

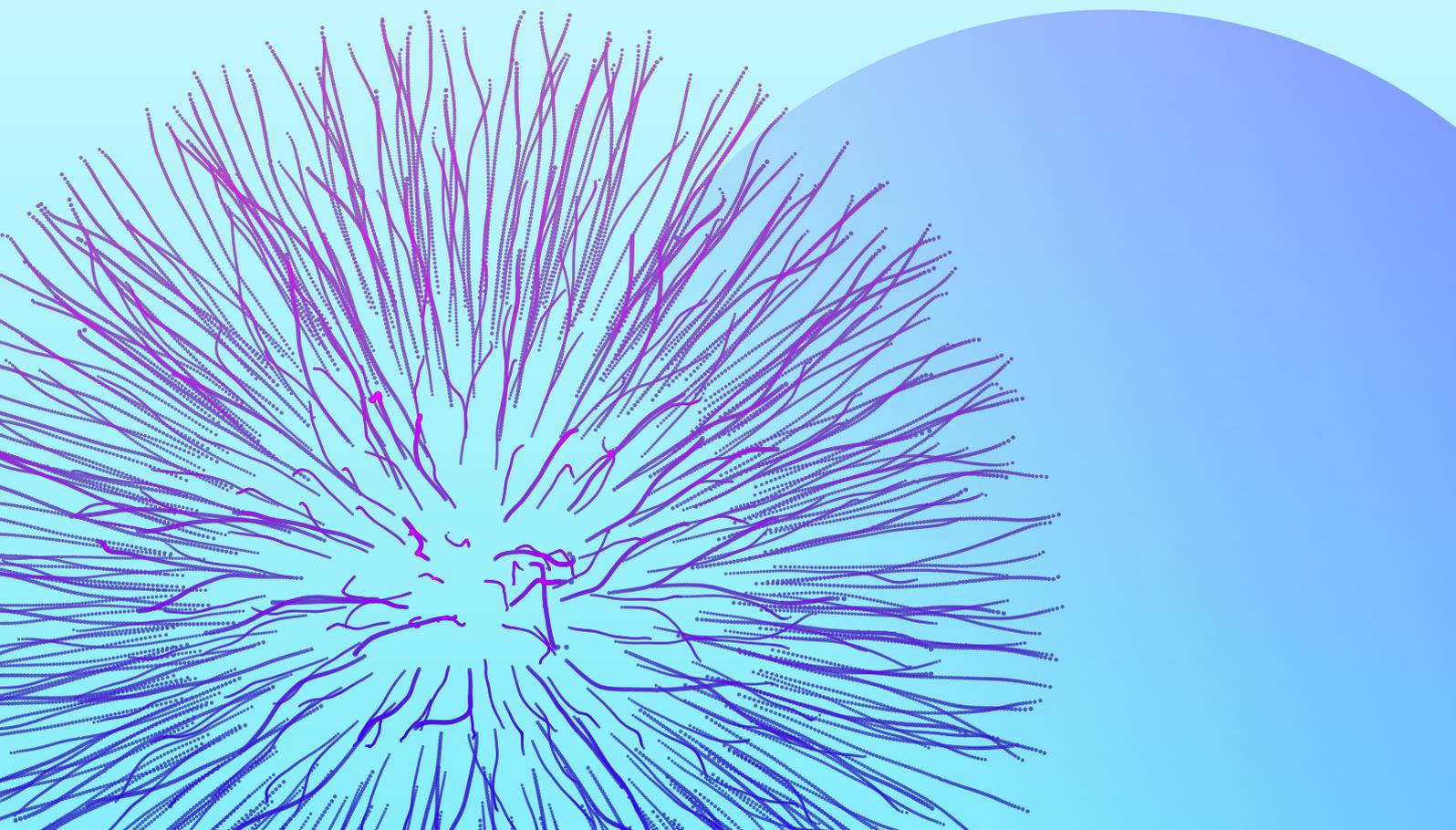
10 OF THE BEST

NHMRC RESEARCH PROJECTS

SEVENTEENTH EDITION

Welcome to the seventeenth edition of **10 OF THE BEST**

Since its launch in 2005, 10 of the Best has spotlighted groundbreaking achievements from Australia's leading health and medical researchers — each backed by the National Health and Medical Research Council (NHMRC). These stories showcase the depth, diversity and impact of NHMRC funded science, reflecting the collaborative spirit and rigorous inquiry that define Australia's global reputation for research excellence and integrity.



CEO Foreword

*It is an honour to present **10 of the Best – Seventeenth Edition**, celebrating the success stories of yet another 10 researchers whose work has significantly contributed to the health and wellbeing of all Australians. The stories included in this edition were selected from NHMRC-funded projects completed in 2023.*



Reflecting on the period in which the projects were underway, it is important to acknowledge that the chief investigators and their teams were navigating the challenges brought on by the COVID-19 pandemic. The pandemic has had lasting impacts on public health. Within the health and medical research sector, COVID-19 prompted us to think outside of the box to accelerate new research. This level of adaptability and innovation is heavily reflected in the stories included in this edition, representing the quality and talent of research that is undertaken by our Australian researchers on an annual basis.

Spanning a broad spectrum of topics, including Indigenous maternal and childhood health, cancer, coronary heart disease, hepatitis B and Parkinson's disease, this edition presents the stories of researchers who have combined fundamental scientific research with national priorities and challenges. Whether the research was carried out in the laboratory, clinic, hospital or community, a common theme that ties these stories together is the resilience and motivation of each researcher to improve the health and wellbeing of the Australian community.

As we look towards the future of health and medical research in Australia, it is important to celebrate the success of the sector – the discovery, trials, translation, and commercialisation of research breakthroughs such as those described here. Our annual funding into health and medical research is and will continue to be an investment to delivering equitable health outcomes for all Australians.

On behalf of NHMRC, it is my great pleasure to congratulate and thank the researchers, as well as their teams and collaborators, featured in 10 of the Best – Seventeenth Edition. This compilation demonstrates the talents, skills and expertise that make up our sector. I know that together, we can continue to build a healthy Australia.

A handwritten signature in black ink, appearing to read 'Steve Wesselingh'. The signature is fluid and stylized, with a long horizontal stroke at the end.

Professor Steve Wesselingh
Chief Executive Officer

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Shining a light on **intergenerational complex trauma** for Aboriginal and Torres Strait Islander families



Professor Catherine (Cath) Chamberlain

Discover the inspiring journey of Professor Cath Chamberlain – a dedicated midwife and researcher, as she shines a light on Indigenous parents experiencing intergenerational trauma and aims to improve support for parents to heal the past by nurturing the future.

INSTITUTION



GRANT



Project Grant

YEAR



2017-2022

FUNDING AMOUNT

\$1,238,906

TEAM MEMBERS

Associate Professor Graham Gee
Professor Yvonne Clark
Ms Karen Glover
Professor Judy Atkinson
Professor Helen Herrman
Professor Stephanie Brown
Professor Jan Nicholson

A proud Trawlwoolway woman from Tasmania, Professor Cath Chamberlain's career has been built on a passion for lifelong learning, exploration and collaboration with others who share the same passion towards finding practical solutions to problems.

