NeuRA

Discover. Conquer. Cure.

PROFILE | 2021

Supporter Spotlight

One of the major challenges facing successful medical research institutes around Australia is the gap between the total cost of doing research and the funding provided by competitive research grants. This makes the support that NeuRA receives from philanthropists crucial.

Nine years ago, Margarete Ainsworth made a capital pledge of $10 million which has been used to complete the fit-out of the seven-level research facility which NeuRA researchers and staff call home. This remains one of the largest single gifts given by a female philanthropist in Australian history. The Board approved naming the building the Margarete Ainsworth Building in recognition of this generous philanthropic gift.

"The brain has always fascinated me, and now more so than ever, a decade on from my pledge to NeuRA. My initial interest was born out of my feeling for families living with mental illness, as it is so devastating. Over time, I have seen NeuRA making progress in many other areas of brain science of great relevance. I find it very rewarding to see light on the horizon. I was inspired, and remain inspired, by two simple factors: a desperate need for research and my confidence in NeuRA," said Mrs Ainsworth.

> *"I was inspired, and remain inspired, by two simple factors: a desperate need for research and my confidence in NeuRA."*
>
> Margarete Ainsworth

Portrait of Margarete Ainsworth
by Paul Newton

Table of Contents

Welcome

The Hon Justice Anna Katzmann

The Hon Justice Anna Katzmann, BA(Hons) LLD, Governing Council Chair

COVID-19, the lockdowns and the lag effect of restrictions have tested our ability to maintain our high research output and outcomes, especially in clinical trials where our teams work with vulnerable people. Our scientists responded with commendable agility, taking many trials online, increasing national and, in some cases, international access. Other research teams focused on data collection and analysis, providing rigorous evidence and new knowledge through 351 publications. They can take pride in their resilience and adaptability.

The Council has been keen to renew organisational strategy, and a new strategic plan is now being implemented. Our scientists, operational staff and Councillors have worked together to focus on three key areas: increasing the impact of research through the dissemination of knowledge, collaboration, disease prevention and improving clinical outcomes; expanding and diversifying sources of funding; and developing, attracting and retaining outstanding researchers and staff.

I extend my gratitude to my fellow Council members and Foundation Board members for their gifts of service and above all to my Deputy Chair, the seemingly indefatigable Alice Kase, for her wise counsel, steady hand and unfailing support.

I also take this opportunity to thank you for your continuing generosity if you are already a NeuRA supporter, and to welcome you if you are new to our NeuRA community.

NeuRA makes an invaluable contribution to the prevention and cure of diseases and disabilities of the brain and nervous system. Our scientists are among the best in the world. Their achievements are remarkable. I am excited by the prospects offered by their current research.

Professor Peter Schofield, AO FAHMS PhD DSc, Chief Executive Officer

Professor Peter Schofield AO

NeuRA's goal is to prevent, treat and cure disease and disability of the brain and nervous system. Our impact is achieved through leadership, excellence and innovation, translating discoveries into practical benefits and improved community health outcomes.

NeuRA's research remains more critical than ever and has provided new insights into neurological and mental health conditions, including dementia and Alzheimer's disease, chronic pain, bipolar disorder, spinal cord injury, and sleep disorders.

Some of our most significant contributions have been in dementia. We developed and tested new tools to assess and lower risk and better support people with early dementia. We played a significant role in international clinical trials to stop the progression of Alzheimer's disease.

Our investigations into falls prevention and consequential hip fractures have led to the provision of strategic advice to the Australian Government on improving care conditions for older adults in hospitals, community dwellings and aged care homes, following the Royal Commission into Aged Care Quality and Safety. Within our Spinal Cord Injury Research Centre we have launched several innovative clinical trials.

There is a large gap between the cost of conducting research and the funding we attain through competitive grants, which leaves us reliant on, and grateful to, our supporters, governments and corporate partners. We secured fundraising revenue of $6.7million and grant revenue of $24.5million over the past year. This is testament to your generosity and the relevance of our work.

NeuRA's Impact in 2020

Building global knowledge

27 registered clinical and randomised controlled trials.

Results will translate speedily into benefits for people affected by disorders of the brain and nervous system

42.9% of our publications appeared in the top 10% of journals

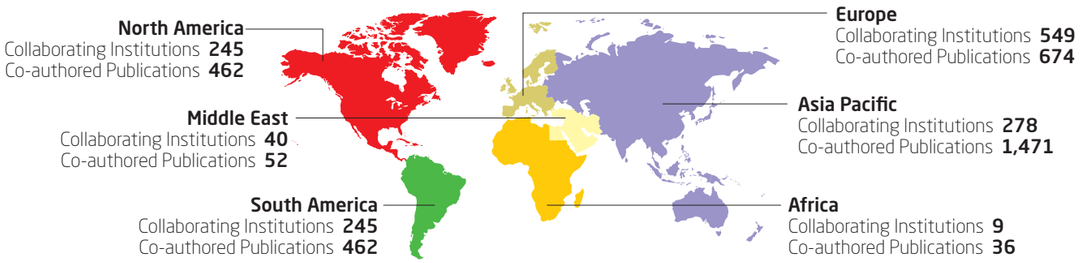
12 Telehealth studies enabling much greater access and participation across Australia.

62 PhD and Masters students comprising 20% of our research workforce

351 NEW DISCOVERIES ADDED to the global bank of neuroscience knowledge through publications.

Collaboration

Between 2015 and 2020, NeuRA collaborated with 122 research institutions in Australia and with 1,042 others around the world.



Attracting support

Grant revenue **$24,509,593**

Fundraising revenue **$6,720,564**

NeuRA Research Grants 2020	
Number of funding bodies	50
Number of new grants awarded	75
Overall number of active grants	202
Prizes/Awards	17

How will our research impact society?

Mental Illness

"Our research into the causes of bipolar disorder is advancing our understanding of the risk factors, which may lead to new treatments as well as tools to predict future illness in young people, so they can avoid illness and enjoy better quality of life."
Associate Professor Jan Fullerton, Leader, Bipolar Disorder.

"We hope our research will help us understand the most effective ways we can boost mental wellbeing and resilience to stress in the general population."
Dr Justine Gatt, Leader, Resilience and Anxiety.

"Following our discovery that more hostile immune cells exist in the brains of people with schizophrenia, we aim to determine why and how they are entering the brain and ways to block them, so that we can reduce people's symptoms and improve their brain function."
Professor Cyndi Shannon Weickert, Leader, Schizophrenia.

Brain Structure and Function

"Most scientists working on the relationship between the brain and cognition, emotion, motivation, and thought require maps to navigate the brain, and it is these maps that our lab constructs."
Scientia Professor George Paxinos AO, Leader, Brain Cartography and Mapping.

Ageing and Neurodegeneration

"Our work aims to better understand the cellular changes underlying neurodegenerative disorders such as Alzheimer's and Parkinson's diseases, and to identify therapeutic targets for prevention and treatment."
Dr Claire Shepherd, Director, Sydney Brain Bank.

"Through our research and translation projects, we aim to enhance dementia prevention and care and strive for brain health equity in collaboration with Aboriginal communities."
Dr Kylie Radford, Leader, Aboriginal Health and Ageing.

Neural Injury

"Our research aims to understand how sensory organs communicate with the brain and use this knowledge to restore impaired senses by various means, including smart bionic devices."
Associate Professor Ingvars Birznieks, Senior Research Scientist.

"I research how chronic fatigue syndrome affects the autonomic nervous system, which controls critical body processes such as blood pressure and the rate of breathing."
Professor Vaughan Macefield, Senior Principal Research Fellow.

