

# the NeuRA magazine

News and breakthroughs from Neuroscience Research Australia • [neura.edu.au](http://neura.edu.au)

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## Our goal to NIX Parkinson's through new gene therapy

**Bringing**  
*Research  
2 Real  
Life*

### **NEWS IN BRIEF:**

*The latest on  
schizophrenia,  
dementia and  
sleep apnoea*

**A Meeting  
of Minds:**  
*Natassia Smith  
& Professor  
Kim Delbaere*

**DON'T FALL  
FOR IT! APRIL  
FALLS DAY  
IS NO PRANK**

**5 Minutes**  
with Grahame Cooksley





## A new era at Neuroscience Research Australia

*2023 has seen the start of a new era at Neuroscience Research Australia (NeuRA).*

We hit the ground running right at the start of the year with breaking news about Professor Carolyn Sue AM's NIX gene therapy for people with Parkinson's disease, which we expand on this edition. As you may know, Professor Sue has recently joined NeuRA, relocating with her scientific and clinical team, and is the inaugural Kinghorn Chair, Neurodegeneration. She is a world expert on movement disorders and will be starting patient clinics at NeuRA shortly. Her goal is to have a proven therapy within three years.

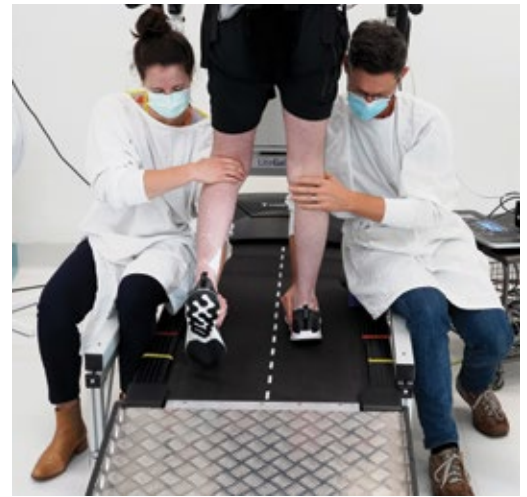
Also hot off the press, our Centre for Pain IMPACT and Spinal Cord Injury Research teams recently secured significant grants from the Australian Government's Medical Research Future Fund to develop digital innovations to improve the lives of people with chronic back and neck pain, and to roll out their ground-breaking neurostimulation therapy for people with spinal cord injuries in two new community trials across Australia.

Lastly, we closed 2022 on a very high note with our inaugural Pearl Symposium, where eight of our PhD Pearl Program students presented a three-minute thesis on their research to a live audience.

To present anything in three minutes is challenging, let alone research ranging from exercise interventions for cardiac patients, to online tools to regulate emotions in chronic pain, to ways of increasing resilience in children. They did us incredibly proud and I'm pleased to say the future of neuroscience looks bright thanks to your ongoing support.

**Carole Renouf**  
Interim CEO  
Neuroscience Research Australia

“We hit the ground running right at the start of the year with breaking news about Professor Carolyn Sue AM's NIX gene therapy for people with Parkinson's disease...”



**As part of the landmark eWALK trial, NeuRA researchers have been testing the ability for neurostimulation to restore the function of spinal nerves in people with spinal cord injury.**

## Welcome to another edition of NeuRA Mag!

With your incredible support, we continue to make strides towards unravelling the mysteries of the brain and we are excited to share our stories of impact with you.

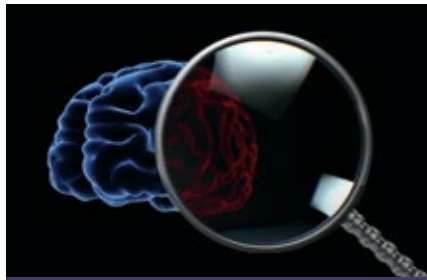
In this issue, you'll find out what our schizophrenia researchers are working on, learn more about our latest developments in dementia and sleep disorders, and meet two passionate scientists and collaborators at our Falls, Balance and Injury Research Centre.