As a clinically trained paediatric nurse and midwife, Professor Chamberlain's interest in women's and children's health has followed throughout her career from health services into academia.

It was during her PhD while researching gestational diabetes that she realised the growing evidence of intergenerational and complex trauma¹ and both the direct and indirect impacts it was having on Aboriginal and Torres Strait Islander people's health. With her passion for continuous learning, Professor Chamberlain sought to explore intergenerational and complex trauma and the implications for maternity care.

Professor Chamberlain proposed 3 main reasons why pregnancy, birth and early parenting (perinatal period) are critical points for intervention:

1. Pregnancy, birth and early childhood experiences can often trigger trauma related stress responses
2. This period offers unique lifetime opportunities for healing
3. Parents have regular contact with perinatal services and need safe healing informed support to manage distress.

'There was growing awareness that complex trauma is an issue, but little understanding of what that meant in perinatal care services, particularly in relation to Aboriginal and Torres Strait Islander families. We knew this was a really sensitive and difficult research area, so we put in a grant application to explore this issue more deeply and co-design perinatal support Strategies,' said Professor Chamberlain.

Through conducting evidence reviews and workshops focused on co-designing perinatal strategies to support Aboriginal and Torres Strait Islander parents experiencing complex trauma, Professor Chamberlain was able to identify issues for consideration. These issues focused on trauma awareness in maternity care and early childhood services and culturally responsive healing informed support for Aboriginal and Torres Strait Islander parents. They also highlighted the importance of developing a culturally sensitive assessment tool for complex trauma and concerns regarding the intersection between child protection and maternity services.

Working with both Indigenous and non-Indigenous researchers, and in partnership with the Lowitja Institute, Professor Chamberlain acknowledges the wisdom and generosity of the brave community members in speaking on such sensitive issues and contributing their knowledge to the project to



improve care and support for parents. It was also the strong engagement and positive response from community members and peers working in the field that emphasised the positive impact of this research to Professor Chamberlain.

'The workshop felt like a campfire in a storm because your listening has warmed and softened me. Tension has eased. Your work will bring out the knowing of Indigenous cultures, knowing about interrelatedness, interconnectedness, attachment orders and the whole, historical situation through the past, present and future. All these words are really just me trying to say thank you for the gift of your work,' said a workshop participant (2018).

Next steps

Professor Chamberlain is trialling the implementation of strategies to increase perinatal awareness, support, assessment for complex trauma, as well as improving safety with regards to child protection service notifications. This includes implementation of community-led support strategies to improve holistic and culturally responsive healing informed continuity of care aligned with birthing on country models. Professor Chamberlain hopes this research will create increased understanding of trauma and healing informed perinatal care which prevents parents being retraumatised, as well as further validation of an Aboriginal complex trauma and strengths questionnaire to understand prevalence and help those impacted by complex trauma to get the best support.

¹ Complex Post-Traumatic Stress Disorder (complex trauma) is a cluster of distress symptoms which most commonly follows prolonged or repeated trauma, such as childhood abuse, neglect, or ongoing domestic abuse.

Beyond the virus: discovering new treatments for influenza infections



Associate Professor Michelle Tate

Although there are no effective drugs for severe influenza, a breakthrough led by Associate Professor Michelle Tate, in collaboration with Associate Professor Ashley Mansell, has led to innovative treatments that target the body rather than the virus itself to limit inflammation and ultimately save lives.

INSTITUTIONS

HUDSON
INSTITUTE OF MEDICAL RESEARCH

 **MONASH**
University

GRANT



Ideas Grant

YEAR



2019-2022

FUNDING AMOUNT

\$597,286

TEAM MEMBERS

Associate Professor Michelle Tate
Associate Professor Ashley Mansell

In Australia, yearly hospitalisations and deaths from influenza have risen over the last decade to an estimated 18,000 and 3,500, respectively.¹ In many fatal cases, it is not just the virus that causes harm, but the body's immune system launching an extreme inflammatory response, sometimes called a 'cytokine storm', that damages the lungs and other organs.

There are currently no targeted treatments for this storm and no widely approved therapy that can precisely calm the overactive immune response driving severe lung damage.

Fascinated by the intricacies that make up the immune system, Associate Professor Tate has dedicated her career to understanding the processes by which viral infections cause disease and identifying novel targeted therapies.

The immune system's effectiveness depends on finding a critical balance between having some inflammation to fight infection, but not in such excess that it leads to life-threatening disease. Now more than ever, in a post COVID-19 society, the devastating impact of respiratory viruses has been unmistakably clear, highlighting the need for proactive interventions to prepare for future pandemics.

Associate Professors Tate and Mansell's project focused on understanding and mitigating the excessive inflammation that drives severe, adverse influenza outcomes. Their project discovered how the host's NLRP3 inflammasome² contributes to hyperinflammation in the lungs during severe influenza infection, helping to shape new directions in the field. It also led to the development and patenting, in partnership with industry, of a novel inflammasome inhibitor that reduces pulmonary inflammation.

'All the major discoveries in medicine have come from basic research. It's the foundation of understanding the immune system and how we can modulate it with drugs. That's what we did – we took a basic discovery in the lab and then we were able to apply that through industry and make a novel drug,' said Associate Professor Tate.

The drug's dual targeting capability opens new avenues for treating a range of inflammatory and infectious diseases, including silicosis and COVID-19 related lung injury.



Developing this drug during the actual COVID-19 pandemic was nothing short of a challenge for Associate Professor Tate who, as a virologist, was working harder than ever. On a positive note, industry partners responded positively, recognising that pandemics happen and are not something of the past.

Associate Professor Tate credits the impact of her research to having the opportunity to collaborate with other researchers around her and bringing together a broad depth of expertise to solve this problem.

Anyone can get the flu which means anyone can get seriously unwell from it. This new drug provides hope for patients diagnosed with not just influenza infections, but other respiratory diseases where inflammation is the issue.

Next steps

Associate Professor Tate will continue to explore the potential use of inhibitors to treat other diseases. By continuing to investigate biomarkers that identify patients at risk of hyperinflammation, Associate Professor Tate aims to reduce hospitalisations, prevent deaths, and improve recovery outcomes for Australians affected by respiratory infections. To do so, she will continue to collaborate with industry to ensure rapid translation of discoveries into clinical practice. This work represents a critical step toward transforming how we treat respiratory infections in the future.

¹ Australian Centre for Disease Control. Season flu (seasonal influenza). Available from: [Seasonal flu \(seasonal influenza\) | Australian Centre for Disease Control](#)

² An inflammasome is a multimolecular protein complex that acts as a sensor in the immune system and detects danger signals such as infection or stress from damaged cells and pathogens.

Refining the precision of deep brain stimulation to **target Parkinson's disease**



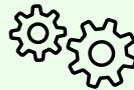
Professor Hugh McDermott

Leading a groundbreaking research project, Professor Hugh McDermott has enhanced the precision of deep brain stimulation for Parkinson's disease, positioning his team at the forefront of the field and revolutionising treatment for patients worldwide.

