

Neuroscience Research Australia

Annual Report 2023



Contents

Chair & CEO welcome message	1
Our impact	2
Contributing to global knowledge	
Neurodegeneration	4
Putting dementia prevention on the map	
Aboriginal ageing and brain health	
Deepening our understanding of Parkinson's disease	
Mental health	10
Solving the puzzle of schizophrenia	
Uncovering the science behind wellbeing	
Understanding the emotional brain	
Cracking the code to bipolar disorder	
Lifting the lid on the brain and immune system	
Translational neuroscience	16
Decoding the complexities of pain	
Standing up for falls prevention	
Advancing spinal cord injury research	
Accelerating progress in road safety research	
Lighting the way for better sleep solutions	
Touching the future of prosthetic design	
Research facilities	22
Putting the brain in focus	
Unlocking the mysteries of the brain and mind	
Charting the course for neuroscience	
PhD Pearl Program	26
Investing in the innovators of tomorrow	
Community engagement	28
Our governance	30
From our Foundation Chair	
Our Board	
Finance	32
In gratitude	33

Front cover image:
A 3D rendered image of
interconnected neural
circuits in the brain.

Welcome



The past year has marked a pivotal moment in the history of Neuroscience Research Australia (NeuRA), filled with positive changes and a focus on moving forward. As we celebrated our 30th anniversary, we embraced a period of transformative change within our organisation. The Governing Council transitioned into the Board of Directors, allowing Mindgardens to become an independent entity. I am honoured to have been appointed as the Chair of the reconstituted NeuRA Board, alongside Deputy Chair Kirsten O'Doherty. We express our deep gratitude to Justice Anna Katzmann and Alice Kase and the Hon John Watkins AM, who retired during 2022 for their outstanding contributions to NeuRA. We also welcome three new Directors: Professors Sven Rogge and Chris White and Dr Debra Graves.

In 2022, we bid farewell to our remarkable Chief Executive Officer, Professor Peter Schofield AO, who shaped NeuRA into a highly impactful research institution. With 28 research groups focused on brain and nervous system disorders, we continue to make a difference in people's lives.

As we enter a new era, Carole Renouf, formerly Foundation Director, serves as our Interim CEO while we confirm a new leader. With the support of our partners, the University of New South Wales and the South Eastern Sydney Local Health District, I am confident that as we work through this period of organisational renewal, NeuRA will emerge stronger, better and even more capable of discovering solutions for neurodegeneration, mental health and healthy ageing through world-class medical research.

James MacNevin BA GAICD

Chair



Organisational change can bring turbulence. I am therefore very pleased to report that NeuRA has experienced smooth sailing and continued to achieve novel and useful research outcomes.

A landmark event was the multi-million dollar gift by the Kinghorn Foundation to recruit the Kinghorn Chair, Neurodegeneration. Professor Carolyn Sue AM took up this position and the majority of her research and clinical teams relocated along with her, providing an instant boost to NeuRA's capacity to tackle Parkinson's disease – the fastest growing neurological condition of our time. We are proud to now have opened Parkinson's clinics at NeuRA, where patients can access the best care and the latest clinical trials. Professor Sue will also build a world-renowned centre for mitochondrial disease and donation.

Just a couple of other research highlights this year include our Centre for Pain IMPACT securing a number of significant grants to develop interventions for people suffering from chronic low back and neck pain; and Professor Kaarin Anstey launching her dementia risk assessment tool, CogDrisk, for the over 40s.

With a reduction in both research grant income (\$19.8m) and donations income (\$5.9m) from the prior year and volatility in the investment market, our financial operating environment has been challenging. To offset this, expenses remained well controlled and our Professional Services teams are constantly striving to improve the support they provide to our research talent. My thanks go to all our staff for their focus on our purpose, and to all our donors for sharing that focus with us.

Carole Renouf

Interim Chief Executive Officer

Our impact

Contributing to global knowledge

22

clinical trials in 2022

294

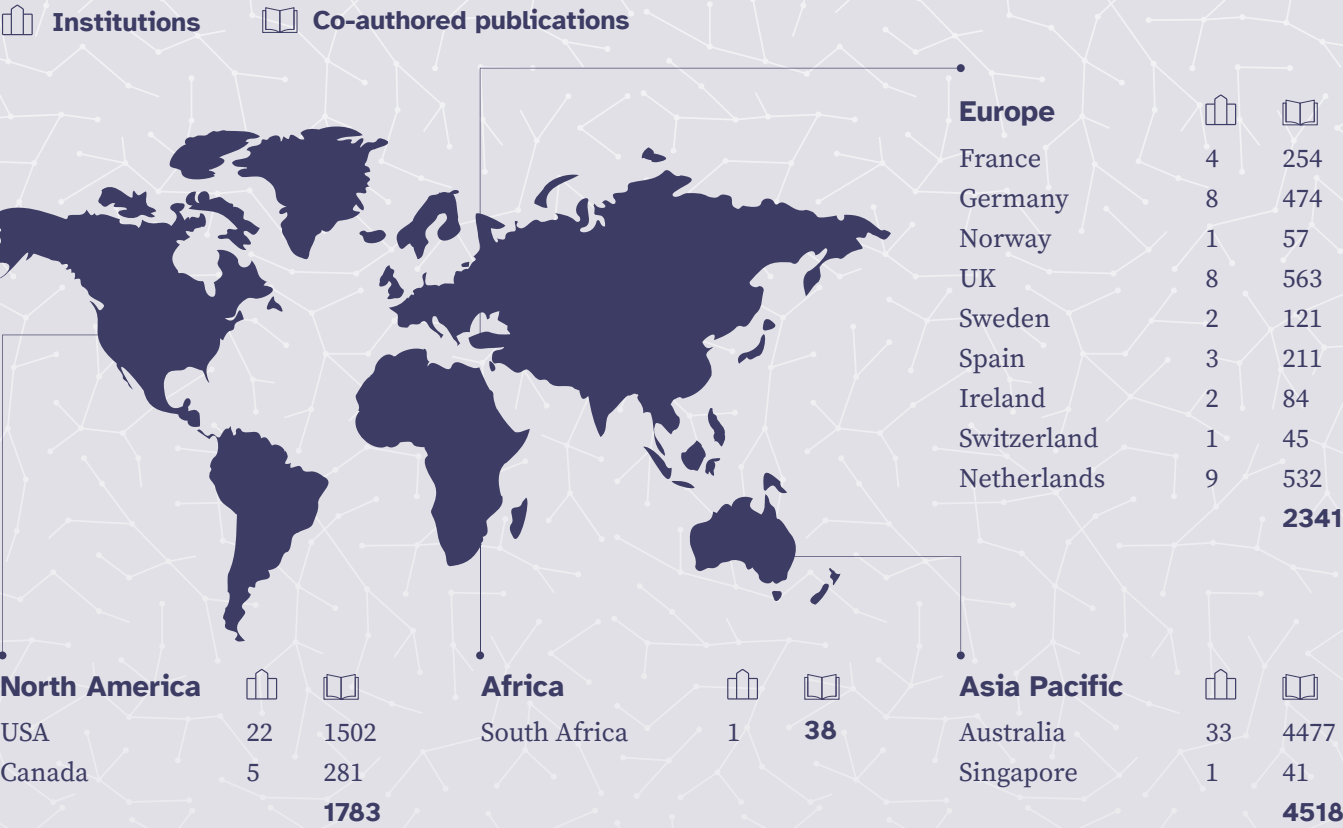
peer-reviewed original research publications in 2022

1,992

publications over the past five years. Each publication is a new piece of knowledge added to global neuroscience understanding.

Collaboration

Between 2017-2022 NeuRA researchers collaborated with institutions all over the world. Here's where our top 100 collaborating institutions are and how many co-authored publications we had:



Attracting support

Fundraising revenue

\$6m

Grant revenue

\$19.8m

Research grants 2022

New grants awarded to commence in 2022	38
Total grants active in 2022	157
Funding bodies supporting research in 2022	50
Prizes and awards received in 2022	26



As a medical research institute, we are continuously looking ahead to ensure we remain innovative, impactful and of service to both the scientific community and broader society. This year, we reaffirmed our commitment to both **gender equity** and **digital healthcare innovation**.



*Heather McCann, Manager,
Sydney Brain Bank*

A thriving workplace for gender equality

Promoting the participation of women and girls in science, technology, engineering, and mathematics (STEM) is a key priority for the Australian Government. However, the STEM Equity Monitor reports that in 2022 across all STEM industries, women only made up 27 per cent of the workforce (1). This number decreases further when it comes to women in senior management and CEO roles.

NeuRA is proud to have a workforce that is 60 per cent female and 40 per cent male. To ensure a gender equitable workplace, we are committed to continuously reviewing policies and benefits such as flexible working, job sharing and parental leave schemes. A recent scheme introduced is NeuRA's Carer's Awards – a program which assists staff and students with primary carer responsibilities to maintain their scientific connections and engagement.

Advancing the digital revolution in healthcare

Apps for smart phones and wearables have provided opportunities to improve healthcare and approaches for providers and clinicians. The pandemic in particular demonstrated the flexibility of e-health and since then, healthcare apps have taken off.

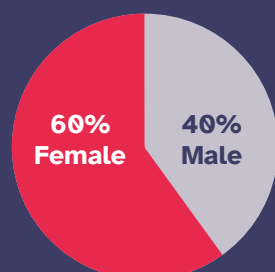
NeuRA is at the forefront of producing innovative apps and online tools which will assist in personalised, digital healthcare. This year, we made significant strides in the development of three digital tools: CogDrisk, ReNeuWell and StandingTall.

CogDrisk is an online tool which provides a personalised dementia risk report that patients can discuss with their doctor. NeuRA researchers evaluated the success of the tool and found that it is effective at predicting dementia across various populations. CogDrisk is a free resource, available to the general public and GPs online: www.cogdrisk.neura.edu.au

ReNeuWell is an app that measures wellbeing and guides users through techniques to improve resilience. Earlier this year, Associate Professor Justine Gatt's team secured funding to evaluate the app's effectiveness through randomised control trials. The app will be available to iPhone users soon.

StandingTall is a technology-based balance exercise program designed to prevent falls in older people. Professor Kim Delbaere recently received an NHMRC Development Grant to commercialise the program. This will provide cost-effective fall prevention solutions that can be done at home, unsupervised, through a tablet computer.

(1) Source: www.industry.gov.au/news/state-stem-gender-equity-2022



NeuRA is proud to have a workforce that is 60 per cent female and 40 per cent male – well ahead of the average for Australia's STEM industries.



