

INSPIRE

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**R&D from
vein to vein**

**DATA &
WHEELCHAIRS
TACKLE CEREBRAL
PALSY**

**MORE BANG
FOR YOUR BUCK
through big
data**

**NATURAL
KILLERS
FIGHT
CANCER**

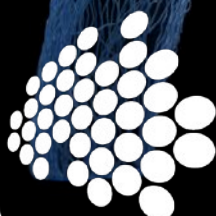
PLUS:

**Brain on Fire:
Interview with
Assoc. Prof.
Tom Weickert**

**Social skills &
dementia**

**Best practice in
burns care**

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AN ALLIANCE FOR DISCOVERIES IN HEALTH

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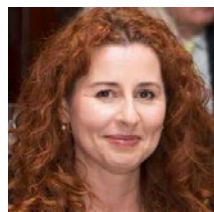
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Editor's Corner

I'm delighted to share with you the winter issue of the renamed Research Australia quarterly publication - INSPIRE.

It is a wonderful showcase of the breadth and depth of Australian research and we are filled with inspiration and pride at the stories you share with us. There is no doubt that the work being carried out by researchers across the Research Australia alliance is indeed inspiring and it inspires us to continue advocating to ensure the crucial role of health and medical research remains at the forefront of the minds of policy makers and decision makers.

The Medical Research Future Fund remains a significant focus on the national agenda and the conversations on its structure and function in driving opportunity through innovation are ongoing. We are optimistic the MRFF along with the innovation initiatives at all levels of government, will enable the transition to a knowledge economy with health and medical research as a key driver in shaping that future.

Translating the significance of the work across the health and medical research sector to the largest possible audience is crucial to the decisions that will be made, the support the sector receives and importantly, an understanding of the incredible collective effort research requires in real life.

This edition includes stories of research that examines a possible link between inflammation of the brain and schizophrenia, clever thinking that has seen the translation of five years of research at the Red Cross Blood Service to exponentially extend the shelf life of blood components and the incredibly generous donation from the founders of iconic Australia brand, *Hard Yakka*, which will enable hard but vital research 'yakka' needed to find treatments for motor neuron disease for which there is no cure.

There is even more inspiration in a global program that not only helps get much needed wheelchairs to young cerebral palsy sufferers in Bangladesh changing the lives of hundreds of mothers and children, but it will also gather vital data about the causes and severity of cerebral palsy in low and middle income countries.

These and other stories from our incredible sector are a great source of inspiration and contribute to a broader understanding of HMR. It also offers insight into the efforts of ordinary people doing extraordinary things that make a difference to us all. We hope you too, are inspired by the refreshed and contemporary approach the Research Australia team is taking to INSPIRE as many people as we can.

Nadia Levin
CEO & Managing Director

Cover: Human brain illustrated with interconnected small nerves

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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.

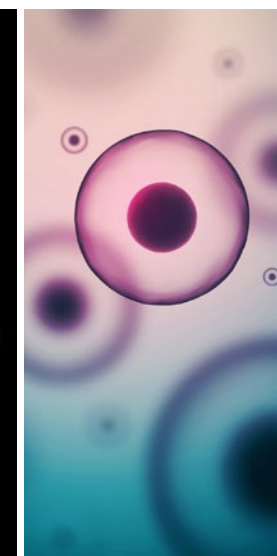
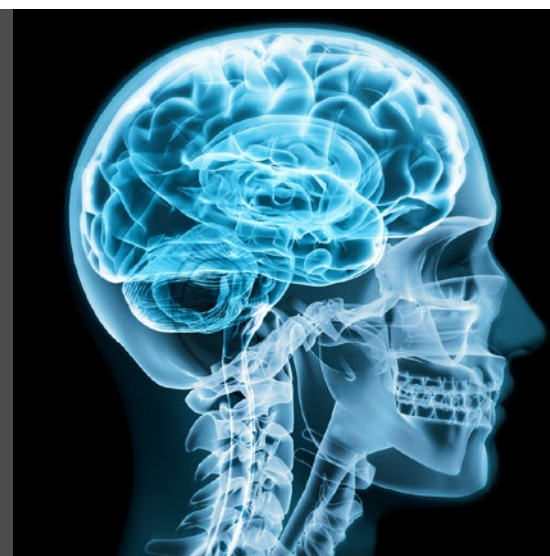
Submission guidelines & deadlines

For information regarding how to submit and publishing deadlines, visit the Research Australia [website](http://www.researchaustralia.org).

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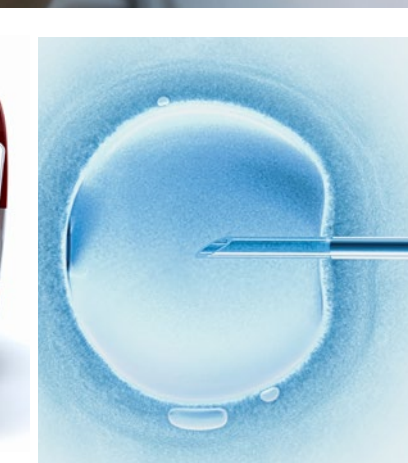
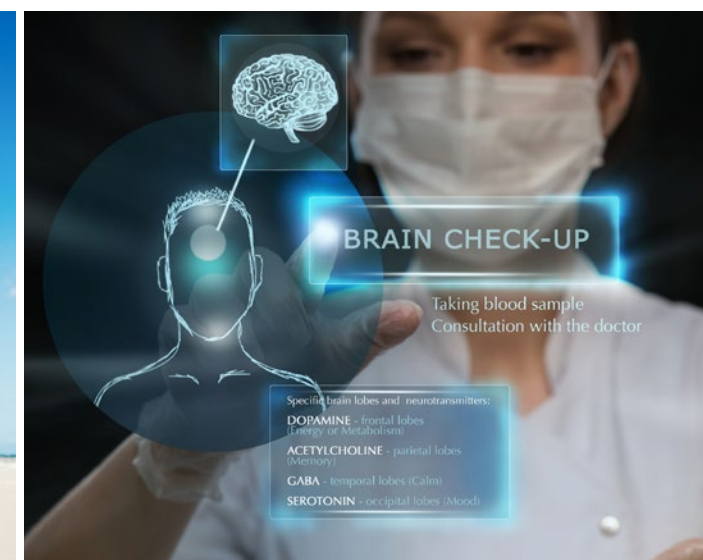
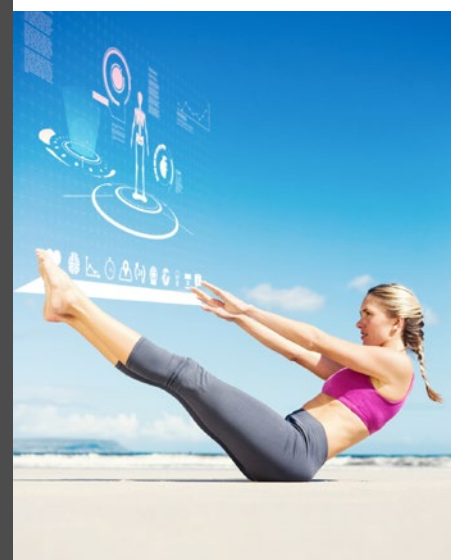
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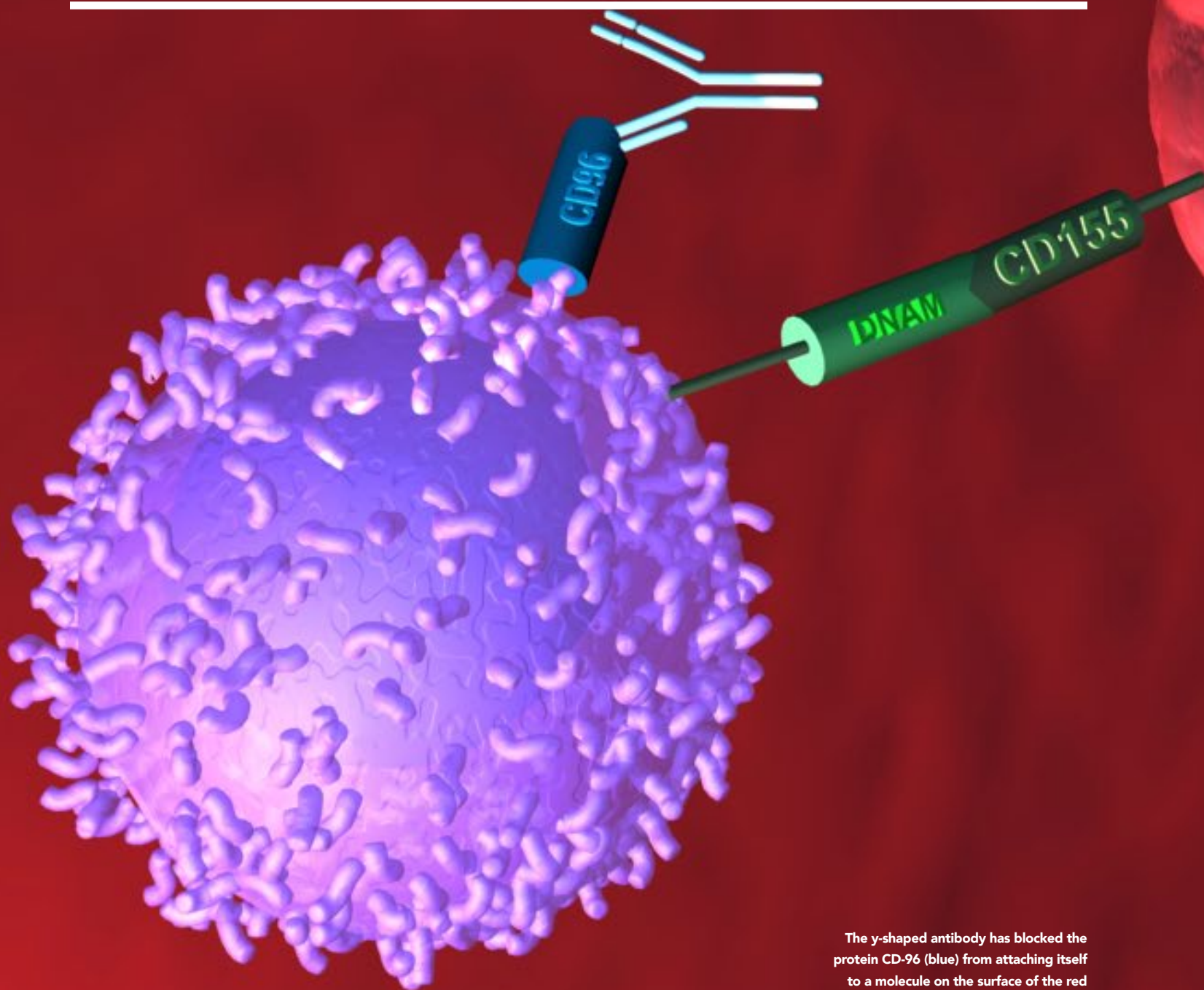
“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”

MARIE CURIE



Fighting cancer with Natural Killers

Scientists at QIMR Berghofer Medical Research Institute are forging a new direction in the field of immunotherapy treatments to fight cancer activating immune cells known as Natural Killer cells.



The y-shaped antibody has blocked the protein CD-96 (blue) from attaching itself to a molecule on the surface of the red cancer cell. This allows another protein on the purple NK cell to attach itself to the molecule on the cancer cell, activating the NK cell to destroy the cancer cell.

Natural Killer cells are the immune system's first line of defence against cancer. They scan our bodies for mutated or damaged cells that could become cancerous and destroy them. But the Natural Killer cells don't always recognise cancer cells, and when that happens, cancers can grow and spread through the body.

In 2014, Professor Mark Smyth, the head of the Immunology Department at QIMR Berghofer, discovered a novel protein on the surface of Natural Killer cells, known as CD96, which stops the Natural Killer cells from recognising cancer cells. "This protein, CD96, is an immune checkpoint molecule," Professor Smyth explained.

"Immune checkpoint molecules sit on the surface of immune cells and their job is to stop the cells from becoming over-activated and attacking the body's own healthy cells. But what we've found is that the cancers hijack this process and stop the immune system from recognising cancer cells and becoming activated. This allows the cancer to spread through the body."

Now, Professor Smyth and his colleagues have shown that an antibody can be used to block CD96, enabling more effective Natural Killer cell activation, thereby allowing the Natural Killer cells to detect and destroy the cancer cells.

"CD96 and other immune checkpoint molecules act like the brakes in a car. They essentially put the foot on the pedal so nothing happens," Professor Smyth said. "But if you bring in an antibody to block the immune checkpoint molecule, that essentially takes the foot off the pedal and allows the immune system to become more activated."

In laboratory tests, the team found the antibody inhibited the spread of melanoma, lung, breast and prostate cancer cells both in culture and mouse models.

"Using this antibody, we've been able to suppress the number of tumours that spread to the rest of the body and prolong survival," Professor Smyth said. "We've therefore been able to demonstrate that these antibodies have tremendous activity in suppressing metastasis, or the spread of tumours."

The finding paves the way for a new avenue in immunotherapy treatments to fight cancer. Immunotherapy is a fast-developing field that is revolutionising the treatment of cancer by using a patient's own immune system to fight the disease.

"Immunotherapy treatments are already proving highly successful in treating some cancers. But the therapies that are currently in use target another type of immune cell called a cytotoxic T cell," Professor Smyth said. "Natural Killer cells have been less harnessed, or less worked on, in terms of their potential as a target for immunotherapy."

"So what's exciting about this development is that we're now working with an immune checkpoint molecule and a novel pathway, which promotes the activity of these Natural Killer cells."

"The effects that we're getting with these antibodies are very impressive. In fact, this particular target looks better in terms of inhibiting the spread of cancers than the targets that are already being used in the clinic."

Importantly, the study found that the antibody was even more effective in slowing the spread of the cancer cells and prolonging survival when used in combination with existing agents that target and activate cytotoxic T cells.

"This antibody can combine with these therapies to give even better effect. We hope that this approach becomes an important part of the armament in terms of immunotherapy treatments," Professor Smyth said.

"Our overall goal is to take this project forward now to try to prove the principle that this molecule is important in a human setting. If we're successful, we think a therapy based on an anti-CD96 antibody could be used to treat those cancers where immunotherapy treatments are already in use, including kidney, bladder and non-small cell lung cancer and melanoma."

Professor Smyth said the emergence and success of immunotherapy had prompted a change in thinking about cancer treatment. "We have to think of immunotherapy now as being the fourth pillar in cancer treatment. We have surgery, radiotherapy and chemotherapy, and immunotherapy is the latest development," he said.