ADMINISTERING INSTITUTIONS



GRANT



Development Grant

YEAR



2020-2023

FUNDING AMOUNT



TEAM MEMBERS

Associate Professor Wes Thevathasan
Dr Kristian Bulluss
Dr San San Xu



From an early age, Professor Hugh McDermott was interested in electronics and audiology. Combining this with a familial interest in music, Professor McDermott sought to apply his background in electronic engineering to help people with hearing loss, partly so they could appreciate music, but mostly because it ticked several boxes that were personally important to him.

Professor McDermott was driven to commence a PhD working on an advanced cochlear implant, which later transitioned into deep brain stimulation (DBS). Bringing the learnings from his early career into the field of DBS made sense to him because while DBS is a relatively new technology, cochlear implants and DBS share the same underlying technical principles.

Both technologies work by delivering small pulses of electricity to neurons to alleviate certain health conditions. One of the main conditions that DBS has been proven to be beneficial for is Parkinson's disease.

Parkinson's disease affects 150,000 Australians.¹ It is characterised by slowness of movement, muscle stiffness and tremors that can impact quality of life. There is currently no cure, but symptoms can be alleviated with medications. Unfortunately, however, medications can be insufficient for some people. In these cases, DBS can provide great benefits by delivering controlled electric currents to the brain instead of, or alongside, medications.

Professor McDermott led a multidisciplinary team of researchers, neurologists, engineers, and neurosurgeons to develop a technique that assists surgeons in placing DBS electrodes more precisely and consistently in the brain of each patient. Similar to how a weather radar displays rain patterns in a map, Professor McDermott's system sends out electrical pulses during the time that the surgeon is passing the electrode into the brain. Certain neurons in the brain then respond by sending a signal back to the device which displays it on a screen for the clinician to interpret.

A key finding of this research was just how reliable and consistent the signal is when the electrode is positioned at the ideal location. Professor McDermott says this is the most critical finding for clinicians as they are assured that DBS will then benefit the patient and the surgery will not need to be revised.

'That is quite unusual in medicine to have such a degree of certainty. It might have been the case that we just struck it lucky with the first few patients, but we've gone on to show that this is a reliable, consistent signal when the electrode is positioned correctly - this was a huge confidence booster to the team,' Professor McDermott.

This work has been replicated in several different hospitals both in Australia and the United Kingdom and has sparked global interest from other researchers seeking to understand more about what they mean for patients both with Parkinson's disease and other conditions.

Next steps

With additional funding from investors and grants, Professor McDermott's research led to the founding of a company in Melbourne. The innovative techniques developed have been patented and licensed to a global DBS provider. Through commercialisation, the benefits of this work will reach patients and clinicians worldwide, enabling surgeons to optimise electrode placement in the brain and ensure each patient gains the greatest possible benefits from DBS.

¹ Parkinson's Australia. Statistics. Available from: [Statistics - Parkinson's Australia](#)

Revolutionising **cardiovascular health** in the digital era



Professor Julie Redfern AM

Discover how Professor Julie Redfern's vision for developing innovative digital strategies have transformed cardiovascular disease prevention, reaching beyond traditional programs to deliver health services reform at the national level.

ADMINISTERING INSTITUTION



GRANT



Career
Development
Fellowship

YEAR



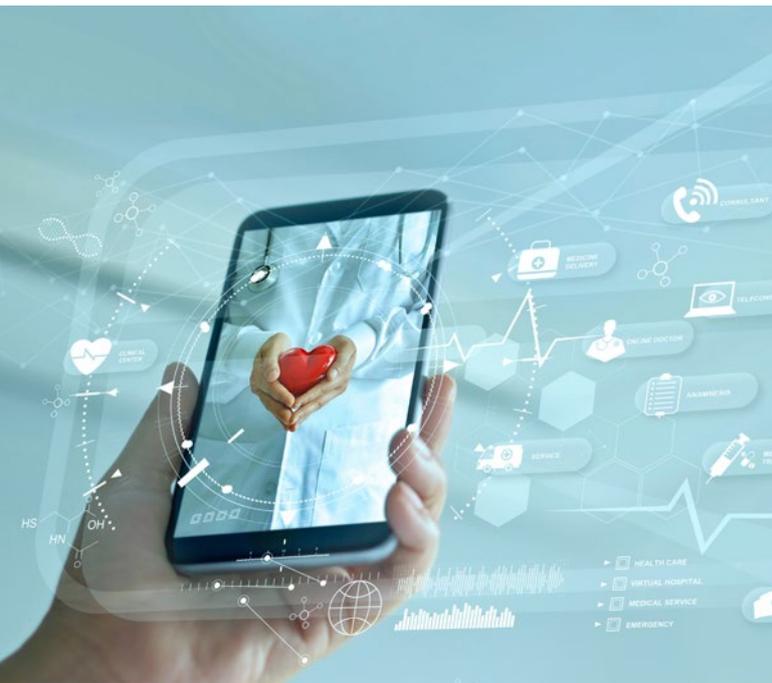
2017-2021

FUNDING AMOUNT



COLLABORATORS

Professor Clara Chow
Dr Aranvinda Thiagalingam
Dr Karla Santo
Dr Anna Singleton
Dr Karice Hyun
Dr Rebecca Raeside
Dr Nashid Hafiz
Professor Christine Jenkins
Dr Qiang Tu
Dr Andrew Knight
Professor Charlotte Hespe
Professor Tom Briffa
Professor Robyn Gallagher
Professor Christopher Reid
Professor David Hare
Professor Nicholas Zwar
Ms Deborah Manandi
Professor Mark Woodward
Dr Emily R Atkins
Professor Elizabeth Halcomb
Professor Tim Usherwood



In the past century, there have been major developments in traditional rehabilitation care for cardiovascular disease. Such advancements have resulted in increased survival rates after initial heart attacks and improved lifelong cardiovascular risk management.

However, traditional cardiac rehabilitation programs were designed over 60 years ago and changing this 'one size fits all approach' to a more contemporary model that is patient centred brings about complexities.

A clinically trained physiotherapist working to prevent future cardiovascular events for people with heart disease, Professor Julie Redfern knew she wanted to help fill the gap in care between patients who attended traditional cardiac rehabilitation programs and those who did not.

'With my own eyes, I identified issues with the traditional approach and while I knew the patients really enjoyed the programs, I was more conscious of the people that weren't coming. What happens to the people after they leave and are we really tackling all of the risk factors?,'
said Professor Redfern.

Supporting these patients in a more innovative and scalable way is what drove Professor Redfern to question whether digital health strategies could provide a more holistic, secondary prevention care for people with cardiovascular disease.

From text messaging to interactive mobile applications, if effective, these strategies could reach people beyond the traditional 10-week rehabilitation program and could also provide prolonged support due to their flexibility.

Through effective co-design and interactions with people with lived experience, Professor Redfern sought to develop a more efficient way that the healthcare system could deliver care that helped keep people out of hospital, supported people in taking prescribed medications, improved quality of life and ultimately prevented future heart attacks.

