phi
prince henry's institute
science for better life®

prince henry's institute
2013 scientific report

OUR VISION

To improve health through hormone research.

OUR MISSION

To improve quality of life through the investigation of hormones in the fields of reproductive health, cancer, obesity, bone health and cardiovascular disease.

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OUR VALUES

- **Quality and integrity** in our research
- **Empathy** for those we help
- **Leadership and excellence**

WE AIM TO:

- Improve early detection, diagnosis, prevention and treatment of disease
- Contribute to national and international health priorities
- Lead in the publication of new scientific knowledge
- Enhance scientific education through innovative research
- Increase community awareness through the promotion of research
- Foster partnerships with others that support PHI's vision, mission, values and aims

CONTENTS

ABOUT US

Prince Henry's Institute (PHI) is Australia's leading not-for-profit centre for translational reproductive health and hormone research.

Our research team is working to improve understanding of the role of hormones in fertility and the diagnosis, treatment and prevention of disease. We believe that translational research is the most effective way to link the laboratory to the bedside and make a real and lasting difference for patients and their families. This is why our team uses innovative fundamental and clinical research approaches to actively shape the future of clinical practice and improve healthcare both in Australia and throughout the world.

Our insights into the role of hormones in fertility and disease are helping to address key health challenges both in Australia and throughout the world. Our research aims to understand and address the following:

- Cancer
- Cardiovascular Disease
- Reproductive health and fertility
- Obesity
- Bone Health and Osteoporosis
- Parkinson's disease

Our history

Established in 1960 under the leadership of Professor Bryan Hudson and later Professor Henry Burger, our first research laboratories were located at Prince Henry's Hospital in South Melbourne. In the early 1980s, Prince Henry's Hospital amalgamated with Queen Victoria Medical Centre and Moorabbin Hospital to form Monash Medical Centre. Research continued at the South Melbourne site until 1991, when the laboratories relocated to Monash Medical Centre in Clayton to form Prince Henry's Institute of Medical Research.

Building a reputation for research excellence and innovation, our researchers have been working for over fifty years to drive world leading research programs and actively shape clinical practice to improve patient outcomes both within Australia and throughout the world.

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Research highlights:

- The development of technologies to improve the detection of common hormone deficiencies
- A key role in the discovery and isolation of reproductive hormone inhibin
- Application of inhibin discovery to produce diagnostic blood test for the detection of some ovarian tumours
- A key role in the development of a new class of drugs for breast cancer treatment - aromatase inhibitors
- Successful completion of studies showing the essential role of the aromatase gene in breast cancer development, sperm formation and the metabolism of body fat
- Joint development and commercialisation of a biochemical test for the detection of endometrial cancer
- Innovative studies to progress development of novel hormonal contraceptives for men
- Established key role of male only gene, SRY, in regulation of dopamine in the male brain
- A key role the identification of key targets for the preservation of fertility in female cancer patients and women in early menopause

CHAIRMAN'S & DIRECTOR'S REPORT

Welcome to the final Annual Scientific Report for Prince Henry's Institute (PHI).

In late 2013, after more than 50 years of medical research and discovery, the PHI Board announced its support for a merger with long-time research and precinct partner, Monash Institute of Medical Research (MIMR). This is both the end and beginning of an era, as we undertake the complex journey to the official merger on 1 January 2014.

The PHI Executive will work alongside the Board and Board Chair, Dr Bob Edgar, over the coming months to provide direction and leadership during this time of change. We hope that together we can embrace this new era of medical research with a sense of opportunity and optimism, as we take our place as one strengthened, leading research Institute.

In October we farewelled Chief Financial Officer, Mr Peter Murray, who after six years with PHI departed to pursue new opportunities in the not-for-profit sector. We thank Pete Murray for his dedicated financial and HR support, as well as his willingness to provide advice and act as a mentor for many. His considerable achievements include the transformation of financial reporting and the business migration of PHI upon the Medical Institute's Repeal Bill of 2008.

With the appointment of Professor Bryan Williams as CEO/Director of both PHI and MIMR, Professor Matthew Gillespie moved to focus on his research and new opportunities with Monash University. An outstanding leader with a keen understanding of the Australian research sector, Professor Gillespie provided strong strategic and administrative direction during his six years as CEO/ Director of PHI, underpinning the Institute's position as a research leader in endocrinology and reproductive health, and maintaining its competiveness within government and philanthropic funding streams.

In 2013, our researchers contributed to innovative reproductive health and hormone research that will lead to improved clinical outcomes for patients. Of the 14,000 new cases of breast cancer diagnosed each year in Australia, 70 per cent are hormone receptive, making research to improve diagnosis and treatment of these tumours vital. In an exciting step towards targeted treatment for hormone-sensitive breast cancer, researchers in the Metabolism and Cancer Laboratory published research in the Journal of Clinical Endocrinology and Metabolism in 2013, showing for the first time how breast tissue produces oestrogen. Using samples from patients diagnosed with Peutz Jeghers Syndrome, a disorder often linked to breast growth, they have been able to understand how associated mutations of the STK11 gene increase aromatase levels, leading to the development of abnormal breast tissue in these patients. This research has confirmed LBK1 as a therapeutic target for the development of new breast cancer therapies.

The Ovarian Cancer Biomarkers Laboratory continues its partnership with the Ovarian Cancer Research Foundation to drive vital research towards early diagnosis of ovarian cancer and development of more effective therapies to improve outcomes for patients with this difficult-to-treat disease. In a new discovery, the group has shown how some high-grade serous ovarian tumours modify CXCL10, a protein linked to inflammation, to suppress the body's normal immune response, and enable tumour growth and spread. The group has identified existing drugs used to treat diabetes that may be useful to treat patients with ovarian cancer.

One of the greatest challenges facing medical researchers is the need for funding to ensure that they have the resources and equipment to drive cutting-edge innovation to tackle our most pressing health challenges. Philanthropic and community funding support has played a key role in ensuring our competiveness. Support through the Harold Mitchell and CASS Foundations was instrumental to ensuring that our researchers were able to attend and present at international conferences and events.

In 2013, Dr Guiying Nie was the recipient of one of the largest grants awarded by the Bill & Melinda Gates Foundation's Grand Challenges Program, receiving almost $1 million in Phase II funding to validate the effectiveness of an early detection test for pre-eclampsia.

The National Health and Medical Research Council (NHMRC) recognised several of our researchers in their 2013 funding round, with the Institute receiving over $3.8 million in Fellowship and Project Funding. Dr Ashwini Chand received recognition as an RD Wright Biomedical Career Development Fellow and Dr Sarah To as a CJ Martin Biomedical Early Career Development Fellow.

PHI is grateful for the government, philanthropic and community support it has received during the past fifty years of its operations. This investment not only underpins the future of discovery and innovation, but will also lead to increased health and wellbeing for future generations in Australia and around the globe.

A great example of the important role of research in helping to improve understanding of human biology and disease is Professor Vincent Harley's collaboration with researchers at Murdoch Children's Research Institute and University of Queensland. In 2013, the team established a website, www.dsdgenetics.org, to assist patients with disorders of sexual development, their families, clinicians and the general community.

In 2013, Australian athlete, Jana Pittman, accepted a role as PHI Ambassador; a major step forward for the PHI Foundation's corporate and donor engagement strategy. Jana took a break from her medical studies and training for the Winter Olympics in February 2014 to join the Foundation in hosting their Women, Sport and Health cocktail function in March.

To attract the very best scientific talent, we need to be able to provide a creative, innovative research environment with competitive access to funding. With over 400 world-class researchers and students and access to state-of-the art technology and research platforms, joining forces with MIMR will allow us to do this and more.

As one of Victoria's top five independent medical research institutes, for the first time we will have the presence and influence to not only drive discovery, but also shape the future agenda of Australian and global discovery, and target our research program to tackle the most pressing health challenges. As the translational research hub on the Monash Health Translation Precinct, we will be in an enviable position with access to some of Australia's educational and health leaders. Working closely with Monash University and world-leading clinical specialists at Monash Health, we will be able to build a responsive research program to drive innovation for those who need it most, foster new generations of scientific talent and translate discoveries into tangible health outcomes for generations to come.

Finally, as we prepare to embrace this exciting new chapter for research at the Institute, I would like to acknowledge those at the core of its legacy, the extraordinary people who support and drive our innovative cutting-edge research and vision to improve health through hormone research.

To the PHI leadership team, research and administrative staff and students, whose talents, commitment and passion have continued to make this all possible, we say thank you.

Dr Bob Edgar,
Chairman

Professor Bryan Williams,
Director

THE BOARD

Board of Prince Henry's Institute of Medical Research Inc
ABN 48 132 025 024

Chairperson
Dr Robert (Bob) Edgar
BEcon(Hons) PhD(Econ) FAICD

Deputy Chief Executive Officer of the ANZ Banking Group Limited Banking Group Limited until April 2009, Dr Edgar brings extensive financial services experience to his role as Chair of the PHI Board. He also serves on the boards of a number of organisations, including Asciano Group, Centro Retail Group, Linfox Armaguard Pty Ltd, Nufarm Limited, Transurban Ltd, AMMB Holdings Berhad.

Special responsibilities:
Chair of the Investment Committee; member of the Finance and Audit Committee

Chief Executive Officer
(until Nov 2013)
Professor Matthew Gillespie
BSc (Hons) PhD

Professor Gillespie was Director of Prince Henry's Institute since 2008 and also leads the Bone, Joint and Cancer laboratory. He serves on a number of scientific boards and is a member of the Research Committee of the National Health and Medical Research Council (NHMRC).

Special responsibilities:
Chief Executive Officer, Member of Intellectual Property and Commercialisation Committee, Investment Committee and of the Foundation.

Mrs Jane Bell B Ec LLB LLM FAICD

Board member of the Company's predecessor since 2002, Mrs Bell has practised as a financial lawyer for 22 years and worked in legal roles in corporate treasury and financial services operations both in Australia and internationally. She also serves on the boards of Melbourne Health, Worksafe Victoria and Westernport Water.

Special responsibilities:
Chair of Intellectual Property and Commercialisation Committee and member of the Finance and Audit Committee .

Ms Jennifer Joiner BEcon CPA

Ms Joiner has an extensive background in Australian and global life sciences business sector including senior executive positions at Idexx Labs, Bayer AG and GE Medical Systems Australia Pty Ltd.

Special responsibilities: Member of Intellectual Property and Commercialisation Committee.

Professor Christina Mitchell
MBBS PhD

A Member of the Board since 2011, Christina is currently the Dean of the Faculty of Medicine, Nursing and Health Sciences, Monash University. She has extensive management experience including roles heading up the Department of

Biochemistry and Molecular Biology, which quadrupled its size and research budget under her leadership, and the School of Biomedical Sciences. A trained physician and researcher, Christina specialises in clinical haematology.

Professor Pauline Nestor
BA (Hons), MPhil, DPhil (From Nov 2013)

Professor Nestor is currently Pro Vice-Chancellor (Research) at Monash University. Previous appointments at Monash University have included

Associate Dean (Research), Faculty of Arts and Academic Adviser to the Office of the Deputy Vice-Chancellor (Research). A highly published expert in nineteenth-century English literature and culture, Professor Nestor completed a BA (Hons) at Melbourne University, before attending Oxford University as a Rhodes Scholar.

Associate Professor Wayne Ramsey AM CSC MBBS MHA FRACMA

A member of the Company's predecessor since 2007, Associate Professor Ramsey has a strong background in health and management. Following a successful military career, including the role of Director General Defence Health Service, Associate Professor Ramsey moved into research, clinical and medical services and is currently Executive Director of Medical Services and Quality for Southern Health. He currently also serves on the Kitya Board responsible for Jesse McPherson Hospital.

Professor Euan Wallace AM MBChB, MD, FRCOG, FRANZCOG

A world-leader in Obstetrics, Professor Wallace is Director of Obstetric Services at Monash Health, Head of Department and Carl Wood Professor of Obstetrics and Gynaecology at Monash University and the Director of The Ritchie Centre. Professor Wallace is Chair of the Scientific Advisory Board, Gravida, The University of Auckland, New Zealand, and a member of the Scientific Advisory Board, Kolling Institute of Medical Research, The University of Sydney. He is also a member of the Strategic Advisory Committee, Judith Lumley Centre, La Trobe University.

Mr John Weste BSc MBA

Mr Weste is a business executive with over 25 years global experience working with leading management consulting firms. He joined the Board of Directors in April 2009. Mr Weste is Director of The Richelieu Group, a corporate advisory firm that focuses on building high-performance teams during major business transformation programs. He also serves on the board of Hocking Stuart Pty Ltd.

Special responsibilities:
Chair of Prince Henry's Institute Foundation.

In 2013, the Foundation implemented a range of key strategic initiatives to strengthen corporate engagement and sponsorship and the Institute's positioning within the medical research marketplace.

PHI Foundation

Highlights for 2013:

- Launch of the Foundation's engagement website (http://princehenrysfoundation.org)
- Appointment of a high-profile Ambassador, Jana Pittman
- Women, Sport and Health Cocktail Function
- Continued expansion of membership

Launched in early 2013, the Foundation website has addressed a long-term gap in the Institute's online engagement with corporate and community investors. This site provides a platform for the Foundation's engagement and fundraising activities targeting high net-worth and corporate donors and sponsors.

In March, the Foundation announced the appointment of Institute Ambassador, Jana Pittman. A former Olympian, Ms Pittman is currently studying medicine at the University of Western Sydney with the view of specialising in obstetrics and gynaecology and undertaking medical research in this area. Her interest in reproductive health, endocrinology, and medical science along with her high national and international profile make her an excellent fit as an Ambassador. Since her appointment, Ms Pittman has co-hosted the Women, Sport, and Health cocktail function, as well as being the face of major donor campaigns for the Institute's annual fundraising program. She has also engaged with the Institute on social media and been featured in publications to promote her involvement with PHI and support of its research.

Following a membership drive in 2013, Ninette Demasi joined the committee in August. A respected member of the Victorian business community and advocate for women's issues, she will use her strong business background and networking skills to drive donor engagement and fundraising.

Mr John Weste
BSc, MBA
Chair, PHI Foundation

Ms Ninette Demasi
Founder, Independently Woman

Ms Fiona Le Brocq
Marketing Director, Seek Limited

Professor Matthew Gillespie BSc (Hons) PhD
Director, PHI

Mr David English
Industry Executive, Banking and Financial Services, Tata Consultancy Services

Mr Dylan Simmons
Director and Founder, RHS Business Services

Ms Natalie Allan
Operations Manager, hockingstuart Franchise Group

Mr Graeme Goldman
Co-Founder, H & G Partners

Ms Georgia Beattie
Founder and Director, Lupé Wines

1 RESEARCH REPORT: CARDIOVASCULAR HEALTH

Cardiovascular Endocrinology Laboratory

Steroid Receptor Biology Laboratory

1. CARDIOVASCULAR HEALTH

CARDIOVASCULAR ENDOCRINOLOGY LABORATORY

New treatments for heart disease are becoming an increasing priority, with diagnosis increasing globally due to obesity, sedentary living, and social lifestyle factors. Patients diagnosed with heart failure experience significant benefits when treated with a combination of traditional and hormone receptor blocking medications. Despite these benefits, the risk of side effects limits their use. Our research focuses on specific cell types within the heart where we know this receptor is critical for heart disease, to identify new targets for alternative therapies without the side effects associated with existing drugs.

Laboratory Head: Dr Morag Young

As the leading cause of death and disability worldwide, heart disease remains one of the most pressing and significant social and economic health challenges facing the world today. While we know mineralocorticoid receptor (MR) inhibiting drugs offer significant benefits to patients undergoing treatment for heart failure, however, the risk of side effects continues to limit their widespread use.

Our research has previously highlighted the importance of MR and its role in cardiovascular disease and the development of cardiac tissue inflammation and fibrosis. In particular, we have confirmed that MR plays two unique and fundamental roles in heart muscle and immune cells (macrophages) driving fibrosis and inflammation.

Building on these discoveries, we are now working to determine how the MR acts in cells critical in the development of heart failure and hypertension. Translation of these findings will aid the development of targeted drugs that act specifically on the heart without the side effects associated with MR blockade in other tissues such as the kidney.

MR activation in immune cells in heart disease

Previously we have shown inflammatory cells to be key sites of MR action in the development of several forms of heart disease. These studies have identified the importance of the MR in driving the macrophage to develop a full inflammatory response. We have also performed studies in mice that cannot recruit inflammatory cells and have validated our provocative findings that MR in macrophages is essential for the development of heart disease and high blood pressure. These studies have identified the importance of the MR-activated macrophage in the regulation of fibroblasts (the collagen producing cells) in the diseased heart and in the turnover of connective tissue. Our data also showed that MR-activated macrophages control blood pressure and blood vessel wall inflammation.

MR activation in heart muscle cells in heart disease

The MR also plays a key role in the function of the heart muscle cells (cardiomyocytes). We previously showed that the MR in these cells regulates the recruitment of inflammatory cells to the heart to drive the tissue inflammation and fibrotic signals that determine the overall level of fibrosis in the heart. We have recently shown that the MR plays an important role in cardiomyocytes, which are critical for the heart's response to ischemia as would occur in the event of a heart attack.

If the MR is blocked or deleted in these cells, the heart experiences significantly less injury. Through the support of philanthropic funding from ANZ Charitable Trust we have established echocardiography for mice to enhance the suite of in vivo testing available in the Institute to enable the determination of molecular mechanisms with functional outcomes.

MR activation in endothelial cells in hypertension and heart disease

We have recently shown that endothelial cells also play a distinct and important role in MR-mediated the inflammatory and fibrotic processes, which underlie MR-mediated cardiovascular disease. Endothelial cell MR signalling is necessary for macrophage recruitment in the DOC/salt treatment model. Although endothelial cell MR signalling was found to regulate endothelial cell relaxation in large arteries like the aorta it did not regulate the function of resistance vessels, which are important for regulating blood pressure. Consistent with these findings, we found that MR signalling in endothelial cells does not play a role in DOC/salt blood pressure regulation. However, therapeutic targeting of endothelial cell MR may limit macrophage recruitment to cardiac and vascular tissues and thereby provide protection for cardiac remodelling and atherosclerosis, for example.

Identification of heart-selective MR antagonists

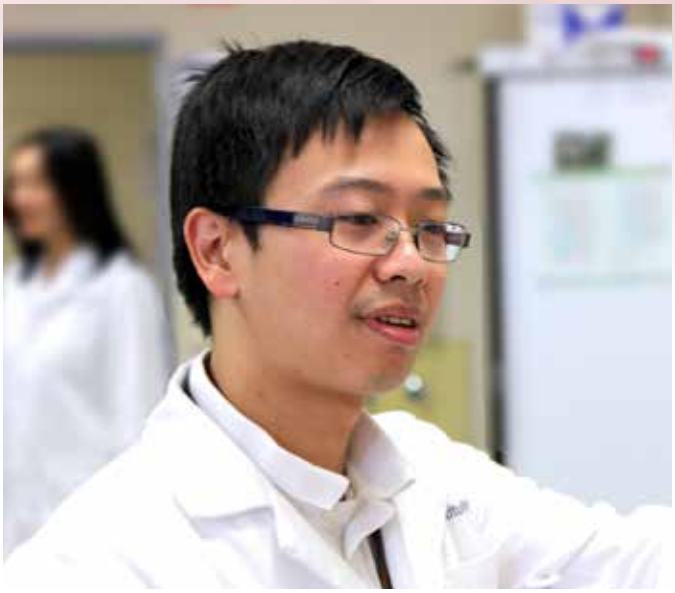
The MR is a unique receptor in that it can bind to two types of hormone, mineralocorticoids (aldosterone) and glucocorticoids (cortisol). Subtle differences in the structure of the MR, when it is bound by either aldosterone or cortisol, suggest that regulation of the MR by the ligand bound may be 'fine-tuned' by the overall shape of the receptor and thus its potential for binding other regulatory proteins.

As a result of these subtle changes, different subsets of accessory proteins can bind to the MR with either hormone to result in different gene expression. We have identified several novel proteins that interact with the MR in a ligand selective manner. We also have identified novel proteins that interact with the MR differently, depending on the cell type they are investigated in. This is proof of principle that we may be able to identify tissue-specific proteins that regulate the MR.

Yizhou (Vicky) Yao

Cardiovascular Endocrinology Laboratory (L): Laura Bienvenu, Elizabeth Fletcher, Dr Jun Yang, James Morgan, Dr Jimmy Shen, Dr Morag Young

Our overall aim is to use these novel proteins to screen and develop new, selective drugs for the treatment of hypertension and heart disease.



Dr Jimmy Shen

L - R: Dr Simon Chu, Professor Peter Fuller, Francine Brennan

1. CARDIOVASCULAR HEALTH

STEROID RECEPTOR BIOLOGY

Steroid hormones such as cortisol, aldosterone and oestrogen mediate their effects via cellular receptors, making them one of the most important therapeutic targets in medicine and a focus for hormone research to tackle serious disease. Greater understanding of the complex molecular interaction of these hormones is opening new avenues for tackling a range of diseases, including cardiovascular disease and endocrine cancers.

Laboratory Head: Professor Peter Fuller

The messengers of the body's complex endocrine system, steroid hormones control many essential physiological functions. Interestingly, these hormones also play a key role in the pathogenesis of cardiovascular disease and cancers of the breast and prostate through their interactions with gene expression regulators known as nuclear receptors.

Focused primarily on the complex molecular actions of these receptors at the tissue and hormonal level, our research aims to understand their role in disease and identify novel therapeutic agents. As is often the case in the world of biology, however, 'the devil is in the detail' when investigating these systems.

Understanding the mineralocorticoid receptor

Pathological activation of the mineralocorticoid receptor (MR), a nuclear receptor for the steroid hormone aldosterone, promotes cardiac fibrosis and heart failure. Commonly administered to heart attack patients, diuretic drugs such as eplerenone and spironolactone, are effective inhibitors of inflammation triggered by MR. However, there are concerns about serious side effects, including dangerously elevated potassium levels in some patients, leading to renal failure.

We have been working with researchers from PHI's Cardiovascular Endocrinology Laboratory to identify proteins that act as potent MR co-regulators. We have also developed novel approaches to exploring the molecular mechanisms that inhibit MR, as well as a novel mouse model to dissect the different mechanisms of its action.

There is evidence of MR expression in a range of other tissues; however, its role in these remains unknown. Recent data from an NBCF-funded multi-centre study, including PHI researchers, suggest a role for the MR as a tumour suppressor gene in breast cancer. Early findings from studies now in progress appear to confirm a key role for MR in normal and cancerous breast tissue. This finding is the subject of intense investigation at present. We are also using the laboratory's combined expertise to discover unexpected roles for the MR in the ovary.

Granulosa cell tumours of the ovary

Granulosa cell tumours of the ovary are hormone dependent, meaning they produce, convert and respond to steroid hormones. In its adult form, the granulosa cell tumour (GCT) arises from a unique mutation in the FOXL2 gene, which plays a key role in the growth and maintenance of the ovary. We have characterised this mutation in several cohorts of GCT. Spearheading this research at PHI, L'Oréal Paris OCRF Research Fellow, Dr Simon Chu, has been investigating the role of nuclear receptors and other signalling pathways in the development of GCT and their possible relevance as therapeutic targets.

Ovarian phenotype of the IKKβ null mouse

Our research has implicated a family of transcription factors known as nuclear factor κB (NF-κB) in the initiation and progress of GCT. To enable further investigation of the role of NF-κB signalling in the normal ovary, Senior Postdoctoral Fellow, Dr Ann Drummond, has created a transgenic mouse model known as the IKK-β conditional knockout mouse. With NF-κB signalling deactivated in the ovary, the model has demonstrated a key role for this signalling pathway in ovulation.

Nuclear receptors in thyroid cancer

We are currently collaborating with former PhD student and Head of Endocrinology at Eastern Health, Professor Chris Gilfillan, on a research program addressing key issues in thyroid cancer. PhD student and clinician, Dr Michael Mond, has established the mutational status of a large cohort of thyroid cancers and identified novel aspects of the role of nuclear receptors in the pathogenesis of thyroid cancer.