"We've still got the conventional approaches, which are to target the tumour cells directly. But now we understand that if we mobilise the host immune system, there's a lot of possibility that the immune system can actually do the job for us."

"I think where we'll see the greatest advances is in combining immunotherapy with the conventional treatment approaches."

"One of the good things about immunotherapy is that it's potentially quite broadly applicable to cancer types. As long as you've got some sort of natural immune reaction in that cancer, or you can bring the immune system into the environment, then you've got a chance of having an effect."

"It's important for the public to realise that there's a lot happening in immunotherapy at the moment and they should have hope that we're going to see improvements in outcomes for them in the future."

The study was funded by the [National Health and Medical Research Council](#), [Cancer Council Queensland](#), the [Cancer Research Institute](#) and QIMR Berghofer. It involved collaborators from the [Washington University School of Medicine](#), [Juntendo University](#) in Tokyo and the [Hannover Medical School](#).

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



Associate Professor Ben Desbrow and Dr Chris Irwin measure the energy cost of exercise as part of their study on fluid recovery in endurance athletes.

Fluid Dynamics: The science behind rehydration

Griffith University researchers are challenging our understanding of what's known about replacing sweat.

Researchers from Griffith University and [The Australian Institute of Sport](#) are collaborating to look at ways of giving our athletes the edge by optimising recovery between events. Associate Professor Ben Desbrow, an Advanced Sports Dietitian at Griffith's Gold Coast campus describes the importance of the work. "We know that the intake of food and fluids following exercise can alter molecular responses to training, modify muscle-damage repair processes, cause changes to the restoration of glycogen and restore water and electrolyte balance."

Associate Professor Desbrow highlights that the bulk of research investigating fluid restoration after exercise has significant practical limitations because prescribed drinking protocols are often employed (i.e. researchers providing fixed amounts of fluid for participants to consume), which is done to explore ingredient or volume manipulations on fluid recovery.

"By prescribing a drink, factors such as thirst, palatability, social acceptability, dietary beliefs, gastrointestinal comfort, cost and competing nutritional priorities - all of which may influence the volume of beverage consumed - are not considered."

Furthermore, only two scientific studies have investigated the influence food has on fluid recovery after exercise and both employed prescribed drinking protocols, prompting the conclusion that "we are providing advice on fluid replacement from research with significant methodological limitations".

To improve the evidence underpinning dietary recommendations following exercise, Associate Professor Desbrow and his team decided to embark on a series of experiments allowing participants to consume fluid at their liberty after exercise, whilst monitoring fluid recovery. The first study explored the voluntary consumption of a milk based supplement (Sustagen®) compared to a traditional carbohydrate-electrolyte (sports) drink following an exercise task.

Recent research (including some from Associate Professor Desbrow's own lab) had indicated that the consumption of drinks which contain a wide variety of nutrients (such as milk and milk based drinks), appear to enhance fluid restoration compared to beverages that are more traditionally consumed after exercise (such as water and sports drinks) when they are provided in equal amounts.

This information was quickly identified by the dairy industry who immediately commenced promoting milk as the ideal post-exercise fluid recovery drink. However, the extent to which individuals would voluntarily drink a milk based beverage after exercise was poorly understood. Results of the trial indicated that when consumed via individual preference, the volume of a milk based beverage ingested was reduced (due to gastrointestinal tolerance) compared to a sports drink, with the smaller intake negating the benefit conveyed by the milk's greater fluid retention capacity. That is, consuming either beverage resulted in recovery of similar amounts of fluid. However,

due to the contrasting nutrient profiles of the beverages, the fluid restoration occurred with substantially different energy and nutrient intakes, a factor likely to influence other aspects of recovery and adaptation to exercise.

As a follow up, the group's most recent study explored the impact of personal preference food and beverage consumption on fluid retention and nutrient intakes following exercise. Participants in this investigation were provided access to one post-exercise drink and a range of food items.

Dr Gregory Cox, nutrition lead dietitian for the Australian Olympic team, member of the Australian Institute of Sport nutrition team and project collaborator explains. "In practical terms, athletes have competing nutrition priorities which will ultimately influence their fluid and food choices during the immediate post-exercise period."

By using this protocol the researchers were able to explore the interaction between fluid and food consumed and markers of fluid and nutrient recovery. The results demonstrated that with consumption of food, fluid restoration is tightly regulated and not influenced by the choice of either water, a carbohydrate-electrolyte (sports drink) or a milk-based beverage. This is distinctively different from prescribed beverage volume studies that have indicated that the nutrient composition of a beverage has a substantial influence on fluid recovery and highlights the impact of food to alter fluid recovery.

The results suggest that active individuals unknowingly self-select foods that compensate for the type of beverage consumed, altering nutrient intakes and ultimately fluid retention. In addition, the results demonstrate that acute energy intake was poorly regulated with the selection of calorie containing beverages (sports drink or milk-based drink) leading to higher energy and altered nutrient intakes during the post-exercise period.

The researchers will be presenting the results from this landmark study at the Annual Congress of the American College of Sports Medicine in June. They anticipate the results will initiate significant debate and new inquiry into the utility of beverages specifically formulated for post-exercise recovery when consumed voluntarily by active individuals who also have access to food.

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



Bringing ideas to life – Meet and Move App

Turning our research into innovative health solutions is what we all aspire to in health and medical research and Bridget Foley is doing just that! She shares how she got funding to turn her idea for an app to increase physical activity into reality.

I have never seen the point in sitting around and waiting for things, when you could be walking, talking and having fun. When I was in school, there were two ways to get myself home using public transport.

1. Catch the early bus with a large group of friends, which dropped me about a 30 minute walk from my house.
2. Catch the late bus that left school with a few friends, which dropped me at my doorstep.

Both of these options got me home at the same time, but I always chose to take option one. Why? Because I had more friends on the first bus. I wanted to spend time talking to them and socialising and if I waited at school I would have missed out on that. During the course of my schooling, I ended up convincing the friends who caught the later bus to join me on the earlier bus and walk too.

Since then, I have heard a lot of young people saying they are not as active now, at age 18–25, as they were in school. As we are searching for our place in the world we lose those great physical activity behaviours from our youth. Current guidelines suggest Aussies should accrue at least 150 minutes of moderate-intensity exercise each week. However, 60% of us fail to meet this recommendation, and around one in six aren't doing any regular exercise at all. One tip for increasing your physical activity, is to find a buddy to do it with.

Students, specifically those who have relocated for their studies, often lack social connections with their peers and struggle to connect off-screen with other young people. Talking to people while you're walking is a very efficient way to look after your physical and mental health. Finding people to meet up with can be a challenge, so I wanted to give people more opportunities to connect with others and do something healthy (rather than sit at the uni bar). So, in an attempt to increase the wellbeing of young people, I came up with the idea of a 'walking bus' for adults!

A **walking bus** is usually for primary school children but is a great way to get people active and connecting with others. I haven't seen it done with adults, so I have been endeavouring to get one started this year. I applied for and was granted funding from the **Healthy Sydney University initiative** to trial getting people to meet at uni and move to, from and around campus, together. My formative research uncovered a need for technological support to coordinate walking groups. I hypothesise that an app will engage young people and ensure the projects sustainability and providing regular opportunities to meet new people and walk around, together.

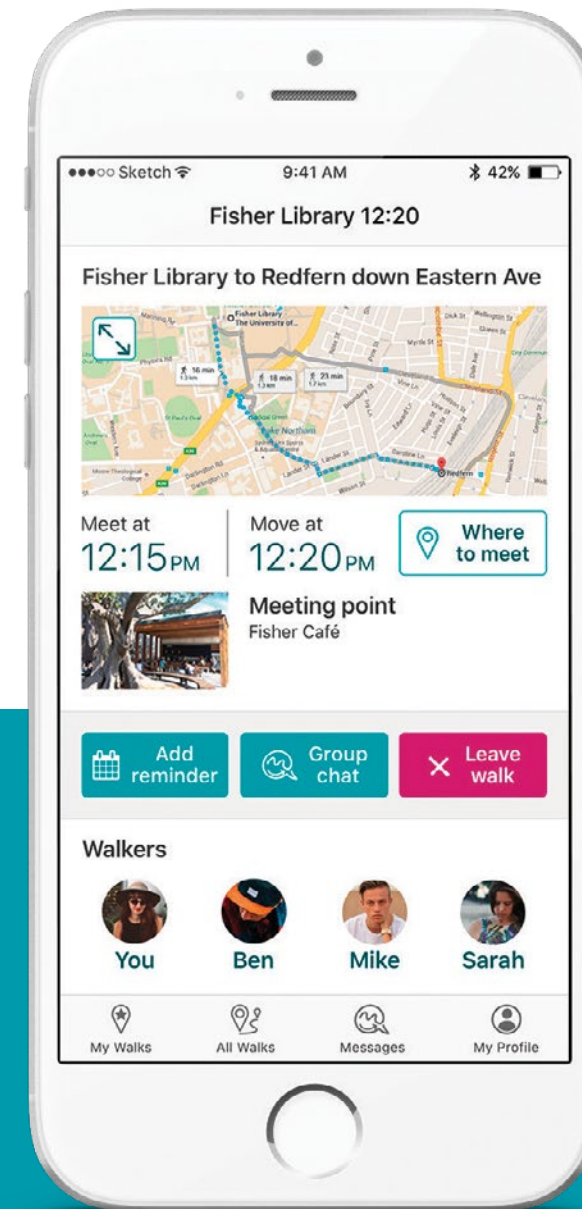
I entered a competition with the **Foundation for Young Australians** to attend the Samsung Adappt Bootcamp, an app development competition for young people wanting to use tech for social good. I had zero expectations and only took about 30 minutes to prepare the application, but it was worth it! The **Meet and Move app** idea was selected in this national competition and I attended the Samsung Adappt Bootcamp in Sydney. It was a life-changing experience, winning \$10,000 from Samsung to further develop the app. I am now working with some amazing mentors from the bootcamp, **Boomworks**, to create a minimum viable product for students at the University of Sydney to meet and move.

Walking has been described as the nearest thing to a perfect exercise as it costs nothing, can be done almost anywhere and is suitable for people of all fitness and skill levels. During the first half of the year, I have attempted to get the walking groups started, without any technical assistance. This has been a great experience, as I now know that creating and promoting timetabled walking groups is not particularly appealing to students. I have been able to modify my approach away from physical activity promotion and really focus it on social connection, as that is what student's value highest. I think that by making walking part of everyday activities, such as meeting people, the benefits of physical activity will be felt by the people involved in the meet and move project.

The Meet and Move app will be launched in July, 2016. The app will have pre-defined walks which students can join and even chat to people they will be meeting before they get there. I will be evaluating the impact of this project to see if the app helps increase the social connections and also physical activity of students. If successful, I plan to add in some new features to gameify the user experience and keep people coming back for more. I would also love to expand the use of the Meet and Move app to other universities. I am now on the lookout for continued financial support for the app development so that this project can continue on an ongoing basis.

Bridget Foley is an early career researcher and physical activity activist. She is passionate about prevention research and making physical activity and good nutrition fun and exciting for young people. Bridget is also pretty keen on distance running and lives every day with type 1 diabetes.

For more information about the research being carried out at the University of Sydney visit, www.sydney.edu.au.



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move together!

More info at
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Available in July from
the Mac App Store

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Children in Bangladesh receive a wheelchair for the first time.

Disability shouldn't mean destitution for millions of mothers - How we plan to reduce cerebral palsy

Cerebral Palsy Alliance Research Foundation has launched an international program which is being used to gather vital data about the causes, severity and prevalence of cerebral palsy in low and middle income countries.

Every year an estimated 15 million babies around the world are born prematurely. Almost 1 million die. For those that survive, around 30% will have cerebral palsy or another disability. Cerebral palsy is a lifelong physical disability which affects movement, and is the most common physical disability in children. 17 million people and their families are affected by cerebral palsy globally.

The decreases in incidence and severity of cerebral palsy among premature babies in high income countries have not been seen in low and middle income countries. A Global Community of Cerebral Palsy Registers is needed to define the causes and severity of cerebral palsy in low and middle income countries and allow country-specific prevention strategies to be developed and implemented.

In some of the poorest areas on the planet, 90% of primary caregivers of a child with a disability are women and mothers. Abandonment, social and economic exclusion, discrimination, abuse and extreme poverty is the result for many women and children. Our project in Bangladesh has provided 332 children with a wheelchair and recruited 600 children to the Bangladesh Cerebral Palsy Register, significantly growing the body of knowledge about what causes cerebral palsy in Bangladesh.

Yasmin lives in rural Bangladesh with her little boy Junayeed, he is five years old. Raising a child with a disability here is a constant struggle. Yasmin, like many mothers is blamed for having a child with a disability. There are no wheelchairs, services or schools for children like Junayeed. She cannot work, she cannot take care of her other children or her household. She goes hungry, so that he can eat. Yasmin feels alone, desperate and guilty. Even her husband blames her, neglects her and has no time or affection for his child.

We have to change the reality for these women. No mother should have to do this alone. This powerful collaboration between the [Cerebral Palsy Alliance Research Foundation](#), [tna foundation](#), [Wheelchairs for Kids](#), [Sydney Medical School at The University of Sydney](#) and other supporters, will restore hope and dignity to children and mothers living with a disability.

Our goal is to reduce the incidence and severity of cerebral palsy in low and middle income countries. By identifying preventable causes of cerebral palsy, we will inform future country-specific prevention strategies. Our unique collaboration will provide children with a low-cost wheelchair to meet their urgent and immediate health needs. We will distribute reusable nappies and vital disability equipment. An Australian disability therapist will train local colleagues to fit and adjust wheelchairs and to gather vital health data (birth history, maternal health, type and severity of disability, age of diagnosis etc). We will assist local colleagues with the infrastructure needed to build a Cerebral Palsy Register. We will use the existing Australian Cerebral Palsy Register and data collected will expand the global community of Cerebral Palsy Registers. Register data will help us understand the causes of cerebral palsy in low and middle income countries which will then inform strategies to reduce the impact of it in these regions. We plan to continue the program in Bangladesh and expand the program to other in low and middle income countries where the need for disability support and research is urgent.

Over the coming 18 months we will work with colleagues in Bangladesh, Myanmar, Indonesia and Vietnam providing children with much needed wheelchairs and building local capacity to gather vital data to detect and prevent cerebral palsy. We will form inclusive and supportive communities to meet and support other women.

Early findings in rural Bangladesh have already seen women feeling less desperate, more empowered, happy to see their children achieving and playing more readily with others. Children like Junayeed have improved physically, emotionally and awareness raising has resulted in less isolation and segregation. Supportive communities are growing.

