SPRING 2016 | 002

INSPIRE

RESEARCH AUSTRALIA SHOWCASES HEALTH & MEDICAL RESEARCH

THE SECRET LIFE of stem cells

WONDER DRUG ASPIRIN Gets a medical makeover

NANOMEDICINE Breaking barriers in Pancreatic Cancer

Australia Speaks

The results are in!

2016 PUBLIC OPINION POLL

PLUS:

Annual Awards Night Celebrating the cutting edge in health & medical research

Genetic risk & Cancers of the young

Open Source: The future of research?

RESEARCH AUSTRALIA

AN ALLIANCE FOR DISCOVERIES IN HEALTH

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AUSTRALIAN HEALTH & MEDICAL RESEARCH

Editor's Corner

Welcome to the Spring edition of INSPIRE – an apt time of year to mark the fresh and new beginnings that health and medical research can bring to us.

Whether it be discoveries into cell rejuvenation or more effective clinical practices through research, there is no doubt that Australian researchers are producing top quality studies.

We have sophisticated research infrastructure and great minds pushing the boundaries of research with a genuine curiosity. Put this together with the ability to access and analyse complex data, a strong desire to do common good and an enabling policy framework – it's a recipe for success but not one that comes without struggle.

There is no doubt our sector is facing some real challenges with an ageing population, pressure on funding sources, and the need to ensure a sustainable health system. That is why we are looking with enthusiasm at the game changing possibilities that the Medical Research Future Fund can offer, coupled with reviews into improving the outcomes delivered by current funding mechanisms, like the NHMRC.

The chance to get involved in shaping policy to support good outcomes is too good to miss. This is front and centre for the Research Australia alliance and of course others in the HMR sector.

As we have said before, it is vital that the phenomenal research being done here in Australia is shared with the largest possible audience be they policymakers or our communities.

Our 2016 Research Australia national poll confirms that Australians recognise that medical research plays a vitally important role in improving the effectiveness of the health system. Simply put, Australians 'get it'; we want to see medical breakthroughs brought from the laboratory into hospitals and clinics through the development of new drugs and medical devices. We also believe that medical research can play a role in creating a healthy economy. All these things considered amount to a very high 87 percent support for the MRFF.

Another fascinating insight is the use of technology in managing our own healthcare and wellness. We have the technology and it seems we are happy to use it – making the possibilities of digital health and the use of data one of the biggest areas of health evolution in modern times and using the power of many to find solutions faster.

The struggles are real but the possibilities are endless - we invite you to enjoy these fascinating insights in this edition of INSPIRE.

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Who can submit articles?
Any current member of Research Australia who would like to share a relevant story that affects their organisation including, philanthropic donations and their outcomes, research findings, and any other related health and medical research topic that affects the Australian population.

Submission guidelines & deadlines
For information regarding how to submit and publishing deadlines visit the Research Australia website.

RESEARCH AUSTRALIA
AN ALLIANCE FOR DISCOVERIES IN HEALTH


RESEARCH AUSTRALIA
HEALTH & MEDICAL RESEARCH
AWARDS
DINNER 2016
WEDNESDAY 16 NOVEMBER
THE WESTIN SYDNEY
JOIN US TO CELEBRATE THE BEST IN AUSTRALIAN HEALTH AND MEDICAL RESEARCH AND ADVOCACY
DATE: Wednesday 16th November
TIME: 7pm for a 7.30pm start
VENUE: Grand Ballroom, The Westin Sydney
1 Martin Pl, Sydney, 2000
DRESS: Black Tie
TICKETS: $275 each
$2400 for a Table of 10
(All prices incl. GST)
Reserve your tickets by Friday 11th November
For more information on some of our outstanding nominees please visit www.researchaustralia.org

Stem cells on their best behaviour

Australian researchers investigate the behaviour of stem cells to leverage their therapeutic potential.

A transformation of contemporary medical therapies is promised by stem cell research, offering breakthroughs in replenishing damaged cells in the body.

With the ability to develop into many different types of cells during the life cycle, from infancy through to adulthood, stem cells are often thought of as the "repair system" for the body. Their ability to differentiate or transform themselves when disease or damage occurs in particular parts of the body inspires researchers to investigate their therapeutic potential. Recent advances enable stem cells to be transplanted from one body to another, which offers the potential for this new therapeutic technique to be applied to areas of the body with serious or otherwise permanent damage. For example burns, stroke, macular degeneration, spinal cord injury and more could be treated with this special type of cell.

Although many associate stem cells with amniotic fluid, placentas and other parts of the fetus, stem cells can also be found in the adult body. Hair follicles, bone marrow, muscle and even skin, are home to stem cells. Stem cells are a diverse, multipurpose type of cell with a considerable potential to improve contemporary therapeutics.

Yet despite the potential of stem cells in medical breakthroughs and human health, much research needs to be done to harness these benefits. Techniques must be devised to better understand the behaviour of stem cells and learn how their behaviour can be shaped to help recipients of stem cells. Researchers need to investigate how stem cells come to possess the most useful characteristics, such as the ability to integrate into the recipient's existing tissue and correctly function for the remainder of the recipient's life. Researchers and experts will present their insight into stem cells and regenerative medicine at the 17th International Biotechnology Symposium, to be held by AusBiotech from 24-27 October in Melbourne.

Understanding the behaviour of stem cells

One of the key challenges in harnessing the therapeutic potential of stem cells is controlling how they behave on a biomaterial surface. Researchers are interested in understanding how this behaviour influences stem cell proliferation, creating new cells, and differentiation, where stem cells transform themselves into new types of cell. Most importantly this research can help us devise techniques to manage stem cell behaviour in the long-term, improving the potential for durable and lasting therapeutics.

DECRA Fellow Dr Peng-Yuan Wang, together with his research team at Swinburne University, have been investigating a special group of biomaterial surfaces called self-assembled monolayer binary colloidal crystals. These surfaces were examined to see how they influenced the adhesion, proliferation and differentiation of stem cells.

"We found that the surface properties influenced stem cells. Our work has established a new platform for stem cell culture, demonstrating an approach to controlling stem cell behaviour into desired lineages and potentially be used as the next generation cell culture tools for directing human stem cell behaviour," says Dr Wang.

"The applications of this research to advanced material fabrication, tissue engineering and regenerative medicine is significant. It provides a versatile approach to tissue engineering that is less expensive and time consuming than existing methods," says Dr Wang.

Dr Wang will discuss his research in a presentation called *Modulation of human stem cell behaviour using binary colloidal crystal substrates* at IBS 2016.

Homing stem cells for a healthy heart

Cardiovascular disease, including heart, stroke and blood vessel diseases, is a major cause of death in Australia, killing one Australian every 12 minutes according to the Heart Foundation. Stem cells, with their regenerative potential, present an important opportunity to transform the way cardiovascular disease is treated and improve outcomes for patients.

Researchers at the Australian Institute for Bioengineering and Nanotechnology and Baker IDI Heart and Diabetes Institute are investigating how stem cells can be "homed", a process where stem cells would be drawn to specific disease sites. This process would greatly increase the efficacy of regenerative cell therapy while reducing the number of cells required, as stem cells would travel toward damaged rather than healthy regions of the heart and blood vessels.

"However current techniques are suboptimal and lead to loss of functionality and damage in cells", says Dr Hang Ta, NHMRC Early Career Research Fellow at the Australian Institute for Bioengineering and Nanotechnology, University Of Queensland. Together with her research team at the Institute, Dr Ta is investigating methods that are novel, gentle, robust and reproducible.

"Using a special enzyme, *staphylococcus aureus sortase A*, we can unite antibodies with nanoparticles and cells, which enables stem cell homing in cardiovascular disease. This unique biotechnological approach provides a versatile and broadly applicable tool for procuring targeted regenerative cell therapy as well as targeted molecular imaging in cardiovascular, inflammatory diseases and beyond," says Dr Ta.

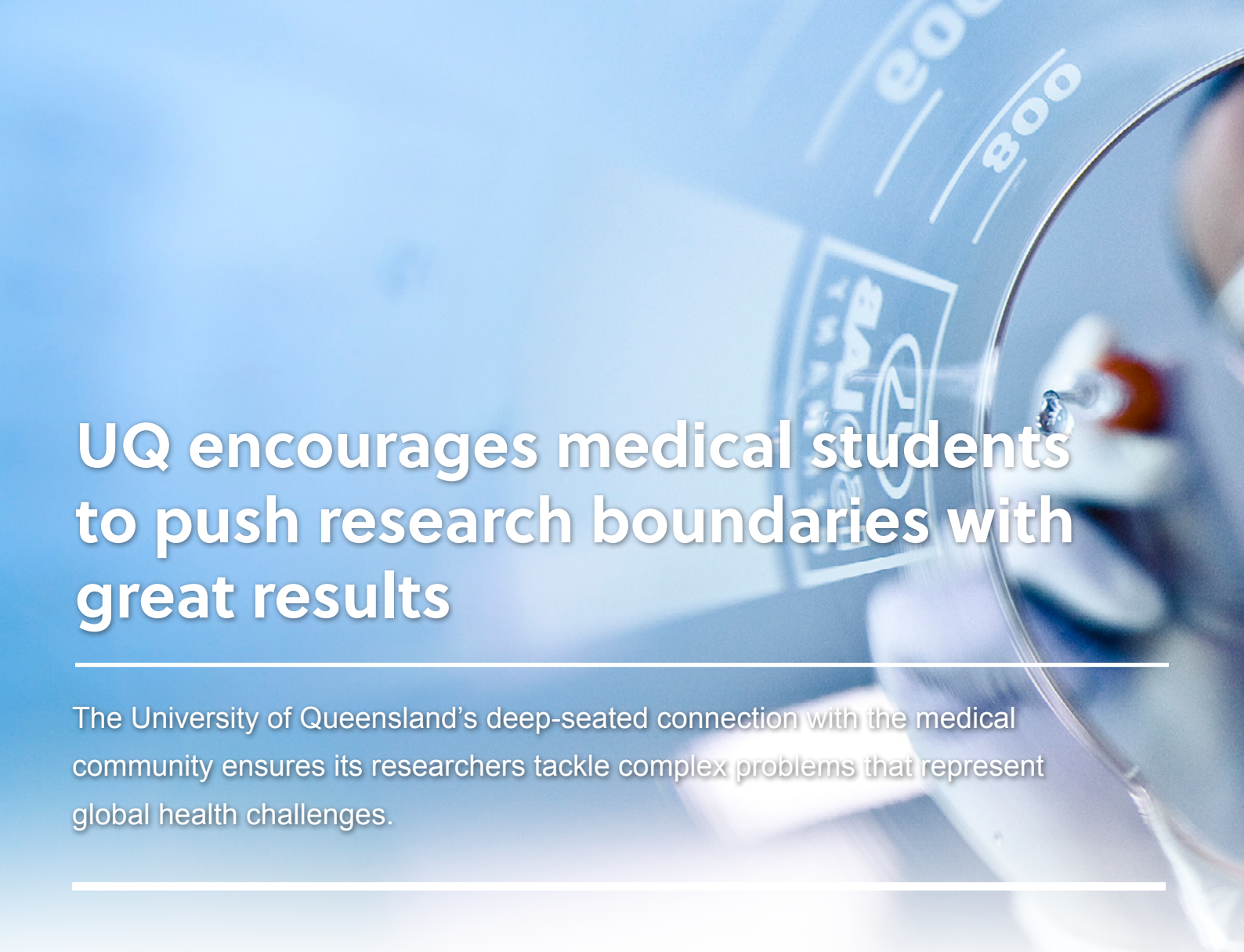
Dr Ta will present ***Targeting imaging contrast and live cells in cardiovascular disease via a chemo-biotechnological approach*** at IBS 2016.

