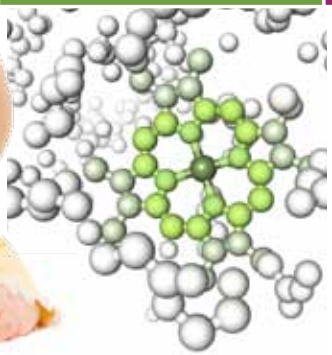

Australian Government
National Health and Medical Research Council
N H M R C

10 of the best
research projects 2010


LOST
CONFUSED
UNSURE
UNCLEAR
PERPLEXED
DISORIENTED
BEWILDERED

10 of the best

research projects 2010

Paper-based publication

ISBN Print: 186496457x

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Internet: http://www.nhmrc.gov.au

Printed on environmentally sustainable paper
NHMRC reference: R48

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Electronic documents

ISBN Online: 1864964634

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Research the key to a healthier Australia

The Hon Mark Butler MP, Minister for Mental Health and Ageing

Australia is truly a fortunate country.

We have one of the highest life expectancies in the world, and this expectancy has increased substantially over the last 20 years. At the same time, ways have been found to tackle many illnesses that were previously disabling.

Health and medical research has made a major contribution to these achievements, giving us longer and healthier lives.

10 of the Best celebrates the achievements of our best and brightest medical researchers, highlighting the benefits to all Australians that come from their work. They have produced tangible, life changing results in areas including cancer, mother and baby health, auto-immune diseases, cardiac health and post-traumatic stress disorder.

I am pleased that the Australian government can support the best health and medical research through the NHMRC. We know that Australian researchers will continue to help improve the health of all Australians.

The Hon Mark Butler, MP

Minister for Mental Health and Ageing

Successful team, successful research

Professor Warwick Anderson AM, CEO NHMRC

Research has always been led by original thinkers, people who have identified a problem or a gap in knowledge and have sought a solution.

However research is rarely about one person, it takes a team. Today's research is multi disciplinary. For example geneticists work with neuroscientists and neurologists to grow new neurons in the brain. Public health researchers work with microbiologists to track sexually transmitted diseases in the community.

Development of teams and teamwork reflects the complexity of modern science. Depth of knowledge comes from specialisation. However, research success so often comes from specialists working together to contribute to a common task. It also reflects the nature of the human condition. No aspect of human life or human functioning is separate from all others.

Although '10 of the Best' profiles individual researchers, all of these people acknowledge the contribution and support of their colleagues and peers. The Honour Role at the end of this publication names their research associates. Associates without whom these projects would not have succeeded.

The NHMRC is very proud to be a partner in the research team. Without the funding support provided by the Australian Government, through the NHMRC, the research projects in this booklet are unlikely to have happened. As NHMRC approaches its 75th Anniversary in 2011, we look forward to supporting many of Australia's most outstanding researchers into the future.

Professor Warwick Anderson AM
Chief Executive Officer
National Health and Medical
Research Council

New brainer

Perry Bartlett

Project title:

Regulation of neural cell production in the normal and diseased brain

Chief investigator:

Professor Perry F Bartlett

Funding:

NHMRC invested $7.9 million in this project between 2004 – 2008

Refreshing memory with stem cells

"What younger students need is a question they want to answer—it's not about collecting data it's about going out and finding that answer—that's the thrill of medical research."

It was only after he had done a PhD in immunology that Perry Bartlett found the question he wanted to answer.

"I thought 'what is the really big question in biomedical science?' and it really is about how the brain works – that's who we are."

This quest took him into the field of neuroscience where he has had a "long and rewarding career".

"It takes persistence and you have to be committed to the long term to be successful."

Almost 20 years ago he was a co-discoverer of the fact that brains grow new cells, and in 2008 his team at the Queensland Brain Institute discovered stem cells in the hippocampus, a section of the brain which is crucial to memory.

They have since identified mechanisms which promote formation of new neurons from these stem cells, and others which inhibit their formation.

"There seems to be a bit of yin and yang – as you get older the inhibitory molecules tend to outweigh the effect of the activating molecules," he says.

"I've been involved in this renaissance of understanding brain function for around 30 years. Now I can see the end of the road coming where we will have molecules that can be used pharmaceutically to stimulate the production of new nerve cells."

