NeuRA
Discover. Conquer. Cure.

the NeuRA magazine

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New hope for Parkinson's disease

Former Deputy Premier of NSW, the Hon. John Watkins AM, tells his story of living with Parkinson's disease.

Message from our CEO

Professor Peter Schofield

Prof Peter Schofield

We have had an amazing year of discovery, with outstanding progress and breakthroughs in mental health, dementia and spinal cord research. As we approach the end of 2018, I would like to thank all of you for helping us make such progress that will help so many in our community.

In September, we announced a major breakthrough in schizophrenia research, led by Professor Cyndi Shannon Weickert. Cyndi identified the role the immune system may play in up to half of people living with schizophrenia. This finding opens the door to new targeted therapies.

This year Professor Kaarin Anstey, the Australian representative for dementia at the World Health Organisation, joined NeuRA bringing her research team from ANU. Together we launched a new Ageing Well for Life educational program based on lifestyle risk factors for dementia. I hope you have had the chance to request a free copy of our Ageing Well Toolkit aimed at helping people to reduce the risk of dementia.

Dr Sylvia Gustin led a major breakthrough in spinal cord research, finding nearly 50 per cent of people in wheelchairs have some remaining sensory perception between the brain and the toes. This has led to a new classification called 'dis-complete' and a call for further research to identify new rehabilitation processes that could help people regain a sense of touch.

Professor Caroline Rae has been developing new research protocols to aid the early detection of Parkinson's disease, which would identify people at risk 10-15 years in advance of symptom onset. This is still in development but with your generous support we can raise the funds to move this project forward in 2019. The brain is a complex but wonderful part of what makes us human, individual and connected.

I am so proud of all the achievements of our researchers over the past year, and look forward with great optimism to finding the cures to some of our generation's major challenges in brain disorders, in the coming years. I wish you all a very safe, and prosperous holiday season and again thank you for your generous support of NeuRA and our dedicated researchers.

Prof Peter R Schofield *FAHMS PhD DSc*
CEO

Cover photo: the Hon. John Watkins AM and Professor Caroline Rae

NeuRA Events

Ageing Well travels to Central Coast

Dr Bill Brooks at Ageing Well for Life seminar

Dr Bill Brooks led a research team of three speakers to the Central Coast to present NeuRA's Ageing Well for Life seminars at Mingara Recreational Club. The event was part of NeuRA's program launched in June to provide access to greater information around dementia risk factors and what we can all do to reduce our risk regardless of age. The seminar included NeuRA's latest research on lifestyle factors, diet, exercise, cognitive engagement known to reduce dementia risk, as well as tactics to reduce falls and injuries.

Bequest lunch steps up research action

Professor Peter Schofield with Mrs Betty Lynch OAM

Professor Peter Schofield, CEO of NeuRA, extended a warm welcome to attendees of NeuRA's annual bequest lunch held in the John and Betty Lynch seminar room. Key speaker Dr Daina Sturnieks demonstrated the Smart Steps program, designed to assist in balance training as we age. Stephanie Grove, Bequest Manager, shared some of NeuRA's new research projects on Parkinson's disease, Alzheimer's, and dementia.

New Ageing Institute launched


Professor Kaarin Anstey

NeuRA's Professor Kaarin Anstey will lead the Ageing Futures Institute, at adjoining precinct UNSW. Professor Anstey hopes the research will inspire communities and governments to view ageing positively and to adopt policies and technologies conducive to ageing well, as well as reducing the social, health and economic burdens of an ageing society.

"We will achieve this by taking a life course approach to ageing which views late life as the accumulation of advantage and disadvantage from birth to death... and we will generate transformative new ideas about ageing," she said. The new institute will draw on research as diverse as psychology, psychiatry, public health, economics, the built environment, human rights, economics and social policy and collaborate with existing bodies including UNSW's Centre for Healthy Brain Ageing, the Centre of Excellence in Population Ageing, NeuRA and the George Institute for Global Health.

