THE UNIVERSITY of ADELAIDE

Annual Report
2019

ROBINSON RESEARCH INSTITUTE

Healthy children from the start

adelaide.edu.au

WHAT HAPPENS AROUND AND TO CHILDREN IN THE FIRST 1000 DAYS SHAPES THE WAY THAT THEIR BRAINS, BODIES AND EMOTIONS DEVELOP THROUGHOUT LIFE.
RAISING CHILDREN

WHAT HAPPENS TO THE CHILD IN THE EARLY YEARS IS CRITICAL FOR THE CHILD'S DEVELOPMENTAL TRAJECTORY AND LIFECOURSE.
WORLD HEALTH ORGANIZATION

WE ARE FOCUSING OUR INVESTMENTS ON CONCEPTION TO 2 YEARS OF AGE, THE KEY STAGE OF LIFE WHERE ADDRESSING BIOLOGICAL VULNERABILITIES HAS A DISPROPORTIONATE IMPACT.
BILL AND MELINDA GATES FOUNDATION

At the Robinson Research Institute, our members strive to build the knowledge and tools to help families grow and to provide children with the healthiest possible start to life.

We focus our research effort on the very early stages of life, as the foundations for lifelong health are embedded well before birth. A child's lifelong health and wellbeing is determined by a myriad of genetic, social, and environmental factors – but most profoundly by the health of both parents at conception, exposures and events during pregnancy, and infant experiences in the weeks and months after birth.

We seek to understand how to best protect current and future generations from health disorders and disease, and to develop early interventions for when things go awry.

Through world-leading discoveries and research translation into practice, we are improving prospects for families around the globe. Our work delivers advances that level health inequalities and reduce the burden of chronic conditions and infections that prevent millions of children from reaching their full potential.

We are convinced that science and medicine can provide the keys for health 'right from the start'. While recent world events raise the stakes, our resolve to work towards a better life for future generations is strengthened to meet the challenge.

Professor Sarah Robertson
RRI Director

WHO WE ARE

The Robinson Research Institute is a collective of internationally renowned researchers in human reproduction, pregnancy, and child health at The University of Adelaide.

Based at The University of Adelaide, our 40+ research teams are uncovering how events and circumstances before birth and during early life impact physiological, metabolic, immune, and behavioural development, and are working on effective interventions to protect children and improve their life time health prospects.

Our members strive to strengthen health in children by working across four broad research areas: Fertility and Conception, Pregnancy and Birth, Early Origins of Health, and Child and Adolescent Health

The greatest potential for a healthy life, free from chronic disease, is achieved through preventative approaches, starting in the earliest stages of life… before conception, through pregnancy, birth, and infancy.

Our **VISION** is life-time health for all children and families, through research excellence.

Our **MISSION** is to deliver world-class advances in human reproduction, pregnancy, and child health, informing clinical care, policy and practice to improve health across generations and global communities.

ROBINSON RESEARCH INSTITUTE

Healthy children from the start

2019 SNAPSHOT

$18,701,292
COMPETITIVE FUNDING

46
RESEARCH LEADERS

355
MEMBERS

45
GRANTS AWARDED FROM 19 FUNDING AGENCIES

9
FELLOWSHIPS FROM 4 FUNDING AGENCIES

18
HONOURS STUDENTS

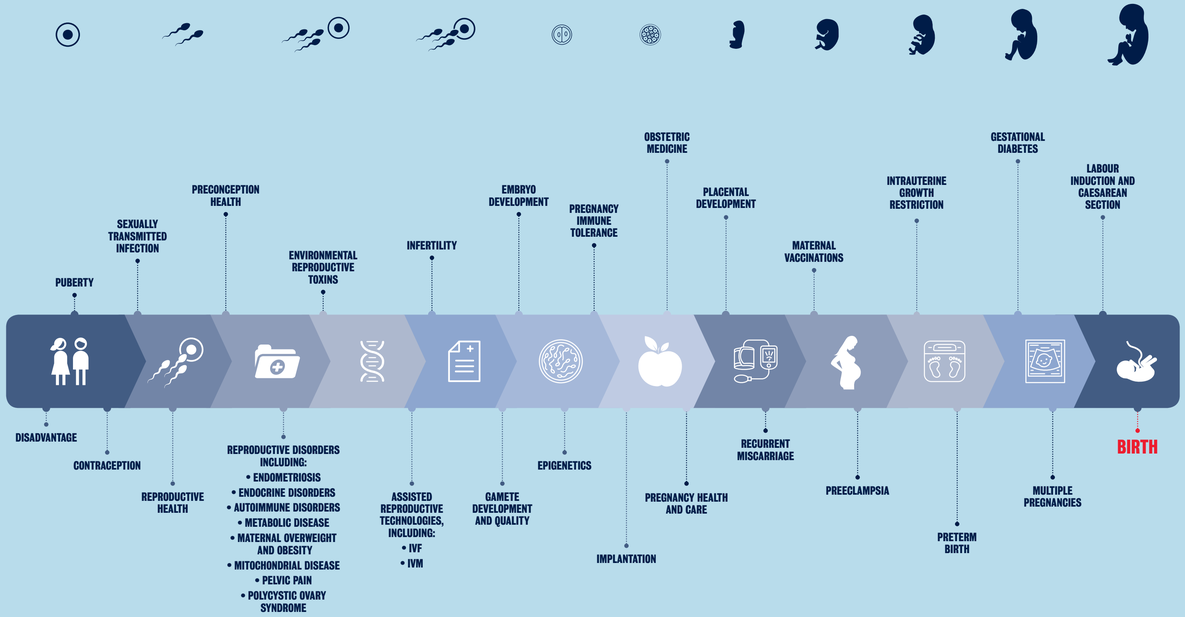
117
PHD STUDENTS

MEMBERS ARE EMBEDDED WITHIN THE 5 SOUTH AUSTRALIAN PUBLIC HOSPITALS

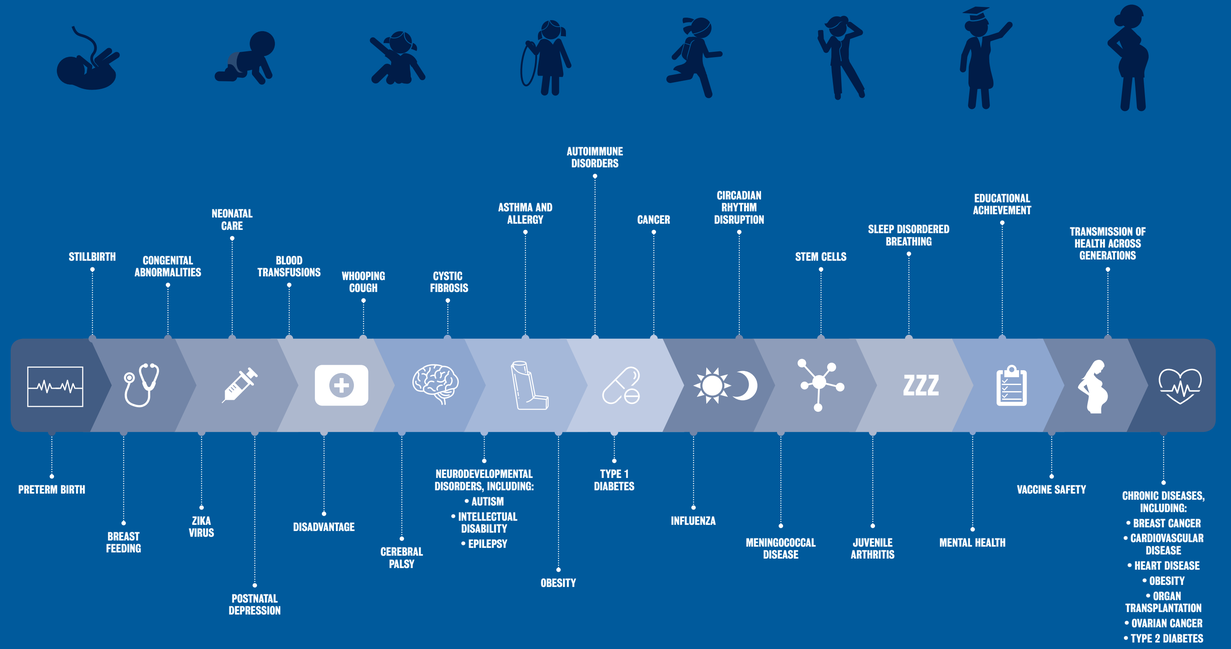
137
CONFERENCE PRESENTATIONS (66 INTERNATIONAL)

467
PUBLICATIONS

OUR RESEARCHERS ARE ADDRESSING HOW EVENTS BEFORE BIRTH...



SHAPE THE LIFELONG HEALTH OF OUR CHILDREN.



REFLECTIONS ON 2019

The RRI's research spans a wide array of topics that seek to improve health and well-being for children and families.

Following wide consultation, from late 2019 the overarching focus of the Institute's work was redefined as the reproductive and early life origins of health and disease. This succinctly encapsulates the Institute's message: that improved life-long health outcomes are best achieved through preventative measures starting before conception, and in the earliest stages of life. It is extraordinary to consider that children born today are predicted to be the first generation to die at a younger age than their parents. Focusing on life before birth through the early years has huge potential to address this alarming trend.

This focus sets the RRI and the University apart from other research institutions around the world. Much of early life research concentrates on later pregnancy and childhood – indisputably key developmental times. However, thanks in part to world-leading work conducted at the RRI, the preconception period is emerging as paramount for healthy pregnancy, by setting each child's developmental trajectory and life course prospects. We argue the greatest gains can be made by considering the health, environment and social circumstances of prospective parents prior to conception, through better planning, education and support, and ensuring every pregnancy is conceived intentionally.

Members of the RRI look forward to progressing research in this space in 2020 with key stakeholders and research partners. This will be complemented by further development of work across the Institute's four themes, which includes pioneering research in the area of child and adolescent health, especially in health conditions like diabetes, cerebral palsy and allergy that have their origins in life before birth.

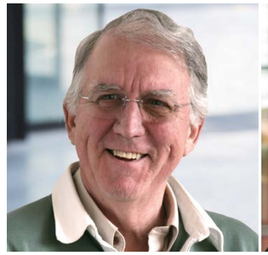
You will notice from the front cover, that the Institute re-branded in 2019 with a new logo and tagline. This enables us to communicate clearly the focus of RRI research, making it clear that we care about healthy children from the start.

As always, our world-class researchers continued to excel in 2019. Just some of the notable achievements:

- Members were awarded $7.8m in NHRMC Clinical Trials and Cohort Studies, Investigator Grants, Ideas and Partnership Project Grants.
- Attracting an ERA rating of the highest score of five for research in Paediatrics and Reproductive Health – well above world standard. This is the fourth time (of four rounds) that the University has scored the maximum rating, again demonstrating the outstanding quality and impact of RRI's research.
- New funding pipelines including funding from the Bill and Melinda Gates Foundation for the development of new non-hormonal contraceptives led by Professor Darryl Russell, and funding from the Federal Government for the development of an online digital platform for diagnosis and treatment of endometriosis led by Associate Professor Louise Hull.
- Contributing to the Australian Institute of Health and Welfare Report. Dr Rhiannon Pilkington and colleagues produced the chapter *An innovative linked data platform to improve the wellbeing of children—the South Australian Early Childhood Data Project*.

Additionally, its members produced approximately 500 publications, with many noteworthy advances. To highlight just a few, they demonstrated that regardless of obesity, women with metabolic syndrome take longer to become pregnant and are more likely to experience infertility; that maternal allergic asthma during pregnancy alters fetal lung and immune development in a 'sheep model'; that higher birth weight infants born of pregnancies complicated by diabetes are prone to poorer school assessment results; and that dietary supplements can improve subfertility in obese male mice.

Professor Jock Findlay AO



Professor Anton Middelberg

Over the last four years, the RRI has directed renewed effort on engagement and collaboration, particularly with non-traditional partners and the community. We continue to see the results of this investment which is leading to new ideas, new projects and new funding success.

In 2019 the Institute held three Co-creation workshops specifically focusing on collaboration. These events bring together researchers, clinicians, advocacy groups, health consumers, not-for profits, government and other groups to tackle important health issues. Workshops in 2019 focused on: stillbirth, paediatric chronic pain, and machine learning in endometriosis. We look forward to progressing the resulting new projects and making a difference in these areas.

> It was very pleasing to see funding awarded from the Federal Government and the Medical Research Future Fund for a collaborative project in endometriosis, which was developed at a Co-creation Workshop in 2018.

Together with Jean Hailes for Women's Health, five endometriosis advocacy groups, and researchers and clinicians across Australia, the RRI developed a project for the development of a new online platform to assist people living with endometriosis to achieve the faster diagnosis and improved treatments required to better manage this debilitating condition. This 3-year project commenced in 2019.

The Institute held another community Q&A event in 2019, designed to speak with the community rather than to the community. In the areas of polycystic ovary syndrome, this event welcomed participants to interact with, and ask questions of, experts and health consumers in a 'safe space'. The event was highly successful and we look forward to seeing more of these events in the future.

We congratulate two members for taking out top prizes at the prestigious SA Science Excellence Awards. Firstly, Professor Jozef Gecz received the SA Scientist of the Year Award for his pioneering gene discovery research in intellectual disability, epilepsy, autism and cerebral palsy. He identified the first gene for non-syndromic intellectual disability in 1994 and has discovered or contributed to the discovery of more than 200 different genes since. Secondly, to Professor Helen Marshall and collaborators for receiving the Excellence in Research Collaboration Award for the B Part of It Study. Led by Helen, and supported by GlaxoSmithKline P/L, this SA Meningococcal B Vaccine Herd Immunity Study is a partnership between SA Health, The University of Adelaide, local government, and education providers. The study paved the way for a SA state-wide program, the most extensive Meningococcal B vaccine program in the world.

We are continually thankful to the RRI's Advisory Board, Executive Committee, Early and Mid-Career Researchers' Council, professional services team, and our highly valued members for their hard work and perseverance. Together we are making a difference to improve the health and wellbeing of families in Australia and around the world.

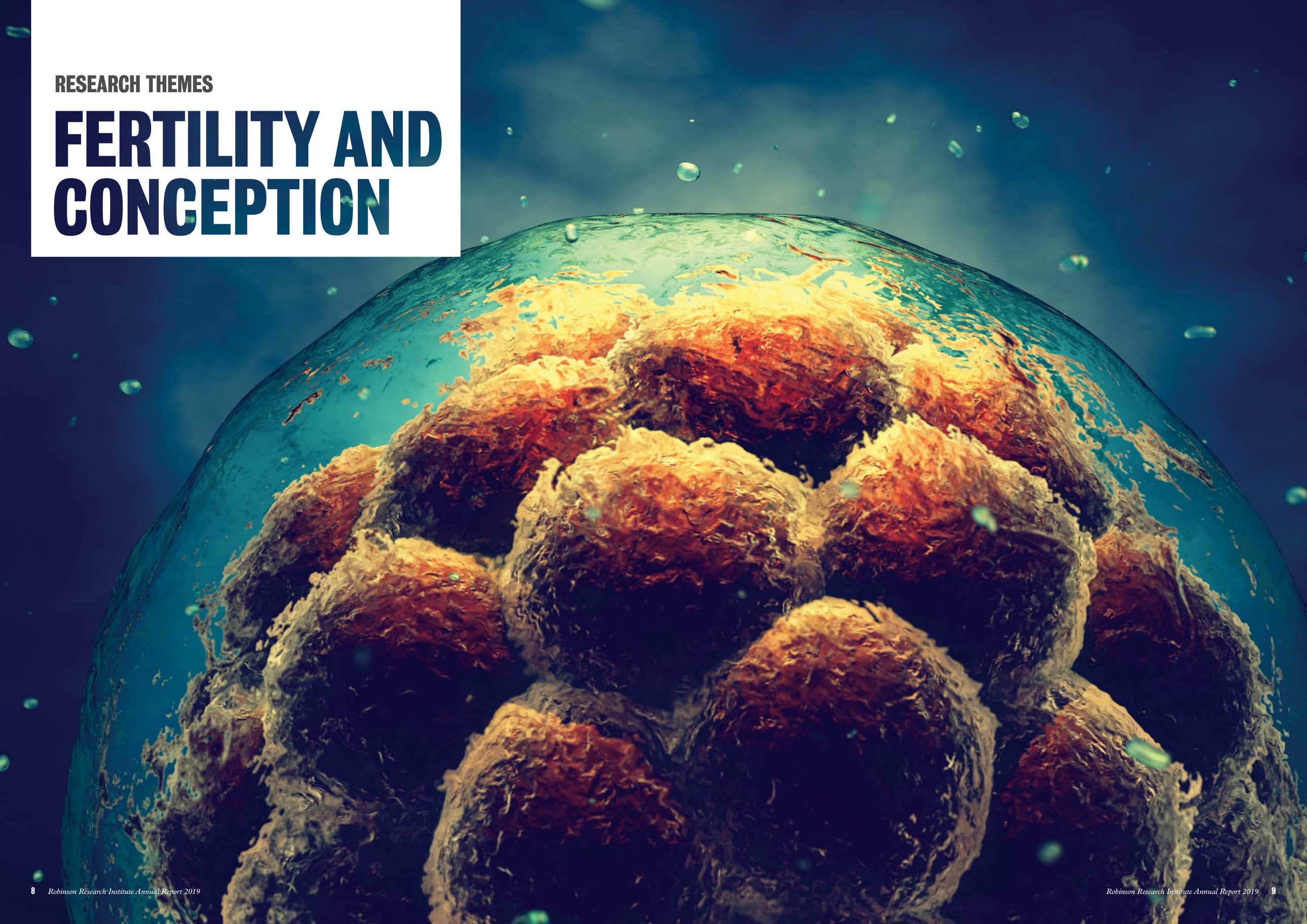
Professor Jock Findlay AO,
Chair of the Advisory Board

Professor Anton Middelberg
Deputy Vice-Chancellor (Research)

Professor Sarah Robertson, Director

RESEARCH THEMES

FERTILITY AND CONCEPTION



FERTILITY AND CONCEPTION

Conception is the foundation event for each new life. Every child's development, growth trajectory, and health throughout life is set in motion at the moment the embryo is formed.

Biological and social factors influence the events that facilitate (or interfere with) healthy conception. These factors ultimately determine not only whether pregnancy can commence, but also the progression of pregnancy, the growth of the fetus in utero, and the health of the infant after birth.

Achieving a healthy natural conception is a challenge for many people; infertility impacts 1 in 6 couples, and 1 in 25 children are conceived by IVF. The reasons for infertility are often not easily identifiable, but age, health conditions, and lifestyle factors are major contributors in both men and women.