The potential of stem cells revealed in Melbourne

While the potential of stem cells is great, significant technical hurdles remain. IBS 2016, gathering researchers and experts from around the world to explore the frontiers of science and applied biotechnologies, will discuss stem cell technologies as part of the biosensors and nanotechnology stream. The conference, to be held by AusBiotech from 24-27 October in Melbourne, will be held as part of International BioFest 2016. This event promises to be largest-ever gathering in the life sciences, including Australia Biotech Invest, Australia's life science investment showcase, and AusBiotech 2016, which will also feature a spotlight on regenerative medicine.

Visit www.ausbiotech.org to find out more.

AusBiotech



UQ encourages medical students to push research boundaries with great results

The University of Queensland's deep-seated connection with the medical community ensures its researchers tackle complex problems that represent global health challenges.

A 27 year old physiotherapist from Japan owes his life to a Queensland medical research and clinical team that dared to push the boundaries of organ transplantation.

In July 1989, the then 18-month old was the subject of the world's first successful living donor liver transplant - from an adult to a child, in a Brisbane hospital. The toddler's parents came to Australia hoping their son would receive a liver from a deceased donor, but it became apparent it was unlikely the child would survive long enough for that to occur.

The team led by Russell Strong and Stephen Lynch from The University of Queensland and the Queensland Liver Transplant Service successfully removed a section of the mother's liver and transplanted it to her child. Both are healthy almost three decades on, and the technique has saved thousands of other lives around the world.

It is one example of the achievements made possible by the close relationship between hospitals, clinicians and UQ's world-renowned medical researchers.

The university has graduated more than 13,000 medical students over its 80 year history, and its recognition of the importance of research goes back to its very early days.

From the inaugural year in 1936, UQ medical students were able to take extra courses to qualify for admission to the Bachelor of Science degree. A proud tradition began, and has continued to evolve over the decades, producing breakthroughs which are changing medical and clinical practice.

A major step was the appointment in 1954 of UQ's Foundation Professor of Medicine John Tyrer, who was to shape teaching and research in Queensland medicine for 30 years. Professor Tyrer recruited research-oriented academic clinicians to a hospital whose traditions had been almost wholly clinical, to establish a modern, research-based department.

Today many UQ researchers hold significant clinical roles, with honorary, adjunct and academic titles awarded to nearly 3,500 medical professionals who contribute actively to our teaching and research programs. Alumni have made a major contribution to improving health outcomes.They include prominent cardiologist Dr Gary Roubin who invented the coronary stent and IVF pioneer Professor Christopher Chen. James Morton, Medical Director of Haematology-Oncology Clinics of Australasia founded the AEIOU Foundation, a non-profit organisation for children with autism, which he also chairs. Cancer researcher Adèle Green AC established that daily sunscreen use can halve the risk of melanoma, and Dr Ralph Doherty led the discovery of the Ross River virus in 1963.

Many other internationally-recognised researchers have established groups within UQ's state-of-the-art facilities, including Professor Ian Frazer AC and the late Dr Jian Zhou, co-inventors of the Gardasil® cervical cancer vaccine. Since its introduction 10 years ago, more than 187 million doses of Gardasil have now been given in more than 130 countries around the world.

UQ research has also been involved in the largest biopharmaceutical deal in Australia's history, estimated to be worth around $1 billion. Professor Marie Smith's research resulted in a developmental drug to

UQ's medical researchers and clinicians collaborate with teams in Australia and overseas to find new prevention and treatment models for acute and chronic diseases, mental illness, and disability.

treat nerve pain. Pharmaceutical giant Novartis bought the technology through the acquisition of Spinifex Pharmaceuticals, a company founded by UQ's main commercialisation arm, UniQuest.

UQ's award-winning life scientists and clinicians collaborate with teams in Australia and overseas to find new prevention and treatment models for acute and chronic diseases, mental illness, and disability. Professor David Tudehope pioneered the transportation of sick and premature newborns from remote areas of Queensland.

The university's Dermatology Research Centre has in recent years patented a sub-millimetre skin punch biopsy device for minimally invasive and suture-free skin sampling for molecular diagnosis and research.

The Centre for Online Health is leading the world in paediatric telemedicine with achievements including the first custom designed telemedicine system for neonatal intensive care consultations, and the first telemedicine enabled Indigenous Ear Health screening service. The university's medical research now encompasses virtually all of the medical disciplines and research methodologies from the molecular and cellular, through to clinical practice. For the past two years, The University of Queensland has been the number one ranked Australian university according to the *Nature Publishing Index.*

UQ Medicine has been a substantial contributor to the university's overall research standing, as one of the university's highest achievers in terms of grant income, publications, research higher enrolments and awards. It remains committed to enhancing the research training and experience for students in its medical programs.

"Active participation and training in the research process gives students the skills to develop independent critical-thinking," said Professor Darrell Crawford, who heads the medical education program and world-renowned research in liver disease. "They learn to propose theoretical concepts, and to critically analyse their findings.

"Our Clinician Scientist Track is unique in Australia providing an innovative research-intensive pathway for students who wish to pursue a research higher degree (RHD) (MPhil or PhD) as part of their medical degree. "This strengthens our philosophy of developing and graduating successive cohorts of physician scholars to become the future leaders in medicine and scientific enquiry." Also unique is the partnership between UQ and Ochsner Health System in the United States, which is fostering unique international learning opportunities for medical students, to unite world class researchers from across two continents, and to maximise funding opportunities.

Professor Crawford said philanthropy had played a significant role in the growth of UQ's medical program over the past 80 years. "Generous donations have enabled us to increase our research capacity, establish several academic positions and support student activities, as well as reward and support our brightest and most deserving students," he said. "These contributions are helping us make a positive and lasting impact on the health of individuals and communities worldwide."

For more information about the research being conducted at the University of Queensland visit www.uq.edu.au

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Integrating technology and mental health care

Many major medical and scientific advances occur in association with technology and there is no argument that computers, and indeed the Internet, are the greatest technological inventions of this era. Web 2.0 has quite literally 'created' a global village where anyone with an internet connection can access specialised medical information.

The Internet has certainly made possible things that were nearly impossible before. Historically, it has taken a median of 24 years to take new research discoveries from the lab to the clinic. The Internet enables this translation to occur much more quickly, provides broader dissemination and allows cost-effective tailoring to the individual.

While new technologies are useful across the medical spectrum, there are a number of features that make them especially impactful for mental health.

Unlike the more physiological conditions like cancer or diabetes, many people experiencing poor mental health will not need a physical intervention. Gold standard psychological therapy such as CBT can be delivered via the internet, and research shows you don't need any further human interaction for it to be effective. This means people who may not be able to attend face-to-face therapy, or those may not want to due to perceived stigma, can still access quality treatment programs.

Mental health tools can actually work better when they are mobile and accessible 24/7. You can now use your smartphone to test yourself for mental illness, engage with an online treatment program or obtain real-time crisis counselling. Sophisticated bio-sensing technologies and Bluetooth can collect data, information and geographical location to provide a real-time view of behaviour and mood. These capabilities facilitate identification of 'at-risk' individuals and assist in referral and access to treatment. This is of particular use when preventing suicide.

Technology lets us create interactive treatment programs in a wide range of formats. Need to deliver a program to high school kids? The latest research shows us that programs presented as online games are both attractive and effective. A specially created app called *iBobbly* is uses artwork, stories and music to deliver quality mental health care to young indigenous people.

Big data and social media can give us real time insights into how the human mind works. We can now measure the emotional content of the global twitter stream using a program called "We Feel", giving us unprecedented vision of how major world events can impact the collective mental health of communities.


Prof Thomas Insel M.D

Finally, the growth of self-help and the empowered patient movement has meant people are more likely to investigate their symptoms online. Whilst we don't advise people to use "Dr Google" when experiencing poor mental health, having access to a range of specialised medical knowledge and treatments, as well as the many personal stories available on blogs and social media, does increase mental health literacy, reduce stigma and encourage help-seeking.

The most exciting thing for researchers and clinicians is that the impact of technological developments will become clear over a very short time. In the meantime, we will continue to see exciting new technologies that have the potential to extend, make more efficient and add value to mental health care.

Learn more about how digital technology is transforming mental health care at www.digitaldog.org.au or www.blackdoginstitute.org.au

Black Dog Institute

Symposium

Humans and Machines: A quest for better mental health

15 September 2016 – Sydney

You are invited to attend a one-day symposium on the interface between science, technology and human health.

As technology advances, so does its potential use in health care. Data analytics, smartphones, social media and sensors are now being used to both detect poor mental health and successfully deliver interventions.

This raises an important question. Do we really need to be physically face-to-face with people to provide quality mental health care?

Join us at this special event to hear more from the experts.

A special keynote address will be given by Prof Thomas Insel M.D., former Director of the US National Institute of Mental Health and currently Director of Clinical Neuroscience at Verily (Google) Life Sciences.

Event Details

When : **9am – 5pm, 15 September 2016**
Where: **Tyree Room, John Nilend Scientia Building, University of New South Wales**
Cost : **$95 (Student tickets $55). Refreshments will be provided.**

Register online

Tickets can be purchased from http://tix.yt/questmh

This event is proudly hosted by:

Black Dog Institute
UNSW AUSTRALIA
THE UNIVERSITY OF SYDNEY
Brain Sciences UNSW AUSTRALIA

Malaria breakthrough offers hope for new treatments

Researchers at QIMR Berghofer Medical Research Institute in Brisbane have discovered that a protein on the surface of a particular immune cell is crucial in the fight against malaria. Armed with that knowledge, they made a synthetic version in the laboratory, with surprising results that could have huge consequences.

Dr Michelle Wykes was floored when, one afternoon in 2011, she realised that she and her team had unlocked the secrets of a powerful but little-understood protein. "It was the most exciting moment in one's life to know you've found a molecule that is controlling such a deadly disease. I don't think there are words for that moment. You're gobsmacked," Wykes enthuses.

Malaria is caused by parasites that are spread to humans by the *Anopheles* mosquito. The disease claimed an estimated 438,000 lives last year. Many of those were children and unborn babies. The parasites first infect the liver, then progress to a blood-stage infection where flu-like symptoms start to develop. Malaria can lead to a lethal brain infection and coma.

For Wykes, that 'eureka moment' in 2011 was more than a decade in the making. The former Oxford University scientist has spent the last 15 years researching how the human immune system responds to malaria, and has dedicated much of the last seven years to two particular proteins, known as PD-L1 and PD-L2.