Professor Lynne Bilston, elected Fellow of Australian Academy of Health and Medical Sciences

Professor Lynne Bilston has been elected as a Fellow of the Australian Academy of Health and Medical Sciences (AAHMS) at its recent annual meeting. Professor Bilston is a Senior Principal Research Scientist and leads the injury prevention group at NeuRA. Her work bridges the gap between biomechanical engineering and medicine, undertaking fundamental research in how soft tissues respond to mechanical loading and applying this across public health and clinical medicine. Professor Bilston said it was a privilege to be elected as a Fellow of the AAHMS.

"I am honoured to be elected as a Fellow of the AAHMS and be recognised for the important research being undertaken by myself and my team here at NeuRA. I look forward to working with the Academy to further this work and extend its reach in practice and in the public."

Professor Bilston joins previously elected Fellows from NeuRA including CEO Professor Peter Schofield, Deputy Director Professor Simon Gandevia, Professor Stephen Lord and Professor Rob Herbert.


Professor Lynne Bilston


The Hon. John Watkins AM

The Hon. John Watkins AM joins NeuRA Advisory Council

We are honoured to welcome the Hon. John Watkins AM to NeuRA as a champion of change for Parkinson's disease research. John has an extraordinary story which he has chosen to share with us about his own journey with Parkinson's disease. He hopes the early detection research work at NeuRA will assist those in the future to find new solutions that enable a better quality of life. As a former member of parliament and former Deputy Premier of New South Wales, John has always been generous with his time for community projects and causes. We are very grateful for his support and for sharing and motivating us all to work towards important discoveries and cures for future generations to come.

Professor Caroline Rae

Donate to NeuRA's Parkinson's research
foundation.neura.edu.au/appeal/parkinsons

Taking a different approach to Parkinson's research

Professor Caroline Rae

Professor Caroline Rae is working on an early detection program for Parkinson's disease to identify people most at risk. The program will also identify those in the early stages of the disease so that treatment can be introduced sooner.

An interview with Professor Rae expands on this important new approach in Parkinson's research.

Why are you taking a different approach to Parkinson's disease research?

The main reason is that by the time a person is diagnosed with Parkinson's they have unfortunately lost areas of their brain which they need in order to recover. We did an initial study looking at a particular area of the brain affected by Parkinson's disease called the *substantia nigra* and found that at the point they were diagnosed this part of the brain had deteriorated or died.

This is a critical area of the brain that produces a neurotransmitter called dopamine and is involved in motor control. It is eroded by this disease, and by the time a neurologist makes a diagnosis, it is too late to save this important functional part of the brain. That is why it is critical to take a different approach to identify the disease well in advance of its symptoms.

What is the substantia nigra and why is it important?

The *substantia nigra* forms part of the *nigrostriatal circuitry* which connects other parts of the brain associated with control of movement, and includes nerves that use dopamine as their major chemical communicator or neurotransmitter. Parkinson's disease targets these nerves in particular, so as they die off the brain's ability to control movement is reduced, producing the symptoms which are a hallmark of the disease.

How does Magnetic Resonance Imaging (MRI) technology provide new insights?

We use MRI technology to study brain structure and as MRI technology is evolving it is enabling us to measure brain structure on a much finer detailed level and in more difficult and deeper parts of the brain. The *substantia nigra* is right down at the bottom of the brain and is an area that has not been easy to image. It is also technically challenging to track the connections from the *substantia nigra* to other parts of the brain. We are one of the few groups here at NeuRA who are looking at *substantia nigra* connections in those at higher risk of developing Parkinson's.

We use a technique called High Angular Resolution Diffusion Imaging (HARDI) to actually look at the wiring between the *substantia nigra* and other parts of the brain that control movement. We have found that by the time people are diagnosed with Parkinson's disease they have largely already lost most, if not all, of the connections from the *substantia nigra* to the rest of the brain.

Why is it important to catch Parkinson's disease 10-15 years in advance?