Being told what to do to maintain optimal health is one thing, but providing behavioural support for people to enact change on a personal level is invaluable. The success of the digital interventions was evident in how quickly patients adapted to them and began to expect their use over time. It wasn't until the very first focus group that Professor Redfern facilitated that she realised the impact of intervening with such a simple form of communication like a text message.

'It's interesting how we think people want something very complex and complicated, but we actually forget that people want something quite simple, supportive and positive,' said Professor Redfern.

It is that creative spirit, boldened with a desire for creating new ideas to solve problems that has led Professor Redfern to create change at a policy, provider and service level. At a patient level, the overarching goal is to ensure that they receive the support they need to live their best lives.

Next steps

With a focus on patient involvement, interdisciplinarity, unity and collaboration, Professor Redfern is rolling out and evaluating the implementation of a national cardiac rehabilitation quality initiative. This initiative is fundamental to the NHMRC Synergy Grant (SOLVE-CHD), she leads as CIA, and will strengthen clinician training, program quality and data collection systems. To optimise achievement of lifelong cardiovascular health for all, Professor Redfern's research will champion improved reach and quality of care through international advocacy and World Heart Federation leadership. Professor Redfern's leadership also extends to another joy of hers - developing the next generation of early career researchers and continuing to provide the level of mentorship that formed her own career in health and medical research.

Equity in cancer care: Bridging the gap for Indigenous Australians



Professor Joan Cunningham

With a commitment to equity, rigour and impact, Professor Joan Cunningham has worked to improve cancer outcomes for Aboriginal and Torres Strait Islander people through collaborative research aimed at understanding and improving the performance of the health system.

INSTITUTION



GRANT



Research
Fellowship

YEAR



2014-2023¹

FUNDING AMOUNT



TEAM MEMBERS

Dr Monica Green
Associate Professor Lisa Whop
Dr Abbey Diaz
Professor Gail Garvey
Associate Professor Kalinda Griffiths
Associate Professor Kate Anderson
Dr Bronwyn Morris
Dr Tamara Butler
Professor Julia Brotherton
Professor John Condon
Professor Paul Lawton

¹ This report covers the period from 2014 to February 2023. Although the length of the Research Fellowship was 5 years, it extended to over 9 years due to part time hours.



Growing up as the youngest child in a very large family in Boston, Professor Joan Cunningham developed a strong appreciation of the importance of equity, fairness, and justice. In pursuing a career as a social epidemiologist, she combined her quest for social justice with a love of using data to understand the health and wellbeing of people and communities.

After moving to Darwin, Australia in 1994, Professor Cunningham began to apply her skills, experience and motivation to improve health equity for Aboriginal and Torres Strait Islander people. Her work has spanned a broad range of diseases, but her central focus has been on understanding and improving the performance of the health system and making it more responsive to the needs of Aboriginal and Torres Strait Islander people and communities.

In the early 2000s, Professor Cunningham joined forces with a small group of colleagues to undertake collaborative work on cancer, which had previously been overlooked despite its growing importance. In Australia, cancer is now the leading cause of death for Aboriginal and Torres Strait Islander people, accounting for more deaths than diabetes, kidney disease and respiratory disease combined.²

'A lot of cancers are treatable if they are found early and some are curable, so access to appropriate and effective health services is critical,' said Professor Cunningham.

As part of Professor Cunningham's Research Fellowship, she co-led, with Professor Gail Garvey, the DISCOVER-TT (2013-2018) and the TACTICS (2018-2023) Centres of Research Excellence (CREs).³ The CREs' research on cancer prevention, early detection, diagnosis, treatment and supportive care helped put cancer firmly on the agenda as an important public health problem. It provided a robust evidence base for policymakers, service providers and Aboriginal and Torres Strait Islander organisations and communities and developed a new generation of Aboriginal and Torres Strait Islander researchers.

Cancer is now considered a priority for federal and state health departments and for the National Aboriginal Community Controlled Health Organisation (NACCHO) – the peak body representing Aboriginal and Torres Strait Islander community-controlled health centres across Australia. Policymakers and healthcare services and providers have become increasingly aware of the importance of culturally safe, accessible and effective cancer care for Aboriginal and Torres Strait Islander people.

'Ultimately, if we can make health services work better for Aboriginal and Torres Strait Islander people then we can reduce the burden of disease and death,'
said Professor Joan Cunningham.

Professor Cunningham hopes this research will lead to the development and implementation of health services that work better for Aboriginal and Torres Strait Islander people. This, in turn, should result in better, more equitable health outcomes.

Next steps

Professor Cunningham says more work is needed to co-design, implement and fund programs and services that are culturally safe, accessible and effective for Aboriginal and Torres Strait Islander people. Having recently retired from the Menzies School of Health Research, she said she has spent over 35 years trying to do herself out of a job by helping to develop and support Aboriginal and Torres Strait Islander research leaders to drive research that meets the needs of their communities. As she looks at the current Aboriginal and Torres Strait Islander health research workforce, she feels confident that she has succeeded in her goal.

² Aboriginal and Torres Strait Islander Health Performance Framework: www.indigenoushpf.gov.au/Measures/1-23-Leading-causes-mortality

³ More information about the research undertaken through these two CREs can be found at: www.tactics-cre.com

Accelerating towards the future for **hepatitis B elimination**



Associate Professor Jessica (Jess) Howell

Developed by Associate Professor Jess Howell, a point of care test that uses a single droplet of blood to measure liver damage has the potential to revolutionise the diagnosis and treatment of hepatitis B for populations worldwide.

INSTITUTION



Burnet

GRANT



Ideas Grant

YEAR



2020-2022

FUNDING AMOUNT



TEAM MEMBERS

Dr Romesh Abeysuriya
Associate Professor David Anderson
Dr Purnima Bhat
Dr Minh Pham
Ms Caroline van Gemert
Professor Joseph Doyle
Associate Professor Rohit Sawhney
Professor Alexander Thompson
Professor Margaret Hellard
Professor Kumar Visvanathan
Associate Professor John Lubel
Dr Huy Van
Professor Nick Scott
Associate Professor Avik Majumdar
Professor Geoffrey McCaughan



254m

people have Hepatitis B

only
13% are estimated
to be diagnosed

only
3% are on treatment



blood test

for liver inflammation & liver scarring

A defining moment in Associate Professor Jess Howell's career was the day she woke up and realised she was a formal researcher as opposed to something she did on the side of her regular job as a clinical hepatologist. To be able to say that she was a researcher was a turning point for her.

With a natural affinity for scientific discovery and working with marginalised and culturally and linguistically diverse populations, Associate Professor Howell was driven to explore how outcomes for patients with liver disease could be improved. Over time, her research has evolved to investigate viral hepatitis, particularly hepatitis B, and liver cancer which is an unfortunate downstream complication of untreated viral hepatitis.

Hepatitis B is a common chronic infection affecting an estimated 254 million people¹ and disproportionately favouring marginalised populations. While there are effective treatments to prevent complications from hepatitis B, there is no cure. Even more alarmingly, globally only 13% of people are estimated to be diagnosed and only 3% are on treatment.²

Associate Professor Howell's Rapid B study sought to address the gap in hepatitis B testing and provide safe and effective medical care, access and treatment, especially in rural and remote communities where pathology services are not accessible.