Sensation, Movement, Balance, and Falls

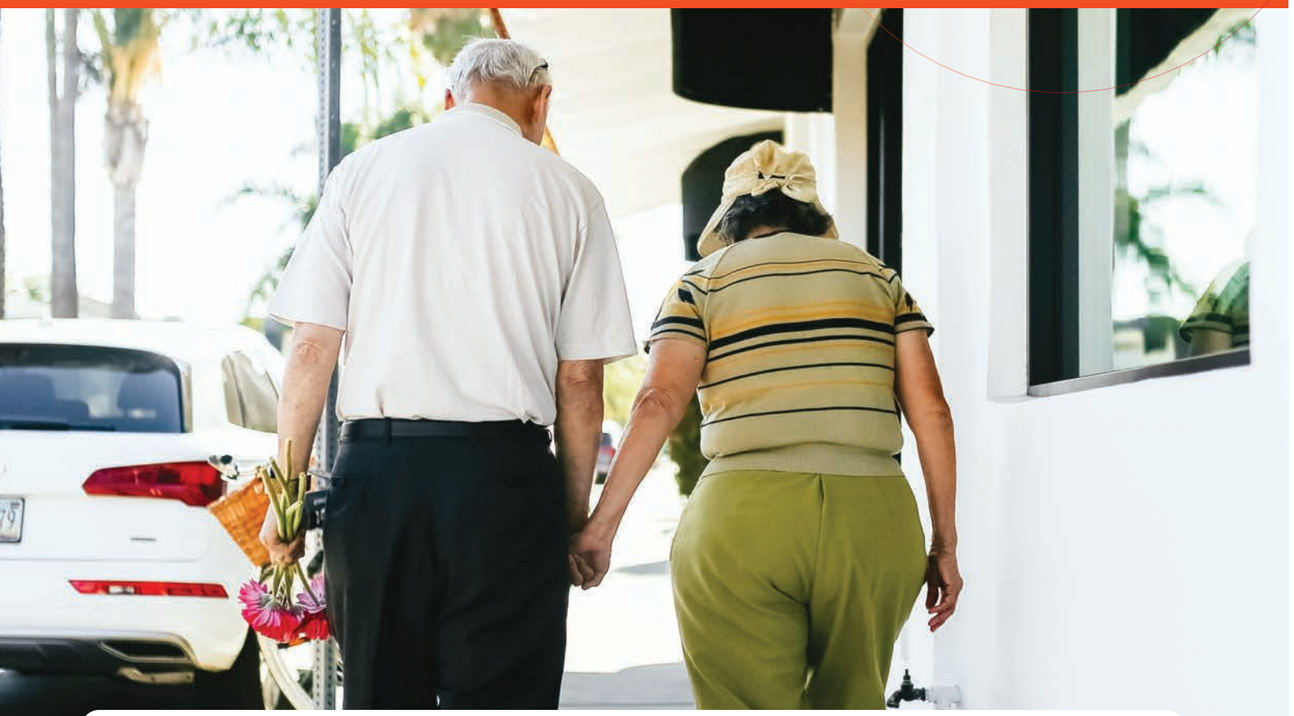
"We evaluate how effectively cutting-edge medical devices and protocols can improve the lives of those living with a spinal cord injury or critical illness."
Dr Euan McCaughey, Senior Research Scientist.

"Our focus is on research designed to enable frail older people to do what matters most to them – stay at home and stay independent."
Professor Jacqueline Close, Clinical Director, Falls, Balance, and Injury Research Centre.

"We are trying to understand muscle growth in typically developing children and impaired muscle growth in children with cerebral palsy to inform strategies to prevent and treat their disabling muscle contractures."
Professor Rob Herbert, Senior Principal Research Fellow.

"My team's research has helped people with chronic pain reduce their pain and disability, leading to improved quality of life."
Professor James McAuley, Director, Centre for Pain IMPACT.

Preventing dementia and frailty



Health Challenge

Studies by NeuRA researchers and others have shown that older adults who are socially isolated, physically inactive, or have low mood are at increased risk of developing dementia and frailty.

Dementia and frailty are linked to loss of independence and entry into aged care, and have a substantial family, societal, and economic impact.

Dementia is Australia's second leading cause of death. Without a medical breakthrough, the number of Australians with a diagnosis of dementia is expected to increase to more than 530,000 by 2025 and over 1.1 million by 2056.

As dementia prevalence will continue to increase due to population ageing, novel and cost-effective approaches are needed to reduce the impact of the disease on people, their care partners and society.

NeuRA's Action

A diagnosis of dementia can lead to an overwhelming mix of emotions. Access to advice and support can help people regain control, plan for the future, and carry on living a life that is meaningful to them.

Our work at NeuRA is putting people with dementia at the centre of their care, by developing tools for people to identify their own risk of dementia and help clinicians develop personalised risk reduction plans and interventions.

NeuRA's world-renowned dementia experts are not only improving disease management, but are investigating prevention mechanisms, alternative methods of treatment, and the environmental and genetic risks that influence a person's susceptibility to neurodegeneration.

Every day, our researchers are making evidence-based recommendations to improve health outcomes and quality of life for Indigenous and non-Indigenous older Australians living in the community.

2020 Community Impact

Frailty is a preventable and treatable condition that reduces quality of life for many older people. NeuRA's research programs aimed at preventing frailty and dementia and improving ageing across the lifespan continue to equip clinicians and community members with practical knowledge and resources.

The Intergenerational Integration Initiative is a trial in which older Australians and pre-school children come together in purposeful activities that could lead to better health and cognition in adults and better interpersonal skills for children.

"I am working with our communities to bring children and older adults together in meaningful ways to reduce frailty and increase learning, helping us to age successfully at both ends of the age spectrum," said study leader, Associate Professor Ruth Peters.

Our hope is that by working with community groups we may see this program rolled out nationally.

By **2027** it is estimated that there will be **609,309** frail and **2,248,977** pre-frail people in Australia, if prevalence continues at current levels.

$15.5 Billion is the annual cost of dementia in Australia. A 5% reduction in incidence rates would lead to **$4 billion in health savings by 2056**

In Australia, dementia is the second leading cause of death and the leading cause of death for women

More than half of the Australian population aged 65 or older is estimated to be frail or pre-frail

Snapshot of current research

Professor Kaarin Anstey and her team are developing CogDrisk, a new risk calculator that will allow people to assess their risk of developing dementia.

The MyCoach program combines online education and personalised diet and exercise advice to improve brain health and reduce risk of dementia for adults with mild cognitive difficulties – about 20 per cent of people over 70 years.

Through our international collaboration as part of the Dominantly Inherited Alzheimer Network, NeuRA researchers are testing new drugs that may stop the development and progression of Alzheimer's disease by targeting a harmful form of the brain amyloid protein.

"At the very least, Caring for Spirit is helping to raise awareness of dementia"

Kevyn Lee

Kevyn Lee is encouraging our community to Care for Spirit

Kevyn Lee is an Aboriginal man and member of the Dementia Australia Advisory Committee and National Older Persons Reference Group.

After learning about NeuRA's dementia toolkit, Caring for Spirit, Kevyn introduced himself to the Aboriginal Health and Ageing research team to see how he could help implement the training program in Aboriginal and Torres Strait Islander communities throughout the country.

Caring for Spirit is a culturally relevant dementia resource that draws on ten years of consultation with urban and regional Aboriginal communities. It contains training, education, and information programs for people living with dementia, sometimes referred to as having a 'sick spirit', and their carers. "As an Aboriginal man and son with a father and grandfather living with dementia, I think the Caring for Spirit resource is a unique resource not only for people with dementia, but for carers, friends, and even people who don't know how dementia will affect their loved ones. Caring for Spirit teaches people who are hungry to learn how they can help, how life can change, and how to adjust to those changes.

"I have shared the Caring for Spirit website with other Indigenous Australians, who are not only more likely than the general Australian population to develop dementia, but are more likely to be affected at an earlier age.

"At the very least, Caring for Spirit is helping to raise awareness of dementia, so that community members can better identify symptoms of the disease, such as forgetfulness, that can sometimes be assumed to be a part of natural ageing."

