarships and fellowships, and publication of 56 peer-reviewed papers.

In addition, ARCH has strong collaborative research links with many international and national organisations in maternal and perinatal health through joint visits, participation in trials and studies, having representation on key committees and providing education and training. International collaborators include the World Health Organization (WHO), Cochrane Collaboration, International Stillbirth Alliance (ISA), South East Asian Maternal and Perinatal Research Network, the Perinatal Society of Australia and New Zealand (PSANZ) and Liggins Institute, University of Auckland, New Zealand.

Research Centres

# Research Centre for Early Origins of Health and Disease

**Centre Directors**
Professor Julie Owens
Associate Professor Michael Davies
Associate Professor Michael Ridding

The Research Centre for Early Origins of Health and Disease (EOHaD) is a leader in investigation of the intergenerational and perinatal origins of metabolic, cardiovascular, neurological and reproductive health in postnatal life.

The Centre includes four main research groups, each of which has a research focus in development and health. They are:

- **Early Origins of Health and Disease** – aims to understand how events in early life, and possibly in previous generations, affect our health and risk of major diseases, so as to develop and test interventions to improve later health.
- **Life Course and Intergenerational Health (LIGHt)** – aims to identify opportunities to improve health and prevent disease among women and their children, focusing on both social and biological pathways at different points in the life course.
- **Neuromotor Plasticity and Development (NeuroPAD)** – investigates the neurophysiological mechanisms underlying developmental or acquired brain dysfunction, in order to develop novel therapies aimed at reducing the impact of these impairments on quality of life at all ages.
- **Pregnancy and Development** – explores how a fetus grows when the pregnancy conditions for growth are suboptimal, and why males and females are different in how they adapt to pregnancy.