Neurodegeneration

Improving brain health through collaboration and innovation

Putting dementia prevention on the map

Health problem

Today, there's an estimated 487,000 Australians living with dementia. Without a major medical breakthrough this is tipped to reach over one million people by 2050, fuelled by our rapidly ageing population. The implications of dementia are far-reaching, affecting not only the individuals diagnosed, but also their families, carers and our broader society. Dementia places a heavy burden on resources, costing our health and aged care systems an estimated \$3 billion per year due to the need for specialised care and support services to address the complex needs of those affected.

Our solution

Under the leadership of Scientia Professor Kaarin Anstey, our work at NeuRA takes a multifaceted approach to understanding dementia. We develop tools for individuals to assess their dementia risk and aid clinicians in improving risk reduction plans. This year saw the launch of CogDrisk, an online risk calculator which empowers individuals to assess their likelihood of developing dementia and provides personalised advice on prevention. Our researchers also conducted a comprehensive analysis of global sex differences in dementia incidence and prevalence with a view to deepen our understanding of how to effectively prevent and treat dementias.

More than
50 million people
have **dementia** worldwide



with this number set to
triple by 2050



Supporter Spotlight

“Medical research is all about looking to the future and finding answers for what we don't understand today. I hope we can identify the early markers for dementia to arrest the decline for people with the disease. If science can help us on this path, I'm hopeful we'll create a better and brighter future.”

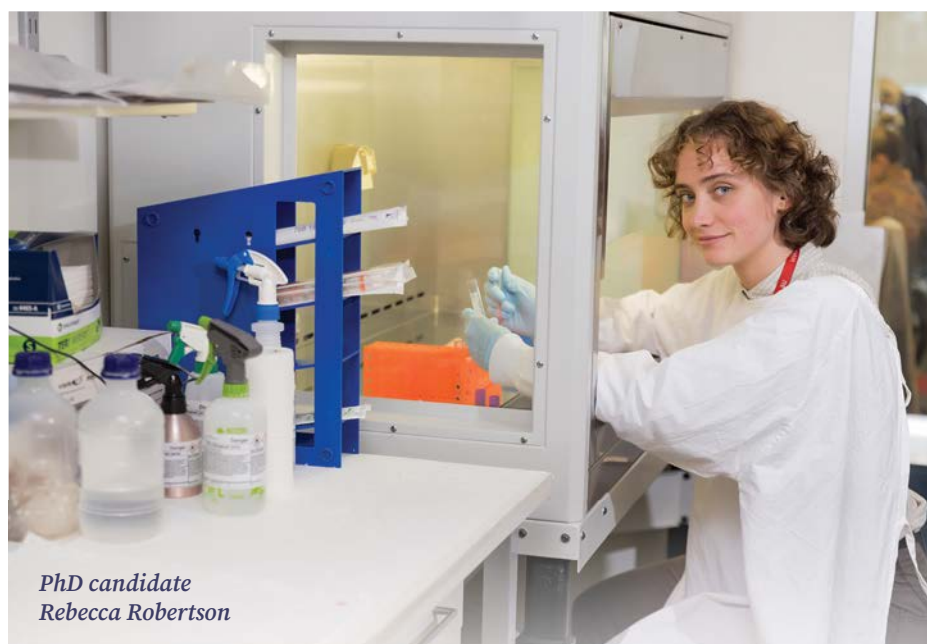
Jacob Mamutil



Participant Spotlight

“My late father was a participant in NeuRA's D.I.A.N study 15 years ago. Through this, we learned that he carried a gene linked to frontotemporal dementia and motor neurone disease. It was so important as it made me and my brothers aware of what could happen to us. It was an anxious time for our family but learning about the research and having NeuRA as part of our support network was invaluable.”

Lizzi Mallett



PhD candidate
Rebecca Robertson



There are
244 new cases
of dementia
every day

Researcher Perspectives

“I joined NeuRA around five years ago to lead a team focused on healthy ageing research, with a specific emphasis on dementia prevention and care within the Australian community.

I am a researcher but I have also been through the family experience of having a parent diagnosed with dementia.

Dementia is a terrible disease because it can steal years of life from people. As researchers, we want to improve the quality of life for people with dementia and promote healthy ageing. If there's one thing I hope research can achieve it's to stop cognitive decline. There's no point

having a long life if you do not have your cognition.

Something I'm proud of is seeing how far dementia prevention research has come, and knowing the role we have played in that. When I started my career in dementia research in the early 2000s, people didn't talk about prevention – it wasn't a disease that was seen as preventable.

Today, dementia prevention has become much more mainstream, as well as a policy concern. And that's because the research has been accumulating to understand the modifiable risk factors of the disease.”

Scientia Professor Kaarin Anstey



Research Progress

In 2023, Professor Anstey was invited to address global health ministers and policymakers at the Asia-Pacific Economic Cooperation's Regional Workshop on Dementia Prevention. Professor Anstey presented NeuRA's research impact in dementia prevention and reinforced the need for urgent and unified global action.

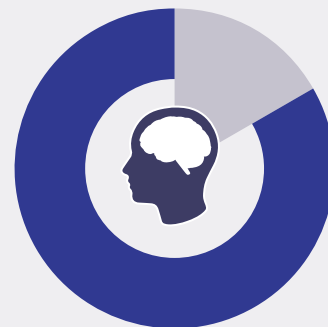
Aboriginal ageing and brain health

Health problem

Older Aboriginal and Torres Strait Islander people hold important leadership, knowledge transfer, and care roles in their communities. Whilst many people are ageing well, Aboriginal and Torres Strait Islander people experience dementia at rates that are three to five times higher than the broader Australian population. This needs to be addressed so that Aboriginal Elders can continue to lead their communities.

Our solution

NeuRA's Aboriginal Health and Ageing group adopts a holistic approach to healthy ageing in Aboriginal communities in New South Wales. Co-designed with Aboriginal and non-Aboriginal community members and health experts, the StandingTall with Our Mob Project (STOMP!) comprises three main components: a home-based balance exercise and brain training program called StandingTall, a group-based culturally grounded mindfulness program, and a tailored health education program.



Aboriginal people experience dementia at a rate **three to five times higher** than the general Australian population



Knowledge Translation with Uncle Terry Donovan

Uncle Terry Donovan is a Gumbaynggirr/Biripi Elder and has been a researcher in NeuRA's Aboriginal Health and Ageing team since 2017.

“As a knowledge translation facilitator, I help research teams to be culturally competent in how they talk to Aboriginal communities about what they do, in particular, about dementia. I also translate resources for the community, helping doctors, especially GPs, get a better understanding of Aboriginal people and their risks for dementia.

Health for Aboriginal people is not just about the individual. It's about their environment, community and importantly, it's about culture.

When I first joined NeuRA, we were one of the few organisations approaching dementia research in partnership with Aboriginal communities. Since then, other organisations have taken notice and followed this approach. Seeing that change has been so significant and feels like a win for us.”



🔗 Researcher Perspectives

"I'm originally from Adelaide and I did my PhD at the University of South Australia. My background is in psychology and cognitive neuroscience, and I've always been very passionate about ageing research.

Over five years ago, I was given the opportunity to come and work with the team here at NeuRA. Now I'm a Research Fellow in the Aboriginal Health and Ageing program, where I've been very lucky to work in partnership with communities and hear people's stories.

There is a pressing need to address the health inequities faced by Aboriginal and Torres Strait Islander peoples.

I love hearing feedback from participants and community members that they feel this research is really going to make a difference for them and for future generations. It's such important work – I can't imagine working anywhere else!"

Dr Louise Lavrencic
Research Fellow



NeuRA's Aboriginal Health and Ageing Group

Research Progress ▶

This year saw the wider roll out of Ngarraanga Giinganay ('Thinking Peacefully' in Gumbaynggirr language), a healthy ageing program co-designed and tailored by NeuRA researchers for the Gumbaynggirr community. Built on a partnership model, the program is about working closely with communities to improve wellbeing, health outcomes and quality of life for all Aboriginal and Torres Strait Islander people.

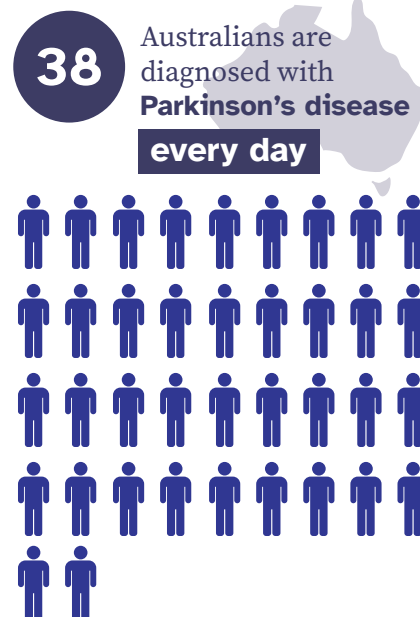
Deepening our understanding of Parkinson's disease

Health problem

Parkinson's disease is the second most prevalent neurological disorder in Australia after dementia. Every day, 38 Australians are diagnosed with the disease, and around 10 million people currently live with Parkinson's globally. Over the past six years, the number of people affected by Parkinson's has grown rapidly, increasing by 17 per cent. The most commonly recognised symptom of the disease is hand tremor, but it can also cause fatigue, speech and swallowing difficulties, loss of independence and in the later stages, dementia.

Our solution

Professor Carolyn Sue AM and her team are actively working to find better treatments for Parkinson's disease. The team's primary focus is to understand how mitochondrial function becomes impaired in patients with Parkinson's disease. Finding the answer to this will be key to developing strategies to restore mitochondrial function and prevent neuronal degeneration and cell death, potentially slowing down or even stopping the progression of Parkinson's disease.





Researcher Perspectives

“I recently made the exciting decision to relocate to NeuRA and bring over my research and clinical teams. I’m grateful for this opportunity from NeuRA, UNSW and the Randwick Health and Innovation Precinct. It demonstrates that translational research is worth investing in. I’m looking forward to the benefits that will come from more interaction between scientists and clinicians.

I’m a neurologist who is medically trained – I completed a PhD in mitochondrial genetics and went on to do postdoctoral training at Columbia University in mitochondrial genetics and movement disorders. This dual training deepened my understanding of the role of mitochondria in neurodegenerative diseases such as Parkinson’s disease.

Besides leading a research and clinical team, I am also deeply passionate about advocacy for people living with mitochondrial disease and their families. I led the bid to get diagnostic genetic testing onto the Medicare Benefits Scheme. We felt that patients in Australia did not have equitable access to genetic testing and yet the genetic test was critical to diagnosis. I was also proud to play a key role in having mitochondrial donation legalised by appearing at Senate hearings, advising government and working with lobbyists to get the legislation passed.”