"If you think of the immune system as an army, then the dendritic cells are the generals and the T cells are the foot soldiers," Wykes explains. "The dendritic cells tell the T cells when to attack an infection and when to put down their weapons.The dendritic cells have proteins on their surface, which they use to send these orders to the T cells."

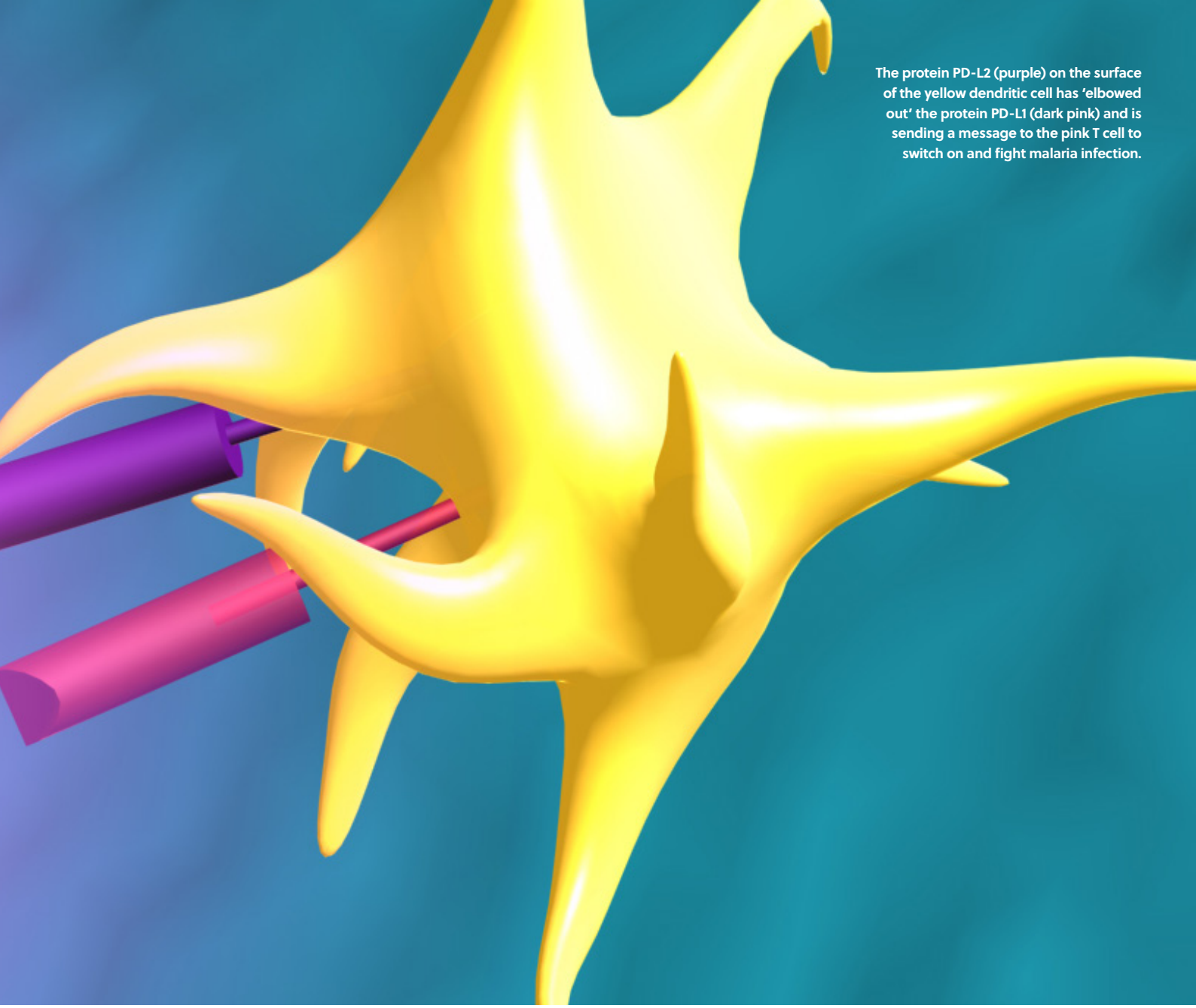
"It had long been known that the job of one of these proteins, PD-L1, was to tell the T cells to switch off and stop fighting once they had cleared an infection. At that time it was believed that a second protein, PD-L2, sent the same message."

That suggestion piqued Wykes's curiosity. "It didn't make sense to me why the immune system would have two proteins both sending exactly the same signal," Wykes says.

After years of investigation, Wykes and her team found that PD-L2 occurs in two forms – as a single molecule (monomeric form), and in a cluster (olgomeric form). They found that as a single molecule, PD-L2 does, as previous thought, tell the immune cells to stop working. But when PD-L2 occurs in a cluster, it overrides and 'elbows out' PD-L1, and instead sends the immune system a message to stay switched on and fight infection.

When Wykes and her team looked at results from humans and mice they found that levels of PD-L2 decreased when malaria infection was present.

"We still don't know how, but it seems that malaria has found a way of defeating the immune system by blocking the production of PD-L2," Wykes proffers. Once Wykes and her team – including Deshapriya Karunarathne and Joshua Horne-Debets – knew how important this



The protein PD-L2 (purple) on the surface of the yellow dendritic cell has 'elbowed out' the protein PD-L1 (dark pink) and is sending a message to the pink T cell to switch on and fight malaria infection.

protein was for fighting the disease, they developed a synthetic version of it in the laboratory. The researchers gave three doses of the protein to mice that had been infected with a lethal dose of malaria and the results were astonishing. "The mice started to clear the malaria infection within two days of receiving the protein," Wykes says. "After 25 days, all of these mice were cured of malaria."

But it's what happened months later that surprised Wykes and her team most. "About five months later, we reinfected the same mice with malaria parasites, but this time we didn't give them any more of the synthetic protein. All of the mice were completely protected and didn't become infected," Wykes says.

The team hopes the extraordinary results could form the basis for a new way to treat malaria in future.

"While there are drugs available that treat malaria, emerging drug-resistance is becoming an increasing problem, especially in parts of South-East Asia. This means we urgently need new treatments," Wykes explains.

"Furthermore, most malaria drugs just cure the infection at that time, leaving the person susceptible to a new infection. This protein trains the immune system not only to fight the infection at that moment, but then to remember the infection and protect against reinfection."

"Stimulating a person's own immune system to destroy the parasites would be a completely new way of treating malaria. This branch of science – known as immunotherapy – is already showing very positive results for treating some cancers, and we hope that it will be just as successful for treating malaria."

For Wykes, Karunarathne and Horne-Debets, the next step is to understand why levels of PD-L2 decline during malaria infection. "We're thrilled to think that we could be on the cusp of a new era in malaria treatment. It really is exciting times," Wykes says. The study has been published in the prestigious journal, *Immunity*.

The research involved collaborators from the University of Queensland's Institute for Molecular Bioscience and School of Chemistry and Molecular Biosciences; The Queensland University of Technology; Singapore's Agency for Science, Technology and Research; and, Harvard Medical School in the United States and was funded by the NHMRC and the ARC.

For more information about the research being conducted at the QIMR Berghofer Medical Research Institute visit www.qimrberghofer.edu.au

QIMR Berghofer
Medical Research Institute

"Tell me what's the best thing for my child and I'll do it!"

Cerebral palsy affects over 17 million people worldwide. That's 1 in 500 births. Guidelines for diagnosis and treatment have been written specifically for certain interventions but there has NEVER been an international effort or resource to say, "We believe these are the most effective forms of intervention for people with cerebral palsy".

Indigo's father just wants to know what are the best interventions and current therapies for his daughter.

In an extraordinary coalition – led by Cerebral Palsy Alliance's Head of Research, Professor Iona Novak – An international effort is underway to create a series of clinical guidelines for the diagnosis and most effective interventions for cerebral palsy (CP).

There is currently no definitive source of information for families and clinicians. Because CP is so diverse, most of the information available has important caveats, which makes it difficult for families to know if the information is relevant to them.

What's needed is a clear source of reference. What Novak is hearing from parents is; "Tell me what's the best thing for my child and I'll do it!" Professor Novak has been championing this cause for some time, previously leading a research group from Cerebral Palsy Alliance, which systematically reviewed CP interventions that worked, and didn't. The results were published in the leading CP journal *Developmental Medicine and Child Neurology*.

A key finding was that the most effective treatments for CP were developed in the last 10 years. This means if a practitioner's original training was conducted more than 10 years ago, their knowledge would be out of date.

Staggeringly, clinical practice worldwide lags as much as 10–20 years behind research. "If you think about this in terms of a child, it's their entire childhood. It's an ethical imperative to close the research-practice gap." Novak tells us.

Clinical practice guidelines are a known effective tool for closing the research-practice gap. Guidelines that are clear, concise, tell you what to do, who to do it with and how much to do, have a proven 67% uptake. They can completely change practice. When vague and ambiguous, usage drops to 36%.

Clinicians looking for strategies to provide the most up-to-date services know that they can go to a clinical practice guideline for a definitive list of what to do. This is what's globally required to close the research-practice gap.

In 2014, agreement was reached between the European Academy of Childhood Disabilities (EACD), the American Academy of CP and Developmental Medicine (AACPDM) and the Australasian Academy of CP and Developmental Medicine (AusACPDM) to collaborate and develop international guidelines for CP with Dr Novak invited to lead this initiative.

Cerebral palsy is a diverse condition. It can range from a mild disability to a very marked physical disability where you need care with every aspect of life. There can't be just one set of guidelines. People respond to different treatments, and the choice of treatments can vary depending on their local context and available resources.

One of the principles Novak embraced is to provide a global continuum of options. In effect, the continuum will say, 'Here's what the evidence says is the best thing to do in this situation, but if you can't do that, then here's the next best thing to do'. The clinical guidelines for CP will accommodate different local settings and support the best available care.

Adult stroke is another diagnosis where clinical guidelines have been used well and provide a proven best practice roadmap. The guidelines have really changed what kind of services people receive.

Practitioners have stopped recommending treatments that are out of date, their knowledge has changed as a result of reading the guidelines and they've been able to identify personal skill gaps.

Clinical guidelines also provide an authoritative framework for negotiating government policy. Practitioners can lobby on behalf of families for additional support as recommended by the guidelines. "That's an important feature," says Iona. "Because they're global and have an authoritative source, they work for individuals but can be used to inform policy for an entire country."

Having an inclusive and collaborative approach and a global perspective has always been an imperative for Iona.

The philosophy is if it's good for people with CP in Australia, it's good for people everywhere. We have a goal of trying to reach the greatest number of people, yet be wise with funding and not duplicate effort. We're stronger as a whole. The best thing for people with CP is that they receive services that work best for everyone and are the best use of resources.

A collaborative approach is also a way for high-income countries to give back to low- to middle-income countries. The first step was to ask people with CP and practitioners what they thought were the most important topics to focus on. 'Early detection' and 'early intervention' were the highest priorities and will be the first two guidelines published. Other priorities include: pain management; feeding, hearing and vision issues; and goal-directed functional training. These guidelines will be completed by 2017.

Many of the interventions are highly effective, yet they are inexpensive and do not require specialist equipment. What's exciting is that many of these high-impact interventions can be done in low-income countries.

