

news

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**HONOURS FOR
DISTINGUISHED
RESEARCHER DEDICATED
TO SAVING OUR SMALLEST
PATIENTS**

**MicroRNAs OPEN DOORS
TO TACKLE DISEASE**



**MicroRNAs
POTENTIAL
FOR TREATMENT
OF INFECTIOUS
DISEASE**



**TRIAL
UNDERWAY
TO INCREASE
IVF SUCCESS**



**HELICOBACTER
PYLORI -
RESEARCHERS
CLOSE IN**



**FIELDING
FOUNDATION
SUPPORTS
MIMR-PHI**

"We urgently need your help to continue our vital work and give hope to those battling serious disease."

- Prof Bryan Williams

COVER PHOTO:
Ritchie Centre Research Fellow, Dr Flora Wong in the Neonatal Intensive Care Unit at Monash Health; BELOW: the new Translational Research Facility is under construction and due for completion in 2015.



DIRECTOR'S MESSAGE

Now more than ever it is important we protect medical research capabilities in Australia. With the burden of disease and an ageing population weighing heavily on our community, health system, and economy, the time to invest is now. The Federal Government's announcement of the proposed \$20 billion Medical Research Future Fund, while welcomed by Australia's medical research community, will not immediately benefit Australian researchers, with funding not expected to commence until 2016 and investment increasing slowly over the next decade until 2022-23. This means we urgently need your help to continue our vital work and give hope to those battling chronic and serious disease. You can read about the government's proposed endowment fund and everything you need to know about this important long-term investment in future health.

Now over halfway through our first year, MIMR-PHI has achieved a great deal in a very short time. A big focus has been implementing the systems and processes needed to support our six specialised Research Centres as they continue to tackle Australia's most pressing health challenges in a program that touches on all stages of life from conception to managing health in older age.

It is with pleasure that I introduce MIMR-PHI's new Chief Financial Officer and Business Development Manager, Mr Rob Merriel. A Certified Practising Accountant (CPA) with over 30 years experience working in the medical research industry, Rob's expertise and intricate understanding of the sector make him a valuable addition to the MIMR-PHI team.

As the major research hub on the Monash Health Translation Precinct we look forward to the completion of the new \$84 million Translational Research Facility in 2015. With the project now three weeks ahead of schedule, the structure of the building and main bridge to Monash Medical Centre are expected to be completed this October, with the second and final link to one of MIMR-PHI's existing buildings to commence in late 2014. It is exciting to watch as the extraordinary vision behind this facility is realised bringing the worlds of medical research and clinical practice together to form a seamless path from discovery to clinical application.

The building's state-of-the-art design recently caught the eye of industry experts, with design consultants, Woods Bagot winning the RTC Integration Prize at this year's Australasian Revit Technology Conference.

I would like to use this opportunity to thank our friends at the Nine Network for their generous support of the annual Ron Evans Golf Day. This appeal has seen the campaign reach an important milestone this year, with \$1 million now raised since



the event began in 2007 to raise funds for MIMR-PHI's bowel cancer research. This is a tremendous achievement for all involved, particularly Andrea Evans, and her family, who have been a major support to the Institute in their quest to tackle bowel cancer, after the disease took the life of the great Ron Evans seven years ago.

Thank you for your continued support for the Institute and investment in medical research. With your help, MIMR-PHI is now in a better position than ever to achieve our mission of improving global wellbeing through research excellence in medical research and clinical translation.

Professor Bryan Williams
Institute Director

THE MOMENT OF JOY and relief as their newborn greets life is a memory that never leaves a parent. However, for the families of the 1 in 20 babies born prematurely, the need for clinical intervention turns joy to uncertainty as they navigate the world of intensive care. Current statistics tell a grim story with premature babies accounting for 70 per cent of newborn deaths, often in what seems the cruellest of twists, from chronic lung disease caused by the interventions needed to save their fragile lives.

MIMR-PHI researcher and fetal and neonatal lung development and transition expert, Professor Stuart Hooper, is leading the charge to transform clinical management of fetal to neonatal transition and develop vital treatments to minimise brain and lung injury resulting from interventions at birth.