Our ultimate goal is to expand the program to an additional 20 low and middle income countries across Africa and Asia, saving countless lives, preventing cerebral palsy, and significantly improving the lives of children living with cerebral palsy in these countries. Over the next 18 months our goal is to provide wheelchairs to 830 children in four low and middle income countries (Myanmar, Bangladesh, Vietnam and Indonesia).

Our achievements thus far have only been possible thanks to our donors and supportive partners, tna foundation, Wheelchairs for Kids, Sydney Medical School at The University of Sydney.

We are currently seeking AUD \$23,400 towards the program over the next 18 months. Funding will be used towards the significant freight and port clearance costs required to transport the wheelchairs to the four countries. \$9,400 will allow us to send one container (each containing 166 children's wheelchairs, donated by Wheelchairs for Kids WA) to three new countries, Indonesia, Myanmar and Vietnam.

An additional \$14,000 will allow us to send two containers (332 children's wheelchairs) to Bangladesh this year. Total cost for freight and port clearance to Bangladesh is \$7,000 per container.

Wheelchair provision is meeting the immediate and urgent needs of children with cerebral palsy in these countries and is also providing the opportunity to collect vital data that will be used to inform future disability service provision in low and middle income countries.

Our vision is for health professionals to be trained in how to collect the register data; and be provided with real-time feedback about how their patients compare to the population of people living with cerebral palsy. This feedback will ensure their patients are provided with the best possible treatment plans and most up-to-date interventions.

Disability shouldn't mean destitution for millions of mothers. Development of the Cerebral Palsy Register in low to middle income countries will allow local communities to capture vital data and knowledge, interpret and assess data. The outcomes and findings will be used to educate families, health professionals, researchers, government and other service providers to ensure that the strategies developed are applicable to people living with cerebral palsy in Bangladesh, and similar settings around the world. This is just the beginning.

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



New research approach takes aim at alcohol-related harm

What if you could press a button and know how raising alcohol taxes, changing advertising laws and improving access to drug and alcohol services might work together to reduce alcohol-related emergency department presentations?

Policy makers are being provided with a unique “what if” tool to test the likely impact of interventions before they implement them in the real world, as [The Australian Prevention Partnership Centre](#) pioneers the use of dynamic simulation modelling for chronic disease prevention.

Simulation modelling – the process of creating computer models that are simplified representations of the real world – has been successfully used in engineering, ecology, defence and business since the 1950s.

Prevention Centre project lead Dr Jo-An Atkinson says the Centre is breaking new ground by trialling ways to embed stakeholder participation and consensus building process into hybrid modelling, to test scenarios for tackling chronic disease problems, to see which set of interventions are likely to be most effective and cost-effective.

Grappling with alcohol-related harm

The Prevention Centre, working in collaboration with the NSW Ministry of Health, is looking at the impact of a range of interventions aimed at reducing alcohol-related harm. Alcohol-related harm is a complex problem with many inter-related causes but it is unclear how those factors interact to produce patterns of drinking behaviour and subsequent harms. There are a broad range of options available to intervene in the problem and these are backed to varying degrees by research evidence. There are also political considerations and competing community views about what solutions might be most effective.

Dr Atkinson says simulation modelling enables those disparate sources of evidence – such as expert knowledge, what the research literature said, policy and practice experience and data such as emergency department presentations or motor vehicle accidents – to be brought together, to produce a computer model of the complex problem. This can then be used to test in a low-cost, and low-risk way, the likely impact over time of different policy options before they are implemented in the real world.

The alcohol-related harm model is testing a range of potential interventions including:

- Brief interventions delivered by health professions and online services provided to individuals
- Improved access to alcohol treatment services
- Community-based interventions such as social marketing
- Restriction of hours of sale of alcohol
- Lock-outs (i.e preventing patrons from entering pubs/nightclubs after a certain time)
- Restriction of alcohol outlet density
- Alcohol pricing
- Advertising and sponsorship bans and/or restrictions
- Enhanced enforcement of liquor laws

According to Dr Atkinson, the model could help answer important questions such as which risk factors for alcohol use are most important and where in the course of people’s lives should interventions be targeted. Other questions could include what combination of interventions works best, is most equitable and is cost effective.

The alcohol modelling project is nearing completion, with the economic component now being added into the model to enable cost-benefit analyses of interventions. Once complete, it will give policy makers a valuable analytic tool to guide their decisions about the best investment to reduce alcohol-related harm in the community.

Using research evidence

She says existing research evidence is integral to how simulation models are structured, with the model helping researchers and policy makers to get most out of the vast amounts of research and data that already exist. But through the participatory modelling process, the project is integrating research evidence with expert and local knowledge, and routinely collected data to amplify its power. “Research is vital but what we have seen is that research evidence alone is not enough to answer the range of questions policy makers have when trying to develop responses to complex health sector problems. The process of developing these simulation models highlights where more

research and data is most needed to make the models even more trying to develop responses to complex health sector problems. The process of developing these simulation models highlights where more research and data is most needed to make the models even more robust and hence can inform research priorities.” Dr Atkinson says such models are far from static tools used to support strategic decisions at a given point in time. Instead, they can be updated, refined and expanded as new questions arise.

“Models capture our institutional wisdom about a problem and grow as our knowledge grows. As new evidence comes to light and as new interventions are tested and evaluated, the results can be integrated into an existing model to help us derive actionable policy and practice recommendations more quickly from new research, research that may have otherwise remained passively in the literature as it focused on an individual component of a broader complex problem.”

“As such, simulation models allow us to further leverage investment in; research, the collation of big data, the evaluation of policies and programs, and in infrastructure improvements for reporting of administrative data.”

An accessible model

Another of the important aspects of the Prevention Centre’s dynamic simulation modelling work is that it would be more transparent and accessible than most previous simulation modelling projects.

“The project’s point of difference is that the model is not being built by clever people behind closed doors,” says Dr Atkinson. “Only in the past one to two years has the software become accessible enough to allow non-modellers to participate in the building of sophisticated hybrid models in a transparent way. We are taking advantage of these advances by bringing together diverse groups of key stakeholders in research, practice and policy to map the key risk factors and likely causal pathways for lifestyle related chronic diseases. By doing this we’re not only drawing on a wide range of expertise, we’re including valuable context and building consensus around what are likely to be the best solutions that will give us the best chance of success.”

Future projects

The Prevention Centre is now embarking on several other research projects using simulation modelling including:

- Applying simulation modelling to the growing problem of gestational diabetes in the ACT, in a case study that will explore strategies for prevention, screening and early intervention and management of the condition.
- Using the approach to inform strategic planning for achieving the NSW Premier’s Priority for reducing overweight and obesity in children by 5% over 10 years.
- Investigating prevention and management of chronic obstructive pulmonary disease (COPD) and analysing longitudinal datasets, such as the Sax Institute’s 45 and Up study, in a way that is compatible with dynamic models.

The Centre is also looking into possible ways of curating the dynamic simulation models it develops, so they can be accessed and refined by national research groups, and regularly used by policy makers.

To find out more about the research being conducted at the Sax Institute, visit www.saxinstitute.org.au

saxinstitute

The University of Queensland now has one of only three VECTRA WB360 whole body imaging systems in the world, using 46 cameras to construct a digital 3D avatar with detailed reproduction of the skin.

UQ focuses on moles to unlock melanoma mystery

While previous work to reduce the burden of melanoma has focused on malignant tumours, much can be learned from increasing our understanding of moles.

Investigating why some moles turn into deadly cancers and others don't is the focus of a major research initiative at The University of Queensland (UQ) to prevent melanoma and improve survival rates. The disease is expected to be responsible for almost 1800 deaths in Australia this year, one and a half times last year's national road toll. While prevention campaigns are making a difference, health authorities estimate 2016 will see more than 13,000 new cases across the nation.

Despite these staggering statistics, there is currently no dedicated population-based screening program. Many melanomas grow adjacent to or within pre-existing moles, and numerous studies have shown the number of moles a person has is a strong predictor of their melanoma risk. New moles form and existing ones change regularly in children and also in adults and most of them will never become a problem. Why some do – and which ones – remains a mystery.

The Centre of Research Excellence for the Study of Naevi has been established to conduct urgently needed research into moles – to better prevent, predict and detect skin cancer. UQ's Chair in Dermatology Professor H. Peter Soyer heads the collaborative project based at the Translational Research Institute in Brisbane which will – in a world-first approach – systematically study how moles change over a lifetime.

Partners include QIMR Berghofer Medical Research Institute, Cancer Council Queensland, The University of Sydney and the Queensland University of Technology. This UQ led Centre of Research Excellence for the Study of Naevi is funded by the National Health and Medical Research Council until the end of 2020. Leading scientists will investigate moles from epidemiological, clinical, dermoscopic, pathological, molecular, genetic, and behavioural perspectives.

Visually, few differences exist between benign and early stage malignant skin tumours, and moles can often show several cellular features that characterize malignancy. An improved understanding of naevus development and transformation, along with recognition of the associated changes is therefore key to understanding melanoma.

UQ's innovative 3D imaging technology is central to the work of the new research centre. This technology has the ability to revolutionise the way naevi are routinely mapped, monitored and melanomas diagnosed, and could be a game changer in the fight against melanoma.

A VECTRA WB360 whole body imaging system has been funded by the Princess Alexandra Hospital Private Trust Fund and installed at the Clinical Research Facility of the Translational Research Institute – one of only three in the world and the first outside of New York. The system uses 46 cameras to construct a digital 3D avatar of a human subject with detailed reproduction of the skin. An extra dermoscopic camera captures highly detailed images of specific lesions – linked to their location on the body – which can show extra features of the lesion lying under the skin's surface. This record of the patient's whole skin surface can be referred to during follow-up visits to identify changing moles, revolutionizing the way skin cancers and conditions are mapped, monitored and diagnosed.

This technology is fundamental to the Centre of Research Excellence's population-based cohort study of naevi in adults living in Brisbane. The Centre of Research Excellence team believe this project will deliver innovative, efficient and reliable solutions for the early detection of melanoma while reducing over-diagnoses and high rates of unnecessary excision and biopsy.

Researchers will follow study participants for three years to track changes in mole number, size, and dermoscopic features and will collect a saliva sample from each participant for genetic analysis. In

addition, the participants' freckling and skin, hair and eye colour will be assessed along with their sun exposure background, personal and family skin cancer history and medication use. The project will document the naevus life cycle and how this varies according to age, sex and body site and will assist with optimising skin self-examination.

Consumers play an essential role in the early detection of melanoma, with current public health guidelines advising people to make skin self-examination a habit and to see a doctor if any changes are observed. Researchers will study the use of mobile technology attached to Smartphones (mobile teledermoscopy), analysing which moles are being selected by participants for monitoring. This will provide insight into whether such devices are useful in helping people keep track of their moles and improve the early detection of potentially malignant moles.

The Centre of Research Excellence researchers will also examine the use of microbiopsies to establish the molecular and genetic characteristics of moles, assessing how well they reflect the histopathological outcomes. Traditional biopsies collect a chunk of skin several millimetres across, requiring local anaesthesia and sutures. In contrast the UQ-developed microbiopsy device takes only a very small skin sample, without the need for anaesthesia and sutures, leaving only a pinprick-like wound behind. This microbiopsy technology has the potential to eliminate the unnecessary excision of 'suspicious' benign lesions, alleviating the fear many people have of excisions in the diagnostic process.

Another program of the Centre of Research Excellence initiative will examine the biology of rapidly changing naevi in people with advanced melanoma. These latest developments build strongly on UQ's international reputation for skin cancer research, and the collaborations UQ has with researchers across Queensland, Australia and the world.

UQ's Faculty of Medicine and Biomedical Sciences is unique in Australia – currently employing four full-time academic dermatologists. Support from philanthropic organisations has helped position UQ as a global leader in the field, with research making a global impact.

Significant donations, from Epiderm, the Merchant Charitable Foundation and Princess Alexandra Research Foundation, leveraged additional funding to reach a total figure of over \$5 million, which supports the integration of the latest technologies with precision and personalised medicine leading to a targeted skin cancer screening program.

The ultimate outcome for all involved is improved risk prediction and early detection, which along with technological advances, will be integrated into clinical practice to further reduce Australia's annual melanoma toll.

For more information about the research being carried out at the University of Queensland, visit www.uq.edu.au/research



Seeking common ground between autoimmune diseases, T1 diabetes & MS

MS Research Australia and JDRF Australia have joined forces for the first time to provide a fellowship investigating the genetic overlap between multiple sclerosis and type 1 diabetes.

MS Research Australia and JDRF Australia have banded together in a unique collaborative research project looking at the overlap between two autoimmune diseases - multiple sclerosis (MS) and type 1 diabetes (T1D) and they anticipate it will inspire other medical research organisations and not-for-profit organisations to develop similar innovative collaborations. The project aims to foster this area of cross-discipline and cross-disease research and develop new processes to enable its funding.

After rigorous discussions between the two organisations about the overlaps in promising areas of research, the result is a jointly awarded novel research fellowship from MS Research Australia and JDRF Australia which has been fully funded through a generous grant of \$150,000 from the Macquarie Group Foundation.

Dr Grant Parnell, a medical researcher at the Westmead Institute for Medical Research, was selected for the one year Post-Doctoral Research Fellowship in late 2015. Dr Parnell will investigate the shared genetic pathways involved in both diseases and look to identify gaps in existing research regarding the similarities between MS and T1D.

Both MS and T1D affect a considerable number of people in Australia. MS is the most common neurological disease affecting young Australian adults occurring in over 23,000 Australians. T1D affects more than 120,000 Australians, with approximately 1,825 new diagnoses each year. In both diseases, the immune system of a person mistakenly starts attacking their own cells - myelin-producing cells in the brain and spinal cord in people with MS and the insulin-producing cells of the pancreas in people with T1D. Both are life-long conditions that do not yet have a cure.

The organisations behind this collaboration are also similar. Both MS Research Australia and JDRF Australia are leading national research

funding organisations, who each have been recognised as the Australian Charity of the Year – JDRF Australia in 2014 and MS Research Australia in 2015. Both organisations are passionate about accelerating outcomes for people living with MS and T1D, be it through prevention, better treatments, or ultimately a cure for patients, underpinned by strong research governance principles. Fast-tracking these outcomes is primarily what this project is about – interrogating the overlap between the diseases to ultimately develop innovative ways of treating both diseases.

JDRF Australia CEO, Mike Wilson said of this project: “By working in alliance with a like-minded organisation such as MS Research Australia, with a focus on accelerating life-changing breakthroughs in autoimmune disease research, our impact is multiplied through shared expertise, resources and passion. I am excited by what we can learn from investigating the common ground between these two autoimmune diseases.”