Professor Carolyn Sue AM
Kinghorn Chair, Neurodegeneration

Research Progress ►

Professor Sue and her team have commenced a new research project that explores whether the Nix protein can improve mitochondrial function in people with gene mutations associated with Parkinson's. The team is working on a unique treatment, where it is hoped that overexpressing the Nix protein using gene therapy could boost energy to brain cells that die in Parkinson's, thereby halting disease progression.

Supporter Spotlight

“The Kinghorn Foundation is proud to have established the Kinghorn Chair, Neurodegeneration in conjunction with NeuRA, which is being led by the inaugural Chair, Professor Carolyn Sue AM. Professor Sue is a world-leading clinician and researcher who is aiming to find a way to slow the progression of Parkinson’s disease, amongst other goals. The Trustees recognise the need within the growing community to fund research into neurodegenerative conditions and are honoured to facilitate an achievement that could make such a difference to so many people.”

Lisa Kinghorn

“We all know that Parkinson’s is a degenerative disease but if we can find ways to slow or stop it, it gives us the time to find the holy grail of a cure.”

Clyde Campbell AM, Founder of Shake It Up Australia Foundation

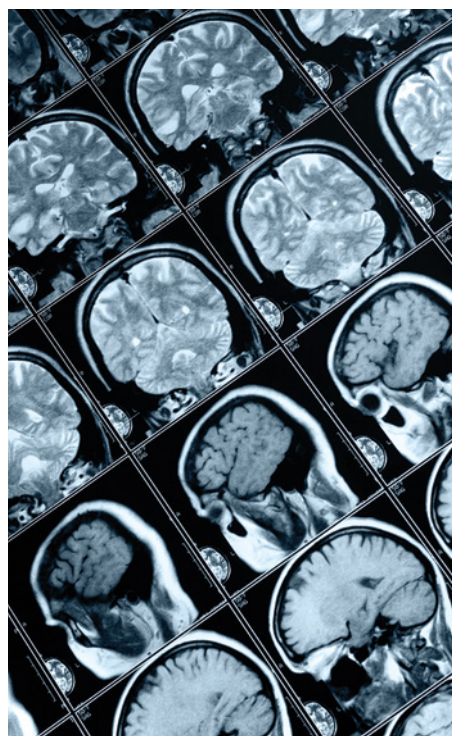
Together with The Michael J. Fox Foundation for Parkinson’s Research, Shake It Up Australia has provided funding towards our research into Nix gene therapy.



Mental health

Advancing positive mental health with collaboration and innovation

Solving the puzzle of schizophrenia



Health problem

Schizophrenia affects one in 100 Australians and roughly 20 million people worldwide. For 70–80 per cent of people with schizophrenia, it is a chronic, lifelong condition. It can result in unusual occurrences like hearing distressing voices and cognitive challenges such as difficulties with planning, problem solving, attention span, memory and social interactions. Current treatments focused only on alleviating psychosis – just one aspect of the condition – are ineffective in approximately 30 per cent of patients, and often have severe side effects.

Our solution

NeuRA's research is focused on understanding the underlying neurobiological causes of schizophrenia and finding new treatment targets that not only improve symptoms but ultimately, enhance quality of life for people affected. In 2022, our researchers secured two grants from the NSW Government's Schizophrenia Research Grants Program to support innovative translational and preclinical research.

Schizophrenia affects
1 in 100 Australians



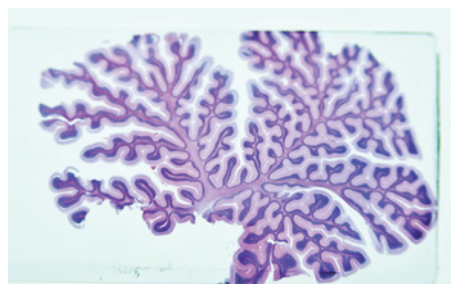
Researcher Perspectives

"I completed my PhD at Manchester University in the UK, and joined NeuRA in 2001 where I now lead a team of researchers in schizophrenia."

After I entered the field of schizophrenia research, due to my interest in oestrogen modulation of the brain, I realised what a hugely impactful and devastating disease it really is.

When I tell people I'm in schizophrenia research, almost half go on to tell me a personal story of someone in their family or extended network who has the disorder. For every individual diagnosed with schizophrenia, there's a far-reaching impact on families, carers and loved ones.

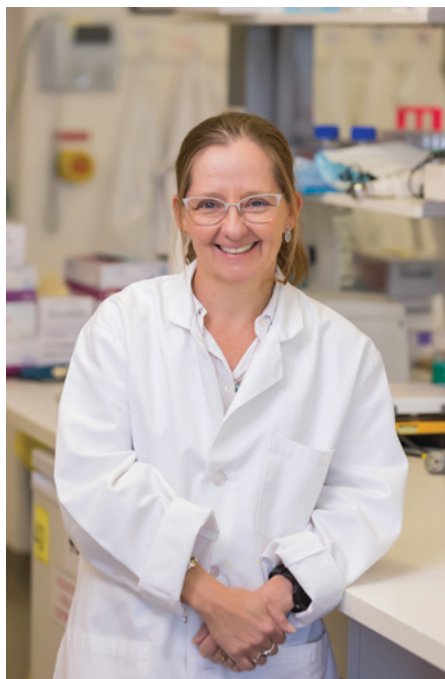
My research focuses on how different parts of the brain communicate with each other, and specifically how sex hormones like oestrogen modulate the brain. Fewer women are diagnosed with schizophrenia than men and we know oestrogen is protective after traumatic brain injury.



Brain tissue examined by Sydney Brain Bank researchers



For **70–80%** of people with **schizophrenia**, it is a **chronic, lifelong** condition



My hope is that our research will lead to the identification of novel targets for the development of new treatments for people with schizophrenia that will enable them to live to their fullest potential."

Dr Tertia Purves-Tyson
Research Fellow

"Schizophrenia is a condition that can be managed through therapies and other treatments, but it can take time to ensure it is right for the individual. That is why we are funding projects that will not only look at how we can use precision medicine to support a better treatment response, but also expand our understanding of schizophrenia itself."

The Hon Bronnie Taylor MLC
NSW Minister for Mental Health

Supporter Spotlight

"My father Don was a driving force for good in schizophrenia research and awareness after my brother Warwick was diagnosed at 15. Dad established what became the Schizophrenia Research Institute and campaigned tirelessly until a couple of weeks before his premature death at 79. He was also a force in the construction industry as National Secretary of the CFMEU, a Senior Australian of the Year finalist and was awarded an Order of Australia for his achievements in both schizophrenia research as well as the construction industry."

The Don and Warwick McDonald Award for Schizophrenia Research was set up to commemorate Warwick and Dad and is kindly funded by the CFMEU. My caring, generous and talented brother endured tough years once he was diagnosed, in and out of rehabilitation facilities until he was able to recognise his illness, stabilise and self-medicate.

Unfortunately during a period of transition to a new medication in the hope of fewer side effects, Warwick passed away at 44, due to medical mismanagement. Our family sincerely hopes to continue to see progress made in developing better treatments with less side effects and one day, a cure."

Craig McDonald

Research Progress ▶

Supported by a NSW Government Schizophrenia Research Grant, NeuRA researchers will embark on a new project to investigate how oxytocin, often known as the 'love hormone,' works within the brain. It is hoped that through finding new molecular pathways, this work will enable the improvement of three symptom domains of schizophrenia: cognition, negative symptoms and psychosis.

Uncovering the science behind wellbeing



Health problem

Mental health is arguably one of the biggest health challenges of our times. It touches each and every one of us at some point in our lives, and doesn't discriminate between age, gender or background. Studies show that one in five people experience mental illness at any given point in time, the most common being depression and anxiety. The impact of poor mental health has far-reaching impacts on wellbeing, productivity, social cohesion and overall quality of life, highlighting the urgent need to develop evidence-based interventions and reduce stigma for individuals touched by mental health challenges.

Our solution

Led by Associate Professor Justine Gatt and her team at NeuRA's Centre for Wellbeing, Resilience and Recovery, our research aims to understand the factors that predict optimal wellbeing and resilience. From an online wellbeing program targeted at healthcare workers to apps that offer science-backed advice on how to become more resilient, NeuRA's research leverages the latest technology to translate scientific knowledge into practical tools.

"It is important that all Australians have access to quality, affordable mental health care. Our government is determined to help improve the lives of people living with mental ill-health."

The Hon Emma McBride MP

Assistant Minister for Mental Health and Suicide Prevention

Researcher Perspectives

"I completed my PhD in psychology, which was focused on mental wellbeing, forgiveness and how to bounce back from mistreatment. Soon after, I went down a different career path and became a teacher in the private tertiary education sector. Ultimately, I missed academia so I explored ways to return to it.

By chance I saw my current position advertised at NeuRA, which is how I met my supervisor, Associate Professor Justine Gatt. Justine truly practises what she preaches. If you preach the value of wellbeing and resilience, you need to be open to people and their unique narratives. My career path wasn't that of the typical researcher but she gave me a chance.

In my day-to-day, I'm responsible for managing a few different projects, all of which involve applications of the COMPAS-W scale, Justine's measure of wellbeing that she created almost 10 years ago.

We've got a great team spirit in the lab. We're highly collaborative and have created genuine connections with each other. We take time to share our research findings, journal article recommendations or simply check in with each other over coffee. It's an environment that is incredibly supportive, stimulating and enriching and I feel privileged to be a part of it."

Dr Luke Egan
Research Assistant



Research Progress ►

After several years of development, researchers from NeuRA's Centre for Wellbeing, Resilience and Recovery are ready to release the ReNeuWell app. It uses the latest scientific evidence to provide personalised advice and education on how to build mental wellbeing and resilience to stress.

Understanding the emotional brain

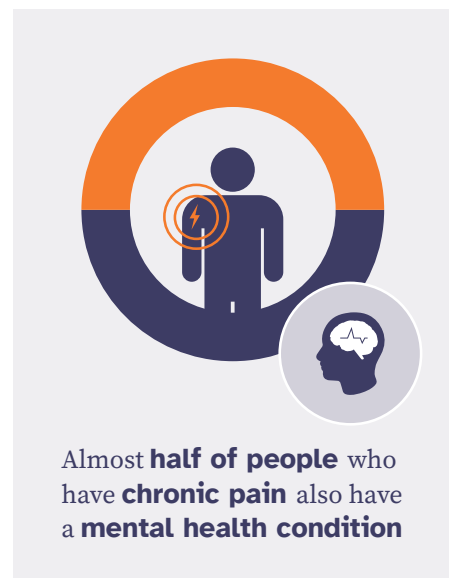
Health problem

More than 20 per cent of Australians experience chronic pain: an ongoing and often debilitating condition that can last from months to years. This persistent pain can impact many parts of a person's life, with almost half of those with chronic pain also experiencing depression and anxiety. This complex interplay not only negatively impacts overall wellbeing but poses significant challenges for healthcare providers.