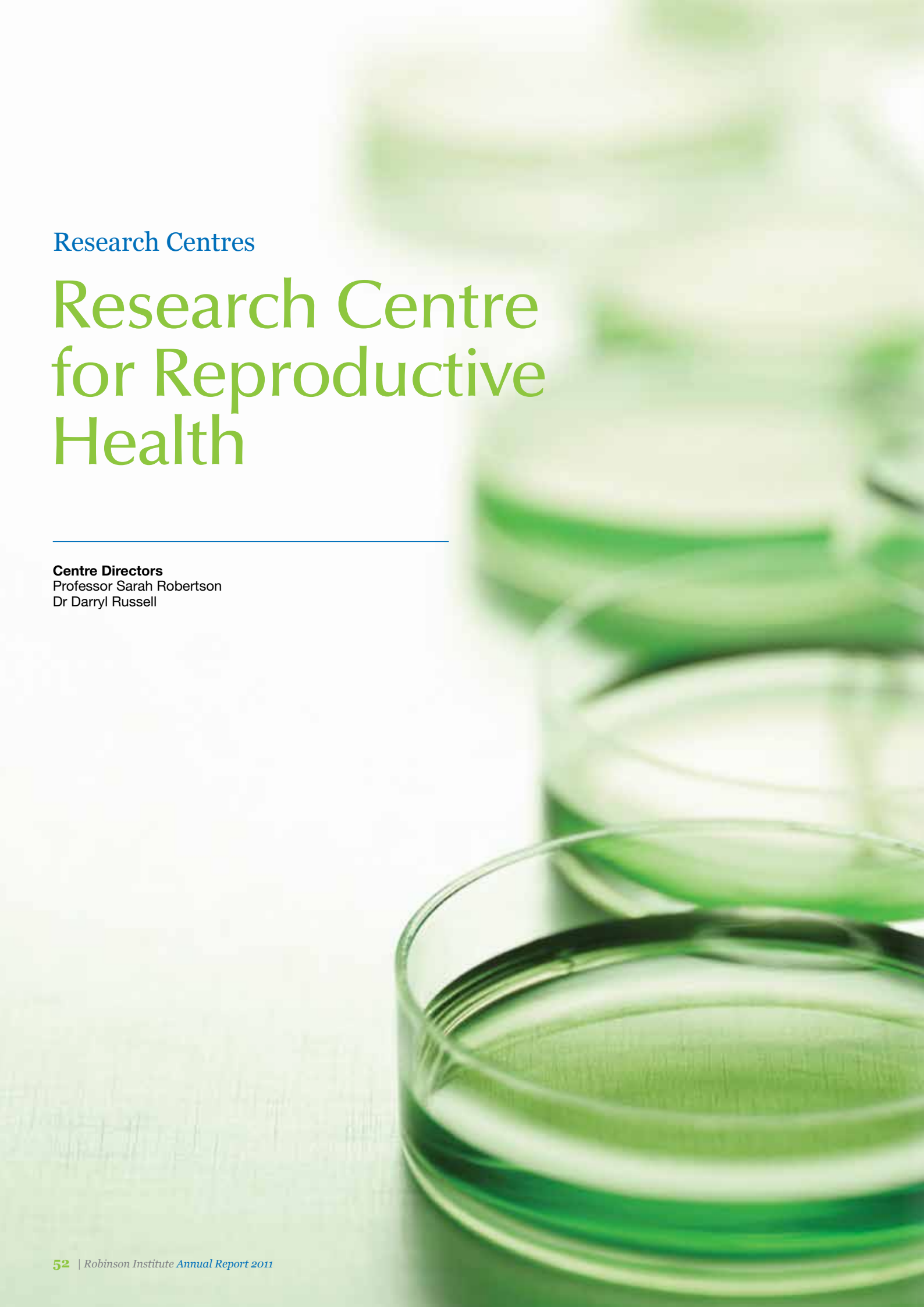
# 2011 Highlights

- Members were invited as plenary and symposia speakers as well as plenary debaters and presenters of scientific communications at important national and international conferences, including the Endocrine Society of Australia Annual Scientific Meeting (Perth, Australia), Developmental Origins of Health and Disease World Congress (Portland, USA), International Federation of Placental Associations (Turin, Italy) and Fetal and Neonatal Physiological Society (Palm Cove, Australia).
- In October the Centre held a Strategic Planning Workshop where research groups presented an overview of their current and planned research directions, with an emphasis on identifying current and potential collaborations internally and externally.
- The Centre has remained committed to 'upskilling' its members in biostatistics and bioinformatics and has conducted several targeted centre-wide skills workshops, as well as supporting key personnel in undertaking additional study in these areas. For example, support has been provided for both Dr Nicolette Hodyl (Pregnancy and Development) and Dr Luke Schneider (NeuroPAD) to undertake post-graduate training in biostatistics.
- Dr Julia Pitcher (NeuroPAD) was invited to become a member of the Women's and Children's Hospital Developmental Care Committee. Consisting of neonatal care professionals, this committee meets monthly to make recommendations on care practices in the Neonatal Intensive Care Unit and Special Care Baby Unit.
- Dr Sebastian Doeltgen (NeuroPAD) led a successful NHMRC Equipment bid that will provide additional high-level neurophysiological equipment to be based in the NeuroPad laboratories.
- Our Centre welcomed two new members in Professor Basil Hetzel and Professor John Lynch (Australia Fellow).
- Dr Julia Pitcher (NeuroPAD) gave the opening keynote lecture at the 24th March of Dimes/Gravens Conference on the Physical and Developmental Environment of the High Risk Infant in Florida (USA). .
- In 2011 the Centre hosted a number of key visitors from around the globe, including the Neuromotor Plasticity and Development Group hosted two sabbatical researchers in early 2011. Professors John C Rothwell (Institute of Neurology, University College, London, UK) and Angela Clow (University of Westminster, London, UK) were based in NeuroPAD from January to April 2011. These high profile visitors provided important input to the development of current and future collaborative projects (including NHMRC Project applications currently under review). In addition, their visit provided extremely valuable opportunities for students and junior researchers within the group to discuss their research and career options. The commitment of these researchers to an ongoing collaborative effort with NeuroPAD has been acknowledged by the University in the form of them both being awarded the title 'Visiting Professor'.

Research Centres

# Research Centre for Reproductive Health

**Centre Directors**
Professor Sarah Robertson
Dr Darryl Russell



# The aim of the Research Centre for Reproductive Health (RCRH) is to advance fundamental understanding of the biological processes underlying reproductive events and how they become disrupted in infertility and reproductive disorders.

The Centre aspires to discoveries that will improve reproductive health in women and men, and strengthen the health and resilience of their children. The strategy is to address the most exciting and urgent research questions in reproduction, utilising the most informative clinical tissues as well as animal and in vitro model systems.

The Centre's research spans the full range of reproductive events - ovarian biology and oocyte production, early embryo development, embryo implantation and placental development, seminal fluid and the male contribution to conception, fetal development, birth and mammary gland function. The impact of intrinsic genetic, immune and infectious factors, and their interaction with external influences including nutrition, stress and physiochemical and social environment, are of special interest in our changing world. Through understanding how tissues and processes operate under optimal and perturbed conditions, researchers hope to unravel causal pathways involved in infertility and miscarriage, and pathologies of pregnancy including preeclampsia, fetal growth restriction and preterm delivery.

The discoveries made have helped generate improved methods for assisted reproduction and are leading to other novel treatments for infertility and subfertility, endometriosis and preterm labour. The same research has also been applied to animal biotechnology and agriculture. Importantly, since many adult diseases have their origins in-utero and are determined by events as early as conception, the insights researchers gain contribute to building awareness of how pre-pregnancy care can promote best possible health in all infants born, regardless of natural or assisted conception.

In order to ensure the clinical relevance and scientific rigour of our research, the Centre has fostered collaborations between scientists and clinicians in reproductive medicine, obstetrics and gynaecology, endocrinology and cancer, and pursued industry outcomes through commercial partnerships, as well as advocating linkages with government, health service providers and industry to maximise impact on reproductive health service and delivery.

# 2011 Highlights

A key highlight of this year was the opening of the Gene Silencing and Expression Facility (GSEx), which will build capability in DNA expression and silencing technology. Additionally, the Centre secured significant new equipment purchases through the NHMRC and SA Government funds. Nearing completion is the STARR laboratory, which aims to offer first rate imaging technology, and will support nanoscale sensing technology for world-leading embryology research and advanced culture systems.

