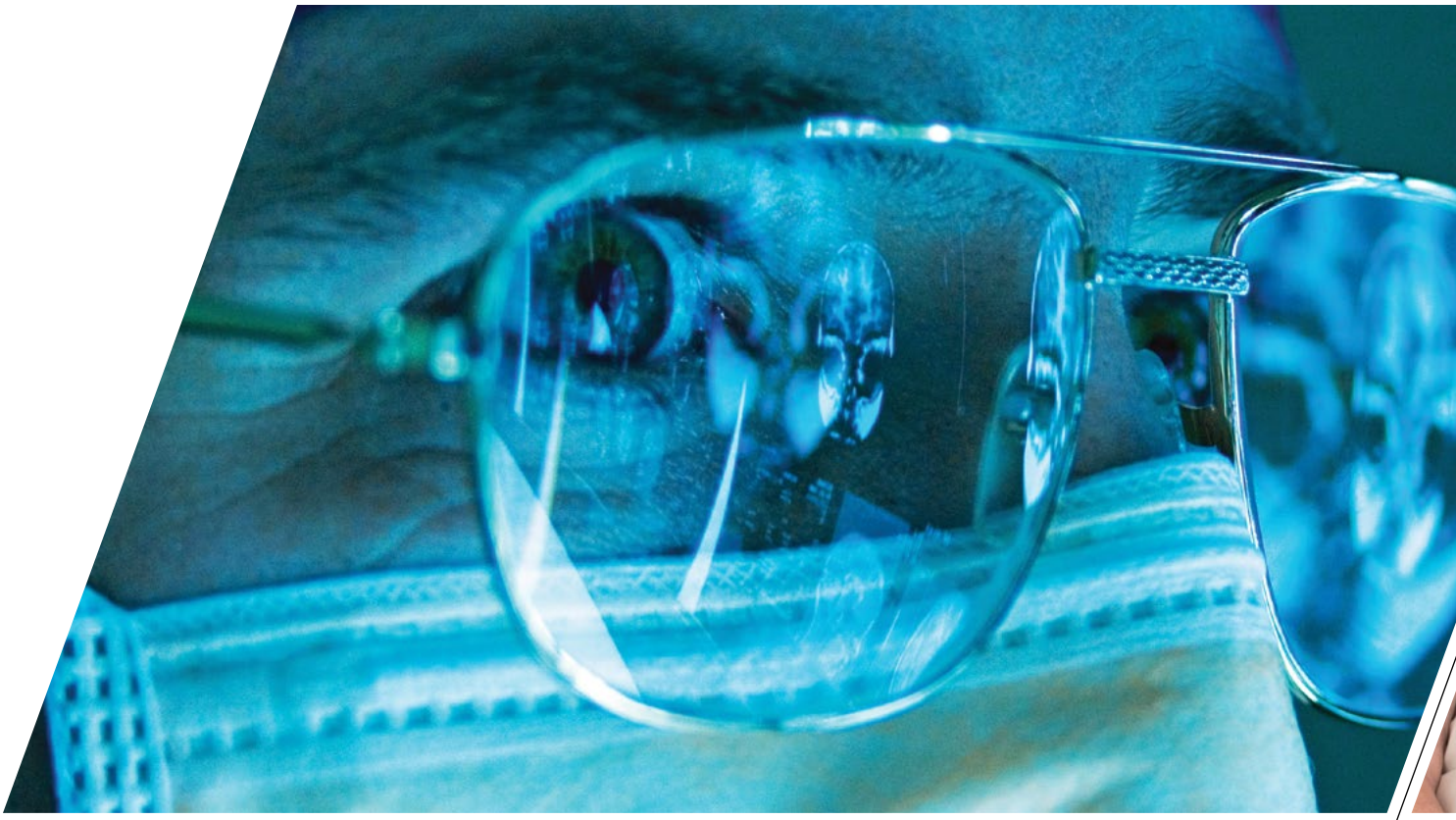
NeuRA
Discover. Conquer. Cure.

Neuroscience Research Australia
Profile 2017

TRANSLATION OF RESEARCH

TRANSFORMATION OF LIVES

"At NeuRA we are focused on translating findings from medical research into real world applications. We develop health and medical practices that help transform people's lives and deliver meaningful outcomes to conquer and cure diseases of the brain."



TRANSLATION OF RESEARCH

"Our ageing population is suffering more illness, most notably dementia, which is now the second leading cause of death in Australia. Here at NeuRA, we are committed to transforming lives through the development of innovative research programs that tackle brain disorders which impact our community."

TRANSFORMATION OF LIVES

WELCOME

Translation of research / Transformation of lives

Discovery occurs now and in the future. It is the fabric of our mission at NeuRA, one of the world's leading centres for neuroscience research.

With 300 researchers, clinicians and support staff, spread across 30 research groups, each led by a Senior Clinical or Scientific Investigator, we are tackling some of the biggest challenges to our health, our lives and the quality of life we can anticipate in an ageing population.

Working in partnership with Government, Business and Research, our mission is to investigate diseases of the brain such as Parkinson's, Alzheimer's, Schizophrenia, Bipolar, Autism, as well as brain and nervous system disorders leading to falls in the elderly, neural and spinal injury and chronic pain.

Our goal is to make cutting-edge discoveries which can then be applied to conquer and cure these brain disorders, that will allow all people, and their families to live a life of fulfilment, one with purpose, passion and a life well navigated with good health.

At NeuRA, we play a vital role in the global research community by translating our research across neuroscience, by participating in multi-country drug trials such as the DIAN trial for Alzheimer's, and by participating in international scientific symposia to share our discoveries.

Today, we stand at the threshold of a number of significant advancements, which will shape our pathways of Discovery in Neuroscience over the coming years.

'Discovery' is not just a word associated with our quest to explore space and time, it is also the mantra we live and breathe at NeuRA. We are excited to share a snapshot of these projects which will frame the goals of NeuRA over the coming twelve months.

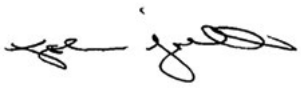
Transurban Partnership opens Australia's first dedicated Road Safety Research Centre
A key platform of NeuRA's research is injury prevention. Injury prevention research is aimed at understanding how and why injuries occur and developing effective preventative strategies. This year marks the opening of the Transurban Road Safety Centre at NeuRA.

Alzheimer's landmark international trial
NeuRA has been participating in a landmark international clinical trial aimed at preventing Alzheimer's disease before the symptoms become a problem. Phase two of this project will commence later this year, while review of initial data will be released in 2018.

New Schizophrenia youth research program
The review of data records and childhood surveys in over 87,000 young people are helping to determine risk and resilience factors contribute to future mental disorders such as schizophrenia.

NeuRA partners in sleep research
NeuRA is partnering with Brisbane-based company Oventus Medical on a major new Obstructive Sleep Apnoea Research program targeting improved therapies for Sleep Apnoea.

The Sydney Brain Bank sets new global research guidelines
The team led by Dr Claire Shepherd, has developed a new method that characterise the pathology in Alzheimer's disease, improving diagnosis.



John Grill AO
BSc BE(Hons) Hon DEng
CHAIRMAN

Prof Peter R Schofield
FAHMS PhD DSc
EXECUTIVE DIRECTOR & CEO

"At NeuRA, we are driven to advance neuroscience research, through technology and discovery to find cures which will allow us to conquer brain disorders. We seek to provide everyone with the potential to live their lives without disease of the brain or pain associated with neural injury, young or old".

"Quite simply, if we DISCOVER, we can Conquer and Cure."

John Grill AO
BSc BE(Hons) Hon DEng
CHAIRMAN

Prof Peter R Schofield
FAHMS PhD DSc
EXECUTIVE DIRECTOR & CEO

Our vision is to prevent and cure disease and disability of the brain and nervous system.

Contents







"Discovery cannot sit alone – it requires focused and dedicated efforts at translation, framed in scientific and academic rigour, to transform human health outcomes."

Partnership for Discovery

A PIVOTAL PARTNERSHIP FOR RESEARCH ADVANCEMENT

Insight / The burden of road trauma in Australia is considerable at around 1,300 deaths and 69,000 hospitalised annually.

Transurban Partnership

The Hon Brad Hazzard, Minister for Health officially opened the Transurban Road Safety Centre

The Transurban Road Safety Centre at NeuRA was officially opened by the Hon Brad Hazzard, Minister for Health and Minister for Medical Research. It brings together Research, Business and Government partnerships, all aligned to work together to reduce injury suffered on our roads nationally.

Housed at NeuRA, this is Australia's first dedicated centre for road safety research and will feed information directly into legislation, standards and guidelines designed to decrease the occurrence of serious road trauma.

Transurban is a Top 20 company on the Australian Securities Exchange (ASX) and have been in business since 1996 managing and developing urban toll road networks in Australia and the USA. Here in Australia, they have 13 roads in their portfolio and at the heart of their business is the desire to manage and respond to driver needs. Through this partnership over the next 3 years with NeuRA, a range of innovative research on driver safety will be undertaken.

The Centre combines world-class research with state-of-the-art facilities and equipment to provide a source of ongoing innovation in road safety research. To alleviate the significant impact of death and injury on Australian roads our new research focus will include older drivers, motorbike riders and young adults in back seats.

Injury is the leading cause of death and disability for Australians aged between 1 and 45 years, and road trauma is responsible for a substantial proportion of this problem. The burden of road trauma in Australia is considerable, at around 1,300 deaths and 65,000 hospitalised each year.

Estimates suggest that road trauma costs the Australian government $27 billion annually, however the human costs to families affected by road trauma is immeasurable.

With Australia's ageing population, there are now greater numbers of older people driving, and for longer than ever before. Drivers over the age of 70 currently account for over 14% of driver fatalities in Australia, but only about 8% of all licence holders. Hospitalisation rates among older drivers are exceeded only by drivers aged 15-25 years. Motorcyclists currently represent 22% of serious casualties on Australian roads but only account for one per cent of the vehicle kilometres travelled.

L-R. The Hon Brad Hazzard, Prof Lynne Bilston, Dr Julie Brown, Scott Charlton, Mrs Margarete Ainsworth, Andrew Head, Mrs Betty Lynch and Prof Peter Schofield.

> “There is a pressing need to find solutions to this increasing problem while maintaining and encouraging increased mobility and independence among older road users, and the fastest growing sector on the road, motorcyclists.”

New research into these sectors will assist the industry to provide greater safety education.

Commenting on the opening of the Transurban Road Safety Centre, Prof Peter Schofield, CEO of NeuRA said “There is a pressing need to find solutions to this increasing problem while maintaining and encouraging increased mobility and independence among older road users, and the fastest growing sector on the road, motorcyclists.”

“We have recently identified that older drivers are experiencing difficulties in achieving good seat belt fit, and that almost 20% reposition their seat belts, and use some sort of comfort accessory when they travel in cars. These behaviours are likely to negatively impact the crash protection they receive in modern vehicles. We aim to develop solutions to improve their comfort and crash protection when they travel in cars.”

A key area of NeuRA’s research is injury prevention. Injury prevention research is aimed at understanding how and why these injuries occur and developing effective preventative strategies. This research program will encompass studies of injury mechanisms in vehicle occupants, and the design and evaluation of countermeasures to injury, including public health, educational and engineering solutions.

Underpinning NeuRA’s research in this area is the need for simulated road accident activity in a controlled environment.

The launch of the Transurban Road Safety Centre for research at NeuRA is an excellent example of the opportunities and benefits of partnerships. Here we are bringing business investment, government support and scientific research together to benefit the community, to drive research into making roads safer, protecting passengers from injury, and ultimately saving more lives.

BIOLOGICAL SYSTEMS HELP AMPUTEES

Insight / Research program simulates neural code to allow amputees to feel.

Dr Ingvars Birznieks

Dr Ingvars Birznieks

The hand is an extraordinary sensory organ which is used to explore the physical world using the tactile sense. At the same time it is also the most sophisticated and versatile instrument to change the environment via manipulation of objects.

The astounding functionality of our hand depends not just on the ability to move muscles, but on highly specialised fine-tuned communication between motor and sensory systems which governs hand actions through most sophisticated tasks.

Dr Birznieks' research comprises a range of studies related to the sense of touch including various clinically relevant examples such as stroke, pain, diabetic neuropathy, or loss of a limb. By borrowing ideas from biological systems, the team is building dexterous robotic manipulators and prostheses which can also feel.

Dr Ingvars Birznieks research is about making prosthesis feel

> “I have aspired to address this challenge for a long time and in the light of our latest achievements the time seems to be right for translation.”

The level of control which amputees possess over the current generation of hand prostheses is generally poor. Substantial numbers of amputees reject prostheses owing to perceiving them as a foreign object. The solution for these problems may lie in the ability to provide sensory feedback via the sense of touch.

Commenting on his research program Dr Birznieks says, “I have aspired to address this challenge for a long time and in the light of our latest achievements the time seems to be right for translation. Thus, an interdisciplinary team representing neuroscientists and engineers led by Birznieks, and UNSW colleagues Richard Vickery and Stephen Redmond has been assembled to address clinical and fundamental research.”

“We address this challenge at multiple levels. Using highly skilled microelectrode recordings in humans we can record signals which touch receptors send to the nervous system when we manipulate or explore various objects. “As part our Australian Research Council funded project, our aim is to understand information encoded in those signals and how it is used in movement control. In parallel, we are also working on a unique non-invasive pulsatile mechanical stimulation technology developed in our lab which will allow us to encode and transmit this information to the nervous system of an amputee and make it feel like it would originate from his or her own limb.”