We also update you on a new trial which could transform the lives of people living with Parkinson's disease and invite you to test your knowledge about the brain and NeuRA with our quiz.

As we continue to advance the frontiers of neuroscience through the tireless work of our dedicated researchers, we thank you for your ongoing support and look forward to your continued partnership. Together, we can make a lasting impact on the future of health. ●

**On the cover:** Professor Carolyn Sue AM, Kinghorn Chair, Neurodegeneration





## What's next for Schizophrenia Research?

Schizophrenia affects one in 100 Australians and roughly 20 million people worldwide.

For 70–80 per cent of people with schizophrenia, it is a chronic lifelong condition. Current treatments are ineffective in approximately 30 per cent of patients and often have severe side effects. They are also focused primarily on alleviating psychosis, just one aspect of the condition.

To advance our understanding of this debilitating disorder, there is an urgent need to characterise the molecular underpinnings of the changes that occur in the brains of people with schizophrenia. In other words, to identify and understand the changes in the brain that happen at a molecular and cellular level that contribute to the development and progression of this disorder. This will allow more effective treatments to be developed.

Right now, researchers at NeuRA are working on finding out the changes that occur in the midbrain of people with schizophrenia, with and without inflammation, and they are determining how these changes impact dopamine regulation.

Knowledge gained from this research will inform decisions on how to improve existing treatments, as well as identify new ones. •



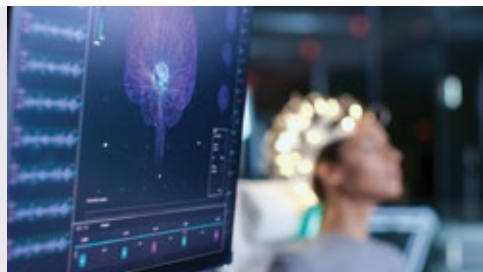
## Global dementia study uncovers sex differences

NeuRA researchers, led by Scientia Professor Kaarin Anstey, recently published the most comprehensive study of sex differences in dementia globally. The study, which looked at data involving almost one million people, was the first to evaluate how life expectancy and gender inequality impacts dementia.

It found that dementia prevalence (i.e. how many people have the disease in the population) was higher in women than men over the age of 85.

Interestingly, there were no sex differences in incidence of dementia – meaning the rate of men and women developing dementia was the same, except in the 90+ group where it remained higher in women. •

## Innovative sleep apnoea therapy one step closer to human trials



Professor Lynne Bilston has been awarded a \$1.1 million NHMRC grant to progress a completely new, minimally invasive therapy for obstructive sleep apnoea.

The funding will help propel light-stimulation therapy, Optosleep, towards human trials.

More than 25 per cent of Australians over 40 are impacted by obstructive sleep apnoea – a sleep disorder linked to daytime sleepiness, increased accidents and an elevated risk of cardiovascular disease.

Professor Bilston explains: “Optosleep consists of two components – an optogenetic component that makes the upper airway muscles sensitive to light, and a smart oral appliance that senses breathing and delivers light stimuli to activate the upper airway muscles, keeping the upper airway open during sleep.” •

## Quick quiz!

- At what age does the brain fully develop?  
a) 14 b) 18 c) 21 d) 25
- How much does an adult brain typically weigh?  
a) 1.36kg b) 2.2kg  
c) 800gm d) 1.9kg
- We use only 10% of our brains.  
a) True b) False
- NeuRA has been operating for \_\_\_\_ years.
- Our emotions are believed to come from the:  
a) Cerebellum b) Amygdala  
c) Frontal Lobe d) Temporal Lobe

Answers: 1 (d) 2 (a) 3 (b) 4 (31) 5 (b)



## Our goal to NIX Parkinson's through new gene therapy

A new study at NeuRA is looking at a way to provide a new, reliable, sustainable source of energy for the brain cells that die in Parkinson's disease.

**P**arkinson's is the second-most common neurological disease in Australia after dementia and affects more than 10 million people worldwide.

