

Oestrogen, Obesity and the Metabolic Syndrome

Obesity is emerging as a global epidemic of increasing concern. More than half the Australian population (aged 25 years or over) are considered overweight or obese, leading to an increased risk of heart disease, stroke, cancer, Type 2 diabetes and osteoarthritis.

Obesity is the term for unhealthy levels of excess fat and can be caused by a number of different factors, including poor diet and lack of physical exercise. But that's not the whole story – scientists at Prince Henry's Institute are investigating the role of hormones, such as oestrogen, in the development of obesity.

Unbeknown to many, fat is actually a dynamic organ of communication. Fat cells receive signals from many different body parts, including brain, pancreas, skeletal muscle, liver, the ovaries and testes. Signals are integrated by the fat cells and acted upon either locally within the fat tissue, or responses are sent out to target organs within the body.

NH&MRC RD Wright Fellow and member of the Sex Hormones in Action Group at PHI, Dr Margaret Jones, is examining how oestrogen controls this communication within the fat tissue to maintain a healthy fat balance.

Ongoing research has shown that there is an important, but not yet fully understood, relationship between oestrogen and the development of the Metabolic Syndrome.

The Metabolic Syndrome is a group of closely related health risks that link obesity to the development of heart disease, stroke and diabetes.

"We already know that the prevalence of the Metabolic Syndrome increases with menopause and is associated with loss of oestrogen," Dr Jones said.

"What we don't know is whether oestrogen is also important for maintaining fat balance in men. Does a change in circulating levels of oestrogen in males also predispose them to the Metabolic Syndrome risk factors?"

Using the ArKO mouse, which is unable to produce its own oestrogen, Dr Jones and her team found that the mice developed many of the risk factors associated with the Metabolic Syndrome.

"We found that without oestrogen, these male mice became fat, insulin resistant and developed fatty liver. However, following oestrogen replacement therapy each of these risk factors significantly improved," she said.

Dr Jones said the study showed that oestrogen plays an important role in the prevention of the Metabolic Syndrome in both males and females.



“The outcome of this work will provide a better understanding of how oestrogen therapy could best be used in the treatment and prevention of this common condition.”

NH&MRC RD Wright Fellow and Member of the Sex Hormone Biology group at PHI, Dr Margaret Jones

PHI Awards

Rare opportunity to work with the world's best



PhD student **Natalie Hannan** has been selected as one of only 20 researchers from around the world to take part in the prestigious Frontiers in Reproduction (FIR) course in Massachusetts, USA in June 2007.

Natalie, a member of the Uterine Biology group at PHI, was accepted into the six week laboratory and lecture course for her outstanding research into pregnancy and infertility.

Her work on human embryo implantation attracted significant media attention in 2006 and has positioned Natalie as one of Australia's most promising young researchers.

The intense FIR program will provide Natalie with an invaluable experience to work with leading international reproductive scientists, meet new people for future collaborations and gain exposure to cutting edge scientific techniques.

Natalie has been fortunate to receive full travel support from WHO and NHMRC to support her participation.

We congratulate Natalie on this fantastic achievement.

Professor elected to Endocrine Society Committee

Professor Evan Simpson, Head of the Sex Hormone Biology group at PHI, has been elected to serve as Chair of the Nominating Committee of the US Endocrine Society. Prof Simpson, who will begin his year long term in July, said he was delighted to accept such an honour.

Harold Mitchell Fellowships

Prince Henry's Institute has been selected as one of 15 health and medical research institutes to receive funding grants from the Harold Mitchell Foundation.

The Foundation is committed to the support of arts and health, having funded projects ranging from \$1000 to \$500,000.

As part of a new program to recognise outstanding young researchers, the Foundation has agreed to award each institute two \$5000 travel grants per year, over a five year period.

The Harold Mitchell Travelling Fellowships will be awarded to a senior PhD student and junior postdoctoral fellow to present his/her work at a major overseas meeting. The successful candidates will also have the opportunity to visit international laboratories with similar research interests.

Dora Lush Scholarships

Congratulations to PhD students **Emily Lam** and **Stacey Jamieson**, who have been awarded highly sought after NHMRC Dora Lush Biomedical Scholarships.

The Dora Lush Scholarships are designed to encourage science, health and health related honours graduates of outstanding ability to gain full-time medical research experience.



Emily, a member of the Steroid Receptor Biology group at PHI, is investigating the involvement of the mineralocorticoid

receptor (MR) in the progression of heart failure. She will receive almost \$40,000 over two years to continue her studies.



Stacey, also a member of the Steroid Receptor Biology group, was awarded a three year Scholarship for her research into

granulosa cell tumours of the ovary. She will also receive a bonus of \$5000 per year as the recipient of the Faculty Postgraduate Excellence Award, funded by Monash University's Faculty of Medicine, Nursing and Health Sciences.

Myth or Fact?

Myth: "People only become obese and overweight because they have an unhealthy diet or do not exercise."

Fact: Although physical activity and eating habits are major contributors to obesity, scientists at PHI are investigating how hormone disorders, such as those related to the thyroid, adrenal glands, ovaries and pituitary, can contribute to obesity.

Beating Heart Disease

Cardiovascular disease is the leading cause of death and disability in Australia, affecting more than 3.7 million people. Every 10 minutes someone dies as a result of heart or vascular diseases.