Find out more at caringforspirit.org.au

Preventing Dementia and Frailty

Research towards Alzheimer's treatment advances

NeuRA researchers are part of an international collaborative study aimed at stopping Alzheimer's disease by testing drugs to tackle the build-up of an abnormal protein in the brain found to precede the onset of Alzheimer's disease symptoms.

The Dominantly Inherited Alzheimer Network (DIAN) Study, now in its twelfth year, engages participants with a family history of dominantly inherited Alzheimer's disease. Affecting less than one per cent of those with Alzheimer's, this rare genetic form of Alzheimer's causes memory loss and dementia in people typically in their thirties to fifties. Participation in research trials by those at risk or with early-stage symptoms enables discoveries that potentially benefit everyone, including older adults with age-associated Alzheimer's.

The DIAN-TU clinical trial program comprises 42 trial sites in the USA, Australia, Canada, South America, Europe, the UK, and Asia. The program was developed after promising findings from the DIAN Observational Study, which began in 2008. It successfully mapped the biological signs (biomarkers) of Alzheimer's disease that are detectable before the onset of clinical symptoms.

By 2012, results showed that symptoms are preceded by the accumulation of amyloid (an abnormal protein) in the brain for up to 20 years.

From 2014-2019, Australian participants in the DIAN-TU-001 clinical trial at NeuRA and also in Melbourne and Perth received one of two experimental drug treatments aimed at potentially changing the course of the disease.

The trial results – published in *Nature Medicine* in June 2021 – showed that the drug gantenerumab had a significant effect on brain amyloid levels. An extension of the trial began in 2020 and will run until 2022, allowing further data collection on the effect of the drug over a longer period, and in a larger group of participants.

NeuRA Principal Investigator, Dr Bill Brooks, said: "The extension will provide extra information on the effect of gantenerumab. We hope to gain an indication of whether reducing brain amyloid can prevent or delay the progression of impairment in memory and thinking."

"Although there are differences between dominantly inherited Alzheimer's disease and the more common age-associated Alzheimer's disease, the study results will have important implications for future studies and treatments in age-associated Alzheimer's disease."

"The study results will have important implications for future studies and treatments in age-associated Alzheimer's disease."

Dr Bill Brooks,
Research Fellow

"Our work in dementia prevention aims to develop understanding of risk and protective factors and to develop practical tools and programs to assist clinicians and members of the public."

Professor Kaarin Anstey, Senior Principal Research Scientist

The SHAPE study:

Self-management and Health Promotion in early-stage dementia with E-learning for carers.

The SHAPE trial is an international collaborative research study to test the effectiveness of an online training and support group program for people with early dementia and a corresponding e-learning program for their care partners.

With dementia diagnoses expected to double in the next 20 years, the trial aims to improve quality of life and wellbeing for people in the early stages of dementia and their care partners.

The trial is being conducted in three countries – Norway, the UK, and in Australia, led here by Professor Kaarin Anstey, Senior Principal Research Scientist at NeuRA and Director of the UNSW Ageing Futures Institute. It is funded by the National Health and Medical Research Council in collaboration with the EU Joint Program on Neurodegenerative Disease.

Participants learn to adapt and manage living with early dementia in ten weekly online group sessions. The training is designed to empower participants to make positive changes to their health and wellbeing and manage decision-making and social interaction in day-to-day situations. The group provides a supportive environment for sharing and listening to strategies for living well with dementia.

Care partners undertake a similar online program that enables them to understand and support people with dementia more effectively.

Professor Anstey hopes that all participants will benefit from more support and information during the early stages following a dementia diagnosis.

"We want to demonstrate how people can make small changes in their day-to-day activities to maintain independence and dignity, improve health behaviours, plan the future together with family and live in their own home for as long as possible."

In the long-term, the study results could positively influence the type and standard of care and support offered after dementia diagnosis.

Preserving Mobility and Independence

Health Challenge

Falls are the leading cause of injury and injury-related deaths in Australia. Better interventions are needed to prevent falls, particularly for people over 65 who accounted for 58 per cent of hospitalisations for falls and 95 per cent of fall-related deaths in 2017-18.

Falling can also lead to chronic pain, which has a number of additional catalysts, including surgery and musculoskeletal conditions such as arthritis.

One in five Australians aged 45 and over experience chronic pain – pain that continues for more than three months and sometimes has no apparent cause. People often struggle to find effective treatment and may experience disability and even depression.

As the proportion of Australians managing chronic pain continues to grow, so does the need to find alternatives to overly prescribed highly addictive opioid drugs, which can worsen chronic pain.

NeuRA's Action

NeuRA's work has improved our understanding of how the brain controls balance and gait, identified risk factors for falls, and developed practical interventions for improved physical and cognitive function and fall prevention.

This work has been translated for community use and disseminated to enhance workforce capacity in caring for older people living in aged care facilities and independently.

NeuRA's Centre for Pain IMPACT is conducting research into the nature of chronic pain aimed at lessening its impacts and improving treatment and drug-free, self-management.

Studies in 2020 also looked at the role of our brain in the experience of persistent pain, and changes in the central nervous system that may occur.

2020 Community Impact

NeuRA's recent research has resulted in the development of practical falls prevention programs for older Australians delivered through accessible technology.

Professor Kim Delbaere said: "Our work is centred around finding novel ways to help people aged 60-plus stay mobile and active, regardless of whether they are healthy or living with chronic conditions."

Professor Delbaere led a two-year trial of 503 Australians aged 70 years and older using StandingTall – a home based, e-health balance exercise program delivered through an app.

The program significantly reduced the rate of falls and the number of injurious falls over two years.

Published in *The British Medical Journal*, the results of the trial showed that StandingTall could provide an effective, self-managed fall prevention program for older people living independently.

The aim now is to develop the platform's functionality for far more extensive use than during its research application. This will create sustainable access to an evidence based, cost-effective fall prevention program nationally for healthcare professionals and the wider community.

NeuRA researchers evaluating the effects of medicines for lower back pain recently published findings, also published in *The British Medical Journal*, from studies undertaken in the last year showing commonly used medicines such as muscle relaxants and antidepressants are ineffective and may have adverse effects. These findings provide the highest level of evidence, as designated by the National Health and Medical Research Council, to guide clinicians in their use of these drugs to treat lower back pain.

Falls resulted in
42%
of hospitalised injury cases

1 in 5 Australians
aged 45 and over had chronic pain in 2016

In 2017-18, falls resulted in
5,156 deaths

40%
of injury deaths

In 2018 **chronic pain** cost an estimated
$139 billion
in Australia
mostly through **reduced quality of life** and productivity losses

Snapshot of current research

Dr Yoshiro Okubo is developing a next-generation virtual reality program, REBUILD, to train participants to recognise and avoid real-life slip and trip hazards that align with actual slips and trips induced by treadmill belt movements.

The Own Your Balance trial is testing whether a self-managed cognitive behavioural therapy intervention, alone or in combination with a balance activity program, can reduce fear of falling in older people.

MEMOIR is a tele-trial testing a drug and rehabilitation program for people with Complex Regional Pain Syndrome (CRPS). With CRPS affecting about 5,000 Australians annually, the trial has started recruiting people nationally to participate in the trial interventions from home.

Preserving Mobility and Independence

Harold Berman is Standing Tall

Eighty-five-year-old Harold Berman has been using NeuRA's StandingTall balance exercise app for more than five years. After a bad fall that left him with a fractured ankle and fibula, Harold had to wear a surgical boot up to his knee and use a walker.

Now, Harold credits StandingTall with helping get him back on his feet and giving him confidence to get back to his normal routine.

"I started using StandingTall after my fall in 2016. I started off only able to do 10 minutes a day, but as I persisted, this time gradually increased. After a few weeks, I was using StandingTall for up to 30 minutes per day, continuously.

"Soon afterward, I was back to my normal routine of going for daily walks with great confidence. Initially, I used a walking stick for support, but as I gained more confidence in stabilising my balance I used the stick less and less. I still take it with me whenever I go out, but I just use it as a security blanket when necessary.