The most common symptom is tremor, however people with Parkinson's disease may also experience slowness of movement, stiffness, a loss of automatic movements such as blinking and smiling, changes in speech and, in the later stages of the disease, dementia. Twenty per cent of sufferers are under 50 years old and 10 per cent are diagnosed before the age of 40.

It currently has no known cure, which is something Professor Carolyn Sue AM, the inaugural Kinghorn Chair, Neurodegeneration at NeuRA, is fearlessly trying to correct.

She is currently embarking on a new study exploring if the Nix protein restores mitophagy and mitochondrial function in people with the PINK1/PARKIN gene mutations.

In simple terms, she and her team hypothesise that their novel treatment based on this protein can restore neuronal energy levels in people with Parkinson's and delay or stop the disease's advancement. It works by providing the brain cells with an alternative way to recycle their mitochondria, the part of the cell that provides its living source of energy.

What this means is that cells that are treated using this method are able to restore their energy levels back to normal to allow them to live and work longer, just like a phone would do, when you recharge its batteries.



**“If successful, the Nix gene therapy would be the world’s first neuroprotective treatment for Parkinson’s disease,”**

said Professor Carolyn Sue AM, the inaugural Kinghorn Chair, Neurodegeneration at NeuRA.



**Professor Carolyn Sue AM**



## Department of Health backs genomic sequencing in mitochondrial disease diagnosis

Professor Sue’s team at NeuRA has successfully achieved an important milestone for patients, families and carers affected by mitochondrial diseases, with the Medical Services Advisory Committee (MSAC) for The Department of Health and Aged Care releasing a public summary document supporting the use of genomic sequencing for the diagnosis of mitochondrial disease.

In collaboration with the Australian mitochondrial medical network, of which Prof Sue is a founder, this work means that patients suspected to have mitochondrial disease can be diagnosed and seek the treatments that they need to stay healthy.

Mitochondrial disease is a rare genetic disorder that affects the way cells produce energy, causing symptoms that can affect many parts of the body such as muscle pain and neurological problems. Around one in 250 Australians are at risk of carrying the disease and 5 to 10 per cent of patients may develop severe mitochondrial disease during their lifetime.

Genomic sequencing is essential in confirming a mitochondrial disease diagnosis as it enables earlier and definitive genetic diagnosis, avoiding inappropriate treatments and investigations, informing reproductive planning, and providing greater access to services and clinical trials.

“This is a great step forward for people with suspected mitochondrial disease and will enable them, and all Australians, to access vital genetic testing,” said Professor Carolyn Sue AM. ●

“If successful, the Nix gene therapy would be the world’s first neuroprotective treatment for Parkinson’s disease,” said Professor Sue AM, the inaugural Kinghorn Chair, Neurodegeneration at NeuRA.

“Ultimately, this would lead to a far better quality of life over a longer period for Parkinson’s patients.”

As Professor Sue told Hamish Macdonald on Radio National’s Breakfast program earlier this year, it was her work with families with a genetic predisposition to Parkinson’s that led to the discovery this new research is based on.

“We had a family where all members were at risk of having Parkinson’s disease and one of these family members did have Parkinson’s disease and the other

didn’t. So we started looking at both of these patients and felt that by looking at the family member who didn’t have Parkinson’s that there might actually be an answer as to how we could approach and treat this disease,” Professor Sue explains.

“By looking at the cells from her and her family member we found she was overexpressing this protein called Nix, which is a protein that’s used by the body to naturally recharge and regenerate the cells’ batteries to provide the energy for those cells. We then started to overexpress Nix into the daughter’s cells and found

we could rescue, or improve, the energy production of the cells affected by Parkinson’s Disease.”

Carole Renouf, Interim Chief Executive Officer at NeuRA said of this exciting new research:

“Professor Sue and her team are on the precipice of a remarkable scientific achievement that could significantly change the lives of people with Parkinson’s around the world.”