The usage of neural code, identical to that employed by the nervous system, will not only make sensory signals easy to learn, but may facilitate the neural plasticity needed to open the possibility for recruitment of spinal reflexes serving fast and effortless operation of the prosthesis.

Eventually, being able to build such advanced prostheses has the potential to transform amputees’ lives, not only functionally by enabling them, but maybe even more importantly, emotionally. Such non-invasive and fully-reversible stimulation systems could also be used in modern technologies involving remote sensing applications such as tele-surgery or robotic manipulators.

Partnership for Discovery

BRAIN MAPPING REVEALS PAIN PATHWAYS

Insight / To identify structures in the brain responsible for changes in blood pressure during pain.

Prof Vaughan Macefield

> “If you think of the bursts of nerve activity as being like flashes from a lighthouse, we are able to see which areas of the brain responded in a similar fashion or at a similar rate.”

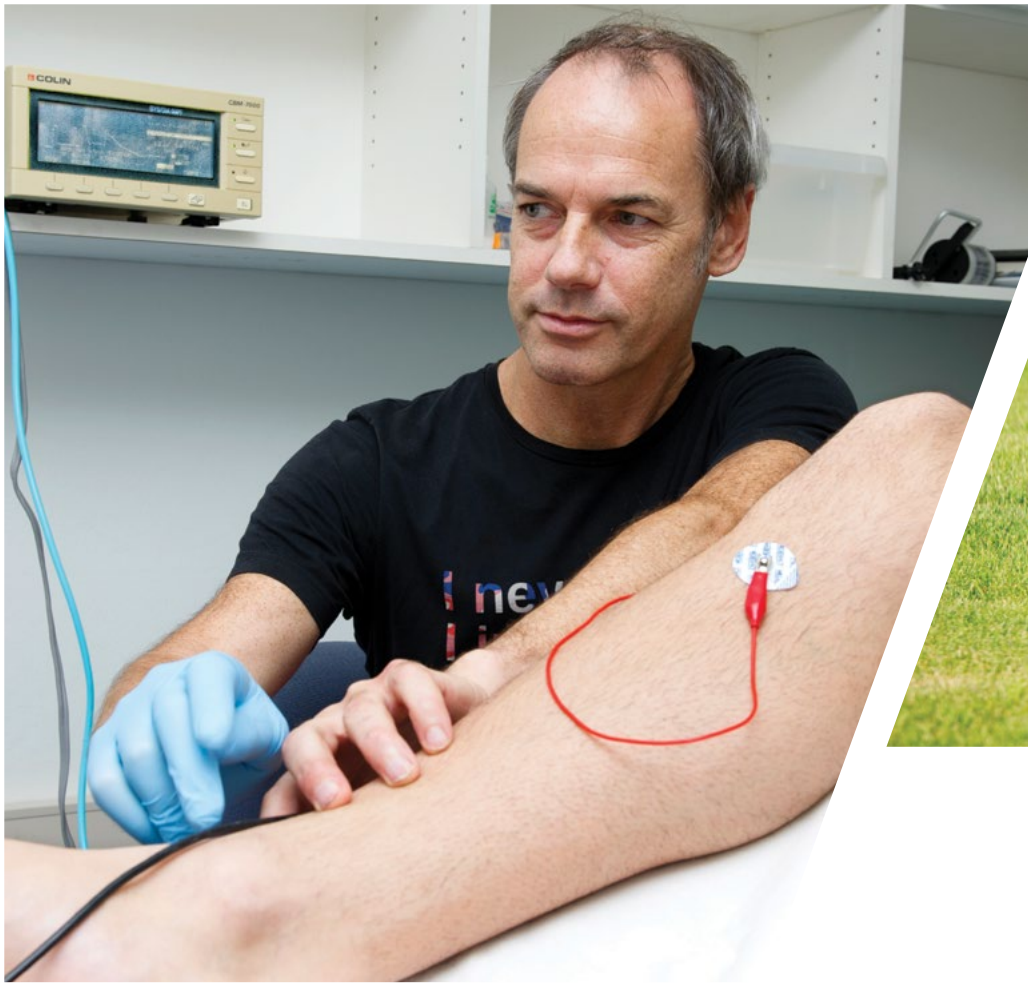
A new study has uncovered the underlying brain mechanisms which cause some people to experience an increase in blood pressure after being exposed to long-lasting pain, while others experience a decrease.

The team at NeuRA lead by Prof Vaughan Macefield have developed a world-first technique that allows scientists to measure muscle sympathetic nerve activity (MSNA), which supplies the extensive network of blood vessels in all our muscles, while using functional magnetic resonance imaging (fMRI) to see which areas of the brain are involved in causing the change in blood pressure. An increase in MSNA results in an increase in blood pressure, while a decrease in MSNA results in a decrease in blood pressure.

For this study, fine microelectrodes sent bursts along the peroneal nerve just under the skin, at the side of the knee. At the same time, fMRI images identified which areas of the brain lit up in a similar fashion.

“If you think of the bursts of nerve activity as being like flashes from a lighthouse, we are able to see which areas of the brain responded in a similar fashion or at a similar rate,” says Prof Macefield.

The current study revealed several core areas of the brain which were strongly coupled with MSNA bursts; the prefrontal and cingulate cortices, the precuneus, nucleus accumbens, caudate nucleus and dorsomedial hypothalamus.



Prof Vaughan Macefield with research participant

These results suggest that the divergent blood pressure response to muscle pain is related to activation of a neural pathway thought to be responsible for cardiovascular responses to psychological rather than physiological stressors.

“We had predicted that we would see an increase in the dorsal medial hypothalamus, as it is known from animal work to be involved in generating the cardiovascular responses to psychological stress,” says Prof Macefield.

The findings of this study may help to explain the underlying factors which lead many people with chronic pain to develop hypertension, given that such individuals suffer with continuous stress. It may also explain why other forms of psychogenic stress, in the work environment for example, lead to high blood pressure.

SETTING NEW CHILD SAFETY STANDARDS

Insight / Setting guidelines towards new Child Safety. Good Practices both in Australia and around the world.

Dr Julie Brown

Active children

NeuRA is a partner with The Sydney Children's Hospital, NSW Health and Kid Safe NSW on a new international 'Child Safety Good Practice Guide'.

Dr Julie Brown, Senior Research Fellow at NeuRA, was one of the leaders of this project which is aimed at educating practitioners and advisers on guidelines towards setting new 'Child Safety Practices' both in Australia and around the world.

Injuries are the number one cause of death among children over the age of one. Each year in New South Wales, around 60 children aged 0-7 years die as a result of an unintentional injury, and a further 20,000 are hospitalised. Effective action is essential to reduce the burden of injuries on children, their families and the whole community; and to ensure that resources made available for injury prevention are directed to measures which are most likely to succeed. Good use of evidence is central to achieving this, and knowing what works is at the heart of developing good policy and programs.

Commenting on the guide, Dr Brown says, "The Australian edition of the Child Safety Good Practice Guide provides practitioners, decision makers and legislators with an evidence-focused resource on which they can base their work, funding and recommendations".

The Child Safety Good Practice Guide brings together authority, research and government with the aim to reduce unintentional childhood injuries which lead to hospitalisation or death, by providing a summary of 'good practice' for each of the leading cases of injury to children in NSW. It also highlights gaps in understanding and addressing child injury prevention to identify important areas for investment.

NeuRA is committed to research around child safety through the Child Safety Good Practice Guide, and its extensive years of research into child safety in car seats. These fields of research support the motivation, understanding, evidence and real-life examples of what can be done to promote the safety of children in Australia.

NEW FALLS AND BALANCE LAB OPENS AT NEURA

In Conversation / Reactive training shows how you can train yourself to withstand a trip or a slip directly.

Prof Stephen Lord

Are falls such a major healthcare issue for our aging population?
Falls are a major healthcare issue for elderly people as they affect 1 in 3 people over 65 years of age with some having serious consequences. These range from fractures of the lower limb including hip fractures and traumatic brain injury, all of which can greatly affect quality of life. Such falls are both common and very costly for the individual, the healthcare system and ultimately the government. Our role here at NeuRA is to identify those most at risk of falls, and help reduce the risk.

What approaches are you taking at NeuRA to mitigate this problem?
We have conducted a series of programs around exercise. Our findings show that in general, the more people exercise, the less likely they are to fall. More recently we have been using new technologies to try to improve the exercise experience for older people and to try and make it more enjoyable for them to exercise at home, which will hopefully lead to a bigger effect.

Where do you see the biggest opportunities for positive intervention?
Looking forward we are taking a more ecological approach to fall prevention. Specifically, we are looking at how trip and slip training can prevent falls.

Why is this a new approach?
This is new because traditionally people have performed standard physiotherapy exercises, and a lot of this has been 'controlled voluntary training' – exercises involve standing on one leg, moving the legs closer together etc. Reactive training, in contrast, is preparing for something you cannot predict. We thought – can you train the ability to withstand a trip or a slip directly?

How is this discovery going to help our ageing population?
There are some outstandingly good results where people who have completed 1-2 hours training session on trips and slips and have been protected against falls for a year. This is at odds with traditional thought suggesting you have to "use it or lose it" i.e. exercise continuously or lose the benefit. Reactive balance training is different because it aims to improve the responsive process to protect against falls in the future.

Do you think we can train the brain to prevent falls?
Yes, I do think this is possible, and at NeuRA we are working towards this in our new gait and mobility lab. Our participants walk along a wooden walkway which is "booby-trapped" – boards on the walkway spring up or slide simulating trips and slips without warning. These hazards can be positioned at any point on the walkway so it is not possible to predict their location or whether they will be encountered by the right or left leg. Participants wear a safety harness to prevent falls.

Prof Stephen Lord

Our goals are to improve the ability to respond well to the unexpected hazards through repeated exposure in a few training sessions.

We anticipate that we can train positive responses, and through such an experience, train the brain to quickly process such events in the future. This will deliver a safer outcome through learned reactions.

We really do believe we can train the brain to prevent instances of trips and slips and in doing so deliver greater confidence, peace of mind and enhanced mobility for older Australians.

3D MOTION TECHNOLOGY SYSTEM STEPS INTO ACTION

Dr Daina Sturnieks fits 3D Motion sensors

Dr Daina Sturnieks

The new NeuRA Gait Lab uses the latest technology which is capable of measuring 3D movement coordinates from fine finger manipulations, to 3D video of walking, running and negotiating obstacles.

In action, the NeuRA team attach reflective markers on the skin over boney landmarks of participants to capture and then analyse their movement on the track.

The camera system is integrated with in-floor force-measuring plates and devices to measure the electrical activity of muscle to give an accurate understanding of how a person's gait and balance responses may help to prevent or increase the risk of a fall.

In action, 9 cameras are placed around the walkway which is imbedded with underfloor force plates to provide 3D kinematic (movements) and kinetics (forces) details regarding gait, balance and other human movements, without the need for restrictive devices and cables.

The synchronisation of equipment and established processing software offers an incredible opportunity for researchers and research participants to work together to understand normal and atypical movement to develop fall prevention strategies.

Says Dr Sturnieks, "we are using leading technologies to progress our understanding of the human body in motion and the intricate relationships between motion and neural processing to enable us to identify how best to train the brain and body to prevent falls as people age.

"This new information will enable us to translate our research into community based programs to help prevent falls and in doing so maintain a purposeful life that's been assisted by the benefit of science."

New Possibilities

STANDING TALL AT HOME TRIAL SET TO EXPAND

Insight / Over 400 participants trial and expand innovative at-home solutions for older Australians to self-manage their health.

Assoc Prof Kim Delbaere

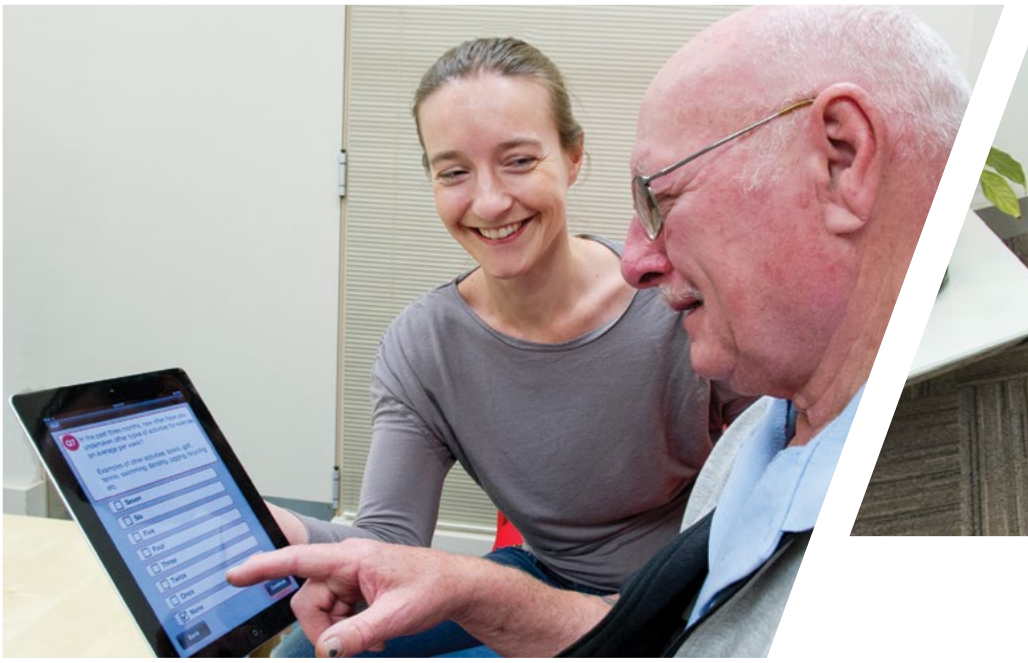
Falls and fractures account for over half of all injury related healthcare costs with one-third of people over the age of 65 and one-in-two people over 80 experiencing a fall each year.