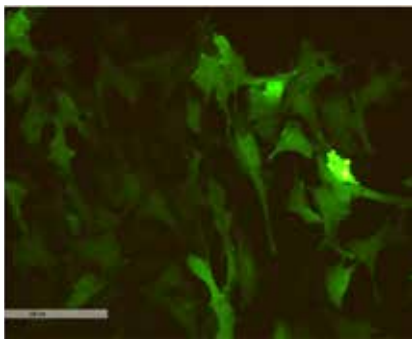
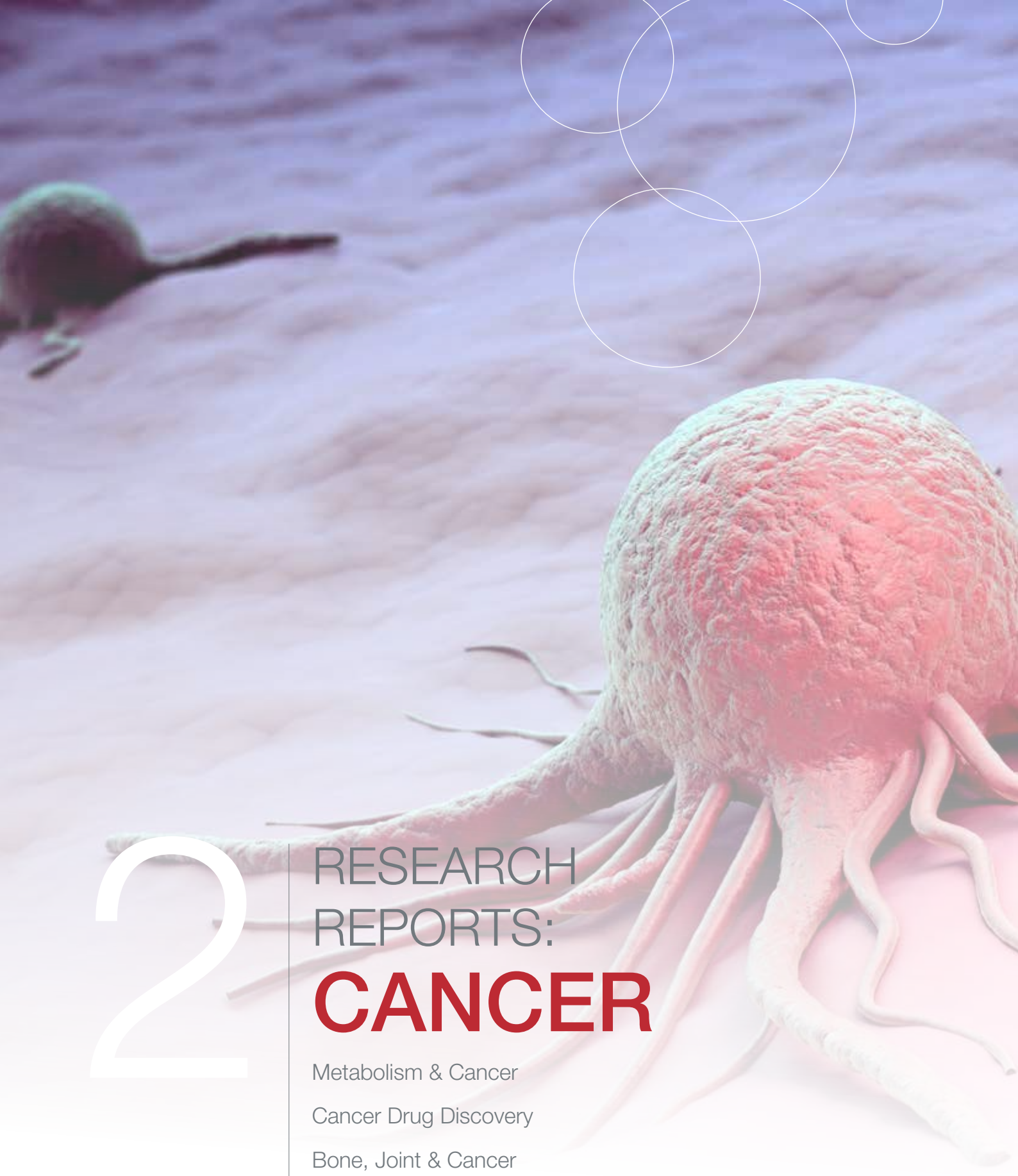


Image: Rat primary granulosa cells transduced with lentiviral pseudoparticles expressing green fluorescent protein (GFP).



2

RESEARCH REPORTS: CANCER

Metabolism & Cancer

Cancer Drug Discovery

Bone, Joint & Cancer

Ovarian Cancer Biomarkers

2. CANCER RESEARCH

METABOLISM & CANCER

Obese or overweight postmenopausal women are twice as likely to develop breast cancer as those who maintain a healthy weight. To understand this increased risk, our team has been working to unravel the complex relationship between obesity and breast cancer, identifying several molecular pathways linking normal metabolic processes within the body to development of the disease. We are now investigating how we can translate these findings into improved breast cancer treatments and preventative measures.

Laboratory Heads:
Professor Evan Simpson and Dr Kristy Brown

Breast cancer affects one in nine women under the age of 85, with 70 per cent of those diagnosed found to have hormone-sensitive tumours. With serious side effects leading many women to discontinue vital hormone-inhibiting treatments, improved therapeutic options remain a critical priority. With a focus on several obesity-associated metabolic pathways and the production of oestrogens, we are continuing to explore opportunities to develop and assess novel treatments for breast cancer.

In 2013, we combined fundamental and clinical research approaches to further our understanding of key metabolic pathways shown to affect oestrogen production in postmenopausal women and the impact of these pathways on breast cancer risk. To progress clinical translation of our findings, we have also been recruiting participants for clinical trials stemming from earlier research outcomes in this area.

Obesity is a major risk factor for breast cancer, due in part to molecular pathways that stimulate expression of the enzyme aromatase in body fat. This enzyme converts androgens such as testosterone into oestrogens, a well-known cancer cell proliferation promoter involved in most cases of breast cancer. This explains why obese postmenopausal women are at such a significantly higher risk of developing breast cancer than their slimmer counterparts.

In previous research, we identified the LKB1/AMPK pathway as an important inhibitor of aromatase expression. LKB1 and AMPK are kinases associated with tumour suppression, and carbohydrate and fat metabolism, respectively. AMPK is already a therapeutic target for treating diabetes; its biochemical linkage with LKB1 suggests that diabetes drugs may also be useful for treating some forms of cancer, including tumours in the breast.

Based on these findings, we are investigating several AMPK-activating drugs as candidates for the treatment and prevention of oestrogen-dependent breast cancer. One such drug has proved successful in an in vitro study and we have commenced a clinical trial involving women with breast cancer.

Peutz-Jeghers Syndrome provides a solid link between LKB1 and aromatase

Working in collaboration with endocrinologists at the University of Western Australia, we have studied precious tissue samples from patients with a rare disease, Peutz Jeghers Syndrome. These boys carry mutations in the STK11 gene, which encodes for LKB1, and tend to have manifestations of oestrogen excess, including advanced bone age and breast development. Examining testicular and breast tissue from these patients has allowed us to demonstrate a clear link between LKB1 and aromatase, thereby strengthening the hypothesis that therapeutics targeting this axis may have benefit for the treatment of oestrogen-dependent cancer.

LKB1/AMPK-related pathways and aromatase

We are also examining several LKB1/AMPK-related pathways, including the p53 pathway. This pathway regulates the cell cycle while inhibiting both cancer cells and the hypoxia-inducible factor (HIF) signalling pathways, specifically HIF-1α. This is important, as most human cancers contain tumour cells with a genetic mutation or deletion that has caused loss of activity of the p53 protein or over-expression of HIF-1α.

Our current research aims to determine how the p53 and HIF-1α pathways regulate oestrogen production in the breast adipose stromal cells of postmenopausal women and whether this is critical for the expression of aromatase. In 2013, we published findings that HIF-1α stimulates aromatase and hence oestrogen biosynthesis in adipose stromal cells. Using clinical breast cancer samples,

we demonstrated that there is a positive association between HIF-1α and aromatase expression in breast tissue. These findings suggest that therapies that target HIF-1α would also inhibit aromatase and may be useful for the treatment of oestrogen-dependent tumours. We are currently examining samples from Li-Fraumeni patients, who have mutations in the gene that encodes p53, and tend to develop a number of cancers, including that of the breast.

Treatment or prevention of postmenopausal breast cancer

We have successfully demonstrated in vitro that the AMPK-activating drug, metformin, widely prescribed for type-2 diabetes, is a significant inhibitor of aromatase expression in adipose stromal cells (fatty tissue).

We are continuing to progress our collaborative study with Professor Susan Davis at the Alfred Hospital. Initiated by PHI in 2010, this study will examine the effects of metformin on basal aromatase expression within the breast of postmenopausal women.

Now underway, recruitment for this study focuses on women undergoing elective breast reduction surgery for unrelated reasons. To measure metformin's impact on oestrogens within the breast, participants will take a four-week course of metformin prior to their breast reduction and will donate a small portion of their breast tissue at surgery. Researchers hope the study will assist in determining metformin's effectiveness as a targeted treatment to decrease oestrogens within the breast to help prevent the occurrence of breast cancer.

Additionally, we are also continuing to progress our collaborative neo-adjuvant study with Monash Health. Now registered, the study will involve 60 Victorian women diagnosed with breast cancer, with the aim of determining metformin's effectiveness in inhibiting tumour cell growth to enable less invasive surgical intervention. Designed in 2011, the study will see participants given a two-week course of orally administered metformin and compared to a two-week course of aromatase inhibitor prior to surgery. We hope that metformin will halt oestrogen biosynthesis and arrest tumour growth in these patients, enabling less evasive surgical treatment.

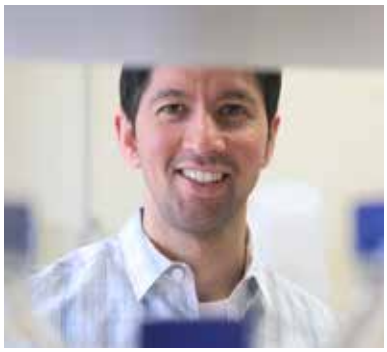
As part of a team led by Professor Susan Davis, we received NHMRC funding in 2013 to pursue clinical studies aimed at examining the effect of metformin on the development of endometrial hyperplasia and cancer. With recruitment to begin in 2014, this study will involve giving the drug to women with breast cancer who are taking tamoxifen, placing them at increased risk of developing endometrial disease. This study is another example of the exciting initiatives our group is driving to improve the quality of life of women undergoing breast cancer treatment.

Regulation of oestrogens in obesity

Cancer and obesity alter fat-derived factors such as adipokines (a cell-to-cell signalling protein secreted by adipose tissue) and inflammatory factors, including prostaglandin E2 (PGE2). Previously, we demonstrated that the adipokine leptin, which is elevated in obese people, and PGE2 both inhibit the LKB1/AMPK pathway, increasing the expression of aromatase and, as a result, oestrogen production.

Conversely, we also found that the adipokine adiponectin, which is elevated in lean people, inhibits aromatase expression and lowers oestrogens. Research funded by the National Breast Cancer Foundation (NBCF), due to begin in 2014, will explore the role of a gut-derived hormone, known to be altered in obesity, for its role in influencing aromatase expression and tumour growth. We will continue to progress further investigations to understand the mechanisms by which these and other factors influence cell metabolism and aromatase expression.

• PHI researchers Dr Kristy Brown and Professor Evan Simpson from the Metabolism & Cancer team, and their University of Melbourne collaborator Professor Stephen Fox, received an NHMRC Project Grant for 2011-13. Dr Brown is also the recipient of an NBCF Novel Concept Award to pursue her studies. The Metabolism & Cancer Laboratory will continue to investigate the regulation of oestrogen production, with the aim of developing breast-specific oestrogen inhibitors.



Dr Kevin Knower

2. CANCER RESEARCH

CANCER DRUG DISCOVERY

The incidence of breast cancer is steadily increasing with more than 10,000 Australians diagnosed each year. Despite significant advances in diagnosis and treatment, many challenges remain.

Laboratory Head: Dr Colin Clyne

Our research addresses key issues in the diagnosis and treatment of breast cancer including the development of resistance to current hormonal therapies, side effects of these treatments, and the lack of effective treatments for hormone-independent breast tumours. By understanding how hormones such as estrogen are produced and regulated in the breast, we hope to identify new targets for treatment of tumours that do not respond to current therapies.

Developing better breast cancer treatments

Most breast cancer patients suffer from hormone-dependent disease that requires the female sex hormone oestrogen for continued growth. These cancers can be treated using anti-oestrogen drugs such as tamoxifen. Tamoxifen blocks the ability of oestrogen to stimulate cancer cell division, and it is usually prescribed for 5 years. However, up to 50% of patients self-discontinue tamoxifen after only 2 years, because they cannot tolerate the long-term side effects of oestrogen blockade (most commonly bone and joint pain, osteoporosis and cognitive disturbance). These side effects arise because oestrogen action is also blocked in tissues where its action is essential – bone and brain, for example. A key goal of our research is to design better anti-oestrogen drugs with fewer side effects, which are therefore more acceptable to patients.

We have identified key proteins that stimulate oestrogen synthesis in breast cancer tissue, but not in other tissues such as bone and brain.

Current work aims to:

- understand how these proteins work at the molecular level
- identify ways to inhibit their action in breast cancer tissue

Epigenetic regulation of oestrogen production in breast cancer

While the genetic factors that contribute to oestrogen production are fairly well understood, epigenetic factors are much less well studied. Understanding these processes is critical for the development of more effective anti-oestrogen therapies that act in a tissue-specific manner

Epigenetics describes traits that are heritable, yet not based upon a change in primary DNA sequence. Epigenetic changes occur at a higher frequency than genetic changes, occur at defined regions in a gene, and can be reversed upon treatment with therapeutic agents.

We have shown that oestrogen production is under epigenetic regulation in breast cells and are currently expanding this theme to investigate the epigenetic regulation of key genes involved in oestrogen metabolic pathways. We are particularly interested in identifying changes in epigenetic status between normal and cancerous tissue.

Understanding resistance to breast cancer therapies

Most breast cancer patients have tumours that require the female sex hormone oestrogen to grow and develop. Blocking this action of oestrogen (using drugs like tamoxifen) is a commonly used and effective therapy. However, many patients develop resistance to these drugs, leading to disease recurrence with poor prognosis. Understanding how therapeutic resistance occurs is therefore critical for the development of more effective therapies.

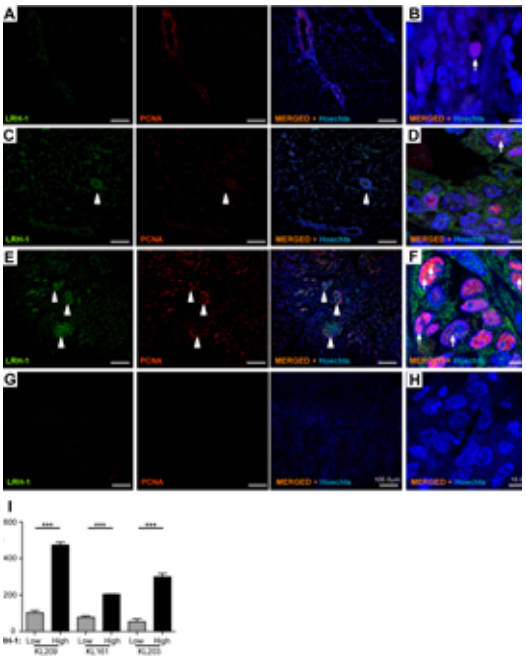
We have identified a novel protein (of unknown function) that becomes activated in breast cancers that have developed resistance to tamoxifen.
We have shown that this protein amplifies the effects of oestrogen - making breast cancer cells more responsive to the hormone, and increasing their ability to divide and spread. This effect may make cells less responsive to tamoxifen, thereby contributing to the development of resistance.

We are currently working to:

- understand how this protein modulates oestrogen action at the molecular level
- determine its potential as a marker to identify patients who may not respond well to tamoxifen

Nuclear receptors as novel therapeutic targets

New targets are urgently required for patients whose tumours do not respond to oestogen blocking therapies. We are also investigating proteins that are structurally related to the estrogen receptor to determine if they are present in breast cancer tissue - and their potential role in Dr David Nickolic-Patterson (Monash University) driving cancer progression. We have linked one such receptor (LRH-1) to the stimulation of breast cancer cell proliferation and invasion, and more recently, we uncovered its mechanism of action. As we identify genes regulated by LRH-1 in the breast, we are increasing our understanding of how it promotes breast cancer progression and how we might disrupt these processes. As part of this research, we are also working to identify small molecule inhibitors of LRH-1 and to determine their inhibitory effects on breast cancer growth and development through testing using human cells and mouse models of breast cancer.



2. CANCER RESEARCH

BONE, JOINT & CANCER

Living with the pain of fractures and serious bone-related complications associated with osteoporosis, arthritis and invading cancer growth, substantially reduces quality of life and, in some cases, life expectancy for patients. These significant impacts on patients, coupled with the social and economic burden of an ageing population, mean that bone health remains a key health priority for Australia and medical researchers. Research efforts during the past decade have increased understanding of how cells build up or destroy bone, resulting in the development of a number of excellent new therapies to reduce bone loss. However, despite considerable advances, there remains an urgent need for new approaches to combat bone destruction (especially in cancer) and replace bone already lost due to disease.

Laboratory Head:
Professor Matthew Gillespie

Bone is a tough material; its perfect composition of collagen proteins and calcium-rich minerals makes it strong enough to support the body, while allowing enough yield to absorb shocks without cracking. It is also a remarkably dynamic material, constantly remodelled and renewed in response to forces placed upon it. This process of renewal and repair is vital to skeletal health, as specialised cells called osteoclasts work to break down old bone while other cells form new bone in its place. In diseases such as osteoporosis, the bones become thin and fragile when too much bone is removed and not enough new bone produced.

While current treatments allow us to arrest or slow bone loss, the close links between bone loss and formation result in a loss of bone formation, leading to additional complications. In a bid to address this, we are investigating how bone-forming cells stimulate their own bone formation.

Diseases such as rheumatoid arthritis and invading cancers develop due to highly localised stimulation of bone destruction, resulting in pain, fractures and other severe problems. With most cases of bone loss caused by an oversupply or accelerated activity of osteoclast cells (bone-destroying cells), better methods to effectively treat these diseases by rapidly and effectively blocking bone loss are vital.

The team at PHI are studying a range of factors that influence bone formation and destruction, with the aim of translating these findings to aid development of much needed clinical applications. A previous detailed study revealed the underlying mechanisms by which the protein interleukin-33 (IL-33) both inhibits and promotes bone loss. In addition, we are continuing to investigate how and why some new cancer therapies actually damage bone.

Preventing bone loss and building new bone

While originally identified in the immune system, our research revealed that bone-forming cells also produce IL-33. We believe that its impacts on bone formation are potentially useful as treatment targets. We have found that IL-33 acts on osteocytes, mechanosensors that control osteoclast formation, to assist in the formation of bone. IL-33 acts on osteocytes to reduce production of sclerostin, a factor that inhibits bone formation; conversely, it also boosts the production of other factors that directly stimulate bone-forming cells, while assisting bone formation by acting on osteoblasts to promote their maturation. Our work to date suggests that rather than acting to control everyday bone-cell activities, locally produced IL-33 may promote healing. Investigations at PHI, identifying increased IL-33 levels in bone undergoing fracture repair, support this theory.

In another key finding, we found that IL-33 is able to block or enhance the formation of osteoclasts, depending upon the cellular populations used. We are currently determining how we may exploit IL-33 for therapeutic advantage.

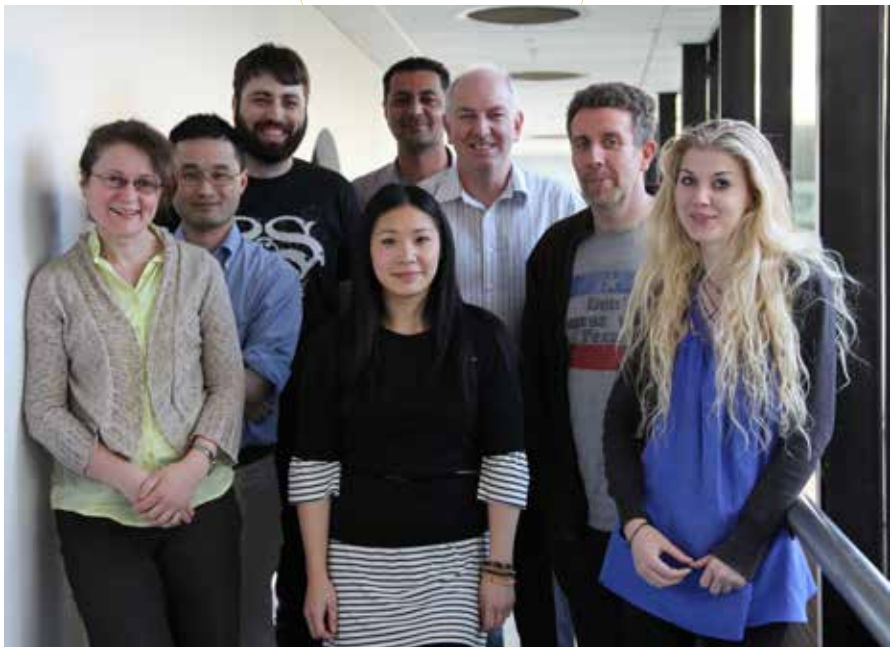
Regulation of cell death in cancer cells

Also known as programmed cell death or sometimes even ‘cell suicide’, apoptosis is a normal biological process that causes cells to die when they are old or unhealthy. Cancer cells do not properly undergo apoptosis and as a result continue to multiply unchecked. We are interested in one of the key proteins responsible for regulating apoptosis, TRAIL (TNF-related apoptosis-inducing ligand). We have found that some breast cancer-derived factors modulate the way that tumours respond to TRAIL. We are currently investigating TRAIL-responsive genes to understand how they help regulate cancer cell death and whether it is possible to enhance the effect of TRAIL on cancers.

Anti-cancer drug 17-AAG

A new anti-cancer drug, 17-AAG, found to be very effective at shrinking tumours in mice, is currently being trialled in humans. Our studies have linked this drug with bone loss and even, surprisingly, increased growth of breast cancer cells that have spread to bone. We found that 17-AAG induces a stress response – this is how cells react to unpleasant conditions to assist them to survive until conditions improve. We have found that 17-AAG increases osteoclast formation (consistent with its ability to damage bone), but inhibiting the stress response reduces this effect. We have identified a number of stress-response targets that appear to enhance osteoclast formation. The wider implication is that drugs and disease processes that induce a stress response will (like 17-AAG) cause bone loss.

We are now working to translate these laboratory-based studies into preclinical models.



Bone, Joint & Cancer Laboratory (L - R): Dr Vicky Kartsogiannis, Dr Phillip Wong, Damien Eeles, Dr Vanessa Cheung, Dr Preetinder Singh, Professor Matthew Gillespie, Dr Julian Quinn, Gabrielle van der Kraan

Transfusion-dependent thalassaemia and bone disease

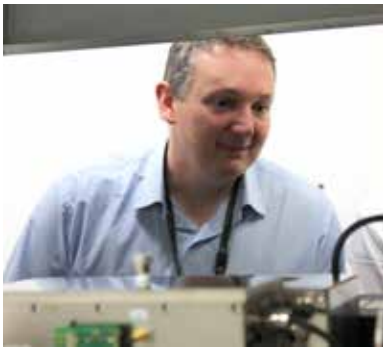
Thalassaemia is a disorder of haemoglobin synthesis due to mutations in the globin chains (α or β). In its most severe form, treatment with chronic transfusion therapy is required, leading to iron overload with cardiac, liver, endocrine and bone complications. Monash Health is the state referral centre for the management of transfusion-dependent thalassaemia. In conjunction with Professor Don Bowden (Head of Thalassaemia Services), we have described for the first time, a case of reversible osteomalacia secondary to Fanconi's syndrome in the setting of an iron chelator, with ongoing studies examining mechanisms of bone loss in this population. We have also recently reported a high prevalence of kidney stones in transfusion-dependent thalassaemia and an association between reduced bone density, kidney stones and fractures.