The technology was established with the support of funding through the Robinson Institute's New Research Directions Scheme. Functioning as a full or partial service provision facility, the GSEx lab provides unique access to a high level biological containment laboratory space or performs gene transfer into mammalian cells using virus-based transfer technology. The cutting edge technology has been applied in a range of molecular genetics experiments investigating the function of specific genes in ovary and oocyte development, cancer progression, embryo implantation, cell regeneration and many other biological processes. Importantly, this facility has produced preliminary data to support nine individual national grant applications to be submitted in 2012.

Associate Professor Jeremy Thompson resigned as Co-Director of RCRH effective from the 1 July 2011 to focus his effort on research commercialisation, and the Centre wishes to acknowledge the value of his important contribution over the last three years. Dr Darryl Russell accepted the Institute Management Committee's nomination to Co-Director effective from 1 July 2011.

A major highlight for 2011 was the combined Research Day with the Centre for Stem Cell Research (CSCR), held at the National Wine Centre and attended by over 90 members from RCRH and CSCR. Professor Peter Currie, Deputy Director, Australian Regenerative Medicine Institute (Monash, Victoria) gave a plenary presentation; eight symposium presentations from research group leaders in RCRH and CSCR were also delivered. Eleven posters were submitted for the inaugural 'Higher Degree by Research Poster Award'.

Also in 2011, RCRH expanded its Research Leader base with new members Dr Louise Hull, heading up a research group in endometriosis, and Associate Professor Frank Grutzner, focussing on sex determination and placental development in Australian monotreme species.

The Centre, along with the Robinson Institute, was a major supporter of the Second World Congress on Reproductive Biology, Cairns, Queensland from October 9 to 12 2011. The Congress program included seven eminent international plenary speakers and 56 invited speakers from around the world including three RCRH members presented on current cutting edge topics in Reproductive Biology. Over 500 delegates attended from 31 different countries. The Centre and the Robinson Institute were highlighted as foundation sponsors, critical contributors to the congress organisation and through presentation and attendance by over 30 members. This event provided a unique opportunity to lure international colleagues to South Australian shores; many visited the University of Adelaide while in Australia.

Dr David Sharkey was funded to undertake a six-week research visit to the Louisiana State University (New Orleans, USA) in the laboratory of Professor Alison Quayle, to consolidate an existing collaboration and build RCRH capacity in the study of sexually transmitted infection. Dr Sharkey acquired key skills in propagation of Chlamydia and completed an extensive series of experiments investigating the impact of seminal plasma on parameters of Chlamydia infection and propagation, including host cell cytokine response in ectocervical epithelial cells. David presented a seminar describing his achievements in New Orleans to the Discipline of Obstetrics and Gynaecology, and a report was tabled at Research Committee meeting on 18 August 2011.

The Centre also assisted with four applications from research leaders and provided leveraging funds for NHMRC Equipment Grants. Three of the four applications were successful, with a total of $165K awarded towards purchase of an Odyessy Classic Infrared Fluorescence Imager for protein quantification and cell and tissue imaging; a Becton Dickinson FACS Canto II Three Laser Flow Cytometer and a Perkin Elmer Microbeta 2 LumiJET microplate reader. Additionally our Centre contributed funds to assist in purchase of an Olympus FV10iW Confocal Microscope to fit out the new STARR laboratory, a new SA Government-funded collaboration between RCRH members and Professor Tanya Monro of the University of Adelaide's Institute for Photonics and Advanced Sensing.

In addition, 23 RCRH postgraduate students and early career academic staff were supported to present their research findings at major national and international conferences in 2011. Conferences attended included the SSR (USA), ANZPRA, SRB and WCRB.

Our Research Leaders and their teams continue to make an impact on the discipline of Reproductive Biology on the national and international scene. Several grants were awarded in 2011. Of special note were:

- NHMRC Senior Research Fellowships awarded to Professor Claire Roberts and Dr Robert Gilchrist.
- Dr Tod Fullston received an NHMRC Early Career Fellowship Dr Lisa Moran was awarded a National Heart Foundation Fellowship.
- Associate Professor Wendy Ingman secured an Early Career Fellowship and a Novel Concept Award from the National Breast Cancer Foundation.
- Dr Carmela Ricciardelli received a Senior Research Fellowship from SA Cancer Research Collaborative (SACRC), a new initiative from Cancer Council SA and the SA Government.
- Dr Michelle Lane was awarded highly competitive Bill and Melinda Gates Foundation Grand Challenge funding.
- Dr David Mottershead was awarded NHMRC Development Grant funding.
- NHMRC Project Grants were awarded to Prof David Kennaway, Prof Claire Roberts, Dr Michelle Lane, Prof Sarah Robertson, Prof Alistair MacLennan, A/Prof Leonie Heilbronn and Dr Kerrilyn Diener.