We are studying a group of people whose *substantia nigra* has a feature that makes it give a larger than usual signal in response to a pulse of ultrasound delivered by placing an ultrasound probe over a particular place on the skull. It has been shown by a group in Germany that people with this feature are seventeen times more likely to go on to develop Parkinson's. In our initial MRI study of these people, we have found that they have already lost up to 60 per cent of the connections between the substantia nigra and the rest of the brain. A neurologist, doing normal clinical checks, will rate these people as healthy. However, if we put very sensitive accelerometers on the fingers of these people while they are doing small tasks with their hands, like lifting an object, we can find subtle signs of motor impairment.

Early detection

Our work is aimed at finding biomarkers for early detection of Parkinson's disease to robustly and reliably identify those people most at risk of developing the disease.

Early detection means that people can start treatment much earlier when there is still a good part of the *substantia nigra* and its connections left to remediate.

Watch The Hon. John Watkins AM tell his inspiring story

New cough clinical trials program

In Australia, there are 350 cases of traumatic spinal cord injury each year. More than half of these injuries will be to the cervical area of the spine leading to a condition called quadriplegia. While quadriplegia is commonly associated with paralysis of all four limbs, paralysis also affects the major respiratory muscles. This reduces cough strength, which can lead to associated respiratory infections and complications.

Dr Bonne Lee and Dr Euan McCaughey, together with Professors Gandevia and Butler and Drs Boswell-Ruys and Hudson, all from NeuRA, are leading the first global trial to investigate the effectiveness of electrical stimulation of the abdominal muscles to reduce respiratory complications in the first six weeks of quadriplegia.

Dr Anna Hudson with a research participant

The technique being studied, known as Abdominal Functional Electrical Stimulation (FES), has been pioneered at NeuRA, with our researchers showing that it can improve respiratory function in quadriplegia.

Definitive evidence of the effectiveness of Abdominal FES to reduce respiratory complications in quadriplegia will drive the rapid worldwide translation of this low cost and easily applied technology for this vulnerable patient group. This will lead to decreased morbidity and mortality, reduced rehabilitation time, improved quality of life and large cost savings for global health systems.

NeuRA launches eBook to support Mental Wellness at Work

NeuRA has a team of committed scientists who study the anatomy and functionality of the brain. The brain is the greatest unknown, understudied and complex part of what makes us think, act and operate on every level.

Our new Heads at Work eBook takes you through a range of research areas being explored by our neuroscientists and the discoveries they have made that can help you understand and maintain mental wellness at work.

This eBook sets out the positive actions we can all take to support the health of our brain, and in doing so, improve our mental wellness in both our personal lives and at work.

The eBook looks at key factors like sleep, stress and chronic low back pain that can contribute to mental distress, depression, anxiety and low energy levels at work. It also looks at new research on the immune-to-brain relationship and whether resilience can be developed to inoculate people against stress.

Download your free eBook today at NeuRAtalks.org

Better labelling on child car restraints could increase correct use by 27%

A recent study by Associate Professor Julie Brown has revealed research statistics that show improved design of child restraint instructional materials could increase correct use by up to 27 per cent, saving lives and preventing injuries.

"Research undertaken at NeuRA identified a critical relationship between comprehension of instructional materials and errors in use," said Associate Professor Brown. In a survey of 400 Australian parents, 90 per cent reported that they had read the instructions supplied with the restraints, yet high rates of incorrect use continue.

"This suggested instructional materials in their current form may not be effective in communicating how to use restraints correctly, and that we may need to take a new approach to how instructional materials are regulated in product standards," said Associate Professor Brown.

As part of the study, researchers at NeuRA looked at the range of instructional materials provided by manufacturers of restraints. Following their review, Associate Professor Brown worked in collaboration with parents and users to develop a new set of prototype instructional materials for using child car restraints.