The Robinson Research Institute is:

- Expanding knowledge of the molecular and cellular biology of each phase of the reproductive cycle
- Understanding developmental programming in gametes and embryos
- Understanding the role of the immune system in establishing a healthy pregnancy
- Uncovering the causes of infertility, including health conditions, lifestyle choices, environmental exposures and experiences
- Identifying the factors that couples can modify to improve fertility chances
- Understanding the long-term implications of assisted reproductive technologies
- Empowering individuals to make informed decisions about their fertility, including pre-conception health, positive behavioural changes, and alternative options to IVF
- Understanding the mechanisms of diseases that affect reproductive capability, including endometriosis, polycystic ovary syndrome, and reproductive cancers
- Development of new non-hormonal contraceptives

Research advances in 2019

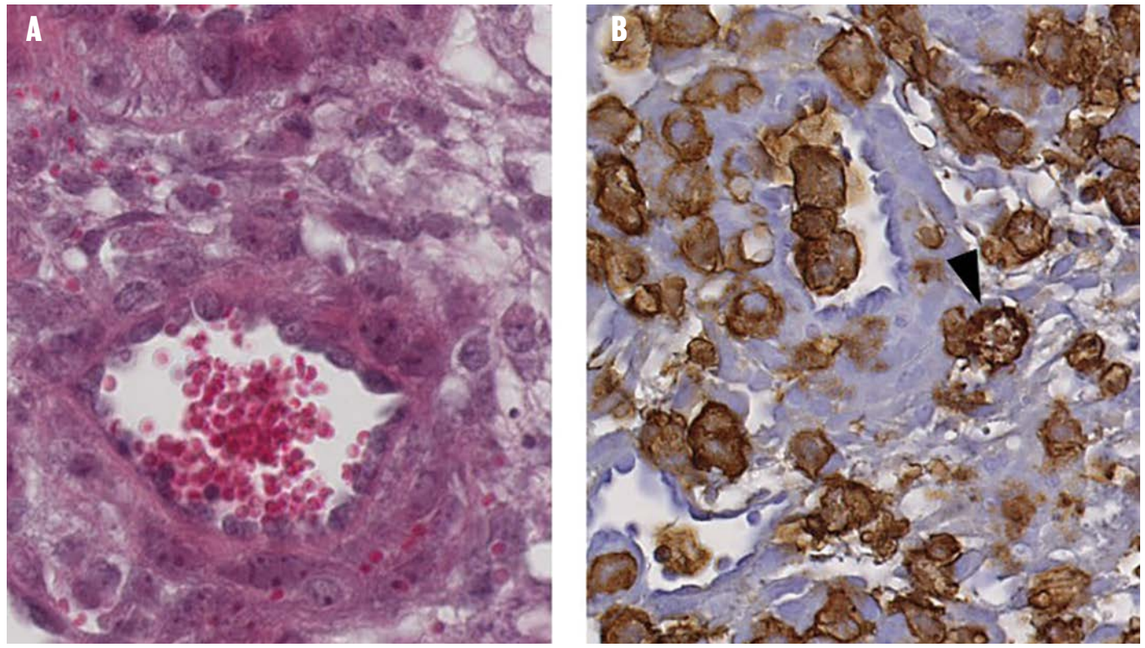
- We are engaged with the Federal Department of Health to advise in policy development for addressing endometriosis. A/Prof Louise Hull was invited by the Federal Minister of Health to develop the National Action Plan for Endometriosis at a round table. She developed the National Endometriosis Science and Clinical Trials Network, and led the medical group. This project will develop a national cohort of women with symptoms of endometriosis to explore the effectiveness of treatment and determine the lifecourse of disease.
- We completed a detailed mapping of disease symptoms in women with endometriosis. A/Prof Louise Hull and Dr Susan Evans surveyed women with pelvic pain with or without confirmed endometriosis to assess 14 co-morbid symptoms in these women. Although on average, women suffer from 8 symptoms, these symptoms can't reproducibly identify women with or without endometriosis. This yields new information of the symptomatology of pelvic pain – but indicates that other non-invasive tests are required for endometriosis diagnosis.
- In response to the building imperative for new detection strategies for endometriosis, we collaborated with the Australian Institute of Machine Learning, to develop advanced medical imaging approaches. Dr Gustavo Carneiro and A/Prof Louise Hull are progressing novel machine learning algorithms that will improve reliability and sensitivity for endometriosis diagnosis.
- We developed cutting-edge tools to investigate molecular drivers of endometriosis that might be effective drug targets. A/Prof Louise Hull and Dr Kavita Panir developed novel microRNA 'knock-out' mouse models where endometriosis susceptibility is altered. Research using these mouse models examined if disease development was affected by changes to macrophage activity. We found these microRNAs are integral to endometriosis-like lesion development. This study provides proof-of-principle that microRNAs have potential as bioceuticals in novel endometriosis treatments.
- We discovered that the menstrual cycle affects genomic tests used to tailor breast cancer treatment. A/Prof Wendy Ingman, Sarah Bernhardt, and team found that this means the result of genomic testing might partially depend on the stage of the patient's menstrual cycle at which breast cancer is analysed. In the future, this work will improve treatment decision-making for young women with breast cancer.
- We are seeking new ways to treat breast cancer using immunotherapy. A/Prof Wendy Ingman, Joe Wrin, and team generated a new antibody that targets dying breast cancer cells to increase the body's natural immunity. This antibody could be used to help the body's immune system eliminate cancer in combination with other therapies such as chemotherapy. This might help treat triple negative breast cancer in the future.
- Prof Rob Norman, Prof Helena Teede, and collaborators developed a translation program for the evidence-base of polycystic ovarian syndrome which was accepted by 38 international scientific and clinical societies and institutions including the World Health Organisation. This led to the widespread use of the app, AskPCOS, to support women dealing with their diagnosis.
- We completed two major trials on in vitro fertilsation to improve methods of assisted reproductive technology. Prof Rob Norman and his collaborators completed one trial on in vitro maturation of eggs, while the other trial compared methods of intracytoplasmic sperm injection with in vitro fertilisation.
- A/Prof Louise Hull led the ANZSREI Groups consensus meeting to develop the first recommendations for use of lipiodol flushing of oviducts to assist in infertility treatment.
- We examined community expectations for the delivery of assisted reproduction and to give the community more choices in their family decisions. Prof Rob Norman and Prof Georgina Chambers examined the likely demand for assisted reproduction across Australia over the next few decades, and its relationship with demography, immigration, education, and geographical background.
- We identified a unique mechanism of action of the hormone progesterone in ovarian cells. Prof Darryl Russell and team found this mechanism is important for understanding infertility associated with ovulation failure, and it contains components that pose novel targets for the development of new methods of contraceptives.
- Prof Jeremy Thompson and Dr Kylie Dunning with E/Prof Dennis Matthews (UC Davis), a world renowned optical physicist, developed novel techniques for embryology during E/Prof Matthews' two month sabbatical in Adelaide. His participation in our work resulted in a new method for sexing morula stage embryos, and he is following up with an exciting new application for one of his discoveries, using radar to detect pregnancies in livestock.
- We discovered that two specific types of immune regulatory cells, known as thymic Tregs and peripheral Tregs, are both involved in the immune response to conception and pregnancy. Dr Lachlan Moldenhauer, Prof Sarah Robertson, and team found that thymic Tregs and peripheral Tregs respond to signals in male partner seminal fluid. Also, thymic Treg cells undergo a specific epigenetic change in the Foxp3 gene after priming. This provides a potential mechanism for induction of immune tolerance in pregnant women that provides new clues about pregnancy disorders.
- We have progressed research with stem cells for tissue studies. The work by A/Prof Mark Nottle and his team have found strategies to ensure embryonic stem cells can differentiate more readily to functionally mature cell types, compared with existing human embryonic stem cells. This makes these embryonic stem cells more viable for further studies into fertility.
- A/Prof Mark Nottle and his collaborators have shown new ways to achieve tissue compatibility for transplantation of pig organs into human recipients in the future. They show that FokI-dCas9 manipulation can eliminate off-target events following gene editing.
- We were able to improve the fertilisation potential of oocytes in vitro, in a method that will advance assisted reproductive technology techniques. A/Prof Mark Nottle and his team gained further evidence about the actions of a cytokine, granulocyte-macrophage colony-stimulating factor, in improving maturation of oocytes in vitro.
- We are investigating chemotherapeutic resistance in ovarian cancer and how it can be overcome. Dr Carmela Ricciardelli, Prof Martin Oehler, and their team demonstrated that the extracellular matrix molecule, hyaluronan, is increased in patients who develop chemotherapy resistance. The hyaluronan inhibitor, 4-MU, is currently being investigated in laboratory studies as a potential candidate to overcome chemotherapy resistance in ovarian cancer cells.
- We are gaining more appreciation of the biology through which ovarian cancer become metastatic and resistant to chemotherapy. Dr Yoshihara Masato, Dr Carmela Ricciardelli, and team have demonstrated that ovarian cancer-associated mesothelial cells (OCAMs) promote progression of advanced ovarian cancer. The mesenchymal transition induced in OCAMs is primarily by TGF-β1 stimulation. Also, OCAMs induce platinum-resistance in ovarian cancer cells through direct cell-to-cell crosstalk via the FN1/Akt signaling pathway.
- We are better understanding the mechanisms of how breast cancer can metastasise. Dr Carmela Ricciardelli and Prof Darryl Russell found that depletion of ADAMTS1 in mammary cancer cells impeded their adhesion to a biological matrix and diminished migration of cancer cells, but not invasion by cancer cells. These findings demonstrate a potential mechanism whereby ADAMTS1 promotes breast cancer metastasis
- We investigated the causes and pathophysiology of polycystic ovarian syndrome (PCOS) and whether it may have recently arisen in human history due to our changing environment. Prof Ray Rodgers, Dr Katja Hummitzsch, and team are examining development of the PCOS ovarian phenotype by studying the formation of the ovary and the expression of PCOS candidate genes in the fetal ovary. Collaboratively we are investigating the role of fibrosis on tissues and organs in PCOS and the roles of exercise in ameliorating it.
- We continue to advocate for polycystic ovary syndrome. Prof Ray Rodgers, Dr Katja Hummitzsch, and team have identified that research funding, publications in diabetes journals and the messages on diabetes websites, all grossly overlook PCOS, even though it contributes to a quarter of type 2 diabetes of women of reproductive age. The international guidelines we contributed to are currently being published, and are being highly read and cited.
- We showed that environment and lifestyle stressors influence ovarian somatic cell function and in turn impact on oocyte and embryo health. Prof Darryl Russell and team found that these stress response mechanisms are important in the initiation and progression of cancers of reproductive organs.
- We developed a unique high throughput screening method for identification of new non-hormonal contraceptives. This development by Prof Darryl Russell and team has led to the discovery of previously unknown molecular pathways essential for ovulation and unique candidate drugs with promise as new contraceptives.
- We demonstrated that that the quality of information about fertility and infertility on the internet and social media is often inaccurate. A/Prof Alice Rumbold, Sophie Kedzior, and team made recommendations about how to monitor conceptions as well as conception behaviours. This identifies clear opportunities for improved dissemination of evidence-based material about fertility to interested couples.
- We progressed work to define how mitochondria underpin key processes in preimplantation embryo development that program later ability to implant and form healthy offspring. Prof Rebecca Robker and colleagues demonstrated that the processes of ovarian stimulation, in vitro fertilisation and in vitro culture differentially impair blastocyst developmental kinetics, differentiation and mitochondrial DNA copy number compared with naturally conceived embryos.
- We expanded knowledge of genetic control of the biological pathways for sex-specific differences between female and male embryos and fetuses. Prof Stefan Hiendleder and team compared mammalian sex chromosome assemblies obtained with a novel sequencing approach and detected evolutionarily conserved gametologues, i.e. X-Y homologous genes, outside the recombining pseudoautosomal region. These genes are candidates for early phenotypic differences between female and male embryos and fetuses.
- Our work contributed to new insight on fetal heart development and the capacity for heart tissue to regenerate. Prof Frank Grutzner collaborated with scientists at the University of California, San Francisco to explore the underlying mechanisms and how they evolved. Studying 41 species, their findings suggest that loss of heart regenerative capacity in adult mammals is triggered by increasing thyroid hormones and may be a trade-off for the acquisition of endothermy – the capacity to maintain a constant body temperature independent of the environment.

RESEARCH THEMES

PREGNANCY AND BIRTH

PREGNANCY AND BIRTH

Most prospective parents anticipate healthy, problem-free pregnancies. In reality, complications are common, with a quarter of Australian pregnancies affected by one or more of the following conditions: preeclampsia, preterm birth, fetal growth restriction, and gestational diabetes.



(A) Decidual spiral artery stained with Masson's trichrome, and (B) uterine natural killer cells (brown staining, arrow head, with DBA Lectin) in the mouse decidua in mid-pregnancy. Scale=50 µm. Masson's trichrome staining by Holly Groome, and DBA Lectin staining by Shanna Hosking, both PhD students at the RRI.

Pregnancy complications can have serious life-long health implications for both the mother and her baby; identifying at-risk individuals and administering effective interventions is vital for healthy communitities.

The Robinson Research Institute is:

- Defining the biological pathways and processes enabling healthy pregnancy and fetal growth
- Understanding the factors and pathophysiological events that lead to pregnancy complications
- Addressing the additional challenges facing disadvantaged communities
- Understanding the maternal immune response to implantation and the immune adaptations allowing placental formation, including vascular supply and nutrient transportation
- Understanding the immune and inflammatory mechanisms controlling the timing of labour, and causing preterm labour
- Identifying the modifiable risk factors that affect pregnancy health
- Developing interventions to measure risk, and prevent or limit pregnancy complications
- Maximising maternal and infant health and well-being after birth
- Educating pregnant women on how to achieve a healthy pregnancy, including diet and lifestyle behaviours, and timing of appropriate maternal vaccinations

Research advances in 2019

- We found that interventions in pregnant women with a healthy weight had no effect on complications. In a study of 641 women, Prof Jodie Dodd showed that for pregnant women with a BMI in the normal range, an antenatal dietary and lifestyle intervention improved diet quality but did not reduce gestational weight gain or reduce the incidence of pregnancy and birth complications.
- We are doing large scale investigations to investigate the long-term effects of lifestyle interventions in pregnancy. In November 2019, in London, Prof Jodie Dodd hosted a face-to-face meeting with twelve collaborators from across Europe. Together, we are the investigators of seven 3-5 year follow up studies of children of women who participated in dietary and lifestyle intervention studies in pregnancy. Data from these studies has been combined in an individual participant data meta-analysis, lead by Prof Jodie Dodd and her team in Adelaide. We presented the preliminary analyses and drafted the manuscript of findings.
- We progressed preclinical studies to evaluate the impact of a new candidate drug therapy for preterm birth. Dr Loretta Chin, Prof Sarah Robertson, and team found a novel TLR4 antagonist (+)-naloxone, provides protection from inflammation in the fetal developmental programming in utero. This is mediated by decreasing inflammatory cytokine expression in a fetal sex-specific manner. The results add to information on the safety of (+)-naloxone and show this pharmacological approach may be useful for protecting human infants from adverse effects of exposure to inflammatory insults in utero.
- Research in pre-birth epigenetics is now advanced by higher accuracy of testing DNA methylation in the placenta. Improvements in analysing the tissue from placentas were developed by Qianhui Wan with Prof Claire Roberts, Dr Tina Bianco-Miotto, and Dr Jimmy Breen. Tissue samples from different parts of the placenta were examined to show that tissue purity is a critical factor in placental tissue analysis.
- We continue to improve the health of mothers and babies with the Stillbirth Centre for Research Excellence. A/Prof Philippa Middleton and colleagues helped to develop the Safer Baby Bundle which is being rolled out nationally to address gaps in prevention of stillbirths across maternity services.
- We performed the most comprehensive analysis of evidence concerning community health educational interventions. A/Prof Alice Rumbold, Dr Zohra Lassi, and team found that community health educational interventions significantly reduced newborn death, early newborn mortality, and late newborn mortality, as well as perinatal mortality in low and middle income countries.
- We are looking at the patterns of placental infection or bacterial colonisation in very preterm newborns to improve their health outcomes. A/Prof Michael Stark and team found that when there was a prolonged preterm rupture of membranes (PPROM), that the current antibiotic recommendations may not be adequate. We found recommendations for this common pregnancy complication may promote selection of unhindered antimicrobial-resistant Gram-negative organisms, which increases the risk of gram negative early onset sepsis in the preterm newborn. These findings suggest that a further wide-scale examination of antibiotic use in PPROM and the implications for neonatal morbidity is a clinical priority.
- We progressed understanding of how advanced maternal age impacts fetal growth patterns and the chances of low birth weight. Dr Alison Care worked with colleagues at the University of Alberta, Canada to show in rats that relative to young mothers, older mothers exhibit compromised growth of both female and male fetuses, linked with different changes to gene expression, oxidative damage, and cell death in the placenta depending on the sex of the fetus.
- We are demonstrating the links between medical practice and improved health outcomes at birth of babies in low resource settings. A/Prof Lisa Smithers, Prof John Lynch and Engida Yisma found that the changing temporal association between caesarean section and neonatal death reflects an improvement in service delivery and secular shifts among characteristics of Ethiopian women from 2000 to 2016.
- We disseminated pilot study results for the PARIS study (pregnancy and respiratory illnesses study) at a neonatal and maternal immunisation conference in Sep 2019. Research by Prof Helen Marshall and team demonstrated feasibility of self-collected nasal swabs as a method for improving detection of common pathogens causing respiratory infections during pregnancy and their implications. The study identified several pathogens including RSV, influenza, rhinovirus, human metapnuemovirus, and parainfluenza virus in a cohort of 135 women reporting 22 respiratory illnesses.
- We presented data at the ESPID and INMIS conferences examining factors associated with influenza vaccine responses in pregnant women. In this study of 96 women, Prof Helen Marshall, her team, and collaborators found that maternal age and BMI did not influence likelihood of achieving seroprotective antibody responses following vaccination. Approximately 80% of pregnant women demonstrated seropositive antibody titres to all three influenza vaccine strains (H1N1, H3N2 and B) following vaccination.
- Prof Helen Marshall, Hassen Mohammed, and team identified psychosocial factors influencing women's uptake and willingness to receive pertussis and influenza vaccine during pregnancy. Regardless of psycho-social factors, most expectant mothers were willing to receive the recommended vaccination during pregnancy, but we observed a difference in the actual maternal vaccination uptake. Psychosocial factors such as a history of major depressive disorder and elevated antenatal depressive symptoms were associated with lower receipt of the vaccines during pregnancy. Thus psychosocial factors should be taken into consideration in designing interventions and implementation of maternal immunisation programs.
- We continue to publish systematic reviews on vaccine recommendations for pregnant women. Prof Helen Marshall and her team published a systematic review published in PLOS One on the effectiveness of interventions used to improve pertussis vaccination uptake in pregnant women. Based on our review findings, we recommend incorporating midwife delivered maternal immunisation programs at antenatal clinics, use of a provider reminder system to target unvaccinated pregnant women, and including maternal pertussis immunisation as part of standard antenatal care.
- We are examining prospective cohort study data that recruited healthy nulliparous women in pregnancy at two obstetric hospitals in South Australia. Prof Helen Marshall, Hassen Mohammed, and collaborators confirmed the safety of maternal influenza vaccine for key pregnancy outcomes including spontaneous abortion, gestational diabetes, chorioamnionitis, gestational hypertensive disorders, and preterm delivery. Importantly, the data suggest a protective effect against adverse birth outcomes such as low birth weight at term.

RESEARCH THEMES

EARLY ORIGINS OF HEALTH

EARLY ORIGINS OF HEALTH

The health of every child is profoundly influenced by events in early life. Early life environment determines the likelihood and trajectory of chronic conditions later in life, affecting metabolic and cardiovascular health, immune and reproductive health, and neurological function.

Parental health and well-being prior to conception, during pregnancy, and in early postnatal life determines the quality of this crucial early environment – a concept known as developmental programming.

Understanding the mechanisms underlying early life 'programming' is essential for developing effective interventions, in identifying early prognostic markers of risk, and defining optimal parental health and lifestyle.

The Robinson Research Institute is:

- Uncovering the role of factors that affect early development, including: poor nutrition, lack of exercise, obesity, diabetes, asthma, infection, shift work, and stress
- Developing interventions that can be administered during pregnancy to improve the life-long health of the infant
- Demonstrating that even late preterm babies are at increased risk of impaired neurological function in childhood and developing effective interventions
- Uncovering the impact of disadvantage on life-long health
- Demonstrating that paternal obesity and poor diet can program obesity and impaired metabolic health in the next two generations of offspring
- Utilising our knowledge to inform pregnancy care guidelines and public health policy
- Understanding the early life environments that program asthma and allergy development

Research advances in 2019

- We led research to build evidence that pregnancy exposures are relevant in modulating a child's risk of developing type 1 diabetes. In 2019, the original recruitment target for the ENDIA study was extended to 1500 mother-infant dyads, and recruitment was completed in November 2019. The central ENDIA project management team are based at The University of Adelaide and 22% of the total ENDIA cohort are being followed by the South Australian team led by Prof Jenny Couper at the Women's and Children's Hospital.
- The Australian Collaborative Cerebral Palsy Research Group headed by E/Prof Alastair MacLennan continues their investigations into genetic factors contributing to cerebral palsy. Prof Jozef Gecz was awarded the South Australian Scientist of the Year for his work both in cerebral palsy and associated neuro-developmental disorders such as intellectual disability, epilepsy, and autism. Dr Clare van Eyk has won a three year fellowship from the Hospital Research Foundation for a study utilising discordant monozygotic (identical) twins to unravel the genetic and environmental contributions to neurodevelopmental disorders.
- We show that fetal development in pregnancy affects the likelihood of allergies in early childhood. A/Prof Kathy Gatford, Prof Helen Marshall, and teams completed a systematic review of human studies, to show that babies that were heavier at birth than normal for their gestational age, were at increased risk of food allergy and eczema in childhood. This work confirms that prenatal growth affects susceptibility to allergy, and identifies a higher risk group of children who may benefit from monitoring and interventions such as early introduction of allergenic foods to promote tolerance.
- We undertook a comprehensive review to investigate the health outcomes of using assisted reproductive technology. A/Prof Alice Rumbold and team found that the poor health outcomes reported in children conceived with ICSI are due in part to the procedure itself, but also due to the underlying factors associated with male factor infertility. This underscores the need for sustained monitoring of children conceived with this technique to understand the intergenerational impact of male infertility.
- We now appreciate that caesarean sections are not likely to be associated with type 1 diabetes. By analysing population-level data, A/Prof Lisa Smithers and Mumtaz Begum were able to examine whether interventions at birth led to diabetes later in life.
- We found that dietary interventions can affect glucose metabolism in men with obesity. Prof Leonie Heilbronn and team published a pilot study showing that time restricted eating yields an acute improvement in glucose metabolism in men with obesity, and that timing from breakfast or lunch were both effective.
- We show that dietary practices can improve cardiovascular disease risk. Prof Leonie Heilbronn and team published a study showing that intermittent fasting was more effective to reduce CVD risk than caloric restriction. However, intermittent fasting did not affect levels of inflammation.
- Prof Leonie Heilbronn and team have published a preclinical study showing that fasting stimulates adipose tissue browning in mice with diet-induced obesity. We show that dietary interventions can affect the metabolic pathways in obese mice.
- We are at the cutting-edge of applying artificial intelligence and machine learning to medical imaging to improve health services. Prof Lyle Palmer, Dr Luke Oaken-Rayner, and team developed and tested several models to be applied to various diseases. Some models used radiological images for hip fracture report generation of the detection of high grade glioma recurrence, and machine learning models used clinical input data including text for the prediction of the cerebrovascular cause in stroke clinic patients and the prediction of thrombolysis outcomes in ischaemic stroke.
- We identified several key factors that limit the clinical validity of current artificial intelligence models. Prof Lyle Palmer and Dr Luke Oakden-Rayner investigated issues including dataset development and reporting problems with "brittleness" of models due to confounding and outliers, and reporting of results with an over-reliance on summary statistics. Several solutions to these problems have been identified including statistical approaches and better design.
- We are applying deep analytics to genome-wide association studies on different diseases to understand the genetic drivers or players in different disease states. Prof Lyle Palmer and his national and international collaborators have identified a number of novel genes which play a role in various chronic diseases including obesity.
- Prof Lyle Palmer has made substantial progress in building state-wide bioinformatics infrastructure to enable artificial intelligence to be applied to clinical problems and translated to the bedside.
- Prof Megan Warin organised a panel at the American Anthropological Association and the Canadian Anthropology Society in Canada. This was an international grouping of social science and biosocial researchers working on the developmental origins of health and disease.
- We continue to investigate public health practices in obesity and socioeconomic factors. Prof Megan Warin and Dr Tanya Zivkovic published a book with Palgrave on Obesity and Disadvantage in Australia which has significant implications for how public health interventions are rolled out in Australia and internationally.
- Prof Megan Warin and Prof Vivienne Moore were invited to present research at a special panel focused on collaborative biosocial approaches to the developmental origins of health and disease at the DOHaD World Congress.

