RESEARCH CENTRE FOR REPRODUCTIVE HEALTH

RESEARCH IMPACT

SOLVING CHALLENGES IN REPRODUCTIVE HEALTH

Research Centre for Reproductive Health

THE UNIVERSITY OF ADELAIDE AUSTRALIA

RESEARCH REPORT

2007

FRONT COVER

Marsupial sperm and egg.

Sperm binding to the surface of the egg coat, the zona pellucida, of a marsupial Opossum with the surface of the egg, together with material in the perivitelline space, being visible where the zona has been removed. (This scanning electron micrograph was taken by Assoc. Prof. Bill Breed whilst on study leave at The University of Wisconsin, Madison, Wisconsin in collaboration with Mark Tandowski & Gerald Schatten).

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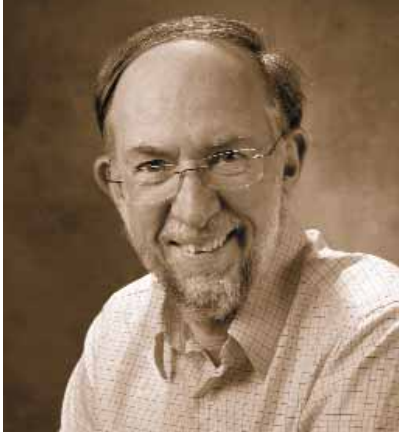


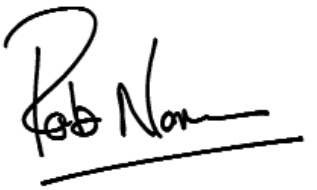
DIRECTOR'S REPORT

The Research Centre for Reproductive Health (RCRH) has grown considerably in the last year and is increasingly focused on research impact. We recognise that reproductive health issues have environmental, genetic, lifestyle and nutritional factors that affect society today. We are moving increasingly into areas such as intergenerational research, peri conception, obesity and the increasing problem of male infertility.

In 2007, RCRH is based in world-class facilities and is addressing broad topics relating to reproductive health. The membership has grown by nearly 20% and is a direct result of the high quality of research and its relevance to Australian society.

The University of Adelaide has committed substantial funds and facilities towards a new Research Institute, the Australian Institute for Reproduction, Women's and Child Health. The RCRH will form the core of this Institute together with a new Centre for Stem Cell Research, The Australian Research Centre for the Health and Wellbeing of Women and Babies and The Centre for the Early Origins of Health and Disease. We believe this will form one of the outstanding groupings of researchers in reproduction, pregnancy and early life in the world.

We have many opportunities and are well placed to make an impact in our area of research. We have a good range of ages across our researchers and we have an excellent diversity of funding. The future is really exciting.



Professor Robert J Norman

'Reproductive health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system, and to its functions and processes.'

'The Cairo' definition of reproductive health states

2008: THE YEAR AHEAD
WORLD’S REPRODUCTIVE FRONTIER

NEW AUSTRALIAN INSTITUTE TO IMPACT REPRODUCTIVE HEALTH

A new Australian research institute is planned for 2008–09 and will incorporate the Research Centre for Reproductive Health. The institute will focus on reproductive health, baby and parental wellbeing, including intergenerational and early development research interests.

The proposed institute’s research primarily focuses on reproductive biology, embryo development, implantation, pregnancy, evidenced-based Interventions in pregnancy and early life, and their application to improve practice, service delivery, health and the long-term impact of reproduction on personal and community health. In addition, the institute research focus includes reproductive biology and technology among domestic animal species, with the aim to improve knowledge and efficiency in animal breeding and livestock management.

The institute will facilitate substantial improvements in male and female reproductive health, neonatal mortality and morbidity, congenital disability and deformity and animal reproductive health and productivity from conception to old age, in the community and across the world.

The research achievements and focus for future advancements in medical science and application of these into clinical practice are the institute’s key promotional strengths.

HIGHLIGHTS
SERVING THE COMMUNITY AND SUPPORTING INDUSTRY

MEMBER HIGHLIGHTS

MENTORS AWARDED

Award for Outstanding Research Training and Mentorship of Early Career Researchers

2007 was the first year in which a new series of Awards for Outstanding Research Training and Mentorship of Early Career Researchers were developed to honour the individual(s) whose commitment to excellence in training has contributed significantly to the professional development of early career researchers and students within the RCRH.

The award winners were chosen based on qualities such as fostering of long-term development, assisting postdoctoral students in acquiring the knowledge needed to succeed as scholars and professionals, encouraging individual talents and strengths, and demonstrating respect and sincere and active interest in their professional advancements.

The nominees were Ms Lyn Harland, Associate Professor Sarah Robertson, Dr Darryl Russell and Associate Professor Jeremy Thompson, and the unanimous winners in 2007 were Ms Lyn Harland and Associate Professor Jeremy Thompson.

ASSOCIATE PROFESSOR JEREMY THOMPSON

Associate Professor Jeremy Thompson is a senior member of Early Development Group at the Research Centre for Reproductive Health, describing himself as spanning across applied and basic science interests, focused on unraveling environmental and oocyte/embryo interactions and how this can improve oocyte maturation and embryo culture techniques. He has a special interest in micro-nutrition of oocytes and early embryos, as these play important roles in determining developmental competence. He believes strongly in collaborative research and has worked hard to develop collaborations across members of the Research Centre, the University of Adelaide and with other national and international laboratories. This is best reflected in his wide scope of publications, including 40 peer reviewed articles in past 5 years.

The commercial implications of Associate Professor Thompson's research stretch wide and are aimed at improving clinical infertility treatment, perinatal and adult health and reproductive technologies for animal biotechnology. He has a long term collaboration and consultancy with a global leader in medical devices, William A. Cook Pty Ltd, with several products commercialised and more in the pipeline. He has also consulted to government and other commercial entities on application of reproductive technologies.

'Jeremy's philosophy is that personnel management and development is first and foremost for the success of a research team. This means that Jeremy puts enormous effort and value into mentoring. He is tireless in terms of the amount of time and effort he will spend listening to people and offering advice and direction'

'He is unquestionably the pivotal person that binds together three research groups and makes it the large cohesive and productive team that it is. It is truly inspiring to so many of us'

Associate Professor Claire Roberts receiving her finalist commendation at the Telstra Business Woman of the Year Awards 2007.

MS LYN HARLAND

Lyn obtained an MSc from the University of Queensland, and developed her love of teaching by Lecturing in Biochemistry at QUT. Following this she spent time at the Department of Biochemistry at the University of Western Australia developing their undergraduate Molecular Biology courses, before spending 10 years at Flinders University honing her molecular biology and protein detection skills in unravelling the secrets of calcium channels in the liver. Lyn commenced her position at RCRH & the Discipline of Obstetrics & Gynaecology at the University of Adelaide in 2002, where she has grown to become a highly regarded and respected member, and a significant source of inspiration particularly to the students with whom she mentors.

OTHER MEMBER HIGHLIGHTS

National Health & Medical Research Council
Senior Fellowship
Dr David Kennaway

National Health & Medical Research Council
Senior Fellowship
Dr Michelle Lane

National Health & Medical Research Council
Senior Fellowship
Dr Vicki Clifton

National Health & Medical Research Council
CJ Martin Training Fellowship
Dr Amanda Sferruzzi-Perri

National Health & Medical Research Council
Peter Doherty Training Fellowship
Dr Helen Irving-Rodgers

IBM Community and Government – Telstra Business Woman of the Year Award
Finalist Associate Professor Claire Roberts

Australian Brain Foundation (SA Branch), Elizabeth Penfold Simpson Prize for Neuroscience
Winner Dr Michelle Mc Donald

European Society for Human Reproduction & Embryology (ESHRE) Established Scientist Award
Winner Dr Robert Gilchrist

University of Adelaide Faculty of Health Sciences
Hilda Farmer Fellowship
Winner Dr Carmela Ricciardelli

‘Lyn has the rare capacity to be uncompromising but non-intimidating as a mentor which results in her being widely used as a resource by students well beyond the lab in which she works.’

‘Lyn is an incredibly approachable person, nothing ever appears too troublesome. Indeed, her ardour in offering guidance and assistance ensures colleagues approach their work with synonymous devotion. Personally, the individual support Lyn generously extended to myself was invaluable to my progress and for that, I am eminently grateful.’

‘Cadence’s research is the first time the effects of obesity on female eggs have been discovered, using mice eggs as a substitute for human eggs.’

STUDENT HIGHLIGHTS

2007 was an outstanding year of success for the students and researchers of RCRH, a highlight of which was Kirsty Pringle, Lachlan Moldenhauer and Cadence Minge being finalists in The 2007 Young Investigator of the Year, with Cadence named as the overall winner.

OBESITY AND EGG DEVELOPMENT

Under the Supervision of Dr Rebecca Robker and Professor Robert Norman, PhD candidate Cadence Minge has been investigating the correlation of obesity and high dietary fat intake has on reproductive health. Cadence’s research showed that high dietary intake disturbed normal ovulation, reduced embryonic survival and she was able to identify stages of embryonic development most affected by high fat diet and obesity, along with pinpointing the metabolic disturbances associated.

Consuming a diet high in fat causes damage to eggs stored in female ovaries. As a result, when fertilised, these eggs are not able to undergo normal, healthy development into embryos. Cadence has also discovered a way to completely reverse the effects of obesity on mouse eggs, enabling afflicted eggs to develop into healthy embryos.

She found that a particular protein in the cells surrounding, supporting and nourishing the egg is critical for egg health. When the protein is selectively targeted with an anti-diabetes drug, rosiglitazone, the adverse effects of obesity on egg quality are completely reversed. However, Cadence warns that rosiglitazone could not be considered a “quick fix” for infertile women.

At this stage, the research findings have only been made in mice. Also, the drug itself can have possible harmful side-effects, and more research is needed to find other, safer ways of activating the protein. Cadence believes her findings emphasize the importance of a healthy lifestyle for women interested in conceiving children naturally.

The Young Investigator Award aims to reward excellence in South Australia’s young researchers in both science and their ability to communicate and ‘sell’ that science to the community. The Award is an initiative of the Children, Youth and Women’s Health Service and the Faculty of Health Sciences, University of Adelaide. In 2007 the University of South Australia and Flinders University were also partners in the Award.

Cadence Minge 2007 Young Investigator of the Year

THE BRADLEY NORMAN HONOURS SCHOLARSHIP

In 2007, the RCRH was proud to be able to award the Inaugural Bradley Norman Honours Scholarship to Alice Georgiou.

Made possible by the very generous donations of the people of the Riverland’s Waikerie/Ramco community, this scholarship was named in honour of Bradley Norman, the only child of Mrs Wendy and Mr Rob Norman (pictured below with Alice Georgiou), who tragically took his own life in 2006. Bradley excelled in life, both academically and athletically. Professor Norman shared the following correspondence from Bradley’s parents:

‘We have always been so proud of our little miracle and forever grateful for the IVF programme. When he was nine, he was on the internet and had looked up a site about IVF. He was rather distressed after reading about the side effects of hormones to stimulate ovaries to produce multiple eggs. He told me it was a big risk. It was a magic moment as I told him about the risks one is prepared to take, and that he was worth every risk and emotion we experienced during our five years of trying’.


Kirsty Pringle


Hassan Bakos


Deirdre Zander


Lachlan Moldenhauer


Kylie Dunning


Leigh Guerin

STUDENT HIGHLIGHTS

Young Investigator Award
Winner Cadence Minge
Runners-up Lachlan Moldenhauer, Kirsty Pringle

Channel 9 Young Achiever Awards: Science & Technology Category
Finalist Brooke Summers-Pearce

2007 Fresh Science
Finalist Cadence Minge

Australian Society for Medical Research Ross Wishart Memorial Prize
Winner Cadence Minge
Finalists Deirdre Zander, Hannah Brown

Larry Ewing Memorial Trainee Award, United States Department of Agriculture, CSREES, National Research Initiative (NRI) Merit Award from the USA Society for the Study of Reproduction
2006 Winner Christine Yeo
2007 Winner Kylie Dunning

Society for Reproductive Biology Young Investigator Award
Finalist Deirdre Zander

Fetal and Neonatal Workshop of Australia and New Zealand Young Investigator Prize
Winner Wee-Ching Kong

Norman Smith Encouragement Award, Emerging Researchers in Ageing Conference
Winner Ashleigh Smith

Australasian Chronobiology Society, Best Presentation by a Postgraduate Student
Winner Tam Varcoe

Australian Society for Medical Research Best Clinical Oral Presentation
Winner Hassan Bakos

3rd International Conference on Experimental and Clinical Reproductive Immunobiology Best Student Oral Presentation
Winner Lachlan Moldenhauer

ARC/NHMRC Network in Genes and Environment in Development Conference Participation Award
Winner Lachlan Moldenhauer
Winner Christine Yeo
Winner Kirsty Pringle
Winner Alison Care
Winner Rachel Nowak

The University of Adelaide Commercialisation Training Scheme Scholarship
Winner Christine Yeo

Discipline of Obstetrics and Gynaecology Robert Seamark Postgraduate Student Award
Winner Kylie Dunning

University of Adelaide Postgraduate Research Expo 2007
ARI best poster with commercial potential Kirsty Pringle
Certificate of Excellence Cadence Minge

Australian Society for Immunology/Adelaide Immunology Retreat (AIR) Best Presentation Award
Winner Leigh Guerin

American Society for Reproductive Medicine (ASRM) and Society for Male Reproduction & Urology (SMRU) Travelling Scholar Award
Winner Hassan Bakos

Annual Australian Society for Immunology Conference, New Investigator Award
Finalist Leigh Guerin

US National Sleep Foundation and the Sleep Research Society, Travel Award
Winner Mark Kohler

Faculty of Health Science Postgraduate Travelling Fellowship
Winner Lachlan Moldenhauer

‘In his illustrious career he has made numerous contributions to basic reproductive biology that we all now take for granted and may not even be aware of’

HALL OF FAME

PROFESSOR DAVID ARMSTRONG

In 2007, Professor David Armstrong was presented with the ‘Life Time Contribution to the Field of Reproductive Biology’ from the RCRH (Discipline of Obstetrics & Gynaecology) for his significant contributions over his long and distinguished career.

As an undergraduate he majored in Animal Husbandry, and then undertook a Masters of Science and a PhD in Animal Physiology at Cornell University.

Professor Armstrong spent post-doctoral years at Brookhaven National Laboratory and Harvard University, where he joined the faculty as Assistant Professor of Anatomy. In 1968 he was awarded Professorship at the University of Western Ontario in Canada, where he founded and directed the Medical Research Council Group in Reproductive Biology for 10 years. He took up a Visiting Professor role at the University of Adelaide in 1998, where he currently resides.

In the 1960’s he pioneered the use of in vitro techniques to study the actions of hormones in the ovary and resolved years of controversy when he reported on the primary action of LH in the ovary. He researched the actions of gonadotropins on glucose and cholesterol metabolism to provide the first evidence that LH regulates ovarian steroidbiosynthesis by influencing substrate availability.

He was the first to demonstrate the role of LH in facilitating the conversion of cholesterol to progesterone in the corpus luteum, and shifted the current thinking of the time from prolactin to LH as the luteotrophic hormone.

Also his studies on lipid metabolism in the ovary led to the discovery of the pivotal role of prostaglandins in ovulation. He provided proof of the ‘two-cell, two gonadotropin’ theory of ovarian oestrogen synthesis and its regulation by gonadotropins, the discovery that the site of action of FSH was in the granulosa cells to stimulate oestrogen production and of LH was in the thecal cells, to stimulate androgen production.

He also applied research in reproductive technology, research on superovulation established the importance of optimal FSH:LH ratio and the detrimental effects of excessive LH, which has been used to design products and regimes for superovulation by pharmaceutical companies, particularly in the animal embryo transfer industry.

Professor Armstrong has been the President of SSR and the IETS, served on many editorial boards including BOR, also served on many national and international granting agency boards, and trained and supervised more than 80 students.

He has been a recipient of many awards throughout his career including a NIH Research Career Development Award, elected to the Fellowship of the Royal Society of Canada, the Carl Hartmann Award from the SSR in 2001 and has an honorary doctorate from the University of Guelph.

Some of the personal comments made by staff and students regarding Professor Armstrong’s contributions and attributes;

‘He is very humble’, ‘he shows all people (students, staff) respect’, ‘and cares about the person not just the science’, and finally, ‘he has great enthusiasm for science and life in general.’

DR LOU WARNES

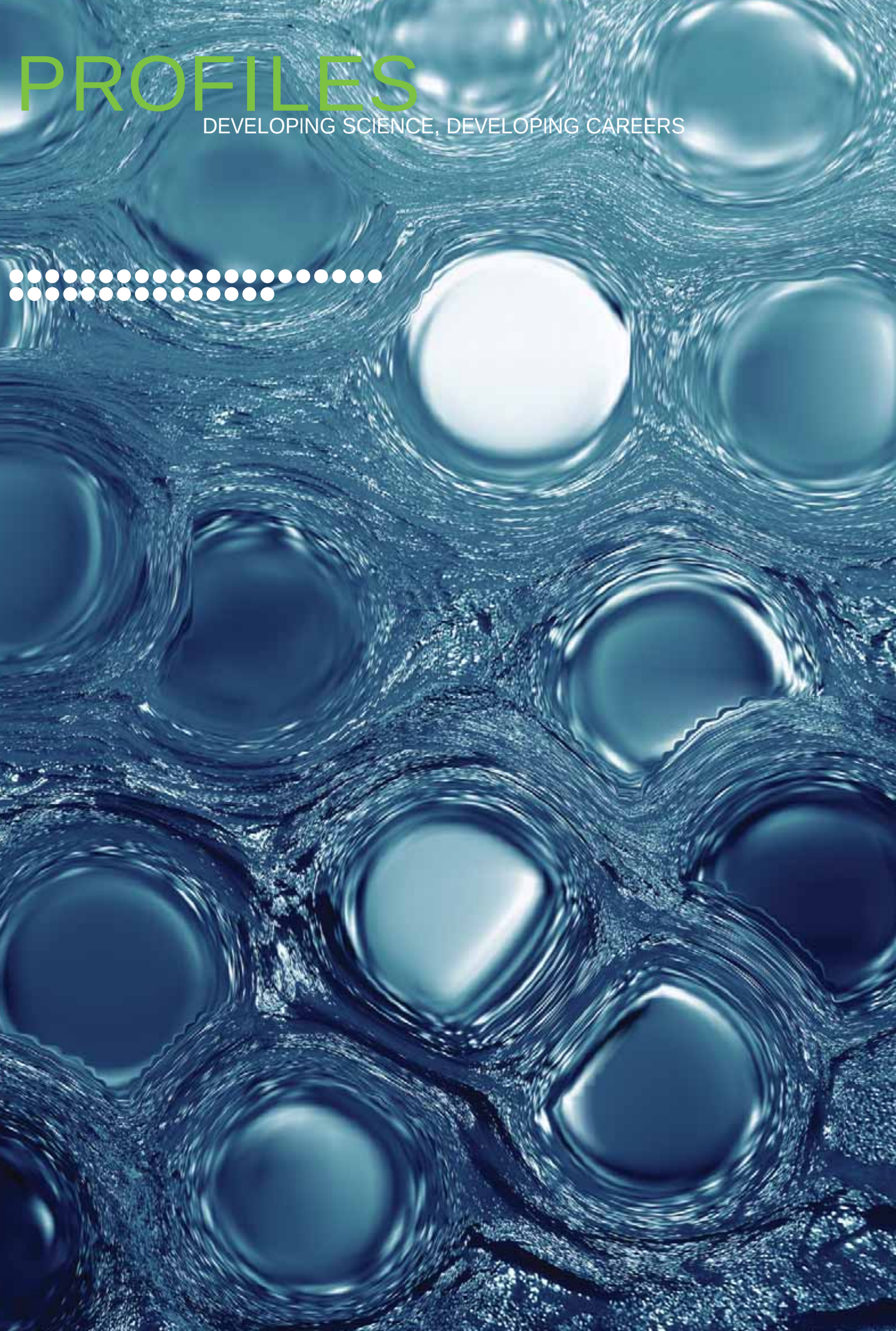
PIONEER OF IN VITRO FERTILISATION

Dr Lou Warnes was one of the pioneers of in vitro fertilisation, starting at the Queen Elizabeth Hospital by completing a PhD under Professor Bob Seamark before continuing his training at Cambridge. On his return Lou was involved in animal IVF and subsequently in humans with Professor John Kerin. The modern IVF program at the Queen Elizabeth Hospital developed into the company Repromed. Lou was in charge of the IVF laboratory for many years and subsequently made a major contribution to the computer program RIMS which is one of the world leading software packages for reproductive medicine. He contributed to many research projects and he is a man of outstanding integrity and loyalty.