2. CANCER RESEARCH

OVARIAN CANCER BIOMARKERS

One of the deadliest and most challenging gynaecological cancers, ovarian cancer affects approximately 1200 Australian women each year. With few recognisable symptoms and no early detection test, diagnosis comes too late for most women, when the disease has spread, making prognosis poor and treatment difficult. Researchers in the Ovarian Cancer Biomarkers Laboratory are working to provide women with ovarian cancer a fighting chance against this insidious disease, through early detection and better treatments.

Laboratory Head:
Dr Andrew Stephens



Previously, we discovered a new mechanism, shown to lead to tumour-specific immunosuppression and directly correlate with pathogenesis. We are now exploring how we can apply these findings for the treatment of ovarian cancer. We are currently investigating the global effects of these changes on cells within the tumour microenvironment, and the effectiveness of using small molecule compounds to target and disrupt this process, and restore immune recognition and destruction of growing tumours.

Early diagnosis remains the best hope for successful treatment and long-term survival for women diagnosed with ovarian cancer. The vital need for an early detection test remains central to our team's ongoing quest to tackle ovarian cancer, as we continued this research in 2013. Currently, we are progressing development of a novel mass-spectrometry-based assay. In addition, we will shortly commence a small study in women who are 'at risk' (i.e. have a genetic predisposition) of developing ovarian cancer.

New mechanisms of ovarian cancer progression
In 2013, we published research showing a new mechanism that we believe underlies the formation and progression of high-grade, serous ovarian tumours. This mechanism involves a family of enzymes called dipeptidyl peptidases, and their effects on intra- and extracellular signalling processes. Supported by funding from both the CASS foundation and Ovarian Cancer Research Foundation, we will now investigate the effectiveness of using small molecule inhibitors to block these enzymes as a novel treatment for tumours.

Proteomic analysis to identify enzyme substrates
Biological substrates of the dipeptidyl peptidase enzyme family remain largely unknown. Our ongoing research efforts have identified several new substrates of these enzymes, along with a novel cleavage site that further expands their catalytic repertoire. We will continue to work in collaboration with the Centenary Institute (University of Sydney) to investigate the role of these enzymes and their substrates in cancers.

Clinical collection program
We are extremely grateful to the generous women who have donated samples to our clinical tissue collection program, so critical for the ongoing success of our research program. Now one of the largest ovarian cancer-specific collections in Australia, the program has collected blood and tissue samples from almost 1300 women diagnosed with ovarian cancer since its inception.

Josie Lawrence

3 RESEARCH REPORTS: WOMEN'S HEALTH

Endometrial Remodelling

Implantation & Placental Development

Embryo Implantation

Ovarian Biology

Reproductive Hormones

Reproductive Development & Cancer

ENDOMETRIAL REMODELLING

Working at the forefront of female reproductive health and fertility research, we are driving cutting-edge investigations to tackle reproductive health issues such as infertility, fibroids, and abnormal bleeding. Currently, we are investigating critical factors that drive endometrial repair following menstruation to understand how these are disturbed in women with uterine bleeding disorders.
To establish a healthy pregnancy the embryo needs to be implanted in 'fertile soil'. We are working to identify and validate markers for endometrial receptivity and determine the ideal intrauterine microenvironment for implantation.

Laboratory Head:
Professor Lois Salamonsen

The only organ in the adult human body to heal without scarring, a healthy uterus, or endometrium works throughout a woman's reproductive years to maintain the perfect environment to establish and grow new life. Each month, the lining of the uterus (womb), known as the endometrium, completely sheds at menstruation, and is rebuilt during the next menstrual cycle. Approximately 20 days following the onset of menstruation, the endometrium becomes 'receptive' to an embryo. Lasting roughly four days, this receptive period is the only time at which the embryo can implant into the womb to allow development of the placenta and successful establishment of pregnancy. If these processes fail, consequences can include infertility or early miscarriage.

In menstrual cycles in which there is no conception, the endometrium sheds its lining at menstruation, to re-grow in the next cycle. Menstruation leaves a 'wounded' surface, which normally repairs very rapidly without scarring. In some cases, however, this repair does not occur appropriately leading to reproductive issues such as abnormal uterine bleeding.

Our research aims to improve the success rates of fertility treatments such as IVF, as well as the long-term health outcomes of the children conceived. It will also help us develop treatments for abnormal uterine bleeding. In an exciting and innovative expansion of this research, we are using our understanding of endometrial remodelling to revolutionise the treatment of wounds to avoid scarring

Endometrial and epithelial repair
As the only adult tissue to undergo rapid cyclic repair without scarring, a better understanding of endometrial repair mechanisms may hold the key to new treatments for wound healing, as well as uterine bleeding problems in women, including those using progesterone based contraceptives and hormone therapy for menopause.

We conceptualised, that since endometrial repair occurs in the presence of menstrual blood, menstrual fluid would contain unique 'repair factors'. We have identified a number of these and demonstrated that they influence proliferation and migration of endometrial epithelial cells in real-time. Furthermore, they can affect junctional complexes between the cells, that form during repair and that are essential for the barrier function of the epithelial cell layer.

Importantly, this research is leading to the identification of factors useful in the development of improved treatments for skin wounds to reduce healing time and minimise scarring. In studies using in vitro models, we have found menstrual fluid factors strongly improve skin wound healing in, suggesting potential actions in reducing scarring in wounds.

Uterine receptivity
The receptive endometrium prepares the embryo for implantation by bathing it in uterine fluid rich in molecular mediators. If both the embryo and endometrium are in synchrony, implantation can then occur. We have published a series of papers detailing results from proteomic analysis of uterine fluid from fertile and infertile women undergoing fertility

treatment such as IVF. We identified differences in protein profiles, with a number of these proteins found to act on both the endometrium and/or the pre-implantation embryo, to enhance the potential for implantation. This is important since uterine fluid provides the microenvironment for implantation, a key step in initiation of pregnancy.

Our aim is to understand how the different factors work so that we can stimulate local production of appropriate proteins or possibly administer the required factors at the appropriate time to improve implantation. Some of the proteins that we have found, while only present in very small quantities in uterine fluid, have strong potential as markers for infertility or endometrial receptivity. We are currently trialling these as a clinically applicable test for uterine receptivity for use in IVF clinics.

We are also continuing to gain new insights into female fertility, as we identify glycoproteins associated with endometrial receptivity in uterine fluid. We have found that some progesterone-regulated glycoprotein forms alter during different stages of the menstrual cycle

Uterine fibroids

A common problem for women, uterine fibroids often require surgical intervention making research to better understand their formation and develop non-surgical treatment options vital. However, the currently available model for experimentation makes such research difficult. Our team is currently working to develop a unique cell culture model for use in future studies.

Exosomal transfer: A new paradigm for embryo-endometrial cross talk at implantation

During ongoing investigation to identify uterine receptivity biomarkers, we have found exosomes within the uterine cavity. Released from cell surfaces, these minute particles (30-150mm) can transfer their contents (mRNA, miRNA, proteins) to non-adjacent cells. We believe the endometrial epithelium releases these exosomes into the uterine cavity to carry signals to the pre-implantation blastocyst. Recently awarded NHMRC funding will enable us to progress this research to map the proteins and small RNA molecules contained within these exosomes and determine their functional importance at implantation.

Key External Collaborations

A/Prof Luk Rombauts, A/Prof Beverley Vollenhoven and other doctors
Monash IVF

Dr Sophie Rome
Lyon, France

Prof Richard Simpson
La Trobe University

Prof David Leavsley
University of Queensland

Dr Jacquie McGovern
Queensland Institute of Medical Research

Professor Robert Norman (Robinson Institute), Professor Tanya Munro, Dr Stephen Warren-Smith
Institute for Photonics & Advanced Sensing (IPAS), University of Adelaide

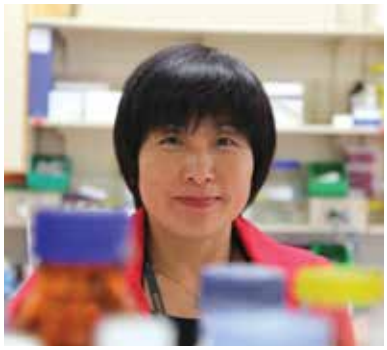
L-R: Prof Lois Salamonsen, Dr Tracey Edgell, Harriet Fitzgerald, Angela Morgan

3. WOMEN'S HEALTH

IMPLANTATION & PLACENTAL DEVELOPMENT

Just as a seed needs fertile soil to grow, uterine receptivity is vital to successful embryo implantation and healthy pregnancy. Our laboratory is interested in the underlying mechanisms of uterine receptivity and implantation, as well as the role of placental development in healthy pregnancy and pregnancy complications. To improve outcomes during assisted reproduction such as IVF, we are currently working on the clinical translation for uterine receptivity testing based on our previous research of a key enzyme and its role in controlling fundamental uterine events for embryo implantation. We also believe these findings may be useful as a novel target for alternative female contraception options.

Laboratory Head: Dr Guiying Nie



Placental development plays a key role in healthy pregnancy and pregnancy disorders, with new information about a family of genes involved in placental development offering hope of early detection and possibly treatment of pre-eclampsia.

Uterine incompetence preventing the implantation of healthy embryos to establish pregnancy is a major factor in female infertility. However, with no reliable biochemical test available to confirm uterine receptivity, it is difficult to diagnose.

Role of PC6 in uterine receptivity for embryo implantation and fertility

Our research has shown that the uterus tightly controls levels of key enzyme proprotein convertase 5/6 (PC6) during preparation for receptivity, making it critical for implantation success. We have been continuing to study the mechanisms of PC6 action in the uterus, to understand its clinical implications in the evaluation of uterine receptivity and fertility.

In 2013, we continued to investigate PC6 as a marker for non-invasive uterine receptivity testing. Previously, we demonstrated a close association between PC6 activity in uterine fluid and uterine receptivity, with PC6 activity levels significantly reduced in women with unexplained infertility. These findings suggest that detection of PC6 in uterine fluid may form the basis for a minimally invasive rapid receptivity test. This year we developed a panel of highly specific monoclonal antibodies against PC6 and developed a high-throughput assay to further this investigation towards translating our discoveries into clinical use.

We have also established the role of PC6 in regulating molecular events on the cell surface and plasma membrane, fundamental for receptivity and implantation. In 2013, we discovered that PC6 processes the cell membrane glycoprotein dystroglycan to regulate cell adhesiveness for embryo attachment. This further demonstrates that PC6 is a 'master-switch' for the establishment of uterine receptivity. The NHMRC and Monash IVF have acknowledged the high quality of our work with continued funding support.

PC6 in prevention of pregnancy and HIV infection

Our group is currently working to identify potential targets for the development of new contraceptive options to protect women against both pregnancy and sexually transmitted infections. We are currently investigating PC6 as a potential target for the development of a new dual-purpose female contraceptive to protect against both pregnancy and HIV infection. In 2013, we developed a small molecule inhibitor for human PC6 and proved the high potency of this inhibitor in preventing endometrial receptivity in an in vitro model of human embryo attachment. Support from the Bill & Melinda Gates Foundation and multidisciplinary collaborations were critical to this research.

PC family proteins in endometrial cancer

As one of the most commonly diagnosed gynaecological cancers in Australia, the development of an early detection test for endometrial cancer is critical to improve long-term prognosis for women diagnosed.

As we continue our search for a useful biomarker as the basis of such a test, we have extended our investigation to include the PC family of enzymes and their role in endometrial cancer. This research has shown a significant increase in the total PC activity in uterine washings from endometrial cancer patients. These findings suggest that monitoring the total PC activity in uterine fluid may provide a rapid and non-invasive method for the diagnosis of endometrial cancer. With the support of the CASS foundation, we have successfully simplified the retrieval of uterine fluid, bringing us closer to a minimally invasive screening test similar to a Pap smear.

HtrA family proteins in placentation and pregnancy disorders

Pre-eclampsia is a life-threatening pregnancy complication, accounting for almost 1 in 12 maternal and perinatal deaths in industrialised nations. Despite these figures, diagnosis is still not normally possible until late in pregnancy. Our previous studies highlighted the importance of the HtrA3 gene for placentation. Recently, we published results from a study showing a strong link between the gene and pre-eclampsia, with patients presenting with abnormal blood levels of HtrA3 in early pregnancy developing pre-eclampsia. Our current research in this area examines the HtrA family proteins in pre-eclampsia and other pregnancy-related disorders such as intra-uterine growth restriction. To progress clinical translation of these findings, we also produced a highly specific HtrA3 monoclonal antibody that neutralises HtrA3 enzymatic activity. The Bill & Melinda Gates Foundation also supported this work.

HtrA3 in cancer

In addition to its role in placentation, the down-regulation of HtrA3 expression is evident in a number of cancers, including endometrial and lung cancers. In 2013, we published that research showing the drastic and extensive down-regulation of HtrA3 in a number of cancer cells and in primary ovarian tumours. Evidence suggests that HtrA3 is a tumour-suppressing gene. We are continuing our study of the biochemical properties of the HtrA3 protein and investigating its role in cancer.

In 2013, the NHMRC promoted Associate Professor Guiying Nie to their Senior Research Fellowship B scheme.

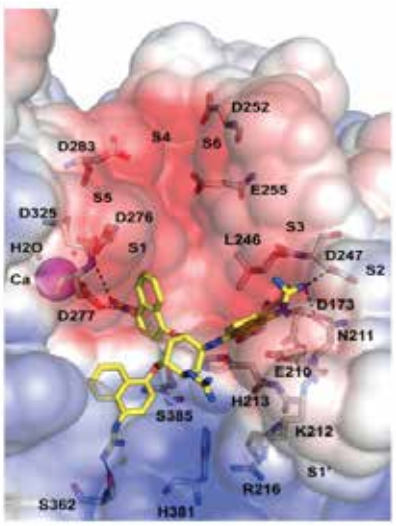


Image: Putative binding mode of a small molecule inhibitor in the active site of human PC6 enzyme

Embryo Implantation Laboratory (L - R): Amy Winship, Carly Cuman, A/Professor Eva Dimitriadis, Dr Michelle Van Sinderen

(L - R): A/Professor Guiying Nie, Sophea Heng

(L - R): A/Professor Eva Dimitriadis, Dr Michelle Van Sinderen, Amy Winship

3. WOMEN'S HEALTH

EMBRYO IMPLANTATION

Our research is providing new insights into the role of critical embryo implantation factors and placenta formation to enhance pregnancy outcomes and devise non-hormonal contraceptives. Additionally, we are opening new avenues for endometrial cancer treatment with the identification of endometrial factors that stimulate carcinogenesis.

Laboratory Head: A/Prof Eva Dimitriadis

For many women falling pregnant is difficult, both naturally and with treatment to assist conception; in a high percentage of cases this is due to the complexities of embryo implantation. After attaching to the lining of the uterus, the embryo must grow through the endometrial tissue until full formation of the placenta. For this to succeed, close contact is required between the embryo trophoblast cells and the mother's blood supply to ensure provision of nourishment and oxygen for the developing fetus. This trophoblast invasion of the womb is similar to the movement of white blood cells from the blood into tissues to counter infection.

Our team has identified a number of regulatory molecules that are important during early implantation, as well as the trophoblast invasion. We have previously investigated how varied levels of these proteins could, in the presence of placenta abnormalities, lead to complications later in pregnancy.

Endometrial-placental interactions

Impairment of embryo implantation can affect placental development and may lead to miscarriage, pre-eclampsia or maternal death. In earlier work, we studied how endometrial proteins and placental trophoblast cells interact, and how this restricts trophoblast invasion. Using a proteomics approach, we were able to identify some of the protein molecules important in these interactions and determine their function in placental development.

Pre-implantation-endometrial interactions are critical for implantation and IVF success

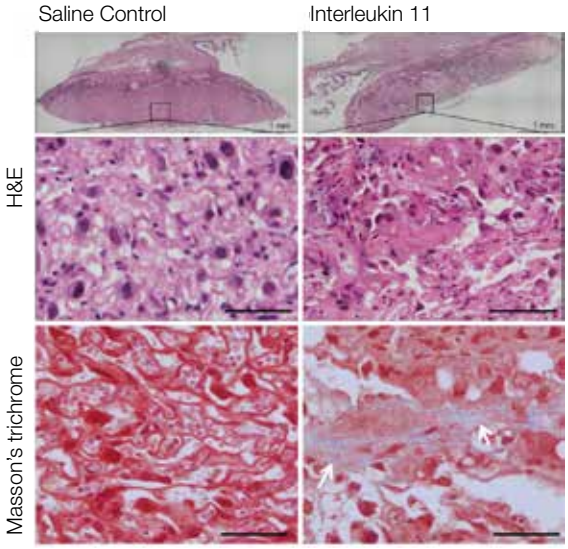
Successful embryo implantation requires the synchronous development of the embryo and the endometrium, and highly complex cross-talk between the two. We know implantation failure leads to infertility; however, our understanding of these very early interactions during implantation and the influence of the embryo on endometrial receptivity remains limited. While IVF has evolved to treat infertility, many unsuccessful treatment attempts are due to the embryo failing to implant, possibly due to inadequate endometrial preparation and/or poor embryo quality. In collaboration with Monash IVF, we are studying how IVF embryos interact with endometrial cells to facilitate implantation and, in particular, pregnancy success. We are also investigating embryonic biomarkers relative to implantation potential.

Non-hormonal contraceptives

Our work has been the first to demonstrate that pharmacologically targeting endometrial factors offers total prevention of pregnancy. We are working with collaborators in the USA to conduct preclinical trials of a vaginally applied, non-hormonal contraceptive based on two molecules identified by our team as capable of preventing pregnancy in mice. Compared to delivery by injection, vaginal delivery reduces non-uterine side effects. We are now investigating methodologies to minimise potential side effects.

New treatments for endometrial cancer

Endometrial cancer is the most common gynaecological malignancy. While it typically affects postmenopausal women, women over the age of 40 also face a significantly increased risk. Currently there are few treatment options for advanced endometrial cancer, making investigation of new targets for therapies vital. We are now working with collaborators at CSL to test a potential therapeutic inhibitor to target a key protein that we previously identified as vital to endometrial cancer progression.



Interleukin 11 treatment of mice alters mouse placental morphology leading to placental fibrosis as demonstrated by Masson's trichrome staining (blue). Representative coss sections of mouse placenta. Top panels are low power and lower panels show high power staining.

OVARIAN BIOLOGY

Greater understanding of the how the primordial follicle pool is established and maintained is assisting the development of clinical treatments for infertility associated with premature menopause and anti-cancer therapy. This research may also provide potential avenues for treatments to control cardiovascular disease, osteoporosis and dementia.

Laboratory Head:
Dr Karla Hutt

The number of eggs in a woman's ovary, also known as the primordial follicle pool, is set during embryonic development. During a woman's lifetime, this stockpile of eggs gradually declines through natural processes until the supply is exhausted, leading to infertility and menopause. Despite their important contribution to female fertility, we still have little understanding of the regulatory factors that control how many primordial follicles are established and maintained in the ovary.

PHI is continuing to work with researchers at Monash University, the Walter and Eliza Hall Institute (WEHI) and the Royal Women's Hospital to investigate these factors and identify new ways to regulate egg supply to extend fertility and delay the onset of menopause.

We are also conducting research to assist the development of new options to prevent infertility in cancer patients treated with chemotherapy and radiation therapy. These treatments can destroy the ovarian egg pool, potentially leading to infertility in girls and young women undergoing treatment for cancer. Our work in this area focuses on identifying the factors that mediate egg death and developing strategies to prevent their ability to destroy the primordial follicle pool.

Egg supply, reproductive aging, and menopause

During fetal ovarian development, it is normal for large numbers of egg precursors to die, with this loss ultimately limiting the supply of primordial follicles available during reproductive life. Intriguingly, how, when or why these eggs die is not known. We have recently identified cell death proteins, known as BH3-only proteins, as key initiators of this cell death process in eggs.

In 2013, we made the exciting discovery that preventing egg death, by eliminating one of these key cell death proteins, can increase the number of eggs stored in the adult ovary and prolong fertility in mice.

Fertility preservation in female cancer patients

Our recent work has also implicated BH3-only proteins in the death of eggs as a side effect of common cancer treatments. Eliminating these genes in mice significantly reduces radiation damage to eggs and the mice remain fertile, highlighting the potential for protecting eggs from chemotherapy or radiotherapy damage in women and young girls. In collaboration with Monash University, WEHI and the Royal Women's Hospital, the team is pursuing the development of therapies to protect eggs against chemotherapy or radiotherapy treatment for any form of cancer.

Ovarian Biology Laboratory (L - R): Nadeen Zerafa, Dr Jason Liew, Dr Karla Hutt, Kavitha Vaithiyanathan, Thilini Gamage

3. WOMEN'S HEALTH

REPRODUCTIVE HORMONES

Our laboratory is interested in reproductive hormones and their role in regulating processes within the body. We are particularly interested in the impact of pituitary and ovary interactions on reproduction.

Laboratory Head:
Associate Professor David Robertson

Characterising inhibins forms and bioactivities in women

Each month the ovary releases eggs. This process, known as ovulation, is coordinated by pituitary- and ovarian-derived hormones. Despite there being over 20 follicles available for ovulation, only a single egg is selected for release in a normal menstrual cycle. Two pituitary hormones - follicle-stimulating hormone and luteinising hormone - control this process. The levels of these pituitary-derived hormones are in turn regulated by hormones produced by the ovary to ensure that multiple ovulations do not occur. The ovarian hormone primarily responsible for regulating the pituitary control of ovulation is called inhibin.

Inhibin is produced as a series of molecular weight forms, which until recently were all believed to be biologically active. However, recent studies of related hormones led by Drs Kelly Walton and Craig Harrison, suggest that the larger inhibin forms are unlikely to be biologically active. The findings predict that the larger inhibin forms would have shielded active sites, rendering them bio-inactive.

Characterisation of a naturally occurring inhibin Pro-protein

The decreased biological activity associated with the large inhibin forms is attributed to the influence of a fragment (Pro-region) of the inhibin molecule, which is normally lost. The large inhibin molecule is cut at specific locations to enable release of the smaller biologically active inhibin form. During this cutting process, a small 'Pro' protein is released. Our studies to date predict that this Pro protein would be capable of disrupting the biological activity of inhibin.

In this study, we have shown that the naturally occurring Pro protein can bind directly to the active inhibin form and suppress the biological activity of inhibin at the pituitary. Complementary studies have shown that the release of this Pro protein during the inhibin cutting process is essential for the production of the smaller active inhibin form. The Pro protein is predicted to shield the active sites on inhibin, thereby blocking its biological activity. Supporting experiments have shown that this Pro protein is evident in human ovarian follicular fluid, and thus has the potential to hinder the reproductive functions of inhibin.

Significantly, the identified inhibin Pro protein region is also present in numerous related hormones, called transforming growth factors (TGF). Importantly, disrupted TGF-β activity is frequently associated with human reproductive disorders. Future studies will use the inhibin Pro protein model to facilitate the design of TGF-β inhibitors, which will aid our current understanding of these proteins in reproductive biology and other human disease pathologies.