More than **20%** of Australians experience **chronic pain**

Our solution

Led by Professor Sylvia Gustin and her team, NeuRA's research focuses on retraining the brain to aid recovery from chronic pain, spinal cord injury and mental health conditions. Notably, researchers have discovered that chronic pain can bring about physical changes in brain function that make it more challenging to control negative and depressive emotions. By deepening their understanding of the pain-mental health connection, researchers hope to improve how the mental health aspects of chronic pain are treated and reduce stigma for individuals affected.



■ A Meeting of Minds

Professor Sylvia Gustin and PhD candidate Nell Norman-Nott hope to improve quality of life for chronic pain sufferers through designing accessible and effective technology-based interventions.



Sylvia: "I trained as a clinical psychologist in Germany and migrated to Australia in 2007. NeuRA's reputation of being a great neuroscience institute led me to work here in 2015.

Nell came to work with me in 2020. She's a high achiever, having been a marketing leader in her previous career. Combine this determination with her natural motivation and technical knowledge, and I think she is the ideal person to have on my side.

What I enjoy the most about my work is simple: I like working with people who have brilliant minds, because two brilliant minds together achieve more than one.

I also enjoy working with people in my job, because when you work with people every day is a surprise. To know that I can change a person's life for the better through the work I do is incredibly rewarding."

Nell: "I had a 15-year career in media and marketing before I retrained in psychology.

Psychology has always been my passion – even as a marketer you're looking at people's behaviour.

I'd become aware of Sylvia's research so I reached out to her and started working at NeuRA soon after. My interests tied in really well with the research Sylvia was doing with people with chronic pain.

Now I'm a third year PhD candidate and I'm particularly interested in using technology to deliver psychological interventions for people with chronic pain.

Sylvia and I are in sync when it comes to our style of working. When we see a challenge, we both ask: 'How do we overcome that?'"

Research Progress ►

This year, Professor Gustin and Nell Norman-Nott launched a national trial of iDBT-Pain, an online emotional recovery program that equips individuals with chronic pain with self-regulation skills. Researchers are trialling whether normalising abnormal brain function and neurochemistry will ease emotional suffering and pain.

Cracking the code to **bipolar disorder**



In 2022, NeuRA published 22 peer-reviewed **research papers on bipolar disorder**

Health problem

Bipolar disorder is a serious mental health condition that is characterised by extreme mood swings. Despite affecting between one to three per cent of individuals worldwide, or around 40 million people, the disorder's underlying biological causes are yet to be fully discovered.

Our solution

While we don't yet know exactly what causes bipolar disorder, we do know it is a multifactorial condition, to which genetics contributes significantly. NeuRA's research, led by Associate Professor Jan Fullerton, examines the interplay between the genetic, environmental, and psychological factors that contribute to the complexity of bipolar disorder.



Researcher Perspectives



"Since 2006 I've been working on understanding the familial factors that contribute to the onset and development of bipolar disorder, as well as other major mental illnesses which tend to affect relatives of patients with bipolar disorder, including schizophrenia, major depression and anxiety. It is amazing to witness the explosion of new knowledge we have contributed to during this time.

I'm a geneticist by training, so a lot of our work looks at the genetic signatures that relate to major mental illness, and I collaborate often with other mental illness researchers at NeuRA who want to explore genetics. From the point of view of people and families affected by mental illness, understanding that these conditions have a genetic component, and what those genes are, is incredibly important because it helps to reduce stigma and provides hope (and targets) for improved therapies.

While genes are key to our research, we also know that they are only part of the story. Other factors affect the expression of genes. For instance, environmental exposures or changes in the brain that have taken place before the onset of symptoms can all have an impact. It's about understanding the whole picture.

My ultimate goal is to identify treatments that can help people with bipolar disorder. The tough challenge is that it's a complex

illness which does not have a single cause – there are multiple pathways to effective treatments. But what I do hope to achieve is to advance our understanding of the causes of the disorder so that we can find these treatment pathways and improve quality of life for people."

**Associate Professor
Jan Fullerton**
Principal Research Scientist

Research Progress ►

Associate Professor Fullerton presented her work on the Global Bipolar Cohort study at the World Congress of Psychiatry earlier this year. The study collects worldwide data on bipolar disorder, examining the impact of factors such as psychosis history, substance use, suicide attempts and cognitive ability on people with the disorder.

Lifting the lid on the brain and immune system

Health problem

Until recent decades, the profound interconnection between the brain and immune system remained largely unknown. This knowledge gap has hindered our ability to identify the right avenues for diagnosing, preventing, and treating conditions that involve both systems, such as autoimmune disorders, psychiatric disorders, and certain cancers. Collectively, these conditions impact the lives of millions of Australians, many of whom live with uncertainty over their future.

Our solution

On the surface, depression, schizophrenia, autism and cancer have little in common. However, research at NeuRA led by Dr Adam Walker has discovered a common thread: they are all impacted by the relationship between our immune system and brain. Researchers believe that improving our understanding of this connection will unlock better treatments for both neurological and psychiatric disorders.



Research Progress ►

NeuRA researchers have found that cancer can hijack the stress centres of the brain, making it harder for people to cope with the stress that accompanies their diagnosis. Researchers are now looking to deepen their understanding of this process in a bid to unlock better interventions for cancer patients.

■ A Meeting of Minds

Together, PhD candidate Delyse McCaffrey and Dr Adam Walker, group leader of NeuRA's Laboratory of ImmunoPsychiatry, research the intricate interplay between the immune system, inflammation and psychiatric disorders.



Delyse McCaffrey
and Dr Adam Walker

Adam: "I'm interested in how chronic inflammatory diseases, and in particular cancer, can give rise to symptoms of mental illness. Inflammation is a hallmark of cancer and we have a higher than ever population of people living with – and surviving – cancer so there's a very high incidence of psychiatric symptoms and side-effects.

While many refer to these symptoms as 'chemobrain', I have regular meetings with clinicians who are recognising symptoms prior to cancer treatment. So, we are actually changing the narrative. It's now become widely accepted that cancer itself can contribute to some of these problems.

Delyse is smart, eager, and works hard. It's great to be able to show Delyse the human side of our research through the people who visit the lab and have cognitive issues associated with their cancer long after being cured. The survivors love talking to the students, and Delyse is wonderful at interacting with them."

Delyse: "My work involves trying to track 'inflammatory embers' produced by cancer that travel from the tumour to the brain, to see if we can identify a unique inflammatory signature that we can target to extinguish the flames and help patients cope better with stress, memory problems, anxiety and depression.

I love working with Adam. He's very patient, he's got a great attitude towards learning and teaching, and he makes it fun.

Science can be challenging, and there's a lot of pressure and stress associated with doing a PhD, and Adam really helps take some of that stress away. He challenges me while also making me feel competent and capable."

Translational neuroscience

Translating neuroscience research into solutions with real-world impact

Decoding the complexities of pain

Health problem

Chronic pain is a complex and common health problem affecting over three million Australians. It can have far-reaching effects, affecting mental health with nearly half of chronic pain sufferers experiencing depression, as well as impacting sleep, family life, plus the ability to work, exercise and socialise.

1 in 5 (1.6 million)

Australians aged 45+ have chronic pain



Our solution

Researchers at NeuRA's Centre For Pain IMPACT take a multifactorial research approach. The team investigates chronic pain conditions from the most common, such as low back pain, to the rare and often debilitating, such as Complex Regional Pain Syndrome (CRPS). It is hoped that by understanding the underlying mechanisms of these conditions, researchers can unlock targeted and more effective prevention and treatment strategies.

✧ Participant Spotlight

"Previously, pain was constantly on my mind but since the trial, I no longer view myself as someone with chronic low back pain. I have even climbed Mount Kinabalu with my family. Never would I have thought I could achieve such a thing."



Carla Pennini
RESOLVE trial participant

Research Progress ►

The results of NeuRA's landmark RESOLVE trial for chronic back pain were published this year. Using sensorimotor retraining, which focuses on the brain rather than bone or muscular problems, the treatment displayed long-term benefits, doubling complete recovery rates and enhancing quality of life.

■ A Meeting of Minds



Professor James McAuley and Michael Ferraro

After a chance discovery of NeuRA's Centre for Pain IMPACT, Professor James McAuley was approached by Michael Ferraro out of the blue. Four years on, they are collaborators in researching one of the most complex pain conditions affecting Australians today.

James: "When I get approached by people who want to do PhDs, it's usually through a university or NeuRA colleague. Very rarely have I received an email from somebody external. So, when I got an email from Michael saying, "I'd like to do a PhD with you" I was intrigued.

Michael is an impressive researcher. His experience in the fitness industry prepared him so well for understanding the world of research and how new interventions might work.

Our main collaboration is in the MEMOIR trial, which is a clinical trial for people living with Complex Regional Pain Syndrome (CRPS). Michael runs the trial beautifully.

The best part of our collaboration is spending time debating various research methods. It's an ongoing expansion of our minds."

Michael: "I'm reasonably new to research, so I'm definitely still cutting my teeth. I did a degree in Health Science and joined James's group in 2019 to do my Honours – soon after, I was hooked.

One of the most unexpected learnings has been discovering that you can make a career out of research. It's still early days for me but I'm starting to carve out some clear research interests for various pain conditions that address evidence and practice gaps.

My favourite part of working with James is our vigorous debates. There's definitely a safe space in which we do that."

Standing up for falls prevention

Health problem

Falls are one of the most significant health and economic issues in Australia, with around 30 per cent of adults over 65 experiencing at least one fall per year. The treatment of injuries from falls cost the economy \$2.3 billion a year – but the impact runs deeper. Falls can be life-altering, with people often experience social isolation, anxiety and fear after a fall.

Our solution

Established in 2014, NeuRA's Falls, Balance, and Injury Research Centre brings together world-leading research groups led by Professor Stephen Lord, Professor Jacqueline Close, Professor Kim Delbaere and Dr Daina Sturnieks who specialise in studying human balance, identifying fall risk factors, and developing strategies to prevent falls and fall-related injuries. At the heart of the group's work is collaboration, which spans partnerships with policymakers, government, research institutes and community educators.

Research Progress ►

This year NeuRA researchers were invited to contribute to the World Falls Guidelines, a landmark publication which brought together falls prevention experts from 39 countries to provide recommendations on how to identify and assess the risk of falls.