For older Australians, the social and personal impact of a fall can be enormous; especially when the fall results in mobility-related disability and a sudden loss of independence.

For many older people, falls are an inevitable part of the ageing process. At NeuRA, Assoc Prof Kim Delbaere challenges that assumption and provides hope for both individuals and their family that the risk of falls, and the resulting reduction in quality of life, can be reduced. Assoc Prof Kim Delbaere and her team are using new technology to help older Australians most at risk of falls stay physically and mentally active to improve their balance and prevent falls.

There is clear evidence that falls in older people can be prevented with exercise programs which include at least moderately challenging balance training to be performed frequently. Incorporating a new exercise regimen into daily life is challenging for many older people due to poor exercise tolerance and enjoyment.

Mobile technology offers various benefits to overcome many of the barriers to uptake and adherence to exercise. It can provide immediate performance feedback and real-time monitoring, as well as optional support from clinicians and/or peers, which allows people to obtain help when needed.



Assoc Prof Kim Delbaere with participant

The application 'Standing Tall' developed in 2013-2014 at NeuRA, is currently being used daily in the homes of over 420 participants in the Sydney-based study and delivers a tailored evidence-based exercise program to the participants.

The application includes over 2000 exercises with video instructions and is designed for older people to use independently at home. It allows participants to choose when and for how long they exercise throughout the week with a recommended dose of two hours of exercise each week.

The exercises are designed to train static balance in different positions and dynamic leaning balance, while also training on an unstable surface (i.e. foam cushion), stepping in different directions on the exercise mat and stepping on a box.

While Assoc Prof Kim Delbaere and her team monitor the data for their research, participants are also able to self-monitor progress as their balance scores improve and set goals for their exercise regime.

Feedback and positive reinforcement on performance are provided after each session and at the end of the week. A goal-setting feature also guides people to identify any personal

Assoc Prof Kim Delbaere instructs participant at home

barriers and enablers to reaching the weekly recommended exercise level. This helps each individual to identify a way to incorporate exercise into their daily routines.

Assoc Prof Kim Delbaere has made major progress in understanding fall risk from physiological, psychological and cognitive perspectives as well as in the development of effiective fall prevention strategies.

Assoc Prof Kim Delbaere's technological solutions to predict and prevent falls are pioneering the field.

It is expected that these programs will be widely implemented by policy makers and industry.

The next stage of Assoc Prof Kim Delbaere's research is to continue studying healthy ageing and the role of the ageing brain on the exponential increase of fall risk in older people. For a person to age well, their body has to function well, they have to feel good and their brain needs to stay on-guard. Her research addresses each of these domains of moving-feeling-thinking in her prediction and prevention models.

BASIL INTRODUCES MEDIA TO STANDING TALL

One of NeuRA's participants Basil hopes to encourage more friends to join his weekly Standing Tall Program.

On the program now for close to two years Basil told reporters who visited NeuRA how much he enjoys the program, and what a difference it has made to his mobility and balance.

Basil said he especially noticed this when he had to take two weeks off; on returning he noticed the difference again after a few days. Say Assoc Prof Kim Delbaere "like any exercise it works on repetitive action, so we do encourage our participants to practise 2-3 times a week."

Optimal Health

NEURA PARTNERS WITH INDUSTRY

Insight / The Sleep and Breathing Lab participates in a large Commonwealth grant to undertake major Obstructive Sleep Apnoea research program.

Assoc Prof Danny Eckert

NeuRA is partnering with Brisbane-based company, Oventus Medical, on a major new Obstructive Sleep Apnoea (OSA) program. It will target therapy for sleep apnoea using a novel personalised approach as a result of a successful Cooperative Research Centres Project (CRC-P) grant application. CRC-P's are funded by the Commonwealth Government Department of Innovation, Science and Technology and are designed to support outcome-focused collaborative research partnerships between industry, researchers and the community.

Assoc Prof Danny Eckert

This project aims to develop a number of technologies to establish an integrated, real-time sleep monitoring and treatment platform for OSA. NeuRA will lead the clinical research program for this collaborative project.

In 2011, sleep disorders including the most common sleep-related breathing disorder, OSA, cost the Australian economy an estimated $21.2bn (Deloitte Access Economics: The economic cost of sleep disorders in Australia 2012). Effective treatment for OSA has been limited by poor tolerance of the main therapy and has been limited by accessibility and adoption of new technology for diagnosis and treatment. The Sleep and Breathing Lab at NeuRA led by Assoc Prof Danny Eckert has demonstrated that a range of factors impact the categorisation of an OSA. This new understanding of the underlying causes of OSA has unlocked new targets for therapy.

However, diagnosis is still heavily reliant on the basic Apnoea Hypopnoea Index from an overnight sleep study, which can be time-consuming and cumbersome. Treatment of OSA has traditionally been dominated by Positive Airway Pressure (PAP), also developed here in Sydney. If used regularly, PAP technologies have a high success rate.

Unfortunately, acceptance and adherence to therapy is a consistent barrier; studies show that more than 50% of patients do not use the devices regularly, or at all, after 1 year due to a range of issues including too-high air-pressure, claustrophobia, uncomfortable mask, noisy pump and nasal obstructions.

Oventus Medical has developed a customised oral appliance which incorporates a novel breathing route through the mouth.

Assoc Prof Danny Eckert with research participant

Patient in the Sleep and Breathing Lab

Recognising the opportunity to advance diagnostic and treatment technologies, Medical Monitoring Solutions has undertaken primary trials of its wearable technology, VitalCore, to the diagnosis of sleep disorders and is a partner on this project. Assoc Prof Danny Eckert's research team will conduct the clinical trials for the project to test and enable refinement of the technologies and incorporate the advances in tailored therapy for OSA pioneered by the NeuRA sleep and breathing team.

Eckert says "clinical validation and refinement in this context will be critical to translating these concepts and technologies to provide new treatment options and improved outcomes for patients".

The clinical sleep trials which will be performed at NeuRA in 3 stages (1 each year of the project) will test various treatment options simply and in combination. The milestones for the project are specifically set to revolve around patient outcomes from the 3 clinical trials with the overarching goals of developing more effective, more reliable and more comfortable therapies compared with current technologies.

Collectively, these research activities will provide a quantum of data that has not previously been available. CSIRO will work with NeuRA researchers as part of the CRC-P to incorporate this data into predictive models to inform treatment decisions to optimise outcomes for patients.

Assoc Prof Eckert says, "NeuRA is internationally renowned for its sleep and breathing research and clinical team who have an established track record in identifying the multiple causes of OSA and developing and testing new tailored therapies.

"Testing the technologies as they are developed in the CRC-P in this multidisciplinary clinical research setting will be a fertile incubator for cross-collaboration and clinical translation" says Eckert.

SLEEP LAB IN ACTION

Insight / New Treatments for Obstructive Sleep Apnea:
A paradoxical role for sleeping pills.

Dr Jayne Carberry

A major public health and safety concern is that current treatments for obstructive sleep apnoea (OSA) are too frequently intolerable or are only partially effective at reducing the severity and symptoms of this common sleep and breathing disorder.

This is because the causes of OSA vary substantially among patients and no single treatment works for all. This is a major problem for the more than one million Australian adults who suffer from OSA as many are without adequate treatment and at increased risk of cardiovascular disease, impaired brain function, sleepiness and its consequences including motor vehicle and work-related accidents. Our vision at NeuRA is to develop a precision medicine based approach to diagnosis, management and treatment of OSA as the current 'one size fits all' method is failing too many patients. My ongoing work and that of my fellow sleep and breathing researchers at NeuRA is to improve the understanding of the individual causes of OSA to develop novel targeted treatments.

> "NeuRA looks at use of sleeping pills and their effects on Obstructive Sleep Apnoea."

Patient in overnight trial program

Dr Jayne Carberry with research patient

More than 5% of adults report using sleeping pills within the previous month to promote sleep. Surprisingly, there is little evidence on the effects of sleeping pills in OSA. While some sleeping pills may make OSA worse, others may actually be beneficial for certain patients. In our sleep physiology laboratory at NeuRA, I recently conducted a large detailed physiology study in healthy individuals and people with sleep apnoea to examine the effects of three commonly used sleeping pills on the upper airway muscles and breathing during sleep. Paradoxically, my recent findings show that one sleeping pill may be particularly beneficial for certain OSA patients by increasing rather than decreasing the activity of the muscles around the throat area which are important for keeping the airway open and preventing OSA.

Dr Jayne Carberry

My future research will examine the mechanisms of these paradoxical findings and I will conduct a large clinical trial to determine the safety profile and effects of this sleeping pill on OSA symptoms and severity. The findings of this research will provide important insight for future novel targeted therapies for people suffering from OSA.

Gaining Insights

NEW YOUTH RESEARCH PROGRAM

Insight / Risk factors for mental illness.

Assoc Prof Melissa Green

Assoc Prof Melissa Green is leading research to discover how stress-related mechanisms disrupt brain maturation early in life, setting off a cascade of effects which impede normal cognitive and emotional development.

Her research uses neuroscience methods to examine the biological effects of stress among adults with severe mental disorders, as well as complementary methods from epidemiology to understand the mechanisms of mental disorder in developing children.

Victims of early childhood maltreatment are among those at highest risk of developing mental disorders. Prof Green's newly funded project, conducted in collaboration with the NSW Government Department of Family and Community Services (FACS), will determine dynamic states of 'risk' and 'resilience' for mental disorders among children who have been maltreated before the age of 5 years. The first few years of life represent the most rapid period of brain development, with increased plasticity of the brain making it highly sensitive to prolonged stress. Exposure to stress at this stage in the

> “Victims of early childhood maltreatment are among those at highest risk of developing disorders.”

Assoc Prof Melissa Green

life-course may critically influence brain development in ways which put children at risk of developing mental disorders in later life.

The new project was funded by the Australian Rotary Health's "Mental Health of Young Australians" scheme and is embedded within the NSW Child Development Study (NSW-CDS), led by Prof Vaughan Carr (UNSW and NeuRA). This study uses repeated waves of longitudinal record linkage to follow a population cohort of approximately 87,000 children as they develop through middle childhood, adolescence, and into young adulthood. The Rotary-funded project will continue to use this routinely collected government data alongside cross-sectional surveys that were administered to the NSW-CDS child cohort at age 5 and 11 years, to determine patterns of 'risk' and 'resilience' which are evident in childhood competencies or developmental vulnerabilities.

Childhood competencies will include social and emotional functioning, as well as cognitive achievements, for which normative skill levels can be determined in the general population. The team are particularly interested in determining protective factors (e.g., availability of family and school supports) which are associated with 'resilience' profiles among maltreated children, in contrast to factors which confer this persistent risk profile across early and middle years of childhood. Findings from the study will be used to make policy recommendations regarding the earliest detection of children at risk of mental disorder, and will determine targets for timely interventions to promote life-long resilience in children who are subjected to early-life adversity.

INSIGHTS INTO DOPAMINE DYSFUNCTION

Insight / Knowing more precisely how dopamine is changed in the brains of people with schizophrenia will help us better understand the development of this disorder.

Dr Tertia Purves-Tyson

Dr Tertia Purves-Tyson is leading a research progam in NeuRA's Schizophrenia Research Laboratory which is aimed at gaining greater insights into the behavior of dopamine.

Says Dr Purves-Tyson, "while there are many roads leading to the development of schizophrenia, one often considered a final common pathway is the dysregulation of dopamine. Too much dopamine in a particular region of the brain – the subcortex – has been shown to contribute to the psychotic symptoms seen in schizophrenia".

Dopamine is a neurotransmitter which helps to control the brain's reward and pleasure centre, and regulates our emotions. Antipsychotics are designed to block dopamine receptors, and reduce the amount of dopamine action in the brain. Unfortunately, antipsychotics do not work for everyone and have serious side effects.

Dr Tertia Purves-Tyson in the research lab

Dr Tertia Purves-Tyson

> “New study begins to address a vital knowledge gap in schizophrenia research.”

A better understanding of how and where dopamine is changed in the brains of people with schizophrenia will help us to know how to more accurately correct or prevent this disruption and thus help to create more targeted approaches to treatment.

A new study from Dr Purves-Tyson and her team in the Schizophrenia Research Laboratory identified molecular changes in the brains of people with schizophrenia, which offers support for and extends the dopamine hypothesis. Their study compared the tissues from the midbrain of people with and without schizophrenia.

This brain region has not previously been given the attention it deserves in schizophrenia research. The study found that the genes of molecules which are responsible for regulating the amount of dopamine and for regulating the reaction to dopamine (receptors) are altered in people with schizophrenia.