RCRH wishes him a very happy retirement and recognise his enormous contribution to developing IVF in South Australia and for his loyalty and friendship to his colleagues.

PROFILES

DEVELOPING SCIENCE, DEVELOPING CAREERS



‘Our research focuses on the role of ancient partner gene of SRY, termed SOX3, and its role in sex determination in brain development.’

NEW MEMBERS

DEVELOPMENTAL GENETICS OF NEURODEVELOPMENTAL DISORDERS

DR PAUL THOMAS

What is the first question most people ask when a new baby arrives: is it a boy or a girl? While the answer seems obvious, this is not always the case.

A surprisingly large number of children are born with Disorders of Sexual Differentiation (DSDs). These infants have ambiguous genitalia or sometimes full “sex reversal” in which the appearance of the genitals does not match their chromosomal sex (boys are XY and girls are XX). In many cases, DSDs result from mutations in genes that control the sex determination pathway.

One of the best known genes in this pathway is SRY which is located on the Y chromosome (and is therefore unique to males) and functions as the molecular switch to activate male development.

Intriguingly, we have shown that XX mice with extra copies of SOX3 develop as males instead of females! This condition, termed XX male sex reversal, is also found in some patients with DSDs. Our investigation of these unique sex reversing mice will provide insights into the genetic pathway that controls male development and the molecular pathology of DSDs. Research in Dr Thomas’ laboratory is funded by a Pfizer Australia, the NHMRC and the ARC.

DEVELOPING CAREERS

THE ROLE OF THE EXTRACELLULAR MATRIX IN THE OVARY

DR HELEN IRVING-RODGERS

There are many ways to begin a career in science, and Helen commenced hers as a research assistant. Along the way she completed a BSc, Grad Dipl Occ Health and PhD. This enabled her to gain a variety of research experience in areas as diverse as fetal lung development and the parasympathetic nervous system, while having a life outside the laboratory. Her experience spans geography (Melbourne, Perth, Texas, Adelaide) and environments (research and clinical laboratories). Helen is recognised internationally for her research on the morphology of reproductive and other tissues. Since joining the University of Adelaide in 2000 she has focused on the basic biological mechanisms surrounding the maturation of cells in the ovary. She discovered a novel type of extracellular matrix and continues to investigate its role in stimulating oestrogen and progesterone production by the ovary. These hormones are important for regulating the menstrual cycle and pregnancy. Her expertise in extracellular matrix and its localisation has led to her collaboratively advancing the field of matrix biology in the testis and the pancreas. In the previous three years her work has featured on the cover of several journals. Helen is a co-investigator of the NHMRC Program Grant ‘Periconceptual foundations for a healthy start to life’.

Amongst her highlights in 2007, Helen earned her PhD from the University of Adelaide and was awarded a Peter Doherty NHMRC post-doctoral fellowship to enable her to investigate the role of extracellular matrix in the regulation of genes needed for hormone production, in collaboration with Professor Richard Ivell, also of the Research Centre for Reproductive Health. She was also an invited speaker at the International Symposium on Diverse Biological Timing Mechanisms, held in Okayama, Japan and was an early career recipient of the Faculty of Health Sciences small grants scheme for the project titled “Regulation of ovarian steroidogenic enzymes in granulosa cells by the extracellular matrix Focimatrix” and was appointed to the editorial board of the journal Reproduction.

Journal covers featuring Helen’s work.

EARLY CAREER RESEARCHERS

MECHANISMS OF FETAL PROGRAMMING

DR MILES DE BLASIO

Since completing his PhD, Dr Miles de Blasio has been investigating the mechanisms of fetal programming indicated by being born small at birth due to placental restriction and its associated catch-up growth, on the development of adult onset diseases such as insulin resistance and central obesity. Miles' current research focus involves the identification of novel genomic determinants of placental function, including altered expression of microRNAs, which target genes for the insulin signaling molecules and enzymes that may mediate the onset of adult diseases such as insulin resistance, obesity and cardiovascular disease following placental restriction in the sheep.

This project is being undertaken in collaboration with the Pork CRC for an Internationally Competitive Pork Industry and QAF Industries Pty Ltd Corowa NSW. The project aims to deliver a biochemical, molecular or genetic marker to select for placental efficiency and reproductive performance, and develop management techniques for pregnant pigs that maximized the growth and efficiency of their progeny for use in the Australian Pork Industry.

Specifically, he is investigating the frequency of the insulin-like growth factor-2 (IGF2) single nucleotide polymorphism (SNP) in a commercial herd of boars and gilts and its association to alterations in birth weight, placental weight and growth performance of progeny, so we can selectively breed for increased productivity and sow longevity.

Miles is also a co-investigator on another major Pork CRC project investigating the effects of exogenous porcine somatotropin (pST) administration in early pregnancy on birth weight and growth performance of sow progeny, and he is involved in investigating the effects of maternal arginine supplementation on the subsequent litter size of gilts and sows in another Pork CRC project.

IMPACT OF LIFE EXPERIENCES ON MACROPHAGE FUNCTION

DR WENDY INGMAN NHMRC CJ MARTIN FELLOW

In 2005 Dr Wendy Ingman returned to the RCRH after postdoctoral research at the Albert Einstein College of Medicine in New York, USA. She worked in the laboratory of Professor Jeffrey Pollard, a world leader in the role of macrophages in reproductive function. Dr Ingman is now a part of the Reproductive Immunology laboratory, working with Associate Professor Sarah Robertson. She is currently exploring a new research area, the role of macrophages in reproductive tissues including the uterus and mammary gland, and working towards developing this research into an independent research stream.

Macrophages are central players in the generation of immune responses; however they also are critical for the development of the reproductive system during early life. This in turn influences adult fertility and fecundity.

Of particular interest are "development-associated" macrophages, and the factors that distinguish these macrophages from "immune-associated" macrophages. Perturbation of the balance between these two cell populations during key stages in development might affect reproductive function for the lifetime of the individual. In women, this means that infection, nutrition and stress during childhood or puberty could have consequences for adult reproductive health, perhaps leading to infertility, ovarian dysfunction and breast cancer susceptibility. This research will therefore provide new insights on the early life factors that influence our later reproductive competence.

POSTGRADUATE STUDENTS

‘Working on this PhD has enabled me to learn not only about PCOS and reproductive aspects of Indigenous Women’s health but also broader public health and cultural issues.’

IN VITRO MATURATION OF THE EGG

KELLY BANWELL

I have always loved science. My interest in biology and medicine led me to a Bachelor of Medical and Pharmaceutical Biotechnology with Honours at the University of South Australia. It was during my Honours year that I was exposed to the field of reproductive biology from within the RCRH. The sheer volume and variation of research here convinced me that it was the best place to continue my research.

The focus of my PhD studies, under the supervision of Associate Professor Jeremy Thompson and Dr Karen Kind in the Early Development group, has been investigating the process of in vitro maturation (IVM) of the egg. IVM aims to artificially induce the final changes in the egg which are necessary for further development and which would normally occur in response to hormone signals before ovulation. Clinically, IVM limits the amount of hormones required for an IVF cycle, drastically reducing the cost and discomfort to the patient, as well as benefiting those whom respond poorly to standard hormone treatment.

Results from my research have suggested the oxygen environment during IVM impacts on the egg itself and almost all subsequent stages of development. Studies such as these will help to optimise the IVM procedure for clinical use in the future.

I will pursue the communication of science as a career using the knowledge I gained during my time as part of the RCRH.

‘The RCRH has always been supportive of community education and outreach programs and I have sought these opportunities to pass on my passion for science to school students and members of the public.’

POLYCYSTIC OVARY SYNDROME (PCOS) IN INDIGENOUS WOMEN

DR JACQUI BOYLE

After completing my specialty training in Obstetrics & Gynaecology and a Masters of Public Health and Tropical Medicine I thought I had done enough study for a long time. I moved to Darwin with my family in 2002 to experience life in the tropics and to work with Indigenous Women’s Health. Shortly after an opportunity arose to do a PhD with Professor Rob Norman (RCRH) and Professor Kerin O’Dea (Menzies School of Health Research Darwin). I couldn’t resist!

The DRUID study, screening for diabetes in an urban Indigenous population, was commencing in Darwin. Infertility is a significant problem for Indigenous women. Whilst not the most common cause of infertility, anecdotal reports from practitioners in the Northern Territory suggested that Polycystic Ovary Syndrome (PCOS) was increasing in Indigenous women in the NT. PCOS is also associated with obesity, insulin resistance and factors of the metabolic syndrome so we planned to assess women participating in DRUID for PCOS and associated metabolic abnormalities.

It has also led to me meeting and collaborating with some wonderful Indigenous women. I have had the opportunity to learn so much about project design, development and execution and it has been instrumental in enabling me to now be involved in a NHMRC funded project as a chief investigator which is very exciting.

‘The RCRH provides an encouraging environment in which to work, allowing the development of students into independent scientists and also in providing opportunities such as presenting at both national and international conferences.’

EXTRACELLULAR MATRIX OF OOCYTE AND SUPPORTING CELLS

KYLIE DUNNING

Following the completion of a Bachelor of Science in 2001 and Honours in Genetics in 2002, both at the University of Adelaide, I accepted a 12 month position in the Gene Technology Unit of Genetic Medicine at the Women’s and Children’s hospital, where I was involved in the development of a gene therapy for inherited metabolic disorders. Toward the end of this time I decided that the undertaking of a PhD was the career course I would take. The choice of both supervisor and institution is enormously important and I am grateful that I was given the opportunity to work with Dr Darryl Russell and Dr Rebecca Robker within the RCRH.

Research conducted during my PhD has focused on the role of extracellular matrix that envelops the oocyte and the cells that support and nourish it. The formation of this unique and complex matrix occurs concomitantly with oocyte maturation. My research has investigated this matrix when oocytes are matured in culture, an exciting technique that may in future negate the use of potentially harmful hormones required for IVF. I showed that in vitro a functionally altered matrix is produced around oocytes that exhibits a poor molecular filtration function compared to oocytes matured in ovaries.

This work provides critical information describing novel roles for extracellular matrix, defining key molecular components that endow these functions, as well as improving knowledge of what the oocyte requires for optimal health. This important cutting edge research has been recognised with the United States Department of Agriculture, CSREES, National Research Initiative (NRI) Merit Award from the USA Society for the Study of Reproduction and the Discipline of Obstetrics and Gynaecology Robert Seamark Postgraduate Student Award.

MATERNAL IMMUNE SYSTEM IN PREGNANCY

JELMER PRINS (VISITING SCHOLAR)

I am a visiting medical student from the University Medical Center Groningen, in the northern part of the Netherlands.

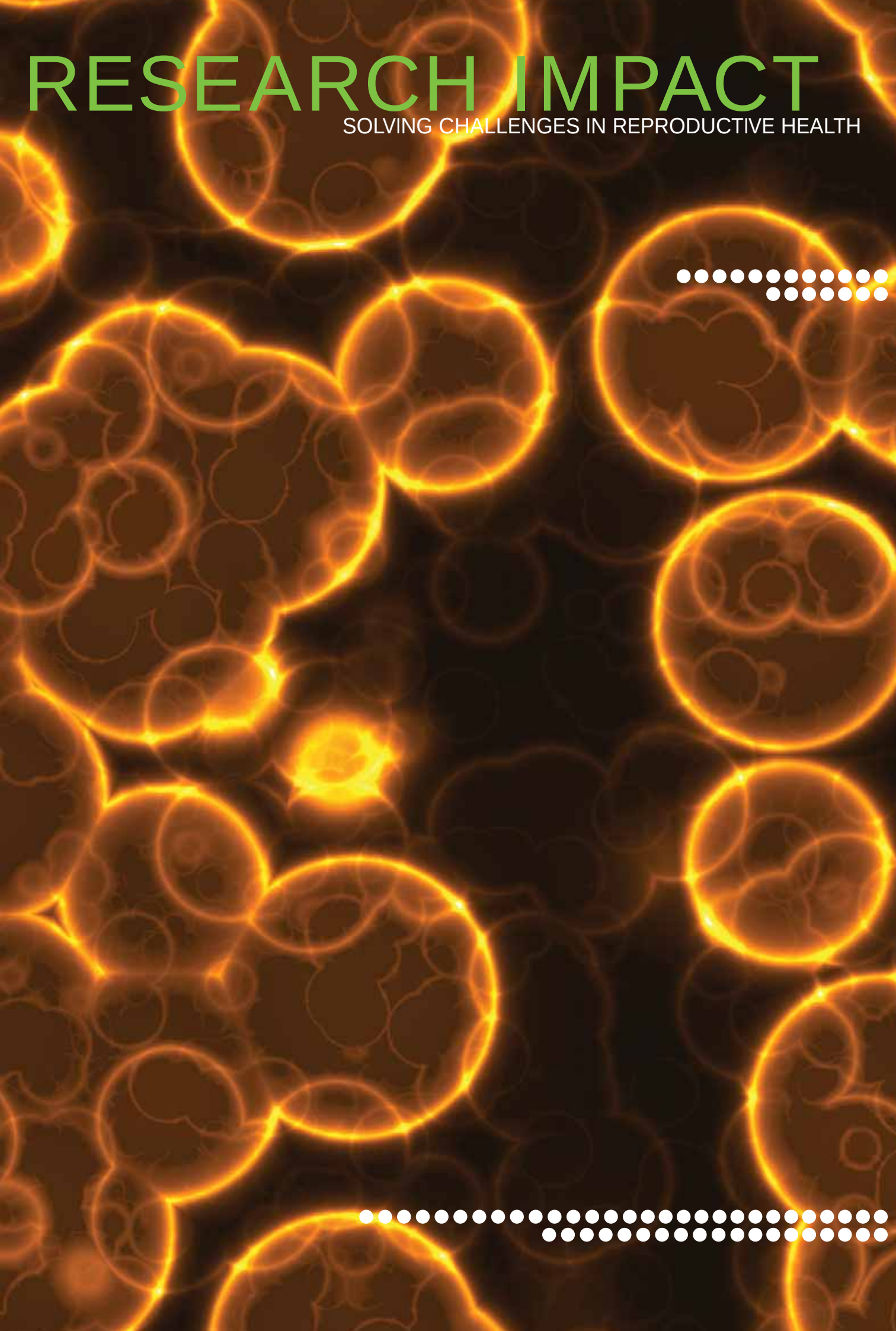
My supervisor from the Netherlands has previously worked with my Australian supervisor, A/Prof Sarah Robertson, and encouraged me to take this opportunity to work in her lab as part of my research project. My project focuses on the maternal immune system in normal pregnancy, and in pregnancy pathologies, particularly the process that is responsible for the tolerance of the maternal immune system towards the fetus. At the moment, I’m working with different mice models to learn more about the maternal immune system during pregnancy. In the future when I’m back in the Netherlands, I’ll translate this research into exploring human pregnancy and pregnancy complications.

I’m glad that I took this opportunity. The atmosphere in and around the lab is great and working together with everybody here is very motivating and pleasant.

‘I’m following a special trajectory which gives me the opportunity to obtain a Medical Degree and a PhD at the same time.’

RESEARCH IMPACT

SOLVING CHALLENGES IN REPRODUCTIVE HEALTH



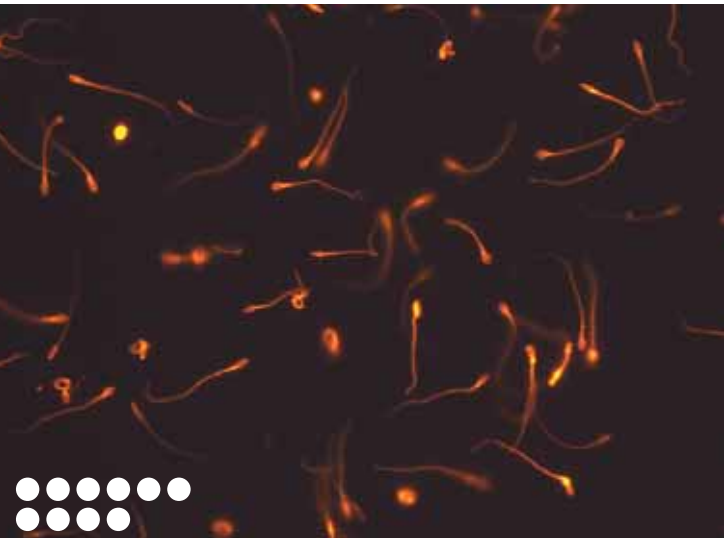
Infertility affects at least 10–15% of couples of reproductive age, and 60% of male infertility is difficult to diagnose and we do not fully understand this growing trend.

MALE FERTILITY

In Australia approximately 20% of males are clinically infertile and the number is growing rapidly. Male infertility accounts for 40–50% of failure for couples to conceive naturally.

Compounding this problem, approximately 60% of male infertility is difficult to diagnose and cannot be attributed to conventional sperm parameters of mobility and volume and while male infertility is on the rise, we do not fully understand the reasons for this growing trend. Internationally, statistics show similar results. Infertility affects at least 10–15% of couples who are of reproductive age. Statistics vary but it would seem that around 30% of men are sub-fertile and at least 2% of men are totally infertile in the US.

At RCRH we are focusing on this growing health concern of male infertility, particularly on unconventional research such as immunology, and the increasing impact of our western lifestyle such as diet and environmental factors affecting male infertility.



Sperm with elevated glucose levels increases oxidative stress as well as lipid peroxidation, as shown here by the bright glowing head.

REPRODUCTIVE IMMUNOLOGY IMPACT ON MALE FERTILITY

In 2007, A/Prof Sarah Robertson's Reproductive Immunology Group has been delivering a new understanding of the role of seminal fluid in communicating with the female reproductive tract tissues. Novel male signaling molecules in seminal plasma that have a role in promoting conception and embryo implantation after coitus have been discovered. This research has identified that male partners of women experiencing recurrent miscarriage often have an imbalance in seminal fluid signaling molecules.

MALE INFERTILITY ORIGINS IN FETAL OR EARLY CHILDHOOD DEVELOPMENT

The Molecular Reproduction Group run by Prof Richard Ivell, has focused intensive activity on the concept that many aspects of male infertility may have their origins during fetal or early childhood development. This extends the "early origins" hypothesis so familiar from other areas of medicine into the male health sector.