Working with a multidisciplinary team that crossed international borders, Associate Professor Howell developed and validated 2 point of care tests for liver inflammation and liver scarring that simply require a droplet of blood.

'The benefits of this type of hepatitis B testing are that it can expand across all locations, and it does not cost a lot of money. It can also tell us on the spot how advanced and significant a person's liver disease is and whether they are eligible for treatment,' said Associate Professor Howell.

Following the establishment of commercial partnerships, the rapid B test has since expanded into a self-testing device, as well as another form of point of care testing to help diagnose liver toxicity among patients on clinical drug trials.

The uniqueness of Associate Professor Howell's mathematical modelling has established the optimal strategies to prevent, diagnose, and treat people with hepatitis B which has the potential to achieve the World Health Organizations' 2030 elimination targets. Associate Professor Howell hopes that with this expansion, it will continue to go above and beyond hepatitis B testing into improved access to timely diagnosis and treatment for liver disease.

'Reflecting on how far we've come, I often think back to when I was working in the clinic and seeing individual patients in front of me who were suffering from a late diagnosis of hepatitis B and the complications of liver cancer. This always brings it home why I'm doing the research that I'm doing and drives the importance of continuing research in this field,' said Associate Professor Howell.

Next steps

Associate Professor Howell and her team will commence further field trials in sub-Saharan Africa and the Pacific Islands. Using their established mathematical models, this continuing research will determine the cost effectiveness and impact of using a point of care test for hepatitis B in low resource settings globally. These novel diagnostic tests of liver inflammation will continue to expand access to rapid liver disease assessment across Australia, with the ultimate goal of reducing deaths from hepatitis B related liver failure and primary liver cancer.

1 World Health Organization. Hepatitis B. Available at: [Hepatitis B](#)

2 WHO Guidelines for the prevention, diagnosis, care 2024. www.who.int/publications/i/item/9789240090903

Turning back the clock on ageing with **nanomedicines**



Professor Victoria Cogger

Ageing is driven by an accumulation of molecular and cellular damage over time. Professor Victoria Cogger is exploring how we might one day be able to reduce the rate or even reverse the process of ageing by starting with one of the body's most critical organs, the liver.

INSTITUTION

ANZAC
Research Institute

GRANT



Project Grant

YEAR



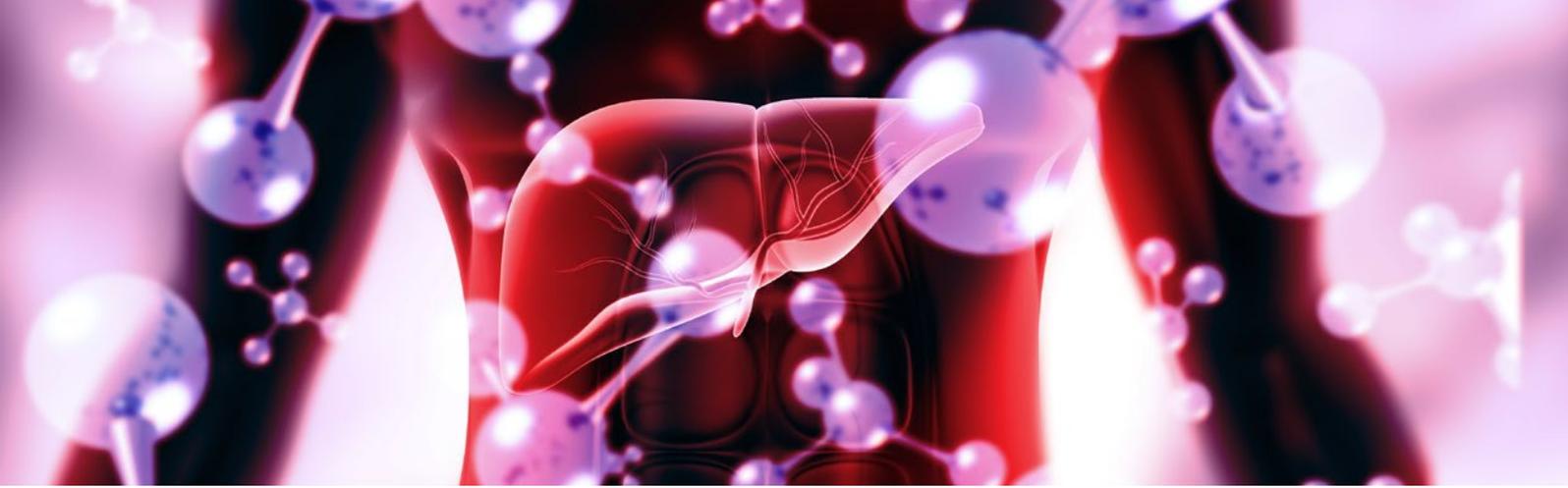
2017-2021

FUNDING AMOUNT

\$574,670

TEAM MEMBERS

Professor David G Le Couteur
Professor Zdenka Kuncic
Professor Peter AG McCourt
Dr Nicholas Hunt
Mr Glen Lockwood



Professor Victoria Cogger has always been interested in science with a deep desire to understand how the human body works.

It was long believed that ageing is the process of accumulating dents and bumps over time. But it is now well understood that ageing is a biologically programmed process. The main takeaway from Professor Cogger's PhD research was that the liver, despite its ability to regenerate, is not immune from the ageing process.

With funding provided through an NHMRC Project Grant, Professor Cogger's research aimed to discover whether medications that are targeted to the liver in older people can change the biology of ageing and reduce the impact of age-related disease. By targeting the medications directly to the liver, Professor Cogger also wondered whether this could reduce the dosage needed and help to reduce side effects from medication.

Prompted by a collaboration with a team from The University of Queensland using a different type of quantum dot, Professor Cogger and her research team were led to successfully use silver-based quantum dots to target the liver. This proved to be an effective way to not only target the liver but also to carry medications. In some cases, this new formulation reduced the drug dosage by up to 10,000-fold.

Not stopping there, Professor Cogger went on to look at using the silver quantum dots for the delivery of protein-based drugs via an oral route, rather than as an injection. Professor Cogger was able to do this with one of the most common protein-based drugs, insulin.

After its discovery over 100 years ago, insulin has saved countless lives for what was previously considered an incurable and untreatable condition. Oral insulin therapy offers an alternative to injectable insulin therapy and is especially useful for babies and children who can become needle phobic, as well as older people who would benefit from being able to self-manage their diabetes more effectively.

'We haven't designed a new insulin drug, but we've designed a new way to get it to where it needs to be to work effectively. Almost like a new suitcase, we've packaged the drug up using a carrier (silver quantum dot) so that we can also reduce the dose needed and potentially reduce side effects,' said Professor Cogger.

Reflecting the patience, persistence and comradery of Professor Cogger's research team, oral insulin for diabetes management was born after completing 200 formulations to get it right. Professor Cogger is grateful for the people she has met throughout her career and the opportunities to deepen her understanding of ageing biology.