In-utero the umbilical cord and associated placental blood vessels provide oxygen to the fetus. The ductus arteriosus, a vessel that closes after birth when the lungs become the sole source of gas exchange, directs this blood away from the lungs. Professor Hooper describes the transition to air breathing as ***“the most critical and high risk event we experience other than traumatic injury and death”*** with premature babies most vulnerable.

“We are interested in the critical period of transition to air breathing at birth and how it is managed. We believe delayed umbilical cord clamping facilitates a smoother transition to air breathing rather than abruptly cutting blood supply to the heart from the placenta. Additionally,



HONOURS FOR DISTINGUISHED CAREER DEDICATED TO SAVING OUR SMALLEST PATIENTS

we are conducting studies on the impact of oxytocin, a drug given to mothers following birth to protect them against haemorrhage. Our studies show that the transition to air breathing is much smoother for the infant if oxytocin administration is delayed until placental delivery, while posing no additional risk to the mother,” said Professor Hooper.

With no current treatments available, Professor Hooper and his group have also been working to develop new strategies to prevent lung and brain damage in premature babies. Using a synchrotron, they have imaged air as it enters the lungs at birth and shown how to protect the lung from damage in these tiny patients. Currently the focus of an international multicentre clinical trial, Professor Hooper hopes this strategy will reduce the risk of lung and brain injury.

“This treatment could potentially transform the lives of thousands of premature infants, simply by minimising the injury they receive in the delivery room while transitioning to newborn life.”

As well as saving lives, this treatment could potentially reduce the risk of premature babies developing chronic life-long lung conditions such as respiratory distress syndrome and asthma.

Recently, Professor Hooper’s research leadership and contribution to global understanding of fetal and neonatal lung development and research technology, earned him recognition from Monash University. He received the 2014 recipient of the Dean’s Award for Research Excellence (Distinguished Career) and is quick to share the spotlight with his team.



Professor Stuart Hooper

“I am extremely humbled by this recognition of my success and my group’s enormous achievements as global leaders and pioneers in our field. This has enabled us to drive development of the technology platforms necessary for our work, as well as gain access to international clinical networks to expedite translation and application of our findings.”

MicroRNAs OPEN DOORS TO TACKLE DISEASE

MicroRNA blocking agents are used for the treatment of many diseases, in particular hepatitis C. MIMR-PHI researcher Dr Michael Gantier has been investigating the side effects of a new class of microRNA blocking drugs, with great potential for treatment of infectious disease and cancers.



Dr Michael Gantier

While more effective than ever before at targeting specific underlying causes of disease, many newer drugs can leave patients battling serious side effects and feeling worse rather than better. While individual reactions are difficult to predict, often differing between patients, understanding the broader effects of new therapies is essential to determining their safety and impact on health.

MIMR-PHI researcher Dr Michael Gantier has been investigating the side effects of a new class of microRNA blocking drugs, which offer great potential for treatment of infectious disease and cancers. MicroRNAs are tiny regulators of gene function which researchers have identified as a possible target for diagnosis and treatment of disease. Clinical trials using microRNA blocking agents are well underway, with promising results already shown in Hepatitis C patients.

While these drugs are seemingly effective at treating a range of diseases, Dr Gantier's team is concerned about their effect on the immune system. Recently the group made the troubling finding that some of these molecules were very potent repressors of the immune response which normally protects us from virus and bacterial infections.

"Unfortunately, our findings indicate that many microRNA blocking drugs have a

suppressive affect on the immune system leaving potentially very sick patients at high risk of developing other serious infections. Worryingly, the frequency that these drugs are administered means there is risk of these effects lasting long-term," said Dr Gantier.

Offering some hope to patients, the team is preparing to publish findings from their recent study of the safety of two of the most common class of microRNA blocking agents, including how they target the immune system.

"We believe we have identified the specific indicators of these molecules that act to suppress immunity. This means we can potentially improve microRNA blocking agents to protect the patient's immunity during treatment with these drugs," said Dr Gantier.

Dr Gantier is also interested in the stability of microRNAs. This directly determines the frequency of administration of microRNA blocking agents, as well as their reliability as novel biomarkers for diagnosis of diseases such as cancer.

“Early detection is by far our best defence against cancer. In understanding why cancers develop at a cellular level scientists have found a strong link between microRNA levels and cancer development. Many scientists believe these changes in microRNA levels, which begin to occur very early in disease development, could help detect cancers before they are established. However, it is critical to define the reliability of microRNA changes across time, which is directly dependent on their stability and turnover,” Dr Gantier explained.