■ A Meeting of Minds



Dr Jasmine Menant
and Dr Daina Sturnieks

Over the course of two decades, Dr Jasmine Menant and Dr Daina Sturnieks have strived to understand the causes of falls and designed effective interventions for prevention.

Daina: “I started working at NeuRA in 2003. I completed a PhD in biomechanics in Perth at UWA. During this time, I met Professor Stephen Lord who invited me to complete my postdoctoral research at NeuRA. So, I moved to Sydney and together we established a balance and gait laboratory.

I met Jasmine soon after and we have been collaborating ever since. One of the things I value most is that we use each other as sounding boards but also challenge each other's thinking. That kind of honesty is really helpful in science. I really value being able to discuss everything with her.”

Jasmine: “After completing my studies in exercise science studies in France and the UK, I came to Australia looking for a lab to complete my PhD.

Since completing my PhD with Stephen Lord, I met Daina and have since set up many experiments in the laboratory, such as looking at the cognitive demands of balance control.

What I enjoy most about my role is exchanging ideas and discovering new ways of looking at things. We encourage and support each other through disappointments but we also help each other to achieve research quality and success. This exchange is what makes our work continuously enriching.”

“Balance is multi-factorial. The inner ear is important, but we also need our legs for sensory information, our vision for perspective and muscles for strength.”

Professor Stephen Lord, who along with other NeuRA researchers featured on ABC Catalyst's award-winning Keep On Dancing in 2022.



Professor Stephen Lord and
Keep On Dancing host Myf Warhurst

Advancing spinal cord injury research



Health problem

Around 20,000 Australians currently live with a spinal cord injury. Many things can cause a spinal cord injury, but some of the common include falls, motor vehicle accidents and sporting incidents. A spinal cord injury can have a profound impact on an individual's mobility, independence, and overall wellbeing. Everyday functions that most of us take for granted, such as general movement, touch and blood pressure control, can all be affected.

Our solution

The Spinal Cord Injury Research Centre at NeuRA was built in 2020, thanks to funding from SpinalCure Australia. Led by Professor Simon Gandevia and Professor Jane Butler, the team conducts research aimed at improving the lives of people with spinal cord injuries. A critical element of their research is neurostimulation, which uses tailored electrical currents to amplify messages between the brain and the body, potentially restoring meaningful movement.

✧ Participant Spotlight

“The thought of regaining the ability to stand and walk, control my bladder and bowels, to move my hands, and to have stable cardiovascular function, is what drives me to keep pushing forward in my recovery journey.”



Alex Richter

SpinalCure Community Ambassador

Research Progress ►

In 2023, NeuRA researchers will embark on a new project to explore a combination of neurostimulation and acute intermittent hypoxia as an approach for restoring arm, hand, and respiratory functions in individuals with quadriplegia.

■ A Meeting of Minds

*Driven by a shared passion for scientific discovery and a dedication to enhancing the lives of individuals with spinal cord injuries, **Professor Jane Butler** and **Dr Claire Boswell-Ruys** have been scientific collaborators for over two decades*



Professor Jane Butler and
Dr Claire Boswell-Ruys

Claire Boswell-Ruys: “Jane and I started working together almost 20 years ago. I was a physiotherapist in the spinal cord injuries unit at Prince of Wales Hospital. I had a patient who had problems breathing, and Jane suggested some emerging research ideas to help him. That marked the beginning of our relationship and within six months I joined her at NeuRA.

What motivates me is knowing the impact a small change can have on somebody's life. Many people with a spinal cord injury go from being able to do anything by themselves to depending on others for everything. If we can return just a little bit of function, it will change their life dramatically.”

Jane Butler: “When I first met Claire, I had just learned about the use of functional electrical stimulation for people with paralysed muscles. Claire worked with me on a project where we developed a new way to stimulate cough in people who have a spinal cord injury. Due to paralysed abdominal muscles, people with high level spinal cord injury can't cough, which can lead to pneumonia. It might seem small, but enabling someone to cough can transform their wellbeing.

It's not an easy job. You have to work hard and progress in research can be slow. But we have kindness for each other as well as respect for each other's opinions and ideas.

And ultimately, we are helping people. That makes it all worth it.”

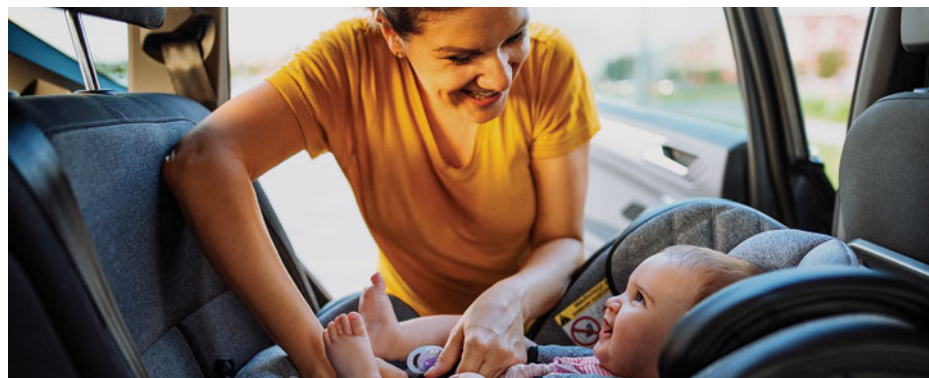
Accelerating progress in road safety research

Health problem

Our roads play a vital role in bringing a sense of independence and discovery to our lives. However, road traffic crashes continue to be a significant cause of injury and lives lost. In 2022, there were 1,194 road crash deaths nationally – an increase of 5.8 per cent from 2021. In addition to the human cost, road traffic crashes are estimated to cost the Australian economy \$27 billion every year.

Our solution

The Transurban Road Safety Centre was built on-site at NeuRA in 2017 and is Australia's first research-dedicated crash test lab. It combines world-class research with state-of-the-art facilities, including a custom-made crash sled, to enable our researchers to carry out research into improving road safety. Our evidence-based insights have been used to inform policymakers, education campaigns and driven technological advancements in vehicle safety.



Research Progress ►

Over 72 per cent of children in Australia are improperly restrained when travelling in cars. To combat this, NeuRA researchers released updated guidelines for child restraint manufacturers, providing them with clear and evidence-based recommendations on how to develop materials for parents and carers.

Partnership in Action

“The Transurban Road Safety Centre – a partnership between Transurban and NeuRA – explores road injury prevention measures and supports our shared commitment to improving road safety outcomes.

Transurban's purpose is to strengthen communities through transport and one of the ways we do this is by championing road safety. It's a topic that resonates with our stakeholders – according to our latest stakeholder and community engagement survey, 71 per cent of stakeholders thought it was important for Transurban to invest in road safety research and partnerships. Our partnership with NeuRA reflects this.

The partnership enables Transurban to strengthen relationships with government and support their efforts to reduce road trauma. Tours of the Centre form an important part of this engagement where they can learn first-hand about the critical work being undertaken in partnership with Transurban.”

Transurban

🔗 Researcher Perspectives



“I’m a researcher in the injury prevention group at NeuRA, where one focus of my research is the incorrect use of child restraints. More than half of all children travelling in cars are incorrectly restrained, and this can triple the risk of injury to those children in the event of a crash.

Road safety research is interesting because it's an evolving field. There are new challenges and opportunities emerging all the time. Having the opportunity to be at the forefront of innovation and looking at new products and new technologies is really exciting.

And it's rewarding to see the results of our research can make a difference to people's lives.

I've always loved science, engineering and problem solving. I also love the human side of research, like getting parents involved in talking about their experiences.

My highlight of the year was completing my PhD which focused on the relationship between child car seat design and its propensity for misuse.”

Bianca Albanese
Postdoctoral Fellow

Lighting the way for better **sleep solutions**



Health problem

Obstructive sleep apnoea (OSA) is a common sleep disorder where the upper airway collapses repeatedly during sleep, interrupting breathing. It affects more than 25 per cent of Australians over 40, and is associated with an elevated risk of cardiovascular disease, diabetes, depression, and personal injury as a result of industrial accidents and road traffic crashes. Current treatments, such as continuous positive airway pressure (CPAP), are highly effective but up to 50 per cent of patients who start CPAP discontinue within two years, highlighting the need for new therapies that are user-friendly.

Our solution

Creating user-friendly solutions to OSA increases the likelihood of patient compliance, improving treatment outcomes and ultimately, quality of life. Led by Professor Lynne Bilston and her team, NeuRA has developed 'Optosleep', a mouthguard that is comfortable and easy to wear, with in-built electronics to detect a patient's breathing and stimulate the muscles of the tongue to keep the airway open during sleep.



Sleep apnoea affects **5%** of the Australian population

■ A Meeting of Minds

*The desire to create a solution for obstructive sleep apnoea that is safe, effective and accessible has underpinned the past years of collaboration between **Professor Lynne Bilston** and **Chris Bull**.*

Lynne: "I love working with smart young researchers, particularly when they've got different skills to me. Chris has got a really deep skillset in sleep physiology and sleep analysis, and an interest in the electronic side of things. That complements my biomechanics background and sleep apnoea focused research expertise. It's a privilege to work with young scientists who have so much potential to improve outcomes for patients."

The biggest challenge is when things don't go the way you expect them to. COVID was a great example of that, where all of our experiments had to stop for a long period of time. The challenge is just to keep going and not give up."



Professor Lynne Bilston and Chris Bull

Chris: "I was working in the NeuRA sleep lab when I first met Lynne. She asked if I'd like to do a PhD on sleep apnoea and I was immediately interested – it meant I could continue to live in Sydney, stay at NeuRA and work on my favourite topic: sleep disorders. I'm so grateful Lynne offered me this opportunity. It's been incredible to see something grow from an idea to a tangible prototype."

What's been most rewarding is the opportunity to trial the device with people. You get to see them experience it first-hand, and ask questions such as: "Is this comfortable? Does anything need to change in the design?" and you get immediate feedback. It's a real privilege."

Research Progress ►

Off the back of a Development Grant from the National Health and Medical Research Council (NHMRC), NeuRA researchers are now working on advancing the development of 'Optosleep' to a stage where it can be tested on humans.

Touching the future of **prosthetic design**

Health problem

As humans, we use our sense of touch to feel, communicate, control movement, and understand the environment around us and to protect us from danger. What might seem like simple and effortless responses are in reality the result of a complex communication between our brain, nerves and thousands of tiny touch receptors located in our skin. So what happens when these processes are disrupted through injury to our body or nervous system?