RESEARCH THEMES

CHILD AND ADOLESCENT HEALTH

CHILD AND ADOLESCENT HEALTH

The future health of society depends on the health and well-being of our children, as many chronic physical and mental disorders originate in childhood.

There is a clear need to develop safe and effective interventions that can be accessed in early life to prevent life-long conditions.

Our members comprise world-leading clinicians and researchers who are working to detect, prevent and treat serious childhood diseases. Collectively we seek to improve the health of infants, children, and adolescents in Australia and around the world.

The Robinson Research Institute is:

- Improving the reach and effectiveness of immunisation programs to prevent serious infections in children
- Advancing better treatments for paediatric conditions including diabetes, sleep and neurological disorders, allergies, joint disease, and cystic fibrosis
- Identifying biomarkers to ensure early diagnosis and treatment of autoimmune disease, allergies, and asthma
- Defining the genetics of intellectual disability, cerebral palsy, and epilepsy to provide targets for new treatment
- Working to prevent and alleviate childhood diabetes and obesity
- Strengthening the mental health of mothers, young children, and adolescents through e-learning programs
- Understanding the serious implications of generational disadvantage and working with Government to comprehensively address these issues
- Running large clinical trials and cohort studies in the areas of obesity, gestational diabetes, and type 1 diabetes

Research advances in 2019

- We are investigating whether the new meningococcal group B vaccine 4CMenB can prevent transmission of invasive group B meningococcal carriage in the throat and potentially induce herd immunity. Prof Helen Marshall was part of a large collaboration for a randomised control trial in South Australian schools to test this vaccine. With 237 schools participating, 34,489 students in years 10 to 12 (age, 15 to 18 years) received 4CMenB vaccination either at baseline (intervention) or at 12 months (control). Among Australian adolescents, the 4CMenB vaccine had no discernible effect on the carriage of disease-causing meningococci, including group B. The lack of effect of 4CMenB on carriage of disease-causing meningococci emphasises the need for direct protection of those at highest risk for meningococcal disease. A South Australian state-funded Meningococcal B vaccine program has now been introduced to provide direct protection for age groups at highest risk of meningococcal disease.
- We are progressing studies on vaccination of infants to protect against infectious disease. The VIRTU team, headed by Prof Helen Marshall, completed enrolment of 250 infants into a study investigating the impact of antibiotics on infant vaccine responses. The study is ongoing and will compare antibody levels for various infant vaccines in blood samples collected at 6 weeks and 7 months of age for infants exposed or unexposed to antibiotics during labour/delivery or during the first 6 weeks of life.
- We continue to lead national programs on cardiovascular disease in children and young people. Prof Jenny Couper's national study will evaluate cardiovascular risk in 7,200 Australasian children and young adults with type 1 diabetes. After following these recruits for over 7 years in the Australasian Diabetes Data Network (ADDN), she showed girls and Indigenous children are particularly vulnerable to cardiovascular disorders.
- We are defining the immune cell profile of children with type 1 diabetes to understand the immune underpinnings of this disease. Prof Simon Barry is using high resolution analysis of multiple factors to interrogate the various immune cell subsets from diabetes patients. In particular, his work reveals the importance of altered function in regulatory T cells in causing this disease.
- We are understanding how a range of autoimmune diseases can develop when regulatory T cells become dysfunctional. Prof Simon Barry, Dr Tim Sadlon, and team found that in mouse models, when particular genes are eliminated, this alters the suppressive function of regulatory T cells. They are developing a deep mechanistic understanding of how various molecular factors in Treg cells interact to maintain normal cell function. Notably Prof Simon Barry has discovered the significance of interactions between FOXP3, other transcription factors, and microRNAs.
- We are advancing frontiers of cancer treatment using immune cells in CAR-T therapy to attack cancer cells. CAR-T therapy has shown promise in curing leukaemia in children, and we are applying CAR-T therapy to tackle other childhood cancers. Preclinical work in the laboratory by Prof Simon Barry, Dr Veronika Bandara, and collaborators have shown the effectiveness of CAR-T therapy by killing 25 different types of cancer cells from 12 different cancers, and eliminating prostate cancer cells in animal studies.
- We are using multi-omics approaches to understand how genes can interact with each other in health or disease by using complex data analytics in genetic analysis. Prof Simon Barry with Dr Jimmy Breen and others developed these techniques and approaches to determine how one gene can affect other genes. Understanding the interplay between different genes will provide information about the biological pathways by which disease arises.
- We are leading research to understand how allergies develop in children at the time of birth. Prof Antonio Ferrante, Dr Alex Quach, A/Prof Charles Hii, and team have identified a key signaling pathway which may be important in promoting development of T cells that are predisposed to produce Th1 cytokines and protect against allergy. Levels of protein kinase c zeta (PKCζ) expression are particularly implicated, and they show in cord blood T cells that maturation with selective PKC stimulators display different cytokine bias. The findings provide new leads on how development of T cells may go awry in children with allergy.
- We have linked Vitamin D with host innate immunity to microbial pathogens to understand the consequences of Vitamin D deficiency in health. Prof Antonio Ferrante, A/Prof Charles Hii, and team links the expression of two immune receptors, innate immune receptor TLR2 and complement receptor CRIg, in macrophages to the active form of Vitamin D. Compared to other receptors CRIg is strongly influenced by Vitamin D. By using frequently encountered pathogens Staphylococcus aureus and Candida albicans, we provide evidence for a wider role for Vitamin D in supporting macrophage function and healthy immunity.
- We are continuing to identify the molecular factors which cause neurodevelopmental disorders in children. Prof Jozef Gecz, working with Prof Luis Perez-Jurado and their team have identified several novel genes for neurodevelopmental disabilities. These rare gene mutations have been linked to particular clinical signs and symptoms previously undiagnosed for neuro-developmental conditions. This research provides more information on the genetic factors that underpin neurodevelopmental disorders and helps families and clinicians plan treatment interventions.
- Prof Jozef Gecz and Dr Lachlan Jolly led a global effort to establish mutations in a gene called USP9X as a cause of a new neurodevelopmental disorder. We reported the syndrome-like clinical presentation, and identified a disease mechanism involving TGFβ signalling, highlighting plausible avenues towards therapy.
- We have progressed international collaborations to understand the genetic causes of epilepsy. Prof Jozef Gecz and Dr Mark Corbett have led an international effort, the International FAME Consortium to identify the locus for Familial Adult Myoclonic Epilepsy which affects thousands of individuals world-wide. They cloned and characterised the chromosome #2 locus, and significantly contributed also to defining the chromosome #5 locus.
- We looked for possible genetic causes of autism in a selected sample of children with Williams-Beuren syndrome, a condition usually associated with the opposite phenotype (hypersociability) and caused by a recurrent microdeletion at 7q11.23. Prof Jozef Gecz and Prof Luis Perez-Jurado identified cis- and trans-acting second genomic hits that contribute to the higher risk for autism in this genetic condition.
- We continue to research the early origins of obesity in children. Prof Jozef Gecz and Prof Luis Perez-Jurado investigated genetic causes of severe early onset obesity in almost 500 unrelated children using a pooling strategy analysing known and novel candidate obesity genes. Highly penetrant variants in multiple genes of the melanocortin pathway were found in 5% patients, supporting the clinical utility of genetic testing to identify patients who might benefit from targeted therapeutic intervention.
- We demonstrated that diagnoses of ADHD in children could be related to late year birth dates. Prof Jon Jureidini and Dr Melissa Raven published work on the youngest children in a classroom to be at increased risk for being medicated for ADHD. There are possible misattributions of cognitive and emotional maturity to 'ADHD' in these children.
- We have shown that children with sleep disordered breathing exhibit abnormal vascular function compared to control children. Now we are looking at physiological changes associated with sleep disordered breathing and their impact on child development. Prof Declan Kennedy and Dr Anna Kontos are recruiting children to gather lifestyle and biological information to better understand the risk factors that predispose children to an accelerated form of vascular ageing. The aim is to identify biomarkers of the disorder so we can develop a cost-effective diagnostic test.
- We found a biological link between how breasts grow during adolescence and breast density as an adult. Breast density is a risk factor for breast cancer and this discovery by A/Prof Wendy Ingman, Maddison Archer, and team could lead to new ways to prevent girls developing high density and increased susceptibility to later life cancer occurrence.
- We are creating new experimental tools to study the genetic and molecular basis of Duchenne Muscular Dystrophy. Prof Paul Thomas, Dr Fatwa Adikusuma and team generated and characterised two mouse models of Duchenne Muscular Dystropy which wil be used to develop next generation CRISPR gene therapies for this devastating disease.
- We continue to increase understanding of child health through research targetting better detection of developmental impairment. Prof John Lynch and Alex Proctor demonstrated that the adult-focussed definition used by the Australian Institute of Health and Welfare has important limitations when it comes to children, causing underestimation of potentially preventable hospitalisations in children.
- We are developing new analytical tools to help us understand research data more effectively. Prof John Lynch and Murthy Mittinty have developed new methods for analysing multiple mediators.
- We characterised two new rat models of cystic fibrosis which will help to improve our understanding of this disease and test potential therapies. A/Prof David Parsons, Dr Martin Donnelley, and team found that the rat models captured key features of cystic fibrosis disease and will facilliate development of an airway gene therapy. The rats will be made available to investigators worldwide to aid cystic fibrosis research.
- We are developing new ways to treat cystic fibrosis using gene therapy as a new treatment strategy. A/Prof David Parsons, Dr Martin Donnelley, and team have developed a novel vector envelope that could improve the targeting of gene therapy to stem cells in the lung. Targeting the lung stem cells would facilitate long-term therapeutic efficacy of our cystic fibrosis gene therapy.
- We performed a year long study to assess the outcomes of multiple lentiviral gene vector re-dosing schedules in the airways of mice to assess the effectiveness of this particular therapy. A/Prof David Parsons, Dr Martin Donnelley, Dr Nigel Farrow, and team found the analysis so far has indicated that the vector can be re-dosed without being silenced by the immune system. This makes this vector a very promising therapeutic candidate.
- We have cutting-edge technology to investigate the effects of cystic fibrosis via X-ray imaging using the SPring-8 Synchrotron in Japan and the Australian Synchrotron. A/Prof David Parsons, Dr Martin Donnelley, and team are examining the effects of airway gene therapy on airway surface health and local lung function, and the effects of bacterial infections. We are also beginning to image magnetic particle motion under the influence of externally applied magnetic fields.
- We led research to investigate how the intestinal microbiome is related to risk of developing type 1 diabetes in children. Prof Jenny Couper and national co-workers found that children who will progress to diabetes have gut microbiome dysbiosis associated with increased intestinal permeability. These findings raise the prospect that interventions to expand gut microbial diversity, in particular short chain fatty acid-producing bacteria, might have potential to decrease progression to diabetes in children at risk. The team's national ENDIA cohort will be used to test these questions.

TRANSLATING FINDINGS THROUGH COLLABORATION

Our members collaborate extensively with researchers and stakeholders, both locally, and internationally, to translate research findings into improved care.

HOSPITALS

Members are embedded within the 5 South Australian public hospitals.

CLINICIANS

Many clinicians are RRI members, and we collaborate with fertility clinics, hospitals, and other primary health organisations.

HEALTH CONSUMERS

Collaborating with health consumers ensures our research is relevant and facilitates access to unique perspectives and solutions.

NOT-FOR-PROFITS

We partner with not-for-profit organisations to support evidence-based impact.

ACADEMIC

Collaborating with researchers at hundreds of institutions across 20+ countries.

PEAK BODIES

We advocate for the importance of our research through memberships and partnerships with peak bodies including AAMRI and PSANZ.

INDUSTRY

Research translation is facilitated through industry and pharmaceutical collaborations and our MRCF membership.

GOVERNMENT

Our members collaborate with local, state and federal Government on projects to improve the health of the community.

Australian Institute of Health and Welfare Report

Australia's Welfare 2019 is the 14th biennial welfare report of the Australian Institute of Health and Welfare. The report presents an overview of the welfare data landscape and explores selected welfare topics, including intergenerational disadvantage, income support, future of work, disability services, elder abuse, and child wellbeing.

Dr Rhiannon Pilkington and members of the BetterStart Research Group were one of two invited academic contributions in the report. Their chapter (Chapter 8) is titled *An innovative linked data platform to improve the wellbeing of children—the South Australian Early Childhood Data Project*.

The full report can be viewed at this link: aihw.gov.au/reports/australias-welfare/australias-welfare-2019-data-insights/contents/summary

Intergenerational Studies Project

The RRI was awarded an additional $50,000 in 2019 from the University to progress an SA Intergenerational Cohort Study. Currently under development, this funding will progress the development of a large, state-wide intergenerational studies project as part of an emerging nationally coordinated initiative of similar studies in each state.

Reproductive Health Australia

Established by Prof Jock Findlay AO (the RRI Advisory Board Chair), Reproductive Health Australia provides a unified voice for Australian researchers in reproduction, advocating directly to the community, opinion leaders, and the Government on behalf of the entire sector.

This alliance seeks to make reproductive health a national priority for the economic and social benefit of the nation, leading to improved environmental, agricultural, and human health outcomes. The RRI is a founding partner and continues to support this alliance for the benefit of the community.

THE COMFORT ABILITY PROGRAM

There is an alarming problem in the field of persistent paediatric pain; research strongly supports multidisciplinary approaches that are inclusive of psychological support, however few patients obtain such treatment.

Dr Carolyn Berryman (RRI) and Dr Nicki Ferenz from the Statewide Service for Chronic Paediatric Pain received an Australia-Harvard Fellowship to fund A/Prof Rachael Coakley from the Boston Children's Hospital to visit Adelaide to share The Comfort Ability program.

A/Prof Coakley's program is an evidence based, one-day workshop for adolescents with pain and their parents. It provides foundational neuroscience education, teaches basic cognitive behavioural therapy skills, and educates parents about how to support their child's function at home and school. Over the past four years, it has been implemented at 16 children's hospitals in the US and Canada and South Australia is now the next location to join this network.

The program will run bimonthly at the WCH in the first instance and the next steps comprise a research program to evaluate the feasibility and acceptability of this program in the Australian environment, and the plan for future collaborations that will investigate low intensity telehealth follow up for program participants.

MRFF Genomics Health Futures Mission

Prof Jozef Gecz formed part of the Strategy Committee to plan and propose the allocation of $350 million for the mission for the next 6 years. This mission has been established to invest $500 million over 10 years in genomics research to improve testing and diagnosis, and help personalise treatment options to improve health outcomes.

Prevention of Childhood Disability

Channel 7 Children's Research Foundation has partnered with the RRI and SAHMRI, forming the initiative *Prevention of Childhood Disability*, with Prof Jozef Gecz the inaugural Chair. Committed to understanding and preventing early onset neurodevelopmental disease, the Chair has studied more than 5000 South Australian patients, issued more than 500 diagnostic reports, received almost 300 inquiries from patients and clinicians, and generated more than $5 million in additional research funding since its inception in April 2016.

International Paediatric and Adolescent Diabetes

Prof Jennifer Couper, Research Leader of the Diabetes Research Group was a Member of the Expert Advisory Group that produced the International Paediatric and Adolescent Diabetes Guidelines for Type 1 Diabetes in Children, Adolescents and Adults.

Polycystic Ovary Syndrome International Guidelines and online app

AskPCOS is the first app that has been developed dedicated to the condition of Polycystic Ovary Syndrome, answering PCOS questions and assisting users to better manage their condition. Prof Rob Norman and Prof Ray Rodgers, along with other leading experts around the world have successfully rolled out the AskPCOS app and the International Evidence-based Guidelines for the assessment and management of PCOS internationally, with both being well accepted. The aim is to improve prevention, diagnosis, treatment and health outcomes of women with PCOS. They have formally engaged 38 societies, patient advocacy groups, and government agencies from 71 countries and six continents in an international PCOS network.

IVF patent

A/Prof Mark Nottle's Reproductive Biotechnology Research Group has explored an option to licence the patent for improving in vitro oocyte maturation which has been signed by two international parties. The method covered by this patent has the potential to provide a safer, cheaper, more patient-friendly form of IVF by overcoming the need for daily hormone injections to produce multiple mature eggs.

Novel lung diagnostics and monitoring technology

A/Prof David Parsons from the Cystic Fibrosis Airway Research Group, together with Dr Tim Kuchel from SAHMRI, sucessfully established the novel lung diagnostics and monitoring technology, funded by contributions from the National Imaging Facility (NCRIS roadmap funds), the Universities of Adelaide and South Australia, the Health Services Charitable Gifts Board, The Hospital Research Foundation, and 4Dx Ltd. Based at the Large Animal Research and Imaging Facility (LARIF) at Gilles Plains, this is a next generation lung health assessment technology that is expected to revolutionise assessment of lung disease and treatments in animals, and eventually humans.

Unexplained infertility and recurrent miscarriage

Prof Sarah Robertson, working in collaboration with A/Prof Louise Hull and Dr Lachlan Moldenhauer have identified new parameters of immune cell disruption, specifically related to Treg cell deficiency, in women experiencing unexplained infertility and recurrent miscarriage. In ongoing studies, they are expanding clinical samples, and refining and validating diagnostic tests for future clinical application.

Fertility and pregnancy outcomes in women

Collaborators Prof Sarah Robertson, Dr David Sharkey, and Prof Gus Dekker, along with Repromed partners Prof Kelton Tremellen and Prof Michelle Lane have discovered key factors in male partner seminal fluid that influence fertility and pregnancy outcome in women. They have secured joint NHMRC funding to build and investigate a biobank of male seminal fluid samples, in order to develop new diagnostic tests based on quantifying these immune regulatory factors in seminal plasma.

Aboriginal Gender Project

A/Prof Alice Rumbold, Research Leader of Equity and Healthy Futures Research Group and team have produced a series of translational resources including a community report, an amendment to the website of the Aboriginal Health Council of SA, and a piece for IndigenousX as part of their Aboriginal Gender Project. This project was designed to explore contemporary understandings of gender and gender equity in Aboriginal communities and was established as a partnership between the Aboriginal Health Council of South Australia (AHCSA), The University of Adelaide and South Australian Health and Medical Research Institute (SAHMRI) and was funded by the Lowitja Institute.

NHMRC's Mitochondrial Donation Expert Working Committee

Prof Jus St. John from the Mitochondrial Genetics Research Group was invited to be a Member of the NHMRC's Mitochondrial Donation Expert Working Committee, appointed by the Minister for Health. Through this committee, Prof St. John has presented at citizens' advice panels, open forums in Melbourne and Sydney, and has been extensively involved in writing a detailed expert statement on behalf of the CEO of the NHMRC to present to the Minister and Parliament.