"StandingTall first focused on rebuilding stability and confidence, but now includes cognitive exercises too. This means that I have to concentrate more on what I am doing, which is more challenging but even better.

"What I like most about the program is that I can choose when to do it and also for how long, as long as I meet my weekly goal."

Harold Berman uses NeuRA's StandingTall program to maintain his stability and confidence.

Residents at Allity Aged Care trialled smart±step to help reduce their risk of falling.

Falls reduction exercise program tested in aged care homes

smart±step is a new exercise game (exergame) which has been trialled in Allity aged care homes to help reduce residents' risk of falling.

The smart±step program was piloted in four Allity homes in New South Wales and Victoria in 2020 as part of a two-year partnership with NeuRA to bring the latest science and innovation in healthy ageing to residential aged care.

The program uses a wireless mat connected to a television or computer monitor through which participants play exergames designed to promote mobility, balance, and brain training. The games prompt players to step in the correct direction, at the correct time. The quicker and more precise their steps are, the higher their scores.

NeuRA Senior Research Scientist and smart±step designer, Dr Daina Sturnieks, said: "To make this type of exercise more enjoyable and motivating, we have taken the fun elements of a game and converted them into a program that will improve someone's balance and thinking skills."

"Balance challenging exercises can improve mobility and significantly reduce someone's risk of having a fall, which is the biggest cause of injury-related death in older Australians."

Previous studies showed that smart±step is safe and improved users' balance, step reaction time, and mental processing.

Dr Sturnieks said that the partnership showcases how the new technology could be used to significantly reduce falls for thousands of people within aged care homes across Australia.

After the large-scale trial ends, NeuRA aims to partner with community and assisted living services as well as hospital inpatient and outpatient departments to promote national implementation.

"My research is aimed at improving the health and wellbeing of older people through improved mobility, reduced injuries, and enhanced quality of life."

Dr Daina Sturnieks,
Senior Research Scientist

Preserving Mobility and Independence

Commonly used muscle relaxants prove ineffective for low back pain

Low back pain is a major global public health problem and has been the leading cause of disability worldwide for the past 30 years.

Low back pain is very common, with around 80% of people experiencing an episode of low back pain at some point in their life. Unfortunately recommendations around treatments are often unclear or conflicting.

Muscle relaxants, for instance, are the third most frequently prescribed drugs for low back pain in the world, yet there exists a range of uncertainty around their effectiveness and whether they should be prescribed to patients for their pain.

To understand just how effective a treatment muscle relaxants are for low back pain, Professor James McAuley, Director of the Centre for Pain IMPACT, and his team reviewed the evidence from 31 randomised controlled trials, which involved over 6,500 participants, and were published as recently as February 2021.

Researchers assessed whether muscle relaxants, including non-benzodiazepine antispasmodics, were:

- Effective (successfully reduced pain intensity and alleviated disability)
- Acceptable (whether the drug was discontinued for any reason)
- Safe (whether the participant experienced drug-related adverse events)

Findings from their research showed muscle relaxants might reduce pain in the short term, but the effect is too small to be considered clinically meaningful, and there is an increased risk of side effects.

"We found that muscle relaxants might reduce pain in the short term, but on average the effect is probably too small to be important and most patients wouldn't be able to feel any difference in their pain compared to talking a placebo, or sugar pill. There is also an increased risk of side effects," said Professor McAuley.

"We were surprised by this finding as earlier research suggested that muscle relaxants were able to reduce pain intensity. But when we included all of the most up to date research, the results became much less certain," said Professor McAuley.

This analysis was based on the best available trial evidence. However, NeuRA researchers acknowledge some limitations, and believe that some, but not many, individuals with low back pain may gain a worthwhile benefit.

NeuRA researchers suggest that large, high quality, placebo-controlled trials are urgently needed to resolve uncertainties in the evidence for the efficacy and safety of muscle relaxants for low back pain.

For now, the research team stress that their findings do not allow any firm recommendations: "We encourage clinicians to discuss the uncertainty in the efficacy and safety of muscle relaxants with patients, including the possible reduction in pain, but also increased risk of experiencing a non-serious adverse event, to allow them to make informed treatment decisions," Professor McAuley said.

Reducing Risk of Injury and Aiding Recovery

Health Challenge

Most injuries are preventable. Despite this, every year in Australia, thousands of people die and many more are admitted to hospital or attend hospital emergency departments because of injuries.

Injuries can happen to anyone, but some population groups are more at risk than others, including older people.

The leading causes of injury and injury deaths in Australia include unintentional falls (42 per cent) and transport crashes (12 per cent). Injuries commonly have multiple causes, like frailty and weak bones can contribute to fall-related injury in old age.

Spinal cord injuries are often a result of trauma such as experienced in motor vehicle accidents, sports injuries, and falls, and are seen most frequently in young men aged between 15-24 years.

NeuRA's Action

Research is an important factor in creating effective measures to reduce the risk of injury, such as appropriate legislation, policies, education, and technology.

NeuRA has a number of research programs examining different aspects of neural injury, from development of preventative strategies to studies of progressive treatments that improve the health and wellbeing of people with spinal injuries.

A major part of our injury research involves understanding how injuries occur in road trauma, which is a leading cause of death and disabling injury in Australia, for both adults and children.

Our researchers simulate accidents in the Transurban Road Safety Centre and study how to enhance passenger safety and injury prevention. Housed at NeuRA, the Centre is Australia's only research-dedicated crash test laboratory.

2020 Community Impact

Motor Vehicle Injury

NeuRA's research has shown that many injuries to children in car crashes are preventable by correctly using appropriate restraints. This research and its adoption by the community has contributed to a drop in the fatality rate for child passengers from 70 to 40 a year in recent years.

More recently, NeuRA researchers developed a new set of prototype child restraint instructions that were designed, tested, and refined together with parent users to ensure more people can understand them and achieve proper restraint use.

In 2020, NeuRA and Kidsafe Australia also launched the updated version of the Best Practice Guidelines for the Safe Restraint of Children Travelling in Motor Vehicles based on the best new scientific evidence to enhance safety.

Spinal Cord Injury

People with tetraplegia endure difficulties with a variety of bodily functions. NeuRA researchers have shown that painless electrical stimulation of the abdominal muscles through electrodes placed on the skin surface, termed 'Abdominal Functional Electrical Stimulation,' improves respiratory function.

Trials are underway currently to show the effectiveness of this low-cost and easily applied technology to improve respiratory function and reduce complications such as pneumonia for newly injured tetraplegic patients.. Translation of the findings could decrease illness and death, reduce rehabilitation time, improve quality of life, and result in a large cost saving for global health systems for this vulnerable patient group.

is the cost of injury to the Australian health system

25% of presentations to public hospital emergency departments are due to injury, of which **26% are for children aged 0-14**

For both males and females, rates of **hospitalised injury** are **highest in people aged 65 and over**

3.8 days is the average length of stay in hospital for injury cases

Snapshot of current research

The RESTORE Trial: a world-first use of immersive virtual reality to retrain the brain to identify touch sensation in people with spinal cord injury.

The SafeTrip study will investigate how older adults learn protective stepping skills to avoid falls when encountering obstacles, trips and slips.

Abdominal Functional Electrical Stimulation (abdominal FES) for Orthostatic Hypotension in Spinal Cord Injury: a trial to show the effectiveness of abdominal FES in regulating blood pressure for people with tetraplegia, which would enable them to better engage in rehabilitation therapy.

"These Guidelines have played a huge part in the drop in the number of children who have been seriously injured in car crashes – a 33 per cent drop in the past 15 years."

The Hon Andrew Constance MP, NSW Minister for Transport and Roads

Keeping Australia's young passengers safe in vehicles

At the launch of NeuRA's updated *Best Practice Guidelines for the Safe Restraint of Children Travelling in Motor Vehicles* in March, the Hon Andrew Constance MP, NSW Minister for Transport and Roads, shared a traumatic personal experience.