*Professor Alistair Maclennan and team*

## Awards/ Prizes:

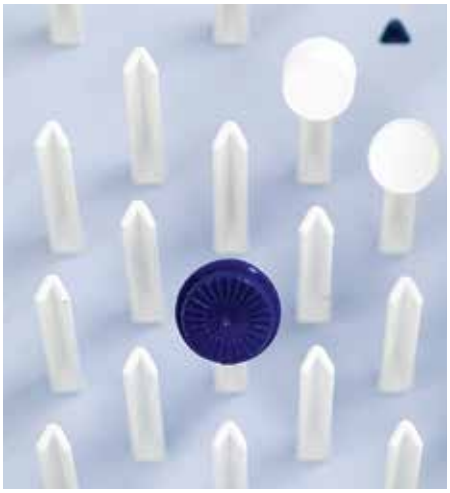
The Centre's research achievements were recognised by several awards and prizes including:

- Laura Frank was awarded the Oozoa Prize for the best free communication on the topic of gamete biology at the Society for Reproductive Biology (SRB), and additionally was a Finalist in the SRB Young Investigator Award.
- Peck-Yin (Loretta) Chin received a Lalor Foundation Award from the Society of the Study of Reproduction.
- Xuan (Sally) Sun was winner of the Best Poster Award at the Pacific Rim Breast and Prostate Cancer Meeting.
- Izza Tan was awarded the Dennic Lowther Award for best poster presentation at the 2011 Matrix Biology Society of Australia and New Zealand.
- Noor Lokman was awarded a Florey Medical Research Foundation scholarship.
- Dr Michael O'Callaghan was awarded an Endeavour scholarship to take up a research position in New Zealand.
- Dr Lisa Moran was a Finalist for the 2011 SA Tall Poppy Award.
- Dr Michelle Lane was awarded the Scientific Prize of the American Society for Reproductive Medicine, as well as the Fertility Society of Australia Clinical Prize.
- Professor Ray Rodgers, Professor Sarah Robertson and Dr Michelle Lane were inducted as inaugural Fellows of the Society for Reproductive Biology.
- Professor Alastair MacLennan was appointed an officer in the Order of Australia and was conferred Honorary Life Membership of the Australian and New Zealand Perinatal Society.
- Some other notable advances were made by RCRH members in 2011, resulting in landmark papers in major journals, including:
- Professor Ray Rodgers and colleagues reported on a new biological pathway linking the molecule transforming growth factor-beta in the fetal ovary with later development of polycystic ovary syndrome, published in FASEB Journal.
- Drs Ricciardelli and Russell reported in American Journal of Pathology on the essential role for ADAMTS1 protease gene in breast cancer development.
- Dr Hull and colleagues published in the same journal that transforming growth factor-beta participates in controlling development of endometriosis.
- Another milestone was launch of EmbryoGen® by Origio a/s (Denmark), a new IVF treatment for miscarriage patients. The launch represents the culmination of 20 years of research from Professor Sarah Robertson and her colleagues.
- In 2011, our Centre hosted a number of interstate and overseas visitors' including Professor Phil Knight (University of Reading, Reading, UK), Dr Suzannah Williams (University of Oxford, UK) and Professor Nick Macklon (University of Southampton, UK).

Research Centres

# Centre for Stem Cell Research

**Directors**
Professor Stan Gronthos
Associate Professor Mark Nottle



The Centre for Stem Cell Research consists of researchers based at the Women's and Children's Hospital, SA Pathology, the Royal Adelaide Hospital, The Queen Elizabeth Hospital and the Hanson Institute.

The Centre consists of over 200 scientists, support staff and postgraduate students who together attract over $6 million in research funding annually. Centre members undertake internationally recognised and awarded research in embryonic, adult and cord blood stem cell research across a range of areas including developmental biology, immunology and regenerative medicine.

Many of our research programs are focused on developing novel cures using stem cells, including repairing the damage to the brain following stroke; bone, cartilage and tissue repair in general; blood disorders such as leukaemia and genetic diseases including cystic fibrosis and lysosomal storage disorders.

# 2011 Highlights

There have been a number of notable highlights for 2011 including networking forums, collaborative research grants, six Summer Scholarships and an annual research forum that was held in conjunction with the Research Centre for Reproductive Health.

Centre members published over 120 papers in refereed journals and received over 9 million dollars in research funding in 2011, these included 10 NHMRC project grants, including:

- Professor Stan Gronthos and Professor Andrew Zannettino for the project 'Mesenchymal Stem Cell maintenance and recruitment during skeletal repair are dependent on EphB-ephrinB signalling' ($591,010);
- Professor Mark Bartold for the project 'How are periodontal disease and rheumatoid arthritis inter-related' ($544,262); and
- Associate Professor Richard D'Andrea and Dr Ian Lewis for the project 'GADD45A promoter methylation and poor prognosis in AML: mechanism and clinical significance' ($682,350).

In 2011, the Centre had a number of key visitors from interstate, including Dr Pritinder Kaur (NHMRC Research Fellow Group Leader, Epithelial Stem Cell Biology Laboratory, Cancer Biology Program and Peter MacCallum Cancer Centre, Melbourne) who presented a talk at one of the Centre for Stem Cell Research Seminar and Networking Forums entitled "Human skin stem cells: Challenges and regenerative potential".