“This is an exciting partnership established between MS Research Australia and JDRF Australia and it wouldn’t be possible without the funding support from the Macquarie Group Foundation.”

Matthew Miles, CEO of MS Research Australia said, “The research fields of both disease states have much to learn from each other and we are thrilled that this unique fellowship will allow us to formally recognise and build this area of research.”

“This funding partnership with JDRF Australia is also unique for both not-for-profit organisations. It has allowed us to partner with another high-impact charitable research organisation working in another disease. I believe this cross-disciplinary approach is critically important and it has been incredibly satisfying to see this all come together.”

There is a growing recognition in the research community of the importance of cross-disease research and this fellowship aims to increase the collaboration between scientists in both fields. Dr Parnell will be mentored throughout this project by two internationally renowned researchers from the fields of MS and T1D: Professor Graeme Stewart AM, from Westmead and Professor Chris Goodnow, Garvan Institute of Medical Research. Dr Parnell will be supervised by Professor David Booth, an expert in the functional genetics of autoimmune diseases based at Westmead.

Dr Parnell said “Both MS and T1D are autoimmune diseases which are the result of complex genetic and environmental interactions. My research will look for patterns in immune cells that are similar in both type 1 diabetes and MS.”

“The aim is to advance knowledge of shared autoimmunological pathways, added Dr Parnell, “This type of research has the potential to lead to better clinical outcomes in terms of prevention and therapies for both diseases.”

Another goal of this fellowship is to determine the most promising research directions for future work into the overlap between T1D and MS and create a base of scientific hypotheses for future examination and research. The partnership could also be expanded to include a larger, more global network of researchers to build on the initial work. Macquarie Group Foundation was drawn to the collaborative and innovative nature of the project from the outset, both at the scientific and the organisational level. It was both rewarding and inspiring to note that Macquarie Group Foundation shared the same principles and values that the project is based on and was willing to invest in this research.

“The Macquarie Group Foundation is pleased to support this partnership between MS Research Australia and JDRF Australia. This is a groundbreaking project in a number of ways and we look forward to great outcomes for many people,” said Shemara Wikramanayake, Chair of the Macquarie Group Foundation.

“This type of collaboration is a novel way to address research questions that apply to more than one disease and we think it is an important way to accelerate outcomes for both MS and type 1 diabetes, and, possibly, hundreds of thousands of people in Australia with autoimmune diseases,” added Ms Wikramanayake.

With the research fellowship now underway, MS Research Australia and JDRF Australia are expecting great results from the year, and look forward to building on this foundation fellowship to develop more effective outcomes for the many people living with MS and T1D.

For more information about MS Research Australia visit www.msra.org.au, and JDRF Australia at www.jdrf.org.au



Dr Grant Parnell. Photographer: Benjamin Lee.



Celebrity chef uses humour to educate students on food allergies

Developed by the SchoolNuts study at the Murdoch Children's Research Institute, a new video is set to teach school students across the country how best to avoid food allergy reactions and what to do if a classmate suffers anaphylaxis.

For most children, the transition from primary to secondary school is associated with increased independence and involves new social experiences. This greater autonomy comes with a range of new personal choices, including what foods to eat. For children with food allergies, however, the entry to adolescence can be an especially hazardous time.

Since the 1980s, the world has experienced an epidemic of allergic disease. The *HealthNuts* study – conducted by the Murdoch Children's Research Institute in Melbourne and involving 5,300 children – has recorded the highest prevalence of oral food challenge-confirmed food allergy in the world. Another Australian study by Mullins, Dear and Tang in 2015 has revealed a 50 per cent increase in population rates of hospitalisation for food-related anaphylaxis between 2005-2006 and 2011-2012. Of particular concern was the finding that the greatest proportionate increase was seen in children aged five to 14 years old, whose rates of hospital admission for food-related anaphylaxis doubled over the time period analysed.

Adolescents are a particularly vulnerable group, as they are the age group at highest risk of death from anaphylaxis while also being the age group most likely to be lost to follow up in the healthcare system. Another critical issue with adolescents is that failure to diagnose resolution of a previous food allergy can result in unnecessary and ongoing interventions, such as food avoidance and carriage of an adrenaline auto-injector device. Despite these issues, food allergy studies focussing on the adolescent age group remain scarce and there is a need for adolescent-specific food allergy management guidelines.

To investigate food allergy specifically in the 10 to 14-year-old age group, MCRI's population-based study *SchoolNuts* has recruited over 9,600 school students in year levels five to eight. Led by paediatric allergist and gastroenterologist Professor Katie Allen, the study visited over 100 randomly-selected primary and secondary schools across metropolitan Melbourne, with government, Catholic and independent schools participating. *SchoolNuts* aims to determine the population prevalence of food allergy as well as to understand risk factors for recurrent and severe accidental ingestion reactions.

A 10-minute DVD has also been developed aimed at educating this age group. A creative approach using celebrity chef Miguel Maestre as the host, engages the target audience of 10 to -14-year-olds by featuring adolescent-age actors and using humour to deliver key messages. It follows the theme of 'a day in the life of a school student with food allergy' and covers topics such as identifying common food allergens, recognising symptoms of an allergic reaction and how to help a friend who is suffering anaphylaxis. An expert panel comprising paediatric allergists, nurses and adolescent health physicians from the Royal Children's Hospital, Melbourne, and food allergy patient support group representatives developed and oversaw production of the *SchoolNuts* DVD.

The *SchoolNuts* DVD has received an overwhelmingly positive reception from students, who reported it is a useful and enjoyable activity. Teachers also provided feedback that the DVD is particularly beneficial for students without food allergies, as it has not only improved health literacy, but has also helped to reduce stigma

surrounding food allergies. *SchoolNuts* Study Coordinator Michael Field commented "the DVD has also allowed us to give something back directly to the participants of *SchoolNuts*, who have so generously contributed to our research." Each school visited by the study was given a copy of the DVD for future use as a food allergy education tool.

"Our hope is that this educational activity can have a positive impact on students' knowledge about food allergy and ultimately contribute to a reduction in the rate of food allergy reactions in adolescents" says Professor Allen.

The *SchoolNuts* study involved two phases of assessment: firstly, questionnaires focussing on food allergy and other allergic diseases were completed by all students during a school session run by MCRI researchers. A separate food allergy survey was also completed by each student's parent or guardian. The second stage of the study involved identifying students with food allergy or at risk of food allergy, as determined by questionnaire responses and a clinical allergy history completed via phone. These students then underwent hospital-based clinical allergy assessment, including skin prick test and oral food challenge (the gold standard for diagnosis of food allergy).

The school setting was ideally suited to this study, as it not only allowed for access to a large, population-representative sample of adolescents, but it also provided an opportunity for the Murdoch Children's Research Institute researchers to conduct a food allergy and anaphylaxis education session at the time of recruitment. This education involved a demonstration of how to use an adrenaline auto-

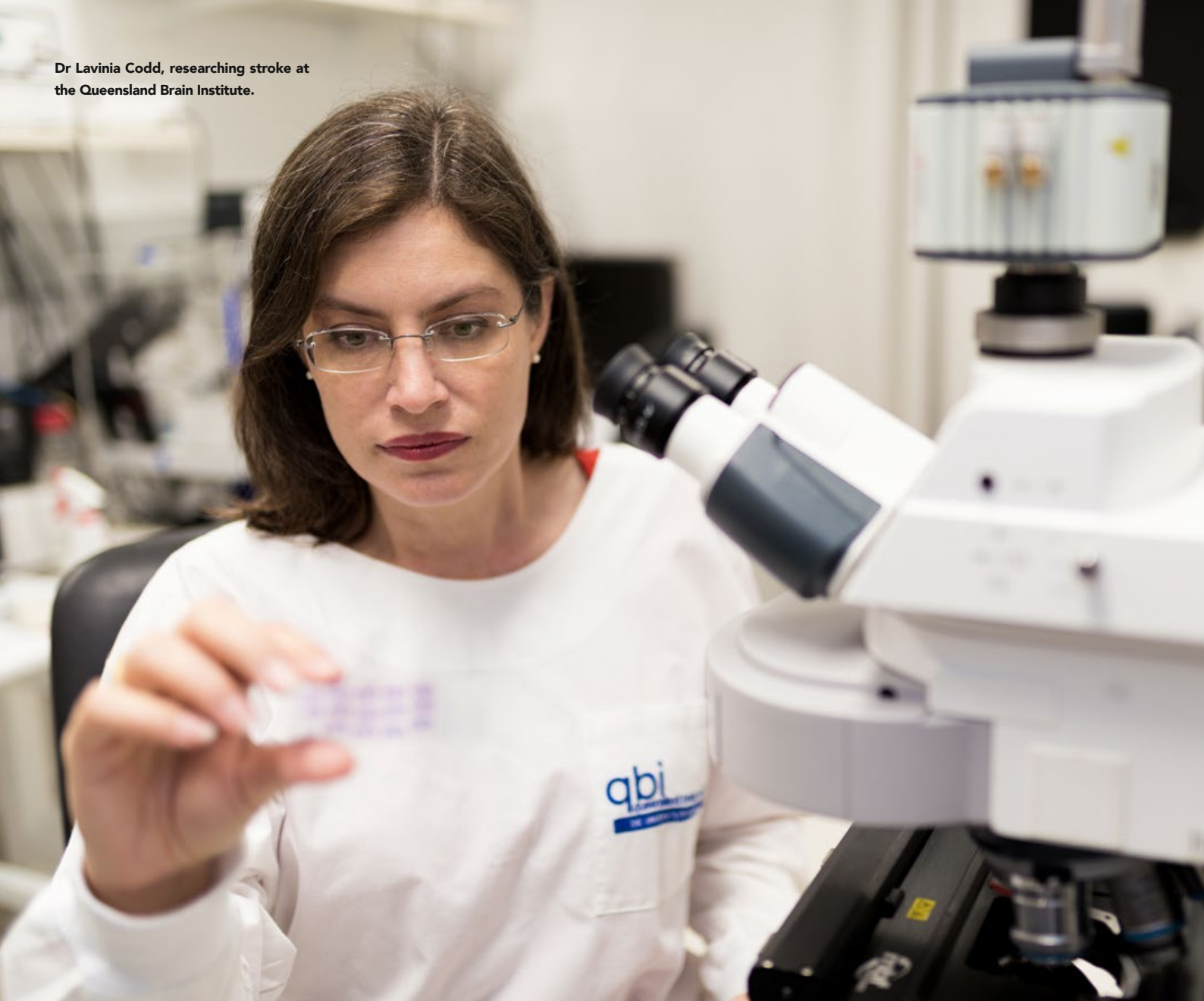
injector (i.e. 'EpiPen'), the opportunity for students to ask questions, and showing the *SchoolNuts* 'Food Allergy & Anaphylaxis' education DVD.

With *SchoolNuts* recruitment now complete, copies of the DVD are currently being distributed at no cost to schools across Australia, as well as to a number of food allergy patient support and youth health organisations. An online version of the video is now also available to view at no cost and has received excellent uptake, with over 2,000 views to date.

The data from the *SchoolNuts* study is currently being analysed with results planned to be published later in 2016. If you would like further information about the SchoolNuts DVD and to view the video online visit the [Murdoch Children's Research Institutes website](http://www.mcri.edu.au).

For more information about the research being conducted at the Murdoch Children's Research Institute visit www.mcri.edu.au





Stroke scientist and survivor leads research push at the Queensland Brain Institute

Stroke survivor Dr Lavinia Codd hopes to improve stroke treatments for hundreds of thousands of fellow survivors.

Nothing seems out of the ordinary when you meet Dr Lavinia Codd. A postdoctoral researcher at The University of Queensland's Queensland Brain Institute, Lavinia is frank, witty, and utterly passionate about her work. For Lavinia, who leads Queensland Brain Institute's Stroke Advisory Board, stroke research is a personal mission. Her sharpness belies an extraordinary story: she's both a stroke researcher and a stroke survivor.

Lavinia's stroke occurred when she was just 31 years old. She was at a dinner function when she suddenly felt weak and experienced visual disturbances: she had trouble reading the menu and counting the number of fingers her husband was holding up. They left the function early and drove to hospital.

"I didn't have any of the classical signs of stroke," Lavinia says. "I had no facial weakness or paralysis in my arms—I just felt unwell." Because of this, and her young age, in the emergency department she was misdiagnosed with a migraine and sent home. When she returned several days later, after her symptoms persisted, the damage had been done.

Lavinia's speech is free of impediment and there are no visible indicators that she's ever had a stroke. But her left field of vision is permanently gone, and she is more easily disoriented than she used to be. In the early days, facial recognition was a problem, she says. "I would even memorise what my children were wearing before they went to kindy, so I would recognise them when I went to pick them up."

Lavinia suffered an ischaemic stroke in the right hippocampus, a region of the brain critical for learning and spatial memory, as well as in parts of the occipital and temporal lobes. Ischaemic strokes, which account for approximately 80% of all stroke cases, result from a blockage to a blood vessel supplying the brain.

Stroke is Australia's third-leading cause of death. 50,000 people suffer a stroke each year, and in Australia there are nearly half a million stroke survivors living with physical and mental disabilities. The cost to the national health system is staggering, estimated at \$54 billion per year, accounting for direct health costs, carers, welfare payments and lost productivity. Yet in recent years, stroke research has attracted less than 5% of the highly competitive funding available through the National Health and Medical Research Council (NHMRC). As a result, research into possible new treatments for stroke are not advancing as rapidly as they should.

The nature of Lavinia's deficits meant that appropriate rehabilitation was unavailable. To drive her cognitive recovery, she resumed a Bachelor of Science degree, which she had commenced after the birth of her first child. She went on to complete her PhD in the laboratory of Professor Perry Bartlett. Bartlett's pioneering work, which earned him the prestigious CSL Florey Medal in 2015, focuses on generating new neurons in the adult brain.

Today, Lavinia is investigating ways of improving recovery after stroke by activating precursor cells to increase the production of new neurons. The area of the brain she is focusing on is the very region that was damaged by her own stroke: the hippocampus. Even in cases where other regions of the brain are primarily affected, stroke survivors commonly display decreased hippocampal volume and significant impairment to cognition.

Research from the Bartlett laboratory is showing that stimulating the production of new neurons in the hippocampus in animal models of stroke can result in almost complete recovery from learning and memory deficits. Lavinia aims to translate these laboratory findings into new behavioural and pharmacological approaches. "With new therapies, the ultimate goal is to restore cognitive functions in stroke survivors," she says.