Our solution

Led by touch and bionics expert Dr Ingvars Birznies, our research into the field of sensory neurophysiology explores how to restore function in individuals who have sensory impairment following significant health events such as stroke, falls, or limb amputation. Our research takes an interdisciplinary approach, combining neuroscience, clinical neurology, and biomedical engineering to unravel these questions and advance prosthetic design, post-injury rehabilitation and other clinical applications.



Research Progress ►

NeuRA researchers are currently looking at the function of tactile receptors and how they control human hand movements. Findings from this could inform the design of better prosthetics, enhance robotic technology, and deepen our understanding of sensory disorders.

◉ Researcher Perspectives

“I was born and studied in Latvia, obtained a PhD in Sweden, and came to Australia for post-doctoral studies. Australia and NeuRA was an obvious choice because only a few laboratories in the world have the technology and skill to record signals from single sensory nerve fibres in humans. This sophisticated technique is called microneurography and we use it to intercept messages which skin receptors send to the nervous system to control hand movements and also let us feel the world around us.

As a sensory neurophysiologist, I am primarily interested in sensory information encoding mechanisms. In other words, the brain's secret language.

Without being able to feel anything, you can't make much use of your hands. You wouldn't even be able to use a knife and fork to eat if you didn't have sensation in your fingertips.

Our research is also aimed at gaining a fundamental understanding how sophisticated movement control algorithms enable superior capabilities of the human hand to manipulate objects. Working together with biomedical engineers we then look for implementation opportunities to create more

accurate artificial sensors and develop more advanced control algorithms for prostheses and robotic manipulators.”

**Associate Professor
Dr Ingvars Birznies,**
Senior Research Scientist



Research facilities

Putting the brain in focus

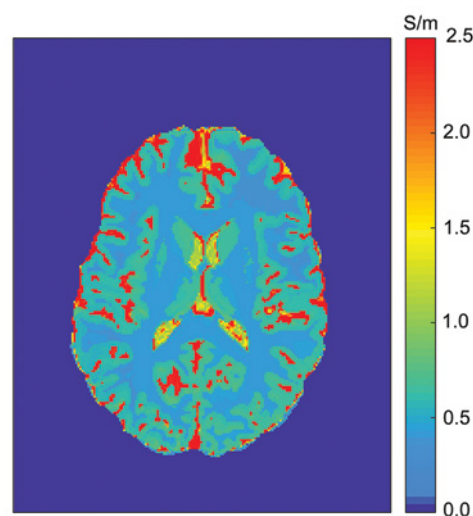
Putting the brain in focus

Health problem

The accurate diagnosis and assessment of diseases of the brain is critical to ensuring the individuals affected receive the treatment and care they need. But until the advent of Magnetic Resonance Imaging (MRI) technology, getting detailed images of the body's internal structures, including the brain, was not possible without invasive techniques.

Our solution

NeuRA operates a state-of-the-art research facility and houses one of the most flexible MRI scanners in Australia. From diagnosing and monitoring brain injury to understanding the progression of Parkinson's disease, MRI is one of the most powerful tools in modern medicine.



A MRI map of brain tissue electrical conductivity

Research Progress ►

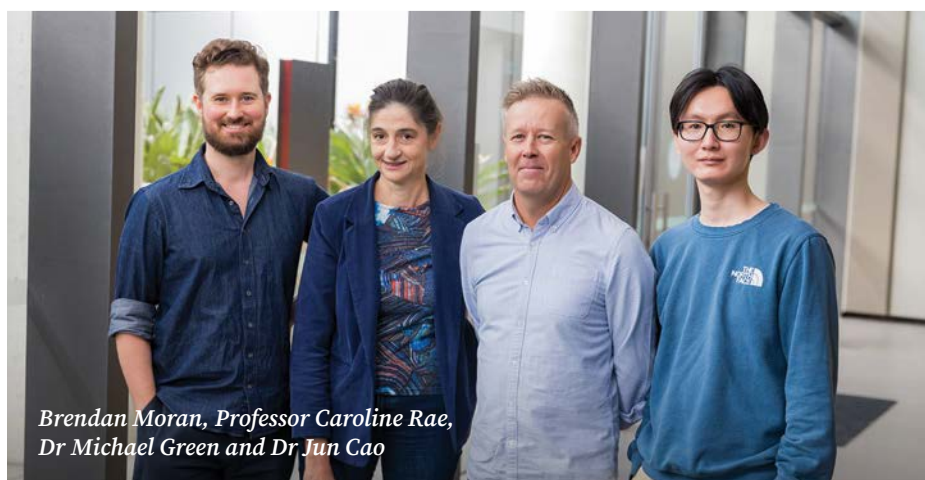
The NeuRA Imaging team have made strides in how functional magnetic resonance imaging (fMRI) is used to examine the brain. Traditionally, fMRI relies on changes in blood flow during brain activity, but the team's new method measures changes in the brain's electrical conductivity, leading to more detailed and accurate images.

■ Meeting of Minds

NeuRA Imaging is home to an open-access MRI scanner for brain research. It is led by **Professor Caroline Rae, Dr Michael Green, Dr Jun Cao, and senior radiographer Brendan Moran.**

Lindy: “What I enjoy most about being part of NeuRA Imaging is that we’re making new discoveries all the time. We’re also an open-access facility, which means our scanners are available for research for academics, industry and clinical research users. As a result, our work is highly collaborative. We work with researchers to understand their needs and set up the best imaging methods and protocols to help them achieve their desired outcomes.”

Jun: “As a PhD student I have found this group to be very supportive. I also think our work in looking at electrical conductivity in MRI is highly novel.”



Brendan Moran, Professor Caroline Rae, Dr Michael Green and Dr Jun Cao

Michael: “What excites me is the quality of images we get. We have great technology to play with, especially with the Philips 3T scanner, and thanks to ongoing support from Philips, we’re able to make the most of the scanner’s capabilities.”

Brendan: “As a radiographer, I’ve been able to learn a lot from everyone in this group as we all come from diverse backgrounds. What a lot of people find surprising about MRI is it doesn’t just look at the brain anatomically, but also functionally and chemically. In other words, brain activity as well as structure. It’s incredibly powerful.”

Unlocking the mysteries of the brain and mind

Health problem

One in six Australians will be affected by a brain disease or disorder their lifetime. There are over 600 diseases that can affect the brain and nervous system, with neurodegenerative disorders such as dementia and Parkinson's disease amongst the most common. These conditions have a profound impact on the individuals affected as well as their families and loved ones. They can cause drastic changes in a person's ability to speak, think, move, and connect with those closest to them. There is an urgent need to improve our understanding, treatment of, and support for those affected by neurological diseases.

Our solution

The Sydney Brain Bank, located at NeuRA, is a specialised facility that collects, characterises, stores and distributes human brain and spinal cord tissue for research into ageing and neurodegenerative disorders. Since its inception in 2005, it has gathered brain tissue samples from over 750 generous donors which, through post-mortem analysis, has led to the discovery of new disorders, novel genes and therapeutic strategies for conditions affecting the brain and mind. The Sydney Brain Bank plays a vital role in advancing global scientific knowledge, having facilitated over 350 studies and provided more than 38,000 specimens of donated neurological tissue.

Supporter Spotlight

"The 1666 Foundation – our family foundation – is happy to support research at NeuRA. While we have an interest in a number of the conditions NeuRA studies, including falls prevention and Parkinson's disease, it is the research carried out in the Sydney Brain Bank by Director Dr Claire Shepherd which particularly appeals to us. Dr Shepherd is drawing on the resources of the Brain Bank to explore the role of the glymphatic system in neurodegenerative conditions. We find it fascinating that this recently discovered waste disposal operation for the central nervous system, which functions during sleep, is thought to be suppressed in neurodegenerative diseases. And this may hold the key to healthier ageing and cognitive function!"

The 1666 Foundation

Research Progress ▶

Vascular disease represents an important risk factor for a number of neurodegenerative disorders. NeuRA researchers at the Sydney Brain Bank are investigating changes in the cerebrovascular system during ageing and neurodegeneration to understand its role in the disease process.

Researcher Perspectives



"When I picked my A-levels in the UK, I chose biology and psychology because I absolutely love them. Coincidentally, the year that I finished high school, neuroscience was being offered as a new course.

In 2009 I became the manager of the Sydney Brain Bank here at NeuRA. Our work is focused on ageing and neurodegeneration, predominantly in trying to understand the role of inflammation in the disease process.

Our research is made possible due to the brain and spinal cord tissue we receive from generous individuals who enrolled in a brain donor program when they were still alive. Human brain tissue is the gold standard for research as it gives a true indication of the human condition.

A fascinating and new area of work for us is a project in collaboration with The Minderoo Foundation and the Queensland Alliance for Environmental Health to measure and identify plastics to understand their impact on brain health. There is great concern regarding the potential impact of environmental toxins on brain health and neurodegeneration.

It's very important to me that my job contributes to society. Knowing my research might one day prevent or treat neurodegenerative disorders is incredibly motivating and rewarding."

Dr Claire Shepherd
Director of the Sydney Brain Bank

Charting the course for neuroscience

Health problem

The brain is the only organ that has a map of our body, a map of the outside world and a map of our experience. There are approximately 86 million neurons in the brain, all of which communicate with each other to share information that enables our bodies to function. Without brain maps, it would be difficult to understand how different regions of the brain look and interact with each other. Neurosurgeons would not be able to make accurate incisions during surgery, and researchers would be unable to create precise animal models of brain disease to explore better ways to diagnose and treat neurological disorders.

Our solution

For more than 40 years world-renowned brain cartographer Scientia Professor George Paxinos AO has been mapping the brain. His brain maps have laid the foundation for the field of neuroscience, enabling scientists and medical practitioners to observe changes in brain structure as we age or experience disease.

It is believed there are **86 billion neurones** in the human brain.