There is substantial evidence both from rodent models and for the human population that exposure of pregnant women and their fetuses to common environmental chemicals foreign to the body, such as phthalate plasticisers (softening agents for plastic), many components of sunscreens and cosmetics, as well as some pesticides, can have subtle effects on qualitative and quantitative aspects of the early developmental biology of the male reproductive system, including changed sperm quality and quantity and testicular cancer.

ELEVATED GLUCOSE AND MALE FERTILITY

Recent research lead by Dr Michelle Lane with the assistance of PhD student Hassan Bakos, has preliminary in vitro data suggesting that elevated glucose levels may influence sperm quality. In particular, increased glucose levels have been shown to increase oxidative stress as well as lipid peroxidation in sperm, markers which are usually associated with male infertility. These findings may particularly have implications for obese or diabetic patients who may have increased levels of glucose levels in their seminal plasma.

Dr Kelton Tremellen also completed a study of this problem with Menevit anti-oxidant therapy for the treatment of male infertility suggesting an improvement in the viable pregnancy rate in treated couples.

NUTRITION & FERTILITY

Approximately 60% of Australian adults are overweight or obese, and The World Health Organization predicts there will be 2.3 billion overweight adults in the world by 2015 and more than 700 million of them will be obese.

So how does our dietary intake affect our lifestyle? More importantly, how does what we eat impact our fertility and ability to reproduce?

At RCRH there has been some dramatic findings into the effects of nutrition on fertility, with the common health warning “you are what you eat” making a poignant impact on reproductive health.

OBESITY AND FERTILITY

Obesity accounts for at least 30% of the total disease burden in Australia and is associated with additional recognised health risks such as coronary heart disease, stroke, colorectal cancer and kidney disease. What is less commonly known is that obese women have markedly reduced pregnancy rates compared with women of moderate body mass index (BMI).

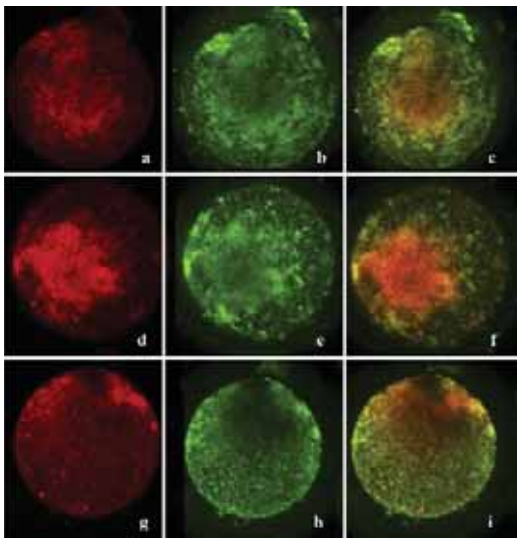
The research groups of Dr Rebecca Robker and Prof Rob Norman focus on understanding the effects of obesity on multiple aspects of female fertility. An article in Fertility and Sterility (2007) highlights the need for better understanding of how obesity may independently affect both the ovary and uterus, and result in subfertility in women. Their research also explores the effects of obesity on ovarian function in a mouse model and in a clinical setting. In collaboration with Dr Michelle Lane, samples of ovarian cells and fluid were collected from women undergoing ART at Repromed. The results, showed alterations in the samples from overweight and obese women compared to women of moderate BMI, similar to observations in the mouse, indicating that obesity results in distinct changes in the ovary which may contribute to infertility in these patients.

Building on these observations is Dr Kylie Dunning, a new Postdoctoral Fellow working with Dr Rebecca Robker and Professor Norman. She is elucidating how the transport of metabolites is regulated in the cumulus oocyte complex and how these may be disrupted by perturbations to energy balance.

MATERNAL SUPPLY OF OMEGA-3 POLYUNSATURATED FATTY ACIDS ALTER MECHANISMS INVOLVED IN OOCYTE AND EARLY EMBRYO DEVELOPMENT IN THE MOUSE

Omega-3 polyunsaturated fatty acids are a well known supplement most commonly found in fish oil, and widely used to ease rheumatoid and arthritic conditions. A research study by PhD student Sarah Wakefield supervised by Dr Megan Mitchell, discovered feeding a diet high in omega-3 polyunsaturated fatty acids can affect oocyte quality and delay embryo development in the mouse.

The research showed that when female mice were mated, and their embryos recovered and cultured in the lab, embryo development was delayed when the mice were fed a high level of omega-3s, however, there was little effect of the diet on embryo development when the eggs were fertilised in vitro (IVF). The underlying mechanisms relate to altered function of the mitochondria in the oocytes and the generation of reactive oxygen species, which are detrimental to embryo development.



Confocal images of oocytes from animals fed a diet high in n-3 pufa (a-f) and oocytes from animals fed a control diet (g-i) showing areas of redox (redox sensor red; left) and active mitochondria (mitotracker green; middle) and their colocalization (right).

RESEARCH GROUP REPORTS

INNOVATIVE, MULTIDISCIPLINARY RESEARCH
TRANSLATED INTO CLINICAL OUTCOMES

BASIC BIOLOGY

The Oocyte Biology group's work featured on the cover of Human Reproduction update in 2007.

OOCYTE & EARLY DEVELOPMENT GROUP

The Oocyte and Early Development Group is the working name for the collaborative research efforts in reproductive biology of 3 independent research groups headed by A/Prof Jeremy Thompson, Dr Rob Gilchrist and Dr Michelle Lane. The extensive collaborations between the research groups results in an increased breadth of our individual research focuses, and maximizes our individual expertise and resources.

EARLY DEVELOPMENT

GROUP LEADER
ASSOCIATE PROFESSOR JEREMY THOMPSON

DR KAREN KIND
DR ANA SOFIA LOPES
ASHLEY GAULD
ANNIE WHITTY
CYNTHIA GUTNISKY
SANDIE PILTZ
DAVID FROILAND
CHERYL SCHELBACH
KIM TAM
KELLY BANWELL

The Thompson laboratory has several major interests and is involved in research across other oocyte and embryology laboratories within the Research Centre, as the group leader, Jeremy Thompson, collaborates widely with others within the Research Centre. A major specific research interest is the role of oxygen and hypoxia during ovarian follicular development, oocyte maturation and early development. During 2007 we have explored this using our unique tool, a reporter transgenic mouse that actively expresses Green Fluorescent Protein when a hypoxia sensitive gene sequence is activated. This is informing us greatly, especially about the formation of the corpus luteum. We are planning future reporter lines that can specifically target the activation of either Hypoxia Inducible Factor-1 or HIF-2 transcription factors.

We also have a major interest in the metabolic requirements within the cumulus-oocyte complex and have demonstrated that the up-regulation of the Hexosamine Biosynthesis Pathway (HBP, required for cumulus expansion following gonadotrophin stimulation) and O-linked glycosylation causes a significant reduction in oocyte developmental competence. This is a completely novel pathway for the regulation of oocyte competence that has not been explored previously.

Worryingly, we have also seen negative effects on subsequent fetal development following up-regulation of the HBP during the peri-conception period.

During 2007, the Thompson group had a post-doctoral fellow, Dr Ana Sofia Lopes, funded by the Portuguese government, and Ms. Cynthia Gutnisky, from the University of Buenos Aires visiting the laboratory and working on aspects of REDOX regulation of oocyte maturation and fertilisation.

OOCYTE BIOLOGY

GROUP LEADER
DR ROBERT GILCHRIST

DR MAXIME SASSEVILLE
DR DHARMA LEKAMGE
LESLEY RITTER
SAM SCHULZ
THAO NGUYEN
JOHAN HARIS
FIRAS ALBUZ
MARK BARNETT

In 2007 Dr Rob Gilchrist was awarded a five year NHMRC RD Wright Fellowship. His Oocyte Biology Group investigates the dynamic interactions between the oocyte and the follicular somatic cells of the ovary. Understanding how oocytes and somatic cells communicate is important as this impacts significantly on oocyte quality, which is a key limiting factor in female fertility (see model from the front cover of Human Reproduction Update). The group continues to focus heavily on the oocyte-secreted growth factors that control cumulus cell function; namely growth-differentiation factor 9 (GDF9) and bone morphogenetic protein 15 (BMP15). At the same time the group is attempting to understand how cumulus cells interact with oocytes to regulate oocyte meiotic maturation and oocyte developmental potential. Currently this research area is focusing on small molecule messengers transmitted from cumulus cells to the oocyte through gap-junctions and how disrupted or enhanced signalling impacts on oocyte quality.

Whilst much of the research program is directed at basic discovery research, Dr Gilchrist's group also has a significant applied, translational research program. He has a collaborative research agreement with Cook Australia Pty. Ltd., one of the world's largest medical device manufacturers for clinical IVF products, on the development of novel products for the treatment of human infertility. In conjunction with Cook they have developed novel oocyte collection and oocyte maturation media, which should be released for a multi-centre Phase I clinical trial in 2008.

The coming years should prove highly productive for the group with new funding and new personnel. In late 2007, Dr Maxime Sasseville moved from Canada to Adelaide to join the Oocyte Biology Group on a two-year Canadian National Science and Engineering Research Council Post-Doctoral Fellowship. In addition a new NHMRC Project Grant has enabled the recruitment of Thao Nguyen and Laura Watson in collaboration with Darryl Russell and Jeremy Thompson.

EGGS, SPERM AND EMBRYOS: FROM BENCH TO BEDSIDE

GROUP LEADER
DR MICHELLE LANE

DR MEGAN MITCHELL
KARA CASHMAN
ALICIA STUMP
DEIRDRE ZANDER
CHRISTINE YEO
DEANNE FEIL
HASSAN BAKOS
SARAH WAKEFIELD
ALICE GEORGIOU
JARED CAMPBELL
TOMISLAV BOZURIC

Our research is focused on answering basic biology questions about the development and metabolism of gametes and embryos that will have an impact on human fertility and assisted reproductive technologies. We collaborate extensively with colleagues at the clinical IVF unit, Repromed, to change clinical practice and improve outcomes for human IVF. We have projects that span the spectrum from generation of fundamental knowledge to translational research projects where research ideas are applied to clinical practice. Our commitment to industry based outcomes is further demonstrated by many of our staff and students spending a day per week working in industry to widen their knowledge and understand how their work in the lab impacts people's health outcomes.

Research for the last 12 months in our group has focused on understanding how the legacy of the environment of the gametes and embryos impact on pregnancy establishment and health. Using animal models, our research led by Dr Megan Mitchell has determined that a significant effector of egg health is maternal dietary intake. We have shown that a diet high in protein or omega-3 can impact directly on the cellular make up of the egg and alter its subsequent developmental competence. Our group's work on sperm health has established that the quality of the sperm DNA alters not only the capacity of the sperm to fertilize the egg but also affects the ability of the resultant embryo to establish an ongoing pregnancy. Furthermore, we showed that although ICSI can overcome the reduced fertilisation in these couples, there was higher levels of early pregnancy loss. We are continuing to develop these projects and determine how this information can be used to improve human fertility outcomes.

OVARIAN CELL BIOLOGY

GROUP LEADER
DR DARRYL RUSSELL

DR REBECCA ROBKER
PROFESSOR ROBERT NORMAN
BRENTON BENNETT
LISA AKISON
LINDSAY CHURA
KYLIE DUNNING
CADENCE MINGE
HANNAH BROWN
KATHRYN GEBHARDT
EMILY ALVINO

The Ovarian Cell Biology group is a collaborative research team elucidating the regulatory processes within the ovarian follicle, particularly maternal signals that determine the niche microenvironment that promotes maturation, ovulation and the developmental capacity of oocytes.

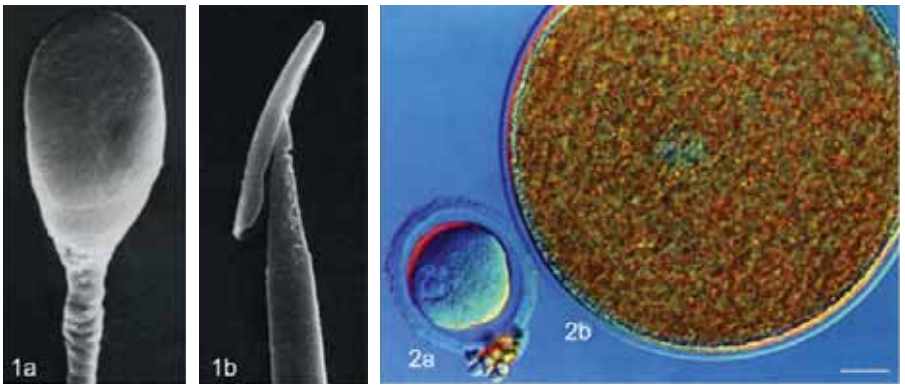
In 2007 the group continued its recent progress toward understanding the basic biology behind these mechanisms and their application to reproductive medicine and technology.

The group published work demonstrating that human ovarian cells produce vital matrix proteins, and in vitro matured oocyte methodologies cause deficiencies in these key components, indicating that their levels may also be crucial for optimal human embryo development. These findings provide profound improvements to human and animal reproductive technologies. Kylie Dunning presented this work in the USA at the Society for the Study of Reproduction conference and was awarded the Larry Ewing Memorial Trainee Award for her work.

Our ongoing work on the mechanisms of ovulation has direct relevance to reproductive medicine in terms of better understanding anovulation in women as well as developing non-steroidal contraceptives.

Our discoveries on tissue remodelling processes formed the basis of a new project (NHMRC Project Grant: Russell, Ricciardelli and Williams) to determine the mechanisms of breast cancer growth and metastasis. These studies will greatly improve our understanding of this disease and identify novel therapeutic targets.

Clinical research directions focus on uncovering the basis of ovarian derived signals that influence oocyte quality as well as subsequent embryo development. These studies, in collaboration with Dr Michelle Lane and Repromed, are investigating the influence of obesity on ovarian cells and oocyte developmental competence, as well as the development of diagnostics for the evaluation of oocyte quality.



The head of a spermatazoon from a human (1a) and marsupial (1b) showing a marked difference in shape and site of tail attachement. Recently ovulated eggs from a mouse (2a) and marsupial (2b). Marsupials, unlike humans and mice, have a very yolky egg which results in its much larger size.

JS DAVIES ANIMAL GENETICS & EPIGENETICS

GROUP LEADER
PROFESSOR STEFAN HIENDLEDER

DR CAROLYN FITZSIMMONS
DR ZBIGNIEW KRUK
DR DANA THOMSEN
RADMILA FELDMANN
SARAH TRURAN

NON-MENDELIAN EFFECTS IN FETAL GROWTH REGULATION

We expanded our research network and established national and international collaborations. Dr Oliver Schmitz (University Wuppertal), a specialist in DNA methylation analysis, and Dr Susanne Ulbrich (Technical University Munich), member of the DFG Research Group “Embryo-maternal communication”, visited Roseworthy Campus for collaborative work on epigenetic gene regulation. We are now focusing on the identification of epigenetic correlates of the differences in embryonic and fetal development in our Bos indicus x Bos taurus overgrowth model.

Sarah Truran and Radmila Feldmann analysed imprinted genes in the IGF system and completed Honours/Masters theses. Results of this work were presented at the Epigentics 2007 Conference in Perth. Dr Fitzsimmons presented placental hallmarks of this natural fetal overgrowth phenotype at the 5th International Congress on Developmental Origins of Health & Disease in Perth, and at the Annual Conference of the International Embryo Transfer Society in Denver.

Increasing interest in epigenetics by industry resulted in a successful joint grant application with DPI QLD and Texas A&M University groups with funding of $1.35 million for a five year period from the Queensland Government Reinvestment Fund (B. Burns, S. Hiendleder, A. Herring: Precision beef cattle production through an alternative genetic approach). The continued characterisation of cytoplasmic genetic effects on prenatal development of cloned and naturally produced concepti delivered a provisional patent application (2007902416). The data were presented by Prof Hiendleder at the Annual Conference of the Society for Reproductive Biology in Christchurch.

Animal model for epigenetics in prenatal growth and development: Bos indicus cattle control placenta and fetus growth by as yet unidentified mechanisms.

COMPARATIVE BIOLOGY OF MAMMALIAN SPERM & EGGS

GROUP LEADER
ASSOCIATE PROFESSOR WILLIAM BREED

EMERITUS PROFESSOR BRIAN SETCHELL
DR ELEANOR PEIRCE
DR DAVID TAGGART
DR MARIO RICCI
CHRIS LEIGH
CHRISTINE SWANN
MELISSA BAUER
ELISA SPARROW
LIBERTY OLDS
NUTTAWAT TITHIPRAMOTE
HARSHA WECHALEKAR
KARLEAH TRENGOVE

The studies conducted by the Comparative Biology of Sperm & Eggs research group on the evolution of sperm form in mammals found that, in rodents, inter-specific differences in morphology relate to differences in relative testis size and hence breeding system.

In the female the research group has continued their investigations into the evolution of the mouse sperm combining region of the egg coat glycoprotein. Their observations, using various rodent species have shown that, although positive selection appeared to have taken place in a few clades, the rate of change of this region of the ZP3 gene is highly variable across groups with full molecular conservation being evident in some lineages.

Various selective forces thus appear to have acted on this part of the ZP3 gene with the result that prevention of inter-specific hybridization is probably dependant on a number of factors apart from the rapid divergence of the sperm-egg coat binding region.

In December, Associate Professor Bill Breed had a book published by The CSIRO publishing company in the Australian Natural History Series, in collaboration with F. Ford, entitled Native Mice and Rats.

MOLECULAR REPRODUCTION

GROUP LEADER
PROFESSOR RICHARD IVELL

DR RAVINDER ANAND-IVELL
BETTINA HAFEN
KEE HENG

The Molecular Reproduction Group has established itself as a reference research laboratory in the context of the human relevance of xenobiotic induced environmental endocrine disruption particularly of the reproductive system.

This was recognized by an invitation as a Keynote Speaker at a recent national conference on endocrine disruption in Canberra in November 2007, and by the invitation to become a founding signatory on the resulting Black Mountain Declaration, which is intended to inform governments, funding agencies and regulatory authorities. Professor Ivell was also invited to inform the Federal Government Office of Chemical Safety on these matters.

In addition the development of The Molecular Reproduction group's internationally unique assays to measure the Leydig cell hormone INSL3 has led to numerous collaborations in the USA, Europe and Australia, with some very interesting new studies ongoing, which promise to support strongly the group's research on endocrine disruption, male fertility, and male ageing. More about this research can be found in "Male Fertility Research Impact" on page 14.

CIRCADIAN RHYTHMS

GROUP LEADER
ASSOCIATE PROFESSOR DAVID KENNAWAY

DR ROBERT MOYER
DR TAMARA VARCOE
ATHENA VOULTSIOS
MARK SALKELD
MELANIE TRAN
MONIQUE CHILVER
SLAVICA MISKOVICH
JENG-YIE CHAN

In 2007 the Circadian Rhythms group continued to work on its major themes of the impact of circadian rhythm disruption on metabolic homeostasis and cancer facilitation and seasonal infertility in pigs.

Metabolic studies highlighted the importance of rhythmicity in maintaining normal insulin secretion. Loss of function of either Clock or Bmal1 genes resulted in a range of compensatory mechanisms including adiponectin secretion from adipocytes that increased the sensitivity of end organs to insulin. Interestingly application of simulated shiftwork-like photoperiod schedules caused a similar range of metabolic changes in mice and rats.