“With the top-class facilities and equipment at NeuRA, Professor Sue will have all the cutting-edge tools necessary to advance her research and develop the Nix gene therapy.” ●



**Shake It Up Australia Foundation and The Michael J. Fox Foundation have provided funding support towards this trial, alongside NeuRA and the Kinghorn Foundation.**



Professor Kim Delbaere (left) and Natassia Smith.

area, we are also collaborating more on a global level. The World Falls Guidelines were published for the first time, providing a blueprint for governments and policy makers looking to solve this problem.

**Natassia:** *How do you foster a positive and collaborative research environment?*

**Kim:** Find everyone's strengths. My ideal team is one where everyone has something really unique they love to do and share with others. Everyone else recognises that unique quality as their expertise and they want to learn from them. If nurtured, research ideas then grow from this foundation.

**Natassia:** *What is the most exciting project you are currently working on?*

**Kim:** Standing Tall is a homebased balance exercise program designed to help improve balance through tailored, guided exercises. Excitingly, after two large clinical trials and a number of other smaller trials, it will soon move out of the research environment and be available to everyone in the community.

**Natassia:** *Looking back on your career, what is the most important lesson you have learned?*

**Kim:** Something my colleague Prof Jacqui Close taught me is to step outside of our bubble. In research, you can get so bogged down in evidence or how to run a project that you forget who you're doing it for. Jacqui's message has made a huge difference to me and it's something I always carry through to my research projects. ●

## A Meeting of Minds: Natassia Smith and Professor Kim Delbaere

Natassia Smith first joined NeuRA's Falls, Balance and Injury Research Centre as a Research Assistant in 2017 and took on the additional role of NSW Falls Prevention & Healthy Ageing Network Project Officer two years later. She met Professor Kim Delbaere, Director of Innovation and Translation, at the Centre that year and since then they have shared a passion for improving public health outcomes, a commitment to evidence-based practices and a collaborative approach to achieving their research goals.

In this issue of NeuRA Mag, they come together for a conversation about Kim's career highlights and insights.

**Natassia:** *What inspired you to pursue a career in research and what motivates you to continue your work?*

**Kim:** What inspired me is the impact you can have through research. My background is in physiotherapy and one of the key motivators for me in pursuing this career was to help people. Moving into research made me realise how many more people I could help

by designing programs that are effective. What we get back from seeing the change in our participants and knowing that our research has generated that impact is extremely rewarding and motivating.

**Natassia:** *What do you consider to be the most significant scientific development in falls prevention?*

**Kim:** What makes me proudest to be in this field is that we actually know how to prevent falls. There's not many public health programs that are as significant as falls prevention with this much evidence behind them. As researchers in the falls



### April Falls Day

Recognised on 1 April, April Falls Day is an annual event designed to encourage older adults to become more active and reduce falls.

It is supported by the NSW Fall Prevention and Healthy Ageing Network and the Council On The Ageing NSW and promotes the benefits of becoming more active to stay independent as we age. In fact, research shows that exercise of any type can reduce the risk of falling by 23 per cent.

During ageing, our bodies lose muscle strength and coordination, so the more active we remain, the better chance we have of maintaining our physical health.

Find out more at [fallsnetwork.neura.edu.au/aprilfalls](https://fallsnetwork.neura.edu.au/aprilfalls)



From left: Carole Renouf, Grahame Cooksley, Dr Bill Brooks and Alasdair Beck at the Boardroom naming ceremony.



# 5 Minutes with Grahame Cooksley

*NeuRA bequestor Grahame Cooksley shares his personal connection to Parkinson's and dementia, his friendship with one of NeuRA's long-standing researchers, and what drove his decision to make a significant contribution to the future of neuroscientific research.*

“A fundamental reason for making my bequest to NeuRA is the dedication and dogged persistence it brings to medical research. There are few ‘Hollywood’ moments in medical research, so an incrementally-achieved breakthrough is even more rewarding for stoically-persistent research teams, when their dedication is ultimately crowned with success.