Next steps

As a result of this work, oral insulin is now being prepared for clinical trial in Australia, giving people with diabetes an alternative to their current insulin therapy. Over the next 10 years, Professor Cogger would love to see oral insulin become available to people living with diabetes and ultimately remove the need for needles and pumps. Reflecting on the origins of her career, she also hopes to develop other formulations which improve health and wellbeing of older people living with diseases that require daily, or even more with frequent, treatments. Professor Cogger has other exciting disease prevention strategies in the pipeline and, to her, being a part of work that improves treatment and the technology is then used to prevent disease is beyond her wildest dreams.

Dual battle: **Protecting the heart** in the fight against breast cancer



Professor Joerg Lehmann

During breast cancer radiation therapy, the heart can receive a significant dose of radiation. To reduce this, patients are treated while holding their breath, also known as Deep Inspiration Breath Hold (DIBH). Read how Professor Joerg Lehmann has successfully developed a first ever monitoring system to continuously and directly measure DIBH to assure optimal radiation delivery to patients.

INSTITUTIONS



Mater Newcastle

GRANT



Project Grant

YEAR



2017-2022



UNIVERSITY OF
NEWCASTLE
AUSTRALIA

FUNDING AMOUNT

\$417,138

TEAM MEMBERS

Professor Peter Greer
Dr Elena Vasina
Professor David Thwaites
Dr Fiona Hegi-Johnson
Associate Professor Peter Graham
Mr Jose Antonio Baeza-Ortega
Dr Jane Ludbrook

Breast cancer is the 2nd most commonly diagnosed cancer in Australia, and over 50% of patients receive radiation therapy as part of their treatment.¹

For Professor Joerg Lehmann, cancer has always been at the heart of his research interest and applying his technical skills to improve patient care was, to him, the easiest step he took in his career as a radiation oncology medical physicist.

Examining the cure rates for breast cancer in Australia, Professor Lehmann began to consider how he could improve treatments while simultaneously looking at both the health of the patient at present and into the future.

'A harm caused by radiation therapy to the chest area of breast cancer patients is unwanted radiation to the heart which can increase the risk of major coronary events. We're not trying to treat the heart, it just happens to be there and so I thought, how can we minimise this?,' said Professor Lehmann.

Holding breath during breast radiotherapy, commonly referred to as treating under DIBH, effectively shifts the heart away from the area being treated and reduces the radiation dose to the heart.

Delving deeper, Professor Lehmann and his research team aimed to develop an effective method to directly monitor the internal anatomy of the patient during DIBH radiotherapy treatments, overcoming a limitation of current commercial methods that monitor external surrogates.

Professor Lehmann's method of real time monitoring of breast radiotherapy allows physicians to target the radiation precisely at the breast tissue and to monitor that the patient remains in the correct breath hold position throughout their treatment. As a result of this increased accuracy, patients can be assured that their treatment is given correctly and consequently reduces the risk of developing heart disease.

The benefits of this method and its increased accuracy extend to reduced treatment sessions for the patient which has positive impacts on the healthcare system by increasing capacity, reducing costs, and reaching more people who live in rural and remote communities – a problem that Professor Lehmann is hoping to address.

'If patients can be treated more accurately during a shorter timeframe, it is likely we can help more patients from rural and remote areas. Radiotherapy rounds can take weeks but if we can get it done in days, these patients who are considered to be at a disadvantage will benefit,' said Professor Lehmann.

Professor Lehmann hopes that by continuing this research, the increased treatment accuracy will lead to improved health outcomes for patients treated with breast radiation therapy in Australia by lowering side effects and possibly improving cure rates.

Next steps

Professor Lehmann's work will expand on LEILA² to also support more advanced radiotherapy delivery to improve outcomes for breast cancer patients. Working with colleagues at radiotherapy clinics in both New South Wales and at the Peter MacCallum Cancer Centre in Melbourne, Professor Lehmann aims to run further studies with LEILA, gathering feedback and comparing the performance of different DIBH monitoring methods. He has also been approached to work with a startup company to bring this concept into a reality to improve health outcomes for patients treated with breast radiotherapy worldwide.



1 Shack, L., et al. 2017. Determining the need and utilization of radiotherapy in cancers of the breast, cervix, lung, prostate and rectum: A population level study. *Radiother. Oncol. J. Eur. Soc. Ther. Radiol. Oncol.* 122, 152-158. <https://doi.org/10.1016/j.radonc.2016.12.006>

2 Live electronic portal imaging device (EPID) based Inspiration Level Assessment (LEILA) system is a real time verification system, utilising EPID images to monitor internal anatomy during DIBH breast radiotherapy

Demonstrating innovation and excellence in perinatal depression and anxiety screening for Aboriginal and Torres Strait Islander women



Emeritus Professor David Atkinson, Dr Emma Carlin, Professor Julia Marley and Ms Erica Spry

Developed through collaboration with Aboriginal communities, the Kimberley Mum's Mood Scale (KMMS) improves early detection of mental health and social, emotional and cultural wellbeing concerns and promotes culturally safe care for Aboriginal and Torres Strait Islander women. Its adoption in routine primary health care illustrates the enduring impact of community driven research

INSTITUTION



GRANT



Partnership Project

YEAR



2016-2022

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 WA Country Health Service
 Mawarnkarra Health Service
 Apunipima Cape York Health Council
 NT Health Department (Gove Hospital)

To the Aboriginal and Torres Strait Islander women who have participated in KMMS research, thank you, without you this work would not exist.

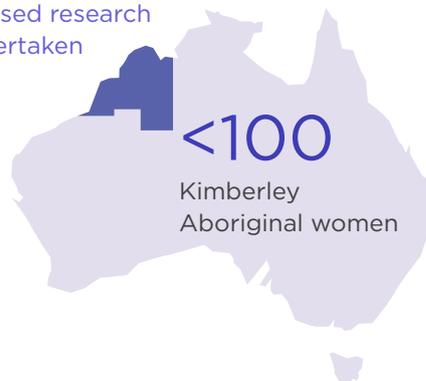
Aboriginal and Torres Strait Islander women are strong and resilient. However, the ongoing impacts of colonisation, racism, trauma, and social and structural inequities have led to significant disparities in perinatal mental health outcomes. Improving the early detection and treatment of perinatal mental health concerns among Aboriginal and Torres Strait Islander women is recognised as a national priority.

In the Kimberley region, concerns were raised that the Edinburgh Postnatal Depression Scale (EPDS) was not the most suitable tool for engaging and screening Aboriginal and Torres Strait Islander women. In response, a community based research project was undertaken to explore more culturally appropriate approaches to perinatal mental health screening. More than 100 Kimberley Aboriginal women and 72 healthcare professionals contributed to this process.

A community based research project was undertaken


72

Health care professionals



Resulted in the development of



The Kimberley Mum's Mood Scale (**KMMS**), a 2-part screening tool

This collaboration resulted in the development of the Kimberley Mum's Mood Scale (KMMS), a 2-part screening tool. Part one is a modified version of the EPDS, while part 2 uses a yarning based template to explore psychosocial areas of stress and resilience in a woman's life.

Kimberley Mum's Mood Scale [KMMS] Part 1

Think about the past 7 days, not just how you feel today.