Obesity in Australia

Prof Megan Warin, Prof Vivienne Moore, and Dr Lucy Farrell were invited to present at the Australian Senate and their research was included in the Senate Final Report into Obesity in Australia.

COMMUNITY CONNECTION

The Institute strives to engage end users in our research. We have deliberately focused on building relationships with advocacy groups, consumers and not-for-profits, to deliver research that is higher quality, meets the needs of the community, and generates translatable outcomes.

Over the last 4 years we have developed a suite of funding programs, training sessions and community events, to provide the support and resources our members require to develop new relationships, and further develop existing collaborations. Now we are reaping the benefits.

RRI Research Symposium

For the second year in a row, the RRI opened its annual research symposium to stakeholders and health consumers. This event showcased the world leading research and translation activities happening across the Institute, and included the experiences of three health consumers and stakeholders in their involvement in endometriosis advocacy, the ENDIA study, and clinical trials in disadvantaged communities.

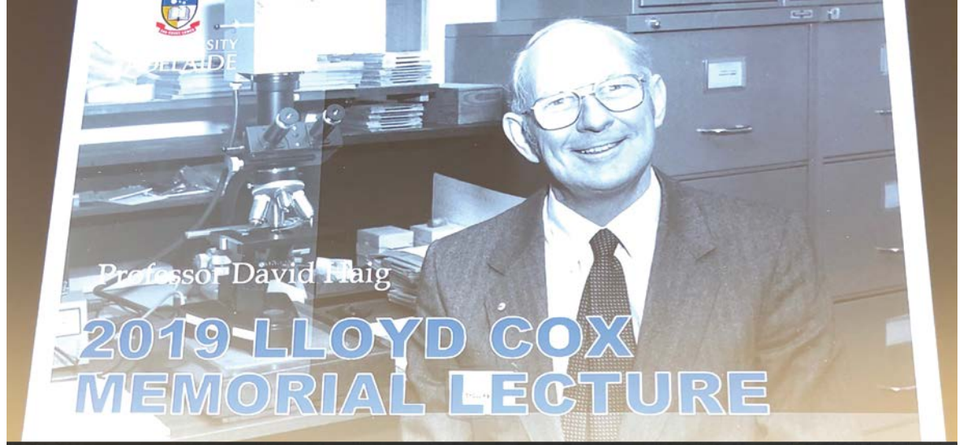
Congratulations to Marcus Goddard for receiving the 2019 RRI Director's Award which was presented at the event.

Polycystic Ovary Syndrome Q&A

RRI and Healthy Development Adelaide co-hosted The Polycystic Ovary Syndrome Q&A, a public awareness forum, featuring panel members: Professors Rob Norman AO, Ray Rodgers and Manny Noakes, A/Prof Alice Rumbold, Dr Alexia Pena-Vargas and Tara Bridge. This event included 90 minutes of Q&A-style discussion of current and future PCOS treatments and research with approximately 100 participants. We were thrilled to welcome Tara Bridge to the panel, who was able to provide her highly engaging perspective as a health consumer.

AFL Grand Final Lunch

RRI was pleased to host a table at the Channel 7 Research Foundation's AFL Grand Final lunch which supports the important work of the Foundation as well as the Sammy D Foundation. We were delighted that Oren and Gill Klemich, Gavin and Pippa Wanganeen, Claire Foord (CEO, Still Aware), Matt Anderson (CEO, Birthing Kit Foundation Australia), Corrine Habel (Women's and Children's Hospital Foundation) and Michelle Rice-Murphy (4P3) were able to join RRI Members Professor Helen Marshall, Associate Professor Darryl Russell, Professor Claire Roberts and RRI Business Manager Marcus Goddard for this occasion.



Science Week

During Science Week the RRI highlighted the work of up-and-coming researchers on social media. Five members developed short videos discussing their research and explaining what science means to them.

Lloyd Cox Memorial Lecture

Prof David Haig, the George Putnam Professor of Organism and Evolutionary Biology at Harvard University, presented the 2019 Lloyd Cox Memorial Lecture on the topic: *When fetal and maternal interests collide - an evolutionary conundrum*.

Prof Haig's talk delved into the common assumption that a pregnant mother and her developing fetus work in harmony for the optimal survival of both. It was a fascinating and thought-provoking talk, advancing new concepts on how and why pregnancy complications arise, with implications for how best to design effective intervention strategies.

Left: Prof David Haig, presenting the 2019 Lloyd Cox Memorial Lecture

Below left: Prof Sarah Robertson presenting Marcus Goddard with the 2019 RRI Director's Award

Below right: The PCOS Q&A community event

ACADEMIC AND HEALTH CARE CONNECTION

Engagement with academic peers and health service delivery is necessary to advance the highest quality research and deliver tangible outcomes for the community.

Clockwise from far left:
Marcus Goddard at the Annual AAMRI Convention
Megan Lim and Ray Rodgers at ASMR
Attendees of the ENDIA symposium

Below are some of the events we hosted and supported in 2019.

The International Cerebral Palsy Genetics Consortium

E/Prof Alastair MacLennan, Prof Jozef Gecz, and collaborators established the International Cerebral Palsy Genomics Consortium, which seeks to foster collaboration between key cerebral palsy genomics groups around the world. Additionally, the group is working towards establishing the world's first genomics database of cerebral palsy. The third meeting of the group occurred in September 2019 with delegates from Australia, China, Canada, USA, Sweden, Turkey, and Spain attending the one-day workshop in Anaheim, California.

This workshop preceded the combined American Academy for Cerebral Palsy and Developmental Medicine (AACPDM), and International Alliance of Academies of Childhood Disability (IAACD) conference at which Prof Jozef Gecz gave a keynote address on redefining cerebral palsy as a genetic neurodevelopmental spectrum disorder.

WCH Co-hosted Grand Rounds

Continuing our collaboration with the Women's and Children's Hospital, the RRI co-hosted three Grand Rounds seminars in 2019: Prof Vicki Clifton, Mater Research Foundation - *Managing asthma in pregnancy and its impact on child allergy and cardiovascular development*; Dr Luke Grzeskowiak, RRI – *Using Domperidone to Increase Breast Milk Supply: Are women really dying to breastfeed?*; and Prof David Olson, The University of Alberta – *Using stress models to understand preterm birth*.

These seminars highlight tangible benefits of research on clinical practice, and facilitate engagement with researchers and clinicians at the Women's and Children's Hospital.

New Frontiers for a Healthy Start to Life

The RRI hosted the sixth *New Frontiers* thinktank conference, bringing together researchers from around Australia under the banner *Environment and Endocrine Disruption in Reproductive Function*. This conference seeks to assemble multidisciplinary groups with disparate but overlapping perspectives to plan effective, bold, and innovative research agendas.

SA Vaccinology Update

Together with SA Health, the Women's and Children's Hospital and SAHMRI, the RRI hosted the fifth *SA Vaccinology Update*. This full day event for immunisation providers, doctors and researchers educates attendees about the latest developments in immunisation research, policy, and programs and is now a highly regarded immunisation conference attracting more than 230 attendees.

AAMRI Workshop, Convention and Board appointment

The second Australian Association of Medical Research Institutes (AAMRI) Research Strategy Network Workshop occurred in May 2019 at the Walter and Eliza Hall Institute in Melbourne. This Workshop was attended by the RRI Business Manager (Marcus Goddard) and the RRI Research Program Coordinator (Ashleigh Kenny). The format was discussion-based sessions in key areas affecting the MRI sector in research governance, management, development and strategy. In November, AAMRI held their Annual Convention over 2 days in Canberra. This is an opportunity for all Australian Medical Research Institute Directors and Business Managers to meet and discuss key topics relevant to the MRI sector and meet with Federal MPs at a dinner in Parliament House. Marcus presented at a session for the Business Managers on "Managing University-Institute Relationships". RRI Institute Director, Professor Sarah Robertson was appointed Board Member at the AGM held at the time of the Convention.

Partnership with SRB

For the 14th year in a row the RRI sponsored the Society for Reproductive Biology at its annual joint meeting (with the Endocrine Society of Australia and the Asia and Oceania Thyroid Association). The Institute sponsored the *Robinson Research Institute Award for Excellence in Reproductive Biology*, awarded to Dr Kirsty Walters from the University of New South Wales.

Sponsorship of ASMR

Sponsorship of the ASMR Annual Scientific Meeting provides the opportunity to support the Institute's early career researchers and students in career development. The Institute sponsored the *Robinson Research Institute prize for the best presentation in the field of reproduction, pregnancy or child health*, awarded to RRI Member, Megan Lim.

ENDIA Symposium

Nearly 80 collaborators including clinicians, scientists, research nurses, allied health professionals, software engineers, students, administrators, consumer representatives, and delegates from ENDIA's funding partners, JDRF Australia and JDRF International attended the 2019 ENDIA symposium.

Given ENDIA reached its recruitment target of 1,500 babies in 2019, the event reflected on what has been achieved, the current cohort profile and preliminary findings, and future strategic directions for ENDIA.

Sponsorship of the DOHaD World Congress

The 11th World Congress on the Developmental Origins of Health and Disease was held in Melbourne in October 2019, with the theme of *"Investing in a Healthy Future for All: Research, Education, Policy"*. Many RRI Members presented their latest research findings with colleagues and health care professionals from around the world. They discussed the many challenges to health of mothers and fathers, babies in the womb, infants, children, and adolescents - and explored solutions, interventions and policies to optimise health across the lifespan.

Machine Learning for Endometriosis

The RRI held two Co-creation Workshops in conjunction with the Australian Institute for Machine Learning to advance research on novel ways to non-invasively improve endometriosis diagnosis. This workshop included clinicians, medical imaging specialists, and researchers, and resulted in development of collaborative projects and new submissions for MRFF funding.

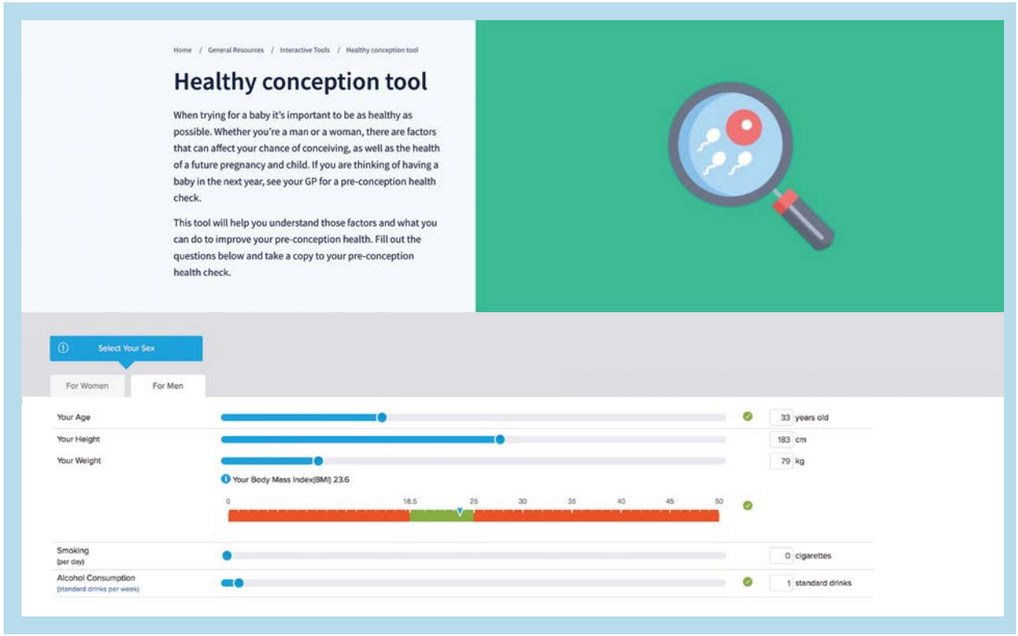
Science in the Shine Dome

Dr Zohra Lassi was sponsored by the Faculty of Health and Medical Sciences, and the Adelaide Medical School, to attend *Science in the Shine Dome* hosted by the Australian Academy of Science. This three-day event is attended by many of Australia's influential scientists and is a valuable networking opportunity in which EMCRs interact with Australian Academy of Science Fellows, politicians, and the media.

Sponsorship of the Transgenetic and ARC Symposium

The SA Genome Editing Facility hosted Oceania members of the International Society for Transgenic Technologies (ISTT) at SAHMRI on October 24th and 25th for the 4th Oceania Transgenic & Assisted Reproductive Technologies Symposium. Experts discussed topical issues in the field of reproductive and transgenic biotechnologies. Topics included the latest developments in CRISPR gene editing, IVF and related assisted reproductive technologies, cryopreservation and reanimation, as well as animal production facility management.

DIGITAL DEVELOPMENTS



AskPCOS App

AskPCOS App is the first Polycystic Ovary Syndrome (PCOS) App based on the best available evidence, developed in collaboration with women with PCOS. Prof Rob Norman, Prof Helena Teede and collaborators in the NHMRC CRE for PCOS developed this App to assist women with managing their condition. This app has now been rolled out to 6 languages worldwide.

E-Research Institutional Cloud Architecture (ERICA)

In collaboation with Centre for Big Data, UNSW, Prof Lyle Palmer and team have developed an E-Research Institutional Cloud Architecture (ERICA) which provides secure remote access to data analysis in South Australia. This will be deployed in 2020 and will be available to University of Adelaide and other South Australian partners.

SA Birth Cohort Study

The SA Birth Cohort, led by Prof Michael Davies, is a census of all births in SA for the period 1986 - 2002. This assembles approximately 327,000 births including those conceived with assisted reproductive technologies, including IVF, and birth defects ascertained to age 5 years (~17,000). This dataset has been expanded to now include a further 258,000 births and birth defects to 2015 to reach a total of 30 years of births in South Australia. The additional years of data have now been linked to the Commonwealth Pharmaceutical Benefits Scheme (PBS) to evaluate the safety of medicines used for infertility therapies. Further planned expansion of the PBS item numbers will permit the evaluation of routine medicines prescribed to women of child bearing age but which have never been tested in pregnancy.

Healthy Conception Tool

In 2019 we analysed the users of the Healthy Conception Tool (https://www.yourfertility.org.au/general-resources/interactive-tools/healthy-conception-tool) that was developed by the Institute in collaboration with VARTA (Victorian Assisted Reproductive Treatment Authority). The tool was developed to improve awareness of the modifiable factors that reduce the chance of conceiving and having a healthy baby. A range of clinical and lifestyle parameters were collected and analysed for men and women users. The site primarily attracts women in their early thirties who are actively attempting conception.

Genomics Data Repository (GDR)

Next-generation sequencing datasets are extremely large and complex sets of data that can often be difficult to process due to prior knowledge of data processing pipelines and workflows. The Genomics Repository enables researchers at the University to safely store, analyse and share large genomic datasets, thus enhancing the reproducibility of complex datasets within the University. Developed with the help of The University of Adelaide Bioinformatics Hub, Robinson Research Institute and University Information & Digital Services, the system will also help researchers track and archive datasets to help the sustainability of data as we move forward.

COMPETITIVE FUNDING HIGHLIGHTS

NHMRC

Project Grants commencing in 2019

$2.43 million to Prof Jodie Dodd
The First 1,000 Days: in-utero and early life exposures and their contribution to child obesity

$1.1 million to Prof Rebecca Robker
A therapy to restore health of gametes from older males and females seeking pregnancy

$980,692 to Dr Luke Grzeskowiak
OPTimising Mothers' Own Milk supply in the neonatal unit – enhancing breast milk supply with Domperidone in mothers of preterm infants (OPTIMOM-D)

$967,481 to Prof Claire Roberts
Targeting micronutrients to tackle pregnancy disorders: an integrated approach

$861,345 to A/Prof David Parsons
Translating gene-addition treatment for CF lung disease to the clinic

$870,024 to Prof Jozef Gecz
TREX nuclear mRNA export and healthy development

$669,790 to Prof Jus St. John
Understanding how mitochondrial DNA contributes to embryo development

$600,772 to Prof Darryl Russell
Functional non-coding RNAs: New players in oocyte maturation and female fertility

Investigator Grants awarded in 2019

$2,078,030 to Prof Claire Roberts
Leadership: Health in pregnancy and beyond

$1,504,485 to Prof Philippa Middleton
Emerging Leadership: Implementing nutrition and lifestyle interventions for women, young children and families

Partnership Project awarded in 2019

$1,292,029 to Prof Helen Marshall
Gono B Gone: Targeted immunisation programs for vulnerable children and young people against serious infectious diseases.

Ideas Grants awarded in 2019

$935,080 to Prof Paul Thomas
Investigating the molecular pathology for PCDH19-Girls Clustering Epilepsy

Clinical Trials awarded in 2019

$2,071,936 to A/Prof Michael Stark
The effect of transfusion with washed versus unwashed red blood cells to modify neonatal morbidity and mortality: A randomised trial

Centre for Research Excellence awarded in 2019

$2,500,000 to Prof Rob Norman AO (Administered by Monash)
Centre for Research Excellence in Health in Preconception and Pregnancy: Prevention of maternal obesity

$2,500,000 to Profs Rob Norman AO and Ray Rodgers (Administered by Monash)
Centre for Research Excellence- Women's Health in Reproductive life

ARC – Discovery Projects

Commencing in 2019

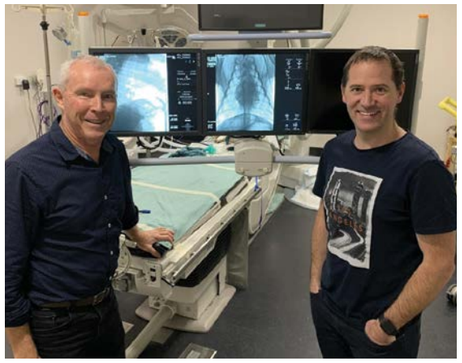
Prof Sarah Robertson awarded $490,000 for *Seminal fluid interferon-gamma: a potential inhibitor of reproductive success* and Prof Paul Thomas awarded $415,000 for *Development of efficient CRISPR gene drives in mice.*

Channel 7 Children's Research Foundation

RRI members were awarded five project grants in 2019, totaling more than $400,000. This includes $96,5717 to Dr Catherine Chittleborough for *Young parents and child protection - the intergenerational story.*

Women's and Children's Hospital Foundation

RRI members were awarded eight project grants in 2019 totaling $770,000. This included $100,000 to Alexandra McCarron for *Airway gene correction in neonatal cystic fibrosis rats.*



Congratulations to A/Prof David Parsons and Dr Martin Donnelley of the Australian Lung Health Initiative (ALHI) on the award of $960,000 for intensive research into new 4D diagnostic technologies to allow accurate assessment of lung function in patients.

ALHI is a newly established consortium in which The University of Adelaide is a leading member. A/Prof David Parsons and Dr Martin Donnelley will lead the Adelaide work, where respiratory physiologists, engineers and physicists will test prototypes, and continuously improve these prototypes based on success measures in large and small animal models, to produce fast and very detailed lung health diagnostics, ultimately suited for use across all ages, from premature babies to the very elderly. This project is one of 10 highly promising research projects funded under Stage One of the Bold Medical Research Future Fund Frontiers Initiative. Stage One supports development of the project for one year and application for Stage Two funding - up to $50 million. This Stage One funding application was supported by the Robinson Research Institute through the Large Grants Applications program, with matched support from the Faculty of Health and Medical Sciences.

FELLOWSHIPS AND AWARDS

ARC

Commencing in 2019

Future Fellowship
Prof Mark Hutchinson

Awarded in 2019

Future Fellowship
Dr Tanya Zivokovic

Discovery Early Career Researcher Fellowship
Dr Catia Malaso

NHMRC

Commencing in 2019

Senior Principal Research Fellowship
Prof Jozef Gecz

Practitioner Fellowship
Prof Helen Marshall

Early Career Fellowship
Dr Amy Keir and Dr Merryn Netting

The Hospital Research Foundation (awarded 2019)

Mid Career Fellowship
Dr Clare Van Eyk
Dr Luke Grzeskowiak
Dr Kylie Dunning

Fellowship
A/Prof Wendy Ingman

Other Fellowships (awarded 2019)

CSIRO

Early Career Fellowship
Dr Gelshan Godahewa

John M Nardo Postdoctoral Fellowship
Dr Natalie Aboustate

The University of Adelaide

Barbara Kidman Fellowship
Dr Jessica Grieger

RRI Career Development Fellowships
Dr Lachlan Jolly
Dr Jessica Grieger

Awards and Prizes

SA Science Excellence Awards

Prof Jozef Gecz was awarded the SA Scientist of the Year for his genetics research. Prof Helen Marshall and collaborators were awarded the Excellence in Research Collaboration category for their study, *Meningococcal B Herd Immunity*.

CRC Program

Prof Simon Barry, Dr Timothy Sadlon and team were awarded Most Innovative CRC for a novel pan solid cancer CAR-T Therapy.

Jean Hailes for Women's Health

Dr Zohra Lassi was awarded a $10,000 Travel Fellowship to further her women's health research.