Development of a new inhibin assay

The measurement of inhibin has proven an effective predictor of reproductive health in women. Elevated levels of inhibin are an indicator for Down syndrome, and inhibin is now included in the triple test for diagnostic screening in the second trimester of pregnancy. Increased inhibin levels in postmenopausal women are also associated with ovarian cancers

Conventional assays to measure inhibins in blood are based only on the smaller inhibin forms. Our studies have shown that these tests do not detect the larger inhibin forms, which are highly abundant in humans. We have developed a new inhibin assay that allows the measurement of the larger inhibin forms. This assay will prove instrumental in re-classifying inhibin forms in humans and will facilitate the generation of similar assays for inhibin-related proteins.

Understanding changes in reproductive hormones in the approach to menopause

In collaboration with scientists from the University of Saskatchewan, Canada, we are exploring how ovarian and pituitary hormones, which are important for regulating the function of the ovary and uterus, change as women approach menopause. One aspect of this work was the development of ultrasensitive assay methods for the hormone, AMH, in blood. This protein provides a marker of ovarian follicle reserve, which is heavily depleted with age. Current methods are too insensitive for practical use. Our studies show we can detect evidence of follicle activity much later with age than that previously shown. In current studies, we are exploring how ovarian follicle patterns change in the approach to menopause.

REPRODUCTIVE DEVELOPMENT & CANCER

In the vast majority of cases, diagnosis of ovarian cancer occurs in the advanced stages when prognosis is poor. In its late stages, ovarian cancer is associated with several clinical challenges, including metastasis (spreading of the disease), poor response to chemotherapeutic treatments and high risk of recurrence after remission. Our research focuses on improving the understanding of these problems of advanced ovarian cancer.

Laboratory Head: Dr Kaye Stenvers

Ovarian cancer remains the deadliest reproductive cancer in women.

A major focus of our work, ovarian cancer metastasis is the process by which malignant cancer cells move away from the primary tumour site and spread to distant parts of the body. Our research has found that a family of multifunctional growth factors known as transforming growth factor-β (TGF-β) strongly influence ovarian cancer metastasis. As part of our research, we are studying how betaglycan, a cell surface receptor protein, facilitates the actions of several members of the TGF-β family. We have previously demonstrated the essential role of betaglycan and the factors that interact with it in the regulation of growth and development of the fetal gonads. We are continuing to provide insights into how betaglycan also regulates the growth and spread of ovarian cancers.

We have shown a possible link between betaglycan loss during cancer progression and increased tumour aggression leading to metastasis. We believe that the re-introduction of betaglycan to ovarian cancer cells may halt or prevent metastasis. We are currently investigating the detailed mechanisms underlying the actions of betaglycan in cancerous ovarian cells, with the aim of developing therapeutic strategies to block metastasis based on this key protein.

Our work suggests that loss of betaglycan in advanced cancers also promotes cell survival. This is a critical finding, given how little we know about how ovarian cancer cells become resistant to the cell-death-inducing effects of chemotherapeutics or how to predict a patient's response to treatment. We are continuing to evaluate the relationship between betaglycan and cancer progression, metastasis, and the response to chemotherapeutics and how this may assist in the development of more effective treatment strategies.

Understanding how to treat advanced ovarian cancers

To better model the way ovarian cancers spread, we have developed a novel culture system and combined this with real-time measurements of the metastatic process. This system has enabled us to identify at which stages during the metastatic process manipulation of betaglycan expression is most effective at blocking the disease.

We have also identified signalling molecules that mediate the enhanced survival of late-stage ovarian cancers. Specifically, we have identified that aberrant co-activation of two cancer-promoting cellular pathways, NF- B and TGF- , allows particularly aggressive cancer cells to escape treatment (by becoming 'chemoresistant') and continue to grow. This has provided us with a number of previously unknown targets for therapeutic intervention.

In collaboration with the Royal Women's Hospital, we are continuing to examine common types of ovarian cancer to assist in the development of clinical applications. In 2012-2013, our collaboration characterised the molecular profile of specific populations of metastasising ovarian cancer cells, which increased our understanding of these advanced cancers and identified novel regulators of the disease.

Ovarian Biology & Reproductive Development & Cancer Laboratories (L - R): Nadeen Zerafa, Ruth Escalona, Dr Mai Sarraj (Grants Officer, from 28/2/2013), Yao Wang, Dr Kaye Stenvers, Dr Karla Hutt, Dr Jason Liew, Dr Maree Bilandzic, Kavitha Vaithiyanathan, Thilini Gamage

4

RESEARCH REPORTS:

MEN'S HEALTH

Male Fertility Regulation

Clinical Andrology

MALE FERTILITY REGULATION

The Male Fertility Regulation Laboratory is working to identify key hormonal mechanisms that control sperm production in the testis and improve understanding of male infertility and its causes. Translation of these findings will assist the future development of treatments to regulate fertility in men.

Laboratory Head: Dr Peter Stanton

As part of our ongoing research to understand how hormones control sperm production, or spermatogenesis, we have been focusing on the role of the Sertoli or 'nurse' cell, which is vital for the development of germ cells into mature sperm. Through this work, we have discovered how Sertoli cells form and control the blood-testis barrier, a protective 'fence' behind which germ cells complete their development; loss of this barrier is linked to infertility. Our recent study of this structure in testis biopsies from infertile men identified a way to measure changes in the organisation of key proteins needed for the barrier to work. We are now seeking to identify protein markers to enable development of a non-invasive blood test for some types of male infertility to reduce the need for current invasive diagnostic techniques. This research is central to understanding causes of male infertility, and to finding new mechanisms of contraception in men.

Hormonal regulation of microRNA expression

We now know that microRNAs — small non-coding protein translation regulating RNA molecules — are regulated by follicle-stimulating hormone (FSH) and androgen in the testis. Our research has demonstrated that in turn, these micro-RNAs control key cell junction proteins involved in cell adhesion pathways necessary for the release of mature sperm from Sertoli cells. In addition, we have shown alterations to a different set of Sertoli cell microRNAs under conditions emulating changes in blood-testis barrier function.

We believe regulation of these microRNAs provides a means by which Sertoli cells can control multiple cell junction events at the same time. If correct, the control of microRNA transcription offers a new model for understanding the hormonal dependence of spermatogenesis and provides new targets for inhibiting or restoring male fertility.

Regulation of Sertoli cell junctions

Animal studies in our laboratory have shown conclusively that the blood-testis barrier, which involves the tight junctions between Sertoli cells, is controlled by FSH and androgen. In 2013, we published new data showing that the blood-testis barrier, long thought to prevent proteins and molecules from directly accessing the germ cell compartment, is in fact porous to many proteins when the complex process of meiosis of germ cells is occurring. This fundamental information potentially changes the way in which we understand the control of spermatogenesis, as it indicates that germ cells could in fact be directly sending or receiving signals, rather than operating via the Sertoli cell as currently thought.

In other research, we have continued our investigations into how activin, a growth factor produced in the testis and other tissues, dramatically changes Sertoli cell tight junctions. In 2013, we found that retinoic acid, the active component of vitamin A, antagonises the actions of activin at these tight junctions.

We therefore postulate that the combined actions of activin and retinoic acid could act to 'open' and 'shut' the blood-testis barrier in normal healthy testis. As the blood-testis barrier is essential for the production of viable sperm, this hypothesis provides an avenue by which we can investigate the effect of disease on tight junctions in men.

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Proteomic discovery in male reproduction

Previously, we identified several serum proteins that vary between men with normal sperm production and men whose sperm production is impaired. In 2013, we continued using proteomics to study human testicular interstitial fluid and identify protein markers useful for the prediction of male fertility. If successful, such a marker may offer potential as a simple diagnostic test for testicular function, providing a less invasive alternative to biopsy.

4. MEN'S HEALTH

CLINICAL ANDROLOGY

Understanding the factors regulating sperm production will provide insights useful to the development of novel male contraceptives and treatments for infertility. Our laboratory is also interested in understanding the important role of testosterone in the management of health and disease in men, as well as its impacts during ageing.

Laboratory Head: Professor Rob McLachlan

This laboratory undertakes both basic and clinical research activities in male reproductive health. We aim to understand the factors regulating sperm production, why this process fails (infertility), and how it can be reversibly and reliably suppressed (contraception). With an ageing population, the management of health and disease associated with age remains a research priority. Testosterone plays an important role in maintaining male health and wellbeing throughout all stages of life, our team is working to understand its role in ageing, disease and other settings.

Genetics of male infertility

We are continuing to investigate the importance of DNA changes, genetic instability, and epigenetic imprinting as causes of male factor infertility. With few answers and specific treatments available, many couples now utilise assisted reproductive technology (ART) techniques to have a family. The genetic basis of male infertility, the possible transmission of infertility, and other defects to their offspring and of the de novo appearance of genetic defects are matters of concern. In collaboration with colleagues at Monash University, Monash IVF and with international partners, we are conducting a series of studies on the genetic basis of male infertility. To date we have collected a repository of genomic DNA and clinical information from over 2,000 infertile men, their partners, and ART-conceived offspring for use in these studies. Translation of findings may lead to development of diagnostic tests and treatments for infertile couples, as well as improved information for couples undertaking ART. This research also includes assessment of mouse models for mutations in genes involved in DNA repair associated with meiotic failure, which is thought to be involved in human conditions of germ cell arrest at the spermatocyte stage or Setoli cell only pattern.

Developing new reversible male contraceptives

Men currently play a major role in contraception through natural family planning, condom use and sterilisation but new effective, reversible and acceptable options are needed. Sex hormone treatment is a potential reversible contraceptive that acts by stopping the pituitary hormone drive needed for sperm production. We have previously studied its effects in human trials and continue to assess its effects on sperm production. In particular, we are examining potential target for non-hormonal methods, such as the disruption of cell junctions within the seminiferous epithelium. Interruption of these junctions may prevent normal maturation of developing sperm cells and/or the release of mature sperm from the supporting Sertoli cell in the wall of the seminiferous tubule (spermiation). We are focussing on the mechanism of spermiation failure including the gene and proteins involved in cell remodelling and cell-cell junction. Our continuing investigations to understand the underlying mechanisms that enable this type of contraception to interrupt sperm production includes the use of both in vivo models and cultured testicular cells.

Testosterone and cardio-metabolic health

As men age they experience a small but progressive fall in serum testosterone levels, this is particularly observed in obese men. Increasingly, clinicians are encountering ageing men with symptoms suggestive of testosterone deficiency. Our previous studies have shown that Testosterone Replacement Therapy (TRT) causes modest reductions in body fat, in particular abdominal fat. This reduction in body fat may prevent the onset of cardiovascular disease through changes in several risk markers, such as cholesterol levels, insulin resistance and blood clotting factors. It is suggested that TRT may be most effective in obese men with diagnosed testosterone deficiency but supportive evidence in this group is very limited. Importantly, obesity is associated with an increased risk of diabetes and cardiovascular disease.

In a major expansion of this research, we are now participating in an Australian multi-centre double-blind, randomised, placebo-controlled trial supervised by the University of Adelaide. This study aims to determine the effectiveness of testosterone treatment combined with a healthy lifestyle program in the prevention of type 2 Diabetes Mellitus in men with pre-diabetes and low testosterone levels in comparison to a lifestyle program alone (T4DM). The study is currently enrolling subjects and will take a minimum of five years to complete. Up to 250 men will be recruited at the PHI site.

Other study sites include The Keogh Institute WA, Fremantle Hospital WA, The Austin Hospital Vic, and the Anzac Institute/ Concord Hospital, NSW. Our laboratory also continues its involvement in the delivery of clinical services through Monash Health, with the increased demand for specialised andrology support leading to an expansion of services. These include the androgen replacement service, located in the department of endocrinology, Monash Medical Centre, and a specialised clinic to care for men undergoing testosterone withdrawal therapy for prostate cancer, located at the Moorabbin site of Monash Health.

5

RESEARCH REPORTS:

GENETICS & DEVELOPMENT

Sex Determination & Gonadal Development

Brain & Gender

Growth Factor Signalling

5. GENETICS & DEVELOPMENT

SEX DETERMINATION & GONADAL DEVELOPMENT

With as many as 100 babies born with a disorder of sexual development each year, and little clinical and community understanding of these disorders, further research and education is vital to improve understanding, clinical management and diagnosis.

Laboratory Head:
Professor Vincent Harley

Disorders of sex development (DSDs) encompass a wide range of abnormalities, including hypospadias (abnormal urinary opening in males), gonadal dysgenesis (underdeveloped or imperfectly formed gonads), ambiguous genitalia and sex reversal (XX males, XY females).

We are using molecular genetics, as well as cell and developmental biology approaches, to identify genes associated with these disorders. The aim of this research is to improve the diagnosis of DSDs and provide insights into the underlying molecular mechanisms of testis and ovary formation in the developing embryo.

Comprehensive review of Disorders of Sex Development

Formerly referred to as 'intersex' conditions, DSDs are congenital conditions in which chromosomal, gonadal or anatomical sex is atypical. A complete revision of the classification of DSDs recently undertaken has emphasised the genetic aetiology of these disorders, while discarding pejorative terms. Uptake of the new terminology is widespread. Perhaps the least understood DSDs are those affecting gonadal development. While work to unravel the molecular mechanisms underlying gonadal development has revealed new causes of DSDs, a specific molecular diagnosis is still only possible in about 20 per cent of patients. DSDs are complex, with patients, their parents and medical staff confronted with challenging decisions regarding gender assignment, genital surgery and lifelong care. This research continues to advance our understanding of these conditions, refining prognostic prediction and systematically improving the diagnosis and long-term management of children with DSDs.

In 2013, our group undertook a major review titled 'Disorders of sex development: new genes, new concepts', published in Nature Reviews Endocrinology. In this comprehensive review, we have described gonadal development and the clinical consequences of DSD mutations, with an additional focus on emerging concepts in DSD genetics and outstanding issues in patient management.

www.DSDgenetics.org website launched

As leaders in our field, we believe we have a responsibility to make the results of our research available to the broader community, as well as DSD families, clinicians, healthcare professionals and other researchers. Currently, there is no central information source providing information regarding the causes, types, effects, impacts and outcomes of DSD, from a scientific standpoint. To address this community resource gap, we have developed over 100 pages of content for a new website (www.dsdgenetics.org). In recognition of the differing needs of those accessing this site, material is divided into information for patients and families (using plain language), and information for scientists and clinicians (more advanced material including how to annotate, store and make available patient samples for research). Content development was a collaborative process, with DSD clinicians, patient advocacy representatives and science writers providing input. By providing this information on a publicly accessible website, we aim to improve public awareness, remove stigma, and empower affected individuals and their families to take a more informed role in clinical management. The site also aims to provide a scientific foundation on which clinicians and other healthcare professionals can base diagnosis and management strategies. This valuable community initiative forms part of a cutting-edge collaborative research program, and will require continued maintenance, updating and correspondence over the lifetime of the NHMRC Program Grant, renewed for 2014-2019.

EndoVL: DSD network

As we continue our investigations, we will continue to play an organisational role in information and sample sharing for DSD diagnosis and research. In collaboration with Professor Richard Sinnott (Director of e-Research, University of Melbourne) and the Endocrine Genomics Virtual Laboratory, we have created a web portal, the DSD Network Online Registry (dsdnetwork). This valuable resource allows DSD clinicians to deposit information on their patient cohorts, collaboratively establish the underlying aetiology of DSD with researchers, and link phenotypic with genotypic information in a flexible, secure and de-identified framework. It also enables researchers to find clinicians managing patients with a specific DSD phenotype, and obtain phenotypic information and/or samples. We have formed an international executive with Drs Vilain, Hiort, Lauber, Faradz, Looijenga, Warne, Hofman and Cotterill to assist with ongoing management. A major new collaborative resource, this portal will revolutionise DSD sample collection,

Sex Determination (L - R): Janelle Ryan, Rajini Sreenivasan, Dr Kate York, Dr Stefan Bagheri-Fam, Professor Vincent Harley, Dr Rowena Lavery, Dr Makoto Ono, Dimithu Alankarage

annotation, sharing and analysis, and strengthen links between clinical and research communities. During the funding period of the proposed Program, we plan to focus efforts on enhancing uptake of the system and expanding its capabilities. Over the next five years, this initiative will draw together national DSD patient collections to facilitate DSD diagnosis and research as we further engagement within the Asia-Pacific region.

ENU screen identifies gonadal defects

Mice harbouring gene mutations known to cause phenotypic abnormalities during organogenesis are an invaluable tool as we seek to link gene function to normal development and human disorders. We participated in a consortium of 11 laboratories, who under the leadership of Monash University's Department of Anatomy, generated mouse models with anomalies closely mimicking those seen in human disorders. This enabled us to conduct a phenotype-driven, genome-wide mutagenesis screen in mice using the mutagen N-ethyl-N-nitrosourea (ENU). One mouse line of an initial 51 pedigrees analysed showed abnormalities on testis cord formation. Using Nextgen sequencing, we identified causative mutant genes for some of the skeletal development. The association between novel mutant alleles and phenotypes will lead to a better understanding of gene function in normal development and establish how their dysfunction causes human anomalies and disease. These advances are refining prognostic prediction and systematically improving the diagnosis and long-term management of children with DSDs.

A role for microRNAs during mouse testis differentiation

Working in collaboration with Drs Peter Koopman and Dagmar Wilhelm from the University of Queensland, we identified gonadal microRNAs with a potential role in regulating mouse embryonic gonad differentiation. Expression of these microRNAs occurs in Sertoli cells within the primordial testis. Sox9 is a transcription factor that is both necessary and sufficient for male sex determination. The conditional Sox9-null mouse model generated at PHI, showed miR-202 expression was downregulated in XY gonads, suggesting that its transcription is downstream of SOX9. Mutation of SOX9 binding sites reduced transactivation of the pri-miR-202 promoter, demonstrating that pri-miR-202 may be a direct transcriptional target of SOX9/SF1 during testis differentiation. Our findings indicate that expression of the conserved gonad microRNA has an early role in testis development.

Genetic differences between the male and female brain may be the key to understanding the cause of differences in gender susceptibility to neurological disorders.

Laboratory Heads:
Dr Joohyung Lee and Professor Vincent Harley

In 2013, we continued to investigate sex-specific genes and their role in male prevalence of neurological disorders such as Parkinson's disease and attention deficit hyperactivity disorder (ADHD).

Vital to the development of the testes, the sex-determining region Y gene SRY is present throughout the male body. Our current research is focused on the role of SRY in the production of neurotransmitters such as dopamine, which controls movement and coordination, as well as reward, motivation and the level of mental attention. We are currently testing the hypothesis that SRY is dysregulated in male-biased brain disorders, such as Parkinson's disease and ADHD.

Role of the Y-chromosome gene, SRY, in Parkinson's disease

A relatively common neurological disorder, Parkinson's disease affects approximately 70,000 Australians, with diagnosis 50 per cent more likely in men than women. The disease is triggered by the death of over 70 per cent of dopamine-producing cells in the substantia nigra region of the brain.

Post-mortem analysis has confirmed the expression of SRY in dopamine-producing cells in the substantia nigra pars compacta in the human male brain, but not the female. Our cell and animal research has uncovered strong evidence that the SRY gene acts as a dopamine pathway regulator in the brain, therefore influencing the control of movement in males. Using human male cell lines, we determined that SRY regulates a number of dopamine synthesis and metabolic enzymes, as well as dopamine receptor 2 (see Czech et al., 2012). These findings provide a molecular explanation for our earlier studies demonstrating that inhibition of the SRY gene in the substantia nigra leads to an impairment of motor function in males.

Regulation of SRY in healthy and diseased male dopamine pathway

The unexpected discovery of SRY expression and function within dopamine neurons of the substantia nigra region of the brain led us to investigate SRY under conditions of injury. When researchers treated a male dopaminergic cell line with the toxin 6-hydroxydopamine (a toxin that causes Parkinson's disease), SRY mRNA levels became elevated. Up-regulation of SRY was rapid (3 hours) and was also induced by the 6-hydroxydopamine metabolite p-quinone, rather than the peroxide stress pathway. These research findings lead us to believe that inhibiting SRY levels in the substantia nigra offers a potential target for development of male-specific treatments to reduce susceptibility to Parkinson's disease and slow progression of symptoms. We are currently exploring potential avenues towards therapeutic applications.

Y are Boys More Susceptible to attention-deficit hyperactive disorder (ADHD) than Girls?

ADHD is a common psychiatric and behavioural disorder in children, consisting of age-inappropriate symptoms of inattention, hyperactivity and impulsivity. Whilst the exact cause is unknown, it is clear that ADHD is much more common in boys than girls, with a ratio of 3:1 or even higher. We hypothesise that the male-specific Y-chromosome gene SRY is a factor in the susceptibility of boys to ADHD. We are investigating SRY levels in males with ADHD to determine what affect the disorder has and whether reducing these levels could improve their symptoms.

Genetics of gender identity disorders

Transsexuals often describe feeling trapped in a body with the wrong gender, a condition that appears linked to how strongly the brain's hypothalamus responds to testosterone. A major genetic study of male-to-female transsexuals undertaken at PHI was the first to identify a small difference in the androgen receptor gene and its prevalence in transsexuals. In a groundbreaking investigation, we are continuing to analyse genes associated with sex steroid actions and metabolism in the world's largest cohort in a bid to identify other genes associated with the condition.

GROWTH FACTOR SIGNALLING

The Growth Factor Signalling Laboratory has a long-term interest in understanding how individual members of the TGF-beta family are regulated and how this regulation affects biological activity.

Laboratory Head:
Dr Craig Harrison

Members of the transforming growth factor (TGF-β) superfamily are key regulators of cellular growth and differentiation, with well documented roles in embryogenesis, reproduction, wound healing, immune function, fibrosis and tumour progression. The Growth Factor Signalling Laboratory has a long-term interest in understanding how individual members of the TGF-β family are regulated and how this regulation affects biological activity.

Activins are potent inducers of muscle wasting and cachexia

In advanced cancers, up to 80 per cent of patients exhibit significant body wasting (cachexia) and remarkably 25 per cent of cancer-related mortalities (1.9 million people world-wide in 2008) derive from cachexia rather than direct tumor burden. Other conditions are also associated with cachexia, including sepsis, renal failure, AIDS and diabetes. Studies have identified activin A and activin B as potential mediators of cancer cachexia.

To demonstrate that activin signalling alone is sufficient to induce cachexia, we used viral vectors to increase circulating activin A levels 7-25-fold in mice. While mice injected with control vector gained weight throughout the experiment, mice injected with increasing doses of activin A vector exhibited significant weight loss, primarily due to a decrease in muscle and fat mass. Importantly, we have found that the muscle wasting that ensues in response to excessive activin levels is fully reversible, highlighting the therapeutic potential of targeting activins in cachexia. To this end, we have recently developed the first activin-specific antagonists.

The role of GDF9 in female fertility

Growth differentiation fact 9 (GDF9) has a profound impact on female fertility. This growth factor is essential for the development, maturation and number of egg cells released during each fertile cycle. GDF9 is produced in the egg in a precursor form, which is processed by enzymes to a mature form. We showed that mouse GDF9 is processed very efficiently and is, thus, secreted in an "active" form, whereas, human GDF9 is poorly processed and is secreted in an "inactive" precursor form. This is the first observed species difference in the activation status of a TGF-β protein, and it likely contributes to the variation observed in follicular development, ovulation rate and fertility between mammals.

Recently, we determined how mutations in GDF9 might contribute to the ovarian pathologies, premature ovarian failure (POF), polycystic ovary syndrome and dizygotic twinning. We found that 14 GDF9 mutations alter the expression and activity of this important ovarian growth factor. Future studies are focused on the development of ways to block GDF9 signalling.

Dr Craig Harrison, and his collaborators Associate Professor David Robertson (PHI), Dr Robert Gilchrist (University of Adelaide) and Professor Ken McNatty (Victoria University of Wellington, New Zealand), received a National Health and Medical Research Council (NHMRC) project grant for 2012-14 to understand the mechanism of human GDF9 activation and to develop GDF9 inhibitors to control folliculogenesis.