This holds out great hope for treatments which can halt and even reverse dementia which now affects more than 250,000 Australians and is predicted to affect over a million of us by 2050, while brain damage caused by stroke or traumatic injury could also be repaired.

Shock tactician

Richard Bryant

Project title:

Posttraumatic Mental Health: Enhancing Resilience and Recovery

Chief investigator:

Professor Richard Bryant

Funding:

NHMRC invested $477 000 in this project between 2004–2008

Getting smarter at treating trauma

"Many people suffer psychological problems following trauma, but we know relatively little about why some people are able to be resilient while others develop mental health problems."

Professor Richard Bryant chose his area of research because he saw an unmet human need.

"Posttraumatic mental health effects are not frequently recognised, so the majority of people who suffer these long-term effects will not be identified and will not receive appropriate treatment," Richard says.

Two of every three Australians experience a severe traumatic event during their lifetime. Most cope reasonably well, while many others suffer posttraumatic stress disorder (PTSD) which can lead to chronic mental health problems.

Identifying people at risk of PTSD after a traumatic event and how to support them is the aim of the research Richard leads at the School of Psychology at the University of New South Wales and the Brain Dynamics Centre, Westmead Millenium Institute.

"We are integrating cutting-edge science from genetic, animal neuroscience, and emotion research to inform how people respond to trauma and how we treat people affected by posttraumatic stress conditions," Richard says.

Richard and his team monitored more than 1000 traumatic injury patients for up to 6 years, conducted brain scans and genetic profiling of PTSD sufferers and others, undertook surveys to assess posttraumatic mental health in other countries, and trialled a range of treatments.

They found that 25% of trauma sufferers have a mental health condition a year later, that a range of genetic, neurological and other risk factors contribute to resilience, and early intervention after a trauma can avert the condition.

This knowledge is now benefitting Australians who experience trauma. To make this kind of difference in medical research, Richard says it is best to choose a topic that excites you and imagine where the research field will be in five years time.

"A novel idea or research question is the most important ingredient."

Sexual healer

Suzanne Garland

Project title:

Infectious diseases research in reproductive health: Particularly of women and babies

Chief investigator:

Professor Suzanne Garland

Funding:

NHMRC invested $372 750 in this project between 2004–2008

Making Australian women healthier

"In an individual's lifetime one does not always see much advancement, yet I saw the proof that human papillomaviruses cause cervical cancer, vaccines being developed, and now we are seeing the benefits of the vaccine."

When Suzanne Garland was a young registrar at the Royal Women's Hospital Melbourne she saw too many babies suffering from Streptococcus B infections contracted from their mothers. Nowadays this is rare, thanks to research at RWH which led to the screening of pregnant women and antibiotic treatment for those carrying the infection.

"Seeing things at the bedside, going back to the laboratory to test an idea, then translating successful findings back to the bedside has been very rewarding," Suzanne says.

Commitment to research and its application characterizes her career. As Director of Clinical Microbiology at RWH, for 15 years she informed her research by treating patients at Melbourne's Sexual Health Clinic.

This mix of clinical, diagnostic and research experience enabled her to make a major contribution to human papillomavirus (HPV) vaccines. As leader of the phase 3 human trials of the vaccine invented by researchers led by Australia's Ian Frazer, her work showed HPV vaccines were effective and safe. She also led a large study of women in remote, rural and urban Australia to define the frequency of various strains of HPV, data which provides the baseline against which effectiveness of Australia's vaccine program is assessed.

She was guided by senior researchers in her early career, and sees mentoring as an increasingly important part of her work. While encouraging people to choose a career in medical research, she cautions that success requires mental toughness and hard work driven by passionate self-belief.

"When I was first working on HPV many laughed or thought I was barking up the wrong tree, but I have a principle of no matter how hard the going, persistence pays."