Using the new consumer-driven instructional materials 27 per cent more people attained correct use, and comprehension was 42 per cent higher. Injury is the leading cause of death and hospitalisation in Australia of children aged over one year. Associate Professor Brown and her team at NeuRA are now taking this study from the lab to the real world to make child restraints in cars safer and more effective.

Video Story Online
neura.edu.au/magazine/neura-magazine-27

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A message from the NeuRA Foundation: The NeuRA Foundation may co-operate with other like-minded reputable Australian charities to promote our work to our respective donors. If you'd prefer that NeuRA does not share your information with other charities, please phone us on **1300 888 019**, email us at **foundation@neura.edu.au** or write to us using the enclosed envelope.

Thank you for generously supporting our research into diseases of the brain and nervous system.

Neuroscience Research Australia Foundation, PO Box 1165, Randwick NSW 2031 ABN 57 008 429 961

Neuroscientist discovers hidden region of the human brain

Scientia Professor George Paxinos AO

World-renowned cartographer of the brain, Scientia Professor George Paxinos AO, from NeuRA has announced the discovery of an unknown region of the human brain. This new region is found near the brain-spinal cord junction. Professor George Paxinos has named it the *Endorestiform Nucleus*.

Professor Paxinos is the author of the most cited publication in neuroscience and another 52 books of highly detailed maps of the brain. The maps chart the course for neurosurgery and neuroscience research, enabling exploration, discovery and the development of treatments for diseases of the brain.

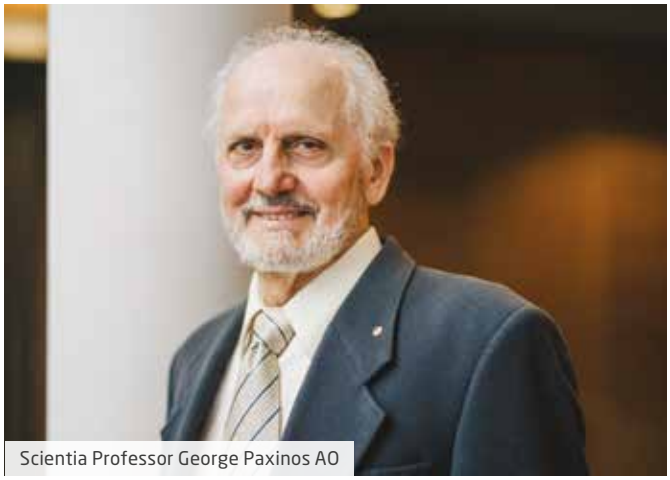
Professor Paxinos suspected the existence of the *Endorestiform Nucleus* 30 years ago and now with better staining and imaging techniques he is able to prove it.

Commenting on this discovery, Professor Paxinos says it can be likened to finding a new star.

"There is nothing more pleasant for a neuroscientist than identifying a hitherto unknown area of the human brain. In this case there is also the intrigue that this area is absent in monkeys and other animals," said Professor Paxinos, adding, "there have to be some things that are unique about the human brain besides its larger size, and this may be one of them."

The discovery of new brain regions helps researchers to explore cures for diseases including Alzheimer's, Parkinson's disease and motor neuron disease.

The *Endorestiform Nucleus* was noticed when Professor Paxinos introduced the use of chemical stains, combined with imaging techniques, in the production of his latest atlas.



Scientia Professor George Paxinos AO

The *Endorestiform Nucleus* is located within the inferior cerebellar peduncle, an area that integrates sensory and motor information to refine our posture, balance and fine movements.

An increasingly detailed understanding of the architecture and connectivity of the central nervous system has been central to most major discoveries in neuroscience in the last 100 years.

"Professor Paxinos' atlases showing detailed morphology and connections of the human brain and spinal cord, provide a critical framework for researchers to test hypotheses from synaptic function to treatments for diseases of the brain," said Professor Peter Schofield, CEO at NeuRA.

Video Story Online
neura.edu.au/magazine/neura-magazine-27

Thank you for your support

If you wish to update your preferred communications from NeuRA, please call 1300 888 019.

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