NAIDOC

Courtney Hammond received the SA NAIDOC Young Person of the Year Award for her work on the Aboriginal Gender Study. Additionally, Courtney is a member of the Gladys Elphick Committee which celebrates the work of Aboriginal women in SA and supports Aboriginal women through their Sisterhood Foundation Leadership Program.

Society for Reproductive Biology

Dr Kylie Dunning received the Newcastle Reproduction Emerging Research Leader Award at the SRB annual meeting for her latest research describing a revolutionary new technology that detects the health and quality of embryos pre-implantation.

Research Australia

Professor John Lynch received the Research Australia Data Innovation Award in recognition of his important work in development of impactful new data innovations in the health and medical sector.

Australian Functional Genomics Network

- Best Oral Presentation at National Meeting – Dr Lachlan Jolly

EXCELLENCE IN RESEARCH COLLABORATION CATEGORY

Prof Helen Marshall and collaborators study, Meningococcal B Herd Immunity

Australia and New Zealand Society for Immunology

- Best Student Presentation – Holly Groome

Australia New Zealand Obesity Society

- Early Career Researcher Finalist – Dr Bo Liu
- Early Career Researcher Finalist – Lijun Zhao

Australian Society for Medical Research

- Best Presentation in the field of reproduction pregnancy or birth – Megan Lim

Cancer Council of South Australia

- Travel Award – Zoe Price

Channel 7 News

- Young Achiever Award – Tahlia Perry

CSIRO

- Supplementary Scholarship – Ashleigh Geiger

Endocrine Society (USA)

- Early Career Travel Award – Thao Dinh
- Outstanding Abstract Award – Thao Dinh

Epigenetics Consortium of SA (EpiCSA)

- EPIC Award Best Oral Presentation - Amy Doan

Fertility Society of Australia

- Best Psychosocial Paper – Dr Jodie Avery

Genome Informatice (GIW) & Australian Bioinformatics and Computational Biology Society (ABACBS) Annual Conference

- Best Poster (People's Choice) – Melanie Smith
- COMBINE 2019 Symposium Best Poster Presentation Award – Ning Liu
- Travel Grant – Ning Liu

Healthy Development Adelaide

- Travel Award – Tara Crawford

International Association of Dental Research

- Best Reviewer – Dr Dandara Haag

International Society of DOHaD

- Travel Award – Dr Prabha Andraweera
- Trainee Oral Award – Hon Yeung (Dexter) Chan

Korean Academy of Tuberculosis and Respiratory Diseases

- Travel Grant – Dr Juliette Delhove

Nutrition Society of Australia

- Poster presentation prize – Nahal Habibi

Society for the Study of Reproduction (USA)

- International Trainee Travel Award – Dr Macarena Gonzalez

The Queen Elizabeth Hospital Research Day

- Best Senior PhD Student Presentation – Amita Ghadge

The Hospital Research Foundation

- Travel Award – Hassen Mohammed

Westpac Scholars Trust

- Westpac Future Leaders Scholarship – Alexandra Procter

The Robinson Research Institute

- Director's Award – Marcus Goddard
- Best Student Posters at the RRI Symposium - Sarah Bernhardt and Thao Dinh
- Best EMCR Poster at the RRI Symposium - Dr Juliette Delhove
- Best Rapid-Fire Presentation at the RRI Symposium - Annabelle Small
- Publication of the Year – Dr Kathy Gatford, Dr Amy Wooldridge and team for Maternal allergic asthma during pregnancy alters fetal lung and immune development in sheep: potential mechanisms for programming asthma and allergy published in The Journal of Physiology.

The University of Adelaide

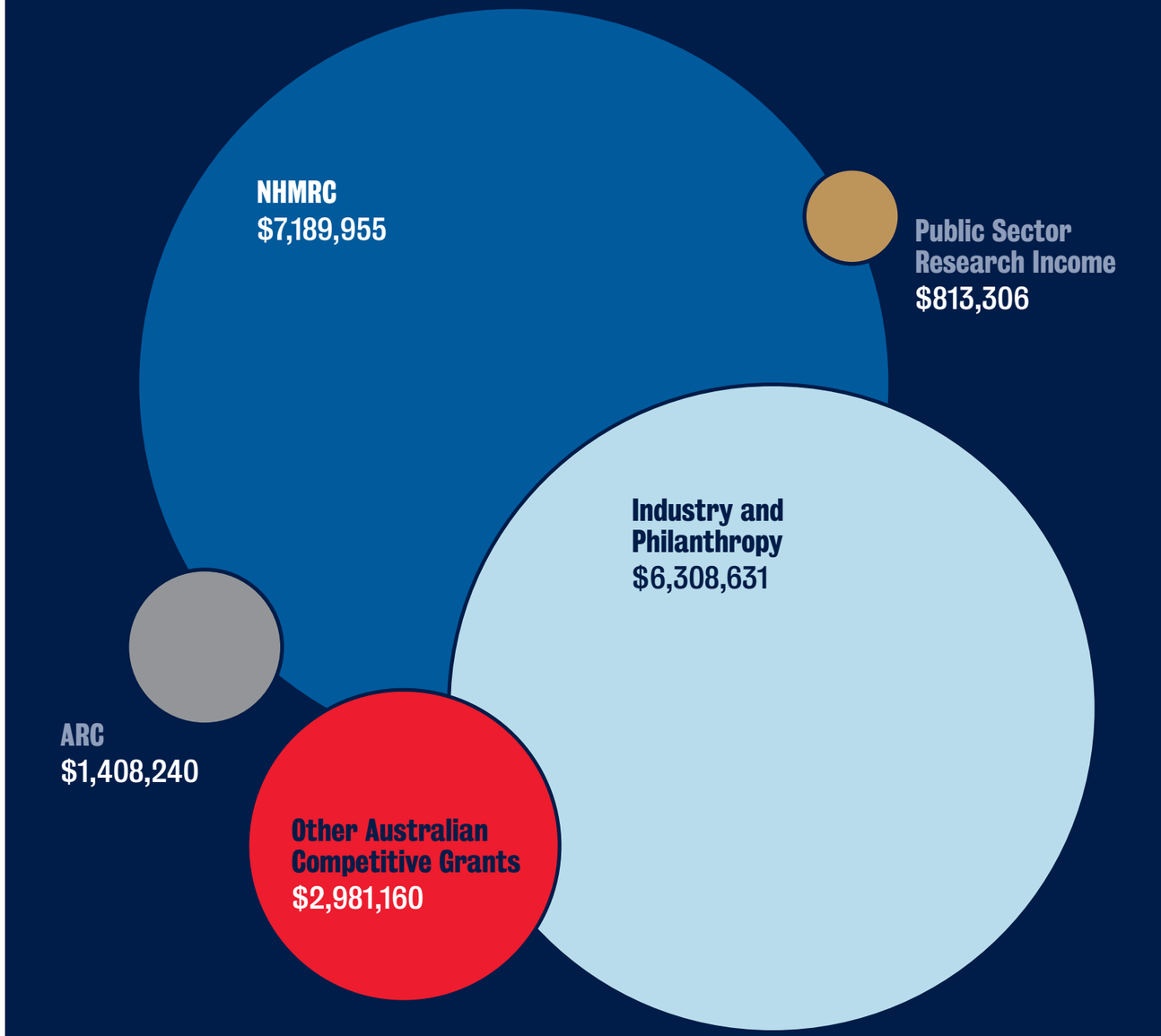
- Adelaide Graduate Scholarship to commence 2020 – Amy Doan
- Faculty of Sciences Divisional Scholarship to commence 2020 – Jacqueline Barsby
- FHMS, Honours Scholarship – Anna Kalamkarian
- Florey Postgraduate Research Conference, Florey Medical Research Foundation Prize – Melanie Smith
- Florey Postgraduate Research Conference, Medical School Prize – Melanie Smith, Sarah Bernhardt, Alexandra McCarron, Thao Dinh
- Florey Postgraduate Research Conference, Robinson Research Institute Prize – Melanie Smith, and Alexandra McCarron
- Florey Postgraduate Research Conference, Vernon Roy East Prize – Tassia Oswald
- Florey Postgraduate Research Conference, John Barker Prize – Sarah Bernhardt
- Florey Postgraduate Research Conference, Adelaide Dental School Prize – Dr Pedro Santiago
- Florey Postgraduate Research Conference, Cmax Industry Engagement Prize – Tara Crawford
- FHMS Research Prize – Prof Jenny Couper
- Women's Excellence Award – Dr Kathy Gatford
- Women's Research Excellence Award – Dr Jodie Avery
- Executive Dean's Award - Prof Jozef Gecz
- Vice Chancellor's Award, A Culture of Impact and Excellence – Prof Mark Hutchinson
- Vice Chancellor's Award (Finalist), Outstanding Achievement – Dr Zohra Lassi
- School of Public Health, Best Paper Prize by an ECR – Dr Angela Gialamas
- School of Public Health, Undergraduate Tutor/Practical Leader of the Year (Student Nomination) – Dr Alexandra Procter
- School of Public Health, Best Undergrad Teacher – Dr Catherine Chittleborough
- School of Public Health, Academic Leadership – Dr Rhiannon Pilkington
- FHMS, Travel Award – Dr Catia Malvaso, Dr Angela Gialamas, Dr Nigel Farrow, Dr Martin Donnelley
- Adelaide Medical School, Travel Award – Michelle Clarke
- Adelaide Medical School, Robert F Seamark Scholarship – Zoe Price
- School of Biology, Travel Award – Thao Dinh

SA SCIENTIST OF THE YEAR AWARD RECIPIENT

Prof Jozef Gecz

FINANCIAL SUMMARY 2019

$18,701,292



RESEARCH GROUPS

Our Research Leaders lead a diverse range of groups across the Institute's four themes.

FERTILITY AND CONCEPTION GROUP LEADERS

Prof Bill Breed

Comparative Reproductive Biology of Mammals

Comparative morphology of gametes and their interaction at fertilisation

Group Members:

PhD Student – Karleah Berris

Coinvestigator – Steve Cooper

Research Officer – Chris Leigh

Senior Lecturer – Eleanor Pearce

Lecturer – Natasha Speight

External collaborators: Chris Dickman (University of Sydney), Emily Roycroft (University of Melbourne), Kevin Rowe (Museum of Victoria/ University of Melbourne)

Prof Frank Grutzner

Comparative Genome Biology

Comparing genetic and epigentic mechanisms in mammalian species to improve our understanding of how human diseases originate

Group Members:

Honours Students – Natasha Bradley, Praveena Chandrasegaran

Lecturer – Tasman Daish

Masters Student – Jifei Huong

PhD Candidates– Eunice Lee, Filip Paijpach, Tahlia Perry, David Stevens

Research Associate – Shee Chee Ong

Affiliated Research Fellow – Peggy Rismiller

Postdoctoral Researcher – Linda Shearwin

Casual Student – Isabella Wilson

RRI collaborators – Carmela Ricciardelli, Martin Oehler, Darryl Russell, Keith Jones

External collaborators – Henrik Kaessmann (Heidelberg University), Guojie Zhang (Copenhagen University)

A/Prof Leonie Heilbronn

Obesity and Metabolism

Does when we eat matter in preventing chronic disease?

Group Members:

PhD Candidates – Rajesh Chaudhary, Kai Liu, Prashant Regmi, Xiao Ting Teong, Lijun Zhao

Postdoctoral Fellows – Amy Hutchinson, Bo Liu

RRI collaborators – Rebecca Robker

External collaborators – Mark Larrance, David James (University of Sydney), Satchin Panda (Salk Institute), John Hawley (Australian Catholic University), George Roth (National Institute on Aging), John Ingram (Pennington University)

A/Prof Louise Hull

Endometriosis

Developing diagnostic and therapeutic tools to treat pelvic pain and infertility caused by endometriosis

Group Members:

PhD student, Gynaecologist, Laparoscopic Surgeon, Specialist – Susan Evans

PhD students – Faizz Fattah, Kavita Panir

Visiting Professor – Neil Johnson

Clinical lead and O+G registrar – Sarah Linsthwaite

Postdoctoral Researcher – Rebecca O'Hara

Postdoctoral Researcher – John Schjenken

RRI collaborators – Sarah Robertson, Gus Dekker, Catherine McCormack, John Schjenken, Jimmy Breen

External collaborators – Guying Nie (The Hudson Institute), Jason Abbott, George Condous (University of New South Wales), Grant Montgomery (University of Queensland), Cris Pint (University of Auckland), Luk Rhombauts (Monash University)

Prof Mark Hutchinson

Neuroimmunopharmacology Laboratory

Exploring the real time contributions of the brain immune-like cell signalling at the neuroimmune synapse that contribute to behaviour.

Group Members:

Research Fellows – Juliana Bajic, Josh Holmes, Stefan Musolino

Senior Research Fellow – Daniel Barratt

ARC Research Associate – Kelsi Dodds

Research Associate – Sam Evans

ARC Research Associate – Jiajun Liu

Senior ARC Research Fellow – Sanam Mustafa

Lab Manager & PhD Candidate – Vicky Staikopoulos

ARC Research Associate and Industry Engagement Officer – Jacob Thomas

NHMRC Fellow – Alexandra Whittaker

Lab manager – Josh Woenig

RRI collaborators – Sarah Robertson, Simon Barry

External collaborators – Macquarie University, RMIT University, Griffith University, University of New South Wales, Peking University, City University London, UniversityQST

A/Prof Wendy Ingman

Breast Biology and Cancer

Exploring how the immune system in the breast affects cancer and mastitis susceptibility

Group Members:

PhD Candidates – Maddison Archer, Sarah Bernhardt, Amita Ghadge, Joe Wrin

Postdoctoral Researcher – Pallave Dasari

Research Officer – Leigh Hodson

Research Nurse – Michelle Warnes

RRI collaborators – Luke Grzeskowiak, Rebecca Robker, Louise Hull, Sarah Robertson, Simon Barry

External collaborators – Tim Price, Amanda Townsend (The Queen Elizabeth Hospital SA Health), Erik Thompson, Honor Hugo (QUT), Kara Britt (Peter Mac Cancer Centre), Wendy Rogers (Macquarie University), Jennifer Stone (University of WA), Prof John Hopper (University of Melbourne).

Prof Rob Norman AO

Reproductive and Endocrine Medicine

Optimising outcomes in fertility treatments and preconception care

Group Members:

Clinical Geneticist – Vicki Nisenblat

RRI collaborators – Ray Rodgers, Alexia Pena, Louise Hull

External collaborators – Helena Teede, Jacqueline Boyle, Lisa Moran, Ben Mol, Dr Rui Wang (Monash University), Georgina Chambers (UNSW), Martha Hickey (University of Melbourne), Jie Qiao, Rong Li (Peking University), Lan Vuong, Tuong (University of Medicine and Pharmacy at Ho Chi Minh City)

A/Prof Mark Nottle

Reproductive Biotechnology

Innovative approaches to regenerative medicine and human IVF

Group Members:

Research Assistant – Stephen McIlfatric

PhD candidates – Anmol Saini, Annie Whitey

Research Fellow – Ivan Vassilev

RRI collaborators – Toby Coates, Jeremy Thompson

External collaborators: Peter Cowan (St Vincents Hospital), Wayne Hawthorne (Westmead Millennium Institute), Andrew Lew (WEHI) and Johan Smitz (Free University of Brussels)

Dr Carmela Ricciardelli and Prof Martin Oehler

Reproductive Cancers

Identification of novel biomarkers and therapeutic targets for ovarian cancer

Group Members:

Honours Students – Hayley Chapman, Vasiliki June Willett, Wanqi Wang

Postdoctoral Researcher – Noor Lokman

Senior Scientist – Anne Macpherson

Research Assistants – Victoria Nikitaras, Anita Oehler

PhD Candidates – Tannith Noye, Zoe Price

Visiting PhD Candidate – Masato Yoshihara

RRI collaborators – Frank Grutzner, Simon Barry, Darryl Russell, Ray Rodgers

External collaborators – Peter Hoffmann, Stuart Pitson, Shudong Wang (UniSA), Jane Rathjen, Justin Coombs (Carina Biotec), Andrew Stephens (Hudson Institute), Karin Sundfeldt (Sahlgrenska Cancer Centre), Andrei Taran (University of Zurich)

Prof Sarah Robertson

Reproductive Immunology

Understanding how the immune system enables healthy conception and pregnancy, and is key in infertility and inflammatory disorders of pregnancy, including preeclampsia, fetal growth restriction, and preterm birth

Group Members:

Research Assistants – Bridget Arman, Ricky Matias, Jasmine Wilson

Heart Foundation Research Fellow – Alison Care

PhD Candidates – Hong Yeung (Dexter) Chan, Ella Green, Holly Groome, Kavita Panir

Postdoctoral Researchers – Peck (Loretta) Chin, John Schjenken

Honours Students – Shanna Hosking, Stephanie O'Hara, Sebastian Overduin

Senior Postdoctoral Researchers – Lachlan Moldenhauer, David Sharkey

Lab Manager – Camilla Dorian

RRI collaborators – Simon Barry, Timothy Sadlon, Gus Dekker, Michael Stark, Michelle Lane, Louise Hull, Emma Knight, Jimmy Breen, Sean O'Leary, Kathy Gatford, Branka Grubor-Bauk

External collaborators – Kenner Rice (National Institute on Alcohol Abuse and Alcoholism), David Olson, Sandra Davidge (University of Alberta), Sylvain Chemtob, William Lubell (Universite de Montreal), Jeffrey Keelan (University of Western Australia), Sylvie Girard (CHU Staine-Justine Research Centrer, Prof Kelton Tremellen (Flinders Medical Centre), Len Harrison (Walter & Eliza Hall Institute), Hayley Dickinson (Monash Medical Centre), Emilie Rissman (North Carolina State University)

Prof Rebecca Robker

Ovarian Cell Biology

Discovering the biological mechanisms that drive ovulation and early embryo development

Group Members:

Postdoctoral Researchers – Eryk Andreas, Macarena Bermudez Gonzalez

Research Assistants – Carl Campugan, Haley Connaughton

PhD Candidates – Yasmyn Gordon, David Kennedy

Clinical Research Fellow – Atushi Morimoto

JSPS Research Fellow – Takashi Umehara

RRI collaborators – Leonie Heilbronn, Wendy Ingman, Rob Norman, Darryl Russell, Cheryl Shoubridge

External collaborators – Tamara Alliston (University of California), John Carroll, Damian Dowling, Mark Febbraio (Monash University), Jon Hennebold (Oregon Health & Science University), Rong Li, Jie Qiao (Peking University)

Prof Ray Rodgers

Ovarian Developmental Biology

Understanding how the ovary produces oocytes and hormones, what can go wrong and why

Group Members:

PhD Students – Rafiatu Azumah, Katrina Copping

PhD Candidates – Nicole Bastian, Monica Hartanti, Menghe Liu

Research Assistant – Wendy Bonner

Postdoctoral Researcher – Katja Hummitzch

RRI collaborators – Robert Norman, Darryl Russell, Sarah Robertson, Michael Davies, Jodie Avery

External collaborators – Richard Anderson (Edinburgh University), Nigel Stepto (Victoria University), Lisa Martin, Helena Teede (Monash University), Viv Perry (University of Nottingham), Kirsty Walters (University of NSW)

Prof Darryl Russell

Ovarian and Reproductive Cancer Cell Biology

Defining the molecular mechanisms of hormone control of ovarian folluculogenesis

Group Members:

Research Fellow – Alaknanda Alaknanda

PhD Candidate – Doan Thao

Prof Jus St. John

Mitochondrial Genetics

Focusing on how the mitochondrial genome is transmitted from the oocyte into the embryo, fetus and offspring

Group Members:

Postdoctoral Researchers – Takashi Okada, Sean O'Leary

RRI collaborators – Jimmy Breen

External collaborators – Ian Trounce (CERA), Peter Temple-Smith (Monash University), Luk Rhombauts (Monash University), Bill Ballard (University of New South Wales)

Prof Paul Thomas

Neural Development

Generation and analysis of mouse models for epilepsy and intellectual disability

Group Members:

Postdoctoral Research Fellows – Fatwa Adikusuma, Gelshan Godahewa, Alvaro Nieto, Louise Robertson, Stefka Tasheva

M.Phil Candidates – Jayshen Arudkumar, Ashleigh Geiger

Honours Student – Luke Gierus

PhD Candidates – Ruby Moffat, Chandran Pfitzner

Research Assistants – Sandra Piltz, Melissa White

RRI collaborators – Jozef Gecz

External collaborators – John Goodwin (North Carolina State University), Jack Parent (University of Michigan)

Prof Jeremy Thompson

Reproductive Success

Understanding the impact of genetic and metabolic disruption to gametes, embryos, and the reproductive tract

Group Members:

MSc Candidates – Madeline Batsiokis, Avishkar Saini

Research Assistant – Carl Campugan

PhD Candidates – Darren Chow, Megan Lim, Hanna McLennan, Cheow Yuen (Tiffany) Tan, Suliman Yagoub

Postdoctoral Researcher – Kylie Dunning

Manager and Quality Coordinator - IVF Solutions – Marie Ellul

Technical Officer – Annie Whitty

RRI collaborator – Darryl Russell

External collaborators – Brant Gibson (RMIT), Ewa Goldys, Robert Gilchrist (University of NSW), David Gardner (University of Melbourne), Johan Smits (Vrije Universiteit Brussel), Marie Paramio (Catalonia University)

PREGNANCY AND BIRTH GROUP LEADERS

Dr Tina Bianco-Miotto

BM Epigenetics Lab

Understanding how all organisms develop so that we can better understand how to maximise a healthy life and reduce the chances of things going wrong

Group Members:

Honours Students – Jacqueline Barsby, Amy Doan

PhD student – Nahal Habibi

RRI collaborators – Carmela Ricciardelli, Claire Roberts, Jimmy Breen, Kathy Gatford, Jessica Grieger

External collaborators – Ryan Lister, Sam Buckberry (University of WA), Mary Wlodek (University of Melbourne), Karen Moritz (University of Queensland), Benjamin Thierry, Marnie Winter (University SA), Rachel Burton, Sue Bastian (Waite Research Institute)

Dr Jimmy Breen

Bioinformatics and Computational Biology

Identifying new analysis techniques for biological datasets

Group Members:

PhD Candidates – Ning Liu, Melanie Smith

Research Assistant – Jacqueline Rehn

Bioinformatics Officers – Nader Aryamanesh, Alastair Ludington

RRI collaborators – Simon Barry, Claire Roberts, Jozef Gecz

External collaborators – Alistair Forest (University of WA/Harry Perkins), Hamid Alinejad-Rokny (University of NSW)

Prof Jodie Dodd

Lifelong Health Research

Start early, stay healthy, stop obesity

Group Members:

Clinical Researcher – Chad Anderson

Clinical Trials Manager – Andrea Deussen

Research Officers – Ashlee Jacobssen, Lavern Kannieappan, Angela Newman, Caroline Sheppard

Senior Statisticians – Jennie Louise, Lisa Yelland

Clinical Researcher – Andrew McPhee

PhD Candidates – Casey Nottage, Cecilia O'Brien, Amanda Poprzeczny

Research Assistant – Jordan Peters

Data Manager – Mark Armstrong

Adjunct Fellow – Danielle Schoenaker

External collaborators – Karen Campbell, Rachel Laws (Deakin University), Lucilla Poston, Annette Briley (King's College), Shakila Thangaratinam (QMUL), Berthold Koletzko (Ludwig-Maximilians-Universität München), Fionnuala McAuliffe (University College Dublin), Susan Phelan (California Polytechnic State University), Riitta Luoto (UKK Institute for Health Promotion), Roland Devlieger (University Hospitals), Annick Bogaerts (Limburg Catholic University College), Kristina Renault, Emma Carlsen (University of Copenhagen), Dorte Moller Jensen (Odense University Hospital)

Prof Bill Hague

Obstetric Medicine

Improving outcomes for pregnant women with medical complications

Group Members:

Research Assistants – Jacqui Aikens, Joanne Koch, Jessica Marathe

Research Coordinator – Suzette Coat

Trial collaborators– Jodie Dodd, Yee Khong, Corey Markus, Michael Stark

Statistician – Jennie Louise

PhD Candidate – Jago McDonald Van Dam

Clinical collaborator – Angela Teh

RRI collaborators – Michael Stark, Jodie Dodd, Jennie Louise

Prof Stefan Hiendleder

Epigenetics and Genetics

Understanding epigenetic and genetic mechanisms and programming in prenatal development

Group Members:

PhD Candidates – Hanh Nguyen, Entesar Shuaib, Laura Latimer Marsh

RRI collaborators – Karen Kind, Kathy Gatford, David Kennaway, Mark Nottle, Claire Roberts

External collaborators – John Williams (Davies Research Centre), Tim Smith (USDA), Sergio Ledda, Daniela Bebbere (University of Sassari), Axel Janke (Biodiversity and Climate Research Centre), Susanne Ulbrich (ETH Zurich), Eckhard Wolf (Gene Center), Ruidong Xiang, Amanda Chamberlain, Mike Goddard (University of Melbourne)

E/Prof Alastair MacLennan AO and Prof Jozef Gecz

Cerebral Palsy

Uncovering the genetic causes of cerebral palsy and understanding the epigenetic interaction with genetic susceptibility

Group Members:

Bioinformaticians – Nader Aryamanesh, Jimmy Breen

Postdoctoral Researchers – Jesia Berry, Mark Corbett, Clare Van Eyk

Research Officers – Kelly Harper, Dani Webber

PhD Candidates – Sayaka Kayumi, Yana Wilson

Paediatric Neurologist – Susanna MacLennan

Clinical Geneticist – Luis Pèrez-Jurado

Honours Student – Ryan Pham

MBiotech Student – Nandini Sandran

RRI collaborators – Lyle Palmer, Cheryl Shoubridge, Lynne Giles

External collaborators - Nadia Badawi (The University of Sydney), Sarah McIntyre and Yana Wilson (Cerebral Palsy Alliance Research Institute), Gareth Baynam (Genetic Services of Western Australia), Hilla Ben-Pazi (Shaare Zedek Medical Center, Israel), Michael Fahey (Monash Medical Centre), Darcy Fehlings (University of Toronto, Canada), Sheng Jin (Yale University, USA), Michael Kruer and Sara Lewis (Barrow Neurological Institute, USA), Manju Kurian (UCL Great Ormond Street Institute of Child Health, UK), Richard Leventer (Murdoch Children's Research Institute), Andres Moreno-De-Luca (Autism and Developmental Medicine Institute, USA), Carlos Santos Ocaña (CIBERER-ISCIII and University Pablo de Olivide, Spain), Xiaoyang Wang and Changlian Zhu (University of Gothenburg, Sweden and Zhengzhou University, China), Stephen Scherer and Richard Wintle (Centre for Applied Genomics, Toronto, Canada), Bo Jacobsen (Gothenburg University, Sweden), David Amor (Murdoch Research Institute, Melbourne), Carina Mallard (Gothenburg University, Sweden), Mikko Hallman (Oulu University Hospital, Finland), Peter Rosenbaum (McMaster University, Canada), Jeffrey Craig (Deakin University, Melbourne)

A/Prof Philippa Middleton

Health of Women and Babies

Improving the care of women & babies through evidence-based clinical practice and policy

Group Member:

PhD Candidate – Emily Shepherd

RRI collaborators – Chad Andersen, Jo Zhou, Beverly Muhlhausler

Prof Claire Roberts and Prof Gus Dekker

Placental Development

Implementing screening tests for women in early pregnancy to alleviate major complications of pregnancy

Group Members:

PhD Candidates – Emily Aldridge, Konstantinos Bogias, Julia Dalton, Amy Garrett, Nahal Habibi, Catherine McCormack, Martha Menberu, Maleesa Pathirana, Michelle Plummer, Melanie Smith, Qianhui Wan, Rebecca Wilson

Postdoctoral Researchers – Prabha Andraweera, Jessica Grieger, Tanja Jankovic-Karasoulos, Shalem Leemaqz, Dale McAnnich

Senior Lecturer – Tina Bianco-Miotto

Research Fellow – Luke Grzeskowiak

Research Assistant – Dylan McCullough

Visiting Postdoctoral Researcher – Callista Mulder

RRI collaborators – Jimmy Breen, Alison Care, Sarah Robertson

External collaborators – Lisa Amir (LaTrobe University), Vicki Clifton (Mater Research Institute), Rosalie Grivell (Flinders University), Louise Kenny (University College Cork), Lesley McCowan (University of Auckland), Alicia Smith (Emory University)

Adelaide Cerebral Palsy research group

Turrific Trial, Bill Hague

EARLY ORIGINS OF HEALTH GROUP LEADERS

Prof Michael Davies and Prof Vivienne Moore

Life Course and Intergenerational Health

Uncovering how inequalities in the health of women and their children arise through social and biological pathways, and identifying opportunities for change

Group Members:

- PhD Candidates – Ash Borqkvist, Tassia Oswald, Anna Roesler, Rachelle Warner
- Postdoctoral Researchers – Stephanie Champion, Renae Fernandez
- Teaching & Research Academic – Lynne Giles
- Senior Postdoctoral Researcher – Melissa Whitrow
- Project & Data Manager – Anthea Hutchinson
- RRI collaborators – Alice Rumbold, Darryl Russell, Megan Warin
- External collaborators – Sheree Boulet (Emory University), Bianca deStavola (University College, London), Dmitry Kissen (Centres for Disease Control), Jennifer Marino (Melbourne University), Lisa Moran (Monash University), Mark Walker, Shi-Wu Wen (University of Ottawa)

Dr Kathy Gatford

Early Origins of Health and Disease

Understanding how early life exposures increase risk of adult disease and developing interventions to improve long-term health

Group Members:

- Honours Students – Georgia Clarke, Kate Highfield
- PhD Candidate – Harleen Kaur
- RRI collaborators – Claire Roberts, Helen Marshall, Lynne Giles, Alison Care, Tamara Varcoe, David Kennaway, Karen Kind
- External collaborators – Rebecca Simmons (U Penn), Beverley Muhlhausler (CSIRO), Amanda Page, Richard Young (SAHMRI/UoA), Robert Bischof, Tim Moss (Hudson IMR), Janna Morrison (UniSA), Vicki Clifton (Mater Institute/University of Queensland), Megan Wallace (Monash University), Will van Wettere (University of Adelaide), David Kleeman (SARDI)

Prof Lyle Palmer

Machine Learning in Medicine

Discovery of novel biomarkers associated with the diagnosis and prognosis of pathology. Applying deep learning to medical images in order to generate translatable insights into clinical and public health problems

Group Members:

- Physician trainee – Stephen Bacchi
- MBBS Honours Student – Tristan Bampton
- Professor of Computer Science – Gustavo Carneiro
- PhD Candidates – James Condon, Alice Krige, Dylan Mordaunt, Luke Oakden-Rainer, Khan Pham
- Statistical Analyst – Kelly Hall
- Medical Student – Kaviya Kalyanasundaram
- Medical Student – Medhir Kumawat
- Postdoctoral Fellow – Gabriel Maicas
- BSc Honours Student – Denghao Wu
- Registered Medical Officer – Toby Zemer

A/Prof Alice Rumbold

Equity and Healthy Futures

Improving the lifelong health of women and children by reducing inequality in disadvantaged families

Group Members:

- PhD Candidates – Anna Ali, Jessica Dawson, Sophie Kedzior, Tassia Oswald
- Administrative Assistant – Courtney Hammond
- Postdoctoral Research Fellow – Zohra Lassi
- Senior Research Associate – Gabbie Zizzo
- RRI collaborators – Vivienne Moore, Michael Davies, Luke Grzeskowiak
- External collaborators – Jacqueline Boyle, Lisa Moran (Monash University), James Ward SAHMRI

A/Prof Michael Stark

Neonatal Medicine

Ensuring life-long health for newborns born preterm

Group Members:

- Clinical Researchers – Chad Anderson, Andrew McPhee
- PhD Students – Megan Bater, Kathryn Martinello
- PhD Candidate – Tara Crawford
- Honours Student – Anthea Hall
- Consultant Neonatologists – Amy Keir
- RRI collaborators – Michael Davies, Rebecca Robker, Kathy Gatford, Luke Grzeskowiak, Bill Hague
- External collaborators – Carmel Collins (SAHMRI), Barbera Lingwood (University of Queensland), Ben Mol (Monash University), Haresh Kipralani (Children's Hospital Of Phillidelphia), Berndt Urlesberger (University of Graz)

Prof Megan Warin

Biosocial Approaches to Health

Examining the biological and social processes that are entangled in the gendered reproduction of bodies, families and environments

Group Members:

- PhD students – Henrietta Byrne, Pallavi Laxmikanth
- Researchers – Lucy Farrell, Gabbie Zizzo
- Senior Postdoctoral Researcher – Tanya Zivkovic
- RRI collaborators – Vivienne Moore, Michael Davies, Alice Rumbold
- External collaborators – Emma Kowal, Maurizio Meloni (Deakin University), JaneMaree Maher, Deana Leahy (Monash University), Connie Musolino, Paul Ward (Flinders University)

CHILD AND ADOLESCENT HEALTH GROUP LEADERS

Prof Simon Barry

Molecular Immunology

Understanding the molecular basis for immune tolerance

Group Members:

- Post Doctoral Researchers – Veronika Bandara, Chris Hope
- Post Doctoral Research Fellows – Cheryl Brown, Timothy Sadlon
- Ph.D student – Katherine Brown
- Research Assistants – Batjargal Gundsambuu, Silvana Napoli
- PhD Candidates – Ying Ying Wong, Soon Wei Wong
- Hons Student – Jerry Zhang
- Masters Students – Holly Withers, Jacqueline Stephens
- RRI collaborators – Jenny Couper, Sarah Robertson, Jimmy Breen
- External collaborators – Joachim Schultze, Marc Beyer (LIMES), Michael Jensen (Seattle Children's Hospital), Alastair Forrest (Harry Perkins), Axel Kallies (Doherty Institute), Len Harrison (Walter & Eliza Hall Institute), Shaun McColl (University of Adelaide)

Prof Jennifer Couper

Diabetes

Preventing type 1 diabetes and its complications

Group Members:

- Project Manager – Mandy Anderson
- Data manager – Pat Ashwood
- Clinical Researcher – Pyria Augustine
- Research Dietitian – Rachel Battersby
- Research Nurses – Sarah Beresford, Alison Gwiazainski, Kirsty Herewane, Meredith Kreig
- Senior Administrator – Leanne Cavenett
- Research Officers – Roger Gent, Trung Nguyen, Ben Ramoso
- Masters Student – Myff Geyer
- PhD Candidate – Jessica Harbison
- Biospecimen Manager – Dao Huynh
- Biostatistician – Emma Knight
- Enagement Officer – Kelly McGorm
- Biostatistician – Helena Oakey
- Clinical Partner – Alexa Pena
- Project Managers – Megan Penno, Rebecca Thomson
- RRI collaborators – Jodie Dodd, Simon Barry, Lynne Giles
- External collaborators – Leonard Harrison (Walter & Eliza Hall Institute), Maria Craig, William Rawlinson (University of NSW), Peter Colman, John Wentworth (Royal Melbourne Hospital), Elizabeth Davis, Aveni Haynes, Timothy Jones (Telethon Kids), Grant Morahan (Harry Perkins), Richard Sinnott (University of Melbourne), Peter Vuillermin (Barwon Health/Deakin University), Georgia Soldatos (Monash Health/ Monash University), David Dunger (Cambridge University)

Prof Antonio Ferrante

Developmental and Genetic Immunology

Cellular signalling pathways in childhood allergy and inflammatory disorders

Group Members:

- Pathologist – Tatjana Banovic
- PhD Candidates – Marwah Basin Khalah, Nikki Lansdown, Yunyu Lao, Khalida Parveen, David Shields
- PhD Candidate/GFSc – Annabelle Small
- Master in Laboratory – Yen-Wei Chang
- Senior Scientist – Nick Gorgani, Alex Quach
- Principal Scientists – Charles Hii
- Paediatric Immunologist – Jovanka King
- Placement – Wan Yue Kong
- Master in Laboratory Medicine – Ling Cheng Lui, Suthan Muraleethasan
- Diagnostic Scientist – Trishni Putty
- RRI collaborators – Simon Barry, Jennifer Couper, Anna Kontos, Declan Kennedy, Andrew McPhee, Patrick Quinn
- External collaborators – Catherine Abbott (Flinders University), Susan Prescott (University of WA/Telethon Kids), Sharon Choo (Royal Children's Hospital), Peter Hoffman (University of Adelaide), Lennart Hammarstrom (Karolinska Institute), Pravin Hissaria (SA Pathology), Mihir Wechalekar (Flinders Medical Centre)

Prof Jozef Gecz

Neurogenetics

Investigating the genetics and biology of human neurodevelopmental disabilities

Group Members:

- Research Assistants – Renee Carroll, Alison Gardner, Bree Hodgson, Brett Johnson, Thessa Kroes, Urwah Nawaz, Marie Shaw, Dani Webber
- Postdoctoral Fellows – Mark Corbett, Lachlan Jolly
- PhD Candidates – Rebekah De Nys, Deepti Domingo, Sayaka Kayumi, Kristy Kolc, Debrah Renders
- Research Officers – Sarah Heron, Duyen Pham, Raman Sharma
- Clinical Geneticist – Luis Perez-Jurado
- Postdoctoral Researcher – Clare Van Eyk
- Masters Student – Nandini Sandran
- External collaboratos – Miles Wilkinson and Joseph Gleeson (University California San Diego, USA), Daniel Geschwind (University California Los Angeles, USA), Evan Eichler (University of Washington), Bert De Vries (Nijmegen Human Genetics, The Netherlands), Vera Kalscheuer (Max Planck Institute, Germany), Stefan Strack (University of Iowa, USA), Samuel Berkovic and Ingrid Scheffer (University of Melbourne), Nicola Specchio (Bambino Gesu Rome, Italy), Mike Field and Elizabeth Palmer (Genetics of Learning Disability of NSW), Angela Morgan and Michael Hildebrand (University of Melbourne), Melanie Bahlo (WEHI), David Amor and Rick Leventer (Murdoch Children's Research Institute), Bekim Sadikovic (London Health Service, Canada), Lynette Sadleir (University of Otago, NZ), Maria Pia Miano (CNR Italy, Naples), Barbara Bardoni (CNRS France, Nice), Laurent Villard (INSERM, Marseilles, France), Christel Depienne (University Hospital Essen, Germany), Irma Jarvela (University of Helsinki, Finland), Kun Xia (Central South University, Changsha), Mauro Costa-Mattioli (Baylor College of Medicine, USA), Magdalena Badura-Stronka (Poznan University of Medical Sciences, Poland), Andrew Sharp (Icahn

School of Medicine at Mount Sinai, USA), Samuel Chong (National University of Singapore), Anne Voss and Tim Thomas (WEHI), Tony Roscioli and Irina Voineagu (University of New South Wales), Yang Shi (Boston Children's Hospital, USA), Frank Kooy (University of Antwerp, Belgium) and Kym Boycott (University of Ottawa, Canada)

Prof Jon Jureidini

Critical and Ethical Mental Health

Promoting safe, effective and ethical research and practice in mental health

Group Members:

Postdoctoral Fellows – Melissa Raven, Natalie Aboustate

Affiliate Senior Lecturers – John Walsh, Catalin Tufunaru, Tom Benjamin

PhD Candidates – Julie Klau, Sheelah Mills

RRI collaborators – Michael Davies

External collaborators – Lisa Bero, Barbara Mintzes (Charles Perkins Centre), Martin Whitely (Curtin University), David Coghill, Indigo Daya, Bridget Hamilton (University of Melbourne), Elia Abi-Jaoude (University of Toronto), Sami Timimi (Lincoln University), Chris Maylea (RMIT)

Prof Declan Kennedy

Sleep Disorders

Understanding the morbidity of sleep disorders and their effect on child development

Group Members:

Medical Scientists – Jessica Carlson-Jones, Anna Kontos

Clinical Trial Administrative Assistant – Anthea Hall

Head, School of Pschology & Social Policy – Kurt Lushington

Respiratory Physician – James Martin

PhD Candidate – Yunyu Lao

Research Students – Priscilla Vokolos, Nathaneal Yap

RRI collaborators – Antonio Ferrante, Michael Stark, Suzette Coats

External collaborators – David Wilson, Mathias Baumert (University of Adelaide), David Wabnitz (Women's & Children's Hospital), Quenten Schwarz (UniSA), Rachel Mudge (Jean Hailes), Catherine Itsiopoulos (Murdoch University), Jim Mitchell (Flinders University), Peter Psaltis (SAHMRI)

Prof John Lynch

Better Start

Providing children with the best start in life

Group Members:

Senior Lecturer – Catherine Chittleborough

Postdoctoral Researchers – Angela Gialamas, Dandra Haag, Catia Malvaso, Rhiannon Pilkington, Alyssa Sawyer, Helana Schuch

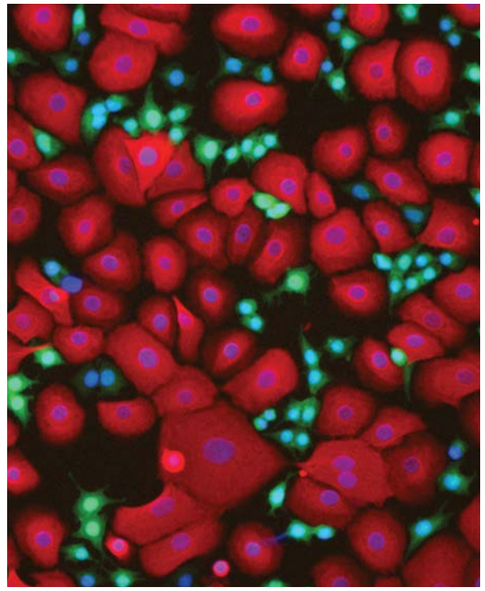
Research Associates – Janet Grant, Alicia Montgomerie, Alexandra Procter