Physiological consequences of the loss of inhibin signalling

Gonadal-derived inhibin A and inhibin B are essential factors in mammalian reproduction, negatively regulating pituitary production of follicle stimulating hormone (FSH). Remarkably, declines in inhibin levels across the menopause transition do not only correlate with an increase in FSH, but also a rapid decrease in bone and muscle mass. Based on these clinical findings, and our recent demonstration that transgenic inhibin A increases bone mass and strength, we hypothesise that:

- inhibin A and B have important physiological roles outside the reproductive axis, primarily the stimulation of bone and muscle growth.
- inhibin mimetics could be utilised as novel therapeutics to treat postmenopausal complications, including osteoporosis and sarcopenia.

6

TRANSLATION

Commercialisation

Clinical Services

Enabling Technologies

TRANSLATION

COMMERCIALISING OUR DISCOVERIES

A vital mechanism for successful translation of research from the lab to the bedside, commercialisation of discoveries enables our researchers to deliver improved treatments and diagnostics and improve quality of life for patients and their families.

The commercialisation of research discoveries delivers products and patents, translatable into new drugs, preventative treatment therapies, and technologies. This has a positive impact on innovation within Australia and our ability to lead major global advances in health care.

Royalties received by Prince Henry's Institute from licensed patents assist to fund future discovery and innovation. Since the execution of a licensing agreement in 2002, the Institute has received approximately $1.3 million in royalties for commercialising our discoveries.

We also continue to pursue opportunities for research collaboration, with the Institute executing 33 new agreements for collaborative research, materials transfer, memorandums of understanding and confidential disclosures in 2013.

Intellectual property (IP) and commercialisation initiatives at PHI are overseen by the Intellectual Property and Commercialisation Committee, a subcommittee of the PHI Board, and monitors and advises with intellectual property and commercialisation activities on behalf of the Institute. Throughout 2013, members provided expert guidance on issues such as corporate governance of intellectual property-related functions and strategies for managing our licensing relationships. We greatly appreciate the contribution made by members of this committee.

Prince Henry's Institute has a proud history of engagement with the provision of clinical services. Our senior clinical teams provide endocrinology consulting, leadership, teaching and service development in the affiliated Monash Health Department of Endocrinology and in other clinical departments at Monash Health.

Originally headed by Professor Henry Burger, the Monash Health General Endocrinology Clinic continues to provide endocrine care for South-Eastern Melbourne. Under the current leadership of Professor Peter Fuller, the Endocrinology Unit serves a population approaching 1.6 million. The Unit includes consultants, clinical trainees, and endocrinologists conducting research toward a PhD at PHI: Dr Jimmy Shen, Dr Michael Mond and Dr Philip Wong.

The increasing demand for this service has led to the evolution of more specialised clinics. The Androgen Replacement Clinic is a joint initiative of Prince Henry's Institute and the Monash Health Endocrinology Unit. Under the leadership of Drs Carolyn Allan and Kati Matthiesson, the clinic advises on the management of men with androgen deficiency, assisting with education of clinicians in this aspect of endocrinology and provides a basis for a number of research studies.

PHI also has strong links with Monash Medical Centre, with Dr Matthiesson providing andrology expertise to the Reproductive Biology Unit Clinic and Dr Allan providing leadership in the hospital's Gestational Diabetes and Endocrinology in Pregnancy Clinics. Dr Jun Yang also provides expertise in the Endocrine Pregnancy Clinic.

In 2013, Dr Matthiesson has continued to work closely with the Department of Urology to deliver clinical services providing care for men undergoing testosterone withdrawal therapy for prostate cancer. This service addresses a significant, unmet need in the management of prostate cancer.

Prince Henry's Institute has a proud history of engagement with the provision of clinical services.

In the 1970's, Professor Henry Burger worked closely with the late Jean Hailes to establish Australia's first Menopause Clinic. The clinic is still operating today under the joint management of Monash Health Endocrinology and Gynaecology Units. The Endocrinology component is jointly headed by Dr Amanda Vincent who also has several research collaborations with PHI researchers. Dr Fran Milat (the Michael, John and Phoebe Jones Fellow) contributes her expertise in the management of osteoporosis to the menopause clinic. Dr Milat has been instrumental in the establishment of the Metabolic Bone Disease Clinic in collaboration with the Paediatric Endocrinology Unit. The clinic specialises in the treatment of osteoporosis, but also treats other diseases of the bone in younger patients, many of whom are transitioning from paediatric care. In 2013, she also continued her work with Dandenong Hospital's Osteoporosis Clinic in collaboration with the Monash Health Endocrine and Orthopaedics Units. Drs Vincent and Philip Wong, a doctoral research fellow at PHI, currently staff this clinic. This has involved service development and the provision of protocols for areas not previously covered by existing management guidelines. Several research studies have arisen from the development of this clinic.

Established to manage thyroid cancer, the Multidisciplinary Thyroid Clinic, is part of the evolution of full academic service associated with research and teaching across disciplines and centres. The staff of this service included Dr Michael Mond who is also conducting research on the molecular pathogenesis of thyroid cancer in PHI.

Professor Rob McLachlan, head of the Institute's Clinical Andrology service, maintains his active engagement with Monash IVF as the Consultant Andrologist and Chairman of their research committee, which oversees research collaborations with PHI. He also serves as Director of Andrology Australia, a federally funded research and advocacy organisation for Men's Health. Andrology Fellow, Dr Bianca St John provides assistance.

L - R: Yulia Roif, Anna Zamojska, Dr Carolyn Allan, Elise Forbes

MHTP Medical Genomics Facility

http://mhtpmedicalgenomics.org.au

incorporating:

- **ACRF Centre for Cancer Genomic Medicine**
- **The Gandel Charitable Trust Sequencing Centre**
- **MHTP High Content Screening Centre**
- **MHTP Microarray Centre**

The Monash Health Translation Precinct (MHTP) Medical Genomics Facility provides vital services to researchers across Prince Henry's Institute as well as MHTP partners Monash University and Monash Health. The Facility hosts state-of-the-art genomics technologies that are used by researchers to gain a greater understanding of gene structure and function. This in turn is used to help develop advanced screening methods, diagnosis and treatments of various diseases for improved healthcare.

The year commenced with an exciting announcement in March that the MHTP Medical Genomics Facility team, were the joint winners of the inaugural Monash Technology Research Platform – Award for Excellence. Conferred by Pro Vice-Chancellor (Research and Research Infrastructure), Professor Ian Smith, the award recognises quality and excellence and reflects the importance of technology platforms in their role in driving research outcomes.

Vivien Vasic, Manager of the MHTP Medical Genomics Facility, said "To be recognised in this way is a great honour and reflection of the quality and importance of the services we offer. We continue to work to expand the services and enhance research capabilities across the Precinct,"

During the year, the Australian Cancer Research Foundation (ACRF) Centre for Cancer Genomic Medicine funded by the ACRF and launched in 2012 continued to provide vital Next Generation Sequencing (NGS) services. This equipment is essential for the rapid sequencing of entire genomes providing researchers greater insight into the nature of genes involved in cancer to assist in the development of improved cancer therapies.

Research facilitated through the Centre included work undertaken by Professor Matthew Gillespie and Dr Julian Quinn from the Bone, Joint, and Cancer laboratory. The group used NGS to investigate how an anticancer drug treatment causes the side effect of promoting bone loss. Research aims to identify new strategies to reduce or prevent this side effect in the future.

The Gandel Charitable Trust Sequencing Centre has a long tradition of providing access to quality DNA sequencing services since 1999, and the Centre, named in recognition of the Gandel family's support provides essential services to 500 medical researchers and clinicians within MHTP as well as nationwide.

The Centre continued to have a strong demand for services that includes various research and clinical applications.

The Facility ended the year with another exciting announcement that funding was granted to introduce Single Cell Genomics and High Throughput Screening within the Facility. A successful NHMRC grant lead by co convener of the MHTP Medical Genomics management committee, Professor Paul Hertzog, will see technologies introduced that can sequence single cells. This paves the way to investigate how individual cells may be the causative agents in disease progression and can be also used to investigate cellular activities for the development of stem cell therapies.

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EDUCATION

STUDENT PROGRAMS

Prince Henry's Institute provides tomorrow's scientific leaders with an innovative and stimulating learning environment so they can develop the skills and confidence to reach their full potential and take their place as drivers of future discovery.

Our student program includes a range of supports and resources to assist emerging and medically trained postgraduate research students enrolled through affiliated universities, as they complete their Honours, Masters, and Doctoral degrees. Under the support of innovative research leaders within our world leading laboratories, students develop practical research skills and expertise in the very latest research techniques and technology platforms. We believe that research education is about empowering students to succeed by giving them the tools and confidence to excel. As well as the discipline of laboratory science and ethics, we work with students to help them develop the confidence and skills to communicate their work and engage with a broad audience. Students participate in regular presentation opportunities including candidature presentations, national and international scientific meetings, and programs such as the national 3MT Competition initiative.

The PHI Education Committee and Student Society also run group-learning opportunities such as regular scientific and technical seminar programs to encourage students to engage in robust discussion and expose them to the latest scientific techniques.

Our stimulating translation-focused learning environment is ideal for medically qualified post-graduate students with opportunity for regular clinical practice in Monash Health clinics, integrated with training in basic science and research technical skills. We recognise the value of scientific and professional mentoring as a vital tool in the education and development of student and early-career researchers embarking on a path that is both challenging and rewarding.

Students 2013:

PhD	16
Masters	6
Honours	10
Total	32

Education and Training Support

The next generation of innovators will play a vital role in ensuring the future of Australian medical research and our important work. We are committed to providing a research and clinical environment that equips students with the skills, confidence, and techniques to become the scientific leaders of tomorrow. We recognise that the demands of research and study can make it difficult for many PhD students to take on additional employment to supplement their PhD stipend. To assist students and ensure they stay in the laboratory, PHI recognises research excellence through the provision of support for high achieving post-graduate students. In 2013, PHI announced two awards recognising research excellence, including sponsored funding providing recipients with $5000 per year over three years.

Social and Academic Support

Prince Henry's Institute provides a strong program of social and academic support for its students, including the Student Society, Higher Degree by Research Committee and Education Committee. Through these groups, students and staff work together to provide student welfare and training support, mentorship and training and development opportunities.

Prince Henry's Institute Student Society

Committee members:
Justine Olcorn (President)
Justin Chen (Vice-president)
Heba Zahid (Secretary)
Amy Winship (Treasurer)
Trang Nguyen (Monash Student Representative)
Alex Cowcher (Non-Monash Student Representative)
Katherine Johnson (Non-Monash Student Representative)

The Prince Henry's Institute Student Society (PHISS) continues to play an important role in providing a positive and engaging academic and social environment for students at PHI. This year, the student society has continued to focus on its strong working relationships with PHI committees and staff as well as advocacy and representation of the PHI student community. Instrumental in organising social events, the committee actively participates in the facilitation of student education, training and professional development, including its PHISS Abstract Awards.

PHISS Abstract Awards 2013

In 2013, the PHI Student Society (PHISS) awarded abstract awards during the PHI Student Symposium.

PHISS Student Symposium Abstract Award winners:

- **Best Honours/Masters Abstract Award:** Paolo Pinares Garcia
- **Best PhD Abstract Award:** Michael Mond
- **Runner Up PhD Abstract Award:** Justine Olcorn

In April 2013, the PHISS ran a professional development workshop "What you can do with a PhD" for students (and ECRs) in conjunction with the PHI postdoctoral association, chaired by Dr Kelly Walton. Run at Monash University,

this workshop featured guest speakers who presented on the following topics:

- Thought Leadership – Dr Sarah Meachem
- Unbounded Consulting – Dr Lynette Airey
- NHMRC Career Development Fellow – Dr Kristy Brown
- Stella Connect Pty Ltd – Stella Clark
- NHMRC Projects Leader – Dr Saraid Billiards
- Scientific Writing – Dr Rebecca Smith
- John Monash Science School – Dr Nick Walpole
- VPTN Bio21 Cluster Node – Dr Gerard Gibbs
- Science in Public – Toni Stevens
- ASN Events – Dr Maree Overall
- Sarpharma – Dr Karla Knower

Higher Degree by Research Committee

Chaired by Professor Lois Salamonsen, the Higher Degree Committee nurtures the development of all Higher Degree by Research students at PHI, through candidature monitoring and the provision of support and advice to students and their supervisors.

The Education Committee

The Education Committee plays a key role in student development through their program formal training and development opportunities including the Institute's Annual Student Symposium, Work in Progress presentations and other seminars. In 2013, the committee hosted the second PHI 3 Minute Thesis Competition, modelled on the initiative originally developed by the University of Queensland, and later rolled out nationally. With a focus on media and presentation skills, this program provides a safe space for students to practice communicating their work to broader non-scientific audiences.

Student Awards 2013

PHI 3MT Competition

First place
Elizabeth Fletcher, Jenna Haverfield, Quynh-Nhu Nguyen

Highly Commended
Heba Zahib, Justin Chen and Kyren Lazarus

University of Melbourne 3MT Competition Finalist
Rajini Sreenivasan

20th Annual PHI Student Symposium Awards

Novo Nordisk Presentation Awards

Best Overall PhD
- **Justin Chen**
"Identifying the causes of cancer cachexia"

First Year PhD
- **Quynh-Nhu Nguyen**
"Novel strategies for fertility preservation in female cancer patients: Does the elimination of PUMA confer protection on oocytes during DNA-damaging chemotherapy "

Runner up PhD
- **Justine Olcorn**
"Activin A-responsive microRNAs in differentiated rat Sertoli cells"

Best Overall Honours/ Masters
- **Tan Leung (Dilys)**
"Characterisation of a potential therapeutic target - X-linked inhibitor of apoptosis protein (XIAP) in ovarian granulose cell tumours (GCT)"

Runner up Honours/Masters
- **Edwina Oliver** "Characterisation of x-linked inhibitor of apoptosis protein function in ovarian granulosa cell tumour"

Special Commendation
- **Trang Nguyen**
"Generation of 'Jumbo' TGF-β ligands for therapeutic applications"

Special Commendation - **Wenxin Chen (Cindy)**
"The role of NFκB signalling in granulose cell biology"

Graduate Excellence Awards 2013

Elizabeth Fletcher
- Cardiovascular Endocrinology

Prince Henry's Institute Development Award 2013 (Inaugural)

Rajini Sreenivasan

Full student list and Invited presentations attached in listings.

20th Annual Student Symposium Awards L - R: Prof Peter Fuller Dilys Leung, Justin Chen, Saras Singam (Novo Nordisk Representative), Justine Olcorn

University affiliations:

Education supporters:

Montgomery Trust

EDUCATION

STUDENT LIST 2013

Student List

PhD Graduates:

Hui Ting Ho BSc (Hons)
'Proprotein convertase 6: role in embryo implantation and clincial implications'
Supervisor: A/Prof Guiying Nie

Nirukshi Samarajeewa BBiomedSci (Hons)
'Elucidating of the role of CRTC2 co-activation of CREB in regulating promoter II-driven aromatase expression in human breast adipose stromal cells'
Supervisors: Dr Kristy Brown; Professor Evan Simpson

Sarah To BSc (Hons)
'TNFalpha and its role in menopausal ER+ breast cancer'
Supervisors: Dr Colin Clyne; Dr Kevin Knower

PhD Students:

Dimuthu Alankarage BBiomedSci (Hons)
'ETV5 and DHH are novel genes in mammalian sex development'
Supervisors: Professor Vincent Harley; Dr Rowena Lavery

Laura Bienvenu BSc (Hons)
'Cardiomyocyte mineralocorticoid receptor signalling plays a critical role in ischema-reperfusion injury and recovery of cardiac function'
Supervisors: Professor Lea Delbridge (University of Melbourne); Dr Morag Young

Justin Chen BSc (Hons) BA
'Targeting activin to conteract muscle wasting and cachexia'
Supervisors: Dr Craig Harrison; Dr Kelly Walton

Daniel Czech BSc (Hons)
'The role of SRY in healthy and diseased midbrain neurons'
Supervisors: Dr Helena Sim; Professor Vincent Harley; Dr Joohyung Lee

Damien Eeles BBMs (Hons)
'The role of IL-33 in bone'
Supervisors: Dr Johannes Schuijers and Dr Brian Grills (La Trobe University); Dr Julian Quinn

Elizabeth Fletcher BSc (Hons)
'Mechanisms of Mineralocorticoid Receptor-Mediated Cardiovascular Disease: a Role for the Peripheral Molecular Clock?'
Supervisors: Professor Lea Delbridge (University of Melbourne); Dr Morag Young

Jenna Haverfield BSc (Hons)
'Endocrine regulation of Sertoli cell function'
Supervisors: Dr Sarah Meachem; Dr Peter Stanton

Sophea Heng BSc (Hons)
'PCs in embryo implantation and endometrial cancer'
Supervisor: A/Prof Guiying Nie

Katharine Johnson, BSc (Hons)
'Characterisation of Activin A and B'
Supervisors: Dr Tony Barton (Swinburn University); Dr Kelly Walton; Dr Craig Harrison; Dr Sara Al-Musawi

Kyren Lazarus BSc (Hons)
'Role of LRH-1 in breast cancer'
Supervisors: Dr Lara Grollo (Swinburne University); Dr Colin Clyne; Dr Ashwini Chand

Michael Mond MBBS, FRACP
'Defining the genetic pathology of epithelial thyroid tumours'
Supervisors: Associate Professor Chris Gilfillan (Monash University); Professor Peter Fuller

Quynh-Nhu Nguyen MBBS(Hons), DipMusPrac
'New strategies for ovarian preservation in female cancer patients'
Supervisors: Professor Martha Hickey (Melbourne University), Dr Karla Hutt, Professor Jock Findlay AO

Justine Olcorn BBiomedSci (Hons)
'Regulation of spermatogenesis by TGFβ superfamily members'
Supervisors: Dr Peter Stanton; Dr Craig Harrison

Irene Papageorgiou BSc (Hon)
'The role of TGFβ signalling in cancer pathogenesis'
Supervisors: Dr Craig Harrison; Dr Kelly Walton; Professor Lois Salamonsen

Jimmy Shen MBBS
'Macrophage MR signalling regulates systolic blood pressure and cardiovascular remodelling'
Supervisors: Dr Morag Young; Professor Peter Fuller

Courtney Simpson BSc (Hons)
'Structure and function of growth and differentiation factor-9'
Supervisors: Dr Craig Harrison; Dr Peter Stanton

Rajini Sreenivasan MSc
'Genetic regulatory mechanisms in mammalian sex determination'
Supervisors: Professor Vincent Harley; Dr Robb de Longh (University of Melbourne)

Amanda Gabrielle van der Kraan BBiomedSci (Hons)
'The potentiating effects of cell stress on pathological bone loss'
Supervisors: Dr Julian Quinn; Professor Matthew Gillespie; Dr John Price (Monash University)

Xuyi Wang BSc Grad Dip Reprod Sci
'Role of P53 in regulating aromatase in the breast'
Supervisors: Dr Kristy Brown; Professor Evan Simpson

Amy Winship BSc (Hons)
'The role of Interleukin-11 in Endometrial Cancer'
Supervisor: Dr Eva Dimitriadis

Phillip Wong MBBS FRACP
'Thalassemia bone disease and the role of iron overload on bone biology'
Supervisors: Professor Peter Fuller; Professor Matthew Gillespie, Dr Fran Milat

Heba Zahid BSc App Med Sci MBiomedSci MSc
'The role of Apolipoproteins in endometrial receptivity'
Supervisors: Professor Lois Salamonsen; Dr Tracey Edgell

Masters Graduate:

Zhe (Kimmy) Zhao BSc
'Indentification of novel LRH-1 target genes in breast cancer'
Supervisors: Dr Colin Clyne; Dr Ashwini Chand

Masters Students:

Cheuk Man (Cherie) Au BBiomedSc
'Molecular Genetics of Sex Determination and Gonadal Development'
Supervisors: Professor Vincent Harley; Dr Rowena Lavery

Hannah Loke BBiomedSc MBS
'The role of SRY in normal & disease dopamine pathway'
Supervisor: Dr Joohyung Lee; Professor Vincent Harley

Wenxin (Cindy) Chen BBiomed
'The Role of NFKB Signalling in Granulosa Cell Biology'
Supervisors: Dr Ann Drummond; Dr Simon Chu

Tan Hung (Dilys) Leung Psych (Hons)
'Characterisation of a potential therapeutic target - X-linked inhibitor of apoptosis protein (XIAP) in granulosa cell tumour (GCT)'
Supervisors: Professor Peter Fuller; Dr Simon Chu

Kavitha Vaithiyanathan BSc Grad Dip Reprod Sci
'Bmf regulates germ cell death and determines the size of the primordial follicle pool'
Supervisors: Dr Karla Hutt; Dr Michelle Myers

Ann Winter PhD BSc(Hons)
'Uterine Fibroids: Investigation of an in vitro model'
Supervisors: Professor Lois Salamonsen; Dr Jemma Evans

Honours Graduates:

Katharine Johnson BSc
'Characteristics of the metabolic growth factor bone morphogenetic protein 8B'
Supervisor: Dr Craig Harrison; Dr Kelly Walton

Sadiqa Maqsudi BSc
'Proteomic identification of substrates of the enzyme OPP9'
Supervisors: Dr Andrew Stephens; Dr Peter Stanton; Dr Jillian Shaw, (Swinburne University)

Medina Taletovic BSc (Hons), BBio (Hons)
'Mineralocorticoid receptor function'
Supervisor: Dr Ann Drummond

Honours Students:

Alexander Cowcher BSc
'Defining the Role of Timeless as a Mineralocorticoid Receptor Coregulatory Protein in Cardiac Cells'
Supervisors: Dr Morag Young; Dr Colin Clyne; Dr Sharon La Fontaine (Deakin University)

Harriet Fitzgerald BSc
'Hormonal Regulation of Protein Glycoforms in the Endometrium'
Supervisors: Professor Lois Salamonsen; Dr Tracey Edgell

Laura Knott BSc
'Does menstrual fluid contain unique repair factors? Functional characterisation of factors identified in menstrual fluid'
Supervisors: Dr Jemma Evans, Professor Lois Salamonsen, Dr Richard Williams (Deakin University)

Trang Nguyen BBSc
'Generation of Jumbo TGF-beta ligands'
Supervisors: Dr Craig Harrison; Dr Sara Al-Musawi; Dr Kelly Walton

Edwina Oliver BSc
'Characterisation of X-Linked Inhibitor of Apoptosis Protein (XIAP) in Ovarian Granulosa Cell Tumour (GCT)'
Supervisors: Dr Simon Chu ; Dr Sharon La Fontaine (Deakin University)

Paulo Pinares-Garcia BSc
'The role of *SRY* in the healthy and injured nigrostriatal dopamine system in males'
Supervisor: Dr Jooyhung Lee; Professor Vincent Harley

Jessica Riseley BSc
'EBP50 & Endometrial Receptivity'
Supervisors: Dr Sarah Paule; A/Professor Guiying Nie

Edris Sayed BSc
'Defining the role of Timeless as an oestrogen receptor co-activator in breast cancer cells'
Supervisors: Dr Colin Clyne; Dr Chantal Magne Nde; Dr Gillian Shaw (Swinburne University)

Luke Terella BBMS, BSc (Hons)
'A mineralocorticoid receptor DNA-binding domain mutation *in vivo*'
Supervisors: Professor Peter Fuller; A/Professor Timothy Cole

Vacation Students:

Nadeeja Atapattu Mudiyanselage
Harriet Fitzgerald
Selen Gursoy
Viet Phuong Anh Le
Trang Nguyen
Jessica Riseley
Poornima Wijayaratne
Farzana Zaman
Emma Zhang

EDUCATION

SEMINARS IN 2013

MHTP Seminars

Professor Barry T. Hinton
Professor of Cell Biology at the University of Virginia
"Morphogenesis of the developing Wolffian duct: how do you get 6 meters of epididymis inside a human scrotum?"