Supporting Lavinia's work is the Stroke Advisory Board, which was established to substantially increase Queensland Brain Institute's stroke research capacity. Four new stroke laboratories have been proposed, which would recruit more world-leading investigators to the institute. The institute has already secured five-year funding for one of these laboratories through a \$2.5 million grant from the Stafford Fox Foundation. As a result, Queensland's Queensland Brain Institute recruited an outstanding young researcher, Dr Steven Zuryn, who is focusing on new ways to provide protection to neurons—or nerve cells—damaged by a stroke.

Lavinia hopes to establish a Stroke Research Fund, to raise \$12.5 million to support the laboratories for an initial five years. Research funding is vital, she says, because of the vast number of stroke survivors in Australia and worldwide. "In Australia, there are 400,000 others like me who are living post-stroke." Like Lavinia, many of these individuals had no predisposing risk factors. While the incidence of stroke increases in people older than 65, Lavinia is case in point that stroke can affect people of all ages.

One of the proposed new laboratories will research the role of deep brain stimulation in promoting neuroplasticity and functional recovery after stroke. Queensland Brain Institute's Australia-Pacific Centre for Neuromodulation is already a world leader in using deep brain stimulation to improve motor function in people suffering from Parkinson's disease and other movement disorders. Another approach to be explored is the use of transcranial magnetic stimulation or transcranial direct-current stimulation to promote recovery. The proposed new laboratories would work towards a better understanding of how deep brain stimulation and transcranial direct-current stimulation change brain anatomy and circuitry, and apply this knowledge to developing effective therapies for promoting recovery of motor deficits after stroke.

Lavinia's extraordinary story drives her passion for stroke research—and it isn't over yet. "Recovery from stroke doesn't just happen in the first year—it happens forever," she says.

"Although a lot of my recovery did happen in the first couple of years following my stroke, I'm still recovering today and I fully intend on recovering for the rest of my life. And in that process, I hope I can help many other stroke survivors too."

For more information about stroke research conducted at the Queensland Brain Institute, go to www.qbi.uq.edu.au.



Queensland Brain Institute

Elder abuse in the spotlight

Elder abuse is coming out of the shadows this year but still not enough is known about how prevalent it is across Australia or how effective responses, such as education and training programs and health justice partnerships, are.



Associate Professor Briony Dow

The National Ageing Research Institute has been investigating elder abuse extensively for the past 4 years. Its executive director Associate Professor Briony Dow welcomes many of the recently announced initiatives but cautions that research is vital if Australia is to stem the epidemic.

Dr Dow says, “We need to better understand the issue, including developing conceptual frameworks that explain all the different types of abuse. We need to know how often it occurs, why it occurs and what are effective responses.”

Currently there is only patchy Australian data on the prevalence or incidence of elder abuse, but based on international research, it is thought that every year, about six per cent of older Australians are abused by someone they trust.

“Research conducted by NARI and others suggest that it is under-reported. A combination of fear, shame and, some may say, misguided loyalty on the part of the affected older person sees a reluctance to seek help and contact the authorities about abusive family members,” Dr Dow said. Elder abuse can be financial, physical, psychological and, in rare, terrible cases, sexual. Contributing factors such as a reluctance to report instances of elder abuse and ageism in our community make this a highly complex issue.

“Each type of abuse calls for a different understanding and approach. Strategies to combat elder abuse have to be multi-faceted, and at the moment we don’t understand enough about perpetrators’ motivations or the contexts in which elder abuse happens,” Dr Dow said.

NARI’s analysis of data, collected by Senior’s Rights Victoria over a two-year period, indicates that approximately 67 per cent of elder abuse is perpetrated by a son or daughter of the older person, and 92 per cent of alleged perpetrators are related to the older person (including those in a de facto relationship) – clearly demonstrating that elder abuse is a family issue.

The research also shows that elder abuse is also largely a gendered issue – with the victim more likely to be female (72.5 per cent) and the perpetrator more likely to be male (60 per cent) – acknowledging that elder abuse significantly affects older men, particularly those who are vulnerable or dependent.

A second study by NARI involved 24 interviews with 28 ex-clients of Seniors Rights Victoria, including 10 from a non-English speaking background and four couples. Data analysis is still underway, but preliminary findings show that most abuse involved financial and verbal/emotional abuse; adult children (particularly sons) were often the perpetrators; older people reported feelings of fear, desperation, anger, shame, ambivalence; and the relief, encouragement and confidence they felt having support.

Some examples of elder abuse highlighted in NARI’s research included verbal abuse and threats to cause harm; physical abuse such as kicking, shoving and rough handling; taking up residence in the older person’s home for reasons other than the benefit or care of the older person; threatening or coercing an older person into handing over an asset; preventing contact with family or friends; physical restraint; and taking over the decision-making and finances of a competent older person without authority.

“Even after seeking help, some were disappointed that they were unable to recover money or obtain help for the perpetrator, or that they no longer had contact with the perpetrator. Many had an on-going concern for their welfare,” Dr Dow said.

While Dr Dow welcomes the recent inquiry announcement by Federal Attorney-General George Brandis into laws and frameworks to safeguard older Australians, she is adamant that a critical need remains for a national prevalence study of elder abuse as well as a national strategy to address the issue. “Our analysis of Australian government policy on elder abuse shows that whilst there are positive

steps being taken to protect and empower older Australians by most states and territories, prevention and response to elder abuse at a national level is missing,” Dr Dow said.

Her view is shared by researchers from the Brotherhood of St Laurence, Benetas, St Vincent’s Health, the Office of the Public Advocate, Australian Institute of Family Studies and the Australian Association of Gerontology, who recently attended an elder abuse research roundtable hosted by NARI and Seniors Rights Victoria.

The roundtable was established to discuss the recent findings from the Victorian Royal Commission into Family Violence, and also to identify gaps in research and potential areas for collaboration.

“It was pleasing to see that the Commission identified elder abuse as a specific area of concern with a chapter dedicated to older people,” Dr Dow said. “We were also pleased to see that the important role of health professionals and the importance of training health professionals to increase detection rates together with health/ justice initiatives were acknowledged.”

While she, and others at the roundtable, expressed concern that the Commission did not focus enough on the importance of research into elder abuse, they were pleased that in one area in particular, the report highlighted the need to draw on evaluated approaches in Victoria and elsewhere to implement a whole-of-hospital model for responding to family violence, including elder abuse. “The report recognised that people experiencing elder abuse often seek health care, and with a more comprehensive response, including legal support, a whole-of-hospital approach will allow better co-ordination of services designed to help older people,” said Dr Dow.

The roundtable highlighted the need for continuing advocacy to ensure that the Commission’s recommendations relating to elder abuse, such as the Family Violence Index, were inclusive of older people.

All of this points to the need for an Australian prevalence study along the lines of the Canadian study, which included their first nation people, together with a conceptual framework that encompasses the full complexity of elder abuse, as well as scoping study to determine what practices, training and other interventions exist within hospitals, aged care and the court system to combat elder abuse.

For example, Dr Dow suggests that any legislative change has to acknowledge that seniors live in a variety of circumstances and come from diverse backgrounds, including culturally and linguistically diverse older people, LGBTI seniors and those living in rural and regional areas.

Access to justice is also a critical consideration given the reluctance of many older people to report abuse or even to pursue the matter through the courts. Alternative forms of dispute resolution should be considered. “Without evaluating current health and justice partnerships, or without knowing how to respond to different contexts, how can we recommend strategies when we don’t know what is working or not?” said Dr Dow.

For more information about the research being conducted at the National Ageing Research Institute visit www.nari.net.au





Israel to support new Australian medical research fund

A new philanthropic fund that supports Australia/Israel medical research will harness Israel's success as one of the world's leading Start-up nations and also enable Public and Private Ancillary Funds to share in any commercial benefits from this research.

The Medical Research Venture Philanthropy Fund which has been developed by Melbourne based not for profit, AUSiMED (Australia/Israel Medical Research), will inject up to \$3M to fund five new Australia/Israel collaborative medical research projects. These include a world's first blood test for brain tumours, a new treatment for severe burns and new treatments for heart attack and resistant prostate and bowel cancer.

The Medical Research Venture Philanthropy Fund is an innovative new way for philanthropists to fund medical research. It enables them to share in the commercial success of the Fund by lending money to AUSiMED (unsecured) for later repayment with interest from commercial success and where any of the projects don't succeed, the loan converts to a donation.

Structure of the Fund

AUSiMED has obtained an Australian Tax Office Public Ruling (specific to AUSiMED) which clarifies that Public and Private Ancillary Funds can use their corpus to lend money for research to AUSiMED at a variable rate of interest for a minimum of three years at 14% plus the Reserve Bank cash rate per annum. This currently equates to 15.75%, for projects in the Medical Research Venture Philanthropy Fund. Loans are then later repaid from any commercial success of Start-ups taking the projects to market. Where there is no commercial success for any of the five projects, the loan for that project reverts to a donation where both the principal and foregone interest can be claimed in the Private Ancillary Funds annual distribution. See www.ausimed.org/vpf.

PAFs lend a minimum of \$30,000 or \$10,000 a year for three years (being the length of each of the five research projects) and the loan amount is allocated in equal amounts to each project to create a balanced portfolio.

Individuals can also donate to the Medical Research Venture Philanthropy Fund. However, because of legal requirements for donations, any donation that is repaid, goes to fund further AUSiMED projects rather than going back to the individual. Involving Israel in the research and commercialisation has been made possible by AUSiMED being a DGR1 tax deductible charity in Australia that can send funds to Israel.

Commercial Benefits of the Fund

This is the first time that a Private Ancillary Fund can gain financial benefit from supporting a risky medical research venture, whether it succeeds or not. This is because, where the research does not commercialise, the initial PAF loan plus interest from the loan, is able to convert to a tax-deductible donation which is planned to occur at the end of the research program, instead of being a loss making investment.

The leveraging power of this funding model is unique and impactful – it can increase the value of a Private Ancillary Funds corpus or gift, whilst supporting early stage medical research that would otherwise struggle to attract venture funding. There is also an opportunity for PAFs to later exchange their loans for shares in any Start-ups and an additional bonus payment if any of the projects create a blockbuster product.

This is a win-win situation that is already attracting new supporters to medical research that have never previously gifted to this area of philanthropy. It also greatly helps promote the translation and commercialisation of Australia and Israel's world-class research.

Commercial Benefits of Collaborating with Israel

"The Start-up Nation ecosystem in Israel helps advance the projects by providing much needed capital and experience to accelerate commercialisation. This is possible because Israel has developed a highly mature investment market to fund the creation of pre-clinical data to fill one of the 'Valleys of Death' for pharmaceutical development. With this potential support from Israel, projects can advance more easily to the next stage of venture capital funding" says AUSiMED Chairman, Antony Cohen.

With the Federal Government's proposed Biomedical Translation Fund and new manufacturing incentives being currently offered by the Victorian Government, AUSiMED's successful projects may also have the opportunity to be funded to run clinical trials in Australia and to have their products manufactured here.

"Since all our Private Ancillary Fund investors are Australian, we would hope they would find this type of further Australian investment in our projects to be attractive" says Cohen.

The Hon. Steve Bracks AC, a Patron of AUSiMED, said "The new funding model reinforces Australia's focus on innovation, and highlights a renewed commitment to making international advances in medical research. The local and global impacts of this type of fund will significantly change and support the medical research field, which is experiencing considerable funding challenges in Australia".

AUSiMED's innovative combination of world leading Australian and Israeli medical researchers with the Israeli Start-up ecosystem, Australian philanthropists and new sources of Government support from Australia, represents an exciting opportunity that is set to change the way medical research is funded in the future.

About AUSiMED (Australia/Israel Medical Research)

AUSiMED's purpose is to select, fund and facilitate outstanding medical research collaborations between Australia and Israel to produce world-leading clinical outcomes. AUSiMED considers that leveraging the unique strengths of Australia and Israel, and fostering valuable relationships between two leading medical research nations, greatly enhances the likelihood of innovation, success and commercialisation.

Since 2012, AUSiMED has raised over 2 million dollars to support a broad range of activities including international symposiums for researchers, 6-12 months training for leading Israeli clinicians to come to Australia as visiting Fellows, educational events for the public, opportunities for Australian researchers to have four-day Israel experiences to meet professional colleagues as well as funding three year medical research collaborations between Australian and Israeli scientists. These activities have had significant impact on paediatric and adult health, in areas including breast and bowel cancer, and improving foetal survival.

For more information about AUSiMED visit www.ausimed.org



Hard Yakka founders boost motor neurone disease research

A \$1 million donation from John and Betty Laidlaw to the Motor Neurone Disease Research Institute of Australia will advance research on a potential therapeutic to combat the devastating effects of motor neurone disease.

Dr Peter Crouch with Laidlaw family members
(L to R) John Laidlaw, Melissa Duggan, Sarah Laidlaw, Jenny Michelmore and Mark Laidlaw

Motor Neurone Disease Australia was thrilled last year when John and Betty Laidlaw generously donated \$1 million to the [Motor Neurone Disease Research Institute of Australia](#) - the research arm of Motor Neurone Disease Australia - to fund a special grant for a collaborative and innovative three-year research project that aims to translate laboratory findings to an effective treatment for motor neurone disease in humans. Such a substantial donation would enable a significant and exciting study to be undertaken that could advance research towards finding effective treatments for motor neurone disease.

Motor neurone disease is a rapidly progressive, terminal disease that can strike anyone. More than 2,000 Australians currently live with motor neurone disease. People with motor neurone disease progressively lose the use of their arms and legs, their ability to speak, swallow and breathe. Average life expectancy is only 2.5 years and, as yet, there is no effective treatment and no cure.

The journey to establish the special \$1 million *Betty Laidlaw Motor Neurone Disease Research Grant* began in 1922, when John Laidlaw's father, David, started making work wear in the garage of his parents' home in Melbourne. By the 1930's, Hard Yakka was an iconic name synonymous with work wear in Australia. John eventually took over from his father and expanded and consolidated the company, which he sold in 2007.

John and his wife Betty have a long history of philanthropy, supporting many projects for homeless and disadvantaged people. This tradition is being continued by their family.

Betty Laidlaw has been living with primary lateral sclerosis, a slowly progressive form of motor neurone disease for over 30 years. She can no longer walk, use her arms or speak and sometimes she does not recognise her husband. John is devoted to Betty who lives at home with 24/7 care. While John has been kindly giving what he calls small contributions to [Motor Neurone Disease Victoria](#), a meeting with former AFL player Neale Daniher who had been recently diagnosed with MND helped John to realise he could make a significant difference to motor neurone disease research. The rest as they say, is history.