NAME:
DOB:
DATE:

1. I can sit down and have a good laugh	Yes, always	Yes, sometimes	No, not much	No, never
2. I look forward for good things to happen	Yes, always	Yes, sometimes	No, not much	No, never
3. I blame myself when things go wrong	Yes, always	Yes, sometimes	No, not much	No, never
4. I worry too much and don't know why	Yes, always	Yes, sometimes	No, not much	No, never
5. I feel frightened and shaky a lot	Yes, always	Yes, sometimes	No, not much	No, never
6. I can't handle all the stress or I stress out	Yes, always	Yes, sometimes	No, not much	No, never
7. I feel really no good, like no-one loves me	Yes, always	Yes, sometimes	No, not much	No, never
8. I can't sleep because I am sad or think too much	Yes, always	Yes, sometimes	No, not much	No, never
9. I am so sad I have been crying	Yes, always	Yes, sometimes	No, not much	No, never
10. I think about doing something bad to myself or others	Yes, always	Yes, sometimes	No, not much	No, never

Kimberley Mum's Mood Scale Part 2

Refer to the KMMS Manual for information on how to facilitate the yarn, guidelines for administration, examples of enquiring/exploring questions for each psychosocial domain, how to determine overall risk, and options for follow-up actions.

PART 1 SCORE:
NAME:
DOB:
DATE:

EXPLORE THE WOMAN'S STORY, NOTING THE SITUATION AND HER PROTECTIVE AND RISK FACTORS

SUPPORT:

MAJOR STRESSORS:

SELF-ESTEEM / ANXIETY:

'The development of the KMMS was driven by the need for a screening tool that centres the voices and experiences of Aboriginal women,' said Professor David Atkinson.

The KMMS was validated in a clinical trial involving 91 Aboriginal women in the Kimberley region. The study found that the KMMS effectively identified women experiencing moderate to severe depression or anxiety. It was also found to be acceptable and culturally appropriate for Aboriginal women and their healthcare providers.

Professors David Atkinson and Julia Marley from The University of Western Australia's Rural Clinical School of Western Australia worked in close partnership with the Kimberley Aboriginal Medical Services, Apunipima Cape York Health Council and the Western Australian Country Health Service to build on the success of the KMMS. Together they submitted a NHMRC Partnership Grant application to ensure the tool could be implemented and embedded into routine primary health care practice across the Kimberley. The grant also aimed to explore the acceptability of the KMMS in other geographical locations.

'The KMMS was well received by both community members and healthcare providers, but NHMRC funding was needed to support sustained implementation,' said Professor Marley.

Upon successfully receiving NHMRC funding, Bardi Jawi researcher, Erica Spry 'Roobaanjarn', and early career researcher, Dr Emma Carlin, joined the team, further strengthening the project's community leadership and research capacity. Acceptability studies were undertaken in Pilbara in Western Australia, Cape York in Queensland, and Gove in the Northern Territory to explore how the KMMS works in different regional and cultural contexts. These studies aimed to understand the experiences of Aboriginal women, health professionals, and community stakeholders in using the KMMS, assessing its cultural relevance, usability, and fit within local models of care.

'We wanted to reinforce that the KMMS assesses not only risk but also protective factors. By engaging with the mother, exploring her strengths through clinical yarning and building her confidence, screening becomes culturally safe. We move past the deficit discourse and work in partnership with the mother to understand and support her wellbeing,' said Ms Spry.



The KMMS team has since focused on translating research into real world practice by embedding the KMMS into routine primary health care in ways that can be sustained and are culturally safe. This included developing free online training through Emerging Minds and NACCHO Learn, integrating the tool into various electronic medical record systems, and making it available on the iCOPE digital screening platform so it can be used across diverse health services.

The KMMS has been formally recognised in the NHMRC-led Living Guidelines and the NACCHO RACGP Preventative Health Guide. It has been adopted by the Kimberley Aboriginal Health Planning Forum and forms the basis of the region's Perinatal Depression and Anxiety Protocol. The KMMS has also been adopted by jurisdictions within state and territory health departments. This broad endorsement demonstrates that culturally secure approaches can lead the way in evidence based care.

Health professionals have reported that the tool strengthens culturally safe practice and builds confidence in providing mental health care. The lessons from these studies are helping refine implementation approaches and to ensure the KMMS remains responsive to the unique needs and strengths of Aboriginal and Torres Strait Islander communities across Australia.

'We continue to find that the KMMS helps create a safe space for Aboriginal women to share their experiences and for health professionals to listen and respond in safe and meaningful ways,' said Dr Carlin.

Working in partnership with Aboriginal people and communities, Aboriginal Community Controlled Health Organisations, and state based health services has been at the heart of the KMMS journey. This collaboration continues to demonstrate how Aboriginal leadership, community partnerships, and culturally grounded research can transform perinatal mental health care across Australia.

Next steps

The next phase of work will focus on supporting broader use of the KMMS across Australia to strengthen early and culturally safe identification of perinatal depression and anxiety. There is interest in exploring the acceptability of the KMMS with Torres Strait Islander women to ensure it reflects and respects diverse cultural perspectives and experiences. There is also interest in exploring the acceptability of the KMMS with other First Nations populations to inform potential adaptation and application in Indigenous communities globally.



Predictive imaging: **Advancing breast cancer risk** assessment with mammograms



Associate Professor Shuai Li (on behalf of the late Professor John Hopper AM)

Discover how the late Professor John Hopper AM led a team of researchers, including Associate Professor Shuai Li, to develop new and more accurate predictors of breast cancer risk that can be translated into breast cancer screening practice globally.



INSTITUTION



GRANT



Ideas Grant

YEAR



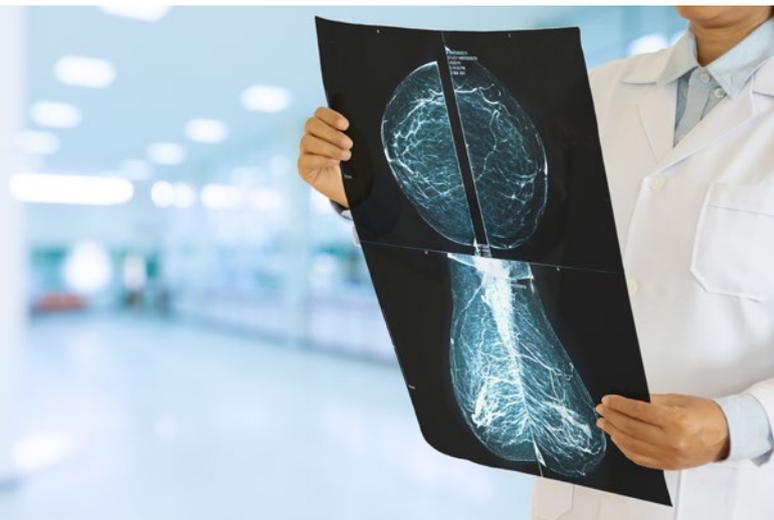
2019-2022

FUNDING AMOUNT

\$895,468

TEAM MEMBERS

Dr Gillian Dite
Dr Daniel Lee
Dr Kevin Nguyen
Dr Osamah Al-qershi
Dr Zhoufeng Ye
Professor Melissa Southey



A pioneering genetic epidemiologist, Professor John Hopper AM (1950–2024) was awarded one of 9 inaugural Australian NHMRC Fellowships for his transformative research that improved understanding of how genetic and environmental factors impact human health.