"We've learnt a lot about brain neuroplasticity, we know a lot of the interventions are hinged around these philosophies," says Iona.

The clinical guidelines for CP will consist of a scientific journal article with clear, bold statements and a summary of the research evidence about how the recommendations were reached.

Knowledge-translation tools are also a critical deliverable for the guidelines. By making the information accessible to individuals with CP or the families, they can then ask their health-care providers for this treatment or support. 'Self-management' - Putting the information back in the hands of those who have the most to gain leads to better health outcomes.

If we can get these guidelines right, and get to them to the right people at the right time and the training to people in low-to-middle income countries, the trajectory for people with disabilities could be quite different.

Iona suggests "The future is bright. This field has a momentum behind it that hasn't been seen before. It's the most exciting time in CP research. It's one of those points in time where we'll be able to say, 'The field changed because of this'. It's a collective achievement for the greater good."

For more information about the Cerebral Palsy Alliance visit www.cerebralpalsy.org.au

Cerebral Palsy ALLIANCE RESEARCH FOUNDATION

Australian-led consortium uncovers complex genetic secrets of cancer risk in the young

A major international research effort, led by the Garvan Institute of Medical Research, is transforming our understanding of the genes that affect our risk of cancer.

Cancer is a disease of our genes – yet we still have only a crude understanding of how our genetic makeup affects our likelihood of developing cancer.

"We're in the very early days of reading our genetic code for clues to cancer risk," says Professor David Thomas (Head of The Kinghorn Cancer Centre and the Cancer Division, Garvan Institute of Medical Research).

"One can of course point to some standout examples – like the *BRCA* genes, which increase the risk of breast cancer – but the fact remains that we still have huge gaps in our understanding of which gene variants predispose an individual to a particular cancer."

Now, that's set to change, following pioneering work by Professor Thomas and the international research consortium he leads, the International Sarcoma Kindred Study (ISKS). The consortium is investigating the genetics of sarcoma – a group of bone and soft-tissue cancers that disproportionately affect the young.

Professor Thomas says, "Sarcomas are devastating cancers. They have a high lethality – and in fact, they are one of the three leading causes of disease-related death among children and young adults in Australia. And for those who survive sarcoma, the risk of developing a second cancer is substantially increased."

"Because sarcomas affect the young, we can surmise that these cancers are strongly influenced by our genes – but until now we've known very little about what the contributing genes might be."

Now, in the largest study ever conducted in sarcoma, Professor Thomas and the ISKS team have uncovered numerous new genetic risk factors for sarcoma. They identified mutations in a number of new genes that significantly increase the risk of developing sarcoma, including in the genes *ERCC2, ATR, BRCA2* and *ATM*.

Importantly, in individuals carrying mutations in two genes, the risk of developing sarcoma was measurably higher than in those with a mutation in only one gene. And in carriers of three or more mutations, the risk was greater still.

"This is the first time – in any cancer – that anyone has quantified the effect of multiple rare genetic mutations on cancer risk, and it transforms our understanding of genes and cancer," says Professor Thomas.

"Until now, we've been limited to single-gene thinking, so we tell patients, for instance, that carrying a *BRCA1* mutation means their breast cancer risk is higher, or that their risk of sarcoma and other cancers is higher if they've got a particular mutation in the *p53* gene.

"The study shows us that the landscape of cancer risk is far more complex than that. We can now see that the risk for developing sarcoma is increased through the combined effect of multiple genes, and that the more mutations someone carries, the earlier the onset of cancer.

"These previously invisible effects are at least as large as the impact of mutations in the *p53* gene itself, which is currently the strongest known genetic cause of sarcoma."

Professor David Thomas and Dr Mandy Ballinger.

Dr Mandy Ballinger (Garvan), who co-ordinates the ISKS globally, says the study will radically change how sarcoma risk is understood.

"It's well accepted for a few cancers – like breast cancer and bowel cancer – that cancer risk is substantially determined by the genes we inherit from our parents. Our study brings sarcoma into that select group.

"About half the study participants carried at least one of these apparently cancer-promoting mutations, and almost a quarter carried more than one, which really underscores that sarcoma risk is inherited to a large extent from one's parents."

"We've never been able to identify these at-risk individuals, and their families, before. Now we can," adds Prof Thomas. "That means we can manage risk better, and help those people to get the care they need, when they need it."

Prof Thomas says the study's findings are an important step towards personalised medicine for cancer. "Understanding the genetic drivers that give a person an increased risk of cancer also helps us understand how best to treat that person's cancer. And for about a third of the individuals we studied, the gene mutations they carry give us important information about how regularly they should be monitored and how they should or should not be treated."

"To give one example, the *ERCC2* gene is involved in detoxifying chemotherapeutic agents – so that could impact on treatment choices for those individuals who carry an *ERCC2* mutation.

"And for individuals carrying a *BRCA2* mutation, we now know that they are at risk of sarcoma as well as breast and ovarian cancer – which also brings into play new treatment approaches."

"A lot of what we're doing going forward is looking at how we use genetic information about risk to alter the way we treat people. The more we know, the more precisely we can match individuals with the best possible treatment for them."

The researchers say that an important new direction for the research will be to investigate the entire genome for genetic mutations that increase sarcoma risk. "We have only scratched the surface of cancer's genetic underpinnings," says Dr Ballinger.

"Ultimately, we want to identify the entire set of genetic mutations that affect the risk of developing this devastating cancer."

Whole-genome studies of sarcoma risk will be aided by the NSW Cancer Genomic Medicine Program announced last year by the NSW Government, as part of the *Sydney Genomics Collaborative program*.

For more information on the research being conducted at the Garvan Institute of Medical Research visit www.garvan.org.au

GARVAN INSTITUTE OF MEDICAL RESEARCH

Osteoporosis – moving in the right direction

A new approach lifts efficacy of exercise for bone health.

Osteoporosis is a condition of weak bones due to insufficient mass and/or structural integrity. The rising problem of osteoporosis in the community is a function of many factors. First, and most obviously, the population is aging and osteoporosis is a condition primarily affecting older adults. Second, osteoporosis is an "invisible" disease; poorly recognised by the average person and often only diagnosed after the first fracture. Third, while drugs are efficacious, recent highly negative media has curtailed adoption and adherence due to the perceived risk of unacceptable side effects. Fourth, the non-pharmacological treatment of osteoporosis (calcium, vitamin D and exercise) has traditionally been considered of low or indeterminate efficacy by clinicians. And fifth, there is no clinical speciality *specifically* dedicated to bone health. Due to the strong influence of hormones on bone metabolism, osteoporosis is traditionally considered the domain of endocrinologists and, when fractures occur, orthopaedic surgeons.

Neither specialist group is renowned for expertise in non-pharmacological or non-surgical interventions (respectively). The focus of a *Griffith University bone research group*, headed by Professor Belinda Beck, is on that most intractable of the non-pharmacological interventions - exercise.

For exercise physiologists and clinical therapists around the world, the historically-accepted dogma has long been that once osteoporosis is established, little bone building is possible, to the extent that the goal of exercise intervention should be merely to prevent falls. An unwillingness to accept this untested assumption, while denying many thousands of sufferers of osteoporosis an alternative or ancillary therapy to medications, motivated Dr Beck's group to design a bone-targeted exercise intervention and test it for safety and efficacy in individuals with low bone mass.

To take a step back, it is well-recognised that heavy loads and impacts are required to stimulate an adaptive response from bone in order to improve mass and structure in such a way that overall strength is enhanced. The conundrum has always been the assumption that weakened osteoporotic bones that would benefit the most from such adaptation, cannot tolerate such loading. In effect, the treatment would cause the condition (fracture). Thus high intensity exercise loading has never been considered a safe or viable therapeutic option for established osteoporosis. As falls are directly responsible for the vast majority of osteoporotic hip fractures, it was not unreasonable to focus anti-fracture exercise interventions on low load muscle strengthening and balance training activities with a goal to prevent falls. But such an approach brings the conundrum full circle, as low intensity exercise does little to enhance bone strength.

The *Griffith bone research group* determined that, while falls prevention is certainly an essential element of fracture risk mitigation for individuals with osteoporosis, condemning sufferers of osteoporosis to such a conservative approach without at least attempting to test a more efficacious exercise program was borderline unethical. For this reason postmenopausal women with low to very low bone mass were recruited to undertake 8 months of high intensity resistance training (80-85% 1RM) plus weight bearing impact exercise to determine safety and efficacy *(the LIFTMOR trial*).

The results have been startling. Women with even very low bone mass have been observed returning gains far greater than previously reported in the literature (compared to losses in a control group performing a low intensity falls prevention exercise program over the same period). Even more gratifying was a virtual absence of adverse events, with the exception of 1 minor muscle strain that resolved within a week.

Study participant Barbara Johnson.

An interesting and slightly unanticipated additional benefit of the high intensity exercise program was an increase in height in the exercise group as the exercises stimulated a reduction in *thoracic kyphosis* (Dowager's hump). Other findings include increased muscle mass and reduced fat, and improvements in a broad range of functional tests related to risk of falling. Indeed, the benefits to some study participants of the high intensity exercise program rival and even outstrip those of bone medications in light of the fact that osteoporosis drugs do not prevent falls. It is important to note that a number of non-responders were observed. Furthermore, high intensity exercise programs for at-risk populations require strict supervision by experienced professionals.

Recently, the *LIFTMOR program* has been adapted into a bone-targeted exercise program delivered at a translational osteoporosis research clinic in Brisbane The Bone Clinic. At The Bone Clinic, all clients have access to the exercise training (regardless of the existence of comorbidities typically screened out of a clinical trial), and regular bone density and functional testing are conducted. In this more representative clinical population, even more remarkable responses have been observed.

While it is not always possible for every person to participate in the program at the intensity required to stimulate notable bone adaptation (due to conditions that prevent heavy lifting and landing), program modifications can improve ability, in some instances to the level of full participation, and in others to the extent that risk of falling is markedly reduced.

Regrettably, while a plethora of evidence suggests that exercise is a virtual panacea for conditions and pathologies that can afflict the human body, the ability to test targeted exercise under rigorous research conditions is normally limited by the lack of research funding. Unlike pharmacological interventions, there is little financial return to be realised from studies that determine a certain form of exercise is beneficial for an illness or injury. For this reason, the vast majority of exercise research is conducted unfunded and on small scales, which leaves the findings open to criticism in comparison to those from drug trials that can afford very large sample sizes. Until such time as that situation is reversed, the optimum exercise prescriptions for the gamut of conditions affecting human kind are likely to remain elusive.

It must also be acknowledged that despite simultaneous benefits of exercise to many systems of the body (cardiovascular, metabolic, etc.), and to quality of life, exercise will never be as simple as swallowing a pill, and many are unable or unwilling to tolerate it.

While pharmacological treatment will undoubtedly remain the mainstay of clinical management of osteoporosis, the findings of the *Griffith bone research team* and The Bone Clinic provide unequivocal evidence that exercise is a potent, viable and vital ancillary.

The primary caveat is that exercise for osteoporosis must be highly targeted and fully supervised to ensure effectiveness and safety. Nevertheless, after many years of an overly conservative attitude to exercise as an intervention for osteoporosis, the field is finally moving in the right direction.