These alterations in gene expression implicate a new suspect as a major contributor to dopamine dysregulation, namely a massive decrease in a dopamine transporter. The 66 percent reduction in this important molecule would mean that dopamine may be allowed to stay in the synapse longer than it should and suggests that novel treatments aimed at ramping up the synthesis and function of this process in schizophrenia could be of benefit. To our knowledge, the dopamine transporter has not been used as a treatment target before.

This study begins to address a vital knowledge gap in schizophrenia research with regards to how dopamine in the midbrain contributes to dopamine dysfunction. This will help us to better understand the dopamine dysregulation that is found in schizophrenia and, potentially, how we can better treat it.

NEUROSCIENCE OF RESILIENCE

Insight / Looking at the promotion of optimal mental health and resilience as a health priority.

Dr Justine Gatt

Dr Justine Gatt prepares a research participant for an MRI scan

With over 75% of the population reporting at least one or multiple major traumas in their lifetime, it is imperative that we understand why some people are more vulnerable and go on to develop mental illnesses like anxiety and depression, and why some are more adaptive and resilient.

In the field of mental health, most neuroscience research to date has focused on understanding what determines risk for mental illness and ways to treat it. In contrast, there are only a handful of studies which have started to look at the neuroscience of resilience and how to promote it.

Dr Justine Gatt and her research team at NeuRA have proposed a paradigm shift in the ways we normally examine and understand mental illness, and to instead focus on mental health. For the first time, the team will aim to identify the brain profiles which predict pathways towards resilience versus risk for mental illness over time. The team are currently doing this in a large sample of 1,600 adult twins ranging in age from 18 to 60 years. To start with, we have developed the first composite scale of wellbeing called the COMPAS-W which provides a combined measure of both subjective and psychological wellbeing.

The researchers are keen to test this measure in predicting patterns of resilience over time. To assist with this, Dr Gatt was recently successful in obtaining NHMRC funding to retest the twin sample 8 years after their initial characterisation. This study will be conducted from 2018 until 2022 and will be the first study of its kind to show the neuroscience of longitudinal patterns of resilience (or risk) across adulthood.

Beyond the current study in adult twins, the team is planning to take these studies to adolescents and children. They have already conducted a pilot study in 200 adolescents across 6 countries including Australia, New Zealand, Canada, China, South Africa and the UK; and have found some interesting patterns showing differences in levels of wellbeing across different cultures, and how different types of trauma exposure may modulate this process.

Childhood is a crucial period of personal and physical development, and a child's brain is particularly vulnerable to the impact of different life experiences – both good and bad. It is therefore critical that we understand how trauma may impact the brain differently during different stages of development, and how optimal resilience can be promoted at different ages.

UNDERSTANDING THE BIOLOGICAL BASIS OF BIPOLAR DISORDER

Dr Jan Fullerton with a research assistant

Insight / Using state-of-the-art DNA sequencing, the team at NeuRA aims to improve our understanding of the causes and treatment of bipolar disorder.

Dr Jan Fullerton

Bipolar Disorder is a severe and debilitating psychiatric condition, for which the specific causes remain largely obscure.

The disorder is ranked in the top 20 most disabling disorders, and leads to severe social impacts, increased suicide risk, and poor general medical health for the approximately 250,000 Australians affected. In Australia alone, the financial costs to government and societal sectors exceed $3.3 billion per annum.

Dr Jan Fullerton and her team are using state-of-the-art DNA sequencing, genomics and neuroimaging technologies to understand the biological basis of bipolar disorder risk, and response to pharmaceutical treatments. This will help to determine whether future risk can be predicted in young people who are at increased genetic risk of bipolar disorder.

Finding genes which contribute to bipolar disorder

Using large scale "next-generation" sequencing, our team is finding that rare DNA variants which affect the function of brain-expressed genes relates to earlier symptom onset. Our studies indicate that genes expressed in the synapse, the molecular communication system between neurons, carry more rare DNA variants than expected, thereby increasing risk of disease. The teams' contribution to international genomics consortia are further elucidating the genetic architecture of bipolar disorder, identifying several new risk genes, and providing additional support for genes previously identified.

Predicting treatment response

Lithium is the most commonly prescribed mood-stabilising drug used for the treatment for bipolar. However, the drug works effectively in only about a third of patients, and we currently cannot predict which patients are likely to respond. As part of the International Consortium on Lithium Genetics, we are actively pursuing the identification of genetic signatures which will facilitate targeted pharmaceutical therapies, enabling faster and improved medication response.

Early identification of those at future risk of bipolar disorder

As part of a multi-site collaboration with four universities in the United States, NeuRA is involved in a unique longitudinal study of young kids and siblings of patients with bipolar, who are at high risk of developing bipolar themselves in the future. The team follow these participants over time to identify predictors which may give an early indication as to which "high risk" individuals will ultimately develop bipolar. Identification of accurate predictors would open up the opportunity for early intervention, to slow or even prevent illness in individuals identified as "high risk".

Gaining Insights

NEURA LAUNCHES NEW DIGITAL SCHIZOPHRENIA LIBRARY

Dr Sandy Matheson

Insight / Knowledge bank for consumer and scientists expands access to important content.

Dr Sandy Matheson

Owing to the increasing volume of worldwide research on schizophrenia, we have spent more than eight years reading, collating and assessing relevant systematic reviews to create a resource for people with schizophrenia, their families, clinicians, and the public.

The Schizophrenia Library provides a resource which can be used by students and scientists to identify pertinent research questions and gaps in the literature review, and can help to inform policy and clinical guideline development.

The Schizophrenia Library was launched during Schizophrenia Week with over 460 new fact sheets for the consumer and 450 technical sheets for researchers and scientists. In addition, there is a digital library with a range of content including podcasts, videos and seminars, with regular updates.

The Schizophrenia Library is the first in a series of NeuRA Knowledge Banks on brain-related diseases NeuRA plans to launch over the coming years.

Take a tour through NeuRA's new Schizophrenia Library at **library.neura.edu.au**

Frequently asked questions about the new Schizophrenia Library

What is the Schizophrenia Library?

The Schizophrenia Library is a resource comprised of relevant schizophrenia and psychosis-related research findings, gathered from a variety of sources, and stored in a searchable database. This involves compiling existing systematic reviews and conducting original reviews and meta-analyses, and preparing and disseminating summaries of major findings.

Where does the information come from?

The information in the library was collected through systematic searches of Medline, Embase, CINAHL, Current Contents, PsycINFO and the Cochrane library. Included are systematic reviews with or without meta-analysis, reporting results separately for people with schizophrenia, schizoaffective disorder, schizophreniform disorder, or first-episode schizophrenia/psychosis. Some topics also include people at risk of psychosis or schizophrenia.

How is the information collated and summarised?

The Schizophrenia Library is structured around nine key categories which have been identified based on the available information. They cover many topics relevant to schizophrenia including treatments; risk factors; physical features; symptoms; disease course and outcome; co-occurring (co-morbid) conditions; epidemiology (population data); family considerations and diagnostic measures.

Two levels of information on each topic are provided. The first is a brief factsheet which provides general information describing the area examined and the available evidence. The second is a Technical Commentary which provides more extensive information, including detailed introduction, method, results and conclusions. All review literature included is quality assessed using Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement, and the quality of the evidence itself is assessed using GRADE guidelines.

How do I search for a particular topic or keyword?

There are two ways to use the Schizophrenia Library. The first is to browse through the Library using the drop-down menu. The second is to search the Library database using a keyword or phrase in the google search bar.

Can I save a copy of the information?

The Factsheets and Technical Tables are provided in PDF form on each topic page for ease of printing or saving for offline access.

Can I access the papers online?

There is a link on the Technical Tables to each review's online abstract, and full test where available.

How do I cite the Library?

If you wish to cite information gained from this website, please ensure that you include this address **library.neura.edu.au**, plus the date accessed.

SCHIZOPHRENIA RESEARCH HAS NEW GOALS IN SIGHT

Insight / Discovering new treatments beyond antipsychotic drugs for schizophrenia treatment.

Prof Cyndi Shannon Weickert

Prof Cyndi Shannon Weickert, NSW Chair of Schizophrenia Research

Schizophrenia is one of the most disabling medical conditions and is one of the most difficult to treat. It often strikes in someone's youth and can lead to a severe, life-long mental illness where individuals can't work, form relationships and enjoy life. NeuRA's research aims to uncover the biological basis of schizophrenia recognizing that there will not be a single cause of schizophrenia, but that there will likely be many.

NeuRA's Schizophrenia Research team are committed to discovering new treatments beyond antipsychotic drugs for schizophrenia treatment. At the moment antipsychotics do not restore one's potential and can cause significant health side-effects such as obesity and diabetes. To identify new therapies, we need a better understanding of the biological basis of schizophrenia, and we need committed researchers capable of running clinical trials with new medications.

World-renowned Schizophrenia scientist Prof Cyndi Shannon Weickert, holds the NSW Chair of Schizophrenia Research at NeuRA. Prof Shannon Weickert first discovered that a brain receptor which normally stimulates growth during adolescence can be abnormal in people with schizophrenia and later identified an existing drug which was able to regulate this receptor in those affected by schizophrenia.

L-R. Dr Samantha Fung, Dr Stu Fillman and Prof Cyndi Shannon Weickert

> “Schizophrenia is one of the top 10 causes for disability worldwide.”

Since this incredible discovery, Prof Shannon Weickert’s research has taken a new direction and instead of focusing solely on neuro-developmental factors, her team are also examining other neuro-inflammatory factors which can impact brain function.

Under Prof Shannon Weickert’s leadership and mentoring, the Schizophrenia Research program has successfully translated “bench” research to “bedside” trials. Prof Shannon Weickert’s aim is to build the tools needed to help transform psychiatry from a generic treatment for schizophrenia patients to a more personalised treatment approach.

As the NSW Chair of Schizophrenia Research, Prof Shannon Weickert’s research will focus on undertaking clinical trials with new medications to test the extent to which we can bring about symptom improvement and cognitive benefit to people with schizophrenia.

Prof Shannon Weickert will also lead laboratory studies aimed at understanding molecular and cellular changes in the brains of people with schizophrenia aimed at furthering our understanding of neuroimmunology and neuroendocrinology changes that occur.

NeuRA plays a lead role globally in the research around schizophrenia which is one of the top 10 causes of disability worldwide. One in 100 people have or will develop schizophrenia during their lifetime. Under Prof Shannon Weickert’s leadership the research team have exciting new goals in sight over the coming year.

DEVELOPING AND TESTING INNOVATIVE NEW TREATMENTS FOR LOW BACK PAIN

Insight / How to identify those most at risk of chronic low back pain.

Dr James McAuley

Pain provides a warning of threat to body tissue. This protective mechanism is critical for survival as it motivates defensive actions to remove the source of the threat.

Unfortunately for many people, pain can become 'stuck', persisting long past the time when it has served any useful purpose of warning of harm. These people have chronic pain, a disabling and highly distressing condition.

Dr James McAuley's research is focused on low back pain, the most common chronic pain and the leading cause of disability. Four million Australians have low back pain and around 40% of these will develop chronic low back pain. There are no effective treatments for people who have a new episode of low back pain, and treatments for people who have chronic low back pain lead to only small improvements in pain and disability.

Dr McAuley's research program aims to develop and test new treatment approaches to prevent people from developing chronic low back pain and to more effectively help those who suffer from it.

Dr James McAuley

> “Dr McAuley is testing whether improving sleep quality can lead to reductions in pain intensity and the risk of developing chronic back pain.”

Dr James McAuley and Dr Sylvia Gustin in conversation

His research has led to the development a five-item prognostic tool, called MYBACK, which can be used to identify the risk of developing chronic low back pain. Early, accurate information on the risk of developing it provides the opportunity for clinicians to advise their patients on whether or not further treatments are necessary.

This brief, easy-to-use online risk calculator has been made freely available to healthcare practitioners and researchers at myback.neura.edu.au.

MYBACK can be used to target interventions for those most in need – those who are at high risk of developing chronic low back pain. McAuley's research program is testing this approach in two randomised controlled trials. Firstly, in PREVENT he is testing whether a structured pain education program can reassure patients with a new episode of low back pain and reduce the risk of developing chronic pain.

In ZTOP Dr McAuley is testing whether improving sleep quality can lead to reductions in pain intensity and the risk of developing chronic low back pain.

Chronic low back pain is the most problematic type of chronic pain.

Most of the $8 billion per year spent on treatments for low back pain is spent on trying to manage chronic low back pain. Unfortunately, the effects of most treatments are only modestly effective. The new treatment program, RESOLVE, combines two promising treatments – a pain education program and sensorimotor retraining. RESOLVE is being testing in a blind, randomised controlled trial to determine whether these promising interventions, either alone or in combination, can reduce pain intensity and sufferers lessen.

Understanding Pain at NeuRA

BRIGHT MINDS AT NEURA

Insight / Studying new ways to deal with back pain and sleep.

Edel O'Hagan

> "To be involved participants don't need to change anything they are currently doing to manage their back pain."

PhD student and physiotherapist Edel O'Hagan is currently working on a study that investigates whether using a medication, normally used for sleep disturbances, can help people with acute back pain – that is, pain which has lasted less than three months.