# Fundraising and Community Engagement

*Professor James McWha*

## Robinson Foundation
### 2011 Funding Round Outcomes

In 2011 the Robinson Foundation distributed over $100,000 to support the Robinson Institute's research. The following projects were successful in the Foundations first funding round since launching in 2010:

| Researcher | Amount Awarded | Project Summary |
|---|---|---|
| Professor Claire Roberts | $40,000 | The Roche xCELLigence equipment can be used for a variety of cell based assays. Cells may be cultured over minutes, hours or days and data can be acquired instantaneously in real time over the course of the cell culture experiment. |
| Dr Darryl Russell | $32,000 | Babies born from assisted reproductive technology (ART) have lower average birth weight than natural conception, which has adverse consequences for the long-term health of these children.<br>Research in this group has identified a gene signature in ovarian cells that support oocyte maturation that can identify oocytes with the best developmental potential.<br>This project aims to test the application of these genes to improve health in both natural and assisted conception. |
| Dr Rebecca Robker | $33,200 | This project aims to build on current evidence indicating that an adult's susceptibility to disease is determined in the womb and is influenced by the nutrition of the mother at the time of conception.<br>The experiments will provide important advancements in our understanding of the mechanisms and pathways by which prevalent metabolic disorders impair ovulation and oocyte quality, including how our modern diet and the consequent obesity epidemic contributes to the rising female infertility and increased obesity in children. |
| Dr Michael O'Callaghan | $2,700 | Dr O'Callaghan presented his Cerebral Palsy research at the 2011 Perinatal Medicine international conference in the United Kingdom.<br>Michael was awarded a student prize for the best abstract, a plenary presentation and the award for best oral presentation at the conference.<br>This travel scholarship was important in disseminating the novel research findings of the Institute internationally and to enhance collaborations to gain insight into genetic technologies and genetic research strategies. |

## Robinson Foundation

**Ms Robyn Brown**
Director, Development and Alumni
University of Adelaide

**Mr Stephen Couche**
Chair, Peter Couche Foundation

**Mr Sathish Dasan**
Partner, Norman Waterhouse Lawyers

**Mr Neil Howells** (Deputy Chair)
Partner, Hudson Howells

**Mr Tim Hughes**
Managing Director, Hughes Public Relations Communications Consel

**Emeritus Professor Colin Matthews**
Founding Director, The Pipette Company Pty Ltd and Reproductive Health Science Pty Ltd

**Ms Julie Mitchell**
Consultant, Julie Mitchell Consulting

**Mr Ian Nightingale**
(Chair until September 2011)
Chief Executive, Department of Primary Industries and Regions

**Ms Mary Patetsos**
(Chair October 2011-present)
Board Member, Various Public Boards and Community Boards of Management

**Ms Ruth Vagnarelli**
Design Director, Hickinbotham Group

### Invited to Attend

**Ms Joanna Close**
Institute Manager

**Ms Alissa Nightingale**
Marketing and Development Manager

## Research Tuesday - How the choosy female immune system exercises reproductive quality control

The woman's immune system has been shown to play a critical role from conception to embryo implantation to placental development, actively assessing sperm quality, embryo viability and embryo-maternal compatibility, then "deciding" whether or not to proceed.

The success or failure of human reproduction has been thought to depend on many things over the years, but the female immune response isn't one of them. In fact, it was widely believed to remain passive throughout the process. Recent research however, is turning the conventional wisdom on its head. Professor Sarah Robertson discussed these fascinating insights and their implications for the treatment of many fertility disorders in her Research Tuesday presentation in May 2011.

## Dare to Dream Gala Dinner for Pre-term Babies

170 supporters dined and danced the night away at the Dare to Dream Dinner in September 2011 to raise funds for pioneering research to overcome the negative effects of pre-term birth on brain development.

The importance of this research was highlighted by two touching accounts from families of pre-term babies: the Honourable Tom Koustantonis, whose daughter Tia was born 11 weeks pre-term, and the Cooper family, whose son Alex was born at just 23 weeks.

Hosted by the Robinson Institute and Children's Research Centre, the event raised over $17,000 to support the Neuroplasticity and Development Group. These funds will assist the development of intervention strategies to help preterm children's brain development so they can reach their potential at school and later life.

**Thank you to our event sponsors;** Seppeltsfield, Fox Gordon, Parri Estate, Chapel Hill, Shingleback, Nicole Willis, Embellish Flowers, Visage, Jurlique, National Wine Centre and all our silent auction contributors.

## Public Seminar - Eating for Two

The Robinson Institute collaborated with the FOODplus and Healthy Development Adelaide on a unique community event in September 2011: Eating for Two – Nutrition in Pregnancy, a public seminar held at Elder Hall, The University of Adelaide.

Keynote speaker, Dr Rosemary Stanton OAM, joined researchers from the Robinson Institute and the Women's and Children's Health Research Institute in answering some important pregnancy nutrition questions including:

- What foods are best for the health of pregnant women and their developing child?
- When it comes to nutritional supplements before and during pregnancy, what are we to believe and are they needed?
- Are we seeing an increased prevalence of health problems in pregnancy related to over consumption and nutritional deficiencies?

The event concluded with an expert panel discussion chaired by Master of Ceremonies Amanda Blair, which allowed the audience the chance to have their questions answered. The gold coin entry raised over $400 for the Robinson Foundation.