For more information about the research being conducted at Griffith University visit www.griffith.edu.au

Griffith UNIVERSITY

MENZIES HEALTH INSTITUTE QUEENSLAND

New cancer nanomedicine overcomes drug delivery barrier in pancreatic cancer

Australian cancer researchers have developed a highly promising nanomedicine that could improve treatment for pancreatic cancer – the most deadly cancer in Australia.

Dr Phoebe Phillips

Australian cancer researchers have developed a highly promising technology to deliver gene-silencing drugs to treat pancreatic cancer – the most chemo-resistant and deadly cancer in Australia.

The UNSW-led research, published in the Biomacromolecules journal, provides new hope for pancreatic cancer patients, most of whom succumb to the disease within three to six months following diagnosis.

Lead researcher Dr Phoebe Phillips, from UNSW's Lowy Cancer Research Centre, said it was devastating for her clinical colleagues when they had to tell pancreatic cancer patients that the best chemotherapy drug available could prolong life by only 16 weeks.

"A major reason for the lack of response to chemotherapy is that pancreatic tumours have an extensive scar tissue which makes up to 90 per cent of the tumour," Dr Phillips said.

"This scar not only promotes pancreatic tumour growth and chemotherapy resistance, but also acts as a physical barrier to chemotherapy drug delivery to tumours.

"We recently identified a key protein that promotes tumour growth, cancer spread and chemo-resistance in pancreatic tumours called *βIII-tubulin*. Inhibition of this gene resulted in a more than 50 per cent reduction in tumour growth and reduced the spread of the cancer in mice," Dr Phillips said.

The results of the research, published in the *Oncotarget* journal in 2015, highlighted *βIII-tubulin* as a genuine therapeutic target for pancreatic cancer. However, despite its promise, *βIII-tubulin* is an 'undruggable gene'.

To overcome this problem, the researchers have developed a nanomedicine with a state-of-the-art nanoparticle that can package small RNA molecules (DNA photocopies of cells) to inhibit *βIII-tubulin* expression.

The researchers have shown that their novel nanoparticle can deliver therapeutic doses of small RNAs to pancreatic tumours in mice, despite the presence of scar tissue, and successfully inhibit *βIII-tubulin* by greater than 80% in tumours.

"The significance of our nanomedicine technology lies in its potential to inhibit any tumour-promoting gene or a cocktail of genes personalised to the genetic profile of a patient's tumour," Dr Phillips said. The nanoparticle delivery tool has the potential to deliver therapies not only to the tumour, but to other cancer promoting cells in the tumour micro-environment.

"We hope the nanoparticle delivery tool will allow us to develop new therapies to target this drug-resistant cancer and improve the effectiveness of current chemotherapies. This may increase survival and quality of life for pancreatic cancer patients. If successful, our nanomedicines could also be used to treat other cancers that express high levels of *βIII-tubulin* such as lung, breast, prostate and ovarian cancers," Dr Phillips said.

"It is anticipated that with the help of our clinical oncologists and development of industry partners, our nanomedicine will translate to the clinic as a new class of therapeutics. They will be designed to target tumour cells and silence the expression of key genes involved in promoting tumour growth and chemo-resistance, to improve pancreatic cancer patient survival.

"It is exciting to be working in the rapidly moving field of nanomedicine which is showing immense potential with benefits for therapy delivery, imaging and diagnosis in the field of cancer.

"In the not too distant future we are likely to see nanomedicine enabling clinicians to treat tumours whilst simultaneously monitoring patient response via imaging. Nanoparticles are already being successfully used to improve the sensitivity in the detection of tumour biomarkers and are currently in human clinical trials for cancer," Dr Phillips said.

The innovative research discovery was made possible through a collaboration facilitated by the Australian Centre for Nanomedicine (ACN) at UNSW. It included two of Australia's leading chemists, UNSW Associate Professor Cyrille Boyer (Deputy Director, ACN) and Professor Tom Davis from Monash University. UNSW Professor Maria Kavallaris (Co-Director ACN) and Dr Joshua McCarroll (Project Leader, ACN) from the Children's Cancer Institute are also key partners in the research team.

This research was supported by the National Health and Medical Research Council and the Cancer Council NSW.

Dr Phillips said she is highly encouraged by the exciting results, but it can take 7 to10 years and significant financial investment to take this drug from mice into patients.

Donations to help Dr Phoebe Phillips continue her research and move towards human clinical trials can be made here.

For more information about the research being conducted at the University of New South Wales visit www.unsw.edu.au

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AUSTRALIA SPEAKS!

RESEARCH AUSTRALIA OPINION POLLING 2016

To find out more about Research Australia's 2016 Polling Report please visit our website.

MEDICAL RESEARCH FUTURE FUND POPULAR

87%

of Australians support the MRFF.

Support is strongest among those aged over 65, with **93%** in favour of the MRFF.

AUSTRALIANS WILLING TO CONTRIBUTE THEIR DATA FOR RESEARCH

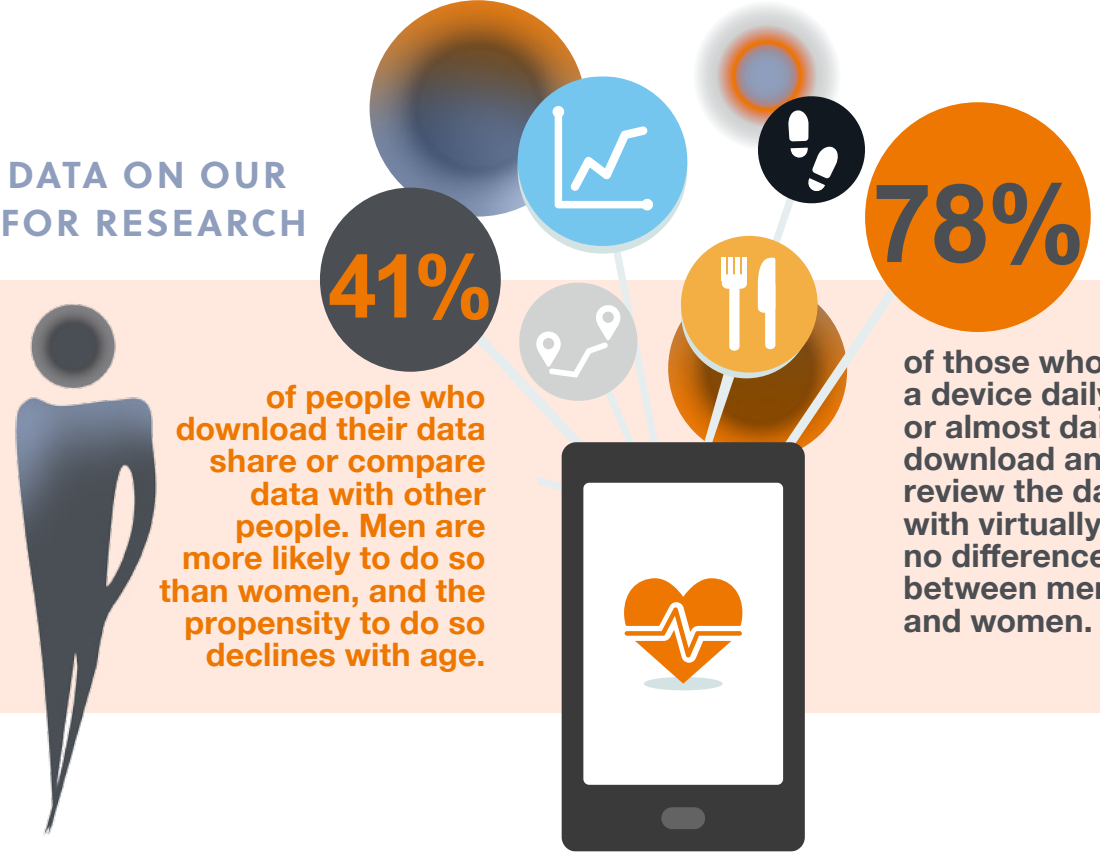
91%

PRIORITIES FOR THE AUSTRALIAN GOVERNMENT

3 of the top 10 priorities relate to health:

- Improving hospitals and the healthcare system
- More funding for health and medical research
- Increasing funding and programs for preventive health

SHARING DATA ON OUR ACTIVITY FOR RESEARCH



41% of people who download their data share or compare data with other people. Men are more likely to do so than women, and the propensity to do so declines with age.

78% of those who use a device daily or almost daily download and review the data, with virtually no difference between men and women.

CAN TECHNOLOGY HELP US MANAGE OUR WELLBEING?

Just over one third of Australians reported having a device for tracking their fitness and/or activity.

Ownership is higher among younger people, 44% of 18-24 year olds.

Men and women own them in equal numbers.

Ownership is lowest amongst older people, 18% of those aged 65 and over.

Research Partner

Roy Morgan Research

RESEARCH AUSTRALIA
AN ALLIANCE FOR DISCOVERIES IN HEALTH

Balancing between risk and reward in funding medical research

Corporate giving means more than just funding when it comes to enabling critical medical research. As Research Director of the Ingham Institute, Professor Michael Barton OAM explains, it's the entrepreneurial approach of those funding the research that provides as much of a benefit to the Institute's work as the monetary investment.

Last month, the Ingham Institute for Applied Medical Research signed a new agreement with South Western Sydney Local Health District, which formalises our medical researchers deepening relationships with hospitals in Liverpool, Campbelltown, Bankstown, Fairfield and Bowral, and health services across the district.

Matching that with our collaboration with the University of NSW and Western Sydney University, the Ingham Institute is in the wonderful position of being a world-class research genuinely linked with day-to-day clinical care.

None of this would have happened so quickly or as comprehensively were it not for the contributions of our community-based founders, all self-made businesspeople dedicated to the common goal of improving the health of future generations of people who lived in an around their home towns in western Sydney.

Over time, the millions donated by these extraordinary visionaries has heavily influenced where we are right now, with more than 300 affiliated researchers covering a broad range of diseases and over 200 clinical trials under coordination by Ingham Institute, the majority being conducted in collaboration with Local Health District hospitals and health services.

Our experience is that these sorts of partnerships are very much accelerated by the philanthropy of people willing to give today, for research that many would not see come to fruition in their lifetimes - for some, this may be about leaving a legacy – but whether that's true or not of individuals whose generosity funds our work, the level of selflessness shown by those who give to fund research that can take decades is staggering.

At the Ingham Institute, we are extremely fortunate that most of the community-based founding supporters continue to play an active role in the Institute through Board positions and various committee roles. Their financial commitment to our mission is genuinely philanthropic in that they demonstrate a desire to promote welfare of others by adding value to our organisation in whatever way they can afford.

As a not-for-profit translational medical research organisation, we take stewardship of our donors' philanthropic gifts as being one of our core activities and as such, working with our affiliated organisations to establish efficient and effective collaborative frameworks is absolutely a fundamental element of this. Demonstrating to our donors that we have the frameworks and agreements in place to translate our research findings into the community is just as important as the act itself.

The newly-formalised agreement between the Institute and SWSLHD embodies that commitment as it demonstrates to all of our constituents that we have been and will continue to "walk the talk".