A leader in this area of research, Dr Gantier, was recently one of only 36 biological researchers to receive a prestigious 2014 Australian Research Council (ARC) Future Fellowship. He plans to use the funding to progress his research on the stability of microRNAs in cancer cells, and confirm their usefulness for early detection of cancer.

“I am very grateful for this recognition of my work, and the interest this area of research is beginning to garner, which directly reflects the ARC’s commitment to tackling the basic phenomenon related to cancer development. If successful findings from this research could change how we diagnose cancer and even enable diagnosis and treatment before tumours have developed.”

MIMR-PHI Director and Centre for Cancer Head, Professor Bryan Williams praised Dr Gantier for his research and the well-deserved recognition.

“This funding reflects the potential of Dr Gantier’s innovative work to drastically change how we tackle cancer and recognises his leadership in this area of cancer research,” he said.

20%
OF AUSTRALIANS
COUPLES SEEK IVF
TREATMENT

Trial to
increase IVF
success



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

For up to 20 per cent of Australian couples, in vitro fertilisation or IVF offers a chance to realise their dream of parenthood. As well as being physically and emotionally exhausting, this often-long path to starting a family can also be costly, making it an unattainable dream particularly for those who endure gruelling a cycle after cycle of treatment without success.

MIMR-PHI researcher and fertility expert, Dr Tracey Edgell believes the answer for many of couples struggling with IVF lies deep in the lining of the uterus.

“An embryo is like a seed, without fertile soil it cannot implant leaving life unable to take hold. We believe that in many cases during IVF, embryo transfer occurs before the endometrium (the inner lining of the uterus) is receptive, thus pregnancy is unlikely to occur,” Dr Edgell explains.

Working with the Endometrial Remodelling team in the Centre for

Reproductive Health, Dr Tracey Edgell is investigating the underlying mechanisms of endometrial receptivity and its role in fertility and IVF. Receptivity occurs for only a small number of days in a regular menstrual cycle. They have shown that fertility drugs given to stimulate ovaries for egg retrieval during IVF disrupt this cycle, reducing receptivity in patients. This may be a key factor in the treatment’s often-poor success rates.

One of the challenges has been identifying whether the endometrium is receptive at the time of embryo transfer, to maximise chances of successful implantation and pregnancy. Now, Dr Edgell and her team believe they are close to developing a test that could solve this issue by enabling clinicians to pinpoint if, and when a woman is most receptive. In some women, the intense hormonal stimulation of their ovaries during IVF treatment leads to altered endometrial development preventing receptivity. In these cases, the ability to detect

non-receptivity, would be to enable treating clinicians to freeze the embryo and delay transfer until a later natural cycle with improved receptivity.

“We have now successfully identified three biomarkers, which we believe can be used to test for uterine receptivity. The plan is to conduct a trial to determine accuracy of this test in collaboration with Monash IVF,” said Dr Edgell.

Dr Edgell has confirmed this trial will go ahead from mid-2014 thanks to a prestigious \$127,000 Merck Serono Grant for Fertility Innovation she received earlier this year to fund the one-year uterine receptivity test trial.

“We will be trialling the test to confirm its accuracy as a diagnostic tool for uterine receptivity. If successful, this could transform the IVF process and could ultimately mean fewer IVF cycles, reducing the emotional, physical, and financial toll on patients.”

RESEARCHERS CLOSE IN ON CURE FOR CANCER-CAUSING BACTERIA



L - R: Natalie Bitto, Dr Amanda Rossiter (Visiting Fellow), Maria Kaparakis-Liaskos, A/Prof Richard Ferrero, Mohammad Hassan, Kim D'Costa

A/Professor Ferrero's group are uncovering the secrets of a common gastrointestinal bacterial infection, which they believe holds the key for prevention of stomach cancer.

Despite affecting almost half of Australians over 40 and leaving sufferers with an increased risk of serious gastrointestinal complications, such as peptic ulcers and cancer, few of us have ever heard of *Helicobacter pylori*. Now a group of MIMR-PHI researchers is uncovering the secrets of this common gastrointestinal bacterial infection, which they believe holds the key for the diagnosis and, possibly, prevention of stomach cancer.