Dare to Dream, 2011

# Peter Couche Foundation

## Peter Couche Foundation Committee

Mr Dom Cosentino
Mr Peter Couche
Mrs Simona Couche
Mr Stephen Couche
Mr Colin Dunsford
Mr Andrew Gerlach
Mr Stephen Gerlach
Mr Stephen Officer
Mr Mick Scammell
Ms Lisa Taplin

### Invited to Attend

Ms Joanna Close
Ms Alissa Nightingale

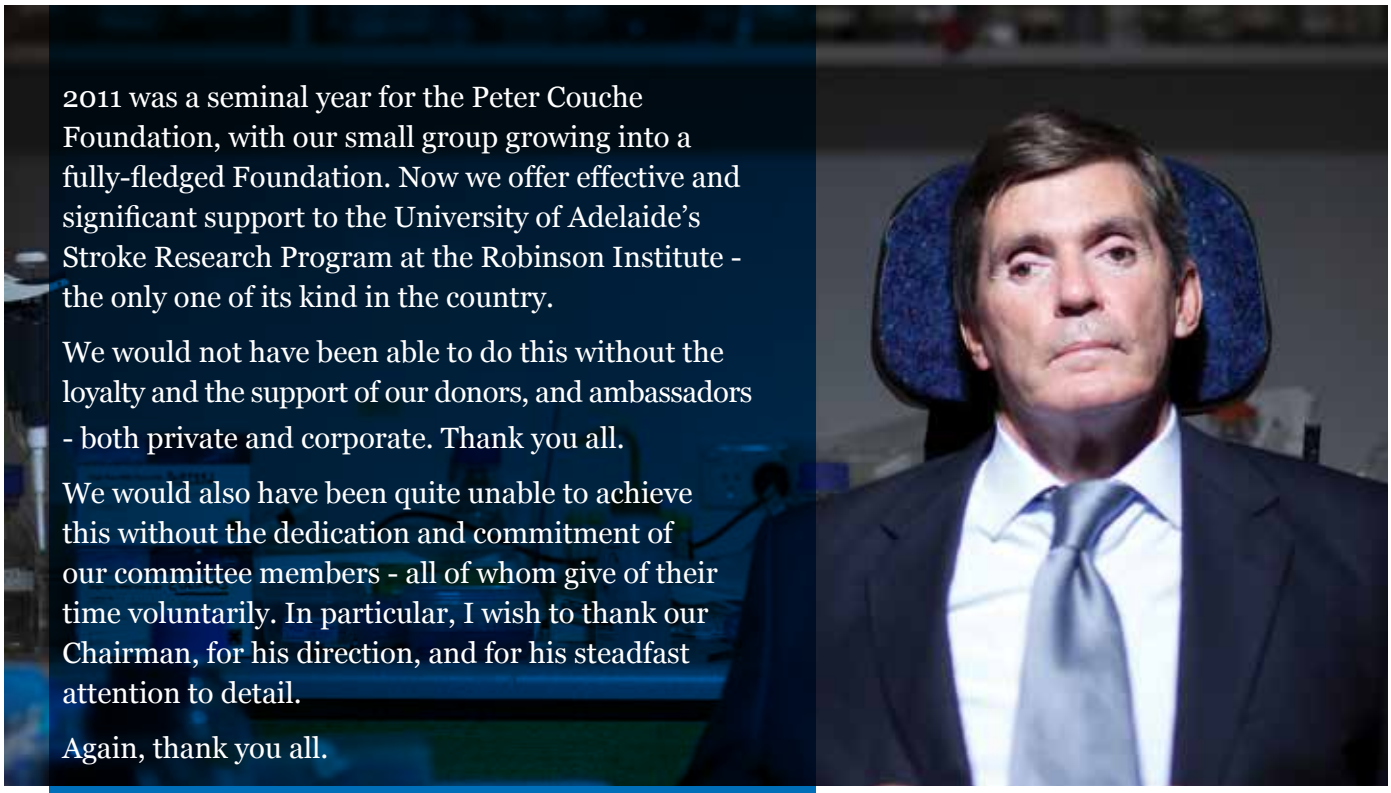
## Why support our stroke research?

In Australia alone, there are 60,000 strokes a year – one stroke every 10 minutes. The total combined cost of stroke and related health costs in Australia is estimated at $2.14 billion per year, as well as an innumerable effect on the afflicted patient and their family in the Australian community. And the numbers will get worse: because our population is ageing, it is estimated that more than half a million Australians will suffer a stroke over the next 10 years.

It's clear that advances in stroke research will have far-reaching benefits. To that end, the Peter Couche Foundation aims to raise over $900,000 to support leading research using adults stem cells to repair the brain following a stroke. Towards that goal, in 2011 the Foundation raised over $140,000.

The Peter Couche Foundation supports research being undertaken by the Stroke Research Program, a collaboration between the University of Adelaide and The Queen Elizabeth Hospital. The research is at the forefront of preclinical investigation into stem cell therapy for stroke. The potential benefit of this research to Australians in regards to the health and financial burden of stroke is enormous.

Research in the Stroke Research Program is highly significant in that it targets how to improve stroke disability; no such treatment currently exists. To the best of our knowledge, the research being undertaken is the most advanced use of stem cell therapy in stroke by any neuroscience research group in Australia. This research is innovative and is supported by a very strong foundation in stem cell biology with international collaborations. It is essential for this work to be funded by the Peter Couche Foundation so that studies can be extended as the first step in translating stem cell therapy from the lab to the clinic.



2011 was a seminal year for the Peter Couche Foundation, with our small group growing into a fully-fledged Foundation. Now we offer effective and significant support to the University of Adelaide's Stroke Research Program at the Robinson Institute - the only one of its kind in the country.