The past decade has seen a considerable increase in the prevalence of heart failure, which can be caused by cardiac fibrosis. Of those patients diagnosed with heart failure, 50 per cent will die within four years.

Scientists at Prince Henry's Institute are working to reduce these alarming statistics through the development of new strategies to treat cardiac disease.

High levels of the steroid hormone aldosterone, which controls salt balance, are an independent risk factor for cardiovascular disease. Researchers in the Steroid Receptor Biology Group, led by Professor Peter Fuller, are investigating the role of aldosterone and its receptor, the mineralocorticoid receptor (MR), in the development of cardiac fibrosis.

Previous work by the group has shown that MR-induced inflammation in the blood vessel wall plays a key role in the development of heart failure.



PhD student Amanda Rickard is working to develop new strategies to treat heart disease

It has been assumed that this cardiac inflammation is modulated by the body's own anti-inflammatory system, involving the closely related glucocorticoid receptor (GR).

However new research by Dr Morag Young and PhD student Amanda Rickard has shown that in a model of aldosterone-induced heart disease, the regular anti-inflammatory effects of GR action do not play a role in the development of cardiac fibrosis.

Miss Rickard said the finding was an unexpected but significant step forward in her studies.

"This finding suggests that the inflammatory response in aldosterone-induced heart disease is not related to the effects of GR. The study further highlights the importance of the MR in the initiation and progression of inflammation, cardiac fibrosis and heart disease," she said.

It is hoped that this research will pave the way for the development of new therapies and treatments for cardiac fibrosis, heart failure and hypertensive kidney disease.

Miss Rickard's research was published in the December 2006 edition of *Endocrinology*. She will also present her work at the US Endocrine Society meeting in Toronto in June 2007.

Visiting Professor at PHI



The Institute is pleased to welcome Professor Richard Santen to the PHI team, who is with us for three months as a visiting professor from the University of Virginia, USA.

Dr Santen is a professor in the Department of Internal Medicine and Division of Endocrinology and Metabolism. He is recognized as a world leader in the field of hormone dependant breast cancer and the development of

aromatase inhibitors for the treatment of breast cancer.

Professor Santen has published over 300 research studies on breast and prostate disease and has received numerous awards for his research, including the Brinker International Award for Breast Cancer Clinical Research from the Susan Komen Foundation.

During his stay at PHI, Professor Santen will work with Professor Evan Simpson and the Sex Hormone Biology group studying the regulation of aromatase. He will also attend various

lectures and share his expertise in the areas of reproductive endocrinology and management of oestrogen deficiency in women receiving aromatase inhibitors.

Professor Santen said the sabbatical provided a great opportunity for intellectual exchange and the generation of new research ideas to take back to his colleagues in America.

"This stay is all about sharing ideas with a similar research group, but on a different continent. It is a great experience and I would like to thank everyone at Prince Henry's Institute for having me," he said.

Ride for Reproduction



Commercialisation Services Manager Mr Andrew McCallum will cycle more than 500 km to raise money for reproductive research at PHI

Training for the PHI Ride for Reproduction fundraising campaign is in top gear as our team of enthusiastic cyclists prepare to participate in the Murray to Moyne Cycle Relay on March 24-25, 2007.

The annual Murray to Moyne attracts 1600 cyclists, representing over 150 organisations, to raise money for a designated health charity. The PHI team of 12 riders, led by Chairman Mr John Robinson, will cycle 520km in 24 hours from Echuca to Port Fairy to raise money for reproductive and fertility research.

Infertility affects 1 in 8 Australian couples. PHI scientists are studying reproduction in men and women in the hope of identifying causes of infertility, improving diagnosis and developing new treatments.

Last year's inaugural event raised more than \$30,000 for the Institute and we are hoping to exceed this figure in 2007 through donations and sponsorships.

Veteran PHI cyclist Mr Andrew McCallum said the team was feeling fit and confident heading into the event. "The group has been meeting for weekly rides of up to 80km and there is a great sense of comradery within the team. Everyone is looking forward to the challenge," he said.

We would like to thank our major sponsors, Boom Logistics and Wilson HTM, and invite sponsorships or donations from businesses and individuals to support this worthy cause.

If you are interested in supporting the Ride for Reproduction please contact Team Manager **Ingelise Jones on (03) 9594 4303.**

Kooyong Classic Fundraiser

Scorching temperatures set the scene for a day of sizzling tennis action at the Kooyong Classic PHI supporter event on January 10, 2007.

Institute guests enjoyed cool refreshments at the PHI morning tea before taking to the court to watch four thrilling matches between some of the world's top tennis players, including Roger Federer, Andy Roddick, Marat Safin, David Nalbandian, Andy Murray and Tommy Haas.

Thank you to everyone who attended the event, which served to raise awareness of reproductive research at PHI.

A special thanks to Colin Stubbs, organizer of the Kooyong Classic, for his generous support.



Miss Ingelise Jones and Mr Peter Tucker at the Kooyong Classic Tennis Day morning tea



Miss Louisa Ludbrook, Dr Mick Lynch, Miss Chelsea Stoikos, Miss Natalie Hannan and Miss Amanda Rickard



Dr Katrina O'Sullivan, Dr Jane Glatz and Professor Peter Fuller



Professor Jock Findlay, Mr Richard Condon, Mrs Janet Hibbins and Mr and Mrs John and Liz Robinson