Patients with *H. pylori* infection are at increased risk of long-term gastrointestinal damage and development of cancer. By identifying how the bacteria damages the stomach lining, MIMR-PHI Gastrointestinal Infection and Inflammation Head, Associate Professor Ferrero and his team, hope to improve effective stomach cancer diagnosis,

potentially preventing up to 80 per cent of cases in Australia each year.

"*H. pylori* bacterium attacks the stomach lining, compromising its integrity and causing inflammation. This can lead to the development of a number of severe gastrointestinal diseases, including almost all cases of duodenal ulcers and more than 80 per cent of stomach cancer cases. Unfortunately, stomach cancer is typically diagnosed many decades after infection with the bacterium," said Associate Professor Ferrero.

By understanding the underlying mechanisms linking *H. pylori* to severe disease, the group hopes to shed light on how and why these diseases develop and identify new therapeutic targets for their treatment. Most recently, the group's work has focused on a family of proteins, the NOD-

like receptors or NLRs, and their roles in inflammation and possible links with the development of stomach cancer. With the five-year survival rate under 27 per cent, the potential impact their research may have for stomach cancer patients is particularly exciting for the team. The ability to diagnose the disease earlier would represent a significant step in improving outcomes for these patients.

"NLRs are one of four families of innate immunity sensors, which trigger immune responses, inflammation and tissue repair processes. When these sensors respond abnormally to microbial or host stimuli, we tend to see increased inflammation, something we now know has a significant link to cancer development," explained Assoc Prof Ferrero.

"By therapeutically targeting NLR proteins, it may be possible to reduce or even reverse inflammation and tissue damage to the stomach lining caused by *H. pylori*, thereby improving health outcomes for individuals harbouring the infection".

Associate Professor Ferrero has recently been granted a competitive Research Fellowship announced as part of the NHMRC's \$71.2 million Fellowship and Mental Health Target Call for Research funding package.

FIELDING FOUNDATION TO FIGHT DISEASE WITH MIMR-PHI

MELBOURNE Businessman and Philanthropist, Mr Peter Fielding recently announced a \$1 million Fellowship Program to foster existing and emerging research talent at MIMR-PHI Institute. The announcement is a boost for emerging researchers with funding gaps forcing Australian talent overseas.

MIMR-PHI Institute Director, Professor Bryan Williams welcomed the program's announcement, which he said represented a vital boost to early-mid career funding and would significantly enhance research capability and career opportunities in Melbourne's southeast.

"We are extremely grateful for this investment by the Fielding Foundation. These Fellowships not only pave the way for health discovery and innovation but create an important platform to foster future research excellence and protect Australia's position as a global research leader."

Fielding Foundation Executive Chairman, Mr Fielding, said the Fellowship was an expansion of the Foundation's investment in health innovation and the development of scientific talent in Australia, as well as providing an exciting opportunity to play a practical role in tackling domestic and global health challenges for future generations.



Mr Peter Fielding (left) with Professor Bryan Williams

"This is an important opportunity for us to foster and develop the extraordinary research talent at MIMR-PHI Institute and make a difference at the frontline of medical science. By enhancing the capability for early-mid career researchers to drive cutting-edge research and innovation on the Clayton Precinct, we hope to help cement the Institute as the epicentre of translational research for the future of health. Innovation drives improvements in quality of life," said Mr Fielding.

Early-mid career funding gaps threatening career security and continuity are forcing young Australian researchers out of the research industry. Professor Williams sees initiatives such as the Fielding Fellowship Program as vital to bridging this critical funding gap to retain talent in Australia.

"This is a crucial investment in the protection of medical research in Australia and will foster the careers of emerging research leaders already located at the Institute. Addressing gaps in early-mid career funding enables outstanding young researchers to build their research, which is vital if we are to maintain the Institute's capacity to translate and apply discoveries and drive global health innovation into the future."

The program is due to commence in 2015.



MIMR-PHI Institute officially launched in January 2014, with the joining of two of the most trusted names in medical research, Prince Henry's Institute (PHI) and the Monash Institute of Medical Research (MIMR). The MIMR-PHI Institute works in partnership with Monash University and Monash Health at the Monash Health Translation Precinct (MHTP) in Clayton, to accelerate and co-ordinate the translation of scientific breakthroughs into patient care.