Edel O'Hagan, PhD Student at NeuRA

Back pain researchers at NeuRA know that there is a shared relationship between sleep and pain. Typically, the higher the pain intensity the worse a person sleeps. Conversely, after a few bad nights' sleep those with low back pain may perceive their pain to be even worse.

"In this trial, we are investigating whether improving sleep has a knock-on effect of improving low back pain intensity," explains O'Hagan.

The medication used in the study acts on a neurotransmitter called GABA, which has a number of roles in the brain, but is primarily involved in calming overexcited neurons, such as those involved in producing pain.

The procedure involves a visit to the NeuRA pain clinic where participants are reviewed by a physician and given the intervention tablets – either a sleep medication or a sugar pill. They take one tablet a night for 14 nights. Over this time participants keep a sleep diary and wear a monitor on their back to measure movements during sleep. They also fill out online questionnaires, at day one, at two and at six weeks.

"Participants don't need to change anything they are currently doing to manage their back pain," O'Hagan assures.

It is hoped that this research will identify a new way to stop low back pain from developing into a long-term chronic condition. This can have debilitating effects such as depression, which is by far the most common emotion to accompany chronic pain.

UNLOCKING THE REASONS FOR CHRONIC PAIN

Dr Sylvia Gustin with research participant

Insight / Understanding and modulating the critical pain mechanisms that underlie chronic pain.

Dr Sylvia Gustin

Chronic pain is a significant problem worldwide and locally, impacting one in three Australians. It results in enormous suffering and costs to the individual, as well as their loved ones and society in general.

Despite the availability of pain medications and other pain therapies, there is still no ideal treatment which benefits the majority of sufferers, and most of the available therapies have significant side effects or risks of serious adverse events. Thus, there is an urgent need to identify, develop, and evaluate new chronic pain therapies.

Dr Sylvia Gustin's research program addresses this need by developing and evaluating treatments which can provide pain relief via the primary source of pain: the human brain. Her research has identified biochemical, structural and functional alterations within the thalamus which are now known to play a key role in the development and maintenance of chronic neuropathic pain. The thalamus is a small structure within the brain located just above the brain stem and acts as a gateway to and from the cortex. Dr Gustin's new approach targets these thalamic changes to ultimately treat chronic pain.

In a new study these thalamic changes will be modulated via electroencephalography (EEG) – based neurofeedback which Dr Gustin hopes will lead to significant pain reduction. This teaches individuals to gain control over their brain activity in a way which reduces their pain. An important part of the programme is a nested mechanisms study which applies causal mediation analysis to state-of-the-art brain imaging data so that the precise brain processes which underlie therapeutic change can be identified.

Part of the reason behind our inadequate ability to provide satisfactory pain relief in people with chronic pain is our limited understanding of the pathophysiology underlying chronic pain. Consequently, it is important that we determine the mechanisms underlying the development and maintenance of chronic pain.

Research has identified anatomical changes within the medial prefrontal cortex in chronic pain sufferers. The medial prefrontal cortex is the brain's major processing centre for emotions. In a new study Dr Gustin will determine the nature of these anatomical changes using state-of-the-art brain imaging techniques. The results from this study will provide evidence that anatomical changes within the medial prefrontal cortex underlie a decrease in GABA which is the major inhibitory chemical messenger in the nervous system.

Establishing a decrease in medial prefrontal GABA is important because it provides new information which is needed to develop pain drugs that specifically target discrete brain regions, e.g. medial prefrontal cortex. Current pain medications are not targeted and therefore have significant side effects or risks for adverse events.

Global Spotlight

HOW WELL DO YOUR HANDS AND ARMS WORK?

Insight / A look at NeuRA's development of gold standard diagnostic tools for motor impairment.

Prof Stephen Lord and Prof Simon Gandevia

NeuRA's 'Physiological Profiling Assessment' (PPA) is widely recognised as a "gold standard" diagnostic tool for quantifying fall risk and the physiological capacity of the lower limb.

The PPA is a series of simple tests, including measures of leg strength, skin and proprioceptive sensation, and standing balance. The combined results for a person provide a signature of their motor impairment and risk of falling. As part of the NHMRC funded Program on Motor Impairment, Prof Stephen Lord and Prof Simon Gandevia are now adapting this ground-breaking physiological profiling approach to measure the performance of the upper limbs in the healthy population over the adult lifespan.

This approach requires measurement of performance in tests, which if defective, would impair motor performance in everyday tasks involving the upper limb such as grasping and manipulating objects, doing up buttons, etc. The tests are inexpensive and simple to perform, provide quantitative measures and cover the range of physiological functions which are required for satisfactory movement control of the arm. Our suite of tests measure functions including arm and hand strength, hand sensation, manual dexterity, and arm coordination.

Prof Stephen Lord and Prof Simon Gandevia in discussion

> "Discovery opens the doorway to possibilities. Passion delivers the hope and the cure."

This study will recruit 320 healthy adults from 20-90 years (20 men and 20 women per decade).

Once completed, this study will define a "gold standard" upper limb assessment and simple tests which can be used in population studies and in comparative studies of patient groups. It will also provide normative data on the type and severity of upper limb motor impairments and provide the impetus to develop strategies to improve function in ageing and disorders, such as stroke, Parkinson's disease, arthritis and peripheral neuropathy.

NEURA SHINES A BRIGHT LIGHT ON PULMONARY DISEASE RESEARCH

Insight / Looking at the way respiratory muscles are controlled in people with Chronic Obstructive Pulmonary Disease.

Dr Anna Hudson

Dr Anna Hudson, Senior Postdoctoral Fellow at NeuRA has been awarded the Lung Foundation Australia/Boehringer Ingelheim Chronic Obstructive Pulmonary Disease Research Fellowship.

This award was announced in Canberra during the Australian and New Zealand Thoracic Society's Annual Scientific Meeting.

Commenting on her fellowship award she said, "the research work over the next two years will focus on looking at the way respiratory muscles are controlled by the brain in people with Chronic Obstructive Pulmonary Disease."

1 in 7 Australians over 40 are affected by Chronic Obstructive Pulmonary Disease, which is a progressive disease that makes it hard to breathe and causes shortness of breath, progressing in severity over time. People living with this disease usually experience coughing which produces large amounts of mucus, wheezing, shortness of breath, chest tightness, and other symptoms.

Says Dr Hudson, " I am going to use my knowledge in the techniques to measure muscle and brain activity to detect impairments in the neural control of breathing in these people."

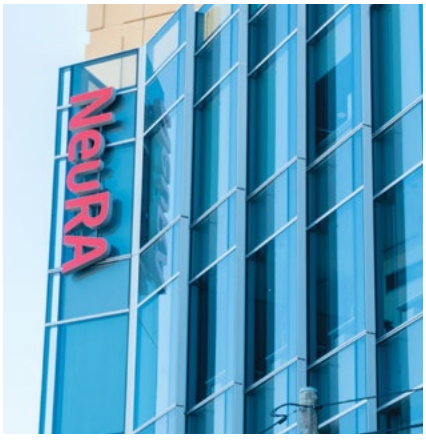
"Most of us rarely think about breathing – it is an automatic process – but for people with Chronic Obstructive Pulmonary Disease, they are often short of breath and so this is a disease which affects their quality of life."

"By looking at how the neural control of their breathing muscles is affected, I am hoping to identify new targets, therapies and techniques to support the lives of people living with Chronic Obstructive Pulmonary Disease", said Dr Hudson.

NEURA TO SPONSOR 2018 GLOBAL MOTOR IMPAIRMENT CONFERENCE

Professor Simon Gandevia, Deputy Director at NeuRA, will drive the NeuRA sponsored first International Motor Impairment Conference in Sydney Australia in 2018. Commenting on this conference, Prof Gandevia said, "I hope we can encourage some of the brightest minds in working on human Motor Impairments to attend this conference. The need for the conference stems from work done by the NHMRC Program grant researchers at NeuRA.

Motor Impairment is the final common pathway which causes physical disability in many diseases and health conditions from stroke to ageing. Prof Gandevia and his colleagues at NeuRA have major programs of work in different aspects of motor impairment. This 3-day international meeting in November 2018, will focus on all aspects of Motor Impairment from basic research through translational medicine to clinical trials. NeuRA is proud to be part of the discovery momentum behind Motor Impairment research on a global level.



Global Spotlight 2018

NEW RESEARCH SUPPORTS CHILDREN WITH CEREBRAL PALSY

Insight / Using diffusion tensor imaging to understand muscle contracture in children with cerebral palsy.

Prof Rob Herbert

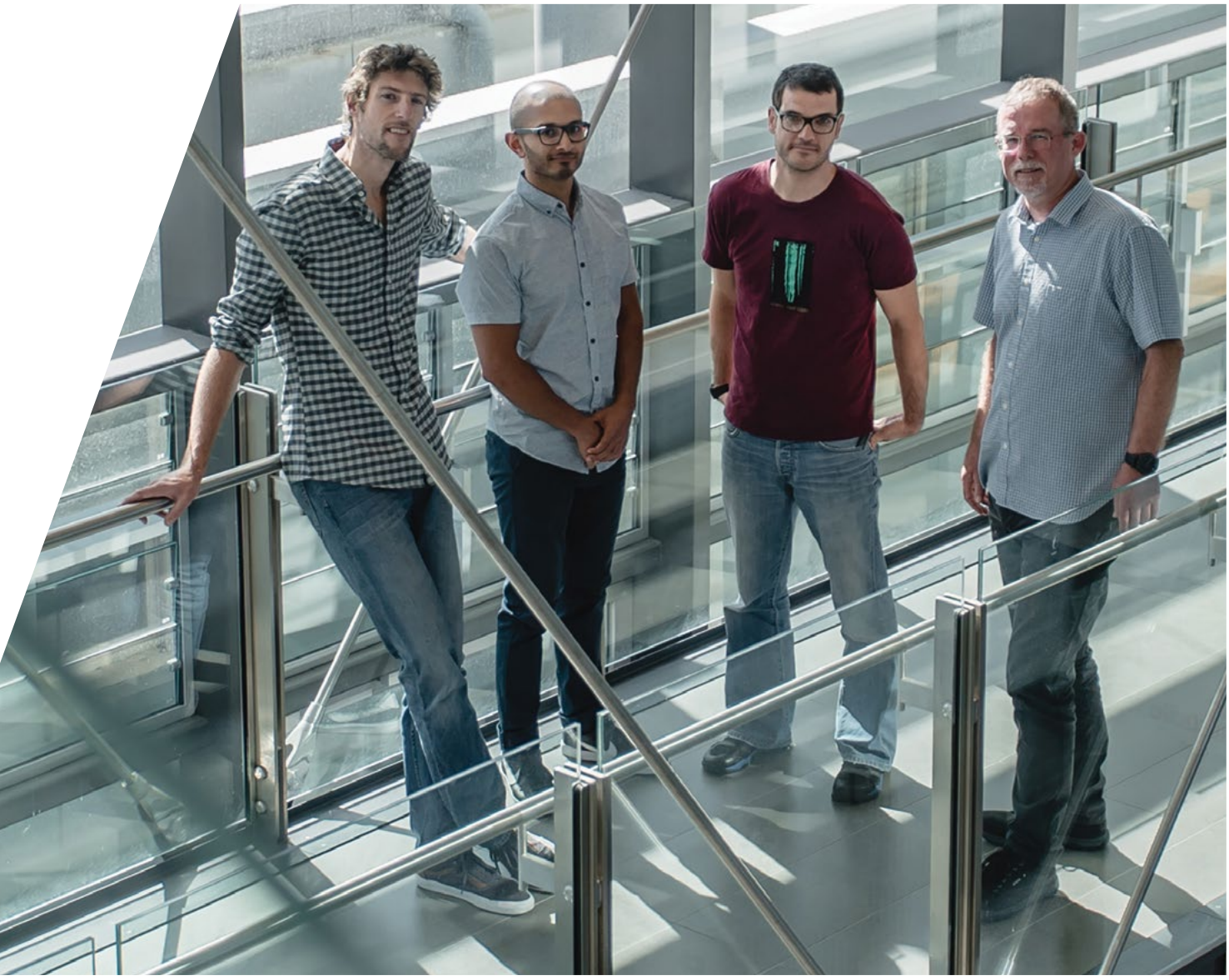
A new study by Prof Rob Herbert and his team is investigating muscle contracture in children with cerebral palsy. Contracture is a stiffening of muscles, even when the muscle is passive.

It is not yet known whether contracture is a result of changes in the muscle, changes in the associated tendons, or a combination of both.

Around 53 per cent of children with cerebral palsy have contractures in the lower leg, which prevent normal joint mobility and can result in deformity. Understanding the mechanism that causes contracture will help to guide intervention strategies.

The motor impairment team, which includes Dr Bart Bolsterlee and PhD student Arkiev D'Souza, is using diffusion tensor imaging (DTI) to determine the changes in muscle architecture

PhD student Arkiev D'Souza with research participant



L-R Dr Bart Bolsterlee, Arkiev D'Souza, Dr Martin Heroux, Prof Rob Herbert

> "Around 53 percent of children with cerebral palsy have contractures at the lower leg, which can prevent mobility and result in deformity."

that accompany contracture. DTI is a magnetic resonance imaging (MRI) technique typically used to examine the structure of the brain. Recent advances in technology have allowed researchers to apply this technology to muscles to measure muscle structure in unprecedented detail.