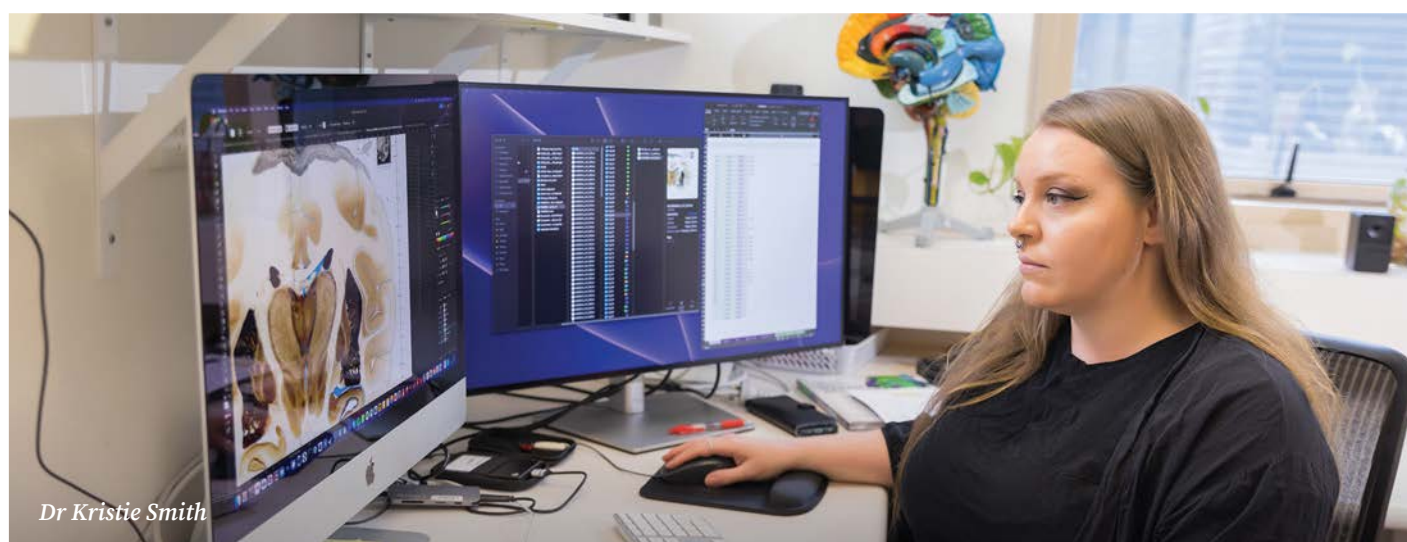


This NeuRA team has **identified and named** **94** hitherto **unknown brain regions**



Dr Steve Kassem





Dr Kristie Smith

■ Meeting of Minds

*The Brain Mapping Laboratory at NeuRA is run by a collaborative team led by **Professor George Paxinos AO**, and supported by **Dr Steve Kassem**, Senior Research Fellow, and **Dr Kristie Smith**, Postdoctoral Researcher.*

George: “Just as maps guided explorers of the world centuries ago, maps of the brain are here to help guide future explorers of the brain. As scientists, when we make progress in improving our delineations of the brain, it’s like reaching new heights on a mountain. As much as I enjoy the process of discovery, it’s the interactions with the bright minds in the lab that motivate me most. In 2021, I had the pleasure of publishing my novel *A River Divided* where in the formation of characters I used neuroscience principles, such as those related to the mind, soul, free will and consciousness.”

Steve: “I consider it a privilege to be able to explore and map the most mysterious and important organ in the human body and the subsequent construction of brain atlases are a fantastic blur of art and science. It’s a shared and empowering experience,



Back row, left to right: Ed Simmonds, Dr Steve Kassem, Ed Townshend
Front row: Dr Kristie Smith, Scientia Professor George Paxinos AO, Professor Gulgun Sengul

one continually motivated by the process of discovery and the chance to work with the best in the field.

I am most looking forward to the completion of the Human Brain Atlas this year. An ambitious project as we are using what we believe to be the highest resolution images of a living person’s brain, images that permit the construction of the most accurate brain map yet.”

Kristie: “I enjoy watching our lab come together to collaborate on a project. Each person brings their own unique skill set and, together, we produce high quality brain maps.

I become immersed in the images and can easily spend hours in a flow state, defining the boundaries of individual brain structures and the pathways that connect them. The overall experience is heightened by knowing our atlases support advancements in scientific and medical research by allowing users to navigate the brain seamlessly.

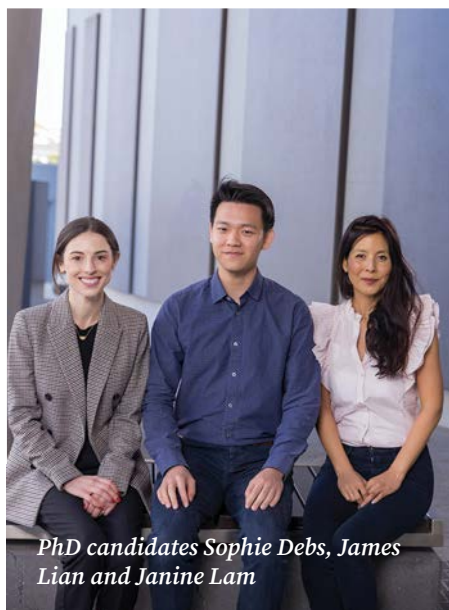
What inspires me most about our work is seeing the beauty of the images with which we create our maps, and having the opportunity to work and learn from the world’s leading brain cartographer, Professor Paxinos.”

Research Progress ►

This year, Professor Paxinos’s team unveiled the MRI/DTI Atlas of the Human Brainstem, a new scientific resource offering in-depth views of the human brain structure and function, including the first detailed sagittal brainstem diagrams, and images with a resolution 8,000 times greater than clinical MRIs.

PhD Pearl Program

Investing in the innovators of tomorrow



PhD candidates Sophie Debs, James Lian and Janine Lam

At any given time, NeuRA hosts and fosters a cohort of 50+ PhD students, who undertake self-directed research projects to make unique contributions to their fields. To ensure the growth of the next generation of neuroscientists, NeuRA launched the PhD Pearl Program last year, which pairs PhD students with benefactors who provide crucial support. At our inaugural Pearl Symposium in November 2022, PhD Pearl students presented their research through a Three Minute Thesis (3MT) event, where they were challenged to convey their thesis within a three-minute timeframe.

The event fostered connection, facilitated learning, and expressed gratitude to both our generous donors and fearless PhD students who are pioneering groundbreaking research that will change lives.

Through the collective effort of the Pearl program to date, NeuRA benefactors are supporting 18 students with their PhD so they can focus on real outcomes.

Powerful partnerships

A personal connection to improving children's mental health motivates Alice and Mikhel Kase's decision to sponsor emerging neuroscientist, Janine Lam.



Janine Lam *PhD Candidate*

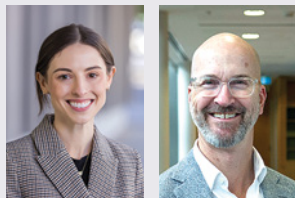
I'm so grateful that Alice and Mikhel value and believe in my contribution to research. I also love being connected up with other talented NeuRA PhD candidates and researchers through the Pearl program.

I am proud to now have the opportunity to connect with respected community leaders who not only generously support, but personally believe in the value and importance of my work to children's mental health and wellbeing.

Alice Kase *PhD Sponsor*

My husband Mikhel and I are thrilled to be supporting Janine at this early but critical stage of her career as a budding neuroscientist. We have two children at home, so the fact that our Pearl is studying resilience and wellbeing, and what factors influence the development of these attributes in children is particularly meaningful to us. We are happy to help.

Sponsoring a Pearl PhD can mean more than just providing financial support. In Sophie's case, Lee has become a personal mentor for her – guiding her through the challenges of life as a PhD candidate.



Sophie Debs
PhD Candidate

It has been absolutely wonderful meeting Lee through the Pearl program. Lee has been such a wonderful support to me, on both a professional and personal level. Lee is an incredibly dynamic thinker and it really is such a privilege to have him on my 'team' as I navigate the complexities of a PhD. With Lee's guidance, I have developed much stronger presentation skills, and even a personal brand! This has resulted in me sharing my scientific research with a much broader audience, including the general public and school-aged children.

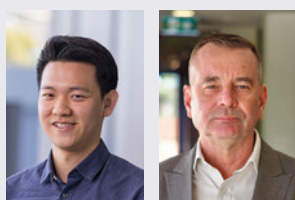
I deeply value my relationship with Lee and always look forward to our catch ups, where Lee's kindness, warmth and generosity shine through, and where I am always challenged to think about things in a more creative and innovative way.

Lee Valentine
PhD Sponsor

I was first drawn to the Pearl program because I wanted to support the process Sophie is going through. The hours required to complete a PhD means there is little time to earn a meaningful income. By supporting a Pearl we have taken a little bit of the edge off the financial pressure and enabled Sophie to focus on her work.

My wife and I have also enjoyed providing non-financial support: a nice surprise - some mentoring for Sophie's work and personal life. Sophie is a vibrant and thoughtful person committed to developing solutions for schizophrenia.

James and Colin bonded over their shared passion for understanding the impact of childhood trauma on mental health.



James Lian
PhD Candidate

The PhD Pearl at NeuRA is special because it is the only program I know of where we get to personally meet and connect with the donor. When I met Colin, I got to hear why he chose to donate to NeuRA and support my research. We keep in touch and I always look forward to updating him about my PhD.

The first time I saw Colin was when he MC'd an event at NeuRA and interviewed David Gonski. I was inspired by his confidence on the stage and when I told him afterwards, he admitted he was actually anxious about public speaking. When we chatted later, we talked about my research on childhood adversity and his own experiences with adversity and mental health. Hearing his story was meaningful to me and brought life to my epidemiological research and motivated me to continue researching and sharing the importance of a healthy childhood.

Colin Tate AM
PhD Sponsor

I appreciated the significance of NeuRA's Pearl PhD program, launched in our 30th anniversary year (2022), as soon as I heard of it. Many of our other Directors on the Foundation Board and NeuRA Board did also. It presents a unique opportunity to foster the next generation of neuroscientists, who will be the ones to solve our major health problems like dementia and mental health. It enables me, as a sponsor, to contribute to the future of a bright young mind and to the future of health.

As it happens, James Lian is doing his PhD in an area which has great personal meaning for me: the impact of childhood trauma and to what degree this correlates with developing dementia. It is my pleasure to support a brilliant, dedicated and highly personable young scientist like James in his quest to find the answers to this question.

Community engagement

Engaging with our supporters and the broader community is central to NeuRA's mission, reflecting our core values of openness and inclusion. Following years of social distancing and lockdowns, 2023 was about reconnecting face-to-face after the pandemic. We took pleasure in inviting the community for tours and research demonstrations within our building, while also actively participating in public talks and special events alongside partners Transurban and SpinalCure.

PhD candidate Abigail Hansen demonstrating the Advance Driver Assisted Systems testing being undertaken at NeuRA



Research 2 Real Life

In 2023, we continued our event series Research 2 Real Life, offering NeuRA supporters and community members a unique opportunity to witness our cutting-edge research in action. This immersive half-day experience showcased the talented individuals driving our diverse research projects through demonstrations, talks, and audience participation. Attendees engaged with leading neuroscience experts, participated in discussions on mental wellbeing, and experienced demonstrations of safe driving simulators and balance assessment.