Studies on rhythm disruption and mammary tumours continued during 2007 and we have established a range of models that are proving valuable. For example knock down of the expression of the clock gene transcription factor Bmal1 in MCF-7 cells gave evidence that this affected cell proliferation.

Seasonal infertility studies commenced in 2007 to investigate the impact of time of year on puberty in pigs. We have shown that the ovariectomy-estradiol implant technique used previously in sheep can be adapted to pigs. Thus we observed the gradual loss of estradiol negative feedback emerge as the pigs approached the normal age of puberty.

PLACENTAL DEVELOPMENT

GROUP LEADER
ASSOCIATE PROFESSOR CLAIRE ROBERTS

DR AMANDA SFERRUZZI-PERRI
GARY HEINEMANN
JAMIE ZHANG
STEVEN THOMPSON
ROBYN TAYLOR
DENISE FURNESS
RACHAEL NOWAK
KIRSTY PRINGLE
ANG ZHOU

Our group's research focuses on the complex molecular regulation of implantation and placental development. In 2007 we published further papers on their work on the potent endocrine effects of IGF-I and IGF-II on fetal growth and placental function, showing that IGF-II in particular has important effects on placental structural differentiation. This work demonstrates that IGF-II infusion into the pregnant mother may be useful to prevent complications of pregnancy associated with placental insufficiency in women at risk. Much of this work was conducted by Amanda Sferruzzi-Perri who received her PhD in early 2007 after winning numerous postgraduate awards. Amanda received a NHMRC CJ Martin Postdoctoral Fellowship to work in University of Cambridge, UK, after which she will return to our group. A/Prof Claire Roberts was an invited plenary speaker at the International Federation of Placenta Associations meeting held in Kingston, Canada and invited to be on the editorial board of Placenta.

Kirsty Pringle, a PhD student in the laboratory obtained exciting data on the efficacy of the combination of three factors, including IGF-II, in a new embryo media formulation that she found improves embryo development and implantation rate in mice. This data formed the basis of an application for a successful NHMRC Development Grant. Denise Furness also joined the group bringing expertise in nutrigenomics, genome damage and pregnancy outcome.

PROFESSOR RAY RODGERS

OVARIAN DEVELOPMENTAL BIOLOGY

GROUP LEADER
PROFESSOR RAY RODGERS

DR HELEN IRVING-RODGERS
DR MARK PRODOEHL
DR YVONNE MIELS
WENDY BONNER

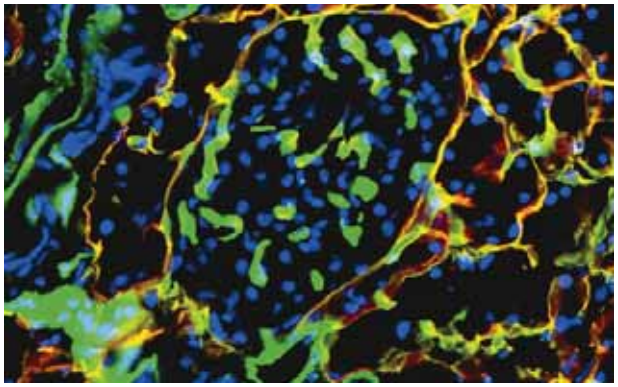
A woman's health and wellbeing are influenced by her ovaries and the hormones they secrete before birth, at puberty, during the menstrual cycle and pregnancy, and of course on their decline at menopause. Additionally the ovary produces the eggs for reproduction. Hence it is important that we understand ovarian function. We still have a lot to learn about how the ovary produces eggs, and hormones such as oestrogen and progesterone, in both health and disease.

Our group focuses on the basic biological changes to cells and the tissue structure of the ovary that occurs during the different phases of life. We chose to study a class of regulatory molecules collectively termed 'extracellular matrix' and have been studying them for over 15 years. This last year we have shown that an unusual matrix structure, similar that seen in tissues of diabetic patients, exists in human ovaries. In collaboration with Associate Professor Thompson's group, we found that the presence of this matrix structure is associated with poorer quality oocytes. On this basis we are now embarking upon gene profiling and proteomics to find biomarkers for such follicle matrix structures. Our goal is to develop a simple diagnostic test identifying better quality follicles and oocytes in IVF programs.

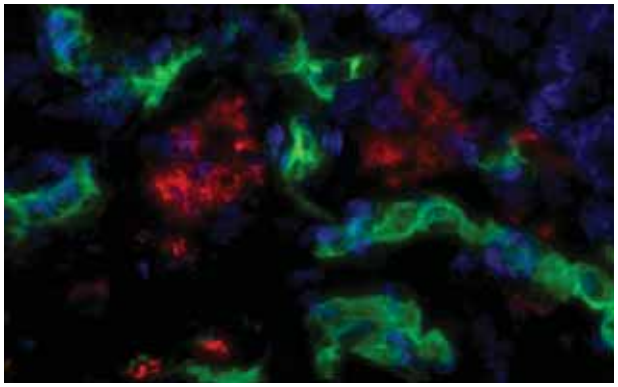
Work on a novel type of matrix, named focimatrix and originally discovered in the ovary by our group, continues. We have shown that it appears in follicles a few days before the follicles secrete oestrogen and progesterone. Recent data show that the more focimatrix is present, the higher the levels of enzymes that produce oestrogen and progesterone are. Could it be that focimatrix induces the follicles to mature and secrete hormones? This is now being examined, and if true opens up some alternative mechanisms to explain infertility and hormone imbalances.

We have also commenced work on a new class of extracellular matrix molecules in collaboration with Professor Norman and others. Family linkage studies from another research group found a region in the genome that predisposes women to develop polycystic ovarian syndrome. This region was in the middle of an extracellular matrix gene called fibrillin 3, and we have commenced research on this.

Some accolades for our group in 2007 include the awarding of the Underwood Fellowship from the Biotechnology and Biological Research Council of the UK to Professor Rodgers. He retained his Principal Research Fellowship with the NHMRC and the Underwood Fellowship enabled him to spend five months at the University of Reading collaborating on gene profiling, and giving numerous seminars throughout the UK. He was also promoted to Professorial level at the University of Adelaide and invited to be a member of the editorial board of the journal Endocrinology, as well as retaining senior editorship of Molecular and Cellular Endocrinology. He also chaired a NHMRC grant panel on Perinatology/Paediatrics/Obstetrics/Reproduction. Both Mark Prodoehl and Helen Irving-Rodgers were awarded PhDs, and Helen a NHMRC Peter Doherty postdoctoral Fellowship to continue her work on focimatrix.



Pancreatic islet that contains insulin producing cells localizing collagen type IV (green) in the capillaries and merged with laminin 2 (red).



Macrophages (red) and endothelial cells (green) within the theca interna of the ovarian follicle wall.

CLINICAL RESEARCH

The Endometriosis Group has identified several molecular pathways and biological functions that have generated new ideas about the regulation of cells in endometriosis.

ENDOMETRIOSIS

GROUP LEADER
DR LOUISE HULL

DR KYLIE VAN DER HOEK
DR MARIA OHLSSON TEAGUE
NAOMI PERRY
PENNY THRUPP

The Endometriosis Group has continued to explore the mechanisms of endometriotic lesion development, trying to identify targets for medical intervention to treat this debilitating disease.

MICRO-RNAS & ENDOMETRIOTIC DISEASE

Much of the focus has been to identify microRNAs that influence endometriotic disease and develop bioinformatic methods to identify their transcript targets. In collaboration with Dr Cris Print from the University of Auckland, several molecular pathways and biological functions were identified from the microRNA data that correlated with the current knowledge of endometriosis. This generated new ideas about the regulation of cells in endometriosis and how we could manipulate their behaviour to suppress disease. The group has also become involved in collaboration with Dr Grant Montgomery in Queensland to determine if defects in microRNAs or their target transcripts underpin the genetic predisposition that some women have for endometriosis using a large sib-pair analysis dataset.

BONE REMODELLING

The role of bone remodeling pathways in endometriosis continues to be explored and we have shown that some bone remodeling proteins are unregulated in endometriotic lesions. The group is now exploring the regulation of these pathways in vivo and in vitro, to determine if endometriotic lesion growth is reduced when bone remodeling factors are inhibited.

ENDOMETRIOSIS MOUSE MODEL

The Endometriosis Group has also established the immuno-compromised mouse model of endometriosis in Adelaide and are using it to explore pharmaceutical inhibition of lesion development. Additionally, TGF-ß SCID mice have been used in this model to determine if host-derived TGF-ß is critical to endometriotic lesion development.

OVARIAN CYST SURGERY & ITS EFFECTS ON OVARIAN RESERVE

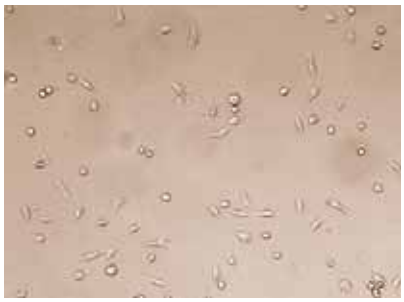
Many women with endometriosis require surgery to remove endometriotic cysts from their ovaries and we are unsure how this impacts on their subsequent ovarian reserve. A clinical trial has started to assess the effects of ovarian cyst surgery on markers of ovarian reserve. The researchers hope this will improve the advice they can give patients regarding future family planning after an ovarian cystectomy.

The group has presented their work at the Society for Reproductive Biology Conference in Christchurch New Zealand and at the World College of Endometriosis in Melbourne, where they received a prize for their work.

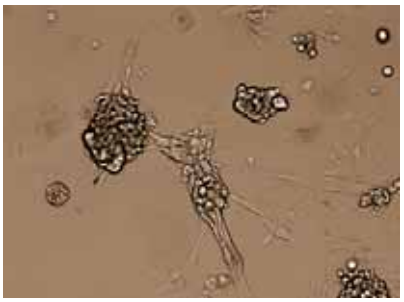
Grant funding has been provided by the Women's and Children's Research Foundation and by the D.A. and J.S Ballentyne Surgical and Medical Research Trust.

An endometriotic lesion

Peritoneal cells



Ovarian cancer cells



Co-cultured peritoneal and ovarian cancer cells

REPRODUCTIVE CANCER – TUMOUR MICROENVIRONMENT RESEARCH

GROUP LEADER
DR CARMELA RICCIARDELLI

A/PROF MARTIN OEHLER
DR DARRYL RUSSELL
DR ANDREW SAKKO
MIRANDA WEEN
KATE FREWIN

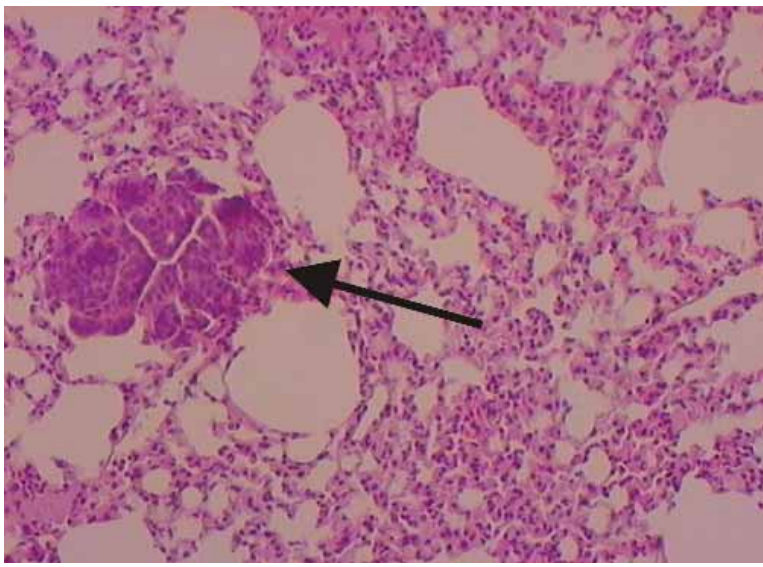
TUMOUR REMODELING OF SURROUNDING TISSUE DURING GROWTH AND METASTASIS

In 2007 Dr Ricciardelli was the recipient of the Hilda Farmer Fellowship in Faculty of Health Sciences, University of Adelaide. The research Fellowship enabled Dr Carmela Ricciardelli to take on a new PhD student (Miranda Ween) and Honours student (Kate Frewin). Work together with Miranda Ween showed that the extracellular matrix protein versican can be assembled as a pericellular matrix around prostate and ovarian cancer cells to promote cancer cell motility. This exciting and novel finding indicate that cancer cells can recruit components of the extracellular matrix to promote their motility was published in the Journal of Biological Chemistry (Ricciardelli C et al, 282 10814–10825, 2007). Ongoing studies will identify whether formation of a pericellular matrix versican promotes adhesion of ovarian cancer cells to peritoneal cells.

Studies together with Kate Frewin and Dr Darryl Russell have found that an enzyme, Adamts1 which can digest versican into smaller fragments and activate versican function may be important for growth and metastasis of breast cancer cells. In Adamts1 deficient mice, tumour burden and metastasis was dramatically decreased compared to wild-type littermates. Our novel observations indicate that Adamts1 plays an important role in tumour growth and metastasis to pulmonary tissue. This work was presented to the ASMR National Conference and the Australian Breast Cancer Conference in 2007. Ongoing studies funded by an NHMRC project to Dr Darryl Russell and Dr Carmela Ricciardelli in 2008–2010 will further examine the mechanism whether Adamts1 promotes tumour growth and metastasis. This work will provide new tests for breast cancer aggressiveness and a novel drug target to prevent spread of cancer cells in patients with early stage breast cancer.

PROTEOMICS OF OVARIAN CANCER IMPLANTATION

In a new project funded by the Ovarian Cancer Research Foundation (OCRF) in 2007, Assoc Prof Martin Oehler (Gynaecological Oncology, Royal Adelaide Hospital), Dr Carmela Ricciardelli, Dr Peter Hoffman (Adelaide Proteomics Centre, School of Molecular and Biomedical Science, University of Adelaide) and Miranda Ween have investigated the interaction between ovarian cancer cells and peritoneal mesothelial cells using proteomics technology. This project aims to identify proteins involved in one of the first steps of ovarian cancer metastasis – the implantation onto the peritoneum. Co-cultured ovarian cancer and peritoneal cells were investigated for morphological changes and differential protein expression. Ovarian cancer and the peritoneal cells formed specific cell aggregates in co-culture that are not observed when cells are cultured alone (below). Several proteins which are differentially expressed in co-culture have been identified by MALDI-TOF/TOF mass spectrometry. Ongoing functional studies are investigating the role of these candidate proteins in ovarian cancer metastasis.



Ovarian cancer and peritoneal cells in culture

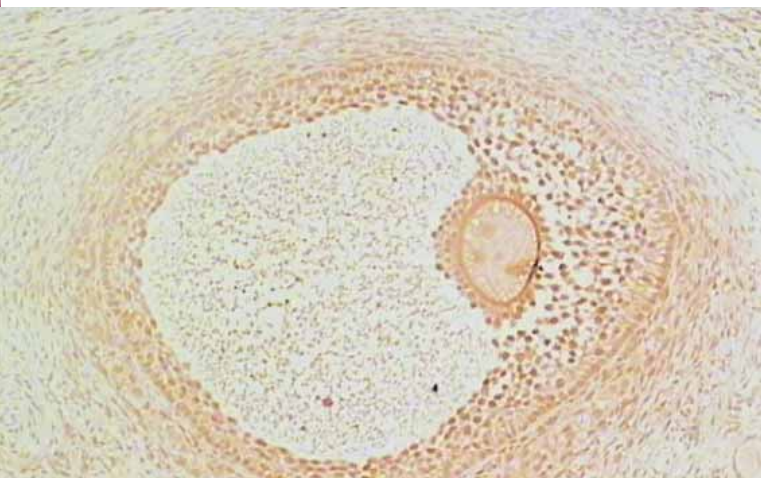
POLYCYSTIC OVARY SYNDROME

GROUP LEADER
PROFESSOR ROBERT NORMAN

A/PROF MICHAEL DAVIES
A/PROF MANNY NOAKES
DR THERESA HICKEY
ASTRUD TUCK
AMANDA POPRZECZNY
GILLIAN HOMAN

Polycystic ovary syndrome (PCOS) is a very heterogeneous endocrine disorder that occurs in approximately 5–8% of the female population in their reproductive years. Due to the heterogeneity and level of incidence, it is very difficult for one research group to generate study cohorts of sufficient size to adequately meet statistical requirements and allow informative sub-group analyses. In light of this dilemma, the International Androgen Excess & PCOS Society was conceived in 2000, with intent to bring together basic research scientists and clinicians working in the field and encourage large scale collaborations. The Polycystic Ovary Syndrome group has actively contributed to this society and in 2007 Professor Robert Norman became its President.

The research group has actively engaged in international collaborations in 2007, establishing linkages with groups in the UK, the Netherlands and Canada to engage in large scale studies to examine candidate genes in PCOS and assess the usefulness of a serum marker of ovarian reserve to diagnose PCOS. Dr Theresa Hickey presented new data at a specialist PCOS meeting in Italy and established collaboration with a colleague in the USA that provided valuable ovarian tissue samples for the group's basic research into the mechanisms of ovarian dysfunction in the polycystic ovary.



A mature follicle within the ovary

SCREENING FOR PREGNANCY ENDPOINTS (SCOPE)

GROUP LEADER & CLINICAL DIRECTOR
PROFESSOR GUS DEKKER

LYELL MCEWIN HOSPITAL

DENISE HEALY
LINDA SHEARER
KAREN RIVERS
PAT DAVDA
DYLAN MCCULLOUGH
JESS LAURENCE

SCIENTIFIC DIRECTOR
ASSOCIATE PROFESSOR CLAIRE ROBERTS

MEDICAL SCHOOL

GARY HEINEMANN
JAMIE ZHANG
STEVEN THOMPSON
ROBYN TAYLOR
DENISE FURNESS
RACHAEL NOWAK
ANG ZHOU

The SCreening fOr Pregnancy Endpoints (or SA SCOPE) study is a three year, $2.37 million project funded by the Premier's Science and Research Fund involving the recruitment of 1500 patients from South Australia as part of the international cohort aiming to involve 15,000 nulliparous pregnant women worldwide.

Patients are recruited by Professor Dekker and his clinical team at the Lyell McEwin Hospital and clinical data collected about these pregnancies are more detailed than in any other study in the world. A biobank is being assembled of multiple aliquots of plasma, buffy coats, urine, and cervical swabs from three time points in pregnancy, as well as paternal and baby blood samples.

DNA is extracted from buffy coat samples in A/Prof Roberts' laboratory at the Medical School and a targeted genomics program of research is identifying genetic polymorphisms associated with major pregnancy complications using PCR followed by High Resolution Melt (HRM) analyses. Proteins encoded by identified genes are measured in maternal plasma by immunoassays. The final aim of SCOPE is to arrive at clinically robust and useful predictors for the main pregnancy complications such as preeclampsia, pre-term birth and miscarriage.

‘Understanding normal motor development and ageing as well as the early origins of neurodegeneration and associated pathologies has enormous social and economic significance.’