While the technology was initially developed to examine neural connectivity of the brain, over the last decade it has been increasingly applied to study skeletal muscle structure. Using DTI, the team will compare the architecture of calf muscles in 20 children with cerebral palsy and 20 of their healthy peers.

The MRI scan takes approximately 45 minutes and the data is used to generate a three-dimensional model of the muscles in the lower leg. Differences in muscle structure between healthy children and children with contracture will help identify the mechanism causing the condition. This information may help to create new techniques to overcome the difficulties caused by contracture.

Breakthrough Study

COGNITIVE ASSESSMENT OF HIV PATIENTS

Insight / How to screen for neurocognitive problems at the primary care level in persons with chronic HIV infection.

Dr Lucette Cysique

In Australia, general physicians (GPs) with high HIV patient caseloads have played a crucial role in curbing the HIV epidemic.

Today, they continue to play a key role in maintaining HIV patients' health with one of the highest rates of successful viral control in the world (>92% HIV patients treated are virally undetectable). GPs also have unique role in managing the chronic complications of HIV. However, methods such as screening for cognitive health, have typically remained outside GP's capacities.

This issue was recently addressed in a study published in the journal *Clinical Infectious Diseases,* by Dr Lucette Cysique at NeuRA, head of the NeuroHIV research group and Dr Mark Bloch, director of the Holdworth House GP.

The study investigators devised a cognitive health screening which could be implemented in busy GP practices within 20 minutes. It requires one-off neuropsychology training for the examiner, and an ongoing supervision by a senior neuropsychologist to assess ongoing cognitive mental health. The procedure is not diagnostic, but streamlines patients efficiently, thus expediting the clinical decision process.

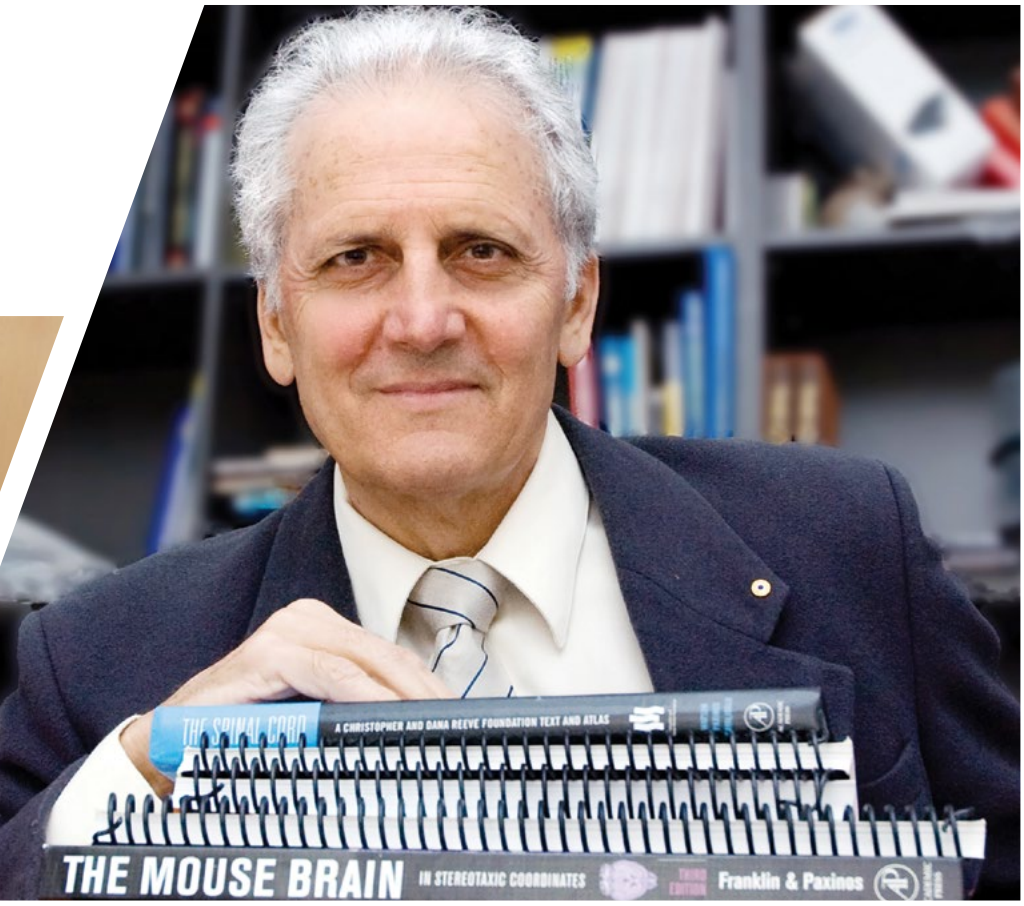
This new screening procedure addresses increasing worries about cognitive health in the ageing HIV community.

Dr Lucette Cysique

The cognitive health screen serves to reassure those with normal cognitive functioning and plan for monitoring in a timely fashion. It also better directs patients with mental health issues towards the appropriate service – in particular depression, which remains common in persons with HIV infection (life time estimate is 40%) and targets HIV+ persons who may be developing mild to moderate levels of cognitive deficits. Between 20%-30% of persons with chronic HIV infection may experience cognitive problems, despite HIV viral control. Cognitive difficulties, no matter how mild, can still impact the most demanding aspects of everyday life, such as gaining and retaining employment; efficiency at work, and learning new skills.

Since the study publication, HIV community members and the study investigators are working on a plan to transform the screening procedure from a research-validated tool to a clinically validated one, as well as extending it to culturally diverse HIV+ persons.

EXPLORING THE GREAT UNKNOWN GALAXIES IN OUR BRAINS



Prof George Paxinos set to release new updated series of his works

> “Prof Paxinos pioneers a three-dimensional framework for working with the brain.”

Insight / Prof Paxinos set to release a new edition of ‘Mapping the Brain’ series.

Prof George Paxinos AO

In April 2017 NeuRA Senior Principal Research Fellow, George Paxinos received an honorary doctorate from the Ionian University, in Corfu, Greece for his landmark work on ‘Mapping the Brain’.

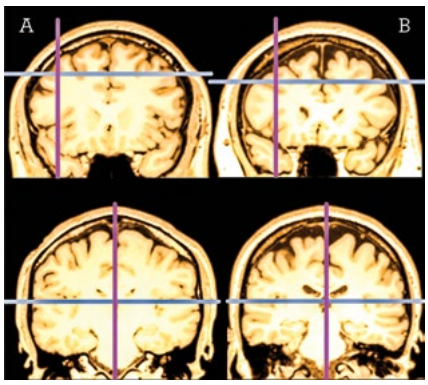
Prof George Paxinos paved the way for future neuroscience research by being the first to produce accurate three-dimensional (stereotaxic) framework for placement of electrodes and injections in the brain of experimental animals, which is now used as an international standard.

Arriving at NeuRA in 2001, Prof Paxinos focused on research, constructing histological maps of the brain. After seeing the good work being done at NeuRA on the spinal cord, Prof Paxinos together with his colleagues constructed the first diagrammatic atlas of the human spinal cord as well as the first comprehensive atlases of the rat, mouse, and rhesus and marmoset monkey spinal cord.

In the last few years at NeuRA, Prof Paxinos has started constructing MRI atlases of the brain of humans, rats, and mice. In 2015, he published the first comprehensive MRI atlas of the rat and is now working on the mouse and human MRI atlases.

“We are using the different contrasts in the MR images as though they are different neuro-chemical stains, to identify parts of the brain. This change in direction from histology to images, makes our work more relevant to researchers and clinicians who increasingly work with images of the living brain.” said Prof Paxinos.

Later this year as well as next year, Prof Paxinos will publish updated versions of seven of his atlases, combining his original foundational work with the MR imaging. This has allowed his team to make the maps more accurate, greatly enhancing the advancement in neuroscience-research, and giving surgeons higher definition maps which assist in facilitation of navigating neurosurgery.



Source of Inspiration

ALZHEIMER'S – A NEW DOOR OPENS

Insight / A new understanding of the intricate steps which lead to the development of Alzheimer's opens the door to new treatments.

Prof Lars Ittner

Around 354,000 Australians are living with Alzheimer's and other dementia-related illnesses.

This figure is likely to rise to 900,000 by 2050, unless a treatment is found.

Until now, research has missed the first essential step in the development of Alzheimer's, which involves the tau protein and its protective effects. This startling new discovery is a result of research that NeuRA's Prof Lars Ittner has been conducting since 2010, when he first identified that two proteins – tau and amyloid-beta – together created a toxicity in the brain which lead to Alzheimer's disease.

Prof Lars Ittner & Dr Arne Ittner investigate the first steps in the development of Alzheimer's

> This study opens the door to new treatments for people with Alzheimer's that could halt its progression.

To further understand why this toxicity occurred, Prof Ittner recruited his brother, Dr Arne Ittner, a cell biologist, to participate in the research. Their study revealed that tau, which has long been thought to contribute to the cell death which leads to Alzheimer's, actually has a protective effect on the brain in the early stage of disease.

This finding overturns previously held ideas of how the disease develops and opens the door to new treatment options which could halt or slow its progression.

Initially, it was thought that amyloid-beta prompted a change in tau, causing it to become toxic. However, results from the new study suggest that tau changes itself in order to protect neurons, and that amyloid-beta assaults this protective functionality until it is progressively lost.

This is the stage at which toxicity levels cause the destruction of neurons and results in the memory loss and confusion associated with Alzheimer's disease.

Their study revealed that a third protein, kinase p38, aided tau in its efforts to protect against damage. But, as levels of p38 became depleted in the brain, so too were the protective benefits reduced.

This study has revealed that p38 is a potential therapeutic target. Using animal model studies, the brothers found that Alzheimer-like symptoms emerged in mice when p38 was blocked. When they reintroduced the protein, however, the symptoms disappeared.

As the protein is lost during the progression of the disease, you lose the protective function. But a small amount of protein still remains, so if you can stimulate that function, we may be able to delay the onset of deficits.

This study opens the door to new treatments for people with Alzheimer's which could halt its progression and is an important step in NeuRA's discovery pathway to a cure.

Source of Inspiration

GLOBAL RESEARCH PROGRAM INTO ALZHEIMER'S PREVENTION

In conversation / NeuRA participates in international effort to find a preventative drug treatment for Alzheimer's disease.

Dr Bill Brooks

Tell us about your work with families with the genetic form for Alzheimer's disease?

I have been working with these families for nearly 25 years and we are involved here at NeuRA with a global research program called DIAN which is about looking for the biological changes that occur in the brain before people develop symptoms of Alzheimer's. Over the last 2 years we have been working on a clinical trial that has been aimed at preventing the symptoms of Alzheimer's disease by removing amyloid from the brain before symptoms develop and before the nerve cells deteriorate. It has been a lot of work for us – it's a demanding task for the clinical trial participants and it is all going well so far.

What is the next big step in the DIAN program?

At the end of this year there will be a 'first look' at the data to see whether there is any difference between the active drug and placebo groups. If there is an indication that either or both drugs are influencing amyloid deposition in the brain, the trial will continue for another two years to see if we can find an effect on people's memory and thinking.

The next phase of the project as far as the first 2 drugs are concerned is that they will be reviewed to see whether they have a significant influence on amyloid disposition of the brain. If so, the trial participants will go on for another 2 years, to see if we can find an influence on people's memory and thinking. We also have plans to start a third drug arm this year and this process will roll on until something is discovered that prevents the symptoms of Alzheimers.

Dr Bill Brooks

How do you feel being at the pointy end of science?

When I was a medical student there was no treatment or cure for Alzheimer's, it was not even on the horizon. It was thought probably to be one of those things, that were just not treatable. Over the last couple of decades, we have seen gradual but major increases in our knowledge, and we are now in a position where we hope we can make the same inroads into Alzheimer's as we have into cancer, heart disease and strokes.

Here at NeuRA we are really proud to be part of this international effort to find a preventative drug treatment for Alzheimer's disease. .For me it's great to be involved in this new stage of research - when I started in 1988 it was hard to imagine that in my lifetime we would be doing prevention trials! It is a great privilege to have been able to work with these families as they progress on their journey through the decades and the generations. I think they are deriving hope and optimism from this work and we need to deliver for them

SYDNEY BRAIN BANK, A WORLD CLASS FACILITY

Insights / Sydney Brain Bank alongside other global research facilities sets gold standard research criteria for characteristics of brain disorders.

The Sydney Brain Bank team L-R Andrew Affleck, Dr Andrew McGeachie, Dr Claire Shepherd

Dr Claire Shepherd

The Sydney Brain Bank has been operating since 2005, and there are currently over 500 brains in the Bank.

The Sydney Brain Bank at NeuRA aims to facilitate world class research and breakthroughs in ageing and neurodegenerative disorders. We hold both frozen and fixed tissue from most brains and supply tissue to 30-40 research projects a year. Many of these projects are a collaborative effort with external research institutions.

Led by Dr Claire Shepherd, recently appointed to position of Director of the Sydney Brain Bank, the team has developed a new method which will allow them to characterise one of the pathologies in Alzheimer's disease by using a more simplistic, cost effective and less labour intensive method without compromising on the quality and sensitivity of the diagnosis.

Says Shepherd, "At the Sydney Brain Bank, we collect, characterise and store the brain tissue from individuals that have died from ageing or neurodegenerative disorders so that we can facilitate medical research."