Dr Nikki-Anne Wilson speaking at the Woollahra Golf Club



Community education

This year was also about expanding our community engagement efforts beyond the institute. Dr Nikki-Anne Wilson delivered talks on dementia prevention at the Woollahra Golf Club, Sydney Science Festival, Stanton Library, and Club Turramurra. She also actively participated in the CSIRO STEM Professionals in School program, serving as a science mentor for girls in high school. Additionally, Dr Mae Lim shared NeuRA's falls prevention and balance research with the broader community, focusing on ways to improve product design for individuals experiencing age-related challenges.

Tommy Little sparks hope

Inspired by close friends living with spinal cord injury, comedian and presenter Tommy Little raised \$103,520 for Project Spark, a partnership between NeuRA, SpinalCure and Spinal Cord Injuries Australia.

Tommy's commitment to find a cure saw him take on a 92 km ocean swim in order to raise funds for the cause close to his heart. Tommy spent months training in order to complete the gruelling swim and came to NeuRA to generously present a cheque for the total raised.

"The generosity of Australians is unparalleled, as is the brain power and science. With all these things combined we can give some hope to our mates with spinal cord injuries and finally find a cure," said Tommy.



Tommy Little presenting a cheque at NeuRA's Spinal Cord Injury Research Centre (SCIRC)

Special guest tours

Earlier this year, we welcomed the Joint Select Committee on Road Safety, along with our partner Transurban, on a tour of the Transurban Road Safety Centre.

We also invited members of the Young Presidents' Organisation Sydney Chapter to presentations from Scientia Professor Kaarin Anstey and Dr Claire Shepherd on the latest research and trends in brain health, with particular reference to our work in preventative strategies.



NeuRA researchers present to the Joint Select Committee on Road Safety and Transurban

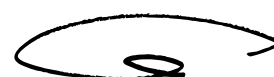
Our governance

From our Foundation Chair

As Chair of NeuRA Foundation, my priority this past year has been to build out the Foundation Board with a number of extremely high calibre Directors. The task is not yet finished, but I am very pleased to have secured the likes of Dave Sharma (former politician and diplomat); Steve Tucker (founder and Chair, Koda Capital); Damien Mu (CEO, AIA); and Felicity Nicholson (Head of Marketing, La Trobe Financial). Between them they bring an impressive array of expertise and connections to the table and to the task of raising profile and funds for NeuRA. Our new Directors are starting to find their feet and engage their networks with NeuRA.

I am delighted that our new organisational strategy commits us to increasing our capacity in neurodegeneration and mental health, two areas of growing community need which are close to my heart. With two in five Australians having suffered from a mental health condition, and the incidence of dementia expected to cost Australia over \$18.7 billion by 2025, we have no time to waste.

Strategically, next year I would like to see NeuRA develop its capability for thought leadership and provide Government and industry with roadmaps to manage these health problems more urgently and more effectively. I look forward to being part of the solution.



Colin Tate AM,
Foundation Chair

Our Vision and Mission

Vision to **improve** the **health and lives** of those living with **brain** and **nervous system** disorders

Mission to **discover solutions** for **neurodegeneration, mental health** and **healthy ageing** through world-class **medical research**

Our Board

Board of Directors



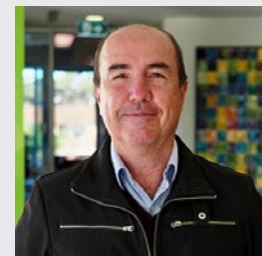
Mr James MacNevin,
BA GAICD



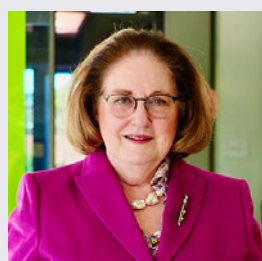
Prof Sven Rogge,
PhD BSc



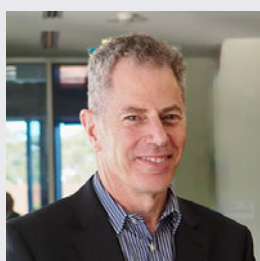
Dr Debra Graves,
MBBS, MHA, FRACMA,
FRCPA (Hon), FAICD



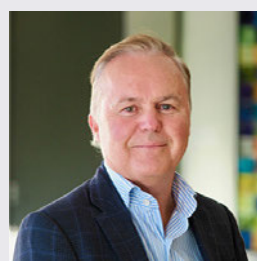
Prof Chris White,
MBBS BScMed PhD
FRACP



Dr Jennifer Alexander,
MCom MBBS MHP
FRACMA FAFPHM (RACP)
FAICD



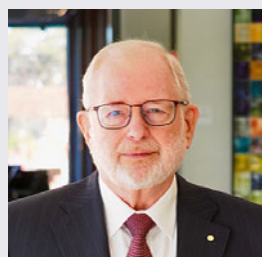
Dr Julian Adler,
MBBS(Hons) FRANZCR



Mr Clyde McConaghy,
BBus MBA FIOD FAICD



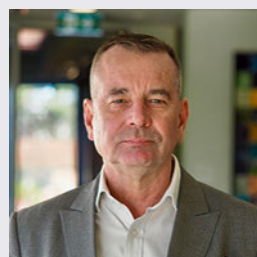
Mrs Kirsten O'Doherty,
BPharm DHP GAICD



Mr Norbert Schweizer
OAM, BA LLB



Mr Barry Shepherd PSM,
GradDipPSM

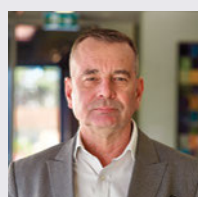


Mr Colin Tate AM

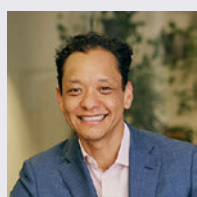


Ms Alice Kase,
BBus FCA FTIA CTA
(until Mar 2023)

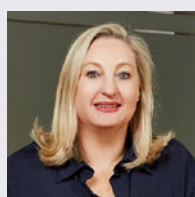
Foundation Board



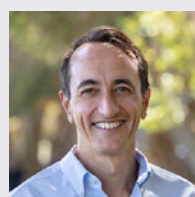
Mr Colin Tate AM



Mr Damien Mu
(from Sept 2022)



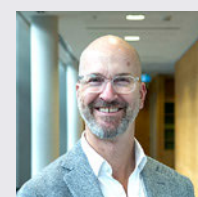
Ms Felicity Nicholson,
BComm



Mr Dave Sharma
(from Feb 2023)



Mr Steve Tucker,
B Econ



Mr Lee Valentine

Prof Peter Schofield AO,
FAHMS PhD DSc (until Dec 2022)

Mr Norbert Schweizer OAM,
BA LLB (until Sept 2022)

Ms Felicity Forsyth
(from Dec 2022) *Company Secretary*

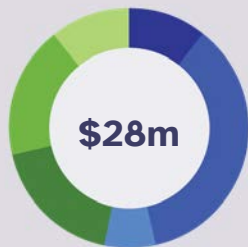
Finance

Income



NHMRC grants	\$5m
Other grants	\$7m
Infrastructure grants	\$8m
Fundraising	\$6m
Investments	\$-3m
Other	\$0m
Total income	\$22m

Expenditure



Research expenses	\$3m
Research salaries	\$10m
Fundraising salaries & expenses	\$2m
Operations expenses	\$5m
Operations salaries	\$5m
Depreciation & amortisation	\$3m
Total expenses	\$28m
<i>Surplus / deficit per financial statements</i>	<i>\$-6m</i>
<i>Prior year research grants</i>	<i>\$4m</i>
<i>Net surplus / deficit</i>	<i>-\$2m</i>

Financial Position

Current assets - endowment fund	\$12m
Current assets - cash & others	\$32m
Non-current assets	\$56m
Total assets	\$99m
Liabilities	\$8m
Net assets	\$91m

Current Assets



Investments - available-for-sale	\$34m
Cash & bank balances	\$7m
Other current assets	\$3m
Total	\$44m

In gratitude

We are very grateful for the philanthropic gifts of our generous supporters

Key supporters who made gifts of \$10,000 or more in 2022

Alice and Mik Kase	The 1666 Foundation
Alison French and Graham Hunter	The Aberdeen Fund
Colin Tate AM	The ASX Refinitiv Charity Foundation Limited
Cathy Gilbert	The Cameron Family
David Gonski AC	The Centenary Foundation – Scott Family Bequest
David Lesnie	The David Z Burger Foundation
Douglas Stutt	The Edward C Dunn Foundation
Dr James Rae	The Hildanna Foundation
Edward and Diane Federman	The Hillcrest Foundation
Eloise Ross-Jones	The Hon Justice Anna Katzmann
Emma and Dominic Stevens	The Jackson Foundation
Felicity Nicholson	The Kinghorn Foundation
Jane Taylor and Scott Malcolm	The Maple-Brown Family Foundation
John Gilbert and Karen Francis	The MCK Family Trust – Jacob and John Mamutil
Laurie Cowled	The Nick Blair Memorial Fellowship
Lucinda Christie and Peter Cook	The Oranges and Sardines Foundation
Lyn Ingham	The Peter and Barbara Hoadley Foundation
Margarete Ainsworth	The Tucker Family
Paul and Mira Brassil	The Waterwheel Foundation
Paul Salteri AO and Sandra Salteri	The Yarranabbe Foundation
Penelope and Lee Valentine	Woollahra Golf Club
Prof Peter Schofield AO	Yvonne Mee
Rosemary Rajola	
The Russo Family in loving memory of Mrs Connie Russo	
SpinalCure Australia	

Corporate Partners

Herbert Smith Freehills
Hicksons Lawyers
Philips
Transurban

2022 Estates

The Estate of Alan Maxwell Butler
The Estate of Angelo Casella
The Estate of Betty L Lee
The Estate of Jean Parkin
The Estate of Joan Isabella Bain Cormack
The Estate of John McClenaham
The Estate of Kathleen Scotton
The Estate of Laurene M Wolff
The Estate of Mary J Derrick
The Estate of Miriam Goodrick

Neuroscience Research Australia

ABN 94 050 110 346

Margarete Ainsworth Building
Barker Street Randwick
Sydney NSW 2031 Australia

T +61 2 9399 1000
F +61 2 9399 1005
E info@neura.edu.au
W neura.edu.au

Postal Address
PO Box 1165
Randwick NSW 2031 Australia

Follow us on:



[NeuroscienceResearchAustralia](https://www.facebook.com/NeuroscienceResearchAustralia)



[neuraustralia](https://twitter.com/neuraustralia)



[neuraustralia](https://www.instagram.com/neuraustralia)



[NeuRA \(Neuroscience Research Australia\)](http://NeuRA.org.au)



neura.edu.au