DEVELOPMENTAL NEUROMOTOR PHYSIOLOGY

GROUP LEADER
DR JULIA PITCHER

DR MICHELLE MCDONALD
RYAN HIGGINS
NISAN TUAZON
KATIE CROCKER
ASHLEIGH SMITH

Neurological disorders account for over 45% of the disease burden in Australia, and many of these disorders have motor dysfunction as a major symptom. Motor disabilities, whether of pathological origin or as a result of normal ageing, underlie the transition for most people from independent living to supported care. Hence understanding normal motor development and ageing, as well as the early origins of neurodegeneration and associated pathologies through research has enormous social and economic significance.

The Developmental Neuromotor Physiology Group was formed in 2005 by Dr Julia Pitcher under the mentorship of Professor Jeffrey Robinson. This involved obtaining funding, securing purpose-renovated space & equipping the new laboratory with state-of-the art human neurophysiological equipment (all funded with intramural & NHMRC equipment grants).

The principle research foci of the group are:

(a) To determine the developmental origins and physiological mechanisms underlying:

  (i) altered age-appropriate motor function, cortico-cortical and corticospinal pathway development in the neonate and early childhood;

  (ii) altered cortico-cortical and corticospinal motor function in the adult;

  (iii) altered ageing of the cortico-cortical and corticospinal pathways in mid-and later life;

  (iv) the relationship between (iii) and the transition to disability in the elderly.

(b) To develop early identification and intervention strategies to ameliorate any negative consequences of this developmental programming.

DEVELOPMENTAL NEUROMOTOR PHYSIOLOGY (2007)

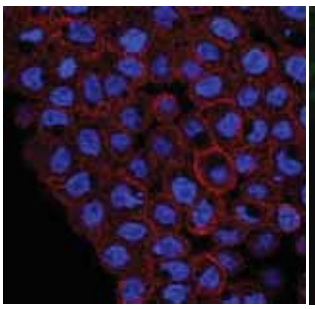
Back row from left: Nisan Tuazon (research assistant), Julia Pitcher (Head, DNP); Ryan Higgins (research assistant)

Front row: Ashleigh Smith (MMedSci student); Katie Crocker (research assistant)

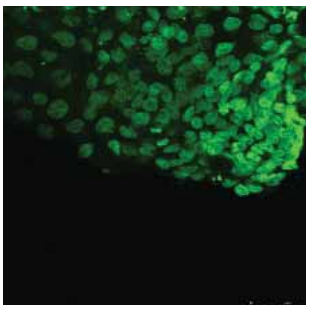
Absent: Kay Pender (study administration)

A major challenge in pursuing these research themes is that, to date, surprisingly little is known about either the normal development of the human cortico-cortical or corticospinal systems, or normal ageing of these systems. Hence the initial studies currently being undertaken by the group are not only providing the first published findings on developmental programming of human motor function, they are also providing some of the very first findings regarding normal corticospinal development and function in children as well as normal ageing of the corticospinal system in the middle-aged and elderly.

Two major projects currently underway are the PreMoCoDe study of motor and cognitive development in children born between 27 and 41 weeks, and the DOMMANO study of the development origins of age-related changes in the motor systems of men aged 20 – 80 years. The Developmental Neuromotor Physiology group is a leader and innovator in what is largely a new field of research that spans both basic and clinical science.



SSEA-1 (marker of pluripotency) expression in porcine ES.



Oct 4 (marker of pluripotency) expression in porcine ES.

REPRODUCTIVE BIOTECHNOLOGY & EMBRYOLOGY

GROUP LEADER
ASSOCIATE PROFESSOR MARK NOTTLE

DR ROD ASHMAN
DR LUKE BEEBE
DR IVAN VASSILIEV
DR SHARON HARRISON
SEAN O'LEARY
JARED CAMPBELL
STEPHEN MCILFATRICK

The Reproductive Biotechnology Group has an international reputation in the general areas of reproductive biology and the development of associated technologies including somatic cell nuclear transfer and embryo freezing. Current research is focused on the development of organ, tissue and cell replacement therapies and has increasingly included work with stem cells.

The latter is being done using porcine embryonic and adult stem cells as a model for humans. These are collaborative projects involving a number of University, Institute and Hospital Research Groups in Australia as well as overseas and are funded by various agencies including the Juvenile Diabetes Research Foundation, The National Health and Medical Research Council and Industry.

Research highlights during the 2007 include the isolation and characterisation of porcine embryonic stem cells.

The Reproductive Biotechnology & Embryology group together with its collaborators was awarded a NHMRC-JDRF Special initiative program grant in Type 1 diabetes.

ASSISTED REPRODUCTION & IVF

GROUP LEADER
DR SHERYL DE LACEY

WITH COLLABORATIVE PARTNERS FROM ADELAIDE, FLINDERS AND YALE UNIVERSITIES.

Moral, legal and community values in decisions about human biological donations

The donation of biological material challenges community values on many fronts. The focus of this study is that of gaining consent for biological donation when the donation involves bodies that are dead or embryos – both of which, legally speaking, are neither people nor things. Neither a human body nor an embryo is 'not nothing', but both are difficult to define as 'something' in policy frameworks. This study combines textual policy analysis with empirical study of community perspectives of the status of embryos and bodies.

Perspectives on family relationships and child welfare of embryo donors and recipients

This project seeks to build knowledge about the perspectives of the parties involved in Donor Embryo programs – ie the donors and the recipients and insight into their perspective of family. Should ED be treated as if it were like adoption or gamete donation?

Women's views towards the use of acupuncture and Chinese herbal medicine for women undergoing In Vitro Fertilisation (IVF), or natural fertility treatment

There is an increasing interest in the use of complementary and alternative therapies in natural reproduction or assisted reproduction, and this study explores the experiences of these women to enhance their natural fertility or chance of conceiving with medical assistance.

Patient understanding of pregnancy rate and risk of adverse outcomes and its influence on decisions regarding the number of embryos transferred in a cycle.

This study identified factors that inhibited or promoted the adoption of single embryo transfer (SET) in a cohort of 163 women patients who participated in a telephone survey. Younger age and first treatment were predictive of a decision for SET. Accurate perceptions of the incidence or risk of multiple gestation were not predictive. Past experience of treatment was predictive of diminished choice of SET. Repeated treatment, advancing age and urgency to become pregnant were factors that moderated choice for SET.

ASSOCIATE PROFESSOR
SARAH ROBERTSON

REPRODUCTIVE IMMUNOLOGY

GROUP LEADER
ASSOCIATE PROFESSOR SARAH ROBERTSON

DR MELINDA JASPER
DR WENDY INGMAN
DR DAVID SHARKEY
CAMILLA DORIAN
DANIELLE GLYNN
LEIGH GUERIN
ALISON CARE
DR ANNE MACPHERSON
DR HITOMI NAKAMURA
DR JOHN BROMFIELD
LEANNE SRPEK
LEANNE MCGRATH
LACHLAN MOLDENHAUER
JELMER PRINS

In 2007 the Reproductive Immunology Group made significant advances in understanding the immune and cytokine environment of early pregnancy and its importance in embryo implantation and fetal and placental development.

Macrophages are key regulators of endometrial cell-cell communication

Our group has developed new models for investigating the roles of macrophages in reproduction. The 'Mac-terminator' CD11b-DTR transgenic mouse allows complete ablation of uterine macrophages. Ablation of macrophages during early pregnancy caused complete pregnancy loss in CD11b-DTR mice. This shows that endometrial macrophages are essential for generation of uterine receptivity and successful embryo implantation. We have developed in vitro models to identify macrophage-derived signals and their effects on mouse and human uterine epithelial cell expression of embryo attachment molecules. These models are providing new insights on the functions of endometrial macrophages in facilitating embryo implantation. We are now using similar approaches to explore the developmental and regulatory roles of macrophages in the mammary gland, ovary and testes.

Male seminal fluid signalling impacts a range of female tract pathways to promote fertility

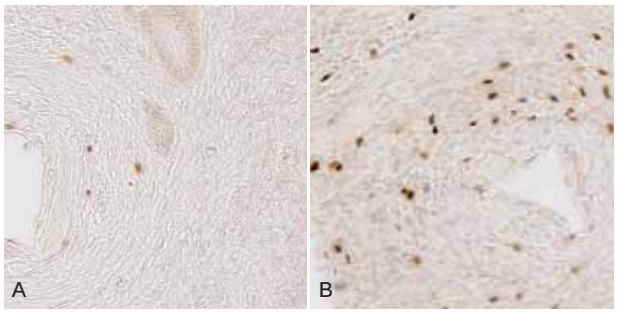
Our studies to decipher the role of male seminal fluid in early pregnancy show that several mechanisms are involved. Male factors act to induce cytokines such as LIF and GM-CSF in the oviduct and uterus, which are essential for optimal embryo development. Populations of T regulatory cells that mediate immune tolerance at implantation are induced by seminal factors. In addition, seminal fluid has a key role in regulating uterine macrophages. Ablating seminal fluid signalling disrupts the tissue remodelling processes essential for generating endometrial receptivity, with effects on vascular and lymphatic endothelial cells and matrix metalloproteinase expression. Seminal fluid also altered uterine epithelial cell expression of integrins and glycoconjugates necessary for embryo implantation.

Human seminal fluid factors influence several cervical gene families

Seminal fluid induces inflammatory changes in the human cervix analogous to the response in mice. Identifying the active signalling agents in human seminal plasma is an ongoing focus. We are using Affymetrix microarrays and qRT-PCR to map the transcriptional response of ectocervical cells to seminal fluid and its constituent cytokines. Members of the TGF-beta superfamily act in synergy to regulate cervical cell gene families. Inflammatory cytokines, as well as genes involved in endothelial cell regulation and tissue remodelling are activated by seminal fluid. These genes control the influx of inflammatory leukocytes involved in the immune response to male seminal antigens and sexually transmitted pathogens, as well as the immune adaptation and tissue remodelling events required for initiating pregnancy.

Events in early pregnancy drive changes in the T-cell compartment to mediate immune tolerance

We have continued to exploit T-cell transgenic models and cytokine null mutant mice to evaluate the significance of seminal fluid and other factors influencing activation of the immune response in early pregnancy. We have shown that paternal antigens expressed by conceptus cells stimulate female T-cell activation and proliferation, via maternal dendritic cells using both MHC class I and class II restricted pathways. Expansion in the T-regulatory cell population is central to this response. GM-CSF and IL-10 have been identified as key regulators of the T-cell response.



Immunohistochemical staining of transcription factor Foxp3 shows Treg cells are increased substantially in the uterus of mice in early pregnancy (B) compared with virgin mice (A) (L. Guerin, unpublished).

PUBLIC HEALTH RESEARCH

REPRODUCTION & SOCIETY

GROUP LEADER
ASSOCIATE PROFESSOR MICHAEL DAVIES

A/PROF VIVIENNE MOORE
DR ALICE RUMBOLD
DR WENDY MARCH
DR MELISSA WHITROW
EMILY STEELE
NEHA MAHAJAN
DEB ROFFE
REBECCA SHORT
AMELIA RUSSIN
TANYA ZIVKOVIC
CHRISTINA SOUGLERIS
KENDALL SMITH
NANETTE KRETSCHMERV
KAYE ROBINSON

The Reproduction and Society Research Group has in recent months undergone a significant expansion of staffing following the awarding of an NHMRC Program Grant and two NHMRC Strategic Grants on the theme of “Early Start to Life”. The funds will enable research on the intergenerational transmission of metabolic risk, with a particular focus on PCOS, and the early origins of childhood obesity. The grants will also provide a basis for extending our collaborations with co-investigators in Southampton, London, and Seattle. The research effort is undergoing a major data collection phase on several fronts. The Lucina cohort of reproductive health in young women is currently being used as a platform by Emily Steele as PhD scholar to study financial insecurity and delayed child bearing in Adelaide women. Neha Mahajan has completed her PhD on psychological stress and assisted reproductive treatment outcomes, indicating both the highly episodic nature of stress across treatments and the direct effect that psychological stress appears to have on treatment outcomes. To investigate the safety of assisted conception we have also assembled a cohort of all deliveries in South Australia for the period 1986–2002 (n=344,000) that has been matched to both the State Birth Defects Registry and to all cycles of assisted conception treatment. Analysis of these data is currently being undertaken.

CEREBRAL PALSY CAUSATION

GROUP LEADER
PROFESSOR ALASTAIR MACLENNAN

PROFESSOR GUS DEKKER
PROFESSOR PAUL GOLDWATER
PROFESSOR ERIC HAAN
A/PROF ANNABELLE CHAN
DR CATHERINE GIBSON
JESSICA BROADBENT
GAI MCMICHAEL
BRONWEN PAINE
KEVIN PRIEST
MICHAEL O’CALLAGHAN
MICHAEL DJUKIC

In 2007 the South Australian Cerebral Palsy Research Group continued to lead international research into the antenatal causes of cerebral palsy. The group published several novel papers in high impact journals and presented their research at national and international scientific meetings.

The group continues to find significant associations between mutations in genes that control the fetal response to infection and inflammation and exposure to viruses particularly of the herpesvirus group. These viruses are also associated with increased risk of pregnancy hypertension and preterm delivery. However, it is likely that these outcomes are more likely when the fetus is genetically susceptible to infection.

The group has found common gene mutations (polymorphisms) in babies with cerebral palsy and other mutations that may lead to preterm delivery which can secondarily cause cerebral palsy from brain haemorrhage following very preterm birth. There appears to be an interaction between environmental risk factors for cerebral palsy e.g. prematurity, infection, chronic growth restriction etc. and cytokine polymorphisms. The latter may increase susceptibility to infection either by down regulating the normal fetal inflammatory response, making the developing fetal neurons vulnerable to destructive viruses, or by up regulating an excessive cytokine response that also can damage the developing brain.

The SA Cerebral Palsy Research Group collaborates closely with the SA Cerebral Palsy Register, The SA Pregnancy Outcomes Unit, and Department Virology at WCH, Adelaide and NIH, Paediatrics Neurology, Bethesda, USA to identify genetic, viral and environmental associations with cerebral palsy outcomes.

Placental insufficiency is a common pregnancy complication that is associated with increased perinatal morbidity and mortality, as well as long term disorders.

EARLY LIFE PROGRAMMING OF HEALTH AND DISEASE

GROUP LEADER
PROFESSOR JULIE OWENS

PROFESSOR JEFFREY ROBINSON
DR KATHY GATFORD
DR MILES DE BLASIO
BROOKE SUMMERS-PEARCE
LYN HARLAND
PAT GRANT
SIMON MORETTA
TASMA HOW

A key focus for the Early Life Programming Group was defining how a poor intrauterine environment and catch-up growth after birth impair insulin action, with our findings highlighted in the Journal of Physiology. The role of the insulin-like growth factor (IGF) axis in maternal endocrine adaptation to pregnancy and regulation of placental function and fetal growth has been further defined. Interventions to promote placental function and to treat the mother or neonate to prevent later metabolic and cardiovascular diseases, are also being tested.

How does restricted supply before birth cause later diabetes?

Intrauterine growth restriction (IUGR) is mostly due to poor placental growth and function and we have delineated the physiological, metabolic and endocrine consequences of experimental placental restriction (PR) in the sheep before and after birth. These resemble those of human IUGR from fetal through to adult life. We have identified the time of onset and mechanisms of impaired insulin secretion and sensitivity and obesity following IUGR and critical windows for intervention, as recently highlighted in the Journal of Physiology (JS Gilbert, E Brandon, T Vera, 2007 J Physiol 585:651–652).

Overcoming early life programming of diabetes and the metabolic syndrome

We are testing interventions to prevent or reverse programming of insulin deficiency and resistance, obesity and diabetes in individuals who grew poorly before birth. This includes supplementing the pregnant rat with placental restriction with a calcium supplement (in collaboration with Associate Professor Mary Wlodek, University of Melbourne) or with folate (in collaboration with Professor Marie Dziadek, Garvan Research Institute) to prevent development of diabetes and the metabolic syndrome in offspring. If effective, these treatments should be readily translatable to humans.

Promoting placental efficiency and fetal growth

A major focus has been on the prevention of poor fetal growth, and in particular, placental insufficiency. This is a common pregnancy complication that is associated with increased perinatal mortality and morbidity, as well as with long-term disorders, including diabetes. Maternal IGF or growth hormone treatment or arginine supplementation at different stages of pregnancy to promote placental functional development and fetal growth and survival in the pig is currently being tested, with support from the CRC for an Internationally Competitive Pork Industry (in collaboration with Associate Professors Mark Nottle and Claire Roberts, Dr Karen Kind and Dr Miles DeBlasio). Also under investigation is the identification of genetic determinants of placental efficiency using selection trials in the pig.

The research group successfully completed in 2007 two large multi-centre trials of Tibolone to treat menopausal symptoms in women with previous breast cancer and a separate trial using Tibolone to treat osteoporosis.

MENOPAUSE AND CLIMACTERIC

GROUP LEADER
PROFESSOR ALASTAIR MACLENNAN

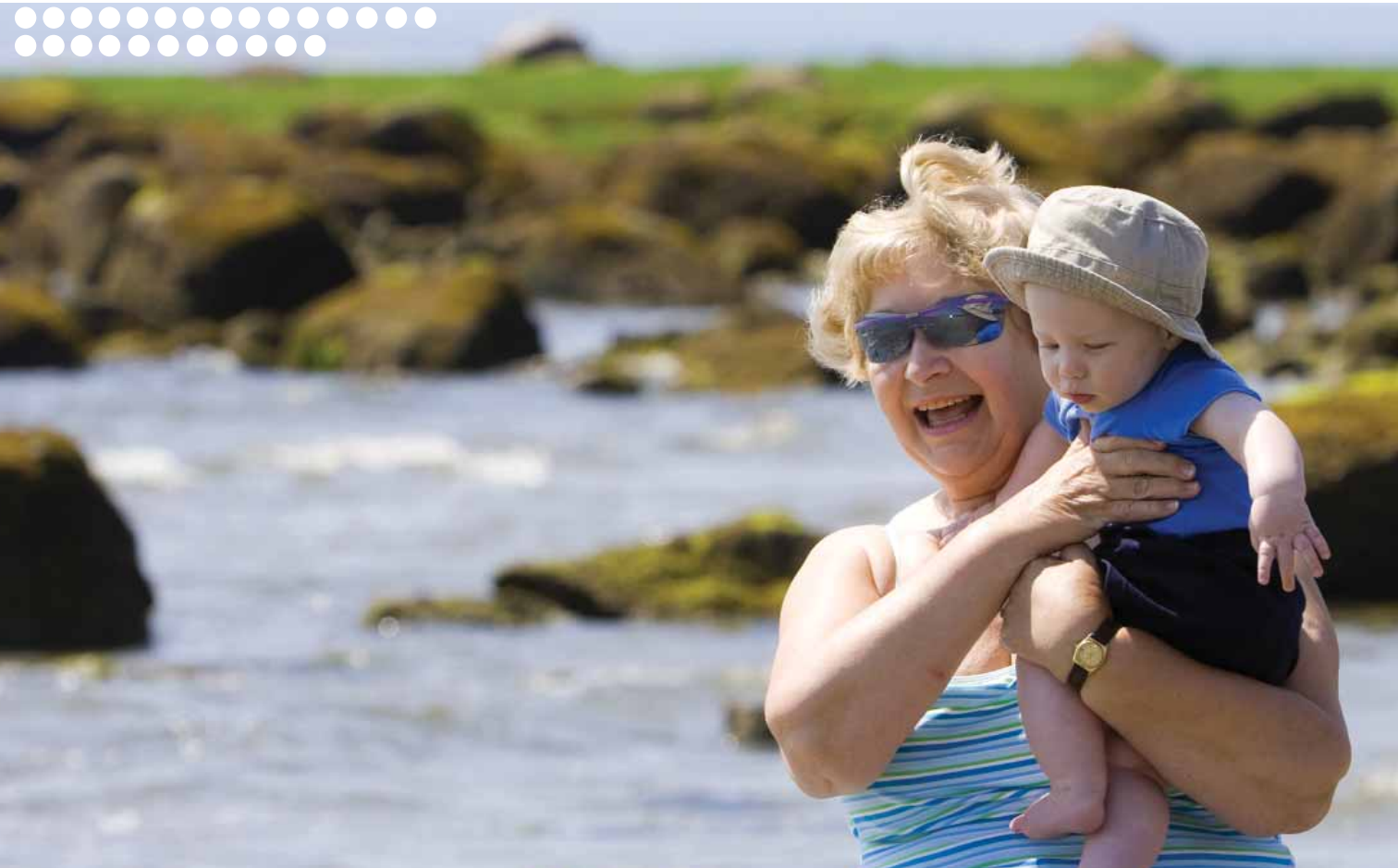
DR ALICE MACLENNAN
GAI MCMICHAEL
BRONWEN PAINE
JESSICA BROADBENT
ANN CHANDLER

Professor MacLennan celebrated his 15th year as Editor in Chief of Maturitas and then Climacteric, the Journal of the International Menopause Society. This scientific journal now has the biggest and widest international circulation of journals on the subject of menopause and has an impact factor of 2.3. With Dr Alice MacLennan, he published the 16th edition of their 28 page booklet “Menopause. Presenting a positive outlook” This has had a print run of 2 million copies over 16 years and is also available free on line at www.menopause.org.au

Dr Alice MacLennan has been appointed President of The Australasian Menopause Society 2007–2009.