We would not have been able to do this without the loyalty and the support of our donors, and ambassadors - both private and corporate. Thank you all.

We would also have been quite unable to achieve this without the dedication and commitment of our committee members - all of whom give of their time voluntarily. In particular, I wish to thank our Chairman, for his direction, and for his steadfast attention to detail.

Again, thank you all.

Peter Couche

# 2011 Activities


*Peter Couche from the Peter Couche Foundation*

## A Cocktail Affair

Over 150 guests gathered at the National Wine Centre in February for an evening of fine food and wine to raise funds for the Stroke Research Program.

Attended by foundation Patrons, His Excellency Rear Admiral Kevin Scarce AC CSC RANR Governor of South Australia and Mrs Liz Scarce, the event also recognised the remarkable strength and courage of Peter Couche who is determined to make a different to those who have suffered a stroke.

Special thanks to the National Wine Centre, Orlando Wines and Jacobs Creek, Channel 9's Kate Collins and the evening's entertainers Acoustic Juice and House Arrest for their generous support of the event.

The event was also the launch of the Foundation's collaboration with Orlando Wines to create an exclusive Barossa Shiraz. Over 200 bottles were produced with all proceeds going to the Foundation.

## Don't Speak Silence for Stroke

This innovative initiative saw $65,000 raised from the Foundation's inaugural campaign.

For just one hour on Friday 16 September 2011, during National Stroke Week, over 50 participants remained quiet to raise vital funds and awareness for stroke research with their friends, family and colleagues sponsoring their silence.

The campaign was inspired by Peter and the thousands of stroke victims who can't speak.

Thank you to everyone who got involved and supported the campaign in particular our Don't Speak Ambassadors Tom Harley, Michaela Cantwell and His Excellency Rear Admiral Kevin Scarce AC CSC RANR Governor of South Australia.

Congratulations to James Baulderstone of Santos who was the top fundraiser raising over $8000. James' participation in Don't Speak complements Santos' existing three-year $60,000 support for the Foundation.

For more information visit www.DontSpeak.org.au

## Rewarding Round of Golf

On November 18th, Adtrans and their business partners got together for a round of golf to raise funds for local charities.

Adtrans has a long history of supporting the community and have held their Annual Golf Day since 1986.

The windy conditions put the golfers to the test, but the generosity of those involved made the day an incredible success with over $100,000 raised and $25,000 being generously donated to the Peter Couche Foundation.

Thank you to the support of Adtrans and all their dealerships for their continued support of stroke research in South Australia.

## Educating the community

In May 2011, the Foundation's first Fellow Dr Karlea Kremer gave an insightful presentation about the discoveries of the Stroke Research Program to the Rotary Club of West Lakes. The club was enthusiastic to support the ongoing developments of this South Australian research, and generously donated $1000.

Adelaide hosted the 22nd Annual Scientific Meeting of the Stroke Society of Australasia in September, which was convened by Associate Professor Simon Koblar. The theme for the event was 'Challenges in the New Millennium: Prevention, Thrombolysis & Repair!' The conference attracted an impressive line up of cross-disciplinary international speakers. One major focus of this international conference was Stem Cell therapy in Stroke and thus an opportunity to promote the Peter Couche Foundation to the research and clinical community was taken.

The Royal Institute of Australia hosted the final event of the year, with a panel discussion on stem cell tourism. The discussion explored the reality and potential for stem cell science, and looked at how long Australians may have to wait for realistic stem cell therapies to be available. ABC Radio National's Dr Norman Swan chaired the panel of experts including; Foundation Chair Stephen Couche, Associate Professor Simon Koblar, Robinson Institute Director Professor Robert Norman and Megan Musie.

*PhD candidate Ms Wee-Ching Kong*

# Future of the Robinson Institute

As a result of the review of the Institute, we have commenced planning for themes to cut across existing research centres and to build greater collaboration among members.

Rather than the Director solely deciding on the themes, we have embarked on a process of consultation using open space technology and more focused groups to encourage communication among all members. They are likely to be in a position by mid-2012 to identify, encourage and fund these themes.

The Robinson Institute is a member of the Women's and Children's Health Research Alliance (WCHRA), which brings together all the research partners on the Women's and Children's campus and those across the state. The Children's Research Centre at The University of Adelaide is also affiliated with

*Philippa Middleton and Professor Caroline Crowther*

the Robinson Institute, enabling a powerful coalition to address problems in Women's and Children's Health. This group will now engage with the South Australian Health and Medical Research Institute (SAHMRI) to contribute fully to development of our research in the state.

The research Foundations have performed well this year. The Robinson Foundation made contributions of $67,643 and the Peter Couche Foundation made contributions of $136,813 and launched the highly successful Don't Speak – Silence for Stroke campaign. Institute member Associate Professor Simon Koblar has developed key collaborations that have led to substantial investment from the biotech company Mesoblast. Further development of the Foundations and rationalisation of the best place for the Centre for Stem Cell Research to sit will be priorities in 2012.

Recruitment of new members is essential to the life of the Institute. Several important researchers step down from full time work this year including Professor Alastair MacLennan, who has contributed 37 years of his life to research on the Women's and Children's campus. While he will stay on part time working on cerebral palsy, there is a great need for new clinical academics who are research active and for young scientists working in creative new enterprises.