I'm hoping that my bequest for research into neurodegeneration and ageing will help lighten the plight and suffering of people with Parkinson's. And, ultimately, help find a cure for dementia. My father endured Parkinson's for 25 years. First, it robbed him of his dignity; then my athletic, outdoorsy father of his mobility; then his ability to converse, and left him with an impenetrable, mask-like visage.

Ultimately, he slipped into mild dementia and had to go to an enforced succession of nursing homes... from which he had a remarkable record of escapes.

Once he hitchhiked in his pyjamas from a hospital in Darlinghurst to Rose Bay. From there, he hitchhiked, nonstop, to Vaucluse! But when he was accepted – upon probation! – into a nursing home at Elizabeth Bay, he was able to relax; his last words were to thank a physiotherapist who had awakened an instinctive response to catch and kick balls. And who used to shower and shave him and do his hair, so he could recognise himself in a mirror...

I became aware of NeuRA through conversations with my friend, Dr Bill Brooks. With Bill now retiring it occurred to me his work has been so instrumental in NeuRA's ongoing success that his achievements deserve acknowledgement by future generations. Accordingly, I approached NeuRA about making a bequest I am confident will provide for the establishment of at least one perpetual Fellowship in Bill's name. I am also very happy that the Boardroom at NeuRA was named the ‘Dr William (Bill) Brooks Boardroom’ this year as a fitting tribute to Bill.” •

“There are few ‘Hollywood’ moments in medical research, so an incrementally-achieved breakthrough is even more rewarding for stoically-persistent research teams, when their dedication is ultimately crowned with success.”

Grahame Cooksley

► To find out more about how to support our life-changing work at NeuRA, visit [neura.edu.au/get-involved/donate](https://neura.edu.au/get-involved/donate) or get in touch with our friendly Supporter Relations team by calling 1300 888 019 or emailing [foundation@neura.edu.au](mailto:foundation@neura.edu.au)



PhD candidate Abigail Hansen providing a hands-on showcase of the Advance Driver Assisted Systems testing being undertaken at NeuRA.

## Research 2 Real Life

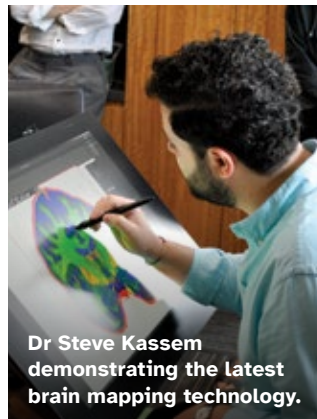
Last month, we held our inaugural *Research 2 Real Life* event for the year, when we invited supporters both new and existing to come and experience our cutting-edge research first hand – and the response was fantastic! Attendees had the opportunity to learn from some of the brightest minds in neuroscience, including our experts in mental health, falls and balance, brain mapping and older driver safety. These researchers brought their work to life through a morning of hands-on science and discovery, sharing science-backed tips on healthy ageing.

For those who had not previously visited NeuRA, they got to experience our purpose-built facility in Sydney’s Randwick Health and Innovation Precinct, and witness up close how we bring our research to life.

We thank everyone who came along for being a part of an immersive and exciting event that showcased our passionate researchers and breadth of research at NeuRA. ●



Dr Luke Egan introducing attendees to the neuroscience-backed COMPAS-W wellbeing and resilience project.



Dr Steve Kassem demonstrating the latest brain mapping technology.



Philanthropy Manager Susie O’Reilly welcoming guests to a day of learning and discovery.

## A gift for generations

Our scientists are making ground-breaking strides every day towards discovering new treatments for the most debilitating neurological diseases – and you can help. Leaving a gift in your Will, no matter the size, can create a legacy for generations, positively impacting the lives of those living with brain and nervous system disorders.



To discuss this important decision in confidence, please contact NeuRA Gifts in Wills Officer, Lauren Moore on 1300 888 019, 02 9399 1122 or email us at [bequests@neura.edu.au](mailto:bequests@neura.edu.au)



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