For us at the Ingham Institute, it means we are able to work at the forefront of international medical research on projects that will change the way we treat some of the most devastating blights on human health here and around the world.

Left to Right: Mr John Hexton (Community Board Director), Prof. Michael Barton OAM (Research Director), Ms Amada Larkin (South West Sydney Local Health District, Chief Executive), Mr Terry Goldacre (Chairman), Mrs Lyn Ingham (Ladies Luncheon Ambassador), Mrs Debbie Kepitis, Mr John Ingham (Community Board Director) and Mr Robby Ingham.

For example, South-West Sydney is the first place in the southern hemisphere to work on development of an *MRI-Linac*, an extraordinary weapon against cancer. With this technology, specialists in Sydney's south west will have direct access to a real-time guided radiation therapy that can track and attack cancerous tumours with pinpoint accuracy, limiting the need for more invasive and debilitating forms of treatment.

The Ingham Institute and the South Western Sydney Local Health District are also working together on circulating tumour cell (CTC) blood test development which, when complete, will replace invasive biopsies with simple blood tests, and result in much more effective cancer treatment. This same work is pioneering methods of potentially cutting months off the time it takes to treat cancers through chemotherapy, by the mapping of CTC DNA and responding with treatment that addresses its behaviour.

This same work at the Ingham Institute on CTCs and enhancing the efficacy of liquid biopsies in determining patient outcomes is being contributed to by Liverpool Hospital's liver cancer specialists, whose urgency to find alternatives to *serafanib* to treat liver cancer is driving our work to identify checkpoint inhibitors across the seven different subtypes of the disease.

We've also collaborated with Liverpool Hospital to develop the *Window To Hope suicide-prevention program* among victims of serious head injuries. This truly innovative program has just been adopted by the US Department of Veterans Affairs after an overwhelmingly successful trial proved more effective in turning around the lives of injured returned servicemen and women than any other attempts to protect their welfare to date.

These are just four of the hundreds of projects we're undertaking, all at various stages and each that are more secure in their delivery thanks to the vital contributions of our well-rounded base of partners including educational institutions, health service delivery and crucially, business-minded community supporters.

The world is full of translational medical research institutes connected to hospitals and universities. At the Ingham Institute, we highly value our vital link to the community and influence of commercially-minded businesses supporters as it ensures we stay connected to our neighbours and continue to deliver on our promises.

And for those neighbours, by having a world-class medical research facility on their doorstep and working with their hospitals, their universities and health clinics they're living in a community that has access to some of the most innovative and ground-breaking advances in medical science taking place today.

To learn more visit our website at www.inghaminstitute.org.au

Ingham Institute
Applied Medical Research

Macquarie University researchers make a giant leap with Dementia and Motor Neurone Disease

Researchers from Macquarie University have discovered that mutations in a single gene can cause both dementia and Motor Neurone Disease – a significant leap forward in understanding the biological mechanism underlying both diseases.

Dr Kelly Williams and Associate Professor Ian Blair from Macquarie University.

Understanding the molecular and cellular basis of neurological diseases is a long haul made up of mostly small, and occasionally giant, steps along the way. Earlier this year, Dr Kelly Williams and Associate Professor Ian Blair from Macquarie University's *Motor Neurone Disease (MND) Research Centre* took one of those giant leaps when they found a common genetic cause of two seemingly unrelated diseases: MND and fronto-temporal dementia (FTD).

The recent findings, published in the prestigious *Nature Communications*, have their origin in a key earlier finding when Dr Williams and Associate Professor Blair found a variation in the *CCNF* gene in Australian families who had an inherited form of the diseases. The mutant gene was also subsequently found in some with 'sporadic' forms of the diseases.

"The *CCNF* gene makes a protein called *cyclin F* that helps nerve cells remove abnormal or excess proteins," explained Dr Williams, who received a Bill Gole MND Postdoctoral Fellowship to undertake part of the work. "Our laboratory experiments found that aberrant forms of the *CCNF* gene in nerve cells disrupted breakdown of these proteins and caused nerve cell death."

The Macquarie University team extended the study internationally to include more than 2000 patients and found consistent results in cohorts from the United States, Canada, United Kingdom, Spain, Italy and Japan, with implications for global populations and diagnostics around the world.

Genetic Pathways

Although a relatively small number of patients who have MND or FTD have the abnormal *CCNF* gene, the research finding is an important step in pointing to a pathway between genetic cause and development of the diseases.

"The fact that two different diseases have a common underlying genetic origin tells us that the pathway is modifiable," said Associate Professor Blair, internationally known for his work in *Amyotrophic Lateral Sclerosis* (ALS) – the most common form of MND.

"If the disease is modifiable, then hopefully we can intervene with therapeutic treatment in the future. Our new understanding has already informed our next stage of work – developing and testing therapies. It will also add to the diagnostic regimes for these diseases and to the bank of knowledge about their biology."

The team is in the process of replicating the disease in the lab environment to explore further the cascade of events taking place at the cellular level. They will do this in the inherited and sporadic forms off the disease. Both a targeted and a high-throughput approach will be used with the latter making use of the now well-established *zebrafish program* that the MND Research Centre has under the direction of Dr Nick Cole.

It Takes A Community

MND is a degenerative disease that currently has no cure. A diagnosis is devastating for patients. Macquarie University researchers working in this field seem acutely aware of the human implications of their work, and their connection to MND families and the larger MND community of researchers is a core part of their work.

"We play an active role in national and international collaborative initiatives to help fight MND," said Professor Chung, Director of the MND Research Centre.

"We work with teams from Melbourne University, Wollongong University, Flinders University and the Queensland Brain Institute who all bring different expertise in trying to solve this medical challenge.

"Sharing information and coordinating approaches is, I think, one of the reasons that our understanding of the disease in Australia has grown rapidly over the past five years."

Researchers also actively participate in community-based fundraising initiatives. Last year, Dr Cole kite-surfed the Great Barrier Reef – a total of 1185 kilometres – to raise awareness of MND and fundraise for research.

The Macquarie University MND Research Centre staff were active participants in the Ice Bucket Challenge for ALS/MND fundraising and Associate Professor Blair was awarded an MND Ice Bucket Challenge Grant-in-aid, which arose from those funds and supports his research. And Director of the MND Clinic Professor Dominic Rowe is former Chair of the MND Research Institute of Australia, a major fundraising body for MND Research providing in excess of $1 million to research each year.

About the MND Research Centre

The world-renowned MND Research Centre is based within Macquarie University Health Sciences Centre – or, MQ Health – that brings together Macquarie University Hospital, the Faculty of Medicine and Health Sciences and clinical components of the Faculty of Human Sciences. MQ Health is Australia's first and only fully integrated university-owned academic health sciences centre.

Through its integrated approach, MQ Health is able to deliver excellence in clinical care, research and education and develop the best patient outcomes. The MND Research Centre works within this model and is a uniquely multidisciplinary MND research program in Australia made up of five teams that collectively create a 'pipeline' of research.

"Our shared goal is to find new MND-causing gene mutations and potential environmental factors that are triggering abnormal protein function and leading to initial and ongoing degeneration of neurons," said Professor Chung, who heads up the cell biology team.

The group is associated with the MND Clinic, also part of MQ Health, that sees about 10 per cent of Australians with MND. The group's 'biobank' is one of the largest in the world and has become a vital research tool in Australia and internationally as a result of the high participation rate of patients.

Once blood is collected and stored in the biobank, the staged research process takes place – including genome sequencing and protein analysis. The initiative is an excellent example of improved patient outcomes resulting from the close integration of research and clinical care.

Researchers from the MND Research Centre, together with a host of international collaborators, have mapped around 60 per cent of the genetic picture of the disease as a result of their comprehensive and integrated research approach.

For more information about the research being conducted at Macquarie University visit www.mq.edu.au

MQ Health
MACQUARIE UNIVERSITY
HEALTH SCIENCES CENTRE

Humble aspirin put to the test

Large-scale research is driving a rethink of aspirin's potential for primary prevention of disease and disabilities in the elderly. Armed with rich clinical and biological data, findings from the ASPREE study will change how we view this age-old drug. Policy makers, researchers, GPs and the general public are set to benefit.

Primary findings from the international ASPREE (ASPirin in Reducing Events in the Elderly) clinical trial, a large randomised, double blind, placebo-controlled study, will determine whether low-dose aspirin prolongs good health in the elderly by preventing cardiovascular disease (heart attack and stroke), dementia, cancer and depression. It will also, for the first time in the world, weigh aspirin's potential benefits versus the risks, such as bleeding, in healthy people aged 70 plus years.

The addition of 15 diverse sub-studies to the principal ASPREE trial, which is led by the School of Public Health and Preventive Medicine at Monash University in Australia and the Berman Center for Outcomes and Clinical Research in the US, primes researchers to answer more aspirin-related questions than ever before.

When ASPREE closed recruitment in 2014, it had 16,703 Australian participants and the support of more than 2,000 registered GP co-investigators to track, for an average of five years, the health of their patients in the clinical trial. Central to the study design is a powerful collection process that will generate more than 30 million data points.

Early on, ASPREE researchers realised the opportunity to build on this database and add further value to the principal trial. Currently, 15 sub-studies are addressing or providing the resources for research into diseases related to ageing, the majority of which involves sub-specialities of medicine. Several sub-studies share data, such as retinal and brain imaging, to successfully amplify research findings at minimal participant burden.

Sub-studies have also proved popular with ASPREE participants, with almost 90% signing up for at least one ancillary activity.

ASPREE sub-studies currently undertaken in Australia (unless stated otherwise) include:

ACES (ASPREE Cancer Endpoints Study) will collect further cancer-related information and genetic/cancer tissue samples from ASPREE participants in both countries for future cancer studies.

ALSOP (ASPREE Longitudinal Study of Older Persons) involves a series of medical and social questionnaires to investigate factors that have a major influence on health, independence and quality of life in later years, such as dental health, access to medical services, and social connectedness. Questionnaires are completed at baseline, year 3 and year 5 of the ASPREE trial. Almost 90% of ASPREE participants are responding to these questionnaires with 44,000 baseline and year 3 questionnaires received to date.

ASPREE-AMD will compare and analyse retinal images from ~5,700 ASPREE participants to determine the effect of aspirin on age-related macular degeneration (AMD).

ASPREE-ANTISEPSIS will determine whether low dose aspirin reduces the incidence and mortality of severe infections in ASPREE participants in Australia.

ASPREE–D (depression) examines whether aspirin reduces depression in the elderly and whether inflammatory pathways are involved. Conducted in Australia and the USA.

ASPREE-FRACTURE will evaluate the impact of aspirin treatment on bone fragility.

ASPREE-G (genomics) investigates the impact of genetics on health in the elderly using genomic sequencing of samples from the ASPREE Healthy Ageing Biobank.

Current sub-studies include:

- collaboration with the Garvan Institute of Medical Research (Sydney) to develop a **Medical Genome Reference Bank** (MGRB) from ~3,000 Australian ASPREE participants aged >75 years without cardiovascular disease or a history of cancer. The MGRB forms a 'healthy' comparison for researchers to identify, more easily, genes that cause disease.
- collaboration with the Icahn Institute at the Mount Sinai School of Medicine in New York, to measure disease-linked mutations in DNA within ~700 genes from all ASPREE participants. These findings will contribute to the **Resilience Project**, investigating how disease-related mutations behave in older people who remain disease free.