Research Fellow – Clare Hume

Statistician – Murthy Mittinty

Associate Professor Paediatric Public Health – Lisa Smithers

Co-culture of airway stem cells, the target of our cystic fibrosis gene therapy (Cystic Fibrosis Airway Research Group)



Prof Helen Marshall

Vaccines and Infectious Diseases

Optimising protection for babies, children, adolescents, and pregnant women against serious infectious diseases through improved immunisation strategies

Group Members:

Postdoctoral Research Fellow – Prabha Andraweera

Administrative Assistant – Manasa Arani Krishna

Clinical Researcher – Sue Evans, Suja Matthew

Research Nurses – Louise Goodchild, Christine Heath, Mary Walker

Research Coordinators – Mark McMillan, Kathryn Riley, Michelle Clarke

Phd Candidate – Jane Tuckerman, Michelle Clarke, Hassen Mohammad, Mark McMillan, Rezanur Rahaman, James Pearce

RRI collaborators – Simon Barry, Gus Dekker, Jodie Dodd, Lynn Giles, Michael Gold, John Lynch, Andy McPhee, Claire Roberts

External collaborators – Ross Andrews (Menzies Research), Ray Borrow, Shamez Lantanti (Public Health England), Margie Danchin (Murdoch Children's Research Centre), Adam Finn (University of Bristol), Ann Koehler (SA Health), Stephen Lambert (Queensland Children's Medical Research Institute), Andrew Lawrence (SA Pathology), David Lynn, Steve Wesselingh (SAHMRI), Kristine Macartney, Nicholas Wood (University of Sydney), Martin Maiden, Jenny McLennan, Andy Pollard, Matthew Snape (University of Oxford), Peter Richmond (University of Western Australia)

A/Prof David Parsons and Dr Martin Donnelley

Cystic Fibrosis

Development of genetic therapies for treating and preventing cystic fibrosis lung disease, effective lung airway delivery, and the non-invasive measurements of their effects

Group Members:

Administration Assistant – Bernadette Boorg

PhD Candidates – Chantelle Carpentieri, Thomas Goddard, Ali McCarron, Harsha Padmanabhan

Postdoctoral Researchers – Patricia Cmielewski, Juliette Delhove, Nigel Farrow, Mark Gardner, Nathan Rout-Pitt, Freda Werdiger

Research Officer – Nikki Reyne

A/Prof Cheryl Shoubridge

Intellectual Disability Research

Defining molecular and cellular pathways for intellectual disability and seizures, and developing effective interventions

Group Members:

PhD Candidate – Karagh Loring

Research Assistant – Monica Thai

RRI collaborators – Jozef Gecz, Claire Roberts, Rebecca Robker

A/Prof Lisa Smithers

Paediatric and Perinatal Epidemiology

Understanding how early life events can influence later health and development

Group Members:

PhD Students – Mumtaz Begum, Engida Derbie, Cherise Fletcher, Davi Macedo, Pedro Santiago, Molla Wassie

Honours Student – Anna Kalamkarian

Mbio – Lilly Chan

RRI collaborators – Cathy Chittleborough, Gus Dekker, Jessica Grieger, Luke Grzeskowiak, Dandara Haag, John Lynch, Murthy Mittinty, Rhiannon Pilkington, Claire Roberts

External collaborators – Lisa Jamieson, Elizabeth Hoon, Clare Hume, Jo Zhou (University of Adelaide), Ben Mol (Monash University), Sohinee Bhattacharya (University of Aberdeen), Annette Braunack-Mayer (University of Wollongong), Tess Gregory (Telethon Kids)

INVESTING IN OUR MEMBERS

The RRI invests in people through facilities, funding programs, scholarships, and training

Core Facilities

Adelaide Research Assay Facility (ARAF)

Led by Professor David Kennaway

The Adelaide Research Assay Facility provides specialised, high-throughput, and high-sensitivity assays of physiologically important analytes for academic researchers and commercial customers Australia-wide.

Bioinformatics Facility

Led by Dr Jimmy Breen

Bioinformatics enhances the Institute's capability in next-generation sequencing and systems biology approaches to basic science and clinical research investigating human and animal reproduction and development. Strategies to design and analyse transcriptome, deep-sequencing, genome, and proteome data sets are powerful tools to investigating systems and processes in biology and disease.

Biostatistics Facility

Led by Dr Emma Knight

The Biostatistics Facility is a collaborative research service that provides expertise in research design and statistical analysis. Statisticians advise researchers on appropriate study design and conduct, undertake statistical analysis, and report on research findings.

Cohort and Intergenerational Studies Facility (CIS)

Led by Professor Claire Roberts

The Cohort and Intergenerational Studies Facility underpins the strategic utilisation of unique Adelaide generated longitudinal studies - both cohorts and randomised controlled trials - established before or at birth, or in childhood. CIS and its resources enhance collaborations, support novel interrogations of accrued data and enable data sharing between studies.

Gene Silencing and Expression Facility

Led by Jason Gummow

The Gene Silencing and Expression Facility provides gene manipulation services to Australian researchers in a fully equipped PC2 laboratory. The facility offers custom production of lentiviral, AAV, adenovirus and retroviral vectors, and stock viruses for purchase by the microlitre.

SA Genome Editing Facility (SAGE)

Led by Professor Paul Thomas

The SA Genome Editing Facility uses cutting edge genome editing technology to generate mutant mice for a wide range of applications. Utilising new genome editing technology, the facility offers a number of services including generation of custom knock out, point mutation, conditional and tagged alleles.

Funding programs

Designed for Success

Designed for Success improves the scientific quality and significance of grant applications through facilitated development of research projects over an extended period, with structured project development in set stages and significant external review.

Seven research teams benefited from this intensive program in 2019, with results to be announced in 2020.

Engaging Opportunities

Engaging Opportunities support the development of new relationships with key stakeholders to jointly address research priorities; sharing identification and ownership of the problem being addressed, and the path to understanding and progressing a solution.

Collaboration with groups such as health consumers, clinicians, business, industry, government and not-for-profits leads to more robust and relevant research projects, quicker development of solutions, and more effective translation of discoveries. This program resulted in the development of 4 new collaborative projects, including Dr Luke Grzeskowiak's project: *Reducing infant morbidity and mortality through improvements in pharmacological management of lactation insufficiency* and contributed to a successful Hospital Research Foundation Fellowship.

Exchange Program

The Exchange Program builds collaborations with international researchers to increase research capacity and facilitate access to international funding, databases and expertise. It achieves this by funding RRI members to spend time with collaborators interstate or overseas, as well as funding national and international collaborators to spend time with the Institute in Adelaide.

Investigator Grant Near-Miss Funding Program

The Investigator Grant Near-Miss Funding program was a new program rolled out in 2019 and is designed to support all levels of NHMRC Investigator Grant applications that were a near-miss, to be developed into more highly competitive applications for resubmission. The Institute supported 4 applicants to develop their grant by holding a series of workshops and coordinating a thorough external review process. Results will be announced in 2020.

Investment for Success

This program increases competitiveness for NHMRC funding by developing highly competitive (but as yet unfunded) project grant applications, into more competitive applications for subsequent submission. Support serves to enable proof-of-concept studies, experiments or analysis, to ensure rapid publication of a pivotal paper or increase scientific quality, significance and innovation.

In 2019, four projects were funded, with NHMRC announcements in 2020. Dr Kylie Dunning's project, *Determining embryo health with a light touch: label-free imaging to detect chromosomal mosaicism* and contributed to a successful Hospital Research Foundation Fellowship.

Innovation Seed Funding

This program supports early and mid-career researchers to collaborate across research groups and themes and to explore novel research questions. Its goal is to harness and progress new ideas towards competitive, fundable research that addresses significant knowledge gaps.

Five collaborative projects were supported in 2019, bringing together 20 members and external collaborators.

Large Grants Program

The Large Grant Applications program is designed to support RRI Research Leaders in the development and preparation of large grant applications (for example NHMRC CREs and Program Grants; MRFF; ARC LIEFs; ARC Discovery; and NIH grants). Applicants must have a well-developed plan including an established CI team and budget. In 2019, the Institute supported A/Prof David Parsons, Dr Martin Donnelley and their team to apply for and successfully receive $960,000 funding through the MRFF Frontier Health and Medical Research Program.

Travel Grants

Supporting researchers to present and share their research findings at national and international conferences and meetings is essential for career development and building a strong track record. Attendance at key conferences enables important networking with peers, and the opportunity to develop future collaborations.

In 2019 the Institute awarded 21 travel grants to research staff and students to attend conferences, training workshops, lab visits, and meetings with research partners, funders and key collaborators.

Visiting Speakers

The Visiting Speakers program enables external research leaders to visit the Institute and encourages collaboration between institutions, providing insight and new perspectives on our research priorities. Visitors present a seminar to the RRI and meet with relevant researchers to discuss research ideas. In 2019, the RRI hosted 13 visiting speakers:

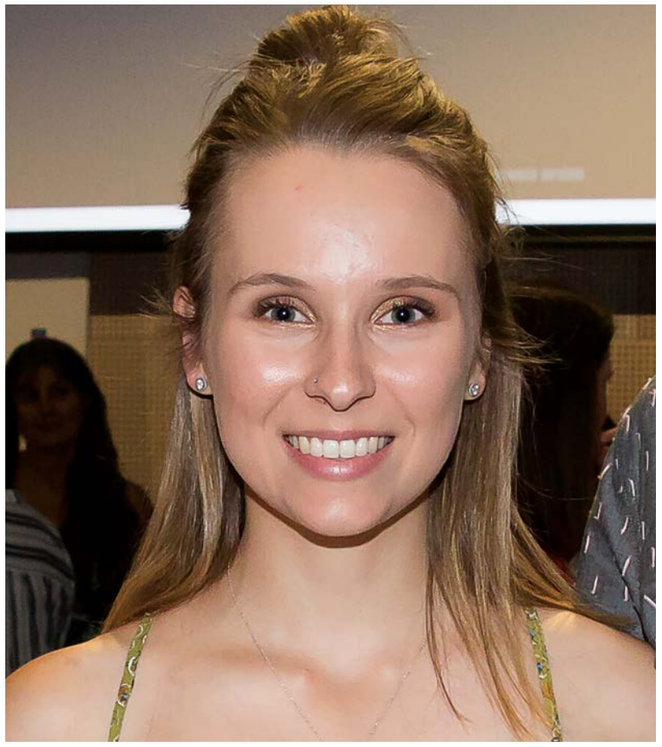
- Prof Bruce Murphy, Université de Montréal
- Prof Caroline McMillen, Chief Scientist
- Prof David Olson, University of Alberta
- Emeritus Prof Dennis Matthews, University of California
- Prof Eric Steegers, Erasmus Medical Centre
- Dr Leemon McHenry, California State University
- Prof Pascale Chavatte-Palmer, French National Institute for Agricultural Research
- Prof Patrick Tam, Children's Medical Research Institute, University of Sydney
- Prof Ranjan Yajnik, KEM Hospital Research Centre
- Prof Regine Steegers-Theunissen, Erasmus Medical Centre
- Prof Simon Stanworth, University of Oxford
- Prof Tony Perkins, Griffith University
- Prof Vicki Clifton, Mater Research and Translational Research Institute

2019 Career Development Fellowship recipient, Dr Luke Grzeskowiak

Jean Hailes Travel Fellowship recipient, Dr Zohra Lassi

Mentoring Program

This program seeks to strengthen networks, build relationships, develop career pathways and enhance resumes, providing mutual benefit for both the mentee and mentor. The RRI's Early Mid-Career Researcher Council run this program for students and all early and mid-career researchers seeking a mentor. A workshop was included in the program to ensure mentees maximised the opportunity and were prepared when meeting their mentors.



Jeffrey Robinson Honours Scholarship recipient, Georgia Clarke

2019 Repromed Reproductive Health Scholarship recipient, Stephanie O'Hara

2019 Fellowships and Scholarships

Career Development Fellowship

This fellowship funds the salary of 'Emerging Star' early career researchers for one year, supporting their career development to enable competitiveness for an NHMRC Investigator Grant or similar. In 2019 the fellowship was awarded to: Dr Luke Grzeskowiak to progress his research: *Developing effective strategies for improving reproductive health outcomes for women with asthma*.

Jean Hailes Travel Fellowship

In 2019, Jean Hailes for Women's Health partnered with the Institute to support a Postdoctoral Travel Fellowship for a RRI Member with a women's health research focus, and was awarded to Dr Zohra Lassi. The fellowship enabled Zohra to travel to major overseas conferences to present her research, and to visit research institutions to form and develop new collaborations.

Jeffrey Robinson Honours Scholarship

Each year the Institute awards the *Jeffrey Robinson Honours Scholarship* to a top performing student, who commences honours under the supervision of a RRI Member. This scholarship and the Institute are named after Emeritus Professor Jeffrey Robinson CBE.

In 2019, the Institute awarded the *Jeffrey Robinson Honours Scholarship* to, Georgia Clarke to undertake the honours project *Gastrointestinal nutrient sensing during pregnancy*, under the supervision of Kathy Gatford, Amanda Page and Richard Young.

Repromed Reproductive Health Scholarship

The Institute partnered with Repromed in 2016 to establish the *Repromed Reproductive Health Scholarship*. This scholarship is awarded to a top student completing their honours year under the supervision of a RRI Member.

Repromed are a South Australian fertility treatment company offering a complete range of fertility treatments and options. The 2019 recipient of this scholarship was Stephanie O'Hara who progressed her project: *Understanding the fate of Treg cells in pregnancy*, under the supervision of Professor Sarah Robertson.

Summer Research Scholarships

During the 2019/2020 break, the Institute funded two Summer Scholarships. These positions provide an insight into a research career and seek to encourage undergraduate students to consider postgraduate study. The recipients were:

- Jessie Walker, *'Significance of Treg cell phenotype switching in pregnancy'*. Supervised by Prof Sarah Robertson
- Chloe Borgas, *'Long term impact of gonorrhea on pregnancy and infant outcomes'*. Supervised by Prof Helen Marshall

GOVERNANCE

ADVISORY BOARD

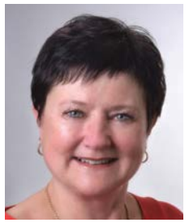

Prof Jock Findlay AO (Chair)


Prof Richard Hills


Prof Alastair Burt


Dianne Davidson


Dr Susan Evans


Lindsey Gough


Ellen Kerrins


Prof Sarah Robertson


Prof Andrew Zannettino

EARLY AND MID-CAREER RESEARCHER COUNCIL


Dr Luke Grzeskowiak (Chair)


Dr Jodie Avery


Dr Macarena Bermudez Gonzalez


Dr Carolyn Berryman


Dr Alison Care


Tara Crawford


Amy Garrett


Dr Duyen Pham


Dr Nathan Rout-Pit


Dr Bing Wang

EXECUTIVE COMMITTEE


Prof Sarah Robertson (Chair)


Prof Simon Barry


Prof Jenny Couper

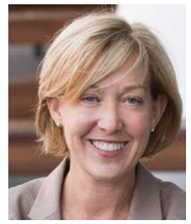

Prof Gus Dekker

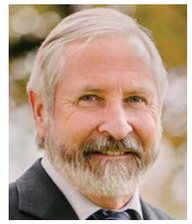

Marcus Goddard


A/Prof Louise Hull


Prof Helen Marshall


Prof Claire Roberts


Prof Rebecca Robker


Prof Ray Rodgers


Prof Darryl Russel


A/Prof Michael Stark


Prof Ian Symonds

MEMBER LIST

Members

Aboustate, Natalie
Adikusuma, Fatwa
Aikens, Jaqui
Alaknanda, Alaknanda
Aldridge, Emily
Andersen, Chad
Andraweera, Prabha
Arani Krishna, Manasa
Archer, Maddison
Arman, Bridget
Ashwood, Pat
Atashgaran, Vahid
Athreya, Vinay
Augustine, Pyria
Avery, Jodie
Azzolini, Nancy
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Banovic, Tatijana
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Battersby, Rachel
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Beresford, Sarah
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Berryman, Carolyn
Bianco-Miotto, Tina
Bogias, Konstantinos
Bonner, Wendy
Boog, Bernadette
Borqkvist, Ash
Bradley, Natasha
Breed, William
Breen, Jimmy
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Brown, Hannah
Brown, Katherine
Burford-Rice, Rose
Care, Alison
Carneiro, Gustavo
Carpentieri, Chantelle
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Chang, Yen-Wei
Chapman, Hayley
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Cheung, Janelle
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Connaughton, Haley
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Crawford, Tara
Daish, Tasman
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Dasari, Pallave
Dass Singh, Mansi
Davies, Michael
Dawson, Jessica
De Nys, Rebekah
Dekker, Gus
Delhove, Juliette
Derbie, Engida
Deussen, Andrea
Diener, Kerri
Dinh, Doan Thao
Dodd, Jodie
Dodds, Kelsi
Domingo, Deepti
Donnelley, Martin
Dorian, Camilla
Dunning, Kylie
Ellul, Marie
Evans, Sue
Evans, Susan
Farrell, Lucy
Farrow, Nigel
Fatohi, Anwar
Fernandez, Renae
Ferrante, Antonio
Fletcher, Cherise
Frolich, Sonja
Gardner, Mark
Gardner, Alison
Garrett, Amy
Gatford, Kathryn
Gecz, Jozef
Gent, Roger
Geyer, Myf
Ghadge, Amita
Gialamas, Angela
Giles, Lynne
Goddard, Thomas
Goldsworthy, Mitchell
Goodchild, Louise
Gooding, Michaela
Gordon, Yasmyn
Gorgani, Nick
Graetz, Lynton
Grant, Janet
Green, Ella
Green, Ryan
Grieger, Jessica
Groome, Holly
Grutzner, Frank
Grzeskowiak, Luke
Gundsambuu, Batjargal
Gupta, Addya
Gwiazdzinski, Alison
Haag, Dandara
Habibi, Nahal
Hague, Bill
Hall, Kelly
Hammond, Courtney
Harbison, Jessica
Harper, Kelly
Hartanti, Monica
Heath, Christine
Heilbronn, Leonie
Hermoza Aragones, Renato
Heron, Sarah
Heruc, Gabrielle
Hiendleder, Stefan
Highfield, Kate
Hii, Charles
Hodgson, Bree
Hodson, Leigh
Hope, Chris
Huang, Hans
Hull, Louise
Hume, Clare
Hummitzsch, Katja
Humphries, Jacqueline
Huong, Jifei
Hutchinson, Mark
Hutchison, Amy
Hutchison, Anthea
Huynh, Dao
Ingman, Wendy
Ivancevic, Atma
Jackson, Matilda
Jacobssen, Ashlee
Jankovic-Karasoulos, Tanja
Jayapal, Minnu
Johnson, Brett
Jolly, Lachlan
Jureidini, Jon
Kaim, Amy
Kalamkarian, Anna
Kannieappan, Lavern
Kaur, Harleen
Kaur, Jasbir
Kayumi, Sayaka
Kedzior, Sophie
Keir, Amy
Kennaway, David
Kennedy, David
Kennedy, Declan
King, Jovanka
Koch, Joanne
Kolc, Kristy
Kontos, Anna
Kopsaftis, Zoe
Kortschak, Dan
Kren, Ann
Krieg, Meredith
Krige, Alice
Kroes, Thessa
Kurunathan, Puvithra
Langley, Erica
Lansdown, Nikki
Lassi, Zohra
Lee, Eunice
Lee, Raxhael Pei-Jui
Lee, Su-san
Leemaqz, Shalem
Leigh, Chris
Lim, Megan
Liu, Bo
Liu, Hong
Liu, Jiajun
Liu, Ling Chen
Liu, Menghe
Liu, Ning
Llewellyn, Angela
Lokman, Noor
Loring, Karagh
Louise, Jennie
Lushington, Kurt
Lyarjdameh, Hossein
Lynch, John
Macedo, Davi
MacLennan, Alastair
Macpherson, Anne
Madex, Cherie
Maicas, Gabriel
Malvaso, Catia
Marathe, Jessica
Marshall, Helen
Martin, James
Martinello, Kathryn
Mathew, Suja
Matias, Ricky
Mattiske, Tessa
McAninch, Dale
McCarron, Ali
McCormack, Catherine
McCullough, Dylan
McDonald Van Dam, Jago
McGorm, Kelly
McIlfatrick, Stephen
McIntyre, Chantelle
McLennan, Hanna
McMillan, Mark
McPhee, Andrew
Menberu, Martha
Middleton, Philippa
Mittinty, Murthy
Moffat, Ruby
Mohammed, Hassen
Moldenhauer, Lachlan
Montgomerie, Alicia
Moore, Vivienne
Morello, Brianna
Mulder, Callista
Muraleethasan, Suthan
Mustafa, Sanam
Napoli, Silvana
Nawaz, Urwah
Newman, Angela
Nguyen, Hanh
Nieto, Alvaro
Norman, Rob
Nottage, Casey
Nottle, Mark
Noye, Tannith Marie
Oakden-Rainer, Luke
O'Brien, Cecelia
Oehler, Anita
Oehler, Martin
Ong, Shee Chee
Oswald, Tassia
Overduin, Sebastian
Owens, Julie
Padmanabhan, Harsha
Paijpach, Filip
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REPRESENTATIVE PUBLICATIONS

The following 50 publications (of a total of more than 450 peer-reviewed primary papers, reviews and book chapters) illustrate the scope and impact of the RRI's research outputs in 2019.