Following independent peer review of applications by international reviewers, Motor Neurone Disease Australia was pleased to announce in May, the award of the \$1 million philanthropic grant to [University of Melbourne](#) neuroscientist Dr Peter Crouch to lead a multicentre team working on a drug called copper-ATSM as a potential treatment for motor neurone disease. Copper-ATSM has been developed in Australia and shows therapeutic potential in MND animal models by protecting motor neurones in the spinal cord, improving motor neurone disease-like symptoms, and extending lifespan. The research team based in Melbourne, Brisbane, Sydney and Oregon, USA, will conduct studies to support clinical translation of the drug.

To date, research shows promise in animal models with a genetic type of motor neurone disease, which accounts for about 5% of motor neurone disease cases in humans. This latest research "*Copper malfunction in MND: a therapeutic target for sporadic motor neurone disease*" will help to broaden understanding of

copper-ATSM in mice and humans and shed light on how the drug performs in the sporadic form of motor neurone disease. The aim is to better determine who is likely to be responsive to the drug and when to give it to them.

A Phase I clinical trial of copper-ATSM sponsored by pharmaceutical group [Collaborative Medicinal Development](#) is set to begin in Australia in 2016. The first in-human safety study will begin after it has been approved by the appropriate regulatory and ethics committees. It is hoped the research supported by the *Betty Laidlaw MND Research Grant* will generate new information to support progression of copper-ATSM towards the Phase II effectiveness stages of clinical testing.

Motor Neurone Disease Australia Executive Director Research, Janet Nash, says John and Betty Laidlaw's generous gift provides real hope that a treatment for motor neurone disease can be found.

"Dr Peter Crouch has gathered a team of national and international collaborators whose combined expertise will bring us closer to understanding how copper-ATSM can be used to alter the course of motor neurone disease."

Effective treatments for motor neurone disease are desperately needed. Each day in Australia two people with motor neurone disease die and two more are diagnosed. To date, the only medication we have to prescribe to patients is Riluzole, which only offers modest benefits, on average extending life by three months.

The Motor Neurone Disease Research Institute of Australia was established in 1984 and aims to promote, support and fund the best motor neurone disease research that has the greatest chance of realising the vision of a world without motor neurone disease. Every dollar donated to research is invested in research. Successful grant applications have been reviewed as part of a competitive process and are endorsed by the Motor Neurone Disease Australia Research Committee to ensure only the best research is funded. At the end of last year, three fellowships and 33 grants-in-aid were awarded via the Motor Neurone Disease Research Institute of Australia for MND research to commence in 2016.

On behalf of Motor Neurone Disease Australia and the motor neurone disease community, we extend our sincere thanks to John and Betty Laidlaw for this truly generous and magnificent gift. Their donation has provided an opportunity to drive collaboration in a promising avenue of research that is still very much in its early stages. This injection of funding is vital to take the understanding of copper-ATSM as a potential therapeutic for motor neurone disease to the next level. We are truly hopeful this research will work towards a better future for people with motor neurone disease.

To find out more about Motor Neurone Disease Australia visit www.mndaust.asn.au



Improving the safety and efficacy of 'last resort' antibiotics

Researchers at Monash University are developing new safer antibiotics for the treatment of gram-negative 'superbugs'.

The emergence of multi-drug resistant gram-negative pathogens is now a major global health issue; a problem that is further compounded by the lack in development of new antibiotics.

Gram-negative bacteria have an innate ability to find new ways to become resistant to drugs, and can even help other pathogens become drug-resistant by passing along their genetic material. In addition to the remarkable increase in bacterial resistance to current antibiotics, there has been a decline in the discovery of new antibiotics since the 1980s. There are now gram-negative bacteria that are resistant to all current antibiotics.

These 'superbugs', particularly *pseudomonas aeruginosa*, *acinetobacter baumannii* and *klebsiella pneumoniae*, are spread worldwide in virtually all environments that support life. These opportunistic pathogens can have a range of serious consequences for infected patients, including secondary meningitis and respiratory tract infections.

The consequences of this troubling mix of resistance and lack of new antibiotic development include: further deterioration of health; a heightened mortality rate; and significantly increased stress on the healthcare system.

"There are currently very limited options available for the treatment of infections caused by gram-negative 'superbugs'. This has forced clinicians to revive 'old' antibiotics such as the polymyxins," says Dr Kade Roberts, Senior Research Scientist in the Li Lab at Monash University and project manager for the group's polymyxin drug discovery program currently funded by the US National Institutes of Health.

Polymyxins are naturally occurring cyclic peptide antibiotics produced by soil bacteria (*paenibacillus polymyxa*) and are very effective against a broad spectrum of gram-negative bacteria. They were first discovered in the late 1940s, and polymyxin B and colistin were introduced into the clinic in the late 1950s. These antibiotics specifically target the outer membrane of gram-negative bacteria, which cannot be

penetrated by many antibiotics. This is one of the reasons why gram-negative bacteria are difficult to treat. The polymyxins bind to a specific phospholipid in the outer membrane called lipid A, which is part of a larger macromolecule called lipopolysaccharide (LPS), a main structural component of the outer membrane. Binding of polymyxins to lipid A results in disruption of this protective outer membrane and ultimately leads to death of the bacteria.

Despite the advantage of using this antibiotic to target gram-negative bacteria, polymyxins often cause kidney toxicity in patients. Their use declined after the 1970s, when 'safer' antibiotics became available. However, the emergence of MDR gram-negative bacteria over the past three decades has seen a renewed interest in polymyxins as a last-line therapeutic treatment.

As kidney toxicity remains an issue and delivering a smaller, suboptimal dosage decreases the efficacy and potentially promote resistance to the polymyxins, a new approach is needed. One solution to this problem is to develop new polymyxins that have improved safety and efficacy for patients.

In a program based on the intellectual property developed by Monash University, Dr Roberts and an inter-disciplinary team of researchers in the Li Lab aim to produce novel, safer polymyxins over the currently available polymyxin B and colistin. The Li Lab is focused on understanding all aspects of the polymyxins, including their chemistry; mechanisms of action, resistance and toxicity; combination therapy; and clinical pharmacology. Research in these areas has been used to help optimise the use of the currently available polymyxin B and colistin as well as develop new polymyxins with improved pharmacological properties.

"We are really excited by the progress of our polymyxin drug discovery program to date. We have developed a number of really promising novel polymyxins that have significantly improved safety in animal models. Over the next 12 months two of our lead compounds will undergo IND-enabling evaluation. If successful, we can then move them into phase I clinical trials," says Dr Roberts.

"When colistin and polymyxin B were first discovered in the 1940s, they were not subjected to the contemporary drug development procedures. If they had, they would not have made it past the pre-clinical stage of development."

Dr Roberts will discuss aspects of their polymyxin drug discovery program including their novel drug design strategy, compound synthesis and lead optimisation studies at the 17th [International Biotechnology Symposium](#) (IBS 2016) to be held in Melbourne from 24 – 27 October 2016.

"We are excited to be presenting our research at IBS 2016. This conference is a great platform for highlighting Australian drug discovery efforts like ours to an international audience of both academic and industry researchers from a diverse range of scientific fields," says Dr Roberts.

This is the first time IBS 2016 will be hosted in Australia by AusBiotech, Australia's biotechnology organisation. Since 1960, IBS 2016 has been organised under the auspices of the International Union of Pure and Applied Chemistry (IUPAC) and is the most representative biotechnology event at the global level, at which typically more than 1,000 participants congregate from academia and industry to explore the advances and frontiers of science and applied biotechnologies.

The IBS 2016 program in Australia will present the most advanced issues in biotech, green chemistry and its related fields, which will be discussed by an extraordinary group of international speakers, many of whom will travel to Australia for the first time. Topics will include agribusiness; industrial and environmental biotechnology; pharmaceutical, medical and molecular; bioenergy and bio-refinery; the bio-economy, policy and investment; and biosensors and nanotechnology.

This year IBS 2016 will be part of International BioFest 2016, a three-conference event that paves the way for the life sciences to advance Australia's knowledge economy. These events include AusBiotech 2016, Australia's national life sciences conference, and Australia Biotech Invest, Australia's investment showcase. This conference forms a critical part of the research ecosystem and is essential to its growth, particularly for emerging elements of the industry.

Find out more about AusBiotech at www.ausbiotech.org



Associate Professor Philip Thompson, Dr Tony Velkov, Professor Jian Li (sitting), Dr Kade Roberts, Professor Roger Nation from the Li Lab at Monash University.

Exploring the impact of social skills on quality of life for people with dementia

Alzheimer's Australia Dementia Research Foundation grant helps develop social skills assessment tool.

So much of our communication is non-verbal, facial expressions, hand gestures, tone of voice – but what happens when a person is no longer able to assess the meaning of these non-verbal communications because of dementia or another cognitive impairment and what impact does that have on relationships and quality of life?

Clinical Psychologist and Senior Lecturer at the University of Newcastle's School of Psychology, Dr Michelle Kelly, hopes to find out.

As a PhD student, Dr Kelly, had seen many people with a traumatic brain injury who also had impairments in social skills. As she completed her PhD she commenced work in a Specialist Mental Health Service for Older People and noticed similar social skills impairments in her clients with dementia.

With the help of an Alzheimer's Australia Dementia Research Foundation - Victoria grant in 2013, Dr Kelly developed a tool to identify if people living with dementia had difficulty processing emotions and other social cues.

Recently, Dr Kelly was awarded an Alzheimer's Australia Dementia Research Foundation - Victoria Cecilia Margaret Hudson Dementia Research grant to continue that work and expand on the tool to see if the difficulties processing social cues found by people living with dementia impact on quality of life and quality of relationships for the person and their care partner.

"We really weren't addressing the issue of social functioning," Dr Kelly said. "What I observed was we were trying to re-engage people in social activity, but generally speaking if you don't have the skills, it's very difficult for it to be a successful and rewarding experience."

Dr Kelly said that so much of our communication can be non-verbal that if a person is no longer able to assess the meaning of non-verbal communications it can lead to misunderstandings, miscommunications, increased carer stress, and eventual breakdown in relationship.

"If the person is unable to display empathy the carer will often say things like "they don't care about my feelings anymore" or "they're not the person I knew" - some of the attributions carers make are because we don't give them the information they need," Dr Kelly said.

Dr Kelly hopes to develop a training program for carers which will give them a better understanding of the challenges they may be experiencing and the skills to communicate successfully in different ways. "For example, if the person with the diagnosis of dementia is having difficulty picking up on emotion from the voice or face, we can tell the carer that they need to use the words "I'm frustrated or I'm sad" for the person with dementia to understand how they're feeling," Dr Kelly said.

Dr Kelly said the Alzheimer's Australia Dementia Research Foundation grants were an immense help in developing her skills as a new researcher and with links to Alzheimer's Australia opened up networking opportunities and access to participants for the research projects.

What advice would Dr Kelly have for someone considering a career in dementia research?

"Talk to lots of people and ask lots of questions," she said. "I learn so much from people in so many different areas. People who have experienced dementia either directly or indirectly, people with a diagnosis of dementia, caring for a person with a diagnosis of dementia

or knowing someone with a diagnosis of dementia. Students too continue to surprise me in terms of their experiences."

"I love to work with people with greater life experience - their wisdom and awareness of what's going on and what's happened in the world."

Dr Kelly said the future of dementia research was heading in lots of promising directions, as researchers and funding streams diversify across areas like genetic, psycho-social, carer wellbeing and quality of life to give the best chance of making an impact for people living with dementia, their carers and family.

For more information about the Alzheimer's Australia Dementia Research Foundation visit www.fightdementia.org.au

**ALZHEIMER'S
AUSTRALIA
DEMENTIA
RESEARCH
FOUNDATION**

Research and development: from vein to vein

The Australian Red Cross Blood Service manages a pool of close to half a million volunteer donors and processes around 1.3 million blood donations every year to provide blood products to hospitals throughout Australia. Maintaining an adequate supply of safe blood and blood products is our mission, and one that is supported by a strategically focused research effort.

In all, some 70 researchers located in three states contribute to the research effort. Their specialities are diverse, including psychology, economics, statistics and engineering, as well as the more expected fields of cell biology, haematology and genetics. Collaborations with research institutes and universities ensure that Blood Service research remains globally competitive, and is well-placed to have positive impacts on the blood and broader health care sectors.

From an organisational perspective, research and development at the Blood Service finds ways to maintain a balance between the types of blood collected, meet the requirements of patients, improve product shelf life, and minimise wastage, processing and distribution costs.

The right donor at the right time

The Blood Service is in the unusual position of being a business whose key raw material is a gift, given freely by volunteers. Understanding what motivates these volunteers, how to keep them coming back, and ensuring the right balance of blood types in the donor panel is the aim of our Donor Research team. Australia is one of the few blood services in the world to have established a Donor Research program, and our team includes researchers with co-appointments to major universities, including the [University of New South Wales](#) (psychology), [University of Technology Sydney](#) (biostatistics) and [University of Sydney](#) (economics). Recent research by this team has shown that directly addressing a first time donor's anxiety in the period leading up to their first appointment can increase the chance they will follow through with their donation.

Insights into donor health and wellbeing using big data

The ongoing health and wellbeing of our donors is a high priority. Australia has a large pool of long-term plasma donors, and linking data from Blood Service records with health information will allow us to see if there are any long term impacts (positive or negative) of plasma donation. Through collaboration with the Sax institute, the Blood Service is linking donor records with information from the 45-and-up study and other databases such as PBS, disease registers

and Medicare. The linked data sets will provide a valuable resource to examine whether there might be any association between blood donation and cardiovascular risk, bone fractures and other health outcomes.

Cool outcomes from frozen blood

Blood for use in transfusions is separated into three components: red cells, platelets and plasma, each of which has its own optimum storage conditions and shelf life. The short shelf-lives of six weeks for red blood cells and only five days for platelets make it a challenge to supply blood products to rural and remote areas. After almost five years of research, the Blood Service's research and manufacturing departments have together developed and implemented a process for preparing deep-frozen blood components in Australia. This ground-breaking work extends the shelf life of blood components up to 10 years by adapting and developing blood freezing and thawing technologies (known as cryopreservation).

Our researchers have gained particular expertise in the cryopreservation of platelets, which are the most difficult component of blood to freeze and thaw successfully. To extend our knowledge of the effects of frozen platelets in patients, the Blood Service is participating in one of the world's first clinical trials of frozen platelets in civilians. The study compares the use of frozen platelets with fresh, never-frozen platelets in patients undergoing cardiac surgery, and outcomes are expected to provide valuable data to support the possible use of frozen platelets in non-military hospitals in the future.

Monitoring and controlling emerging risks

Australia has one of the safest blood supplies in the world. However, concern around transfusion-transmitted infections exists, especially in relation to emerging diseases such as Zika virus. Blood Service researchers are keeping a watchful eye on emerging disease risks, to allow the development of appropriate management strategies to future proof our blood supply.