The **ASPREE Healthy Ageing Biobank** collects and stores blood and urine samples from ASPREE participants at baseline and after three years for future evaluation of new preventive and diagnostic biomarkers (including genetic markers) of chronic disease in older Australians, such as Alzheimer's disease and cancer. More than 12,200 Australian ASPREE participants donated samples at baseline. Collection of year 3 samples, which currently total >6,700, will continue until the end of 2017. Each sample in the Biorepository is linked to unprecedented high quality clinical data collected in the principal ASPREE trial.

ASPREE-HEARING will determine whether low dose aspirin prevents or delays the progression of age-related hearing loss in 1,262 ASPREE participants.

ASPREE-Knee uses 3 Tesla MRI imaging in 165 ASPREE participants to test whether aspirin slows or prevents cartilage loss associated with osteoarthritis.

ASPREE-NEURO uses 3 Tesla MRI of the brain to determine whether cerebral microhaemorrhages alter cognitive abilities in 572 ASPREE participants and whether aspirin alters this relationship or the incidence of cerebral microvascular events.

ENVIS-ion is a neuroimaging sub-study which completed recruitment of 600 ASPREE participants in Melbourne (300) and Canberra (300). Participants have brain MRI (1.5 Tesla) and retinal photography at baseline and three years after treatment with aspirin or placebo to help understand the role that changes in cerebrovascular anatomy may play in aspirin's effect on cognition and whether retinal vascular changes reflect changes in the brain vasculature.

SNORE-ASA is a study of sleep disordered breathing in 1,835 ASPREE participants to determine the role of low dose aspirin in delaying the cognitive decline associated with severe obstructive sleep apnoea.

The **SHOW** (Sex Hormones and heart disease in Older Women) study measures blood androgen levels in ~6200 ASPREE women at baseline, with 450 retested in three years, to investigate the association between androgen and cardiovascular health in elderly women. It will also provide for the first time, an age-specific reference range of androgen levels in this cohort.

The ASPREE study has provided the opportunity to investigate mechanisms of aspirin's action that will have a legacy for clinical and basic science research for many years into the future, focussing on the health and disease of older people.

Results from the principal ASPREE trial and most sub-studies are expected in 2018.

For more information about the research being conducted at Monash University visit www.monash.edu

MONASH University

Inside the RetCam Van – a vehicle fitted with a mobile retinal camera enables the capture of retinal images for ASPREE sub-studies from participants living in metropolitan, regional and rural parts of south-eastern Australia.

Cook Medical Australia: Putting the patient first

Cook Medical Australia is dedicated to bold leadership in pioneering medical solutions to enhance patient care worldwide. Through research and development, manufacturing, and continuing to prioritise patients, Cook helps to create innovative healthcare treatments that improve people's quality of life every day.

In 2013 my doctor found an aortic aneurysm and he told me I had three options: do nothing and have three years to live; do a bypass and not survive; or implant a stent graft. The choice was easy. So after some testing and several visits he said they would do the procedure. I was thrilled.

As I have learnt more about your product that is in my body I can't believe the work that goes into making stent grafts—the technology is amazing. It took three months to make mine. I am lucky to be alive. The extra years I get to spend with my three children, my seven grandchildren and three great-grandchildren mean the world to me. I get to spend time with them at the beach, we have fish and chips up at the lookout, we go for walks, and my twin grandsons play cricket and baseball and I can go and watch them sometimes.

The work you do affects real people so on behalf of all the patients your product helps, let me say a big thank you to the Cook Medical family. Thank you. Mrs Marcia Gregor, New South Wales

It is stories like Marcia's that define who we are as people and what we do as a company. As a medical device manufacturer, it is a privilege to be able to provide people with a personalised healthcare treatment. Ensuring a patient's health and well-being is our first and foremost objective. It is a big responsibility and one that everyone at Cook takes very seriously. It is Cook's purpose to research, design, manufacture and deliver medical devices of the finest quality.

Turning ideas and research into quality products

This objective inspires our people to be leaders in research, development and manufacturing processes and we are constantly looking at ways in which we can bring new products to market.

Our *Asia Pacific New Technologies Team* (ANTT) scouts for novel technology in Australia and the APAC region. The team actively engages with universities, research institutes, start-ups and clinicians to identify suitable technologies that have potential for commercial success. To date, almost 400 concepts have been reviewed and 11 are currently being invested in.

One well-known partnership is with local biotechnology company Anteo Technologies where we provided funding to conduct a feasibility study in applying their patented *Mix&Go bonding technology*.

Another partnership is with *CWAN technologies* where Cook Medical is providing funding for sponsored research to further develop a novel Australian technology that has great potential to be commercialised by multiple Cook business units.

More recently ANTT has reviewed two technologies from South Australia including: a cancer margin probe which detects the pH margin of cancerous tissue and non-cancerous tissue, enabling surgeons to optimise the removal of cancerous tissue; and an antithrombotic stent technology which aims to reduce fouling and thrombosis in stents. It is anticipated these technologies may become full scale development projects managed jointly by Cook and the technology holders.

Under new leadership

While there are a significant number of opportunities for us to pursue, it is the leadership within our company that differentiates us. Earlier this year Dr Samih Nabulsi was appointed as the General Manager (GM) for Cook Medical Australia. Dr Nabulsi succeeds Barry Thomas, Director of Cook Medical Asia Pacific, Vice President of Cook Incorporated who is now focusing on new markets and opportunities for the company across the APAC region.

Dr Samih Nabulsi appointed General Manager of Cook Medical Australia earlier this year.

Dr Nabulsi has been with Cook Medical for 12 years and previously held positions as the regional Director of Operations and Director of Research and Development – Cook Medical, Asia Pacific. His leadership in the research and development (R&D) sector will inform his vision and decisions of the company's future.

According to Dr Nabulsi, R&D enhances our knowledge of new or unfamiliar areas by challenging us; keeps us up to date with emerging technologies; and at its best, leads to solutions that make a difference to most of us, be it patients, families or friends.

One of the keys to successful R&D is to understand what has already been done and unearth solutions and insights into challenges that may even be unrelated to the question at hand.

It is an exciting time for Dr Nabulsi to take on this role at Cook. As well as increased industry growth and research opportunities the company itself is transforming. Transforming any organisation requires strong leadership and Dr Nabulsi is prepared to lead, embrace and adapt as the company evolves and prepares for the future.

A commitment to the future

Our R&D initiatives work hand in hand with our commitment to the health outcomes of patients and it is easy to see the benefits resulting from the advancement of the medical device industry. Our ability to manufacture an aortic stent graft specifically for a patient's anatomy, such as Marcia's case, allows the patient to undergo endovascular repair rather than a highly invasive open repair.

We are privileged that we can pursue innovative healthcare treatments and as such we're looking ahead at opportunities to partner with other companies and research institutes.

Cook is committed to several research initiatives including establishing a Research Hub for the advanced manufacturing of medical devices. The Australian Research Council (ARC) awarded funding to UQ, with Cook as the lead industry partner to transform Australia's $10.8 billion medical technology sector by developing cost competitive technologies for the rapid production of advanced medical devices.

Other significant projects include a linkage project with the University of Queensland to improve the material properties and designs of medical devices and a proof of concept study examining coating technologies with the University of Wollongong.

Towards the end of 2016, we will launch the *Advanced Commercialisation and Development Centre* (ACDC) which, through the themes of connect, collaborate and create aims to encourage further collaboration between research and industry.

The ACDC will also support projects managed by ANTT such as CWAN technologies, with lab space where they can continue their research.

Through our industry and research partnerships we can look to the future with confidence. Moving forward Cook Medical will continue to explore, develop and invest in medical devices to treat patients all over the world.

For more information, visit www.cookmedical.com

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Open source: the future of medical discovery

There is growing recognition that no single research body or group has the know-how or resources to tackle the most widespread and persistent diseases. Fortunately, a growing number of scientists are engaged in open source innovation that removes barriers and creates a more transparent environment for medical discovery.

Based on the recognition that the whole can be greater than the sum of its parts, open source innovation is an interconnected way of working, in which sharing is everything. The benefits of this alternative approach are being most realised in diseases affecting the developing world, such as malaria and tuberculosis, where the science is complex and the commercial opportunity limited.

Among the pioneers of this new model is Associate Professor Matthew Todd, lead researcher at the University of Sydney and founder of the *Open Source Malaria consortium*. He believes a collaborative approach will help find medicines that will reduce the 200+ million new cases of malaria each year that cause an estimated 438,000 deaths annually, the majority of which are recorded in the developing world.

"Open source is a radically different approach that is likely to accelerate the discovery and development of new treatments. Using an open source model, the team has been able to access expertise, knowledge and equipment that we wouldn't normally have access to, which is very valuable to the research," said Professor Todd.

Professor Todd believes that reversing the tide on malaria requires the pooling of resources combined with bringing together the experience and expertise of scientists from different backgrounds and specialties. As part of his work, he has collaborated with the Tres Cantos Open Lab Foundation that gives independent researchers access to GSK resources, expertise and facilities to help research into diseases of the developing world. GSK also opened to the public the structures of 13,500 chemical compounds that are capable of killing the parasite that causes malaria.

GSK hopes that sharing information and working together will lead scientists to develop a drug for treating the mosquito-borne disease faster than the company could on its own. Using an open source model allows scientists from different institutions and backgrounds to work together, both physically and remotely, drawing on each other's strengths and know-how.

"Tres Cantos gave us existing data on malaria, which really helped as a starting point and gave us a head start. Medical researchers want to work with the best people, the latest equipment and have access to data. To support future research our own data is available to others in real time, which we hope will encourage debate and the discovery of new medicines," said Prof Todd.

Set up in 2010, the Tres Cantos Open Lab Foundation is considered an unprecedented step in tackling the diseases of the developing world. Supported by GSK, it was the first time a global pharmaceutical company had helped set up an *open lab* that would unlock commercial resources and expertise to the broader scientific community. Six years on and the Tres Cantos Open Lab Foundation is an emerging success story and a thriving international hub for research into diseases of the developing world. Scientists who visit the open lab in Spain often cite access to world-class facilities and the opportunity to collaborate with scientists working in the drug discovery field as the key benefits of this unique approach.

The lab operates with the support and advice of a broad range of actors, including GSK, the Wellcome Trust, the European Union, and Medicines for Malaria Venture, as well as various other product-development partnerships and academic centres.

More than 100 scientific staff work at the Tres Cantos campus in a range of areas including medicinal chemistry, parasitology, mycobacteriology, pharmacology and toxicology. The combination of these facilities and expertise enables Tres Cantos to take care of all scientific needs of drug discovery and development from screening campaigns to clinical Proof of Concept studies (Phase IIb).

It is hoped that the goals of the Tres Cantos Open Lab Foundation will be achieved through collaborations where the complementary expertise and capacity, currently residing in the pharmaceutical industry as a whole, is made accessible to academic, biotech and other pharmaceutical industry scientists.