Targeting tumours

Martin Lackmann

Project title:

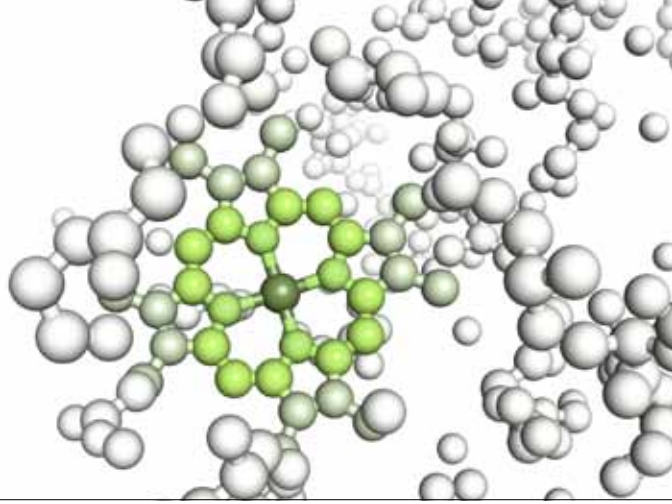
The role of EphA3 in tumour growth, invasion and neo-vascularisation

Chief investigator:

Associate Professor Martin Lackmann

Funding:

NHMRC invested $632 875 in this project between 2006–2008



Starving cancer with creativity

"My interest in medical research goes back to my high school days when I wrote my first essay on the mysteries of cancer and the difficulties in its treatment."

Diagnosis of cancer is bad news, being told that cancer is spreading is even worse.

Secondary tumours – known as metastatic cancer – claim some 8 million lives each year, making it the leading cause of death worldwide.

Nipping metastatic cancers in the bud is the goal of Martin Lackmann, Head of the Protein Interaction and Cancer Research Laboratory at Monash University. His target is a protein dubbed EphA3, present on the surface of cells that form blood vessels for growing and spreading tumours.

EphA3 was first identified on leukemia cells by his friend and collaborator Andrew Boyd. Together they discovered that it also controls positioning of cells during early embryo development.

"I speculated that this function during early embryogenesis and its presence on tumour cells are not coincidental but point to a mechanism occurring during tumour progression," Martin says.

"Proving this hypothesis and yielding a novel therapeutic that may help in treatment of cancer patients is one of the most decisive highlights in my scientific career."

In collaboration with Boyd, colleague Andrew Scott and a pharmaceutical company, he developed an antibody which targets EphA3 on leukemias, destroys the integrity of new tumour blood vessels and arrest the growth of other cancers.

As the team prepares for the first human trials of this treatment, Martin relishes the practice and rewards of science which he recommends as a fundamentally creative career.

"The unique attraction of medical research is an opportunity to combine intuition with the growing knowledge that develops from critical review of documented findings, to discover fundamental concepts of life."

Team leader

Peter Morris

Project title:

Development of evaluation of a primary health care model to prevent dental decay in Aboriginal preschool children

Chief investigator:

Associate Professor Peter Morris

Funding:

NHMRC invested $1.6 million in this project between 2005–2008

Saving teeth in the Territory

"The biggest challenge in these projects is achieving adequate follow-up of children in mobile families all over the Northern Territory, luckily we had a team that wouldn't give up."

Health checks of Aboriginal children living in remote Northern Territory communities in 2009 found more than 50% suffering from both untreated tooth decay and gum disease.

"The lack of water fluoridation, irregular brushing with fluoride toothpaste, and inappropriate diet are all contributing factors," says Associate Professor Peter Morris of the Menzies School of Health Research at Charles Darwin University.

"But despite the prevalence of the problem, experienced clinicians had become sceptical that improved health care might have a role to play."

Peter's job is about researching ways to improve the health of Indigenous children, so he set out to test this scepticism with a randomised controlled trial.

Joining with the Australian Research Centre for Population Oral Health at the University of Adelaide, he and his Darwin-based team applied fluoride directly to the teeth of young Indigenous children, four times over two years. This was done in combination with training for health staff, health promotion campaigns, and support for clinic, school and store programs to encourage tooth brushing and drinking water.

When they compared the teeth of the treated children with children in other communities randomly assigned to routine care, they found up to 36% fewer cavities. This led the NT Department of Heath and Families to undertake treatment programs which are putting the findings into practice.

"Seeing research translated into action doesn't happen very often so I feel very lucky to see it happen so promptly with this project," Peter says. "It is an excellent example of collaborative research which is delivering improved basic health outcomes to the most disadvantaged Australians."

It is also an excellent example of why he prefers doing 'useful' rather than 'interesting' research.

"I don't think there are many more stimulating jobs."