Photograph by Genghis Lopez.

This image shows a flow cell that is used in massively parallel sequencing. The flow cell is used to amplify DNA up to 1000 fold before it is sequenced. This technology allows researchers to determine the genetic basis of rare blood groups and improve transfusion safety

Our research projects combine the study of prevalence and spread of viruses in Australia with rigorous assessment of other ways to reduce the risks to the blood supply. A group of technologies known as pathogen inactivation use ultraviolet light to inactivate viruses and other pathogens in blood products by damaging their DNA. These technologies are effective against a wide range of pathogens, some of which are not detected by routine testing. Of particular interest in the Australian context is a recent study by our researchers showing that both Ross River virus and Chikungunya virus are effectively inactivated in platelet components using this technology.

Molecular understanding

At the sub-microscopic end of the spectrum, our research scientists study blood on the cellular and molecular level to understand the changes that occur during storage, how transfused blood interacts with a recipient's immune system, and to improve the matching of donors and patients.

Researchers harness massively parallel sequencing to solve previously intractable issues of blood group incompatibilities by probing the genome for changes that affect the more than 36 known blood groups. This research helps us provide appropriate transfusion support for people with rare blood types and leads to a greater understanding of the diversity within the modern Australian population. During the last three years, Blood Service researchers have discovered and documented several new blood group variants which have been added to international databases.

Historically, the establishment of blood banking depended on pivotal research, initially for cross-matching between donors and recipients, and to allow the storage of blood without clotting. Today, through the collaboration of researchers across disciplinary boundaries, research and development continues to contribute to the wellbeing of donors and patients, from vein to vein.

The Australian Governments fund the Australian Red Cross Blood Service for the provision of blood, blood products and services to the community.

For more information about the Australian Red Cross Blood Service visit www.donateblood.com



Brains on Fire - Schizophrenia and inflammation of the brain

Neuroscience Research Australia's Associate Professor Tom Weickert was researching the link between psychosis and inflammation of the brain when he came across Susannah Cahalan's memoir, *Brain on Fire: My Month of Madness*. The book details how her quick descent into psychotic-like symptoms was reversed once she was treated with anti-inflammatories.



The interview with Associate Professor Weickert explains how his current clinical trial aims to identify people with schizophrenia who have signs of inflammation markers in their blood. It is thought that an anti-inflammatory treatment may reduce their symptom severity and restore thinking abilities. His research may even have benefits for people with depression or bipolar disorder.

What was it about the subject matter that caught your attention?

Initially it was the title and subtitle that caught my attention. "*Brain on fire: My month of madness*" was enough to catch my attention since I had already begun to work on the relationship between the immune response and mental illness. Use of the term "Brain" pretty squarely placed the subject matter in my field of interest and use of the phrase: "*Brain on fire*" implicates the immune system and inflammation as playing a role in her condition which is also further clarified in the subtitle: "*My month of madness*". All these aspects came together to spark my interest and then the brief synopsis describing how she was cured further ignited my interest to give the book a closer read.

Is the link between schizophrenia and inflammation in the brain being discussed much in academic circles?

Yes, it's being presented more and more often at conferences and meetings, with whole sessions devoted to the topic. There are also many more articles published in scientific journals on the topic of brain inflammation and mental illness. However, the idea of inflammation being relevant to people with schizophrenia is also very controversial since there is debate as to whether the inflammation is causative of schizophrenia or simply a by-product of the illness. The answer is presently unknown, but I think both could be possible. It could be causative in some people but a by-product of the illness in others. Either way, it would be treatable.

Was the idea of a link a gradual one or a 'lightbulb moment' for you?

The idea of a link between inflammation and mental illness was a bit of both: gradual and a light bulb moment. Gradual, due to the consistent research reporting that inflammation may be a factor in schizophrenia. More instantaneous: based on recent findings from our labs showing signs of inflammation in people with schizophrenia and this book which showed that inflammation may cause psychotic symptoms in at least some people and that it was not only treatable but there could actually be a cure for some people.

Who else might benefit from this kind of research?

It could also be beneficial to people suffering from schizoaffective disorder, bipolar disorder, (anyone with psychosis) and depression. As is so often the case for many people with mental illness, the cause is usually uncertain and the diagnosis can change somewhat over time, which is what happened to Susannah Cahalan in *Brain on Fire*.

I think this often happens because our diagnostic system for mental illness doesn't tap into the cause of the illness. By performing a more extensive and thorough biological assessment that includes testing for measures of inflammation, we may be able to find more appropriate and therefore, beneficial treatments for some people suffering from psychotic symptoms and depression.

Have these findings regarding inflammation in schizophrenia influenced the design of your new trial?

Yes, our new treatment trial is unique in that it screens participants to identify which people have inflammation markers in their blood samples. If found, these people can then enter the trial in which they may receive the specific "designer" treatment aimed at blocking the markers of inflammation, which has been shown to reduce symptoms of other immune-related illnesses.

What do you hope to find at the end of this trial?

In my opinion, the optimal outcome from our trial would be that people who were treated with the active form of the medication would show substantial symptom reductions, a restoration of their cognitive abilities, and improvement in their social and functional abilities that would allow them to get back to their lives the way they were prior to any onset of the illness. Then hopefully, government and industry would see the potential for this treatment to restore people's lives and they would move forward to make this treatment more available.

How might this change the way we treat schizophrenia?

It could completely revolutionise the treatment of schizophrenia. Instead of targeting the so called fast-acting neurotransmitter molecules such as dopamine, this new treatment targets part of the immune system response (a cytokine receptor) which may be overactive in some people with schizophrenia and would cause damage to the brain. So, ideally, all people with schizophrenia could be screened using a blood test for these elevated inflammation markers and if the elevated markers are present, then the person could be administered this inflammation reducing treatment, which could substantially reduce or possibly even eliminate symptoms and restore thinking abilities in some people with schizophrenia or schizoaffective disorder.

If you have any questions about the CATS study, or are interested in participating, please feel free to email Isabella Jacomb at ijacomb@neura.edu.au or call on 02 9399 1858.

For more information about the research being conducted at Neuroscience Research Australia visit www.neura.edu.au



Burns registry provides crucial evidence for best practice in burns care

The Monash University hosted Burns Registry is collecting data from across Australia and New Zealand to improve care and outcomes for burns injury patients, and to ensure best international practice.

Key findings of the first four years of data from the Burns Registry of Australia and New Zealand (BRANZ) were recently published in the *Medical Journal of Australia*. These findings paint a clear picture of variation in treatments and outcomes in burn care that underlines the importance of evidence-based consistent practices in burns care.

BRANZ was established in 2009 to monitor and benchmark quality of care in specialist burn units in the two countries, and plays a vital role in providing the information that will advance burns treatment and improve outcomes for patients with severe burn injuries. The registry is a collaboration between the peak body for Australian and New Zealand burn clinicians, the Australian and New Zealand Burn Association, and the Department of Epidemiology and Preventive Medicine in the School of Public Health and Preventive Medicine at Monash University.

Burn care is incredibly complex and severe burn injuries have a devastating life-long impact. Each year in Australia there are approximately 50,000 burn related hospital admissions, and more than 3,000 people will require admission to one of the 17 specialist burn centres throughout Australia and New Zealand. Apart from the devastating physical injury itself, a severe burn can result in loss of income, long term unemployment and disability, as well significant personal and familial stresses.

While Australia has made major advances in therapeutic strategies for the management of patients with severe burns, with a centralised approach involving specialised burns units in each state and territory that provide care for the most severely injured, there are many aspects of burn treatments that are poorly understood – especially in terms

of longer term outcomes. The Burns Registry of Australia and New Zealand is designed to provide information that will address such gaps. However data alone does not explain observed variation or its clinical significance. The information provided by the Burns Registry of Australia and New Zealand points to areas that require further unit level examination of practice, in order to understand the determinants of best practice and their effects in outcomes.

The Burns Quality Improvement Program was launched in 2013 to develop evidence-based standards of care and to provide a quality improvement framework for contributing burns units; in order to assist the implementation of improved care, based on the evidence provided by risk adjusted benchmarking of BRANZ data.

Director of the Victorian Adult Burns Service and Monash Adjunct Senior Lecturer, Dr Heather Cleland, led the analysis of the first four years of data from the Burns Registry of Australia and New Zealand and said the information provided underpins the establishment and development of BQIP.

“The information provided by Burns Registry of Australia and New Zealand provides a unique opportunity for significantly improving the quality of care for burns patients in Australia and New Zealand,” Dr Cleland said.

“Despite the highly centralised delivery of care in specialist burns units to patients with severe or complex burn injuries, there is considerable variation in fundamental areas of burn care practice and in outcomes, such as length of hospital stay and mortality, that are not explained by simple differences in case-mix alone.”

The *Medical Journal of Australia* article reports on the Burns Registry of Australia and New Zealand data relating to four basic features of burn care in Australia and New Zealand from July 2010 to June 2014: two management items — rates of admission to intensive care units and rates of skin grafting; and two outcome measures — length of hospital stay and mortality.

Nearly three-quarters (74 per cent) of patients underwent at least one surgical procedure, the authors found scarring and its associated symptoms of functional deficits and deformity are likely outcomes of burn injury, and they determine a burn victim’s capacity for successful rehabilitation and social re-integration. Surgical management such as skin grafting impacts on long term scarring outcomes and the study indicated that the rates of grafting differ significantly between units.

“Although variation is not necessarily in itself a sign of inferior treatment, it does signal the need for further investigation, especially where outcome indicators are also found to vary,” Dr Cleland said.

Dr Cleland said the precise relationship between such differences in surgical management and long term outcomes for patients are yet to be determined, highlighting the value in the continuation of the registry, and the need for long term outcome data.

“Benchmarking the quality of care for burn management practice is limited by an inadequate evidence base — the heterogeneity of patients, injuries, interventions and outcome measures all significant impediments to conducting clinical trials in burns patients,” Dr Cleland said.

To date, use of the burns registry data and observations has successfully resulted in improved burns service planning based on local quality improvement activities, along with driving key changes to community awareness and burns prevention campaigns. It has been vital in advancing and improving understanding of burns treatment, but it could go further in providing crucial evidence-based standards of care for all burns units in the region.

“Currently, there is no standardised protocol or guidelines for treating burn injuries, and each unit has developed local practices, such as for skin grafting. Improved understanding of the relationship of treatments such as grafting or use of skin substitutes and scarring outcomes will contribute to changes in practice that will significantly benefit patients’ lives after burn injury. This is the impetus for the registry.

“The Burns Quality Improvement Program will use the data generated by the registry to provide a framework that drives change towards developing evidence-based guidelines and best practice burns care in Australia and New Zealand,” Dr Cleland said.

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

New national collaboration to advance Alzheimer's research

A multi-faceted national partnership will see Macquarie University Health Sciences Centre contribute their advanced technologies and research expertise to diagnostic and treatment innovations for Alzheimer's disease.

Macquarie University Health Sciences Centre is in the process of signing formal agreements with the Perth-based **McCusker Alzheimer's Research Foundation** to undertake a ground breaking study using Testosterone for the prevention of Alzheimer's Disease.

Professor Ralph Martins established in 2001 the McCusker Alzheimer's Research Foundation and since that time his ground breaking research programs have focused on a range of diagnostic initiatives including the development of a blood test to help detect the early stages of Alzheimer's disease and improve the accuracy of diagnostics. The Perth-based program is unique in traversing both clinical and laboratory-based research to facilitate the translation of research findings into proven diagnostics, therapies and preventative interventions for people with Alzheimer's Disease. A study, conducted in the NSW based Anglican Retirement Villages (ARV), Sydney is an excellent example of this type of approach where researchers from Edith Cowan university and the McCusker Alzheimer's Research Foundation are working collaboratively with industry service providers.

Widely respected as one of the leading international researchers in Alzheimer's Disease, Professor Martins has been working in the field for more than 30 years. His work has led to a number of ground-breaking discoveries. He contributed to the pioneering discovery of beta-amyloid and its parent protein the amyloid precursor protein (APP), an important protein found in the brains of Alzheimer's patients now universally acknowledged as being fundamental to the pathology of Alzheimer's Disease.

The McCusker Alzheimer's Research Foundation's mission is to support research that makes Alzheimer's disease treatable and preventable. Professor Ralph Martins' and his team have chosen to partner with the Macquarie University Health Science Centre because they believe this multi-faceted collaboration is going to bring about real and impactful advances in making this mission a reality.

"Our collaboration with Macquarie University will give us access to technology unavailable elsewhere in Australia," said Professor Martins, Foundation Chair in Ageing and Alzheimer's Disease at Edith Cowan University and Professor of Neurodegenerative Diseases at Macquarie University.

"For one, the superior imaging capabilities at Macquarie Medical Imaging will enable us to conduct our brain scanning work more efficiently and effectively. Macquarie Medical Imaging has state of the art imaging equipment and ready access to brain amyloid imaging agents, which make it possible to scan multiple patients in a day."

Macquarie University will also share its research expertise – particularly in proteomics, an area in which the University is a national leader. Researchers will look at using proteomics to further diagnostic ability, based on achieving a better understanding of the proteins relevant to Alzheimer's Disease.

Researchers in the fields of motor neuron disease, through Professor Roger Chung, and ophthalmology through Professor Stuart Graham, will also work with Professor Martins on specific studies.

The Executive Dean of Macquarie's Faculty of Medicine and Health Sciences, Professor Patrick McNeil said, "The involvement of Professor Martins will boost the Faculty's neurosciences research programs which have already been an area of research strength, evidenced by our highly integrated Motor Neurone Disease clinical and research program, and the award of a \$6.7 million NHMRC Dementia Research Team Grant in 2015."

Macquarie University Professor Ralph Martins has also established the KaRa Institute of Neurological Diseases (KaRa MINDS) in partnership with Honorary Associate Professor Kathryn Goozee. KaRa MINDS facilitates high-calibre clinical trials in Alzheimer's Disease through its role in recruiting cohorts from the east coast of Australia for large national and international clinical trials.

Macquarie and KaRa MINDS will work collaboratively to advance diagnostic and treatment approaches to Alzheimer's Disease by facilitating clinical trials and also independent research and development work in the field. Currently we need to recruit 100 NSW based men needed for the Intrepid Study, which uses a combination of Testosterone and DHA, or Omega 3, to reduce brain levels of the toxic beta-amyloid protein, while a further 100 will be recruited from WA. The trial is looking for men over the age of 60 with generally normal memory function but experiencing some mild memory complaints.