Dr Andrew Weekes, medical director at GSK Australia, believes open source innovation will increase in popularity as more pharmaceutical companies adopt the model.

“The use of open source models in medicine is now a reality that the scientific community is embracing. There is a growing consensus that an open source approach, with greater collaboration and transparency between the pharmaceutical industry and independent researchers, is the key to tackling diseases of the developing world,” said Dr Weekes.

With over 50 projects in the portfolio, Tres Cantos activities are starting to bear fruit in terms of publications, validation of novel therapeutic modalities, promising lead optimisation programs and leveraged funding from third party agencies.

This bold and flexible approach has positioned the Tres Cantos Open Lab Foundation as a dynamic research hub, helping to stimulate innovative research that could ultimately result in the discovery and development of new medicines.

“GSK is committed to researching new treatments for diseases that affect millions of people. There is still work to be done, but increasing openness and collaboration among scientists researching and developing medicines for the developing world is paving the way for further progress,” said Dr Weekes.

While it’s still too early to evaluate the success of the Tres Cantos Open Lab Foundation in terms of drug approvals, this new approach has encouraged research into diseases of the developing world. There is palpable excitement that open source ways of working could herald a new age of research and development.

Proposals to the Tres Cantos Open Lab Foundation can be submitted at any time via www.openlabfoundation.org. Each submission is reviewed by the Foundation’s Governing Board and Trustees.

For more information about GSK Australia visit www.au.gsk.com

Professor Matthew Todd’s research into malaria is being funded by the Australian Research Council and Medicines for Malaria, based in Geneva.

It's time to... Know Your Bones

Osteoporosis Australia and the Garvan Institute of Medical Research have launched *Know Your Bones*, a major consumer project that aims to increase awareness of osteoporosis and bone health in the community.

Know Your Bones is the first project to be launched under the *Bone Alliance* between Garvan Institute of Medical Research and Osteoporosis Australia.

The new risk assessment website, launched mid-June, delivers a freely accessible, online bone health self-assessment tool for consumers. The self-assessment provides an estimate of future fracture risk for users over 50 years of age and general risk recommendations for users of all ages. A simple report is generated that summarises any risk outcomes and provides recommendations. People with multiple risk factors or with moderate to high fracture risk are advised to speak with their doctor.

The *Know Your Bones* website incorporates Garvan's fracture risk assessment algorithm, which was developed from the internationally recognised, 26-year-long Dubbo Osteoporosis Epidemiology Study, the world's longest-running, large-scale, osteoporosis study. The Dubbo study has been led, since inception, by researchers from Garvan's Bone Biology Division, including Professor John Eisman AO, Professor Jacqueline Center and Professor Tuan Nguyen.

Professor Jacqueline Center said, "The Dubbo study has confirmed that both men and women are affected by osteoporosis, and that bone loss continues in older age. The study has also revealed that once you fracture a bone as a result of poor bone health, the risk of breaking another bone doubles in women, and increases three-to-four-fold in men. Furthermore, there is a strong link between all major fractures and premature death.

"Importantly, this study has allowed us to understand a person's risk of fracture based on a combination of factors, which we have incorporated into the *'Know Your Bones'* self-assessment tool," Professor Center said.

"Given the community's thirst for credible health information, this innovative bone health self-assessment tool will offer consumers a simple summary of their fracture risk, which they can take to their GP for further discussion."

Professor John Eisman AO said, "We are very proud at Garvan to know that the findings from our osteoporosis study, which has been running for 26 years, is contributing this assessment tool for the wider community and ultimately could improve awareness about fracture risk."

Professor Peter Croucher, Head of Garvan's Bone Biology Division, said, "This is a unique opportunity to translate research into a practical solution and improve bone health. In particular, *Know Your Bones* should help identify people who may have osteoporosis and ensure they are treated effectively."

The *Know Your Bones* website asks a series of questions in four sections – personal details (including age, any previous fractures and bone mineral density if known), medical history (diagnosed conditions that impact bones), lifestyle habits (including smoking, drinking, calcium intake, sun exposure and exercise) and medications (use of osteoporosis medication or supplements). The assessment only takes around 5 minutes for patients to complete.

Professor Peter Ebeling AO, Medical Director of Osteoporosis Australia said, "In 2016 in Australia we estimate there will be 155,000 fragility fractures due to poor bone health, and that 66% of Australians over the age of 50 years have osteoporosis or osteopenia, placing them at increased risk of such a fracture.

"Despite these alarming statistics, bone health is not a high priority for the community or for health professionals, so this is something we

intend to change. Osteoporosis and related fractures is an Australian national health priority. That's why Osteoporosis Australia and the Garvan Institute of Medical Research have joined forces, to place this practical, online self-assessment tool in the hands of the community, so they can be proactive about their bone health."

Osteoporosis Australia CEO, Greg Lyubomirsky, said Australians should regard these new fracture figures as a public health warning.

"Unfortunately, only around 20 per cent of those women who sustain a fracture and go to hospital, are either treated or properly investigated for osteoporosis. Even fewer men are followed up appropriately.

"Poor bone health can lead to fractures. Don't wait to break a bone, take the *Know Your Bones* health assessment now," Mr Lyubomirsky said.

Federal Minister for Health, The Hon. Sussan Ley MP, attended the launch of the website and said, "The *Know Your Bones* health assessment tool is a great example of how medical research can be translated into a real community's benefit, allowing anyone to better understand their own risk of fractures.

"I encourage all adults to take a few minutes out of one day, jump online and complete the *Know Your Bones* assessment."

Osteoporosis Australia Chairman John Hewson said, "Our alliance with the Garvan Institute demonstrates that like-minded organisations with a common vision can join forces and share expertise and evidence-based research to ultimately benefit the community."

Osteoporosis affects women and men, and occurs when bones lose their density and quality, weakening the skeleton. Risk factors for osteoporosis include a family history of the disease, fractures from minimal trauma, low bone density and falls.

Medical risk factors include low body weight, early menopause, low testosterone, inflammatory conditions, malabsorption disorders (such as coeliac disease), corticosteroid use (e.g. for asthma), some cancer treatments (particularly for breast and prostate cancer), loss of height (3 cm or more), overactive thyroid and parathyroid conditions. Lifestyle issues include calcium and vitamin D deficiency, smoking, insufficient exercise and excessive alcohol consumption.

Visit knowyourbones.org.au to take the test, and follow *Know Your Bones* on Facebook for updates about the project and insights into bone health.

For more information about Osteoporosis Australia visit www.osteoporosis.org.au

Find out more about the research conducted at the Garvan Institute of Medical Research visit www.garvan.org.au

Taking research out of the lab and onto laptops in the community (from left) Garvan researchers Professor John Eisman and Professor Peter Croucher with John Hewson (Chairman of Osteoporosis Australia) and Garvan researcher Professor Tuan Nguyen.

World-class research trial to improve management of Type 2 diabetes

Australians with Type 2 diabetes are invited to trial a new digital health program to help them stay on top of their condition.

The University of Melbourne's My Diabetes Coach program aims to simplify the management of Type 2 diabetes and to reduce the risk of developing serious diabetes-related complications.

My Diabetes Coach is an innovative e-health solution which supports existing health service provision by providing a platform to help people manage their Type 2 diabetes anytime, anywhere.

Diabetes is the fastest growing chronic condition in Australia, with one person being diagnosed every five minutes. Type 2 diabetes accounts for 85 per cent of all cases. Maintaining adequate glucose control is essential to preventing or delaying complications. Yet, only about half of Australians with diabetes are reaching the clinical target for glucose control. Difficulties with effectively making and maintaining changes to one's lifestyle, including following a healthy eating and physical activity regimen and taking medication can play a significant role in the well-being of people with diabetes.

While support from health professionals is essential to achieving effective health and well-being in people with Type 2 diabetes, self-management by patients is also very important. The *My Diabetes Coach* program provides lifestyle support that is designed to complement the care of health professionals in managing Type 2 diabetes.

The use of digital technology to improve health care delivery has increased rapidly in recent years. Indeed, Australians of all ages are increasingly using mobile health apps and web-based programs to assist with chronic disease self-management. However, a majority of currently available apps have not been trialed in research studies and therefore we cannot be sure of their effects on people's health and well-being.

Professor Brian Oldenburg, from the University of Melbourne's School of Population and Global Health, is leading the *My Diabetes Coach* program, which presents a novel approach to supporting Type 2 diabetes self-care.

"For our trial, people with diabetes are invited to access *My Diabetes Coach* from their smart phones, tablets or PCs. We will monitor how effective this is for them to self-manage their condition" Professor Oldenburg said.

"By improving self-management, this kind of program will also improve the health and wellbeing of Australians with Type 2 diabetes."

Central to this world-first digital health program has been the development of an app supported by the Bupa Health Foundation. A virtual, interactive 3D avatar, presenting as a health coach called 'Laura', checks in with users weekly to discuss their blood glucose monitoring, medications, exercise, diet and foot care. She also helps people set goals and track their progress over a 12-month period.

The app is fitted with interactive voice recognition, which enables users to have their responses "heard" by the system and tracked over time to provide feedback on their progress.

Program users can also upload their blood glucose levels to the app and receive feedback on the percentage of levels within the target range that was set by their General Practitioner.

At 3 and 6 months into their use of the program, their GP receives a report from the research team which indicates their progress in meeting personalized self-management goals. Integration of the program into the health system is an important aspect of it.

Annette Schmiede, Bupa Health Foundation Executive Leader, said, "The more we are able to assist people and empower them to manage their diabetes through clever digital tools the better it is for everyone. The technology will support them in achieving better self-care behaviours including nutrition, physical activity, blood glucose monitoring and medication taking."

MDC program users also have access to a website that contains links to useful information resources on diabetes self-care and a discussion board; a user guide that supports their use of the app; and a Program

Health Coach Laura, guides users through the My Diabetes Coach program.

Coordinator, who assists with technical queries. As a whole, the program provides 24-hour support in the comfort and safety of the user's own home. Study participant Graham Tongs, of Parkville, was diagnosed with Type 2 Diabetes in 2000. He says that the *My Diabetes Coach* program has really helped him to manage his condition.

"This program is incredible. You set up weekly appointments with Laura and she talks to you about your health as a diabetic and what any issues might be. I'm currently working on logging my exercise.

"When you're first diagnosed with diabetes, you have to digest all this information about the things you need do to manage it so it doesn't get worse.

"This app includes all of that as well as the lifestyle coaching. The information is presented in a palatable way, it's not just another leaflet. I'm looking forward to the rest of it."

Professor Oldenburg added: "We are really keen for program users to help us properly evaluate the *My Diabetes Coach* program and to suggest ways that it can be improved for the future." The trial is for people with Type 2 diabetes who are over 18 years of age and registered with the National Diabetes Service Scheme.

To register interest in the study or to find out more information, please contact the *My Diabetes Coach* research team on 1300 170 569 or just visit www.mydiabetescoach.mspgh.unimelb.edu.au to register your interest in being involved.

The evaluation of the My Diabetes Coach program is funded by a National Health and Medical Research Council (NHMRC) partnership grant and is being conducted in partnership with Diabetes Australia and Diabetes Victoria, Diabetes WA and Diabetes Queensland as well as Roche Diagnostics.

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