Dr Philippe Collas PhD
"Remodeling of nuclear lamin - genome interactions in the context of adipogenic differentiation"

Dr Jose Polo PhD
Larkins Fellow, Australian Regenerative Medicine Institute, Monash University, and Oliver Vasilevski, PhD, Asia Pacific Channel Manager, Fluidigm Corporation
"Advances in fluidigm single cell genomics"

Dr Morag Young PhD
Head, Cardiovascular Endocrinology Laboratory, Prince Henry's Institute
"The mineralocorticoid receptor, more than just salt and water"

Professor Michael Cowley
Department of Physiology; Director, Monash Obesity & Diabetes Institute, Monash University
"Leptin induced hypertension: a mean trick of nature?"

Professor John Mattick
Garvan Institute of Medical Research, Sydney, NSW
"The hidden layer of RNA regulation in human development"

Professor John Furness
Dept of Anatomy and Neuroscience, University of Melbourne
"Ghrelin, ghrelin mimetics, autonomic function and other novel actions of ghrelin: An ongoing story"

Professor John Carroll
Head of School of Biomedical Sciences, Monash University
"Polarity and organelle inheritance in meiosis"

Professor David Thorburn
Head, Genetic Disorders Theme and Mitochondrial Research Group, Murdoch Childrens Research Institute
"Massively Parallel Sequencing for Mitochondrial Disease: Identification of 8 novel disease genes in the first 44 patients"

Professor Richard Kitching
Centre for Inflammatory Diseases, Monash University Department of Medicine.
"CD4 + T cell autoimmunity and the kidney: a tale of two antigens"

A/Professor Terry Johns
Centre for Cancer Research, MIMR
"Targeting Receptor Tyrosine Kinases in Cancer"

Professor Stuart Hooper
The Ritchie Centre, MIMR
"The transition to life after birth"

Professor Ian Smith
Monash University
"Monash at the Academic Industrial Interface: Trains and Platforms"

Professor Yuri Estrin
Department of Materials Engineering, Monash University
"Bulk nanomaterials for biomedical implants"

Professor Jonathan Morris
Director, Kolling Institute for Medical Research; Head of the Northern Clinical School
"Placental insufficiency: Its prediction, pathology, prevention and population significance"

Professor Jane Visvader
Head, Breast Cancer Laboratory, WEHI
"The emerging mammary epithelial hierarchy"

Professor Martin Pera
Chair Stem Cell Sciences, The University of Melbourne, Florey Neuroscience and Mental Health Institute, Walter and Eliza hall Institute of Medical Research
"The Many States of Pluripotency"

Dr Robin Hobbs
Group Leader, Australian Regenerative Medicine Institute, Department of Anatomy and Developmental Biology, Monash University.
"Molecular mechanisms of germline stem cell maintenance and development"

Professor Stephen Simpson
Academic Director, Charles Perkins Centre and Australian Research Council (ARC) Laureate Fellow, School of Biological Sciences, University of Sydney.
"Nature of Nutrition: a unifying framework from animal adaptation to human obesity"

Professor Susan Fisher
Director, Translational Research in Perinatal Biology and Medicine program, Department of Obstretics, Gynecology and Reproductive Sciences, University of California, USA.
"Culturing Cytotrophoblasts reverses gene dysregulation in preeclampsia revealing possible causes"

Professor Michael Ryan
Head, Department of Biochemistry, La Trobe Institute for Molecular Science.
"Mitochondrial fission: breaking up is hard to do"

Professor Ulus Atasoy
Chief of the Division of Allergy-Immunology, Harry S. Truman Veteran´s Hospital, Columbia.

Dr David Powell
Senior Research Fellow, Victorian Bioinformatics Consortium, Monash University
"Basic bioinformatics and tools for analysis using Galaxy"

Professor Sharad Kumar
Co-director, Centre for Cancer Biology, South Australia Pathology.
"Ubiquitination in cell physiology and disease"

Dr Bev Mühlhäusler
Head, Metabolic Health Unit, FOODplus Research Centre, University of Adelaide.
"Breaking the intergenerational obesity cycle through nutritional intervention"

Professor Richard Simpson
Head, Department of Biochemistry, La Trobe University.
"Exosome: proteomic insights and diagnostic potential"

A/Professor Stephen Tong
Clinician-Scientist, Mercy Hospital for Women and The University of Melbourne
"Developing molecularly targeted therapeutics and diagnostics for major pregnancy complications"

Professor Julian Savulescu
Uehiro Chair in Practical Ethics and Director, Oxford Centre for Neuroethics, University of Oxford
"The Futility of Futility: The challenges of treating critically ill newborns and children and sharing reflections on the Ashley Treatment case almost a decade later"

Dr Patrick Western
Group Leader, Centre for Genetic Diseases, Monash institute of Medical Research
“Signalling, epigenetics and the germline: Establishing a foundation for following generations”

Dr Michael Tavaria PhD
Scientific Applications Support Manager, Life Technologies, Australasia
“Advanced qPCR data analysis - Are you getting the most out of your qPCR data?”

Dr Dinny Graham
Research Fellow, Breast Cancer Group, Westmead Institute for Cancer Research.
“Mechanisms of progesterone signalling in the normal breast and breast cancer”

Dr Robin Anderson
Research Fellow, Peter MacCallum Cancer Centre; Senior Research Fellow, National Breast Cancer Foundation
“BMP4 inhibits breast cancer metastasis by blocking immune suppressive activity”

Professor Rob Norman AO
University of Adelaide
“Reproduction as a window on future health: an ovarian perspective”

Professor John Carroll
Head of School - School of Biomedical Sciences, Monash University
“Cell cycle control in the mammalian oocyte”

A/Professor Sophia Zoungas
Monash University
“Exemplars of translation projects within MCHRI”

Dr Brant Bassam PhD
Bio-Strategy Ltd
“Digital Nucleic Acid Quantification: An Introduction to NanoString Technology”

Professor Vincent Harley
Head, Sex Dertermination and Gonadal Development, PHI
“Sex development and differentiation”

Mr Paul Rasmussen
Director of Sales, Asia Pacific Region
“Digital Nucleic Acid Quantification: An Introduction to NanoString Technology”

Professor Fred Gungerich
Vanderbilt University, Nashville, Tennessee
“Regulation of enzymes involved in steroid hormone metabolism”

Professor Bernard Jégou
Research Director IRSET-INSERM U1085, Université de Rennes I, Campus de Beaulieu, France
“Two decades of research on endocrine disruptors: Science and Science friction”

MHTP Translation Research Facility building under construction and due for completion in 2015 will include new lecture facilities

EDUCATION

INVITED PRESENTATIONS

Carolyn Allan
- Invited speaker, Prostate Cancer World Congress
- Session Chair: 10th International Congress on Andrology Symposium, Melbourne
- Invited speaker, Male Reproductive Health and Diabetes Mellitus (on behalf of Andrology Australia) General Practitioner Conference & Exhibition (GPCE) Melbourne
- Invited Speaker, Epworth Healthcare: Men's Health in General Practice Seminar, Androgen Deficiency, Diagnosis, and Management
- Invited speaker, Physician Education Program (FRACP Trainees), Female Reproductive Endocrinology / Male Reproductive Endocrinology

Sara Al-Musawi
- Invited Speaker, School of Exercise and Nutrition Sciences, Deakin University
- Invited Speaker, Fetal and Neonatal Health Laboratory, The Ritchie Centre, Monash Institute of Medical Research, Melbourne
- Invited Speaker, Kambrya College, Berwick (for ASMR)

Stefan Bagheri-Fam
- Invited speaker, GSA, Sydney, "ATRX is required for PML nuclear body function in Sertoli cells"
- MHRW, "FGFR2 mutation in 46, XY gonadal dysgenesis with Crouzon-like syndrome"

Maree Bilandzic
- Poster presenter, Monash Comprehensive Cancer Consortium Research Symposium, Australia

Kristy Brown
- Invited Speaker, Australian Breast Cancer Conference, Melbourne, Australia
- Invited Speaker, Drug Discovery Biology Seminar Series at Monash Institute of Pharmaceutical Sciences (MIPS) Melbourne, Australia

Ashiwini Chand
- Invited speaker, School of Population and Global Heath, University of Melbourne: "Targeting the renin-angiotensin system as a preventative and therapeutic target in breast cancer"

Justin Chen
- Invited Speaker, Women's Health Research Institute, Northwestern University, Feinberg School of Medicine; Chicago, USA
- Invited Speaker, Department of Neurology, University of Washington School of Medicine, Seattle, USA

Colin Clyne
- Invited Speaker, Deakin University School of Life and Environmental Sciences

Eva Dimitriadis
- Invited speaker, SIRT (Scientists in Reproductive Technologies) meeting in association with the Fertility Society of Australia, Sydney
- Invited speaker, Fertility Society of Australia, Sydney

Peter Fuller
- Invited speaker, Novo Nordisk VIC/TAS Endocrine Weekend Meeting, Torquay
- Invited speaker, Victorian Comprehensive Cancer Centre Ovarian Cancer Symposium, Melbourne

Vincent Harley
- Invited Speaker, Gordon Research Conference (GRC) on Germinal Stem Cell Biology, Hong Kong: "A novel disorder of sex development"
- Invited speaker, LaTrobe Institute of Molecular Sciences, LaTrobe University, Melbourne: "Genetics of Sex and Gender"
- Invited speaker, Department of Biochemistry, University of Hong Kong, "Sox9 regulation and function in sex determination"

Craig Harrison
- Invited speaker, The Salk Institute, San Diego
- Invited speaker, Rigel Pharmaceuticals, San Francisco
- Invited speaker, Ember Thereapeutics, Boston

Jenna Haverfield
- Invited speaker, Centre for Reproductive Health, University of Edinburgh, UK
- Invited speaker, Centre for Reproductive Medicine and Andrology, University of Munster, Germany
- Invited speaker, Department of Growth and Reproduction, Copenhagen University

Karla Hutt
- Invited Speaker, Ovarian Club Meeting, Paris, France
- Invited speaker, ANZCHOG, Melbourne
- Invited speaker, CRD, MIMR, Melbourne

Rowena Lavery
- Invited speaker – NHMRC Program Grant Meeting, Flowerdale. "Discovery of Candidate Genes for Disorders of Sexual Development (DSD)."
- Invited speaker, NHMRC Program Grant Meeting, Flowerdale. "Novel gonadal phenotypes from a sensitised ENU mutagenesis screen in mice"

Joohyung Lee
- Invited speaker, Seoul National University, Department of Dentistry

Yogesh Makanji
- Invited Speaker, Robinson Institute, Adelaide

Rob McLachlan
- Invited Speaker, Meet-the-Professor symposium, US Endocrine Society 95th Annual Scientific Meeting, San Francisco
- Invited Speaker, 10th International Congress of Andrology, Melbourne
- Invited Speaker, Ipsen Clinical Meeting, Melbourne
- Invited Speaker, Eli Lilly Andrology, Forum, Sydney
- Invited Speaker, ANZCHOG (Australian and New Zealand Children's Haematology Oncology Group) 2013: Annual Scientific Meeting; Australia

Ellen Menkhorst
- Invited speaker, University of Melbourne
- Invited speaker, Australian and New Zealand Placental Association (ANZPRA) annual meeting, Sydney
- Invited speaker, Monash IVF annual scientific day, Melbourne
- Invited speaker, Pregnancy Research Group, Royal Women's Hospital, Carlton
- Invited speaker, Society for Reproductive Biology, Newcastle Reproductive Science Early Career Researcher Award, Sydney

Guiying Nie
- Invited speaker, Bill & Melinda Gates Foundation Grand Challenges Meeting, Rio de Janiero, Brazil
- Invited speaker, SEED meeting, the embryo and the endometrium. Sydney, NSW, Australia
- Invited speaker, 8th SGI Endometrial Satellite Symposium, Orlando, Florida, USA
- Invited speaker, University of Auckland, Auckland, New Zealand
- Invited speaker, Monash Health Research Week, Melbourne, Australia

Liza O'Donnell
- Invited speaker, International Congress of Andrology Conference

Jyothsna Rao
- Invited Speaker, The Ritchie Centre, Monash Institute of Medical Research, Clayton
- Invited Speaker, Institute for Stem Cell Biology and Regenerative Medicine, National Centre for Biological Sciences, Bengaluru, India
- Invited Speaker – Department of Biotechnology, Indian Institute of Technology, Chennai, India
- Invited Speaker, Manipal Hospital Ethics Committee, Manipal Hospital, Bengaluru, India
- Invited Speaker, National Centre for Cell Science, Pune University, India

Lois Salamonsen
- Invited Speaker, Pre-SSR Symposium on Endometriosis, Kingston, Ontario. 'Human endometrial receptivity'
- Invited Speaker, Scientists in Reproductive Technologies meeting, Melbourne.
- Invited Speaker, 11th General Meeting RED, Panama. Symposium: 360 degrees in ART. Round table - Implantation: 'Faulty ground for Fertile Seed'
- Invited Speaker, SEED (Specialists Sharing Expertise, Education and Data) meeting: The Embryo and the Endometrium, Sydney, March 2013. 'What happens when the embryo implants?'
- Invited Speaker, Mercy Symposium: Innovative Techniques in Reproduction. Exosomes; a new paradigm for embryo-maternal interactions at implantation
- Invited speaker, institutional seminars, La Trobe University, Monash IVF

Evan Simpson
- Invited Speaker, 18th Int. Conference on P450, Seattle, USA
- Invited Speaker, Dept of Biochemistry and Molecular Biology, University of Louisville, Kentucky, USA
- Invited Speaker, Gordon Research Conference on Hormone Dependent Cancers Providence, USA
- Invited Speaker, European Society for Human Reproduction and Embryology, London, UK

Rajini Sreenivasan
- Invited speaker: 'Transcriptional regulation of SOX9 in mammalian sex determination and differentiation.' MRC National Institute of Medical Research, London, UK

Peter Stanton
- Invited speaker, Fertility Society of Australia Conference
- Invited Speaker, Translational Obstetrics Group, Mercy Hospital, Heidelberg

Kaye Stenvers
- Invited Speaker, Festschrift in Honour of Prof. Jock K. Findlay: A Day of Science Monash Medical Centre, Australia
- Selected speaker, 46th Annual Meeting of the Society for the Study of Reproduction, Montreal, Canada
- Selected speaker, 44th Annual Meeting of the Society for Reproductive Biology, Sydney, Australia
- Poster presenter, Monash Comprehensive Cancer Consortium Research Symposium, Australia

Andrew Stephens
- Invited Speaker, Victorian Comprehensive Cancer Centre Ovarian Cancer Symposium

Kelly Walton
- Invited Speaker, CSIRO Parkville, Melbourne

Amy Winship
- Joint-Session Chair, SRB Meet the Professor session for Students and ECRs "Strategies for Success for the next generation"
- Invited speaker, Society for Reproductive Biology 44th Annual Conference, Sydney, Australia, David Healy New Investigator Award Session
- Invited speaker, ASMR Victorian Student Research Symposium, Royal Melbourne Hospital, Australia, Highly Ranked Abstract Award Session

Morag Young
- Keynote speaker, International: Endocrine Society Annual Meeting, San Francisco, USA, Declined due to pregnancy
- Keynote speaker, National: Australian Society of Clinical and Experimental Pharmacology and Toxicity, Melbourne
- Invited Departmental Seminars, National: Monash Health and Translation Precinct, Monash Health; Department of Health Sciences, Deakin University

Awards and Prizes

Sara Al-Musawi
- Fresh Science State Finalist

Stefan Bagheri-Fam
- NHMRC Project Grant (CIB), "FGFR2c and human testicular dysgenesis"

Laura Bienvenu
- ISHC Early Career Publication Award Winner

Maree Bilandzic
- Contributing to Australian Scholarship and Science (CASS) Foundation Science Medicine Grant (co-chief investigator)
- GCT Research Foundation grant (co-principle investigator)

Dr Kristy Brown
- NHMRC Career Development Award (CDA) 2011-2014
- Young Investigator Award - Women in Endocrinology
- Promotion and Tenure Travel Award -Endocrine Society

Ashwini Chand
- NHMRC Career Development Fellowship (2014-2018)
- Prince Henry's Institute Career Enhancement Award (2013 & 2014)
- Association for International Cancer Research (2013-2016): Chief Investigator B : CIB A novel estrogen receptor coregulator associated with tamoxifen resistance.

Justin Chen
- PHI Student Symposium: Winner PhD presentations
- Monash University Postgraduate Travel Grant
- The Endocrine Society (US): Abstract Award Travel Grant
- Prince Henry's Institute 3-Minute Thesis: Runner-Up
- Baker IDI Heart and Diabetes Institute Travel Award

Jock Findlay
- NHMRC Ethics Award

Elizabeth Fletcher
- 3 Minute Thesis Award, PHI

Peter Fuller
- NHMRC Senior Principal Research Fellowship

Vincent Harley
- Adjunct Professor, Department of Anatomy & Developmental Biology and Department of Biochemistry & Molecular Biology, Monash University

Jenna Haverfield
- Prince Henry's Institute 3-Minute Thesis: Winner
- Harold Mitchell Foundation, International Travel Fellowship
- Society for Reproduction and Fertility, Travel Grant
- Society for Reproduction and Fertility, Student Prize
- ESA/IPSEN International Travel Grant Award

Karla Hutt
- Career Development Fellowship (CDF), NHMRC

Jason Liew
- Harold Mitchell Early Postdoctoral Travel Fellowship
- The Larry Ewing Memorial Trainee Travel Fund Award
- SRB Mid-Career Poster Award
- Monash Research Week Poster Award

Chantal Magne Nde
- Best Research Award (Basic Science) Monash Health Research Week
- Poster Award, Australian Breast Cancer Conference

Ellen Menkhorst
- Finalist, Newcastle Emerging Scientist Award
- Ian Potter Travel Award ($3300) World Congress for Reproductive Biology, Edinburgh Scotland & International Federation of Placental Associations, Paris France.

Quynh Nhu-Nguyen
- Pfizer Research Grant award
- Best presentation from a first year student, PHI Student Symposium

Trang Nguyen
- PHI Student Symposium 2013 Honours/Masters presentations: Special commendation

Justine Olcorn
- 20th Annual Student Symposium PhD Abstract: Runner Up
- 20th Annual Student Symposium PHI, PhD presentations: Runner Up
- SRB Oozoa Award, Finalist

Paulo Pinares-Garcia
- Best Honours Abstract, PHI Student Symposium

Jyothsna Rao
- Australia India Early Career Research Fellowship

Professor Lois Salamonsen
- NHMRC award: 'High Achievers in Health and Medical Research'
- Beacon Award (USA): Frontiers in Reproduction

Rajini Sreenivasan
- Poster prize at Lorne Genome conference
- Prince Henry's Institute Development Award
- Larry Ewing Memorial Trainee Travel Fund, Society for the Study of Reproduction, Montreal, Canada
- Annual Scientific Meeting of the Endocrine Society of Australia Travel Grant
- ESA-Novartis Junior Scientist Award finalist, Annual Scientific Meeting of the Endocrine Society of Australia, Sydney, Australia
- University of Melbourne 3 Minute Thesis Competition Grand Finalist
- Monash Health Research Week: 1st prize, Poster competition in Endocrinology/Diabetes/Critical Care category)

Kaye Stenvers
- Ovarian Cancer Research Foundation (OCRF) pilot award (co-chief investigator)
- GCT Research Foundation grant (co-principle investigator)
- Marsha Rivkin Center for Ovarian Research Pilot Award (co-chief investigator)

Andrew Stephens
- Cancer Research Trusts Project Grant

Sarah To
- CJ Martin Overseas Early Career Fellowship (ECF), NHMRC
- Cancer Council Victoria Postdoctoral Fellowship
- Monash University Postgraduate Publications Award

Kelly Walton
- Endocrine Society of Australia: Postdoctoral Scholarship
- Endocrine Society of Australia Career Enhancement Award, 2012-2013
- Australian Women in Endocrinology

Amy Winship
- SRB David Healy New Investigator Award
- Australian Society for Medical Research Victorian student research symposium highly commended oral presentation award, ASMR 2013 Gala Dinner Ticket.
- Monash Health Research Week Poster Award, 2nd Prize

Jun Yang
- 2014 RACP (Royal Australasian College of Physicians) High Blood Pressure Foundation Research Establishment Fellowship ($50,000)

Heba Zahid
- Best Oral Presentation: BioMedLink Symposium, St Vincent's Institute, Melbourne

Service to the Scientific Community

Anthony Argentaro
- Member, Endocrine Society
- Member, ASBMB
- Member, Biology (ANZSCDB)

Sara Al-Musawi
- Chair, PHI Education Committee
- Chair, PHI Student Symposium: Honours and Masters oral presentations
- Chair, PHI Career Development workshop
- Member, Student Welfare Committee
- Member, Student Open Day Committee
- Adjudicator, PHI Student Society Abstract Award

Stefan Bagheri-Fam
- Member of the Monash Medical Centre Animal Ethics Committee B (MMCB)
- Member, ANZSCDB
- Member, ASMR
- Member, SDB
- Member, ESA
- Reviewer, Heredity
- Reviewer, Nucleic Acids Research
- Reviewer, NHMRC Project Grants

Maree Bilandzic
- Member, PHI Student Welfare Committee
- Coordinator, Deakin University Professional Placement
- Member, Australian Society for Medical Research (ASMR)
- Member, Endocrine Society of Australia (ESA)
- Member, Society for the Study of Reproduction (SSR) USA
- Member, Society for Reproductive Biology (SRB) Australia,
- Member, Society for Reproductive Biology Early Career (SRB/ECR)
- Member, Prince Henry's Institute Postdoctoral Association

Kristy Brown
- Member, Endocrine Society (US)
- Member, Endocrine Society of Australia
- Member, American Association for Cancer Research
- Member, Editorial Board, Journal of Steroid Biochemistry and Molecular Biology
- Member, the Endocrine Society Annual Meeting Steering Committee
- Member, Victorian Cancer Biobank Consortium Committee
- Member, NHMRC peer review

Ashwini Chand
- Member, American Association of Cancer Research (AACR)
- Member, AACR Women in Cancer Research
- Member, Australian Society of Medical Research
- Member, Endocrine Society of Australia
- Member, Endocrine Society of USA
- Member, Women in Endocrinology (Australia)
- Member, Women in Endocrinology (USA)
- Member, Victorian Cancer BioBank Access Committee

Justin Chen
- Member, Endocrine Society (US)
- Member, Australian Society for Medical Research
- Vice President, PHI Student Society

Simon Chu
- Member Endocrine Society of Australia
- Member Australian Society of Medical Research

Colin Clyne
- Member, Endocrine Society of Australia
- Member, Endocrine Society (USA)
- Member, Monash Comprehensive Cancer Consortium Executive Committee

Carly Cuman
- Member, Society for Reproductive Biology

Evdokia Dimitriadis
- Member, Editorial Board, World Journal of Translational Medicine
- Member, Reviewing Board, Journal of Reproductive Immunology
- Member, Editorial Board, Reproductive Biology and Endocrinology
- Member, Editorial Board, American Cancer Research Journal
- Elected Council member and Awards Chair, Society for Reproductive Biology
- Conference Convenor, Society for Reproductive Biology Annual Meeting, Gold Coast
- Member, European Society for Human Reproduction and Embryology
- Member, Society for the Study of Reproduction (USA)

Dr Ann Drummond
- Member of the Society for Reproductive Biology (Australia)

Nicole Fairweather
- Member, Victorian Association of Research Nurses
- Reviewer, Southern Health Research and Ethics Committee, Low Risk Projects

Jock Findlay
- Life Member of the Society of Reproductive Biology
- President, Society for the Study of Reproduction
- Member, Board of the Robinson Institute, University of Adelaide
- Chair, Grant Review Panel, NHMRC, Canberra
- Member, Endocrine Society of Australia, Fertility Society of Australia, Endocrine Society, USA, Society for the Study of Reproduction, USA, Endocrine Society, UK, Society for Reproduction & Fertility, UK., & Australian Society for Medical Research