The research group published in the British Medical Journal the first results of WISDOM (Women’s International Study of long Duration Oestrogen after Menopause). This paper won the best publication of 2007 awards from both the Australasian Menopause Society and the Discipline of Obstetrics and Gynaecology.

The group is now looking at genetic and environmental factors possibly influencing memory loss and cognitive function after menopause.



COLLABORATIONS & AFFILIATIONS
HIGH PROFILE, OUTCOMES BASED COLLABORATIONS

CSIRO HUMAN NUTRITION

GROUP LEADER
ASSOCIATE PROFESSOR MANNY NOAKES

DR GRANT BRINKWORTH
SIEW LIM

RCRH and the CSIRO's Human Nutrition Group continued their successful collaboration in 2007. The research focuses on integrating diet, nutrition, psychology, consumer science, medicine and exercise physiology to improve overall health. The key research cluster steams of this collaboration are:

- Determinants of eating and exercise behaviour
- Nutrition & physical activity intervention
- Program development and delivery (including the Total Wellbeing Diet)

Featured Collaboration Scholar Siew Lim

SIEW LIM – CSIRO AND RCRH POSTGRADUATE SCHOLAR

The effects of metformin or lifestyle intervention on weight, metabolic, reproductive and psychosocial outcomes in young women.

Siew Lim has a Bachelor of Science (Biomedical Science) from the University of Adelaide and a Masters in Nutrition and Dietetics from Flinders University, and is in her final year of a Healthy Development Adelaide PhD scholarship.

She is supervised by A/Prof Manny Noakes (CSIRO Human Nutrition & affiliate with Department of Medicine, University of Adelaide), Dr Peter Clifton (CSIRO Human Nutrition & affiliate with Discipline of Physiology, University of Adelaide) and Prof Robert Norman (Director of the Research Centre for Reproductive Health). Her project aims to investigate the weight loss, metabolic, reproductive and psychological effect of metformin and lifestyle intervention in overweight or obese young women. Young women are gaining weight at a rapid pace and this has significant impact on their metabolic, reproductive and psychosocial health. The findings of this project will help in the development of weight loss strategies which optimise overall health outcomes in young women.

In this project 297 young women were recruited and randomised to one of three treatment arms: metformin plus general lifestyle advice, placebo plus general lifestyle advice, or structured lifestyle program for 12 weeks.

This project is expected to complete by the end of July this year. In addition to the metabolic effects of metformin vs lifestyle intervention in young women, the project also provided valuable insights on the behavioural aspects influencing young women in adopting new healthy behaviours. These insights will be useful in the development of health interventions which require long term lifestyle changes in this group.

The study has received significant media attention from Today Tonight, The Advertiser and Radio Adelaide, which have aided in the recruitment process.

'The PhD journey has been challenging, exciting and rewarding. Having the opportunity to work with great supervisors and a fantastic support team on a topic which I am absolutely passionate about has been a wonderful experience.'

HEALTHY DEVELOPMENT ADELAIDE

A RESEARCH & INNOVATION CLUSTER
IN SOUTH AUSTRALIA
www.adelaide.edu.au/hda

CONVENORS
PROFESSOR ROBERT NORMAN
(UNIVERSITY OF ADELAIDE)

PROFESSOR CAROLINE MCMILLEN
(UNIVERSITY OF SOUTH AUSTRALIA)

PROFESSOR MICHAEL SAWYER
(CHILDREN, YOUTH AND WOMEN'S HEALTH
SERVICE/UNIVERSITY OF ADELAIDE)

MS ANNE JURISEVIC
NETWORK AND COMMUNICATIONS OFFICER
(UNIVERSITY OF ADELAIDE)

Healthy Development Adelaide (HDA) was established in 2004 as an initiative of the University of Adelaide

The vision of HDA is to be the major hub of research and innovation in South Australia that will advance an understanding of healthy development and ensure the physical, psychological, mental and social health of infants, children and adolescents.

BUILDING COMMUNICATION & MULTIDISCIPLINARY INTERACTIONS

HDA aims to develop effective communication and multidisciplinary interactions that inform and define research directions in developmental health research.

HDA held its 3rd annual Oration at the State Library of South Australia on the 7th June 2007. A/Professor Manny Noakes from CSIRO Human Nutrition delivered the Oration on 'Science behind weight management'. A/Professor Noakes was presented with the Healthy Development Adelaide Award for 2007 in recognition of her internationally acclaimed research in this area.

INTERACTING WITH EXTERNAL STAKEHOLDERS

HDA has played an important role in working towards establishing a Centre for Intergenerational Health (CIH) in South Australia, which was seeded in 2007, and has been approved formally for establishment in 2008.

- CIH is a partnership between the Department of Further Education, Employment, Science and Technology (DFEEST) and Department of Health (DoH), University of South Australia, Flinders University and the University of Adelaide.
- HDA's involvement will be coordinating and developing the research agenda, networks and state profile for the Centre. More information about this venture is available from the HDA website.

OTHER KEY COLLABORATIVE AFFILIATES WITHIN SOUTH AUSTRALIA

- Lyell McEwin Health Service – Department of Obstetrics & Gynaecology
- Royal Adelaide Hospital
- School of Molecular and Biomedical Science, University of Adelaide
- Adelaide Research & Innovation, University of Adelaide
- The Queen Elizabeth Hospital – Department of Obstetrics & Gynaecology
- Women's & Children's Hospital – Department of Obstetrics & Gynaecology/Neonatal Medicine
- Women's Health Centre, Royal Adelaide Hospital
- Repromed

MEMBERS, PUBLICATIONS AND GRANTS

MEMBERS

TITLE	NAME	SURNAME	POSITION
Ms	Lisa	Akison	Research Assistant
Mr	Firas	Albuz	M Med Sc/PhD Student
Ms	Emily	Alvino	M Med Sc/PhD Student
Mr	Fred	Amato	Research Officer
Dr	Ravinder	Anand-Ivell	Research Fellow
Ms	Prabha	Andraweera	M Med Sc Student
Prof	David	Armstrong	Research Fellow
Dr	Rod	Ashman	Veterinarian
Mr	Hassan	Bakos	PhD Student
Ms	Kelly	Banwell	PhD Student
Mr	Mark	Barnett	M Med Sc/PhD Student
Ms	Melissa	Bauer	PhD Student
Dr	Luke	Beebe	Research Fellow
Mr	Brenton	Bennett	Research Assistant
Mr	Michael	Boden	PhD Student
Ms	Wendy	Bonner	Research Assistant
Dr	Jacqueline	Boyle	PhD Student (Remote)
Mr	Tomislav	Bozuric	Honours Student
A/Prof	William	Breed	Deputy Head, Discipline of Anatomical Sciences
Ms	Jessica	Broadbent	Research Assistant
Ms	Hannah	Brown	PhD Student
Mr	Jared	Campbell	Honours Student
Mr	Frank	Carbone	Laboratory Manager
Ms	Alison	Care	M Med Sc/PhD Student
Ms	Kara	Cashman	Research Assistant
Ms	Jeng-Yie	Chan	Honours Student
A/Prof	Annabelle	Chan	Senior Medical Consultant/Public Health Physician
Ms	Ann	Chandler	Research Nurse
Ms	Monique	Chilver	Technical Assistant
Dr	Matthew	Chong	ARI, Business Development Manager
Ms	Lindsay	Chura	Fullbright Scholarship Fellow
Ms	Katie	Crocker	Research Assistant
Dr	Allan	Cyna	PhD Student
Ms	Pat	Darda	Research Nurse
A/Prof	Michael	Davies	Senior Research Fellow
Dr	Miles	De Blasio	Research Fellow
Dr	Sheryl	De Lacey	Senior Research Fellow
Prof	Gus	Dekker	Head, Women & Children's Division, Lyell McEwin Hospital
Dr	Lekamge	Dharmawjaya	PhD Student
Mr	Michael	Djukic	Honours Student
Ms	Camilla	Dorian	Research Assistant
Dr	Paul	Duggan	Senior Lecturer, Royal Adelaide Hospital
Ms	Kylie	Dunning	PhD Student
Dr	Jane	Elliott	Clinician, Affiliate Member
Ms	Renate	Faast	Research Assistant
Ms	Anwar	Fatohi	Laboratory Technician
Ms	Deanne	Feil	PhD Student
Ms	Radmila	Feldmann	Research Assistant
Dr	Carolyn	Fitzsimmons	Research Fellow
Ms	Kate	Frewin	Honours Student
Mr	David	Froiland	Research Technician
Ms	Denise	Furness	PhD Student
Ms	Virginia	Furness	Project Officer
Dr	Kathy	Gatford	Research Associate
Mr	Ashley	Gauld	Research Assistant
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PUBLICATIONS

AUTHORS	TITLE	JOURNAL NAME	VOLUME	PAGES
Hiendleder S	Mitochondrial DNA inheritance after SCNT	Advances in Experimental Medicine and Biology	591	103–116
Halyburton AK, Brinkworth GD, Wilson CJ, Noakes M, Buckley JD, Keogh JB, Clifton PM	Low- and high-carbohydrate weight-loss diets have similar effects on mood but not cognitive performance	American Journal of Clinical Nutrition	86	580–587
de Jonge L, DeLany JP, Nguyen T, Howard J, Hadley EC, Redman LM, Ravussin E	Validation study of energy expenditure and intake during calorie restriction using doubly labeled water and changes in body composition	American Journal of Clinical Nutrition	85	73–79
Moran LJ, Noakes M, Clifton PM, Wittert GA, Le Roux CW, Ghatei MA, Bloom SR, Norman RJ	Postprandial ghrelin, cholecystokinin, peptide YY, and appetite before and after weight loss in overweight women with and without polycystic ovary syndrome	American Journal of Clinical Nutrition	86	1603–1610
Gatford KL, Dalitz PA, Cock ML, Harding R, Owens JA	Acute ethanol exposure in pregnancy alters the insulin-like growth factor axis of fetal and maternal sheep	American Journal of Physiology-Endocrinology and Metabolism	292	E494–E500
Owens JA, Thavaneswaran P, De Blasio MJ, McMillen IC, Robinson JS, Gatford KL	Sex-specific effects of placental restriction on components of the metabolic syndrome in young adult sheep	American Journal of Physiology-Endocrinology and Metabolism	292	E1879–E1889
De Blasio MJ, Gatford KL, Robinson JS, Owens JA	Placental restriction of fetal growth reduces size at birth and alters postnatal growth, feeding activity, and adiposity in the young lamb	American Journal of Physiology Regulatory Integrative and Comparative Physiology	292	R875–R886
Sferruzzi-Perri AN, Owens JA, Standen P, Taylor RL, Robinson JS, Roberts CT	Early treatment of the pregnant guinea pig with IGFs promotes placental transport and nutrient partitioning near term	American Journal of Physiology: Endocrinology and Metabolism	292	E668–E676
De Blasio MJ, Dodic M, Jefferies AJ, Moritz KM, Wintour EM, Owens JA	Maternal exposure to dexamethasone or cortisol in early pregnancy differentially alters insulin secretion and glucose homeostasis in adult male sheep offspring	American Journal of Physiology: Endocrinology and Metabolism	293	E75–E82
Kennaway DJ, Owens JA, Voultsios A, Boden MJ, Varcoe TJ	Metabolic homeostasis in mice with disrupted Clock gene expression in peripheral tissue	American Journal of Physiology: Regulatory, Integrative and Comparative Physiology	2007	R1528–R1537
Papatsonis DN, Bos JM, van Geijn HP, Lok CA, Dekker GA	Nifedipine pharmacokinetics and plasma levels in the management of preterm labor	American Journal Therapeutics	14	346–350
Druery GV, Shimmin GA, Taggart DA, Temple-Smith PD, Breed WG, McDonald CH, Finlayson GR, Paris MC	Ovarian follicular superstimulation and oocyte maturation in the anoestrous Southern Hairy-nosed wombat (Lasiorhinus latifrons)	Animal Reproduction Science	99	363–376
Duggan P, Keefe DM	Paid term-time employment in undergraduate medical students at the University of Adelaide	ANZAME The Association for Health Professional Education	9	58–66
Williamson DA, Martin CK, York-Crowe E, Anton SD, Redman LM, Han H, Ravussin E	Measurement of dietary restraint: validity tests of four questionnaires	Appetite	48	183–192
Galletly C, Moran L, Noakes M, Clifton P, Tomlinson L, Norman R	Psychological benefits of a high-protein, low-carbohydrate diet in obese women with polycystic ovary syndrome-a pilot study	Appetite	49	590–593
Edwards B, Galletly C, Semmler-Booth T, Dekker G	Antenatal psychosocial risk factors and depression among women living in socioeconomically disadvantaged suburbs in Adelaide, South Australia	Australian and New Zealand Journal of Psychiatry	42	45–50
Edwards B, Galletly C, Semmler-Booth T, Dekker G	Does antenatal screening for psychosocial risk factors predict postnatal depression? A follow-up study of 154 women in Adelaide, South Australia	Australian and New Zealand Journal of Psychiatry	42	51–55
Tremellen K, Miari G, Froiland D, Thompson J	A randomised trial examining the effect of an antioxidant (Menevit) on pregnancy outcome during IVF-ICSI treatment	Australian and New Zealand Journal of Obstetrics and Gynaecology	47	216–221
Hiller JE, Crowther CA, Moore VA, Willson K, Robinson JS	Calcium supplementation in pregnancy and its impact on blood pressure in children and women: Follow up of a randomised controlled trial	Australian and New Zealand Journal of Obstetrics and Gynaecology	47	115–121
Dodd JM, Crowther CA, Antoniou G, Baghurst P, Robinson JS	Screening for gestational diabetes: the effect of varying blood glucose definitions in the prediction of adverse maternal and infant health outcomes	Australian and New Zealand Journal of Obstetrics and Gynaecology	47	307–312
Stankiewicz M, Smith C, Alvino H, Norman R	The use of complementary medicine and therapies by patients attending a reproductive medicine unit in south australia: A prospective survey	Australian and New Zealand Journal of Obstetrics and Gynaecology	47	145–149
Lane M, Gardner DK	Embryo culture medium: which is the best?	Best Practice & Research in Clinical Obstetrics & Gynaecology	21	83–100
de Lacey S	Patients' attitudes to their embryos and their destiny: social conditioning?	Best Practice & Research in Clinical Obstetrics & Gynaecology	21	101–112
Warnes GM, Norman RJ	Quality management systems in ART: are they really needed? An Australian clinic's experience	Best Practice & Research in Clinical Obstetrics & Gynaecology	21	41–55
Mayes MA, Laforest MF, Guillemette C, Gilchrist RB, Richard FJ	Adenosine 5'-monophosphate kinase-activated protein kinase (PRKA) activators delay meiotic resumption in porcine oocytes	Biology Reproduction	76	589–597
Robertson SA, Care AS, Skinner RJ	Interleukin 10 regulates inflammatory cytokine synthesis to protect against lipopolysaccharide-induced abortion and fetal growth restriction in mice	Biology of Reproduction	76	738–748
Dragovic RA, Ritter LJ, Schulz SJ, Amato F, Thompson JG, Armstrong DT, Gilchrist RB	Oocyte-secreted factor activation of SMAD 2/3 signaling enables initiation of mouse cumulus cell expansion	Biology of Reproduction	76	848–857