Minister Constance and his family were involved in a head-on crash at Mogo on the NSW South Coast in 2011.

"It was on a rainy Sunday afternoon on a country road that I pulled my 4-year-old daughter out of the back of the car after a high-speed crash. The other driver crossed to the wrong side of the road and hit us head-on.

"You never expect a crash to happen, but when it does, holy hell. Having experienced that head-on, it was remarkable we survived. I've ended up with life-long injuries to my hands and back. My former wife spent many weeks in hospital.

"But Zara, who had been in a properly fitted five-point child restraint, survived that crash with a little bit of bruising on her inner thigh – and thankfully that was it.

"There is no doubt if you look at the work that has been done in the progression of the National Child Restraint Guidelines over the years that hundreds of kids' lives have been saved. Children are our most precious and vulnerable cargo. We need to do everything we can to protect them on our roads.

"Road safety initiatives over the past 16 years have saved 1,200 lives in this state. These Guidelines have played a huge part in the drop in the number of children who have been seriously injured in car crashes – a 33 per cent drop in the past 15 years.

"The National Child Restraint Guidelines are crucial because a properly fitted car seat is one of the most important things we can use to protect our children on our roads."

Reducing Risk of Injury and Aiding Recovery

Boosting older Australians' driving skills

For more than 15 years, Senior Principal Research Scientist, Professor Kaarin Anstey and her team have undertaken research aimed at understanding how age-related cognitive and sensory changes affect the skills of older drivers, and how best to improve their road safety.

Her previous work has shown that 92 per cent of adults aged 70 and over are still driving, with those in their mid-seventies planning to drive for at least another 12 years. Unfortunately, the risk of crashes increases with age.

Yet driving in later life enables social participation for older people, reducing loneliness and social isolation, both of which contribute to poorer health.

While there is a need to improve older drivers' safety, currently there is limited evidence on the best ways to achieve this. The Better Drive program aims to deliver a proven, accessible, and affordable intervention to keep people driving safely for longer.

Better Drive is a five-year multi-institutional, international collaboration funded by the National Health and Medical Research Council that began in 2019.

The program is based on earlier pilot studies that evaluated interventions to improve older drivers' skills and safety. These showed that tailored driving instruction can significantly enhance safety and reduce crash-causing errors.

In a randomised controlled trial of over 384 older drivers, Better Drive aims to evaluate the long-term efficacy and cost-effectiveness of providing tailored driving lessons, tailored feedback on driving skills, and a group-based road rules refresher course.

The feedback session provides a personalised assessment of participants' driving performance using a behavioural modification approach and video footage to identify areas that need improvement and things that have been done well. The driving lessons take this a step further and show drivers how to make practical, on-road changes to their driving.

"Our world-first trial will provide much-needed evidence on the best methods to improve older driver skill and safety, and if effective, our results will lead to programs that will enable older drivers to drive safely for longer," Professor Anstey said.

All participants in the trial receive the Rolls Royce walking therapy, but only half will get the special spinal stimulation. This is crucial to be able to work out if the stimulation has a real benefit.

"At the Spinal Cord Injury Research Centre, we aim to determine whether new potential therapeutic techniques can improve movement, bowel, sensory, and other functions in people with spinal cord injury."

Professor Simon Gandevia, NeuRA Deputy Director

Neurostimulation could help people with spinal cord injuries to stand and walk

Professor Simon Gandevia, Deputy Director at NeuRA, is one of the world's leading researchers in the field of human movement control. Within NeuRA's Spinal Cord Injury Research Centre, he is leading a landmark international clinical trial aimed at helping people with spinal cord injury to walk again.

The eWALK trial will study the use of neurostimulation coupled with step and walking training in people with spinal cord injury to restore their ability to stand and walk. A critical element of the trial is the use of real stimulation with half the participants and a sham or placebo stimulation with the others. Neurostimulation involves sending electrical currents through electrodes placed on the skin surface over the spinal cord to rewire the neural pathways that have been impaired. Professor Gandevia describes the potential changes induced by neurostimulation as "like a hearing aid for the spinal cord". The idea is that electrical currents can amplify messages transmitted via surviving neural pathways to enhance communication between the brain and the neural circuits that drive walking. The results of previous small, select neurostimulation studies are positive, but a lack of highly controlled clinical trials has prevented this technology from being converted into clinical practice. The scale of the eWALK clinical trial will determine convincingly whether spinal cord function is improved, with the trial taking place in Sydney, Toledo, Glasgow, and Chicago. It has been made possible through funding from SpinalCure Australia and New Zealand's CatWalk Spinal Cord Injury Research Trust.

Initial results are expected in 2023, depending on the impacts of COVID-19-related restrictions, and may ultimately enable this technology to be established in clinical practice.

Improving Mental Health and Wellbeing

Health Challenge

At the peak of mental health, people are not necessarily without mental illness, but are resilient to stress and hardship. They experience positive feelings and are more prone to improved physical health, productivity and relationships.

On the opposite end is mental illness. Though everyone is prone to some degree of mental fluctuation, people experiencing mental illness have bona fide disorders that alter their thinking, perception and response to self and the world.

Mental illness currently affects one in five Australians and although national population data about the correlation between COVID-19 and mental health is yet to be released, researchers believe the number of people affected by mental illness is set to rise.

NeuRA's Action

NeuRA's work in mental illness looks at factors contributing to both optimal and deteriorated mental states, how these factors can be mitigated, and effective treatments.

Our reputation precedes us in the field of schizophrenia research – a label traditionally used to categorise a variety of severe mental illness symptoms that could not otherwise be defined. NeuRA's novel findings show that when the immune system attacks the brain, the result is a schizophrenia-like state.

NeuRA's pioneering research into wellbeing and the human ability to flourish shows that wellbeing can also range from a diminished to a prosperous state.

Experts at NeuRA are researching behaviours associated with mental state, such as sleep, which is crucial for survival. Researchers are investigating how to better treat sleep disorders, which significantly impair quality of life and increase the risk of vehicle accidents, cardiovascular disease, obesity, and dementia.

2020 Community Impact

There is growing recognition that promoting wellbeing above and beyond mental illness is critical to improving quality of life around the world. NeuRA's Dr Justine Gatt has created a scale to quantify and measure individual wellbeing and is researching the resources that individuals with high wellbeing draw on to provide this information back to the wider community. This scale has already been used by over 10 domestic and international research studies spanning mental health, resilience, and other health conditions including ageing, chronic pain and cancer.

Researchers have been trying for 30 years to find a successful drug treatment for sleep apnoea, which puts people at greater risk of cardiovascular disease, dementia, and depression. Research by Professor Danny Eckert showed that repurposing two existing medications can reduce the severity of sleep apnoea by at least 30 per cent.

45%

of Australia's adult population meet the criteria for a mental disorder in any given year

Our genes contribute to 48% of our wellbeing, meaning that our environment contributes equally to its variation. This includes positive and negative life experiences, such as stress, which we can change and control.

12%

of Australia's disease burden **is due to mental illness**

$10.6 billion, or **$420 per person**

is the amount spent on mental health-related services in Australia during 2018–19

Australians with sleep apnoea wake 100 times or more per hour and are two to four times more likely to crash a car than the general population

Snapshot of current research

Investigating the role of chronic stress in children with autism: a study that will identify whether hair can be used to determine the role of chronic stress in the development of Autism Spectrum Disorder, and related conditions, in children.

Understanding the underlying pathophysiology of neurovascular injury as a result of decreased sleep quality with normal ageing: this study will investigate the role of sleep-breathing disorders, such as obstructive sleep apnoea, and increased blood pressure and heart rate which results from spontaneous arousal, in cognitive decline for people over the age of 60.

Reducing blood glutamate to treat inflammation-induced depression: excessive glutamate is released in the brain when the immune system is activated, which can contribute to inflammation-induced depression. This study will determine the potential of reducing blood glutamate levels as a method of treatment.