Research Supporters



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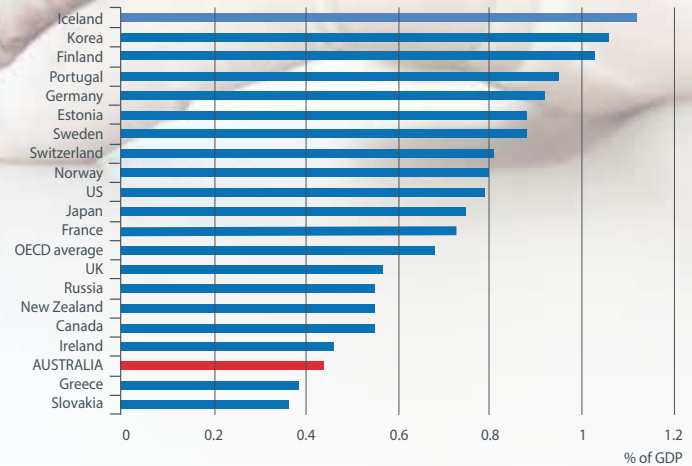
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THE MEDICAL RESEARCH FUTURE FUND EXPLAINED

Investment in medical research will position Australia to lead the global response to the social, economic and health burden of disease facing communities across the world.

Anounced in June, the Federal Government's proposed \$20 billion Medical Research Future Fund (MRFF) is poised to make history as one of the most significant medical research initiatives implemented in Australia. While not expected to have an immediate impact, the scheme provides a long-term vision for the alignment of Australian research funding with that of our global peers. If successful, disbursements will commence in 2016, building from \$20 million in the first year to \$1 billion by 2022-23. With estimates placing current Australian medical research expenditure at \$37 per capita (largely through the NHMRC) compared to \$100 per capita for the US and \$57 for the UK, this would effectively double federal government investment within the next decade. It would also go some way to stemming the 'brain drain' as the lack of job security and funding continues to drive our researchers overseas. Ensuring we have the best scientific minds working in Australia will strengthen our global research impact and capacity to drive health innovation.



This graph illustrates how poorly Australia ranks among Organisation for Economic Co-operation Development (OECD) countries for research and development expenditure

Medical research still needs your support

While it represents a ground breaking step towards the advancement of Australian medical research, the proposed MRFF is a very long-term vision that remains at this stage, unconfirmed. Short-term funding is crucial to prevent vital research from dissipating before the scheme is active. As well as relying on community support to conduct our research, institutes such as MIMR-PHI need your help to maintain the momentum of the MRFF discussion and ensure the success of this vital initiative. With recent figures showing that the Australian government's investment in research and development has dropped to its lowest level in 30 years, it is vital that Australians work together to strengthen our position and also to protect health well into the future. As the graph shows, this lack of funding has seen us fall well behind many of our global peers.

Will this benefit Australia economically?

A 2012 study found that investment in basic research leads to 30 times more economic growth than investment in physical capital such as infrastructure. Without strategic investment, Australian Academy of Science president, Andrew Holmes believes Australia will be ill prepared for future health challenges as other nations reaping the rewards of increased scientific investment, power ahead of us.

With predictions putting government health expenditure as high as 33 per cent by 2050, Australia's hip pocket is set to take a considerable hit over the next decades. With every \$1 invested in health and medical research generating a return of over \$2 in health benefits for Australians, economists would call it a low risk, high return investment and one that stands to deliver long-term economic benefits.

With approximately two percent of the market share, health innovation is a major export for Australia. Investment in medical research will position Australia to lead the global response to the social, economic and health burden of disease facing communities across the world. It also underpins our pharmaceutical industry, is a significant contributor to our economy with a \$22 billion annual turnover.

How will it benefit you?

Opening new treatment and prevention avenues, medical research remains our best weapon against chronic and incurable disease. With an aging population of over seven million Australians battling chronic illness and many more diagnosed with incurable disease, quality healthcare is more urgent than ever before. Protecting and increasing

translational medical research across academic, health and research industries strengthens global capacity to expedite translation of research discoveries to deliver cutting-edge diagnostics and treatments and improve health outcomes. This will enhance understanding, management, and treatment of disease and emerging health risks for the improvement of health outcomes for Australians, particularly those most at risk such as indigenous communities.

Thanks to AAMRI and Fairfax Media for information in this article. For more information please visit www.aamri.org.au