Professor Hopper’s career spanned over 40 years, significantly contributing to our national health and medical research sector – in particular, through his dedication to advancing breast, colorectal and prostate cancer epidemiology.

Inspired by Professor Hopper and his work, Associate Professor Shuai Li developed an interest in why some diseases cluster in families. In 2014, Associate Professor Li became one of Professor Hopper’s PhD students, eventually gaining his doctorate on the correlation between genetics, epigenetics and breast cancer risk factors.

Throughout the decade of working together, Associate Professor Li’s greatest learning from Professor Hopper was to focus on the evidence and avoid having predetermined ideas by fully embracing the research journey. Associate Professor Li is now leading the work started by Professor Hopper in identifying new risk factors for breast cancer based on digital mammograms.

A mammogram is a low dose x-ray of the breast tissue used to screen for breast cancer. On a mammogram image, dense breast tissue appears solid white and is hard to see through. Mammographically dense breasts can hide existing tumours which also appear as solid white and can consequently develop into interval cancers.¹

An NHMRC Ideas Grant, originally led by Professor Hopper, sought to address this problem by developing a new and more accurate predictor using automated measures that could identify women who were at high risk of developing interval breast cancer.

The research team demonstrated that the new mammogram based risk measures, Altocumulus and Cirrocumulus,² were as strong as the genetic factors for predicting breast cancer risk. Furthermore, they were not related to genetic factors currently known to be associated with breast cancer risk. The discovery of genetic causes of these measures holds the potential to reveal new genetic causes of breast cancer.

‘We illustrated that in a mammogram, the lighter (less dense) areas have a causal effect on the brightest (highly dense) areas. This is consistent with the brightest areas being more aetiologically important for screen detected breast cancer, and light areas being more important for interval breast cancer,’ said Associate Professor Li.

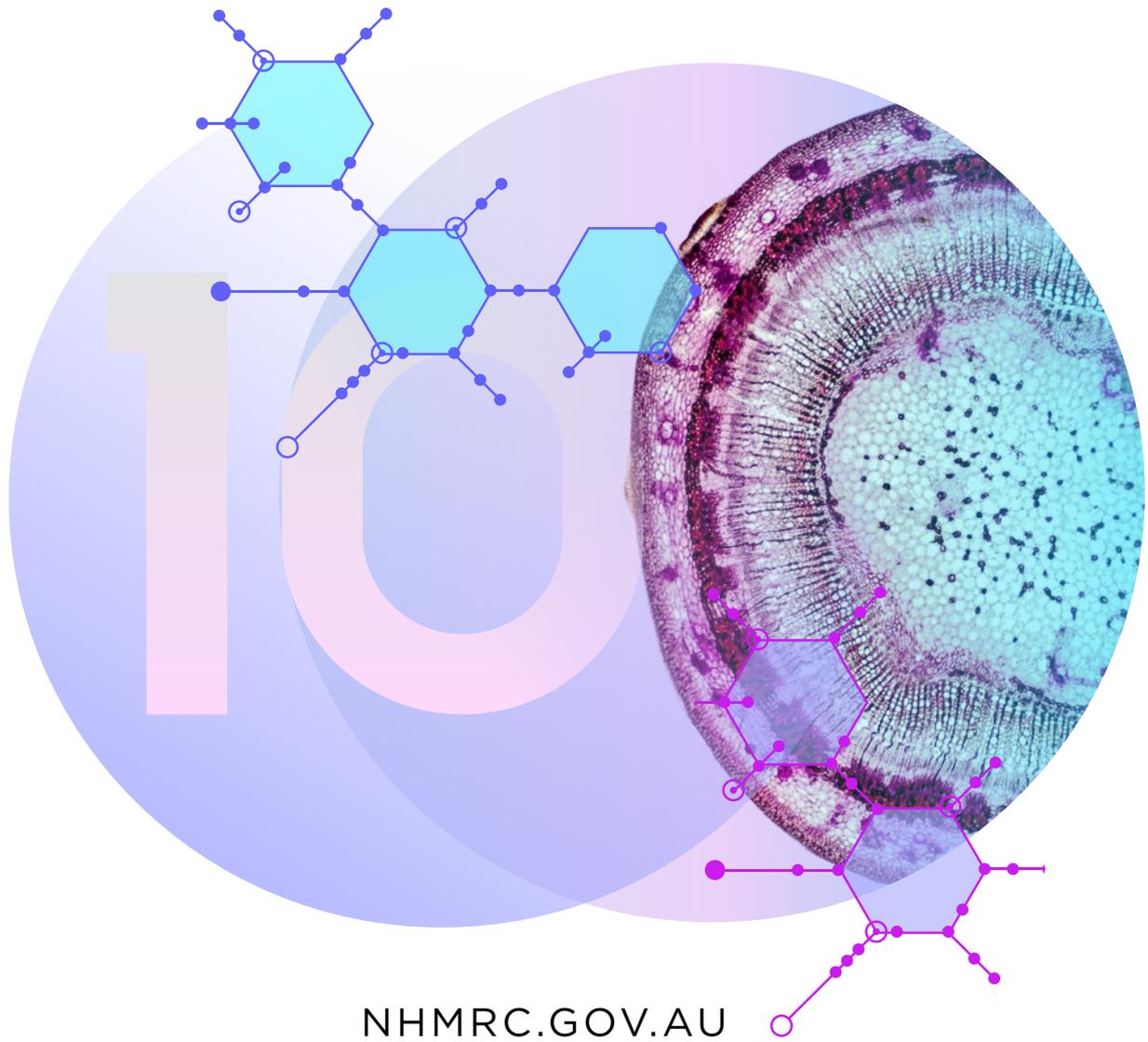
This research laid the foundation for the recently established NHMRC Centre of Research Excellence, MyBRISK, having advanced our understanding of how genetic, lifestyle and environmental factors interact to influence breast cancer risk – a lasting legacy of Professor Hopper’s work.

Next steps

Women at higher risk of developing invasive breast cancer will be more accurately identified during mammographic screening, allowing for tailored reporting, personalised management, and potentially shorter screening intervals. Associate Professor Li and his team will use artificial intelligence (AI) to analyse mammograms and uncover new imaging features that predict invasive breast cancer risk. These AI-derived insights will be combined with traditional risk factors, such as mammographic density and age, to create a more precise and personalised breast screening approach for clinical use.

¹ An interval cancer is diagnosed during the time between a regular screening mammogram that appears normal and the next screening mammogram, usually conducted 24 months apart. Interval breast cancers tend to be larger, grow and spread more quickly, and have a worse prognosis than those found on screening mammograms.

² Altocumulus and Cirrocumulus are density measures that use higher pixel brightness to quantify dense areas on a breast mammogram.



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