AUTHORS	TITLE	JOURNAL NAME	VOLUME	PAGES
Harvey AJ, Kind KL, Thompson JG	Regulation of gene expression in bovine blastocysts in response to oxygen and the iron chelator desferrioxamine	Biology of Reproduction	77	93–101
Nassar N, Roberts CL, Raynes-Greenow CH, Barratt A, Peat B; Decision Aid for Breech Presentation Trial Collaborators	Evaluation of a decision aid for women with breech presentation at term: a randomised controlled trial [ISRCTN14570598]	BJOG-An International Journal of Obstetrics and Gynaecology	114	325–333
Duggan PM, Palmer E, Devitt P	Electronic voting to encourage interactive lectures: a randomised trial	BMC Medical Education	7	39326
Henderson-Smart DJ, Lumbiganon P, Festin MR, Ho JJ, Mohammad H, McDonald SJ, Green S, Crowther CA; SEA-ORCHID Study Group	Optimising reproductive and child health outcomes by building evidence-based research and practice in South East Asia (SEA-ORCHID): study protocol	BMC Medical Research Methodology	7	1–9
Pirc LK, Owens JA, Crowther CA, Willson K, De Blasio MJ, Robinson JS	Mild gestational diabetes in pregnancy and the adipoinsular axis in babies born to mothers in the ACHOIS randomised controlled trial	BMC Pediatrics	7	1–7
Dodd JM, Crowther CA, Hiller JE, Haslam RR, Robinson JS	Birth after caesarean study-planned vaginal birth or planned elective repeat caesarean for women at term with a single previous caesarean birth: protocol for a patient preference study and randomised trial	BMC Pregnancy and Childbirth	14	1–9
Moss JR, Crowther CA, Hiller JE, Willson KJ, Robinson JS; Australian Carbohydrate Intolerance Study in Pregnant Women Group	Costs and consequences of treatment for mild gestational diabetes mellitus – evaluation from the ACHOIS randomised trial	BMC Pregnancy and Childbirth	7	1–7
Vickers MR, Martin J, Meade TW and the WISDOM Study Team (MacLennan A H)	The Women's international study of long duration oestrogen after menopause (WISDOM): a randomised controlled trial	BMC Women's Health	7	1–17
Norman RJ and Moran LJ	Weight, fertility and management approaches	Book: Advances in Fertility Studies and Reproductive Medicine Chpt 4	n/a	24–35
Redman LM, Ravussin E	Energy Expenditure in Obesity	Book: Contemporary Endocrinology	n/a	151–172
Robillard P, Dekker G, Chaouat, Chaline, Hulsey TC	Possible role of Eclampsia/Preeclampsia in Evolution of Human Reproduction	Book: Evolutionary Medicine and Health Chpt 11	n/a	216–225
Norman RJ, Moran LJ	Diet and Lifestyle Factors in the Etiology and Management of Polycystic Ovary Syndrome	Book: Insulin Resistance and Polycystic Ovarian syndrome, Pathogenesis, Evaluation and Treatment	n/a	113–128
Norman RJ, Moran LJ	Lifestyle factors in the etiology and management of polycystic ovary syndrome	Book: Polycystic Ovary Syndrome: second edition Chpt 9	n/a	113–128
Thompson JG Lane M and Gilchrist RB	Metabolism of the bovine cumulus-oocyte complex and influence on subsequent developmental competence	Book: Reproduction in Domestic Ruminants VI	n/a	179–190
Dekker G, Robillard P	Immune maladaption in the etiology of preeclampsia: an updated epidemiological perspective	Book: Preeclampsia Chpt 19	n/a	276–294
Murphy KJ, Meyer BJ, Mori TA, Burke V, Mansour J, Patch CS, Tapsell LC, Noakes M, Clifton PA, Barden A, Puddey IB, Beilin LJ, Howe PR	Impact of foods enriched with n-3 long-chain polyunsaturated fatty acids on erythrocyte n-3 levels and cardiovascular risk factors	British Journal of Nutrition	97	749–757
Keogh JB, Luscombe-Marsh ND, Wittert GA, Clifton PM	Long-term weight maintenance and cardiovascular risk factors are not different following weight loss on carbohydrate-restricted diets high in either monounsaturated fat or protein in obese hyperinsulinaemic men and women	British Journal of Nutrition	97	405–410
Bird AR, Vuaran MS, King RA, Noakes M, Keogh J, Morell MK, Topping DL	Wholegrain foods made from a novel high-amylose barley variety (Himalaya 292) improve indices of bowel health in human subjects	British Journal of Nutrition	99	1032–1040
Vickers MR, MacLennan AH, Lawton B, Ford D, Martin J, Meredith SK, DeStavola BL, Rose S, Dowell A, Wilkes HC, Darbyshire JH, Meade TW; WISDOM group	Main morbidities recorded in the women's international study of long duration oestrogen after menopause (WISDOM): a randomised controlled trial of hormone replacement therapy in postmenopausal women	British Medical Journal (BMJ)	335	239
Boyce AC, Gibson KJ, Wintour EM, Koukoulas I, Gatford KL, Owens JA, Lumbers ER	The kidney is resistant to chronic hypoglycaemia in late-gestation fetal sheep	Canadian Journal of Physiology and Pharmacology	85	597–605
Buchanan G, Ricciardelli C, Harris JM, Prescott J, Yu ZC, Jia L, Butler LM, Marshall VR, Scher HI, Gerald WL, Coetzee GA, Tilley WD	Control of androgen receptor signaling in prostate cancer by the cochaperone small glutamine rich tetratricopeptide repeat containing protein alpha	Cancer Research	67	10087–10096
MacLennan AH (Board of the International Menopause Society) Pines A, Sturdee DW, Birkhauser MH, Schneider HPG, Gambacciani and Panay N	IMS Update Recommendations on postmenopausal hormone therapy	Climacteric	10	181–194
Ho JT, Lewis JG, O'Loughlin P, Bagley CJ, Romero R, Dekker GA, Torpy DJ	Reduced maternal corticosteroid-binding globulin and cortisol levels in pre-eclampsia and gamete recipient pregnancies	Clinical Endocrinology	66	869–877
Thomson R, Brinkworth GD, Buckley JD, Noakes M, Clifton PM	Good agreement between bioelectrical impedance and dual-energy X-ray absorptiometry for estimating changes in body composition during weight loss in overweight young women	Clinical Nutrition	26	7771–7777
Hill CL, Gill T, Taylor AW, Daly A, Grande ED, Adams RJ	Psychological factors and quality of life in arthritis: a population-based study	Clinical Rheumatology	26	1049–1054
Beebe L, McIlfatrick S, Grupen C, Boquest A, Harrison S, Faast R, Ashman R, Wengle J, Hamilton H, Nottle M	A comparison of two in vitro maturation media for use with adult porcine oocytes for adult somatic cell nuclear transfer	Cloning and Stem Cells	9	564–570
Beebe LF, McIlfactrick S, Nottle MB	The effect of energy substrate concentration and amino acids on the in vitro development of preimplantation porcine embryos	Cloning and Stem Cells	9	206–215
Johannsen DL, Redman LM, Ravussin E	The Role of Physical Activity in Maintaining a Reduced Weight	Current Atherosclerosis Reports	9	463–471
Lim SS, Noakes M, Norman RJ	Dietary effects on fertility treatment and pregnancy outcomes	Current Opinions in Endocrinology, Diabetes and Obesity	14	465–469
Robertson SA	GM-CSF regulation of embryo development and pregnancy	Cytokine & Growth Factor Reviews	18	287–298
Sferruzzi-Perri AN, Owens JA, Standen P, Taylor RL, Robinson JS, Roberts CT	Early pregnancy maternal endocrine insulin-like growth factor I programs the placenta for increased functional capacity throughout gestation	Endocrinology	148	4362–4370
Ross JT, McMillen IC, Lok F, Thiel AG, Owens JA, Coulter CL	Intrafetal insulin-like growth factor-I infusion stimulates adrenal growth but not steroidogenesis in the sheep fetus during late gestation	Endocrinology	148	5424–5432
De Blasio MJ, Gatford KL, Mc Millen C, Robinson JS, Owens JA	Placental restriction of fetal growth increases insulin action, growth, and adiposity in the young lamb	Endocrinology	148	1350–1358
Ingman WV, Robertson SA	Transforming growth factor-beta1 null mutation causes infertility in male mice associated with testosterone deficiency and sexual dysfunction	Endocrinology	148	4032–4043

AUTHORS	TITLE	JOURNAL NAME	VOLUME	PAGES
Tonack S, Kind K, Thompson JG, Wobus AM, Fischer B, Santos AN	Dioxin affects glucose transport via the arylhydrocarbon receptor signal cascade in pluripotent embryonic carcinoma cells	Endocrinology	148	5902–5912
Duggan P	Development of a Script Concordance Test using an Electronic Voting System	ergo: The Journal of the Education research Group of Adelaide	1	35–41
Crowther CA, Harding JE	Repeat doses of prenatal corticosteroids for women at risk of preterm birth for preventing neonatal respiratory disease	Evidence-Based Child Health: a Cochrane review journal	Issue 2	CD003935
Dodd JM, Crowther CA	Specialised antenatal clinics for women with a multiple pregnancy to improve maternal and infant outcomes	Evidence-Based Child Health: a Cochrane review journal	Issue 2	CD005300
Russell DL, Robker RL	Molecular mechanisms of ovulation: co-ordination through the cumulus complex	Human Reproduction Update	13	289–312
Homan GF, Davies M and Norman R	The impact of lifestyle factors on reproductive performance in the general population and those undergoing infertility treatment: a review	Human Reproduction Update	13	209–223
de Lacey S	Decisions for the fate of frozen embryos: fresh insights into patients' thinking and their rationales for donating or discarding embryos	Human Reproduction	22	1751–1758
Wu R, Fujii S, Ryan NK, Vander Hoek KH, Jasper MJ, Sini I, Robertson SA, Robker RL, Norman RJ	Ovarian leukocyte distribution and cytokine/chemokine mRNA expression in follicular fluid cells in women with polycystic ovary syndrome	Human Reproduction	22	527–535
Banwell KM, Lane M, Russell DL, Kind KL, Thompson JG	Oxygen concentration during mouse oocyte in vitro maturation affects embryo and fetal development	Human Reproduction	22	2768–2775
Dunning KR, Lane M, Brown HM, Yeo C, Robker RL, Russell DL	Altered composition of the cumulus-oocyte complex matrix during in vitro maturation of oocytes	Human Reproduction	22	2842–2850
Bakos HW, Thompson JG, Feil D, Lane M	Sperm DNA damage is associated with assisted reproductive technology pregnancy	International Journal of Andrology	30	1–9
Bowen J, Noakes M, Clifton PM	Appetite hormones and energy intake in obese men after consumption of fructose, glucose and whey protein beverages	International Journal of Obesity (London)	31	1696–1703
Festen L, Duggan P, Coates D	Improved quality of life in women treated for urinary incontinence by an authorised continence nurse practitioner	International Urogynecology Journal	19	567–571
Duggan P, Williams R	Incisional hernia after a tension-free vaginal tape procedure	International Urogynecology Journal	18	335–337
Budde MP, De Lange TE, Dekker GA, Chan A, Nguyen AM	Risk factors for placental abruption in a socio-economically disadvantaged region	Journal Maternal Fetal & Neonatal Medicine	20	687–693
Robertson SA	Seminal fluid signaling in the female reproductive tract: lessons from rodents and pigs	Journal of Animal Science	85	E36–E44
Ricciardelli C, Russell DL, Ween MP, Mayne K, Suwiwat S, Byers S, Marshall VR, Tilley WD, Horsfall DJ	Formation of hyaluronan- and versican-rich pericellular matrix by prostate cancer cells promotes cell motility	Journal of Biological Chemistry	282	10814–10825
Tian L, Shen H, Lu Q, Norman RJ, Wang J	Insulin Resistance Increases the risk of Spomntaneous Abortion after Assisted Reproduction Technology Treatment	Journal of Clinical Endocrinology and Metabolism	92	1430–1433
Moran LJ, Noakes M, Clifton PM, Wittert GA, Belobrajdic DP, Norman RJ	C-reactive protein before and after weight loss in overweight women with and without polycystic ovary syndrome	Journal of Clinical Endocrinology and Metabolism	92	2944–2951
Redman LM, Heilbronn LK, Martin CK, Alfonso A, Smith SR, Ravussin E; Pennington CALERIE Team	Effect of calorie restriction with or without exercise on body composition and fat distribution	Journal of Clinical Endocrinology and Metabolism	92	865–872
Redman LM, de Jonge L, Fang X, Gamlin B, Recker D, Greenway FL, Smith SR, Ravussin E	Lack of an effect of a novel beta3-adrenoceptor agonist, TAK-677, on energy metabolism in obese individuals: a double-blind, placebo-controlled randomized study	Journal of Clinical Endocrinology and Metabolism	92	527–531
Moran LJ, Noakes M, Clifton PM, Norman RJ	The use of anti-mullerian hormone in predicting menstrual response after weight loss in overweight women with polycystic ovary syndrome	Journal of Clinical Endocrinology and Metabolism	92	3796–3802
Bay K, Virtanen HE, Hartung S, Ivell R, et al	Insulin-like factor 3 levels in cord blood and serum from children: Effects of age, postnatal hypothalamic-pituitary-gonadal axis activation, and cryptorchidism	Journal of Clinical Endocrinology	92	4020–4027
Robillard PY, Dekker G, Chaouat G, Hulsey TC	Etiology of preeclampsia: maternal vascular predisposition and couple disease-mutual exclusion or complementarity?	Journal of Reproductive Immunology	76	1–7
Dekker G, Robillard PY	Pre-eclampsia: Is the immune maladaptation hypothesis still standing? An epidemiological update	Journal of Reproductive Immunology	76	8–16
Jasper MJ, Tremellen KP, Robertson SA	Reduced expression of IL-6 and IL-1alpha mRNAs in secretory phase endometrium of women with recurrent miscarriage.	Journal of Reproductive Immunology	73	74–84
Wlodek ME, Mibus A, Tan A, Siebel AL, Owens JA, Moritz KM	Normal lactational environment restores nephron endowment and prevents hypertension after placental restriction in the rat	Journal of the American Society of Nephrology	18	1688–1696
Kist WJ, Janssen NG, Kalk JJ, Hague WM, Dekker GA, de Vries JI	Thrombophilias and adverse pregnancy outcome – A confounded problem!	Journal of Thrombosis and Haemostasis	99	77–85
Breed WG, Bauer M, Wade R, Thitipramote N, Suwajarat J, Yelland L	Intra-individual variation in sperm tail length in murine rodents	Journal of Zoology	272	299–304
Ravussin E and Redman LM	Caloric Restriction and Longevity	Journees Annuelles de Diabetologie de l'Hotel Dieu	n/a	111–125
Norman RJ, Dewailly D, Legro RS, Hickey TE	Polycystic ovary syndrome	Lancet	370	685–697
Dabadghao P, Roberts BJ, Wang J, Davies MJ, Norman RJ	Glucose tolerance abnormalities in Australian women with polycystic ovary syndrome	Medical Journal of Australia	187	328–331
MacLennan AH	HRT: a reappraisal of the risks and benefits	Medical Journal of Australia	186	643–646
Petrucco OM, Silber SJ, Chamberlain SL, Warnes GM, Davies M	Live birth following day surgery reversal of female sterilisation in women older than 40 years: a realistic option in Australia?	Medical Journal of Australia	187	271–273
Koehn H, Oehler MK	Proteins' promise-progress and challenges in ovarian cancer proteomics	Menopause International	13	148–153
Koohi MK, Walther N, Ivell R	A novel molecular assay to discriminate transcriptional effects caused by xenoestrogens	Molecular and Cellular Endocrinology	276	45–54
Anand-Ivell R, Heng K, Bartsch O, Ivell R	Relaxin signalling in THP-1 cells uses a novel phosphotyrosine-dependent pathway	Molecular and Cellular Endocrinology	272	1–13
Sharkey DJ, Macpherson AM, Tremellen KP, Robertson SA	Seminal plasma differentially regulates inflammatory cytokine gene expression in human cervical and vaginal epithelial cells	Molecular Human Reproduction	13	491–501
Behr R, Deller C, Godmann M, Muller T, Bergmann M, Ivell R, et al	Kruppel-like factor 4 expression in normal and pathological human testes	Molecular Human Reproduction	13	815–820
Harvey AJ, Santos AN, Kirstein M, Kind KL, Fischer B, Thompson JG	Differential expression of oxygen-regulated genes in bovine blastocysts	Molecular Reproduction and Development	74	290–299

AUTHORS	TITLE	JOURNAL NAME	VOLUME	PAGES
Moran L, Noakes M, Clifton P, Norman RJ, Fenech M	Genome instability is increased in lymphocytes of women with polycystic ovary syndrome and is correlated with insulin resistance	Mutation Research – Fundamental and Molecular Mechanisms of Mutagenesis	639	55–63
Crowther CA, Doyle LW, Haslam RR, Hiller JE, Harding JE, Robinson JS; ACTORDS Study Group	Outcomes at 2 years of age after repeat doses of antenatal corticosteroids	New England Journal of Medicine	357	1179–1189
Martin CK, Heilbronn LK, de Jonge L, DeLany JP, Volaufova J, Anton SD, Redman LM, Smith SR, Ravussin E	Effect of calorie restriction on resting metabolic rate and spontaneous physical activity	Obesity	15	2964–2973
Gibson CS, MacLennan AH, Dekker GA, Goldwater PN, Dambrosia JM, Munroe DJ, Tsang S, Stewart C, Nelson KB	Genetic polymorphisms and spontaneous preterm birth	Obstetrics and Gynecology	109	384–391
Kennare R, Tucker G, Heard A, Chan A	Risks of adverse outcomes in the next birth after a first cesarean delivery	Obstetrics and Gynecology	109	270–276
Morley R, Moore VM, Dwyer T, Owens JA, Umstad MP, Carlin JB	Maternal birthweight and outcome of twin pregnancy	Paediatric and Perinatal Epidemiology	21	501–506
Pringle KG, Kind KL, Thompson JG, Roberts CT	Complex interactions between hypoxia inducible factors, insulin-like growth factor-II and oxygen in early murine trophoblasts	Placenta	28	1147–1157
Pringle KG, Roberts CT	New Light on Early Post-Implantation Pregnancy in the Mouse: Roles for Insulin-Like Growth Factor-II (IGF-II)?	Placenta	28	286–297
Sakko AJ, Ricciardelli C, Mayne K, Dours-Zimmermann MT, Zimmermann DR, Neufing P, Tilley WD, Marshall VR, Horsfall DJ	Changes in steroid receptors and proteoglycan expression in the guinea pig prostate stroma during puberty and hormone manipulation	Prostate	67	288–300
Immler S, Moore HDM, Breed WG, Birkhead TR	By hook or by crook? Morphometry, competition, and cooperation in rodent sperm	Public Library of Science-ONE	2	e170
Hawthorne G, Osborne RH, Taylor A, Sansoni J	The SF36 Version 2: critical analyses of population weights, scoring algorithms and population norms	Quality of Life Research	16	661–673
Martin CK, Anton SD, Han H, York-Crowe E, Redman LM, Ravussin E, Williamson DA	Examination of cognitive function during six months of calorie restriction: results of a randomized controlled trial	Rejuvenation Research	10	179–190
Ivell R, Heng K, Anand-Ivell R	Diverse signalling mechanisms used by relaxin in natural cells and tissues: The evolution of a "Neohormone"	Relaxin and Related Peptides	612	26–33
Mendis-Handagama SMLC, Ariyaratne HBS, Mrkonjich L, Ivell R	Expression of insulin-like peptide 3 in the postnatal rat Leydig cell lineage: timing and effects of triiodothyronine-treatment	Reproduction	133	479–485
Fletcher CJ, Roberts CT, Hartwich KM, Walker SK, McMillen IC	Somatic cell nuclear transfer in the sheep induces placental defects that likely precede fetal demise	Reproduction	133	243–255
Swann CA, Cooper SJB, Breed WG	Molecular evolution of the carboxy terminal region of the zona pellucida 3 (ZP3) glycoprotein in murine rodents	Reproduction	133	697–708
Thompson JG, Mitchell M, Kind KL	Embryo culture and long-term consequences	Reproduction Fertility and Development	19	43–52
Glattauer V, Irving-Rodgers HF, Rodgers RJ, Stockwell S, Brownlee AG, Werkmeister JA, Ramshaw JA	Examination of basement membrane components associated with the bovine seminiferous tubule basal lamina	Reproduction Fertility and Development	19	473–481
Gutnisky C, Dalvit GC, Pintos LN, Thompson JG, Beconi MT, Cetica PD	Influence of hyaluronic acid synthesis and cumulus mucification on bovine oocyte in vitro maturation, fertilisation and embryo development	Reproduction Fertility and Development	19	488–497
Bagg MA, Nottle MB, Armstrong DT, Grupen CG	Relationship between follicle size and oocyte developmental competence in prepubertal and adult pigs	Reproduction Fertility and Development	19	797–803
McDonald CH, Taggart DA, Breed WG, Druery GV, Shimmin GA, Finlayson GR, Paris MCJ	The effect of exogenous gonadotrophins on ovarian morphology and oocyte maturation in the Southern Hairy-nosed Wombat Lasiorhinus latifrons during the breeding season	Reproduction, Fertility and Development	18	477–484
Ivell R	Lifestyle impact and the biology of the human scrotum	Reproductive Biology and Endocrinology	5	Article 15
Lekamge DN, Barry M, Kolo M, Lane M, Gilchrist RB, Tremellen KP	Anti-Müllerian hormone as a predictor of IVF outcome	Reproductive Biomedicine Online	14	602–610
de Lacey S, Davies M, Homan G, Briggs N, Norman RJ	Factors and perceptions that influence women's decisions to have a single embryo transferred	Reproductive Biomedicine Online	15	526–531
Redman LM, Teran-Garcia M, Ravussin E	Preventing Metabolic Syndrome: Diet, Exercise, both or More?	Review of Endocrinology/Nutrition and Fitness	1	23–25
Yi J, Manandhar G, Oko RJ, Breed WG, Sutovsky P	Mechanism of sperm-zona pellucida penetration during mammalian fertilization: 26S proteasome as a candidate egg coat lysine	Society of Reproduction and Fertility Supplement	63	385–408
Martin CK, Anton SD, York-Crowe E, Heilbronn LK, VanSkiver C, Redman LM, Greenway FL, Ravussin E, Williamson DA; Pennington CALERIE Team	Empirical evaluation of the ability to learn a calorie counting system and estimate portion size and food intake	The British Journal of Nutrition	98	439–444
Rumbold A, Duley L, Crowther C, Haslam R	Antioxidants for preventing pre-eclampsia	The Cochrane Database of Systematic Reviews	n/a	1–59
Doyle LW, Crowther CA, Middleton P, Marret S	Magnesium sulphate for women at risk of preterm birth for neuroprotection of the fetus	The Cochrane Database of Systematic Reviews	n/a	1–63
Owens JA, Gatford KL, De Blasio MJ, Edwards LJ, McMillen IC, Fowden AL	Restriction of placental growth in sheep impairs insulin secretion but not sensitivity before birth	The Journal of Physiology	1	935–949
Thompson J	Culture without the petri-dish	Theriogenology	67	16–20
Grupen CG, Gilchrist RB, Nayudu PL, Barry MF, Schulz SJ, Ritter LJ, Armstrong DT	Effects of ovarian stimulation, with and without human chorionic gonadotrophin, on oocyte meiotic and developmental competence in the marmoset monkey (Callithrix jacchus)	Theriogenology	68	861–872
Gilchrist RB, Thompson JG	Oocyte maturation: emerging concepts and technologies to improve developmental potential in vitro	Theriogenology	67	6–15
Prasad S, Humphreys I, Kireta S, Gilchrist RB, Bardy P, Russ GR, Coates PT	The common marmoset as a novel preclinical transplant model: identification of new MHC class II DRB alleles and prediction of in vitro alloreactivity	Tissue Antigens	69	72–75
Gill TK, Taylor AW, Watson M	Trends in influenza immunisation amongst an elderly Australian community	Vaccine	25	5428–5432
Nottle MB, Beebe LF, Harrison SJ, McIlfatrick SM, Ashman RJ, O'Connell PJ, Salvaris EJ, Fisicaro N, Pommey S, Cowan PJ, d'Apice AJ	Production of homozygous alpha-1,3-galactosyltransferase knockout pigs by breeding and somatic cell nuclear transfer	Xenotransplantation	14	339–344