Improving Mental Health and Wellbeing

Nurse Educator Karen Woods is thriving through COVID-19

The mental health impact of the COVID-19 crisis on the global population has been unprecedented, especially for healthcare workers who are experiencing occupational stress, burnout, and fatigue.

NeuRA's Dr Justine Gatt has worked with the Prince of Wales Hospital Nursing Education Team to develop a wellbeing intervention program, THRIVE, aiming to assess and improve the mental wellbeing of our much-needed front line staff.

Karen is a Nurse Educator at Prince of Wales Hospital, and a participant in this program. Karen has undertaken seven weekly 60-minute webinars on the neuroscience of key wellbeing focusing on topics such as sleep, diet, exercise, stress, social connections, cognitive challenges, and life purpose.

"What inspired me to enrol in THRIVE was a desire to find new ways to boost my own sense of wellness and vitality. One of the most valuable outcomes for me was that I am now committed to using movement and exercise in a more purposeful way to support my wellbeing.

"Now during lockdown, I've been doing High Intensity Training and Zumba classes online and enjoying these activities even more so because I'm aware of all the benefits exercise has on the brain, such as improving cognition and reducing the risk of cognitive decline and dementia.

"I looked forward to tuning into the webinars each week. I always came away feeling more inspired to prioritise my sense of wellness and integrate each of the habits and topics into my daily life.

"I'm a real theorist so I really liked all the evidence-based research that underpinned THRIVE. I would definitely recommend this program to anyone who wants to get inspired and motivated to make small changes to one's lifestyle – THRIVE was all about doing the 'next right thing'. My aim is to keep thriving!" Karen said.

Karen Woods came away from THRIVE feeling more inspired to prioritise her wellness and integrate the habits she had learnt into her daily life.

Bipolar disorder affects around 350,000 Australians and an estimated 40 to 50 million people worldwide.

World's largest bipolar genomics study sheds light on biological causes

Bipolar disorder is a common mood disorder that affects around 350,000 Australians and an estimated 40 to 50 million people worldwide.

The disorder usually develops during adolescence or early adulthood and can cause extreme manic and depressive symptoms, as well as psychosis. On average, people with bipolar disorder die eight to 12 years earlier than the general population, and are 20-30 times more likely to attempt suicide.

Until now, only a fraction of the genetic risk factors contributing to bipolar had been identified, meaning much remains unknown about the specific biological mechanisms that contribute to the development of the disorder.

This year, researchers at NeuRA and over 200 other institutions around the world identified 64 new genomic regions that make people more susceptible to bipolar disorder.

The study, published in *Nature Genetics*, revealed where the genetic variations that increase risk of bipolar disorder are located in our DNA, and what specific genes and pathways they impact.

Senior Research Scientist at NeuRA, Associate Professor Jan Fullerton said the results open up future opportunities to better identify people who are likely to develop the condition and develop better treatments.

"Your genome is a book made up of letters, sentences and paragraphs that tell part of your personal story. This study is looking at common spelling mistakes that can change the meaning of the story and occur more frequently in people with bipolar disorder. If a person's genome has enough spelling mistakes, then this can result in bipolar disorder," said Associate Professor Fullerton.

This study is the largest in the world to examine genetic risk factors for bipolar disorder. Researchers studied over 7.5 million common variations in the DNA sequence from almost 415,000 people, over 40,000 of whom had bipolar disorder.

Next, researchers at NeuRA and UNSW will use these results to inform their ongoing "Kids and Sibs" study – which includes children and siblings of bipolar patients aged 12 to 30 years who are at high risk of developing bipolar disorder themselves.

The aim of Kids and Sibs is to enable early identification of those young people on the trajectory towards illness, who would most benefit from treatment to prevent the development of symptoms, and to reduce illness burden.

Improving Mental Health and Wellbeing

Study shows people with schizophrenia have excess dopamine

The debilitating hallucinations and delusions a person with schizophrenia experiences are caused by too much dopamine in the brain. However, little consideration has been given as to why there is too much dopamine in the first place.

From a neuroscience point of view, there are two possible explanations. Either there is too much drive or stimulation of the neurons that produce dopamine (dopamine neurons) or there is too little brake on them. No one knew which was more likely, until now.

In a study led by Professor Cyndi Shannon Weickert and Dr Tertia Purves-Tyson, researchers analysed the human midbrain, where dopamine neurons are located in people with schizophrenia, and compared them to healthy controls. The team used sensitive techniques to detect changes in molecules within the neurons.

There were two major neurotransmitter systems to consider as possibly causing dopamine overactivity, the first being the drivers (glutamate) and the second, being the brakes (GABA).

If there was too much drive on dopamine neurons, researchers and doctors would want to decrease activity of the excitatory glutamate neurons to normalise the dopamine.

If there was too little braking on dopamine neurons, then they would want to increase activity of the inhibitory neurons to normalise the dopamine.

The results from the current NeuRA study revealed that it is actually a reduction in the brake (GABA) that causes dopamine neurons to over-fire. Excess dopamine can induce psychosis even in the healthiest of people, but for people with schizophrenia, who are particularly sensitive to surplus dopamine, the effects are far worse.

Professor Shannon Weickert says that current treatments for schizophrenia all target overactive dopamine, but that this current work opens up the possibility of targeting the GABA neurons.

"By directing treatments to target the root of the problem – namely, fixing the faulty brakes – we may be able to control the dopamine neurons and quiet the hallucinations and delusions," Professor Shannon Weickert said.

Researchers will next try to understand whether a reduction in the GABA brake is the only reason for increased dopamine in people with schizophrenia, or whether are there other neurotransmitters and neuromodulators involved.

This knowledge will help the team decipher whether new treatments should target more than one system, and if there are different reasons for dopamine overactivity in different people.

Professor Cyndi Shannon Weickert,
NSW Chair of Schizophrenia Research

NeuRA's Spinal Cord Injury Research Centre

Underpinning our research

Spinal Cord Injury Research Centre

The newly opened Spinal Cord Injury Research Centre is a state-of-the-art facility featuring the best exercise, rehabilitation and neurophysiology equipment.

The Centre enables NeuRA scientists to increase the scope and speed of its research into spinal cord injury, exploring cutting-edge techniques like neurostimulation, acute-intermittent hypoxia and improved activation of muscles to help lead to improved bodily functions, such as breathing and walking.

At the opening of NeuRA's new Spinal Cord Injury Research Centre in July 2020, significant state government funding was announced for research projects that could substantially improve life for people with spinal cord injuries.

The Spinal Cord Injury Research Centre was built thanks to funding support from SpinalCure Australia.

Impact of respiratory muscle training on respiratory muscle strength, respiratory function and quality of life in individuals with tetraplegia

Trial results published in 2020 showed that a respiratory muscle training program increased inspiratory muscle strength in people with tetraplegia and may reduce respiratory complications.

Abdominal Functional Electrical Stimulation (FES) to Improve Bowel Function in Spinal Cord Injury

A trial examining the effectiveness of abdominal FES to improve bowel function for people with a spinal cord injury, who experience high rates of bowel-related dysfunction, pain, and other problems. This study is the first of its kind and is expected to confirm that this affordable, risk- and complication-free treatment can reduce bowel-related problems for people with spinal cord injuries, the impact of which would be significant improvement in their quality of life.

"At the Spinal Cord Injury Research Centre, our work focuses on the development and understanding of novel therapies that can restore respiratory and limb muscle function after spinal cord injury."

Professor Jane Butler,
Senior Principal Research Scientist

Underpinning our research

Sydney Brain Bank

The Sydney Brain Bank located at NeuRA is responsible for the collection, characterisation, storage and distribution of human brain and spinal cord tissue. The facility provides this tissue to fellow researchers at NeuRA, as well as to institutions around the world for investigations into healthy ageing and neurodegenerative conditions.

The Sydney Brain Bank works with clinical research programs that have longstanding clinical data of the individuals who sign up as brain donors. This information conveys the donor's health and lifestyle at their time of death as well as in the years leading up to it and is a valuable resource for researchers wishing to determine associations between brain pathology and physical states of health.