The Intrepid study is only one of many studies offered, which are selected by the research groups as the most promising for the at risk of Alzheimer's Disease population. Using state of art technology researchers are now able to clearly identify those people who are most likely to be at high risk of Alzheimer's Disease. It is now recognised that pathology related to Alzheimer's Disease is accumulating for up to twenty years prior to the first symptoms, and this stealth-like stage, is a clear window of opportunity to make a difference, before too much damage has occurred. Integrating academics, universities and service providers to achieve translation in research is paramount to finding answers. Given the prevalence of dementia, this is even more crucial in the field of Alzheimer's Disease.

The KaRa MINDS team are also reaching out to the community with a message of 'proactivity and positivity'. It's never too early or too late to make a difference and 'change your mind' says A/Prof. Goozee. Simple lifestyle changes can be instrumental in achieving a better outcome. KaRa MINDS doesn't want the community to see this as a 'daunting memory testing process', everyone has strengths and weaknesses in memory and cognition and while few of us our perfect in this area, particular health approaches and strategies can help to maintain and enhance cognitive reserve.


The KaRa MINDS brain training program has been particularly helpful for a number of people along with some personalised advice to improve physical wellbeing. In order to optimise brain function it is important to take a whole of body approach.

KaRa MINDS links the general community with ground breaking ethically approved clinical trials to help prevent, treat, care and ultimately cure Alzheimer's Disease. Many people who have a member of the family or a friend with dementia worry about their own or future generation risks. Understanding diseases, like Alzheimer's Disease, the most common form of dementia, identifying the individual risk factors, and learning about ways to reduce those risks can have a significant impact.

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



MACQUARIE
University
HEALTH SCIENCES CENTRE



Can Big Data lead to more ‘bang for the health buck’?

A team from the Capital Markets CRC in Sydney says, analytics has the call.

David Jonas, Dr Uma Srinivasan and Associate Professor Federico Giroi are the new pioneers at the Rocks in Sydney.

The Health Market Quality R&D program, is an arm of the Capital Markets Cooperative Research Centre which applies advanced data sciences to all public and private healthcare settings. The Health Market Quality is the love-child of a collaboration between 10 universities and private and public health organisations that collectively engage with over 60% of Australia’s huge health spend.

The Health Market Quality is producing robust and challenging research to positively reform Australia’s inefficient health sector, by introducing a wide range of analytics-driven solutions for funders, providers and consumers, supported by over 50 multi-disciplinary researchers.

Health Market Quality builds on the track record of Lorica Health, a Capital Markets Cooperative Research Centre group company, that provides data-analytics services and solutions to over 90% of Australia’s private health insurers as well a growing portfolio of analytical solutions and services for public sector funding and monitoring bodies.

The Capital Markets Cooperative Research Centre’s key core capabilities include:

- Data Management, including collection, transformation, linkage and storage
- Enterprise Software Development
- Predictive Analytics
- Advanced Visualisation/Network Analysis
- Machine Learning
- Natural Language Processing

Leveraging these core capabilities, Health Market Quality’s R&D program is focused in three key areas:

1. Improving data management and overcoming data fragmentation across the health sector.
2. Reducing fraud, abuse, waste and errors thereby delivering improved market efficiency and integrity as well as improved health outcomes for consumers.
3. Empowering consumers to play an active, fully-informed role in the choice, cost and quality of their healthcare.

And Health Market Quality’s research is already making waves! In September last year, ABC’s Four Corners presented ‘Wasted’, a special episode investigating low-value healthcare in Australia. This widely watched episode included research and commentary by Professor Adam Elshaug, University of Sydney, and analytic support by Kelsey Chalmers and Tim Badgery-Parker, both PhD candidates at the Capital Markets Cooperative Research Centre.

When one heads to the doctor most assume “the doctor knows best”. But the truth is, as Four Corners presented, many of the scans, tests and procedures ordered by medical practitioners are wasteful, unnecessary and potentially harmful. ABC guest reporter, Dr Norman Swan, revealed the real story behind the malaise in the Australian health system. A malaise, Dr Swan claimed, driven by waste rather than a lack of money.

Over time Health Market Quality will develop solutions in this field that are aimed at influencing clinical practice and better informing consumers contemplating having procedures that may not deliver much if any health benefit. The resultant savings will leave more money

in the health care system for high value care, which is of particular interest to governments and insurers, and will result in better value to the consumer as well.

Health Market Quality is also looking at the cost effectiveness of common health interventions, particularly those where alternative clinical approaches with highly varied costs are used. The initial study is focused on certain classes of cardiovascular procedures.

As many researchers will know, health data in Australia is highly fragmented. With public hospitals being run by State Governments, Medicare and the Pharmaceutical Benefits Scheme by the Federal Government, and then private hospitals run by some 92 different organisations, accessing and linking data has been a bridge too far for most research projects. This fragmentation also negatively impacts individual’s healthcare as well leading to less than fully informed health services and workforce planning. To lay the foundations for improved analytics in the future, Health Market Quality’s focus is on harvesting, harmonising (or cross-referencing), linking and enriching healthcare data and driving changes in the structural and/or legal barriers that impede a fully informed approach to health in Australia.

And Health Market Quality is tapping new data sources. Clinical notes and guidelines, and information from phone calls from patient support centres have been rarely used as sources of data. Using natural language programming, the Health Market Quality is turning this unstructured data into a treasure trove of useful information. We are currently working with the Victorian Transport Accident Commission on such a project, with the view to improving service delivery and accident victims’ quality of care.

The Health Market Quality program is headed up by Capital Markets Cooperative Research Centre’s Chief Operating Officer, David Jonas. David was the founding CEO of Lorica Health and has a long history in developing technology businesses and leading national technology initiatives.

Health Market Quality’s R&D program is led by Associate-Professor Federico Giroi of Western Sydney University. Federico holds a PhD in Health Policy from Harvard University and PhD in Physics from the University of Genoa, Italy. He conducted research for 10 years at the Artificial Intelligence Laboratory at the Massachusetts Institute of Technology. While at the RAND Corporation, Federico led the team that developed the COMPARE micro-simulation model for the analysis of the proposed ‘Obama Care’ health insurance reform.

Federico is joined by Professor Adam Elshaug MPH PhD, Co-Director of the Menzies Centre for Health Policy at The University of Sydney. Adam is an internationally recognised researcher and policy advisor with expertise in reducing waste and optimising value in health care. Adam’s work spans public health as well as private and public health insurance.

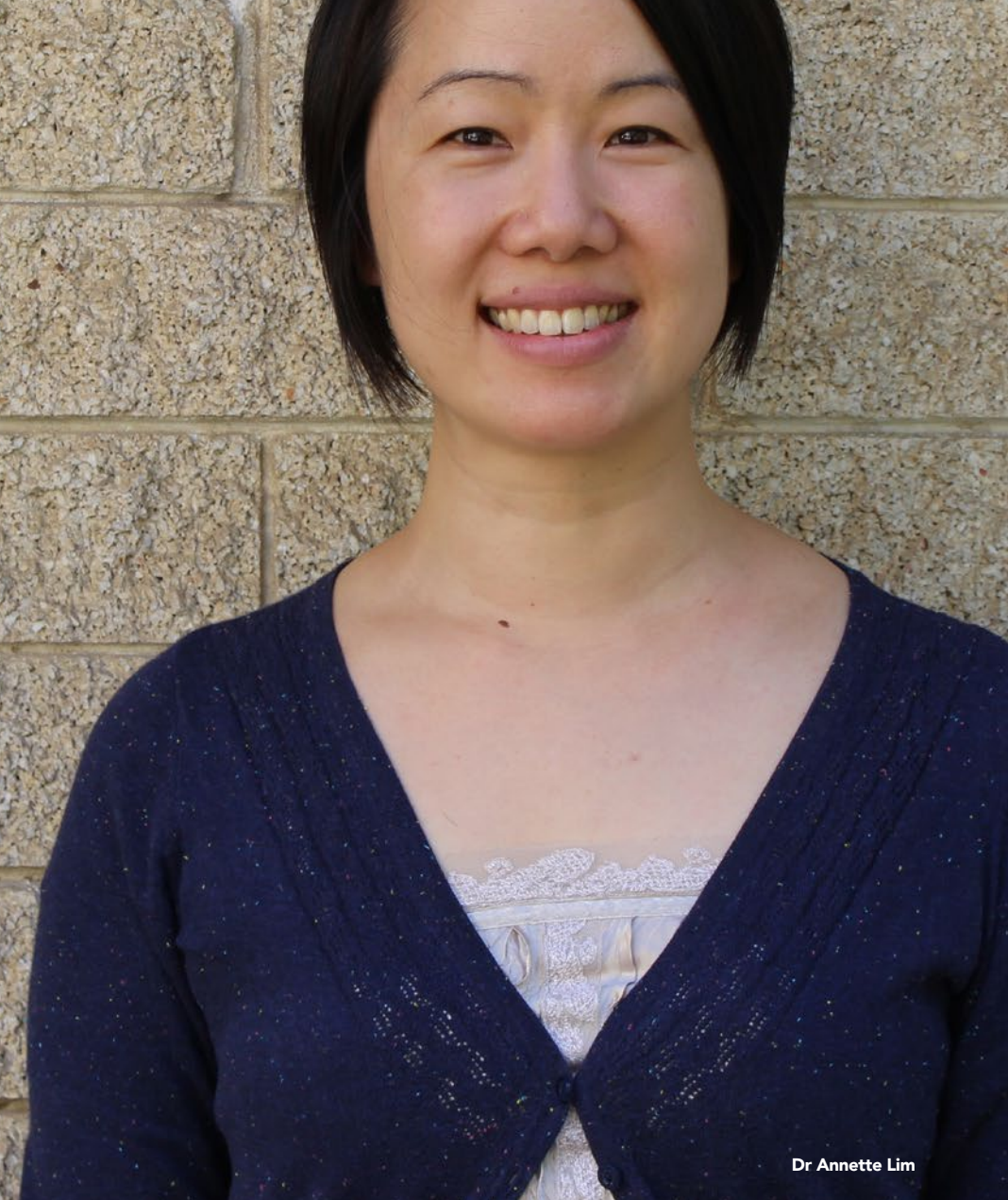
‘In spite of our already significant coverage, we are continuing to develop new industry and university partnerships in the health services community across Australia,’ says Jonas. ‘We have leading edge technology solutions that can rapidly make a difference in this space. A more affordable, efficient health care market benefits all Australians.’

For more information about Capital Markets Cooperative Research Centre visit www.cmcrc.com



The tongue has it - A simple organ with a complex challenge

Over the last few years, the incidence of oropharyngeal cancers has been increased worldwide. This group of head and neck cancers, consisting mainly of base of tongue and tonsillar squamous cell carcinomas, has now become the most frequently caused cancer by the human papilloma virus.



Dr Annette Lim

As the 2016 recipient of the Royal Australian College of Physicians GlaxoSmithKline (GSK) Research Establishment Fellowship in Oncology, Dr Annette Lim is investigating the role of tumour derived exosomes in the context of cancers which occur in the base of the tongue.

Exosomes are fragments of tumour that are released into the bloodstream. Dr Lim says these exosomes are interesting for a wide range of reasons.

“We now know that tumours release fragments of itself called “exosomes” into the blood stream, which are lipid rich vesicles containing all the molecular cargo of the primary tissue from which it arises. Early studies of exosomal functions reveal that they have a diverse range of roles that contribute directly to carcinogenesis. Their molecular cargo can directly confer oncogenic mutations to recipient cells, and they can help to facilitate metastatic potential through the process of epithelial-mesenchymal-transition. Exosomal ligands can also modulate the immune response to enable tumoural immune evasion,” said Dr Lim.

“Importantly, as exosomal contents represent the tumour from which they arise, the molecular cargo contained within them can be analysed – the DNA, RNA, miRNA and proteins. This is where we get the idea of ‘liquid biopsies’ from. “Liquid biopsies from the exosomes in blood

could provide a less invasive procedure compared to a tissue biopsy, especially if you consider the difficult access with parts of the neck and head – or when complexities arise due to medical comorbidities when sometimes it is too dangerous to expose patients to the risks of a general anaesthetic,” she said.

If exosomes represent a molecular marker of disease with poor prognosis, their assessment may hopefully identify cancers at risk of spreading or those which may require treatment intensification. That is, they could help with risk stratification which importantly informs treatment decisions. Similarly, exosomes may represent a means of us molecularly assessing treatment response or conversely, may represent a molecular means for us to detect disease recurrence early. We could use exosomes then for post-treatment surveillance.

“If we can identify reliable molecular markers for cancer in the blood then the potential applications are huge. We can start to think about identifying problems at a pre-cancerous stage,” says Dr Lim. Some of these developments may well be relevant to a range of cancers. “Clearly we are focusing on one form of cancer, but imagine if we can deliver benefit to other patients battling other forms of cancer.”

The potential benefits of confirming molecular, blood-based cancer markers (exosomes) for cancer diagnosis and care can also improve risk stratification of disease, thus informing the appropriate treatment

allocation, assist with disease surveillance – prediction of malignant transformation and improve surveillance after treatment, reduce the need for invasive procedures during post-treatment surveillance and facilitate early intervention when disease recurrence is suspected and apply the findings and benefits (potentially) more widely to other forms of cancers.

Dean of the Royal Australian College of Physicians Professor Richard Doherty says he is delighted to see the RACP GSK Research Establishment Fellowship in Oncology being put to such a valuable project.

“I commend GSK on their investment in medical science and innovation. This is an important relationship and the College and all of the recipients certainly value the support. It shows how partnerships between industry and the College can be the catalyst for important projects that drive patient-focused innovations,” said Professor Doherty.

Medical Director at GSK Dr Andrew Weekes said “It is a great source of pride for the GSK team to be able to support research which advances understanding in oncology. You just never know where projects like Dr Lim’s might lead. From first principles, there is potential for meaningful impact in the clinical setting, both in diagnosis and in patient care.”

The project is being co-ordinated by Dr Lim, who is a Consultant Medical Oncologist at Sir Charles Gairdner Hospital in Perth and an Adjunct Clinical Senior Lecturer at the University of Western Australia. The translational research involves the collaborative input of the clinical multidisciplinary team and scientists from the university.

Dr Annette Lim is the recipient of the RACP GlaxoSmithKline Research Establishment Fellowship in Oncology for 2016. Dr Lim will be using the Award to research: *Mechanisms that facilitate metastatic potential in base of tongue carcinomas*. The core funding for Dr Lim’s broader project (looking at head and neck cancers more broadly) comes from Garnett Passe & Rodney Williams Memorial Foundation Conjoint Grant, Cancer Council Western Australia Early Career Investigator award and the WA Health/Raine Foundation Clinician Research Fellowship.

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



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