We intend to increase our collaborations over this next year, including those with the University of Southampton, several groups in the People's Republic of China and the Liggins Institute in New Zealand. We will continue to collaborate with significant groups in Australia including our contributions through the YourFertility group, the PCOS Alliance, the networks built by ARCH, and the multiple professional societies to which our members contribute and are leaders.

# Donors 2011

Abbott, Tony
Acutt, Peter
Adamson, Scott
Adamson, Mary Anne
Adelaide Development Company
Aguilar, Mark
Akison, Lisa
Akison, Adrian
Akison, Pamela
Akison, Mia
Akison, Sasha
Albertini, Rick
Alexander, Helen
Allen, Anna
Allert, Rick
Allgood, Shaun
Allgrove, Marc
Almond, Greg
Anderson, John
Anderson, Tim
Anderssen, Andy
Andruchowycz, Matthew
Antony, Andrew
Arbon, Terry
Archer, Dona
Armitage, Susan
Arnott, Maureen
Artis, Zora
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Astbury, Peta
Backen, Roma
Bajada, Louise
Baker, Tracey
Barnes, Belinda
Barnes, Bradley
Bartesko, Wayne
Barton, Richard
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*"This acknowledges the 2011 membership of the Robinson Institute; we have aimed to capture as comprehensive a list as possible and any omissions are unintentional. We would like to recognise the contribution of all members, with a special mention to the School of Paediatrics and Reproductive Health's administration team led by Michael Guerin."*

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Sun, Wai
Sutton, Edwina, Dr
Szarek, Eva
Teo, Karen, Dr
Thomas, Paul
Thompson, Emma
Thomson, Viji, Dr
Vandyke, Kate
Vassilev, Ivan, Dr
Vassilieva, Svetlana
Venkatesh, Nisha
Verma, Roopali, Dr
Wakefield, Sarah
Watson, Laura
Weightman, Michael
West, Amanda
Williams, Kerry
Williams, Sharon, Dr
Wong, Dennis, Dr
Worthley, Matthew, Dr
Worthley, Stephen, Professor
Xiong, Jimin
Yang, Dongquing
Young, Justin
Zannettino, Andrew, Dr
Zhang, Jamie
Zilm, Peter, Dr
Zimmet, Hendrik, Dr

## EOHaD Members

Burgess, Jordan
Champion, Stephanie
Chu, Vincent
Clifton, Vicki, A/Professor
Cole, Joanna
Davies, Michael, A/Professor
DeBlasio, Miles, Dr
Delany, Toni
Doeltgen, Sebastian, Dr
Drysdale, John
Dziadek, Marie
Edwards, Suzanne
Fogarty, Paul
Gatford, Kathryn, Dr
Gibson, Peter
Giles, Lynne, Dr
Gillman, Matthew, Dr
Goldsworthy, Mitchell
Grant, Pat
Hardefeldt, Laura, Dr
Hetzel, Basil
Higgins, Ryan
Hirst, Jon
Hodyl, Nicolette, Dr
Horton, Dane
Hunter, Damien
Jarryanto, Himawan
Kenneway, David
Kong, Wee-Ching
Kretschmer, Nanette
Kurylowicz, Lisa
lipsett, Jill
Lynch, John, Professor
Macpherson, Anne, Dr
Maftei, Oana
Malbon, Winifred (Trish)
March, Wendy, Dr
Marino, Jennifer
McAllister, Suzanne
McLernon, Penelope
Mohamed Jamil, Ezani
Mohammad, Saidatul
Moore, Vivienne, Professor
Moritz, Karen
Morris, Margaret
Murphy, Vanessa
Nath, Pratiti
Nicholson, Richard
Osei-Kumah, Annette
Owens, Julie, Professor
Parange, Nayana
Phillips, David
Pitcher, Julia, Dr
Ridding, Michael, Dr
Rivers, Karen
Roberts, Claire, Professor
Robinson, Jeffrey, E/Professor
Rumbold, Alice, Dr
Schneider, Luke
Simmons, Rebecca
Smith, Ashleigh
Smith, Kendall
Smith, Roger
Stark, Michael, Dr
Steele, Emily, Dr
Steenkamp, Matilda
Sulaiman, Siti
Thavaneswaran, Prema, Dr
Tung, Elena
Warin, Megal, Dr
Whitrow, Melissa, Dr
Willson, Kristyn
Wlodek, Mary
Wood, Lisa
Wright, Ian
Zarkar, Tamas
Zivkovic, Tanya, Dr

## Professional Members

Buckley, Kate
Close, Jo
Craig, Imogen
Furness, Virginia
Hannah, Karen
Hunt, Lisa
Jaensch, Jackson
Kontic, Rachel
Nightingale, Alissa
Porter, Sophie
Srpek, Leanne

# Publications

*This acknowledges the publications by Robinson Institute members for the year of 2011; we have aimed to capture as comprehensive a list as possible and any omissions are unintentional.*


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# For further enquiries

The Robinson Institute
Ground Floor, Norwich Centre
55 King William Rd, Norh Adelaide
University of Adelaide, SA 5005

**Telephone:** +61 8 8313 8166
**Fcsimile:** +61 8 8313 1355
**Email:** robinsoninstitute@adelaide.edu.au

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