There are six staff in the Sydney Brain Bank team at NeuRA, including the Director, Dr Claire Shepherd. Each member of the team carries a pager alert system for when a brain donor passes away, as there is only a small window of time in which to respond, as well as a freezer failure alarm.

After collection and preparation, the Sydney Brain Bank examines the brain tissue and communicates the results to the clinical research program and donor's family. This assists in refining clinical diagnoses, and also gives loved ones a sense of closure. Provided the tissue is preserved correctly, it can be stored for fifteen to twenty years, and used successfully by scientists for experimental study.

Sydney Brain Bank researchers carefully prepare brain tissue for use in studies locally and around the world.

Treatments for Alzheimer's disease

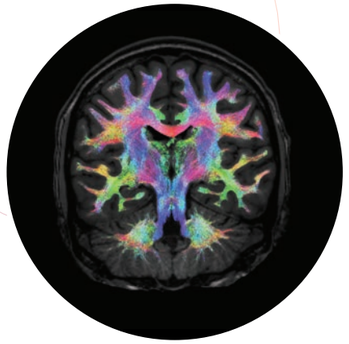
Researchers have found evidence that a medication intended to lower blood pressure appears to be associated with a decrease in signs of Alzheimer's in the brain. Using specimens from the Sydney Brain Bank, a project will investigate the levels and locations of select proteins known to play a role in the medication's activity to better understand its potential as a treatment for Alzheimer's.

Normal human ageing

Normal ageing of an otherwise healthy human brain is itself a poorly understood process. Changes in structure and function can make us vulnerable to the influences in our everyday environment in ways younger brains can handle, contributing to disease risk in our later years. Tissue from the Sydney Brain Bank is providing researchers with insights into changes in the way genes express themselves across a spectrum of ages, which could explain how our brains deal with changes in the environment.

Dr Claire Shepherd,
Sydney Brain Bank Director

Underpinning our research



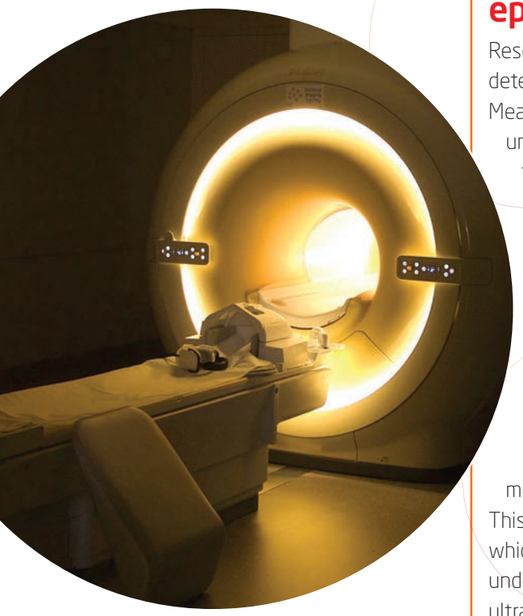
NeuRA Imaging data representing "cabling" connections in the brain, overlaid on an anatomical image.

NeuRA Imaging

Some of the most valuable tools in a medical researcher's toolkit are those that can deliver information about living or excised tissue without causing harm. To achieve this, NeuRA invested in the very best MRI technology by purchasing the Philips Ingenia CX 3-Tesla imaging technology, which now resides in the NeuRA Imaging Facility.

There is no other scanner in Australia like it, and it can be used to scan not just the brain but any tissue in the human body. Its magnetic field is 50 to 100 thousand times stronger than the Earth's.

Using the scanner, NeuRA has developed and optimised a new, non-invasive MR imaging method, Magnetic Resonance Electrical Properties Tomography (MREPT) which has the potential to reliably and repetitively detect changes in brain activity.



The Philips Ingenia CX 3-Tesla MRI scanner.

A new way to detect and localise epileptic seizures

Researchers are using the MRI scanner to see if it proves useful for the detection and location of epilepsy in the brain.

Measurement of the degree and source of these discharges is currently undertaken by attaching electrodes to the surface of the skull, implanting them on the surface of the brain or inserting deep brain electrodes.

Our newly developed approach, MREPT, is completely novel, but has the potential to provide superior electrical discharge location in this vulnerable patient population.

Brain mapping

Brain cartographers Professor George Paxinos AO and Dr Steve Kassem have been able to use the scanner to develop the world's highest resolution MRI of a living human brain. The team have been working diligently with collaborators across Australia to construct what is now the most comprehensive atlas of the human brain, ever.

This atlas includes exquisite images of the brain's regions and connections which will assist brain researchers, surgeons, and even enthusiasts in understanding and appreciating the brain's complexity and beauty. These ultra-high-resolution images were generated by having a researcher lie in the MRI for a cumulative total of 40 hours.

Underpinning our research

Transurban Road Safety Centre

The Transurban Road Safety Centre (TRSC) was built in 2017 and is Australia's first research-dedicated crash test lab. It features a crash sled that enables researchers to test a variety of simulated road accidents, providing invaluable data that can be used to improve safety for road users.

The goal of the TRSC is to alleviate the significant impact of death and injury on Australia's roads through research into road safety. Findings from the Centre are provided to the Australian Government, regulatory bodies, manufacturers and vehicle associations to help shape policy and inform the development of regulations for road users.

Preventing pelvic injury in motorcycle drivers

With the majority of pelvic injuries caused by direct contact with the motorcycle fuel tank, researchers at the TRSC performed crash tests to investigate how the most common designs of the motorcycle fuel tank (standard, sports, cruiser, and touring motorcycle types) and rider posture affect the risk of pelvic injury. Their results revealed riders of 'cruiser' style motorcycles are at increased risk of pelvic injuries compared to sports bike riders. These findings have implications for future motorcycle fuel tank designs, and improved protective clothing for motorcyclists.

Testing the misuse of child restraints to improve their design

Researchers at the TRSC tested five of the most common errors people make when using child restraints to assess how they impact the performance of child restraints during a crash. Results from the study revealed that all five errors had negative consequences, but that incorrect use of forward-facing restraints increased the risk of head and chest injury in a simulated crash more than the incorrect use of rearward-facing restraints. These findings have implications for the design of child restraints so that they are easier for parents and carers to use correctly.

"Our research aims to understand both the engineering and human factors that cause injury to people of all ages travelling in cars on our roads, and to develop and test holistic solutions to prevent these devastating injuries."

Professor Lynne Bilston,
Senior Principal Research Scientist

NeuRA's TRSC crash sled enables researchers to test a variety of simulated road accidents, providing data that can be used to improve safety for all road users.

Community engagement in our trials

As NeuRA's research is focused on understanding disorders and diseases of the brain and nervous system, many of these research projects need people that meet specific criteria, who are able to partake in trials.

This past year, NeuRA researchers conducted 27 registered clinical and randomised controlled trials. Results will help to benefit people affected by disorders of the brain and nervous system.

Our research teams also conducted 12 telehealth studies, which in light of the current pandemic as well as geographical limitations, has enabled much greater access and participation across Australia.

Healthy volunteers over the age of 18 are also needed as a comparison group to measure the changes in affected individuals and are essential to the research projects. We engage these volunteers through the Healthy Volunteer Registry, which continues to grow despite some people understandably withdrawing during the COVID-19 pandemic.

By the end of 2020, NeuRA welcomed an additional 52 healthy volunteers to the registry, taking our total number of eligible volunteers to 869.

Volunteers are approached once every two years to participate in a NeuRA research project. In some instances, volunteers are approached more frequently, but never more than three times per year.

There are eight different NeuRA studies that have engaged healthy controls since the beginning of 2021, including the ReacStep study. Led by Dr Yoshiro Okubo, ReacStep is examining the effects of two balance training programs (one novel and one conventional) on trip and slip responses in adults over the age of 65.

Healthy volunteers are being asked to visit NeuRA four times to undertake these programs and assessments.