Peter Fuller
- Member, Executive Committee, Cancer Council, Victoria
- Deputy Chair, Consultative Council, Victorian Cancer Agency, Department of Human Services (Victoria)
- Member, Council, Cabrini Clinical Education and Research Institute, Cabrini Hospital, Melbourne
- Member, Council of Governors, Florey Neurosciences Institutes, Melbourne
- Chair, Career Advancement Award Committee, Murdoch and Children's Research Institute, Melbourne
- Co-Editor, Hormone, and Metabolic Research
- Editor, Endocrine and Metabolic Section, Expert Opinion on Investigational Drugs
- Member, Editorial Board, Steroids
- Member, Faculty of 1000, Medicine
- Member, Southern Health Tissue Bank Steering Committee
- Chair, Selection Panel for the 2013 Colebatch Fellowship, The Cancer Council of Victoria
- Member, Research Affairs Core Committee of the Endocrine Society (USA)
- Press Task Force of the Endocrine Society (USA)
- Publications Committee of the Endocrine Society (USA)
- Member, Nominations Committee of the Endocrine Society (USA)
- Co-Chair, 39th International Aldosterone Conference, San Francisco, California, USA
- Chair, 40th International Aldosterone Conference, Chicago, Illinois, USA
- Member, Organising Committee, Renin-Angiotensin-Aldosterone Satellite, Putting the A back into RAAS, Santorini, Greece 2014
- Member, International Program Organising Committee, International Congress on Hormonal Steroids and Hormones and Cancer, Riyadh, Saudi Arabia 2014
- Committee, Diabetes, Obesity, Men's Health and Endocrinology Theme, Academic Health Science Centre

– Platform Planning Group, MHTP
– Capital Planning Group, Monash Health Translational Precinct
– Member, NHMRC Academy
– Editorial Board, Cancer Medicine
– NHMRC Grant Review Panel
– Victorian Cancer Registry Scientific Advisory Group
– Victorian Cancer Agency Consultative Council, Deputy Chair
– Basic Research Subcommittee of the Research Affairs Core Committee

Professor Vincent Harley
– Member, Editorial Board, International Journal of Biochemistry and Cell Biology
– Member, Editorial Board, Sexual Development
– Vice President, Lorne Genome Conference
– Judge of Abstracts, 94th Annual Meeting of The Endocrine Society, ENDO 2012
– Member, NHMRC Molecular Biology Grant Review Panel
– Medical Research Council review of the MRC NIMR Genetics & Development Group, Mill Hill [London], UK
– Co-convenor: APEG Satellite meeting on DSD, Perth
– Member, American Society for Biochemistry and Molecular Biology (ASBMB)
– Member, Australian Neuroscience Society
– Member, The American Society of Human Genetics (ASHG)
– Member, US Endocrine Society
– Member, Lorne Genome Conference Inc. (Vice president)
– Member, Human Genetics Society of Australasia (HGSA)
– Member, Victorian Society for Developmental Biology Society (VSDB)
– Member, Australian Society of Medical Research (ASMR)
– Member, Australian & New Zealand Society for Cell and Developmental Biology (ANZSCDBI)
– Member, Australian Society for Biochemistry and Molecular Biology (ASBMB)
– Member, National Association of Research Fellows of NHMRC Inc (NARF)
– Member, Human Genome Variation Society
– Member, Organization for the Study of Sex Differences (OSSD)
– Member, American Society for Cell Biology (ASCB)
– Member, The Endocrine Society of Australia (ESA)
– Member, NHMRC Research Translation Faculty
– Member, Australasian Paediatric Endocrine Group

Jenna Haverfield
– Member, Society for Reproductive Biology
– Member, Endocrine Society of Australia
– Member, Student Representative Subcommittee, Society for the Study of Reproduction
– Co-chair, organising committee PHI Non-Research Career Development Workshop
– Co-chair, platform session, SSR Conference
– Member, Aust Society for Medical Research
– Member, Society for Reproduction and Fertility
– Member, Society for the Study of Reproduction

Craig Harrison
– Member, Editorial Board, *Endocrinology*
– Member, US Endocrine Society
– Member, The Endocrine Societyof Australia
– Scientific Advisory Board, Paranta Biosciences
– Deputy chair, National Health and Medical Research Council Grant Review Panel

Karla Hutt
– Member, Society of Reproductive Biology
– Member, Society for the Study of Reproduction
– Website Secretary, Society of Reproductive Biology
– Bylaws Committee Member, Society for the Study of Reproduction
– Member, Editorial board, Reprodedia
– Assistant Chair, Grant Review Panel, NHMRC, Canberra

Kevin Knower
– Member, Endocrine Society of Australia
– Member, Endocrine Society (USA)

Rowena Lavery
– Member, Australian and New Zealand Society for Cell and Developmental
– Member, Monash University Institutional Biosafety Committee (IBC)
– Member, Monash University Institute of Graduate Research (MIGR) Level 1
– Conference Organiser, annual NHMRC Program Grant Meeting

Joohyung Lee
– Member, Society of Neurosciences
– Member, Australian Neuroscience Society
– Member, International Basal Ganglia Society
– Academic Editor, PLoS One

Jason Liew
– Member, Society of Reproductive Biology
– Member, Society for the Study of Reproduction

Chantal Magne Nde
– Member, Endocrine Society of Australia
– Member, Australian DAAD (German Academic Exchange Service) Alumni Association
– Member, Dresden Alumni Association
– Deputy Convener, Australian Association for Medical Research
– Member, Australian Association for Medical Research

Yogesh Makanji
– Adjudicator, PHI Student Symposium
– Member, PHI Hypoxia Suite Committee

Rob McLachlan:
– Director, Andrology Australia
– Member, Royal Australasian College of Physicians
– Member, Endocrine Society of Australia
– Member, Fertility Society of Australia
– Member, US Endocrine Society
– Member, American Society of Andrology
– Member, National Association of Research Fellows
– Member, Editorial Board, *International J Andrology*
– Member, Editorial Board, *J Andrology*
– Invited Reviewer, *Up-to-Date*, USA
– Section Editor, Male Reproduction,www.ENDOTEXT.org (Chief Ed. L de Groot)
– Chairman, Program Organising Committee, International Society of Andrology Congress
– Member, Eli Lilly Pty Ltd, Scientific Advisory Board
– Chairman, Medical Undergraduate Curriculum Committee
– Chairman, Monash IVF Research and Education Foundation
– Scientific Advisor, Victorian Assisted Reproduction Treatment Authority (VARTA)
– Member, World Health Organisation (WHO): Research on Methods for the Regulation of Male Fertility Sub-committee

Ellen Menkhorst
– Member and Early Career Representative, Society for Reproductive Biology
– Member,Australian and New Zealand Placental Research Association
– Member, Australian Society for Medical Research
– Member, Southern Health Research Week Program Committee

Guiying Nie
– Editorial Board manager, Frontiers in Bioscience
– Member, Editorial Board, Endocrinology
– Member, Reviewing Board, Reproductive Biology and Endocrinology
– Member, Research Translation Faculty, NHMRC of Australia
– Member, Australian Society for Medical Research
– Member, Society for Reproductive Biology
– Member, Australian and New Zealand Placental Research Association

– Member, International Federation of Placenta Associations
– Member, Society for Gynecologic Investigation

Liza O'Donnell
– Session chair, SRB Annual Conference
– Member, Society of Reproductive Biology Council

Makoto Ono
– Member, Councillor, Japanese Society for Paediatric Endocrinology
– Member, European Society for Paediatric Endocrinology (ESPE)
– Abstract Judge, 47th Annual Scientific Meeting of the Japanese Society for Paediatric Endocrinology (JSPE)
– Member, Japan Paediatric Society
– Member, Japan Endocrine Society
– Member, Japanese Society for Mass-screening
– Member, Japan Diabetes Society

Justine Olcorn
– Member, Society for Reproductive Biology
– President, PHI Student Society
– Member, Student Open Day Committee
– Member, Aust Society for Medical Research
– Member, Society for the Study of Reproduction

Sarah Paule
– Member, Society for Reproductive Biology

Adam Rainczuk
– Member, Society for the Study of Reproduction

Jyothsna Rao
– Member, Australian Society for Medical Research
– Member, Endocrine Society of Australia
– Member, Australian Physiological Society

David Robertson
– Member, Endocrine Society of Australia
– Member, Endocrine Society (US)
– Member, National Association of Research Fellows
– Editor, Women's Health
– Member, Australian Society for Medical Research
– Acting Chair, PHI Postdoctoral Association
– Member, PHI Higher Degrees Committee

Lois Salamonsen
– Associate Editor, Biology of Reproduction, Reproductive Sciences
– Co-chair, Society for the Study of Reproduction (SSR:USA) Program committee for 2014 meeting
– Member, SSR, Society for Reproductive Biology, Society for Gynecologic Investigation, US Endocrine Soc, Matrix Biology Society

Harmeet Singh
– Member, Society for Reproductive Biology
– Member, International Society for Extracellular Vesicles (ISEV), Europe
– Member, Australia and New Zealand Placental Research Association
– Life member, The Indian Society for Technical Education (ISTE)
– Member, Institutional committee responsible for OGTR engagement

Peter Stanton
– Co-chair, PHI Data Audit Committee
– Co-chair, Student Open Day Committee
– Member of Research Degrees Committee, Monash University
– Member, Endocrine Society of Australia
– Member, Society for the Study of Reproduction
– Member, US Endocrine Society
– Editorial Board, Tissue Barriers

Rajini Sreenivasan
– Member, Endocrine Society of Australia
– Member, Society for the Study of Reproduction

Dionne Sroczynski
– Member, Victorian Association of Research Nurses

Kaye Stenvers
– Co-chair, Program Organisation Committee, 2013-2015 Society for Reproductive Biology (AUS) Annual Meetings
– Member, Program Committee, 2013 -2014 Society for the Study of Reproduction (USA) Annual Meetings
– Member, Program Organisation Committee, PHI Festschrift in Honour of Prof. Jock K. Findlay: A Day of Science
– Co-Opted Member, Society for Reproductive Biology (AUS) Council
– Adjunct lecturer, Monash Institute for Medical Research and the Dept. of Anatomy & Developmental Biology, Monash University
– Member, PhD thesis advisory committees (3), University of Melbourne
– Member, PHI Equipment Committee
– Member, Australia and New Zealand Society for Cell and Developmental Biology
– Member, American Association for Cancer Research (USA)
– Member, Australian Society for Medical Research
– Member, Society for Reproductive Biology (AUS)
– Member of Society for the Study of Reproduction (USA)
– Member, Metastasis Research Society (International) & OZ-MRS (Australia)

Andrew Stephens
– Associate Member, American Association for Cancer Research
– Member, Australian Society for Biochemistry and Molecular Biology
– Member, Australasian Proteomics Society
–Associate Editor, Journal of Integrated Omics
–PHI Student Symposium 2013 adjudicator

Michelle Van Sinderen
– Member, Society for Reproductive Biology
– Member, Australian Society for Medical Research
– Member, American Association for Cancer Research (AACR)
– Member, Women in Cancer Research – AACR

Sarah To
– Member, Endocrine Society of Australia

Amy Winship
– Member, Society for Reproductive Biology

Kelly Walton
– Member, US Endocrine Society
– Member, Australian Society for Medical Research
– Member, Endocrine Society of Australia

Dr Morag Young
– Member, Editorial Board: Journal of Steroid Biochemistry and Molecular Biology
– Guest Editor, Clinical and Experimental Pharmacology and Physiology
– Member, Faculty 1000
– Member, US Endocrine Society
– Member, International Aldosterone Society
– Member, International Heart Research Society
– Member, European Endocrine Society

GRANT FUNDING

Funding Announced in 2013

National Health and Medical Research Council of Australia (NHMRC)

NHMRC Research Support

– Julian Quinn, Matthew Gillespie. Project Grant: Determining the influences of cell stress and heat shock factor-1 action in osteoclast formation and pathological bone loss. $635,558 (2014-2016)

– Lois Salamonsen, Richard Simpson. Project Grant: Endometrial exosomes: a new paradigm in endometrial-embryo cross-talk. $703,285 (2014-2016)

– Peter Fuller, Simon Chu. Project Grant: Molecular Determinants of Advanced Disease in Ovarian Granulosa Cell Tumours. $592,562 (2014-2016)

– Peter Fuller. Project Grant: Determinats of Tissue- and Ligand-Specific Responses at the Mineralocorticoid Receptor. $646,894 (2014-2016)

– Vincent Harley, Stefan Bagheri-Fam. Project Grant: Role of Fibroblast Growth Factor Receptor 2c in human testicular dysgenesis. $591,226 (2014-2016)

– Andrew Sinclair, Peter Koopman, Vince Harley. Program Grant: Disorders of Sex Development: Genetics, Diagnosis, Informing Clinical Care. $5,509,450 (Announced in 2013 for 2015-2019)

NHMRC People Support

- Ashwini Chand. Career Development Fellowship: New Targeted Therapies in Breast Cancer. $404,884 (2014-2016)

- Sarah To.Early Career Fellowship: Dietary and environmental risk factors for breast cancer: role of epigenetics. $316,676 (2014-2016)

Research Support

Ovarian Cancer Research Foundation (OCRF)

– Andrew Stephens. Operation of the OCRF Ovarian Cancer Tissue Bank. $131,386 (2013)

– Andrew Stephens, Adam Rainczuk. Generation of an iMALDI Diagnostic Test for Screening-Based Detection of Early-Stage, Serous Ovarian Tumours. $280,000 (2013)

– Simon Chu, Andrew Stephens, Adam Rainczuk. L'Oreal Paros Research Fellow. PPARgamma Activation Augments Anticancer Effects of XIAP Inhibition in Ovarian Granulosa Cell Tumours and in Serous Ovarian Epithelial Cancers. $215,000 (2013)

Marsha Rivkin

– Nuzhat Ahmed, Jock Findlay, Michael Quinn, Kaye Stenvers. Determining the microRNA signature of isolated chemoresistant ascites tumor cells. $A 75,000 Funding to the University of Melbourne (2013)

Monash IVF Pty Ltd

– Lois Salamonsen. Uterine Receptivity: the final hurdle in IVF. $27,000 (2013)

– Peter Stanton. Identification of novel marker proteins of spermatogenesis in human testicular interstitial fluid. $27,400 (2013)

– Guiying Nie. Implantation and Placentation. $50,000 (2013)

– Evodokia Dimitriadis. microRNA in the embryo secretome as a non-invasive screening tool for Aneuploidy. $40,000 (2013)

– Evodokia Dimitriadis. Human trophectoderm-endometrial interactions critical for implantation and the establishment of pregnancy. $42,000 (2013)

– Rob McLachlan. Meck Sharp & Dohme Pty Ltd Project Grant via Monash IVF. $150,000 (2013)

Cancer Council Victoria

Research

– Peter Croucher, Julian Quinn. Defining the critical role of osteoclasts in multiple myeloma cell growth and activation in bone. $360,000 Funding to the Garvin Institute (2013-2015)

People Support

– Sarah To. Postdoctoral Cancer Research Fellowship. Epigenetic regulation of oestrogen biosynthesis in breast cancer. $69,891 (2013)

Endocrine Society of Australia (ESA)

People Support

- Kelly Walton. Targeting activin signalling to restore adult tissue homeostasis. $50,000 (2013)

Travel Support

- Phillip Wong. Travel Award The Endocrine Society's 95th Annual Meeting & Expo being held June 15-18, 2013 in San Francisco. $400 (2013)

The Royal Australian College of Physicians (RACP) Foundation

People Support

- Jun Yang. Fellowship. Identification of proteins that interact with the mineralocorticoid receptor to therapeutically modulate macrophage function and ameliorate inflammation in cardiovascular disease. $50,000 (2013)
- Michelle Lewicki. Fellowship. Ambulatory Blood Pressure in Haemodialysis: Prevalence of hypertension in both incident and prevalent dialysis cohorts and the effect of early education, intervention and dialysate sodium manipulation on morbidity and mortality. $45,000 (2013)

L.E.W. Carty Charitable Fund

- Tracey Edgell. Giving Infertility Treatment the Personal Touch. $31,250 (2013)

Fresh Science

- Sara Al-Musawi. Media Training Award for ECRs (2013)

Ted Billson – (Equipment) Donation

- Matthew Gillespie. Hypoxia Suite Microscope. $8,000 (2013)

Granulosa Cell Tumor Research Foundation (GCTRF)

- Kaye Stenvers, Maree Bilandzic. Identification of dual pathways which control granulosa cell tumour progression and chemoresistance. $10,000 (2013)
- Simon Chu, Peter Fuller. A Novel Combination Therapy for Treatment of Granulosa Cell Tumours. $10,000 (2013)

The Marian and E.H Flack Trust

- Tracey Edgell. Equipment Grant. Clinical Chemistry Analyser. $54,780 (2013)

National Breast Cancer Foundation (NBCF)

- Kristy Brown. The use of ghrelin receptor agonists to inhibit oestrogen-dependent breast cancer growth. $200,000 (2013-2014)
- Karla Hutt. A novel strategy for fertility preservation in breast cancer patients. $200,000 (2013-2014)

Bill & Melinda Gates Foundation

- Guiying Nie. Novel and very early detection of preeclampsia. $996,264 (2013-2015)

CASS Foundation

- Jemma Evans. From wombs to wounds: Unique translation of repair factors from reproduction to skin. $52,500 (2013)
- Andrew Stephens. An Anti-Diabetes Drug Can Help to Treat - and Prevent - Ovarian Cancer. $52,500 (2013)

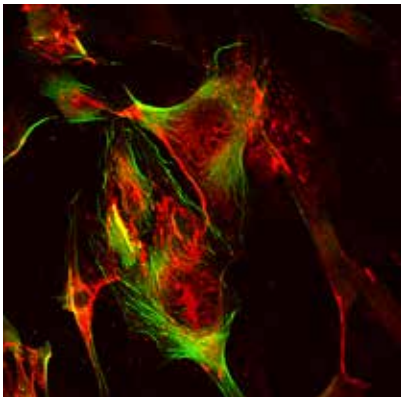

Image: Confocal microscopy, Cancer cells (Ashwini Chand, Rhiannon Coulston)

STAFF LIST

1/1/2013 - 31/12/2013

CEO/Director
Bryan Williams PhD (Hon) FRSNZ FAA (from 1/11/2013)

Matthew Gillespie BSc (Hons) PhD (until 31/10/2013)

Associate Director
Peter Fuller BMedSci MBBS PhD FRACP
NHMRC Senior Principal Research Fellow

Senior Research Fellow, Emeritus Director
Henry Burger AO FAA MD BS FRCP FRACP FCP (SA) FRCOG FRANZCOG

Senior Research Fellows
Jock Findlay AO PhD DSc

John Funder AO MD BS PhD FRACP FRCP LL D(Hon)

Research Advisory Group
Evdokia Dimitriadis PhD
NHMRC Senor Research Fellow

Peter Fuller BMedSci MBBS PhD FRACP
NHMRC Senior Principal Research Fellow

Matthew Gillespie BSc (Hons) PhD

Vincent Harley PhD NHMRC Senior Research Fellow

Rob McLachlan MBBS FRACP PhD
NHMRC Principal Research Fellow

Guiying Nie PhD
NHMRC Senior Research Fellow

Lois Salamonsen PhD FRANZCOG (Hon)
NHMRC Senior Principal Research Fellow

Evan Simpson BSc (Hons) PhD FAA
NHMRC Senior Principal Research Fellow

Laboratory Heads
Colin Clyne PhD - Cancer Drug Discovery

Evdokia Dimitriadis PhD - Embryo Implantation

Karla Hutt PhD - Ovarian Biology

Peter Fuller BMedSci MBBS PhD FRACP - Steroid Receptor Biology

Matthew Gillespie PhD - Bone, Joint & Cancer

Vincent Harley PhD - Sex Determination and Gonadal Development / Brain & Gender Co-head

Craig Harrison PhD - Growth Factor Signalling

Joohyung Lee PhD - Brain & Gender

Rob McLachlan MBBS FRACP PhD - Clinical Andrology

Guiying Nie PhD - Implantation & Placental Development

David Robertson PhD - Reproductive Hormones

Lois Salamonsen PhD - Endometrial Remodelling

Evan Simpson PhD FAA - Metabolism & Cancer Co-head

Peter Stanton PhD - Male Fertility Regulation

Kaye Stenvers PhD - Reproductive Development & Cancer

Andrew Stephens PhD - Ovarian Cancer Biomarkers

Morag Young PhD - Cardiovascular Endocrinology

Laboratory Co-Heads
Kristy Brown PhD - Metabolism & Cancer

Joohyung Lee PhD - Brain & Gender

L'Oréal Paris Research Fellow
Simon Chu BSc (Hons) PhD

NHMRC Career Development Fellows
Craig Harrison PhD

Kristy Brown PhD

The Michael, John and Phoebe Jones Fellow
Frances Milat MBBS (Hons) FRACP MD

OCRF Research Fellow
Andrew Stephens PhD

OCRF Witchery Research Fellow
Adam Rainczuk PhD

Clinical Research Fellows
Carolyn Allan MBBS (Hons) DRCOG(UK) FRACP PhD

Kati Matthiesson MBBS FRACP PhD

Andrology Fellow
Bianca St John MD

Cancer Council Victoria Fellow
Sarah To BSc (Hons) PhD (from 1/7/2013)

NHMRC Overseas Biomedical Training Fellows
Yogeshwar Makanji BAppSci (Hons) PhD

Peter Nicholls BBiomedSci (Hons) PhD

Amanda Rickard BBiomedSci (Hons) PhD

NHMRC Post-Doctoral Fellow
Karla Hutt PhD

Ellen Menkhorst PhD

PHI Senior Fellow
Andrew McCallum BE (Met) MEngSc GAICD

Clinical Research Nurses
Nicole Fairweather RN

Elise Forbes RN

Judi Hocking RN

Anne Paterson RN (until 6/5/2013)

Yulia Roif RN BSN MPA

Anna Zamojska RN

Dionne Sroczynski RN

Senior Research Officers
Anthony Argentaro PhD

Stefan Bagheri-Fam PhD

Pascal Bernard PhD (until 25/1/2013)

Maree Bilandzic PhD

Ashwini Chand PhD

Anne Corbould MBBS (Hons) PhD FRACP

Ann Drummond PhD

Tracey Edgell BSc (Hons) PhD

Jemma Evans PhD

Vicky Kartsogiannis PhD

Kevin Knower PhD

Sarah Meachem PhD

Liza O'Donnell PhD

Sarah Paule PhD

Julian Quinn DPhil MSc

Harmeet Singh BSc MSc PhD

Kelly Walton PhD

Research Officers
Sara Al-Musawi BSc (Hons) PhD

Vanessa Cheung BSc (Hons) BA PhD

Rowena Lavery PhD

Jason Liew BBiomedSc (Hons) PhD

Chantal Magne Nde PhD

Devi Ngo BSc (Hons) (until 8/3/2013)

Makoto Ono MD PhD

Jyothsna Rao BSc PG DCA PhD

Nirukshi Samarajeewa BBioMedSci (Hons) PhD

Preetinder Singh PhD

Michelle van Sinderen BSc (Hons) PhD

Sonia Teoh BSc (Hons)PhD (from 21/10/2013)

Katherine York BSc (Hons) DipEd PhD

Senior Research Assistants
Maria Alexiadis BSc (Hons)

Francine Brennan BSc (Hons)

Denis Cleven BSc

Maria Docanto BSc (Hons)

Caroline Foo BAppSc

Ying Li BSc GDipMicroBio

James Morgan BSc (Hons)

Yao Wang BSc (Hons)

Yizhou Yao MD

Research Assistants

Karen Chan BAppSc

Jeanne Correia BSc (Hons)

Rhiannon Coulson BSc (Hons)

Carly Cuman BBioMedSc (Hons)

Rebecca D'Sylva BBiomedSci (Hons)

Nadine Duffield BBiomedSci (Hons)

Thilini Gamage MSc(Biotech)

Jessica Gathercole BSc (Hons)

Seungmin Ham GradDipRepSc, Grad Dip Drug Eval Pharm Sc, BSc (Hons)

Tamara Howard BA/BSc (Hons)

Yanqiu Hu PhD

Emily Kelly BSc (Hons)

Josie Lawrence DipAppSci

Ming Yee Makanji BSc (Hons) (from 11/6/13)

Angela Morgan BSc (Hons)

Enid Pruysers

Katarzyna (Kate) Rainczuk MSc

Janelle Ryan BSc MSc

Medina Taletovic BBiotech (Hons) (from 20/6/2013)

Nadeen Zerafa BSc (Hons) Grad Dip

Laboratory Technicians

Robin Leuba BA Dip Ed (until 8/7/2013)

Susan Taleh BA

Administrative Support

Chief Financial Officer

Peter Murray FCA BSc (Econ) (Hons) (until 22/11/2013)

Platform Technology Integration Manager

Rod Wealands MBA

Laboratory & Technical Services Manager

Steve Bouralexis PhD BSc B Hlth Sci (Hons) B Comp Sci

Grants & Commercialisation Manager

Neil Owens PhD

Biomedical Engineer

Leon Moussa BSc (Med Sci) Hons, PhD

Finance Officer

Jennifer Watson

Grants Officers

Belinda Kelly BSc (Hons) (until 8/3/2013)

Mai Saraj MSc PhD (from 28/2/2013)

Graphic Communications

Sue Panckridge DipArt

Human Resources Officer

Christina Matisons Prof Dip HR MAHRI MBA(HR)

HR/Payroll Officer

Lesley Bowyer

Laboratory Support Officer/Technician

Hsien Teh BSc (Hons)

Media & Communications Officer

Laura Watson BA Prof Writing

OH&S Officer

Ganeema Tokhi BSc MPhil Cert IV TAA

Purchasing and Facilities Officer

Henry Wos

DNA Sequencing Facility Manager, Monash Health Translation Precinct (MHTP)

Vivien Vasic BSc

Next Generation Sequencing & High Content Analysis Specialist, Medical Genomics Facility, MHTP

Trevor Wilson BSc (Hons) PhD

Executive Assistant

Roseline Acker

Personal Assistants / Administrative Officers

Dianne Arnold BSc

Sue Elger (until 26/3/2013)

Jacqueline Harrison RN

Claudette Thiedeman

Jeana Thomas

HONORARY APPOINTMENTS & COMMITTEES

PHI Fellows

Prince Henry's Institute has a longstanding history of research delivery, academic mentoring and community engagement.