ONGOING GRANTS AND FELLOWSHIPS

PROJECT TITLE	SPONSOR	TOTAL FUNDING	INVESTIGATORS
Periconceptual foundations for a healthy start to life Program Grant	National Health and Medical Research Council	2007–2011 $10.8 million	Norman RJ, Rodgers RJ, Robertson SA, Thomspon JG, Lane M, Davies M, Dekker G
NHMRC Senior Research Fellowship	National Health and Medical Research Council	2005–2009 $663,250	Robertson SA
NHMRC Principal Research Fellowship	National Health and Medical Research Council	2005–2009 $643,250	Rodgers RJ
NHMRC Senior Research Fellowship	National Health and Medical Research Council	2005–2009 $588,250	Nottle MB
NHMRC Senior Research Fellowship	National Health and Medical Research Council	2005–2009 $588,250	Thompson JG
Career Development Award	National Health and Medical Research Council	2005–2009 $447,750	Davies M
Career Development Award	National Health and Medical Research Council	2005–2009 $447,750	Lane M
Career Development Award	National Health and Medical Research Council	2007–2011 $452,500	Gilchrist R
Career Development Award	National Health and Medical Research Council	2005–2009 $447,750	Russell D
Career Development Award	National Health and Medical Research Council	2003–2007 $417,500	Thomas P
Training Fellowship Overseas	National Health and Medical Research Council	2005–2009 $288,342	Redman L
Training Fellowship Australia	National Health and Medical Research Council	2004–2007 $266,500	Pitcher J
CJ Martin Fellowship	National Health and Medical Research Council	2003–2007 $368,000	Ingman W
Underwood Fellowship	Biotechnology and Biology Research Council, UK	2007 £41,400	Knight PG, Rodgers RJ* *Travel Awardee
Exploitation of unique growth factors to develop new products for infertility treatment	National Health and Medical Research Council	Development grant 2007 $130,000	Gilchrist R, Thomspon JG, Lane M
Androgen Receptor Activity in Normal and Abnormal Human Ovarian Function	National Health and Medical Research Council	Project grant 2007–2009 $408,150	Norman RJ, Hickey TE, Tilley WD
Damage to arterial extracellular matrix induced by reactive nitrogen species and its consequences	National Health and Medical Research Council	Project grant 2005–2007 $326,250 Administered by University of Sydney	Davies M
Does women's nutrition during pregnancy influence metabolic health of their children?	National Health and Medical Research Council	Project grant 2007–2009 $251,885	Moore V, Owens JA, Phillips IW, Robinson JS
Functional and epigenetic consequences of maternal folate deficiency, supplementation and fetal growth restriction	National Health and Medical Research Council	Project grant 2007–2009 $534,000	Owens JA, Robinson JS, Dziadek M
How does disruption of circadian rhythms induce diabetes?	National Health and Medical Research Council	Project grant 2006–2008 $627,332	Kennaway D, Owens JA
Macrophage-regulated tissue remodelling in endometrial receptivity for embryo implantation and pregnancy success	National Health and Medical Research Council	Project grant 2006–2008 $453,188	Robertson SA, Roberts CT
Metabolic and Molecular Determinants of Embryo Viability	National Health and Medical Research Council	Project grant 2007–2009 $549,275	Lane M, Hiendleder S, Mitchell M
Relaxin signalling in the endometrium and the regulation of early pregnancy	National Health and Medical Research Council	Project grant 2005–2007 $466,125	Ivell R
The fetal and early childhood origins of PCOS: A prospective cohort study	National Health and Medical Research Council	Project grant 2006–2008 $495,938 Administered by UWA	Hickey M, Davies M, Hart R, Franks S, Sloboda D, Doherty D
Understanding the determinants of human oocyte and embryo health	National Health and Medical Research Council	Project grant 2006–2008 $251,075	Lane M, Russell D, Davies M
A population-based survey of recent mothers in South Australia and Victoria	National Health and Medical Research Council	Project grant 2007–2010 $981,750 Administered by La Trobe University	Brown S, Robinson JS
Preclinical Studies in Xenotransplantation	National Health and Medical Research Council	Project grant 2006–2008 $1.2 million Administered by University of Melbourne	d'Apice A, Nottle M
Obesity and Infertility: effects of diet-induced insulin resistance on oocyte quality	National Health and Medical Research Council	Project grant 2007–2009 $513,000	Robker R
Relaxin signalling in the endometrium and the regulation of early pregnancy	National Health and Medical Research Council	Project grant 2005–2007 $458,625	Ivell R
Enrichment, differentiation and functional analysis of Growth Hormone progenitor cells from the adult mouse pituitary	National Health and Medical Research Council	Project grant 2005–2007 $462,750	Thomas P
Identifying the pathological mechanism of polyalanine expansion mutations in the X-linked hypopituitarism gene in SOX3	National Health and Medical Research Council	Project grant 2007–2009 $386,875	Thomas P
ARC Special Centre for the Molecular Genetics of Development	ARC Special Centre for the Molecular Genetics of Development	2007–2008 $60,000	Thomas P
Investigating the role of the UPF3B gene and nonsense mediated RNA decay (NMD) process in mental retardation	National Health and Medical Research Council	Project grant 2007–2009 $551, 500	Gecz J, Thomas P, Geschwind D, Schwartz C, Brooks D
Intergenerational growth and risk of metabolic disorders	National Health and Medical Research Council A Healthy Start to Life for All Australians Strategic Award	Strategic Award 2007–2011 $1.96 million	Davies M, Moore VM, Robins JS, Phillips D, Norman R, DeStavola B

PROJECT TITLE	SPONSOR	TOTAL FUNDING	INVESTIGATORS
Early life influences on obesity and fat patterning in children: critical periods, environmental determinants, and socio-cultural context	National Health and Medical Research Council A Healthy Start to Life for All Australians Strategic Award	Strategic Award 2007–2011 $1.09 million	Moore V, Robinson JS, Davies MJ, Warin M, Ryan P, Worsley A
Prognostic importance of androgen receptors in epithelium and stroma in early stage prostate cancer	National Health and Medical Research Council	2005–2007 $342,900	Horsefall D, Ricciardelli C, Marshall V, Tilley W
Network in Genes and Environment In Development	ARC and NHMRC Research Network	2005–2009 $1.5 million	Richards R, Roberts CT, Robertson SA, Thompson JG + 45 Others
Consent in the void: moral, legal and community values in decisions about human biological donations	ARC Discovery Grant	2007–2008 $210,000	de Lacy S
Mechanisms of infertility induced in mice by vaccination with murine ZP3	ARC Discovery Grant	2005–2007 $220,000	Shellam G, Robertson SA
A microarray platform for gene expression analysis and genotyping in biological systems	ARC Discovery Grant	2007–2009 $196,000	Tilley W, Owens J
Establishment of the endocrine axes in the embryo and their xenobiotic distortion	ARC Discovery Grant	2007–2008 $214,000	Ivell R
Development of a bioassay to measure xenoestrogens in environmnetal water samples	ARC Linkage Grant	2006–2008 $138,000	Ivell R
Improving the efficiency of bovine oocyte maturation in vitro	ARC Linkage Project	2005–2008 $460,444	Gilchrist R
How do oocytes and embryos cope with adverse environments?	NIH, NICHD.RFA Female Health and Egg Quality	2003–2008 US$1.26 million	Thompson JGE, Edwards LJ, Gilchrist RB, Kaye PL, Kind KL, Pantelon M, Roberts CT, Robertson SA
Screening fOr Pregnancy Endpoints; SA Scope	Premier's Science and Research Fund	2005–2008 $2.37 million	Dekker GA, Roberts CT, Robertson SA, Robinson J, Norman R, Richards R, North R
Development of a selection marker for placental efficiency	CRC for an Internationally Competitive Pork Industry Ltd	2006–2008 $129,299	Owens JA, Robert CT, Nottle MB
The effects of dietary arginine during gestation on the subsequent litter size of gilts and sows	CRC for an Internationally Competitive Pork Industry Ltd	2007–2009 $284,829	Owens JA, Kind KL, Roberts CT, Smits R
The effects of exogenous PST administration and feeding ractopamine in early pregancey on the birth weight and growth performance of sow pregnancy	CRC for an Internationally Competitive Pork Industry Ltd	2007–2009 $313,759	Gatford K, Owens JA, Roberts CT, Kind KL, DeBlasio M, Nottle MB
Do changes in steroid sensitivity and melatonin underpin seasonal infertility in pigs?	CRC for an Internationally Competitive Pork Industry Ltd	2007–2009 $155,000	Kennaway D, Hughes P, van Wettere W
Evaluation of omega-3 and -6 fatty acid supplementation as a nutritional approach to increase productivity in gilts and sows	CRC for an Internationally Competitive Pork Industry Ltd	2006–2008 $75,000	Mitchell M
Development of ovulation synchronization protocols to facilitate natural mating and artificial insemination	CRC for an Internationally Competitive Pork Industry Ltd	2006–2007 $155,000	Nottle MB, O'Leary S
Using GnRH analogues to address seasonal infertility in pigs	CRC for an Internationally Competitive Pork Industry Ltd	2007–2009 $180,066	Nottle MB, O'Leary S, Armstong D
Studies on cerebral palsy causation	South Australian Government Captive Insurance Corporation	2006–2007 $158,000	MacLennan A
Studies on stored serum, viral infection and cerebral palsy	Channel 7 Children's Research Foundation of SA	2007 $36,000	MacLennan A
Investigating antenatal causes of cerebral palsy	Cerebral Palsy Foundation NSW	2007–2008 $40,000	Gibson C, MacLennan A, Dekker G, Goldwater PN
A new role for AMPK in oocyte maturation and cumulus cell expansion	Serono Foundation	2005–2007 US$90,000	Mayes M, Richard F
Oocyte somatic cell interactions regulating embryo development	Research Development Award, University of Adelaide	2007 $12,000	Gilchrist R
Disruption of the circadian rythms of gene expression and the development of breast cancer	US Dept of Defence, Congressionally Directed Medical Research Programs, Breast Cancer Research Program, Idea Award	2006–2008 $170,000	Kennaway D, Butler L, Tilley W
Effect of in vitro embryo culture on placental development and function	Channel 7 Children's Research Foundation of SA	2007 $18,200	Lane M, Kind K
Intergenerational effects of pertubations on preimplantation stage embryos	Channel 7 Children's Research Foundation of SA	2007 $27,000	Robker R, Lane M
Consequences of women's nutrition during pregnancy for cardiovascular health of their children	National Heart Foundation	2006–2007 $117,643	Moore V, Davies MJ, Ryan P, Robinson JS
Prediction of Preeclampsia, Fetal Growth Restriction and Preterm labour; A longitudinal Study in High Risk Pregnancies	NIH (International Multi Centre Trial)	2003–2007 US$1.5 million	Dekker GA
Does restriction of fetal growth impair plasticity as well as function of the beta-cell after birth?	Diabetes Australia Research Trust	2007 $50,000	Gatford K, Owens J
Regulation of ovarian steroidogenic enzymes in granulosa cells by the extracellular matrix focimatrix	Faculty of Health Sciences, The University of Adelaide	2007 $10,000	Irving-Rodgers HF
Versican as a target to inhibit peritoneal adhesion of ovarian cancer cells	Hilda Farmer University of Adelaide Fellowship	2007–2009 $90,000	Ricciardelli C
Isolation of porcine multipotent cells for xenotransplantation research	Juvenile Diabetes Research Foundation International	2005–2007 US$477,000	Nottle MB
Towards pig to human transplantation	National Health and Medical Research Council Administered by St Vincents Hospital	2006–2008 $1.17 million	d'Apice A, Cowan PJ, O'Connell PJ, Nottle MB, Nandurkar H

GRANTS AND FELLOWSHIPS AWARDED IN 2007 TO COMMENCE IN 2008

PROJECT TITLE	SPONSOR	TOTAL FUNDING	INVESTIGATORS
NHMRC Senior Research Fellowship	National Health and Medical Research Council	2008–2012 $595,000	Kennaway D
NHMRC Senior Research Fellowship	National Health and Medical Research Council	2008–2012 $537,500	Lane M
NHMRC Senior Research Fellowship	National Health and Medical Research Council	2008–2012 $537,500	Clifton V
CJ Martin Training Fellowship	National Health and Medical Research Council	2008–2010 $321,684	Sferruzzi-Perri A
Peter Doherty Training Fellowship	National Health and Medical Research Council	2008–2010 $274,000	Irving-Rodgers H
A genomic basis for cerebral palsy-studies on a large Australian cohort	National Health and Medical Research Council	Project grant 2008–2010 $495,000	MacLennan A, Gibson CS, Goldwater P
Diagnostic test to predict risk for life threatening pregnancy complications	National Health and Medical Research Council	Project grant 2008–2010, $655,500	Roberts C, Dekker G
Mechanism of breast cancer metastsis: tumour cell remodelling of the extracellular matrix	National Health and Medical Research Council	Project grant 2008–2010 $363,200	Russell D, Ricciardelli C, Williams E
Regulation of oocyte quality	National Health and Medical Research Council	Project grant 2008–2010 $486,000	Gilchrist R, Russell D, Thompson JG
SlidePath Digital SlideServer Software, Acer Altos R250 Server for optimum distribution, storage, management and image analysis	National Health and Medical Research Council	Equipment grant $52,510	Owens J, Tilley WD, Norman RJ, Findlay D, Rodgers R, Roberts C, Wittert G, Ricciardelli C, Robertson SA, Callen DF, Keefe DM, Sakko AJ
A media formulation to improve implantation rates and pregnancy outcome following ART	National Health and Medical Research Council	Development Grant 2008–2009 $294,750	Roberts C, Thompson JG, Nottle MB
Genomelab GeXP Genetic Analysis System for simultaneous quantitiation of the expression level of 20-30 genes	National Health and Medical Research Council	Equipment grant $65,000	Kennaway D, Owens JA, Wittert GA, Hiendleder S, Bartold M, Norman RJ, Somogyi A, Robertson SA, Thompson JG, Roberts CT, Gilchrist R, Robker R, Russell D
Comparing light and cognitive-behaviour therapies for the treatment of sleep maintenance insommonia in older adults	NHMRC Project grant (Administered by Flinders University)	2008–2010 $370,000	Lack L, Wright H, Kennaway D
Which transgenic pig will be used for islet transplantation in humans?	NHMRC Special Program Grant in Type 1 Diabetes (Administered by St Vincent's Hospital	2008–2012 $3 million	d'Apice A, Nottle MB
Liquid Chromatography Tandem Mass Spectrometry Steroid Analysis Facility	ARC Linkage Infrastructure, Equipment and Facilities Proposal (Administered by University of Sydney	2008–2010 $356,000	Handelsman D, Norman RJ, Risbridger GP, Liu PY
Cellular signals controlling oocyte activation	ARC Discovery Project Grants (Administered by University of Newcastle	2008–2010 $270,000	Mc Laughlin E, Russell D, Robker RL
Angiogenic factors and pregnancy complications that compromise maternal, fetal and infant health	Channel 7 Children's Research Foundation of SA	2008 $49,000	Roberts C, Dekker G
Does restriction of fetal growth impair plasticity as well as function of the beta-cell after birth?	Diabetes Australia Research Trust	2008 $50,640	Gatford K, Owens JA
The role of latent TGB beta in the ovary	Research Development Award, University of Adelaide	2008 $12,000	Rodgers R
Metabolic programming:impact of insulin and IGFs on blastocyst metabolism	Go8/DAAD Aust Germany Joint Research Co-operation Scheme	2008–2009 $16,000	Owens J
Epidemiological and clinical research into cerebral palsy	Cerebral Palsy Institute/Innovative Research Grant	2008–2009 $115,000	MacLennan A
Precision beef cattle production through an alternative genetic approach	Queensland Government Reinvestment Fund	2007–2010 $1.35 million	Burns B, Hiendleder S, Herring A
SlidePath Digital SlideServer Software, Acer Altos R250 Server for optimum distribution, storage, management and image analysis	Faculty of Health Science University of Adelaide	Equipment grant $30,000	Owens J, Tilley WD, Norman RJ, Findlay D, Rodgers R, Roberts C, Wittert G, Ricciardelli C, Robertson SA, Callen DF, Keefe DM, Sakko AJ
Genomelab GeXP Genetic Analysis System for simultaneous quantitiation of the expression level of 20-30 genes	Faculty of Health Science University of Adelaide	Equipment grant $20,000	Kennaway D, Owens JA, Wittert GA, Hiendleder S, Bartold M, Norman RJ, Somogyi A, Robertson SA, Thompson JG, Roberts CT, Gilchrist R, Robker R, Russell D

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