Young entrepreneur

Kevin Pfleger

Project title:

Peter Doherty Fellowship

Chief investigator:

Associate Professor Kevin Pfleger

Funding:

NHMRC invested $264 000 in this project between 2005–2008

Helping cells take their medicine

"Commercialisation enables discoveries in medical research to have an impact beyond the academic arena by transferring knowledge to the pharmaceutical industry so they can develop better drugs, and the revenue generated can then fund more research."

As Chief Scientific Officer of a company commercialising his discoveries, at the age of 33 Kevin Pfleger is on the way to fulfilling the goals he set when he chose a career in medical science.

"I am passionate about my research because I truly believe the discoveries we are making in the laboratory are incremental steps towards improving the health and quality of life of patients, the reason I was attracted to medical research in the first place," Kevin says.

At the Western Australian Institute for Medical Research and University of Western Australia, where he is a Research Associate Professor and head of Molecular Endocrinology, his work focuses on a group of proteins that regulate how cells respond to hormones and neurotransmitters. These 'G protein-coupled receptors' - GPCRs - are targeted by up to 50% of medicines, so improving our knowledge of how they operate will lead to better drugs with fewer side effects.

He and his colleagues have invented a method to investigate interactions of GPCRs, the key technology being developed by spin-out company Dimerix Bioscience, with 16 patent applications arising from this project.

Inspired by "fantastic teachers and exceptional lecturers", he cautions that medical research is highly-competitive. Achievement requires hard work, strength of character and an understanding family. The most important ingredient is teamwork.

"It's not easy, but with everyone working together, believing in what they are doing, incredible things are possible - every great scientist has a great team behind them."

Early interventionist

Susan Prescott

Project title:

Early prevention of allergic disease using non invasive interventions in pregnancy and the early postnatal period

Chief investigator:

Professor Susan Prescott

Funding:

NHMRC invested $292 250 in this project between 2003–2008

Nipping allergies in the bud

"I'm in the wonderful position of being a clinician who can take important questions of improving child health from the clinic to the laboratory and back again."

Professor Susan Prescott divides her time between the clinics of Perth's Princess Margaret Hospital for Children and the School of Paediatrics and Child Health at the University of Western Australia.

"Working in the clinic gives direct meaning to basic laboratory research, and real opportunities to test new ideas and to translate discoveries into everyday practice to improve patient care," says Prescott, whose research is revealing how susceptibility to allergies and auto-immune diseases is determined by life in the womb and soon after birth.

Around a quarter of Australian children suffer allergies or auto-immune diseases and the incidence is rising—over the last decade the number of children with serious food allergies has increased five-fold.

Prescott's research focuses on how mothers' exposure to dietary and other environmental factors can affect development of their children's immune systems, and how rising rates of maternal allergy might be amplifying the effects of these environmental changes.

Her team has discovered unique differences in immune function evident in allergic children at birth, before any symptoms have appeared. By tracking the immune responses to bacteria in the first five years of life, they are finding "quite striking differences" between healthy children and those who develop allergic conditions.

When it comes to choosing a career in medical research she believes "follow your heart because you have to do something you love".

"Doing research and science help you feel part of an international community of people who are all working on a common goal to improve our future health, which is very exciting and nourishing for the soul."

Cardiac defender

Chris Semsarian

Project title:

Molecular studies in hypertrophic cardiomyopathy

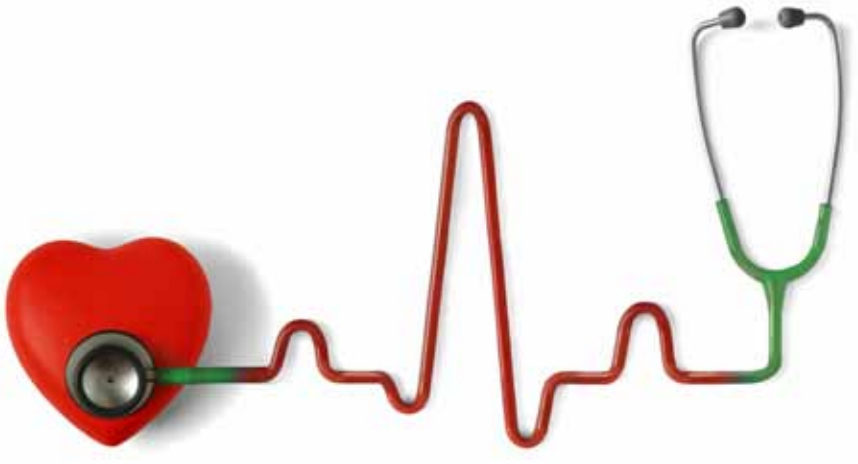
Chief investigator:

Professor Chris Semsarian

Funding:

NHMRC invested $377 775 in this project between 2004–2008

Genetic detective on the heart beat



"My ultimate goal is to improve the heart health of all Australians."