"This new method will be advantageous because brain research takes a lot of time and money to do – we have to screen every brain we get into the bank, so if we can do this more cost effectively, we will be able to do more work, and collect more cases to facilitate greater research into the understanding of the brain and neurodegenerative disorders," says Dr Shepherd.

At the Sydney Brain Bank, working with a large number of clinical research programs means the majority of donors have been involved in longitudinal clinical research

> "This new method will be advantageous because brain research takes a lot of time and money."

studies. This data allows researchers to understand the relationship between someone's clinical symptoms in life and the pathology in their brains at death.

For many of these disorders, there is currently no definitive diagnosis in life. When characterizing these brains at NeuRA it allows researchers to use research diagnostic criteria to identify the neurodegenerative disease they were suffering from.

The Sydney Brain Bank has been involved in setting the gold standard research diagnostic criteria for diagnosing some of these disorders alongside other global research facilities.

During 2017, Dr Claire Shepherd will travel to the UK to visit several British Brain Banks to work with their researchers in understanding their processes and to share ideas and techniques.

By working more closely together, NeuRA aims to strengthen and harness a more collaborative global approach through the various Brain Bank networks to address many research questions – together, sharing is a more powerful way to go.

Source of Inspiration

PREVALENCE OF DEMENTIA IN INDIGENOUS COMMUNITIES

Insight / High rates of dementia in Aboriginal Communites links early childhood trauma with ageing population.

Dr Kylie Radford and Prof Tony Broe AM

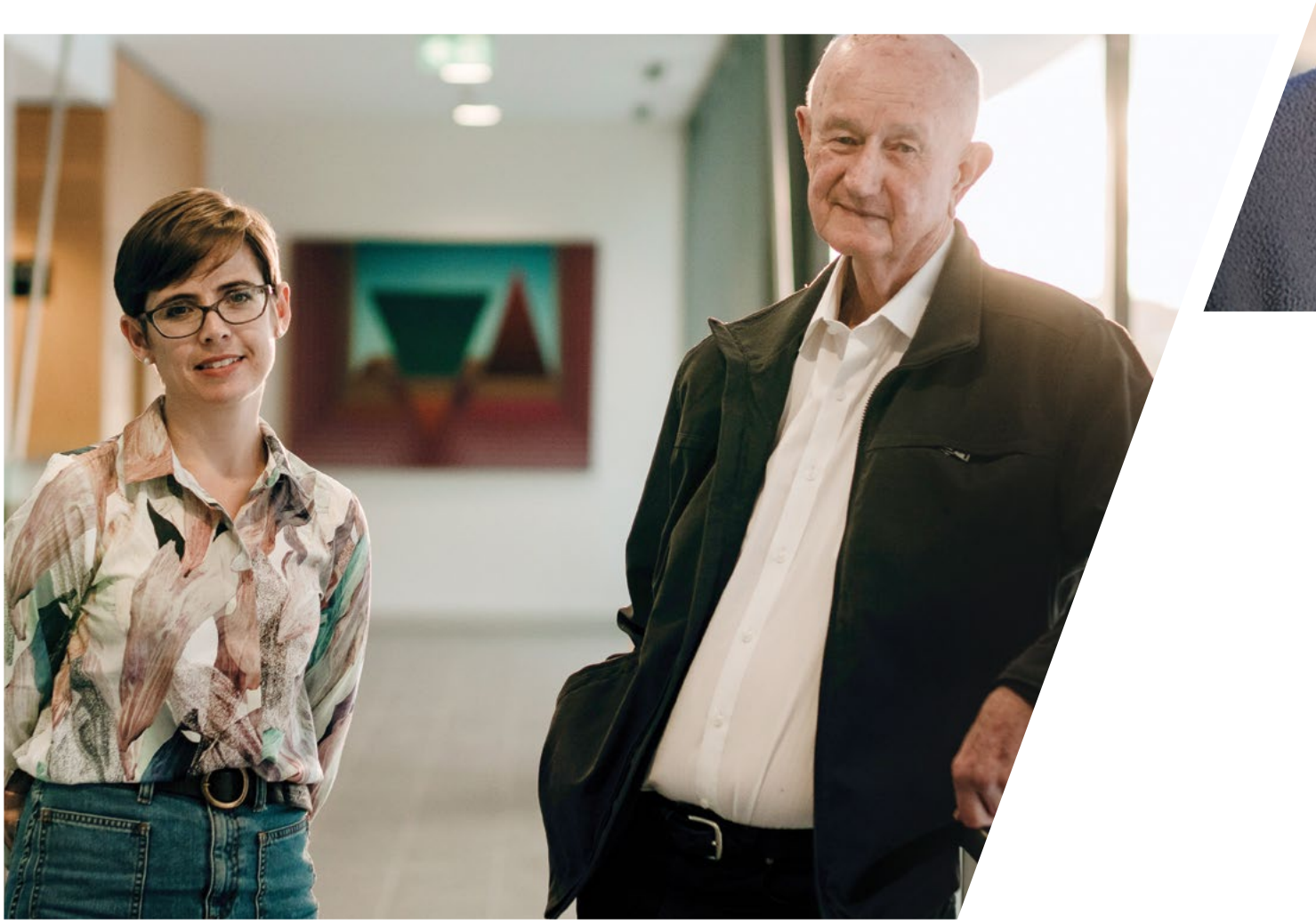
Research lead by Prof Tony Broe and Dr Kylie Radford has highlighted the high prevalence of dementia, particularly Alzheimer's disease, in Aboriginal communities.

We are now working towards understanding the causes of cognitive decline and dementia, building capacity in dementia care and supporting Aboriginal family carers, and developing culturally appropriate strategies to promote healthy brain ageing.

The next decade will see a dramatic increase in the number and proportion of older people within the Aboriginal and Torres Strait Islander population. Close to 80% of these older people live in regional and urban parts of Australia (a third in our major cities). Recently, the Koori Growing Old Well Study (KGOWS) has shown that dementia prevalence in Aboriginal Australians across NSW is three times higher than the overall Australian population, at ages 60 years and older.

This is consistent with evidence of high rates of dementia from remote Aboriginal communities and highlights the widespread burden of dementia and the need for culturally responsive approaches to dementia education, care and prevention.

What is it that helps one person age successfully, and causes another to develop age-related diseases like dementia? Scientifically, we know too little about normal ageing and what



Dr Kylie Radford and Prof Tony Broe

Research program in the Koori Dementia Care Project

> “Research has highlighted the connection between early childhood stress and high prevalence of dementia in indigenous communities.”

factors influence some people, and not others, to develop diseases that affect the brain. Only by studying healthy elderly people, as well as those with problems, can we know what normal ageing looks like and learn more about staying healthy as we age. In collaboration with our Aboriginal community partners, our rigorous population-based approach allows us to accurately assess the prevalence of dementia, not just those already ‘in the system’ seeking treatment or care. Alzheimer’s disease was the most common type of dementia diagnosed, followed by vascular dementia – a pattern seen across older populations worldwide.

Our Aboriginal health and ageing team, with our collaborators, is now conducting a follow-up study (KGOWS-II) to determine the social and biomedical risk and protective factors for dementia across the lifespan. In 2016, we also initiated the Koori Active and Healthy Ageing Project. This research will develop effective, culturally appropriate, and accessible strategies to promote vitality and healthy brain ageing and prevent dementia in Aboriginal communities.

This research is supported by our ongoing Koori Dementia Care Project, which aims to build capacity in dementia understanding and care with Aboriginal community controlled and mainstream service providers. As one of our older Aboriginal participants observed: “Healthy ageing is your mind staying young”. Most Australians would agree.

UNDERSTANDING THE RISK OF FALLS IN PEOPLE WITH PARKINSON'S DISEASE

Insight / Assessing poor ability to quickly adjust steps while walking that increases fall risk in people with Parkinson's disease.

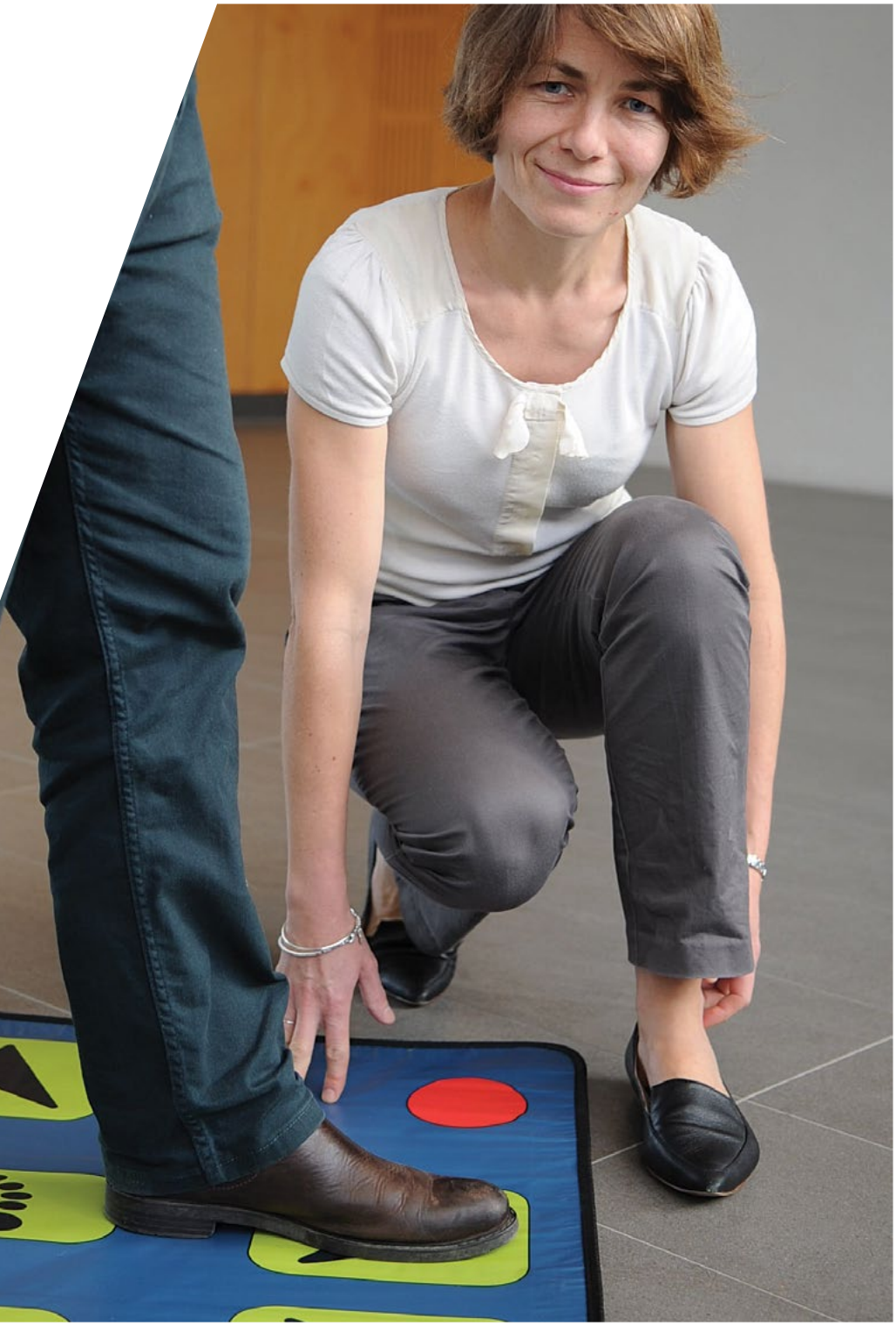
Dr Jasmine Menant, Joana Caetano and Prof Stephen Lord

Balance and walking impairments are disabling symptoms of Parkinson's disease that adversely affect performance of daily activities, reduce independence and increase the risk of falls. Around 60% of people with Parkinson's disease fall at least once a year, with a large proportion (50-86%) falling multiple times in this period.

Declines in the ability to adapt stepping and walking behaviour, particularly under challenging conditions, might contribute to trips and slips; which are a frequently reported cause of falls in people with Parkinson's disease.

To further our understanding of fall risk in people with Parkinson's disease, we conducted a study on the role of attention in stepping and the ability to adjust steps while walking in response to unexpected hazards.

Prof Stephen Lord and Dr Jasmine Menant



Dr Jasmine Menant measures stepping reaction times

> “Reducing fall risk in people with Parkinson’s disease.”

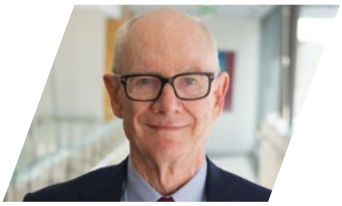
This involved a step mat test of reaction time and an obstacle course designed by PhD student Joana Caetano. Dr Menant said that great care was made in designing a test that could mimic everyday walking challenges, for example walking along in a busy street and at the last second noticing the slippery banana peel or the broken tile, that required a short, long or wide step to successfully avoid it.

The team found that compared with their healthy peers, people with Parkinson’s disease had slower and more variable stepping reaction times in a situation involving a distracting task and were less able to adapt their stepping while walking. The participants were, therefore, more likely to miss step targets and strike obstacles on the pathway. Professor Lord considers that such reduced stepping and gait adaptability places people with Parkinson’s disease at an increased risk of falling when negotiating unexpected hazards in everyday life. Our future work will investigate whether rehabilitation interventions aimed at improving stepping and walking adaptability can reduce fall risk in people this group.