In recognition of their substantial the following individuals have been appointed as PHI Fellows:

Dr Nuzhat Ahmed
Royal Women's Hospital, Melbourne, Victoria

Professor John Aitken
University of Newcastle, New South Wales

Professor John Bertram
Faculty of Medicine, Nursing & Health Sciences, Monash University

Associate Professor Timothy Cole
Faculty of Medicine, Nursing & Health Sciences, Monash University

Professor David de Kretser AC
Centre for Reproduction and Development, Monash Institute of Medical Research

Associate Professor Mark Frydenberg
Australian Urology Associates, Cabrini Medical Centre, Victoria

Professor David Gardner
The University of Melbourne

Professor Martha Hickey
Royal Women's Hospital, Melbourne

Associate Professor Tom Jobling
Chairman, Ovarian Cancer Research Foundation

Associate Professor Jeff Kerr
Faculty of Medicine, Nursing & Health Sciences, Monash University,

Professor Gab Kovacs AM
Monash IVF, Victoria

Associate Professor Kate Loveland
Faculty of Medicine, Nursing & Health Sciences, Monash University

Dr David Nikolic-Paterson
Department of Nephrology, Monash Medical Centre, Monash University

Professor Moira O'Bryan
Faculty of Medicine, Nursing & Health Science, Monash University

Professor Gail Risbridger
Faculty of Medicine, Nursing & Health Sciences, Monash University

Dr Luk Rombauts
Monash IVF, Victoria

Professor Ian Smith
Deputy Dean, Research, Monash University

Associate Professor Peter Temple-Smith
Monash Institute of Medical Research, Victoria

Dr Greg Tesch
Faculty of Medicine, Nursing & Health Sciences, Monash Medical Centre

Honorary Senior Research Associates

Dr Sarah Meachem
(Metabolism and Cancer Laboratory

Dr Helena Sim
(Sex Determination and Gonadal Development Laboratory)

Honorary Research Associates

Davina Cossigny
(Ovarian Biology)

Natalie Hannan
(Endometrial Remodelling)

PHI Board Committees

PHI Foundation

Members:
Mr John Weste (Chair)
Professor Matthew Gillespie (until 31 Oct)
Ms Natalie Allan (until March 2013)
Ms Georgia Beattie
Ms Ninette Demasi (from August 2013)
Mr David English
Mr Graeme Goldman
Ms Fiona Le Brocq
Mr Dylan Simmons
Miss Laura Watson (Secretary)

Finance and Audit Committee

Members:
Mr Stuart Alford (Chair)
Ms Jane Bell
Dr Bob Edgar
Mrs Carmel Mortell
Mr Peter Murray (Secretary) (until 22 Nov)

Investment Committee

Members:
Dr Bob Edgar (Chair)
Mr Martin O'Meara
Mr Richard Condon
Professor Matthew Gillespie (until 31 Oct)
Mr Peter Murray (until 22 Nov)

Intellectual Property and Commercialisation Committee

Members:
Mrs Jane Bell (Chair)
Ms Jennifer Joiner
Mr Grant Fisher
Dr Neil Owens (Secretary)
Mr Michael Pannacio
Professor Matthew Gillespie (until 31 Oct)
Mr Andrew McCallum
Associate Professor David Robertson
Professor Lois Salamonsen

Internal PHI Committees

Education Committee

Members:
Dr Sara Al-Musawi (Chair)
Dr Ashwini Chand
Miss Elizabeth Fletcher
Mr Kyren Lazarus
Dr Neil Owens
Dr Sarah Paule
Dr Michelle Van Sinderen
Professor Evan Simpson

Higher Degrees Committee

Members:
Professor Lois Salamonsen (Chair)
Professor Matthew Gillespie (until 31 Oct)
(until 31 Oct)
Dr Peter Stanton
Dr Kelly Walton
Dr Neil Owens

Promotions & Classifications Committee

Members:
Professor Lois Salamonsen (Chair)
Dr Peter Stanton (ISG Member)
Mr Rod Wealands (External Member)
Ms Christina Matisons (Admin)

Equipment Committee

Members:
Dr Julian Quinn (Chair)
Mrs Roseline Acker (Secretary)
Dr Steve Bouralexis
Dr Colin Clyne
Dr Tracy Edgell
Dr Peter Fuller
Ms Belinda Kelly
Dr Joohyung Lee
Dr Neil Owens
Dr Adam Rainczuk
Dr Kaye Stenvers
Mr Peter Murray (until 22 Nov)

Occupational Health and Safety Committee

Members:
Professor Matthew Gillespie (Chair)
Ms Jeanne Correia (HSR)
Ms Francine Brennan (Deputy HSR)
Dr Steve Bouralexis (OHS Manager/ Radiation/Biosafety LN2)
Ms Janelle Ryan (Level 3)
Ms Emily Kelly (Level 4)
Ms Maria Docanto (Level 3)
Mrs Roseline Acker (Secretary)

Institute Biosafety Committee

This committee provides liaison between Prince Henry's Institute and Monash University's Biosafety Committee to ensure all PHI research and facilities using genetically modified materials complies with regulations as outlined within framework of the Gene Technology Act 2000.

Members:
Professor Vince Harley (Chair)
Dr Anthony Argentaro
Ms Kate York
Dr Ashwini Chand
Dr Craig Harrison
Dr David Nickolic-Patterson (Monash University)

PHI Post Graduate Association (PHIPA)

PHIPA was established in Oct 2012

Members:
Dr Kelly Walton (Chair)
Dr Mai Sarraj (Deputy Chair)
Dr Jessica Gathercole (Secretary)
Dr Sara Al-Musawi/Kevin Knower (ECR)
Dr Jyothsna Rao/ Dr Michelle Van Sinderen (Networking Reps)

Research Advisory Group

This group advises and assists the Director on matters of policy to be recommended to the Board of the Institute.

Members:
Professor Matthew Gillespie (Director) (until 31 Oct)
Professor Peter Fuller (Associate Director)

Lab Heads
Associate Professor Eva Dimitriadis
Professor Vincent Harley
Professor Robert McLachlan
Professor Guiying Nie
Professor Lois Salamonsen
Professor Evan Simpson
Professor Jock Findlay (Associate)
Dr Morag Young
Dr Colin Clyne
Dr Craig Harrison
Dr Peter Stanton
Dr Kaye Stenvers
Dr Jooyung Lee
Dr Kristy Brown
Professor Evan Simpson
Associate Professor David Robertson
Dr Andrew Stephens

Institute Scientific Group

Members:
Dr Craig Harrison (Chair),
Mrs Roseline Acker (Secretary)
Dr Stefan Bagheri-Fam,
Dr Pascal Bernard
Dr Marie Bilandzic
Dr Steve Bouralexis
Dr Kristy Brown
Professor Henry Burger
Dr Simon Chu
Dr Colin Clyne
Dr Anne Drummond
Professor Jock Findlay
Professor Peter Fuller
Professor Matthew Gillespie
Professor Vince Harley
Dr Karla Hutt
Dr Vicky Kartsogiannis
Ms Belinda Kelly
Dr Kevin Knower
Dr Joohyung Lee
Professor Rob McLachlan
Dr Ellen Menkhorst
Associate Professor Guiying Nie
Dr Liza O'Donnell
Dr Julian Quinn

Dr Adam Rainczuk
Associate Professor David Robertson
Professor Lois Salamonsen
Dr Mai Sarraj
Dr Peter Stanton
Dr Kaye Stenvers
Dr Andrew Stephens
Mrs Ganeema Tokhi
Dr Kelly Walton
Dr Morag Young

Ongoing support and investment is critical to the future of Institute's such as PHI.

Community investment and support is critical to Prince Henry's Institute's capacity to continue delivering innovative research discoveries and actively shape future healthcare and clinical practice. The Institute's community and corporate engagement program plays a vital role in increasing funding support as well as building awareness and understanding of translational medical research and its role in delivering quality healthcare for all Australians. As well as events such as the Women, Health and Sport Cocktail Function, the Institute has continued to implement a range of corporate and donor engagement initiatives including our Ambassador program, Ride 4 PHI, media engagement and participation in awareness and education programs.

Engaging with the business community

Following the success of the Discovery Dinner Series, the PHI Foundation hosted a Women, Health, and Sport Cocktail Function in March 2013. The Cocktail Function provided a fun, engaging platform for informal discussion as the Foundation introduced guests to PHI and its research program. This coincided with the announcement of Jana Pittman's appointment as PHI's first celebrity Ambassador and was her first event with the Institute. This program continues to expand with plans to appoint additional Ambassadors in 2014.

Discovery Dinner sponsors, Tata Consultancy Services – Australia and New Zealand once again sponsored the Cocktail Function and are continuing to engage with the Foundation as a primary event sponsor. This strategy will focus on engagement and corporate donor support for the Institute, as well as delivery of a capital campaign for the new translational research facility and the positioning of the Monash Health Translation Precinct as one of Melbourne's leading centres for translational research.

Ride for PHI sets record with biggest team yet in 2013

In 2013, the Institute registered its largest ride team in the Murray to Moyne since they began participating in 2006. The team, including riders from Prince Henry's Institute (PHI) and Davies Collison Cave completed the gruelling 520 km relay from Echuca to Port Fairy in 24 hours and raised $27,000 towards the purchase of Leica CM3050 S cryostat. This equipment will assist teams across the institute to process and analyse tissue samples as part of ongoing research investigating the role of hormones in infertility and diseases such as cancer, cardiovascular disease, and osteoporosis.

Raising awareness and public support for ovarian cancer

With approximately 1200, women diagnosed each year; ovarian cancer remains one of Australia's most deadly gynaecological cancers due to its early lack of discernible symptoms and often late-stage diagnosis. Funded by the Ovarian Cancer Research Foundation, the Ovarian Cancer Biomarkers laboratory continues to drive innovative research to develop a vital early detection test for ovarian cancer, as well as improved treatments. During 2013, our researchers have worked closely with the OCRF to build awareness of ovarian cancer and the urgent need for investment in this area of research. Throughout the year, Ovarian Cancer Biomarkers researchers have provided scientific expertise at key community, business and education functions, as well as assisting with key OCRF driven fundraising campaigns.

Media engagement

PHI has continued to build its media profile with extensive radio, newspaper and television coverage during 2013.

At the Women, Health, and Sport Cocktail Function: L - R: John Weste (PHI Foundation), Mark Roberts (Davies Collison Cave), Jana Pitman, Ashish Shetty

The Institute received significant prime-time coverage of research achievements including novel research to tackle ovarian cancer, breast cancer research using Peutz Jeghers Syndrome to show how in human breast tissue produces oestrogen, and its co-leadership of the Victorian arm of the national T4DM study. PHI researchers have also been regularly engaged to provide expert comments as part of national and international coverage of broader research outcomes and health issues.

We also continue to foster media skills in emerging research talent through initiatives such as the 3-minute thesis competition and Fresh Science. This year, Dr Sara Al-Musawi participated in the Victorian state finals for Fresh Science - an initiative designed to expose early career and student researchers to media through simulated exercises and challenges. Cardiovascular Endocrinology student, Elizabeth Fletcher participated in a panel discussion broadcast by 3RRR as part of ASMR Research Week.

Community support of clinical research

Without community investment, researchers at Prince Henry's Institute would not have access to the resources, equipment, and support they need to continue to translate its research into improved health care and treatments. The willingness of community members to participate in our clinical studies and trials is also vital to the success of our research initiatives. As co-heads of the national T4DM study, Prince Henry's Institute has been working to recruit male participants aged 50-74 to help determine the effectiveness of testosterone and healthy diet in the preventing type 2 diabetes. We have also continued to build our tissue donation program, with over 1150 generous donations of clinical tissue samples from women in both Melbourne and Sydney collected to date. This program is central to our capacity to gather vital insights needed to expedite development of an early detection test for ovarian cancer. This research would not be possible without these women.

Research in the community

In 2013, PHI researchers brought the world of science and innovation to the classroom to encourage students to consider a career in medical research, as part of the CSIRO Scientists in Schools scheme and the Australian Society for Medical Research education program.

Researchers in the community in 2013

Dr Kevin Knower
Dr Karla Hutt
Dr Jason Liew
Ms Carly Cuman
Ms Amy Winship
Dr Sara Al-Musawi
Ms Elizabeth Fletcher
Ms Justine Olcorn
Ms Jenna Haverfield

Ride for PHI, 2013

As a PHI supporter, you are playing an important role in securing future health and wellbeing for generations to come both in Australia and across the world.

Thank you to those who so generously supported our medical research during 2013, your investment has made all the difference. We also acknowledge the PHI alumni, thank you for your loyalty and continued support.

Every gift, no matter how big or small, is a step towards a new generation of healthcare and wellbeing here in Australia and beyond.

Community investment plays a vital role in providing the funding and resources needed to progress health innovation and discovery. Without your support projects, resources, and equipment critical to PHI's work would go unfunded. This year donor support has continued to strengthen through our regular appeals including Ride 4 PHI and the June Tax Appeal, as well as the Foundation's Cocktail function. Funding from these appeals has assisted us to progress vital research, as well as purchase much-needed technology platforms and invest in the development of emerging research talent. This ensures our work can continue today and well into the future.

Our donors and supporters are instrumental to our capacity to translate discovery into real and lasting health outcomes for patients. Together we continue to improve diagnosis, treatment, and prevention of disease.

Thank you

Major donors

Mrs (Eva) Jean Armstrong
Mr Hayden Barke
Mr and Mrs Bartholemew
Mr John Bate
Mr Edward Billson
Miss Margaret Bowman
Professor Henry Burger
Mrs Joan Cowan
Mr Andrew Cummins
Mrs Jill D'Arcy
Mr Nicholas Davies
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Fielding Foundation
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Mr Mark Roberts
Mr Edward Russell
Professor Lois Salamonsen
Dr William Varney
Mrs Sue Worcester

Ride 4 PHI sponsors

Boom Logistics
Davies Collison Cave
Zouki

Discovery Dinner Sponsors

Tata Consultancy Services Australia and New Zealand

STRATEGIC PARTNERS

Prince Henry's Institute acknowledges the support of the following organisations

Affiliated Partners

MonashHealth

MONASH University

MHTP Monash Health Translation Precinct

MHTP Monash Health Translation Precinct

A partnership between Monash Health, Monash University, Prince Henry's Institute and Monash Institute of Medical Research translating discoveries into world's best healthcare

MonashHealth

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MONASH INSTITUTE OF MEDICAL RESEARCH

Research Funding Partners & Support

Australian Government National Health & Medical Research Council

Victoria

The Institute is supported by the Victorian Government Operational Infrastructure Support Program (OIS)

AICR CANCER KNOWS NO BOUNDARIES FORTUNATELY, NEITHER DO WE

Australian Academy of Science

Victorian Breast Cancer Research Consortium

National Breast Cancer Foundation Funding Research for Prevention and Cure

Cancer Council Victoria

CASS

Bill & Melinda Gates foundation

MERCK SERONO

Harold Mitchell Foundation

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Ovarian Cancer Research Foundation

Pfizer Australia

Ted Billson (Donor)
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Cancer Research Trust
Collier Charitable Fund
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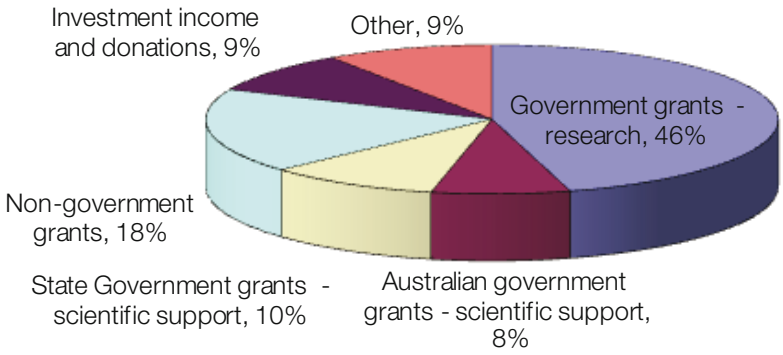
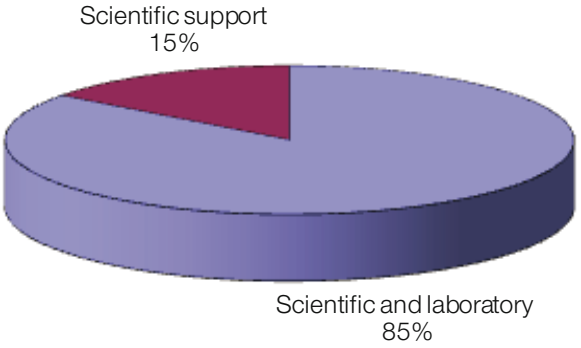
Fielding Foundation
The Marian and E.H. Flack Trust
The Gandel Charitable Trust
Montgomery Foundation

FINANCIAL YEAR AT A GLANCE

Income



Expenditure



The year in brief	2013	2012
Government grants - research	5,317,392	7,753,211
Australian Government grants - scientific support	909,829	1,516,686
State Government grants - scientific support[1]	1,132,443	1,426,771
Non-government grants	2,148,391	2,375,336
Investment income and donations	1,049,107	1,081,446
Other income	1,103,228	1,073,067
Expenditure on research	10,865,296	12,015,604
Expenditure on scientific support	1.884,275	2,085,581
Total surplus	-1,089,181	1,125,332
Number of NHMRC fellows	10	9
Number of staff	143	157
Number of students	47	32
Number of PhD students	3	19
Capital expenditure	312,257	384,141

[1]The Institute is supported by the Victorian Government Operational Infrastructure Support Program (OIS)

SUPPORT US

Act now to protect those you love and future generations of Australians from the pain of infertility and serious disease. The future of health is in your hands.

Donations

Life is precious. At every age and every milestone, nothing matters more than the wellbeing of those we love. The life and health of your child, the wellbeing of your partner and the knowledge you will be there to share all the important moments. Protect what matters most and become a regular MIMR-PHI donor today. Every dollar helps prevent serious disease and infertility for generations to come.

Donate today!

Donate online at **http://mimr-phi.org/support-us/**

For more information contact us on tel. 9902 4700 or email: **info@mimr-phi.org**

Bequests and Gifts

A bequest means you can make a difference well beyond your lifetime. Make better healthcare your legacy by including MIMR-PHI in your Will.

The Australian Tax Office endorses Prince Henry's Institute as a Deductible Gift Recipient (DGR). As a health promotion charity, gifts to Prince Henry's Institute of Medical Research (trading as MIMR-PHI) qualify for a tax deduction under item 1 in section 30.15 of the Income Tax Assessment Act 1997.

Named funds

Remember and honour a loved one by creating a lasting and meaningful tribute in their name.

Are you looking for the perfect gift for that big birthday or special milestone? Give the gift of health and donate to PHI in your loved one's name.

Corporate

Corporate support and sponsorship is vital to the success of our fundraising and community engagement program. As well as supporting our researchers, you can help raise awareness of the Institute and vital funds to improve health and wellbeing for all Australians today, tomorrow and well into the future. Associate your company with one of Australia's leading and most trusted centres for translational research and take corporate responsibility to the next level with PHI. Become champions for Australian health today.

For more information please contact:

Development Office
MIMR-PHI Institute
PO Box 5152
Clayton VIC 3168 Australia
Tel: 61 3 9902 4700
Email: info@mimr-phi.org

Yes, I would like to support research at MIMR-PHI Institute

Mr/Mrs/Ms/Miss/Dr/Prof Please circle

First Name

Surname

Address

Postcode

Phone Mobile

Email

Date of Birth

Donation Amount

☐ $20 ☐ $50 ☐ $100 ☐ $200 ☐ $ _____ (Other)

☐ Cheque (*please make payable to MIMR-PHI Institute)*
Donations over $2 are tax deductable. ABN 48 132 025 024

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Card Nº

Cardholder's Name

Signature Expiry Date /

Please forward to:
Development Office
MIMR-PHI Institute
27 - 31 Wright Street, Clayton, VIC 3168

Prince Henry's Institute is a health promotion charity. Donations $2 and over are tax deductible. Prince Henry's Institute respects your privacy and complies with the Privacy Act, 1988 (Cth) and amendments. Your details remain confidential and we do not pass on any data to third parties.

HOW TO CONTACT US

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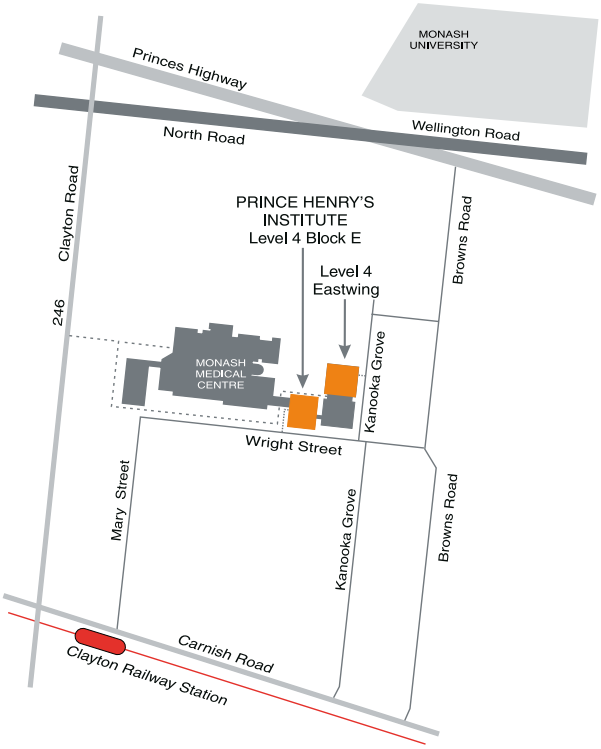

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