A healthy young man collapsed and died while running along a beach. His parents wanted to know why, and how to ensure their younger children did not suffer the same fate.

"I had no answers, nor did the world," says Chris Semsarian, then a trainee cardiologist.

"That encounter triggered my research interest in cardiac diseases in the young, and specifically genetic heart diseases which can lead to sudden death."

Now Professor of Medicine with the Centenary Institute at the University of Sydney, he leads research into hypertrophic cardiomyopathy (HCM), the condition which claimed the young man's life and is the most common of at least 40 cardiovascular genetic disorders, affecting around one in every 500 people.

His research has identified new genes involved in HCM, and how they cause heart muscles to thicken and become less efficient. It also delivered a paradigm shift in our understanding of genetic diseases with the discovery that some families with severe HCM carried two genes associated with the disease.

This has led to improved diagnosis, therapies to prevent complications, and better risk management to prevent heart failure and sudden death in patients with genetic cardiovascular disease.

"My role as a cardiologist and medical researcher is to be the critical link to translate our research discoveries to the clinical setting, with the goal to improve the heart health of our community," Chris says.

He acknowledges that while medical research is "tough, demanding, challenging, with many ups and downs", it offers more profound fulfilments than any other career.

"The ultimate reward is seeing your discoveries improving the health of your patients, and in the case of prevention of sudden death, actually saving peoples' lives."

Smoke signals

Melanie Wakefield

Project title:

Effects of anti-smoking advertising, press coverage and tobacco control policies on smoking prevalence and consumption

Chief investigator:

Professor Melanie Wakefield

Funding:

NHMRC invested $357 000 in this project between 2006–2008

Decoding a success story

"We have seen massive advances in helping people quit smoking and reducing the proportion of adolescents who take up smoking in Australia—it's a public health triumph."

Since 1980 the proportion of Australian adults who smoke has halved to under 20%. Over that time we have seen increased taxes on tobacco, new smoke-free regimes in restaurants and workplaces, improved stop smoking services and medications, restrictions on tobacco marketing, and anti-smoking advertising campaigns. Which had the most effect?

Melanie Wakefield and her team at Cancer Council Victoria's Centre for Behavioural Research in Cancer answered that question by interrogating data on smoking behaviour from a monthly survey by a commercial pollster beginning from the early 1990s.

"We used advanced data analysis methods to disentangle the effects of these various policies and the two that came up as by far the most important were increasing the price of cigarettes and greater exposure to anti-smoking television campaigns," Melanie says.

"Our research was able to show that they do have an effect at a population level on reducing smoking prevalence - that was tremendously exciting."

With a degree in psychology and a PhD in community medicine, Melanie has always been intrigued by decisions people make about their health behaviour.

"As time went on I moved away from the psychology of decisions made by individuals to understanding the bigger picture at the population level. I became interested in large-scale policies – the population is my laboratory."

She believes "innate curiosity into why things are the way they are" is a necessary prerequisite for a career in medical research.

"Being tenacious and persistent has also been very important for me, because the issues we investigate are complex. You need to be patient to unravel them, because often the first answer that presents itself is not the right one."