The full list of publications can be found at adelaide.edu.au/robinson-research-institute/research/publications/

1. Andraweera, P., Dekker, G., Leemaqz, S., McCowan, L., Myers, J., Kenny, L., Walker, J., Poston, L., & Roberts, C. T. (2019). Effect of birth weight and early pregnancy BMI on risk for pregnancy complications. *Obesity, 27*(2), 237-244.

2. Bertoldo, M., Caldwell, A., Riepsamen, A., Lin, D., Gonzalez, M., Robker, R., Ledger, W., Gilchrist, R., Handelsman, D., & Walters, K. (2019). A hyperandrogenic environment causes intrinsic defects that are detrimental to follicular dynamics in a PCOS mouse model. *Endocrinology, 160*(3), 699-715.

3. Chambers, G. M., Harrison, C., Raymer, J., Petersen Raymer, A. K., Britt, H., Chapman, M., Ledger, W., & Norman, R. J. (2019). Infertility management in women and men attending primary care–patient characteristics, management actions and referrals. *Human Reproduction, 33*(11), 2173-2183.

4. Chen, M., Wong, S., Wu, L., Gordon, Y., Heilbronn, L., & Robker, R. (2019). Differential impacts of gonadotrophins, IVF and embryo culture on mouse blastocyst development. *Reproductive BioMedicine Online, 39*(3), 372-382.

5. Chin, P. Y., Dorian, C., Sharkey, D. J., Hutchinson, M. R., Rice, K. C., Moldenhauer, L. M., & Robertson, S. A. (2019). Toll-like receptor-4 antagonist (+)-naloxone confers sexually dimorphic protection from inflammation-induced fetal programming in mice. *Endocrinology, 160*(11), 2646-2662.

6. Corbett, M. A., Kroes, T., Veneziano, L., Bennett, M. F., Florian, R., Schneider, A. L., Coppola, A., Licchetta, L., Franceschetti, S., Suppa, A., Wenger, A., Mei, D., Pendziwiat, M., Kaya, S., Delledonne, M., Straussberg, R., Xumerle, L., Regan, B., Crompton, D., van Rootselaar, A. F., Correll, A., Catford, R., Bisulli, F., Chakraborty, S., Baldassari, S., Tinuper, P., Barton, K., Carswell, S., Smith, M., Berardelli, A., Carroll, R., Gardner, A., Friend, K. L., Blatt, I., Iacomino, M., Di Bonaventura, C., Striano, S., Buratti, J., Keren, B., Nava, C., Forlani, S., Rudolf, G., Hirsch, E., Leguern, E., Labauge, P., Balestrini, S., Sander, J. W., Afawi, Z., Helbig, I., Ishiura, H., Tsuji, S., Sisodiya, S. M., Casari, G., Sadleir, L. G., van Coller, R., Tijssen, M. A., Klein, K. M., van den Maagdenberg, A. M., Zara, F., Guerrini, R., Berkovic, S. F., Pippucci, T., Canafoglia, L., Bahlo, M., Striano, P., Scheffer, I. E., Brancati, F., Depienne, C., & Gecz, J. (2019). Intronic ATTTC repeat expansions in STARD7 in familial adult myoclonic epilepsy linked to chromosome 2. *Nature Communications, 10*(1), 4920-4920.

7. Crowther, C. A., Ashwood, P., Andersen, C. C., Middleton, P. F., Tran, T., Doyle, L. W., Robinson, J. S., Harding, J. E., & Group, A. S. (2019). Maternal intramuscular dexamethasone versus betamethasone before preterm birth (ASTEROID): a multicentre, double-blind, randomised controlled trial. *The Lancet Child and Adolescent Health, 3*(11), 769-780.

8. Dinh, D., Breen, J., Akison, L., DeMayo, F., Brown, H., Robker, R., & Russell, D. (2019). Tissue-specific progesterone receptor-chromatin binding and the regulation of progesterone-dependent gene expression. *Scientific Reports, 9*(1), 11966-11961-11966-11914.

9. Dodd, J., Louise, J., Deussen, A., Grivell, R., Dekker, G., McPhee, A., & Hague, W. (2019). Effect of metformin in addition to dietary and lifestyle advice for pregnant women who are overweight or obese: the GRoW randomised, double-blind, placebo-controlled trial. *The Lancet Diabetes & Endocrinology, 7*(1), 15-24.

10. Grieger, J., Grzeskowiak, L., Smithers, L., Bianco-Miotto, T., Leemaqz, S., Andraweera, P., Poston, L., McCowan, L., Kenny, L., Myers, J., Walker, J., Norman, R., Dekker, G., & Roberts, C. (2019). Metabolic syndrome and time to pregnancy: a retrospective study of nulliparous women. *BJOG: An International Journal of Obstetrics and Gynaecology, 126*(7), 852-862.

11. Grubor-Bauk, B., Wijesundara, D., Masavuli, M., Abbink, P., Peterson, R., Prow, N., Larocca, R., Mekonnen, Z., Shrestha, A., Eyre, N., Beard, M., Gummow, J., Carr, J., Robertson, S., Hayball, J., Barouch, D., & Gowans, E. (2019). NS1 DNA vaccination protects against Zika infection through T cell-mediated immunity in immunocompetent mice. *Science Advances, 5*(12), eaax2388-eaax2388.

12. Haag, D. G., Jamieson, L. M., Hedges, J., & Smithers, L. G. (2019). Is there an association between breastfeeding and dental caries among three-year-old Australian Aboriginal children? *Nutrients, 11*(11), 1-11.

13. Harbison, J., Roth-Schulze, A., Giles, L., Tran, C., Ngui, K., Penno, M., Thomson, R., Wentworth, J., Colman, P., Craig, M., Morahan, G., Papenfuss, A., Barry, S., Harrison, L., & Couper, J. (2019). Gut microbiome dysbiosis and increased intestinal permeability in children with islet autoimmunity and type 1 diabetes: a prospective cohort study. *Pediatric Diabetes, 20*(5), 574-583.

14. Hirose, K., Payumo, A., Cutie, S., Hoang, A., Zhang, H., Guyot, R., Lunn, D., Bigley, R., Yu, H., Wang, J., Smith, M., Gillett, E., Muroy, S., Schmid, T., Wilson, E., Field, K., Reeder, D., Maden, M., Yartsev, M., Wolfgang, M., Grützner, F., Scanlan, T., Szweda, L., Buffenstein, R., Hu, G., Flamant, F., Olgin, J., & Huang, G. (2019). Evidence for hormonal control of heart regenerative capacity during endothermy acquisition. *Science, 364*(6436), 184-188.

15. Hope, C., Welch, J., Mohandas, A., Pederson, S., Hill, D., Gundsambuu, B., Eastaff-Leung, N., Grosse, R., Bresatz, S., Ang, G., Papademetrios, M., Zola, H., Duhen, T., Campbell, D., Brown, C., Krumbiegel, D., Sadlon, T., Couper, J., & Barry, S. (2019). Peptidase inhibitor 16 identifies a human regulatory T-cell subset with reduced FOXP3 expression over the first year of recent onset type 1 diabetes. *European Journal of Immunology, 49*(8), 1235-1250.

16. Hummitzsch, K., Hatzirodos, N., Irving-Rodgers, H. F., Hartanti, M. D., Perry, V. E., Anderson, R. A., & Rodgers, R. J. (2019). Morphometric analyses and gene expression related to germ cells, gonadal ridge epithelial-like cells and granulosa cells during development of the bovine fetal ovary. *PLoS ONE, 14*(3), 1-20.

17. Hutchison, A., Liu, B., Wood, R., Vincent, A., Thompson, C., O Callaghan, N., Wittert, G., & Heilbronn, L. (2019). Effects of intermittent versus continuous energy intakes on insulin sensitivity and metabolic risk in women with overweight. *Obesity, 27*(1), 50-58.

18. Jamieson, L., Smithers, L., Hedges, J., Aldis, J., Mills, H., Kapellas, K., Lawrence, H., Broughton, J., & Ju, X. (2019). Follow-up of an intervention to reduce dental caries in Indigenous Australian children: a secondary analysis of a randomized clinical trial. *JAMA Network Open, 2*(3), 1-13.

19. Kennedy, L., Crawford, T., Andersen, C., & Stark, M. (2019). Does umbilical cord blood glucose extraction discriminate the risk of early neonatal hypoglycaemia in at-risk newborns? *Journal of Paediatrics and Child Health, 55*(12), 1476-1480.

20. Lassi, Z., Kedzior, S., & Bhutta, Z. (2019). Community-based maternal and newborn educational care packages for improving neonatal health and survival in low- and middle-income countries. *Cochrane Database of Systematic Reviews, 2019*(11).

21. Lim, M., Brown, H., Kind, K., Thompson, J., & Dunning, K. (2019). Hemoglobin: potential roles in the oocyte and early embryo. *Biology of Reproduction, 101*(2), 262-270.

22. Liu, B., Page, A. J., Hatzinikolas, G., Chen, M., Wittert, G. A., & Heilbronn, L. K. (2019). Intermittent fasting improves glucose tolerance and promotes adipose tissue remodeling in male mice fed a high-fat diet. *Endocrinology, 160*(1), 169-180.

23. Liu, R., Low, W. Y., Tearle, R., Koren, S., Ghurye, J., Rhie, A., Phillippy, A. M., Rosen, B. D., Bickhart, D. M., Smith, T. P., Hiendleder, S., & Williams, J. L. (2019). New insights into mammalian sex chromosome structure and evolution using high-quality sequences from bovine X and Y chromosomes. *BMC Genomics, 20*(1), 1000-1000.

24. Lokman, N.A., Price, Z.K., Hawkins, E.K., Macpherson, A.M., Oehler, M.K., & Ricciardelli, C. (2019). 4-Methyllumbelliferone inhibits cancer stem cell activation and overcomes chemoresistance in ovarian cancer. *Cancers, 11*(8), 1-18

25. Macedo, D., Smithers, L., Roberts, R., Haag, D., Paradies, Y., & Jamieson, L. (2019). Does ethnic-racial identity modify the effects of racism on the social and emotional wellbeing of Aboriginal Australian children? *PLoS ONE, 14*(8).

26. MacLennan, A., Lewis, S., Moreno-De-Luca, A., Fahey, M., Leventer, R., McIntyre, S., Ben-Pazi, H., Corbett, M., Wang, X., Baynam, G., Fehlings, D., Kurian, M., Zhu, C., Himmelmann, K., Smithers-Sheedy, H., Wilson, Y., Ocaña, C., van Eyk, C., Badawi, N., Wintle, R., Jacobsson, B., Amor, D., Mallard, C., Pérez-Jurado, L., Hallman, M., Rosenbaum, P., Kruer, M., & Gecz, J. (2019). Genetic or Other Causation Should Not Change the Clinical Diagnosis of Cerebral Palsy. *Journal of Child Neurology, 34*(8), 472-476.

27. Makrides, M., Best, K., Yelland, L., McPhee, A., Zhou, S., Quinlivan, J., Dodd, J., Atkinson, E., Safa, H., van Dam, J., Khot, N., Dekker, G., Skubisz, M., Anderson, A., Kean, B., Bowman, A., McCallum, C., Cashman, K., & Gibson, R. (2019). A randomized trial of prenatal n-3 fatty acid supplementation and preterm delivery. *The New England Journal of Medicine, 381*(11), 1035-1045.

28. Marcovecchio, M. L., Dalton, R. N., Daneman, D., Deanfield, J., Jones, T. W., Neil, A. W., Dunger, D. B., Acerini, C., Ackland, F., Anand, B., Barrett, T., Birrell, V., Campbell, F., Charakida, M., Cheetham, T., Chiesa, T., Deanfield, J., Cooper, C., Doughty, I., Dutta, A., Edge, J., Gray, A., Hamilton-Shield, J., Mann, N., Marcovecchio, M., Marshall, S., Rayman, G., Robinson, J., Russell-Taylor, M., Sankar, V., Smith, A., Thalange, N., Yaliwal, C., Benitez-Aguirre, P., Cameron, F., Cotterill, A., Couper, J., Craig, M., Davis, E., Donaghue, K., Jones, T., King, B., Verge, C., Bergman, P., Rodda, C., Clarson, C., Curtis, J., Daneman, D., Mahmud, F., & Sochett, E. (2019). A new strategy for vascular complications in young people with type 1 diabetes mellitus. *Nature Reviews Endocrinology, 15*(7), 429-435.

29. Marshall, H., Clarke, M., Heath, C., Quinn, H., Richmond, P., Crawford, N., Elliott, E., Toi, C., Kynaston, A., Booy, R., & Macartney, K. (2019). Severe and complicated varicella and associated genotypes 10 years after introduction of a one-dose varicella vaccine program. *Journal of Infectious Diseases, 219*(3), 391-399.

30. McHugh, L., Marshall, H. S., Perrett, K. P., Nolan, T., Wood, N., Lambert, S. B., Richmond, P., Ware, R. S., Binks, P., Binks, M. J., & Andrews, R. M. (2019). The safety of influenza and pertussis vaccination in pregnancy in a cohort of Australian mother-infant pairs, 2012-2015: the FluMum study. *Clinical Infectious Diseases, 68*(3), 402-408.

31. Moldenhauer, L., Schjenken, J., Hope, C., Green, E., Zhang, B., Eldi, P., Hayball, J., Barry, S., & Robertson, S. (2019). Thymus-derived regulatory T cells exhibit Foxp3 epigenetic modification and phenotype attenuation after mating in mice. *Journal of Immunology, 203*(3), 647-657.

32. Nisenblat, V., Sharkey, D., Wang, Z., Evans, S., Healey, M., Maria Ohlsson Teague, E., Print, C., Robertson, S., & Louise Hull, M. (2019). Plasma miRNAs display limited potential as diagnostic tools for endometriosis. *Journal of Clinical Endocrinology and Metabolism, 104*(6), 1999-2022.

33. Ovadia, C., Seed, P., Sklavounos, A., Geenes, V., Di Illio, C., Chambers, J., Kohari, K., Bacq, Y., Bozkurt, N., Brun-Furrer, R., Bull, L., Estiú, M., Grymowicz, M., Gunaydin, B., Hague, W., Haslinger, C., Hu, Y., Kawakita, T., Kebapcilar, A., Kebapcilar, L., Kondrackiene, J., Koster, M., Kowalska-Kańka, A., Kupčinskas, L., Lee, R., Locatelli, A., Macias, R., Marschall, H., Oudijk, M., Raz, Y., Rimon, E., Shan, D., Shao, Y., Tribe, R., Tripodi, V., Yayla Abide, C., Yenidede, I., Thornton, J., Chappell, L., & Williamson, C. (2019). Association of adverse perinatal outcomes of intrahepatic cholestasis of pregnancy with biochemical markers: results of aggregate and individual patient data meta-analyses. *The Lancet, 393*(10174), 899-909.

34. Prowse, T., Adikusuma, F., Cassey, P., Thomas, P., & Ross, J. (2019). A Y-chromosome shredding gene drive for controlling pest vertebrate populations. *eLife, 8*(ARTN e41873).

35. Sawyer, A., Kaim, A., Le, H., McDonald, D., Mittinty, M., Lynch, J., & Sawyer, M. (2019). The effectiveness of an app-based nurse-moderated program for new mothers with depression and parenting problems (eMums Plus): pragmatic randomized controlled trial. *Journal of Medical Internet Research, 21*(6), e13689-13681-e13689-13614.

36. Sevoyan, A., Davison, B., Rumbold, A., Moore, V., & Singh, G. (2019). Examining the relationship between body mass index and adverse cardio-metabolic profiles among Australian Indigenous and non-Indigenous young adults. *Scientific Reports, 9*(9), 1-8.

37. Shoubridge, C., Jackson, M., Grinton, B., Berkovic, S., Scheffer, I., Huskins, S., Thomas, A., & Ware, T. (2019). Splice variant in ARX leading to loss of C-terminal region in a boy with intellectual disability and infantile onset developmental and epileptic encephalopathy. *American Journal of Medical Genetics, Part A, 179*(8), 1483-1490.

38. Smithers, L., Mittinty, M., Dekker, G., Mol, B., & Lynch, J. (2019). Diabetes during pregnancy modifies the association between birth weight and education: a whole-of-population study. *Diabetes Care, 42*(9), E143-E145.

39. Soto-Heras, S., Menéndez-Blanco, I., Catalá, M., Izquierdo, D., Thompson, J., & Paramio, M. (2019). Biphasic in vitro maturation with C-type natriuretic peptide enhances the developmental competence of juvenile-goat oocytes. *PLoS ONE, 14*(8), e0221663-0221661-e0221663-0221620.

40. St John, J., Makanji, Y., Johnson, J., Tsai, T. S., Lagondar, S., Rodda, F., Sun, X., Pangestu, M., Chen, P., & Temple-Smith, P. (2019). The transgenerational effects of oocyte mitochondrial supplementation. *Scientific Reports, 9*(1), 6694-6691-6694-6612.

41. Tan, I., Frewin, K., Ricciardelli, C., & Russell, D. (2019). ADAMTS1 promotes adhesion to extracellular matrix proteins and predicts prognosis in early stage breast cancer patients. *Cellular Physiology and Biochemistry, 52*(6), 1553-1568.

42. Thompson, S. C., Nedkoff, L., Katzenellenbogen, J., Hussain, M. A., & Sanfilippo, F. (2019). Challenges in managing acute cardiovascular diseases and follow up care in rural areas: a narrative review. *International Journal of Environmental Research and Public Health, 16*(24), 1-17.

43. Thomson, R., Adams, L., Anderson, J., Maftei, O., Couper, J., Giles, L., & Pena, A. (2019). Australian children with type 1 diabetes consume high sodium and high saturated fat diets: Comparison with national and international guidelines. *Journal of Paediatrics and Child Health, 55*(10), 1188-1193.

44. van Eyk, C., Corbett, M., Frank, M., Webber, D., Newman, M., Berry, J., Harper, K., Haines, B., McMichael, G., Woenig, J., MacLennan, A., & Gecz, J. (2019). Targeted resequencing identifies genes with recurrent variation in cerebral palsy. *npj Genomic Medicine, 4*(1), 27-21-27-11.

45. Verburg, P. E., Roberts, C., McBean, E., Mulder, M. E., Leemaqz, S., Erwich, J., & Dekker, G. A. (2019). Peripheral maternal haemodynamics across pregnancy in hypertensive disorders of pregnancy. *Pregnancy Hypertension, 16*, 89-96.

46. Wang, B., Hajiali Afzali, H., Giles, L., & Marshall, H. (2019). Lifetime costs of invasive meningococcal disease: a Markov model approach. *Vaccine, 37*(46), 6885-6893.

47. Wassie, M. M., Middleton, P., & Zhou, S. J. (2019). Agreement between markers of population iodine status in classifying iodine status of populations: a systematic review. *The American Journal of Clinical Nutrition, 110*(4), 949-958.

48. Wilson, R., François, M., Jankovic-Karasoulos, T., McAninch, D., McCullough, D., Leifert, W., Roberts, C., & Bianco-Miotto, T. (2019). Characterization of 5-methylcytosine and 5-hydroxymethylcytosine in human placenta cell types across gestation. *Epigenetics, 14*(7), 660-671.

49. Wooldridge, A. L., McMillan, M., Kaur, M., Giles, L. C., Marshall, H. S., & Gatford, K. L. (2019). Relationship between birth weight or fetal growth rate and postnatal allergy: a systematic review. *Journal of Allergy and Clinical Immunology, 144*(6), 1703-1713.

50. Yap, B., Kontos, A., Pamula, Y., Martin, A., Kennedy, J. D., Sampson, W., & Dreyer, C. (2019). Differences in dentofacial morphology in children with sleep disordered breathing are detected with routine orthodontic records. *Sleep Medicine, 55*, 109-114.

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