People Behind NeuRA

NEURA BOARD OF DIRECTORS

Our discoveries impact the community and help transform the lives of people living with disorders of the brain, their families and greater community.



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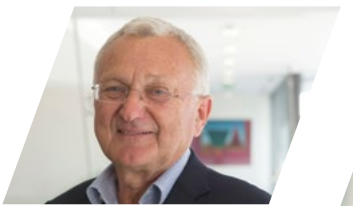

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Director, 2005 – present

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Director, 2013 – present
Managing Director, Optima Boards

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FAHMS PhD DSc
Executive Director & CEO
Director, 2004 – present

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SUPPORTING NEUROSCIENCE RESEARCH

Grant Simpson, Foundation Director

Led by Grant Simpson, the NeuRA Foundation team is committed to building awareness and support for NeuRA's research to conquer and cure disease and disorders of the brain. Over the last 10 years there has been a great focus on heart and cancer research which has achieved enormous strides in improved diagnosis and treatment.

Today, one in five Australians will experience a brain related disease or disorder at some point in their lives, making it our largest health concern.

Now is the time to put a greater spotlight on this important area of research, to address the tremendous burden it places on our community.

NeuRA's mission to discover, conquer and cure is achieved by the endeavours of partnership and we are greatly appreciative of the many forms of partnership our supporters provide. Government funding though necessary and welcome, is not able to bridge the gap we have in meeting research staff costs, providing the best laboratories and equipment possible and conducting clinical trials with patients. Our ability to do this is only made possible by the vision and generosity of individuals, companies, trusts and foundations who support the work of NeuRA.

In supporting NeuRA, our donors are investing in hope for the many families who look to research to provide the answers to these devastating conditions which affect so many Australians.

NEURA'S TREK TO CONQUER KOKODA AND DEMENTIA

Benjamin Franklin first said, "out of adversity comes opportunity".

This quote has almost become a platitude. However, the great adversity the Rushton family faced, when at the age of 48 Bob was diagnosed with dementia, bears out the veracity of this quote.

Bob was a vibrant soldier who had arranged complex evacuations of critically ill people from around the world. He was a fun-loving husband and dad to three beautiful girls. His dementia was to rob him of his speech, his capacity to eat, his mobility, emotional capacity, independence and hardest of all his dignity. For Bob's family, their world changed forever. His wife Lisa became his carer and his girls' lives became filled with responsibilities beyond their years.

Bob died, surrounded at the end by the family who had loved, cared and cried for him. Bob's death may have been the end point of an association with this disease, however, in their desire to prevent other families suffering, the Rushtons, saw two ways to take their adversity and create opportunities.

They knew that NeuRA is the home of the Sydney Brain Bank where the objective is to provide a research resource facility for the collection, characterisation, storage and distribution of human brain tissue for research purposes. Bob, before his death granted the bank the incredible opportunity to learn more about dementia by agreeing to donate his brain. This precious gift will contribute to research now and for decades to come and came about because of his great adversity.

When Bob's wife Lisa and his girls Stephanie, Amy and Poppy thought about another opportunity to prevent others suffering as they had, fifteen-year-old Amy decided to join NeuRA's Trek to Conquer Kokoda this year and raise funds for further Dementia research.

This is just one example of many people in our community who are stepping up to raise awareness for the important research work done by NeuRA and to raise funds to assist in these endeavours.

Amy sees herself as an everyday Australian, just like you, but she is trekking to honour her dad and raise vital funds for Dementia research. She seized this opportunity so that future Dementia patients will one day have a cure.
What could you do?
Call NeuRA events on 1300 888 019 for more details.

BRIDGE FOR BRAINS RESEARCH CHALLENGE

The Bridge for Brain Research Challenge is held across Australia each year with over 130 clubs participating. In the first week of May each year, bridge clubs nationwide join forces to support Alzheimer's research at NeuRA.

This year there was a 10% increase in club registrations. The total raised since the event's inception will exceed the half a million-dollar mark. The event is now embedded in the calendars of bridge clubs and has created strong relationships with this incredible group of supporters.

During this time, thousands of players have been part of the Bridge for Brains Challenge, with clubs from every state in Australia committing to play. Club registrations have climbed and in 2017 more than 5,000 players have competed.

Most importantly, the funds raised have and will continue to enable research into Alzheimer's disease to advance.

The Bridge for Brains Challenge over the past 13 years has provided vital funds to NeuRA's research as well as a platform for bridge players to test their minds and extend their generosity.

LEAVING A LEGACY TOWARDS MEDICAL DISCOVERIES

A bequest is one of the most significant and enduring acts a person can make in their life. It provides a legacy which ensures our work in medical discoveries continues well into the future.

Gary McCarron made the decision to leave a bequest to NeuRA after watching firsthand the suffering of his wife, Colleen with Parkinson's. Living with his wife Colleen whom he married in 1978, Gary first noticed her Parkinson's in early 2000 when she developed a tremor in her left foot. He looked after Colleen lovingly, but to the detriment of his own health and passed away in January this year. Gary had been giving regular donations to NeuRA to go towards Parkinson's research since 2011, and decided to make a final, significant gesture in his will to perpetuate NeuRA's research in this area.

Whether it is a large or small gift in your Will, or a residual portion of your estate, it plays a vital role in funding research projects across a range of neurological diseases. Gary decided to leave a bequest to NeuRA in his Will and so can you. There are several options to consider, including leaving a percentage of your estate to support research in a particular area. If you have any questions or would like to discuss in confidence, please contact NeuRA's Community Bequest Manager 1300 888 019.

LIFTING THE LID

NeuRA recently supported the regional coastal community of Nelson Bay by participating in a two-day event which included a community forum, and a series of talks at local schools on the different roles needed for an effective mental health strategy in the Port Stephens area. Developed to support the community across all ages, the forum organised by NeuRA supporter Don McDonald AM, the event was aimed to spark conversation about mental illness with a view to address community needs for more support in this vital area.

The forum featured Prof Cyndi Shannon Weickert, NSW Chair of Schizophrenia Research at NeuRA in partnership with Prof Helen Christensen Director of the Black Dog Institute who engaged in answering questions from the floor in an open session. Over 1,500 people turned out for the public forum and the local school presentations.

Prof Cyndi Shannon Weickert

Steve and Claire Hartley

STEVE SAYS THANKS FOR SUPPORTING PARKINSON'S DISEASE

Steve Hartley was only in his 30s when diagnosed with Parkinson's disease, the second most common neurological condition after dementia. The tragedy of Parkinson's disease is that up to 70% of vulnerable brain cells have been damaged by the time the first symptom appears. Recent research however has discovered that a special protein, found in people with a family history of the disease increases prior to symptoms.

At NeuRA we are focused on new insights into early detection of Parkinson's disease. We are making constant progress and need the support of our donors to keep our momentum going.

Prof Peter Schofield and Mrs Betty Lynch

JOHN AND BETTY LYNCH SEMINAR ROOM OPENS

Our sincere thanks to Mrs Betty Lynch OAM for her very generous donation which has enabled NeuRA to undertake the fit out of a light-filled and elegant conference facility which will enhance communication and the exchange of ideas, leading to enhanced collaboration.

People Behind NeuRA

NEURA'S DIGITAL VOICE

Liz Courtney
Head of Communications

Over the past two decades, the rise of internet (and mobile phones) has irreversibly changed the way people communicate. Science communication is evolving with modern communication broadening to include online video content, deep dive portals, webinars, and breaking research stories on social media channels.

Digitizing data is allowing more people greater access to scientific content and here at NeuRA we are working to develop and deliver a greater range of educational content for the wider community across a range of new communication platforms.

Due to the increasing volume of worldwide research into mental and brain-related disorders, there is a need to collect, collate and store these research findings in a free, online portal, a hybrid style library. This allows the general public, consumers, carers, researchers, clinicians and policy developers to better understand, investigate and manage these disorders.

The Libraries which we are building within the NeuRA Discovery Portal will provide information that is gained from only the most reliable research findings published in systematic reviews.

Watch our Video
Check out our NeuRA Discovery Portal
Like us on Facebook and Twitter
Watch out for our coming online library on Bipolar later this year.

Once these reviews are collected, the evidence is summarised and quality assessed so that the strength of the evidence can be measured. This evidence is presented in topics covering symptoms, treatments, diagnosis, risk factors, outcomes, co-occurring 'comorbid' conditions, epidemiology, and physical features associated with each disorder. Gaps in the evidence are flagged to encourage further research in those areas. We hope the NeuRA Discovery Portal is a valuable resource for all to access locally and globally as we take on new digital pathways at NeuRA to enable the greater community to access breaking research information.

New communication pathways through Facebook and similar social networking sites hold vast potential for reaching non-traditional audiences for science. As the NY Times recently reported, Facebook has nearly 2 billion users and growing as the company plans bold new features and opens up its user base to almost anyone with an email account.

Social networking sites are important new platforms for science communication since they facilitate reaching non-traditional audiences, whilst encouraging users with an interest in science to serve as science investigator or opinion leader to re-broadcast, share, and like information to their friends. Social media can also play a strong lead in recruiting people to participate in clinical trials.

Here at NeuRA we are exploring live streaming of speaker events and conferences, holding our first series on mental health, building our video production facilities to take words and images into an engaged digital space, and expanding our Discovery Portal to provide the community with access to vital information on disorders of the brain. We are creating leadership in science communication and looking for new technologies to assist us with modernising science communications towards 2020. The journey is not over yet; we are just beginning a new expedition and hope you will join us in this pursuit.

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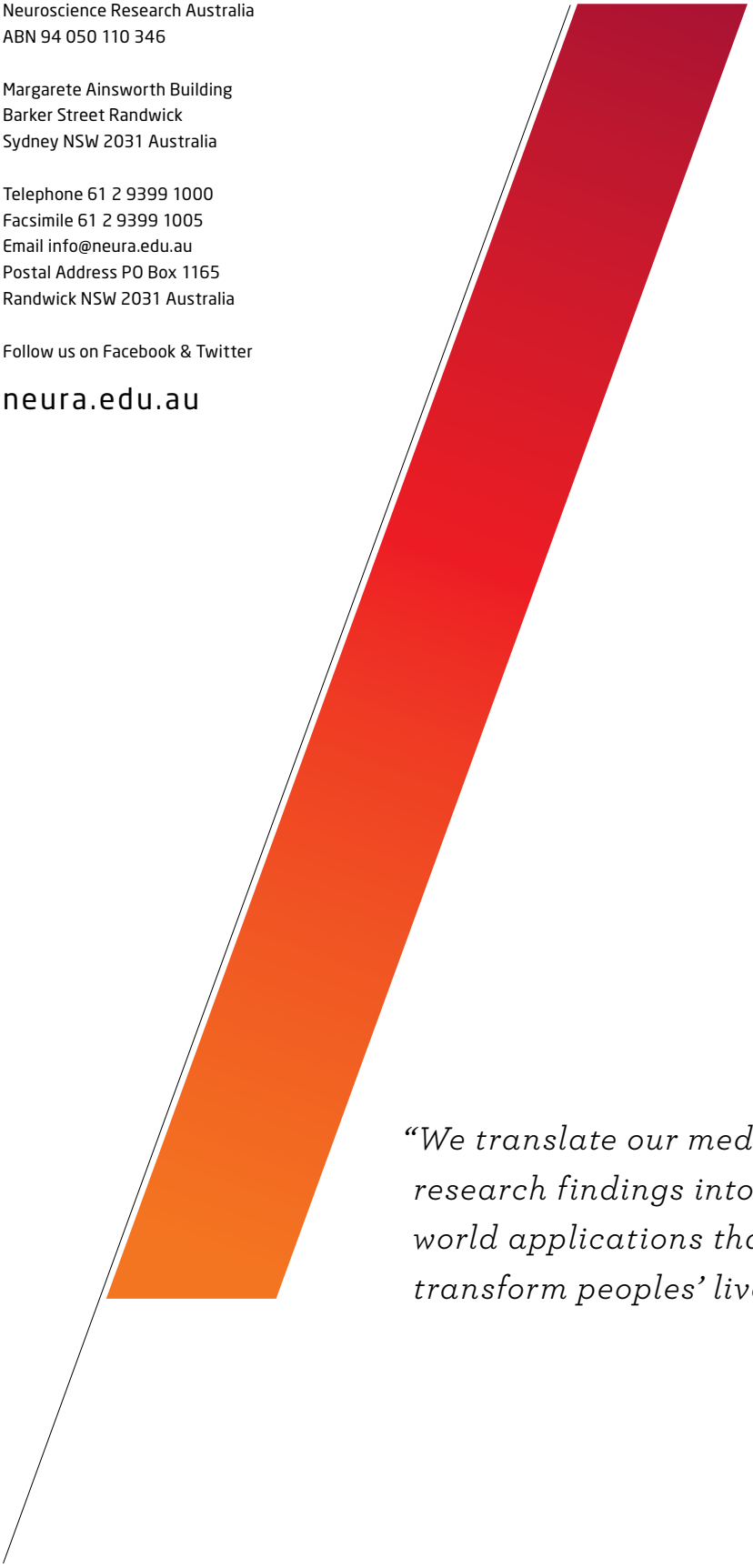

"We translate our medical research findings into real world applications that help transform peoples' lives."