With new opportunities to contribute to the future of Australian research becoming available, we invite you to regularly visit neura.edu.au/content/volunteer to view details of new research studies that may be of interest to you and how you might be able to help.

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2020 NeuRA Group Financial Snapshot

The NeuRA Group includes NeuRA (the institute), NeuRA Foundation (the institute's fundraising and communications arm), Schizophrenia Research Institute and Mindgardens (a cross-campus initiative focused on neuroscience, mental health and addiction).

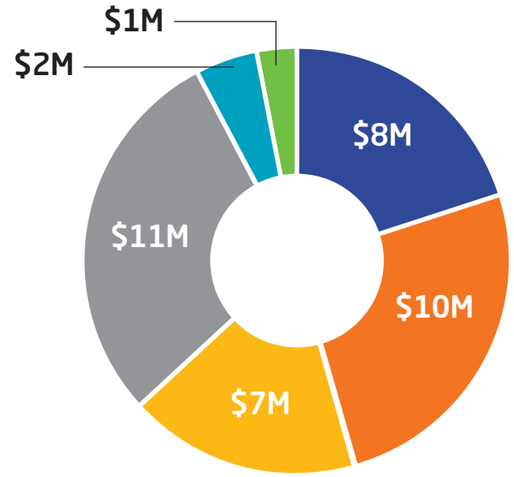
INCOME	2020 $m
NHMRC Grants	8
Other Grants	10
Operations	11
Fundraising	7
Investments	2
Other	1
TOTAL INCOME	39

EXPENDITURE	
Research expenses	6
Research salaries	10
Fundraising salaries & expenses	2
Operations expenses	9
Operations salaries	4
Depreciation & amortisation	3
TOTAL EXPENSES	34

SURPLUS / DEFICIT	5

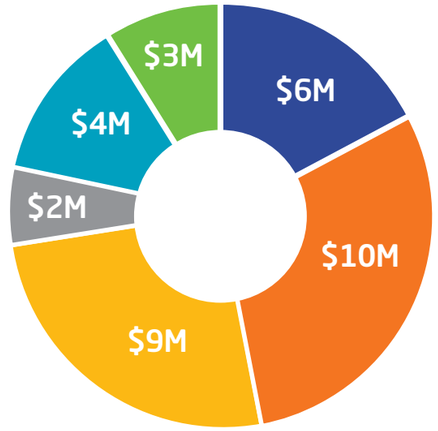
FINANCIAL POSITION	Dec-20 $m
Current assets - Endowment Fund	14
Current assets - Cash & others	30
Non-current assets	60
Total assets	104
Liabilities	14
NET ASSETS	90

CURRENT ASSETS	Dec-20 $m
Investments - available-for-sale	37
Cash & bank balances	3
Other current assets	5
TOTAL	45



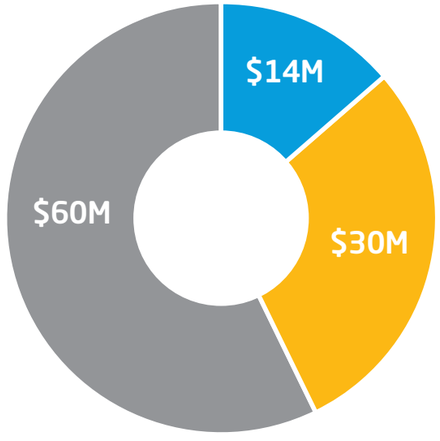
2020 Income

- NHMRC Grants
- Other Grants
- Operations
- Fundraising
- Investments
- Other



2020 Expenditure

- Research expenses
- Research salaries
- Fundraising salaries & expenses
- Operations expenses
- Operations salaries
- Depreciation & amortisation



Dec 20 Financial Position

- Current assets - Endowment Fund
- Current assets - Cash & others
- Non-current assets

In Gratitude

We are especially grateful for the philanthropic gifts of our generous supporters.

Key supporters who made gifts of $10,000 or more in 2020

Margarete Ainsworth
ASX Refinitiv Charity Foundation
Cameron Family
CatWalk Spinal Cord Injury Research Trust
Laurie Cowled
Diana and Edward Federman
Elizabeth Gilbert
Hicksons Lawyers
Dr Francis Hooper
Lyn Ingham
MCK Family Trust - Jacob and John Mamutil
Deborah and John McMurtrie
Janette Mary O'Neil
Dr James Rae
Paul Salteri AO and Sandra Salteri
Professor Peter Schofield AO
SpinalCure Australia
Sportmedtech Pty Ltd
Emma and Dominic Stevens
The 1666 Foundation
The David Z Burger Foundation
The Centenary Foundation – Scott Family Bequest
The Edward C Dunn Foundation
The Maple-Brown Family Foundation
The Oranges & Sardines Foundation
The Profield Foundation
The Serpentine Foundation
The Unsworth Foundation
The Yarranabbe Foundation
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2020 Estates

The Estate of Gwendoline Valma Banks
The Estate of Margaret Frank
The Estate of Margaret Greig
The Estate of Margaret Isabel Hewlett
The Estate of William Brian Jory
The Estate of Matthew Terrence Steele
The Estate of Russell Watman

Supporter Spotlight

Thanks to generous donors, a significant endowment fund set up at NeuRA called the Michael & Elizabeth Gilbert Postgraduate Scholarship in Parkinson's Disease Research has provided valuable funding for postgraduate students since 2007.

Elizabeth created the scholarship in her husband Michael's honour as a means of providing NeuRA's early career researchers with scholarships and the resources needed to develop new therapies, diagnostic tools, and prevention mechanisms.

"When my husband Michael died, I wanted to do something about Parkinson's Disease and Alzheimer's, both of which he suffered from. I just could not believe how much a man could change due to the impact of these brain diseases. So I really wanted to increase research capacity in these areas," Mrs Gilbert said.

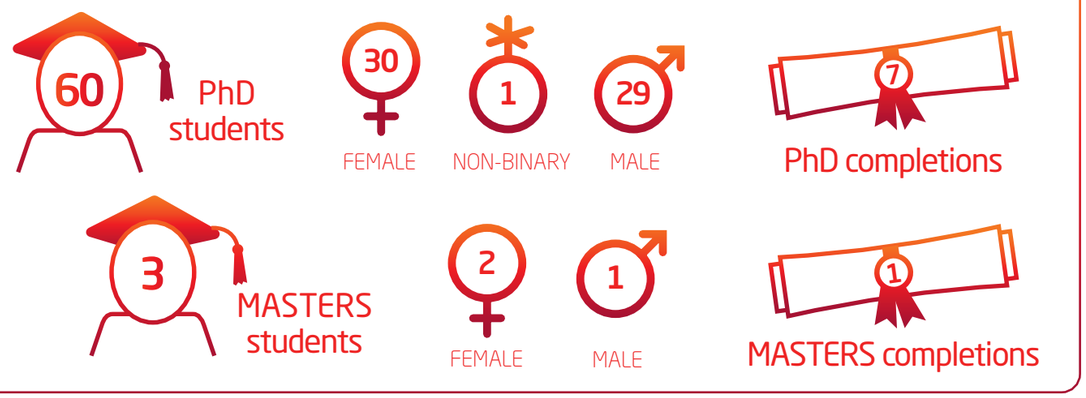
Over the past year, the Michael & Elizabeth Gilbert Postgraduate Scholarship has supported Lloyd Chan. Lloyd is a PhD student whose research uses wearable and sensor technology, such as a smart watch, to measure mobility performance in people with Parkinson's.

"I am extremely grateful for Mrs Gilbert's support, which has been critical to my research to see the effects of smart watch technology in measuring mobility performance.

"The data I collect will be used to train a machine learning algorithm to identify different walking forms and extract walking pattern parameters with smart watches. The results of this project could help quantify Parkinson's disease progression and mobility performance," he said.

Lloyd Chan, PhD student.

NeuRA Student Body



NeuRA

Discover. Conquer. Cure.

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