Memory saver

Anthony White

Project title:

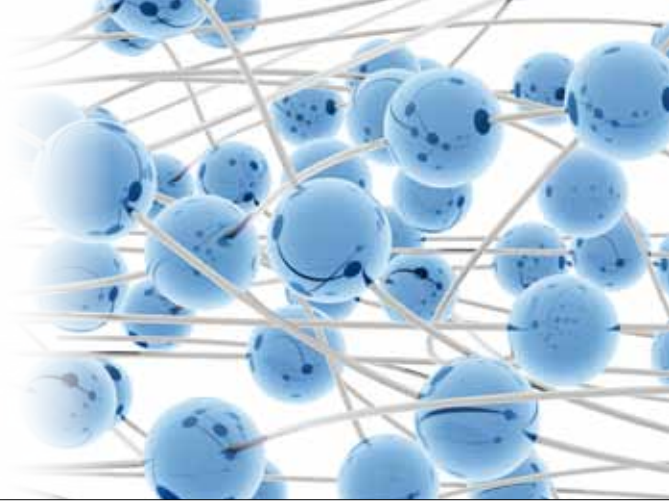
R.D. Wright Career Development Award

Chief investigator:

Dr Anthony White

Funding:

NHMRC invested $444 500 in this project between 2004–2008



Balancing metals in the brain

"This is one of the few opportunities in Alzheimer's disease research to rectify the underlying basis of brain cell dysfunction rather than targeting the consequences of the disease process."

Our bodies need a range of metals to keep us healthy, but changes in the way the brain handles biometals such as copper and zinc are associated with neurodegenerative conditions such as Alzheimer's disease.

The traditional view of these diseases is that biometals accumulate and generate toxic free radicals which cause neuronal cell death, but research led by Dr Anthony White at the University of Melbourne has shown that restoring the correct metal balance and distribution in brain cells can help restore neuronal function.

"In models of Alzheimer's disease treated with our metal-complexes, we have seen potent reversal of several key features that occur in the brains of Alzheimer's disease patients," Anthony says.

"Our growing understanding of how these metal-complexes work is rapidly expanding the opportunities to target other forms of neurodegeneration such as Parkinson's disease and motor neuron disease."

The number of Australians suffering from Alzheimer's disease is expected to increase three-fold by 2050, a daunting statistic which motivates Anthony in his quest to develop new curative treatments which could halt the progress of disease and restore normal neuronal and memory function.

Attracted to medical research by a fascination with the complexity of the brain and how signaling pathways control brain function, he recommends it as a challenging and rewarding career.

"In a world where much of the focus is on the individual, this is a field where you can really make a difference for many people."

Honour roll

Professor Perry Bartlett

Seong-Seng Tan
Trevor Kilpatrick
Pankaj Sah
Tara Walker
Toby Merson
Dhanisha Jhaveri

Professor Richard Bryant

Derrick Silove
Alexander McFarlane
Mark Creamer
Richard Clark

Professor Suzanne Marie Garland

Sepehr Tabrizi
John Wark
Colin Morley

10 of the Best Research Projects

Susan Jacobs
Christopher Fairley
Michael Quinn
Marian Pitts
Jeffrey Tan
John Condon
Jacinta Tobin
Catriona Bradshaw
Basil Donovan
Jane Hocking
Matthew Stevens
Andrew Daley
Julia Brotherton
Alice Rumbold
Dorota Gertig
Marian Saville
Shelley Rowlands

Associate Professor Martin Lackmann

Mary Vail
Christopher Vearing
Peter Janes
Catherine To
Eva Nievergall
Andrew M. Scott
Fook-Thean Lee
Carmel Murone
Cassandra Thumwood
Andrew W. Boyd
Fiona Smith
Trina Yeadon
Daniela Cilloni
Dimitar Nikolov
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Associate Professor Peter Stanley Morris

Gary Slade
Ross Bailie
Kaye Robert-Thomson
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Bruce Simmons
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Angie Perry-Mansell
Brenda Bochman
Mercedes Mambort
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Penny Brown
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Natalia Sampaio
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Ruth Seeber
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Meri Tulic
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Nina D'Vaz
David Martino
Suzanne Meldrum
Jess Metcalfe
Suzi McCarthy
Sarah Partridge
Sharon Nichols
Rachel West

Professor Christopher Semsarian

Jodie Ingles
Christine Chiu
Emily Tu
Matthew Kelly
Lan Nguyen
Ju-En Tan
Alessandra Doolan
Laura Yeates
Tatiana Tsoutsman
Richard Bagnall

Professor Melanie Wakefield

Sarah Durkin
Matthew Spittal
Michelle Scollo
David Hill
Victoria White
Julie Simpson
Mohammad Siahpush
Simon Chapman
Roy Morgan Research Pty Ltd

Dr Anthony Robert White

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