

Issue 39 | Autumn 2022

NeuRA magazine

How do you treat pain in a limb that's no longer there?

OUR PAIN RESEARCHERS TACKLE THIS DEBILITATING PROBLEM

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Message from our **Professor Peter** Schofield AO



Prof Peter Schofield AO

"The human brain is remarkable – it can store more information than all the libraries in the world, and its workings are capable of creating symphonies, vaccines and bombs. It is little wonder therefore, that

discovering more about it, and how to prevent it from breaking down is regarded as one of the greatest challenges facing humankind."

These words from our Institute's founding Director, Ian McCloskey, in the first edition of NeuRA Mag's predecessor newsletter BrainWorks, remain as true now as they were then. We've come far on this mission and our researchers, whether at NeuRA or the Prince of Wales Medical Research Institute as we were previously known, have had incredible impact over the past 30 years.

In this edition we profile one of our four founding scientists, and current NeuRA Deputy Director, Professor Simon Gandevia, and recognise 10 years of clinical impact from Professors Jacqui Close and Ian Harris leading the Australian and New Zealand Hip Fracture Registry.

We look at an upcoming trial from our Centre for Pain IMPACT tackling the debilitating issue of phantom limb pain for amputees. And share an update on our MRI Imaging and motor impairment groups' painstaking tracking of muscle growth in children with cerebral palsy.

Last but not least, I am delighted to welcome our new Foundation Chair Colin Tate AM, and extend my sincere thanks to our outgoing Foundation Chair Norbert Schweizer OAM who has been appointed as an Honorary Life Governor.

I hope you enjoy this edition. Thank you for your ongoing support.

Prof Peter R Schofield AO FAHMS PhD DSc CEO



Carole's Column

I am very proud and pleased to launch NeuRA's 30th Anniversary year (2022). Our tagline is 'celebrating 30 years of impact', and throughout the year we'll be sharing with you our research gamechangers - the initiatives and the people which have made the greatest difference to those affected by brain and nervous system disorders.

We'll also be sharing our vision for the future. Absolutely critical to that is our ability to train and develop the next generation of neuroscientists. 30th anniversaries are associated with the pearl, and we are therefore referring to our PhD students as our Pearls: they will be the ones to solve some of our greatest health challenges such as dementia and mental health.

It is no small endeavour undertaking a PhD. To secure the gualification, students must make a novel and unique contribution to their field of research and this involves up to four years of hard labour planning and conducting experiments, collating and analysing data, and writing up their thesis. During this time, a PhD student will typically need to live on a Government scholarship of \$28,000+. At NeuRA, we provide them with an annual top-up package to assist with living expenses, purchase of a laptop, travel to conferences, and some of their research costs.

This 30th Anniversary year, we are looking for far-sighted and generous individuals, families and businesses who may wish to support a named PhD scholar at \$15,000 per annum for four years. If you would be interested to find out more, please contact me at c.renouf@neura.edu.au or on 0410 611 446. Thank you.

Carole Renouf Executive Director of the NeuRA Foundation

Magic MUGgLEs shining light on muscle contracture in cerebral palsy





In the world of Harry Potter, Muggles didn't have any magical abilities or any magical relatives. But at NeuRA, MUGgLEs have very special powers - to help researchers in Australia, and potentially all over the world, understand more about how muscles grow and develop in children with cerebral palsy.

Cerebral palsy (CP) is the most common cause of disability in children. More than 34,000 Australians have the condition, which is caused by abnormal brain development or damage to part of the brain that controls muscles. It's a lifelong condition, with no known cure.

One of its key markers is muscle contracture - shortening of a muscle-tendon unit that impairs movement and causes joint deformities. However, little is known about the specifics of what happens to the muscles in children with CP.

Which is where NeuRA's Professors Rob Herbert and Caroline Rae and Dr Bart Bolsterlee come in - combining state-of-the-art Diffusion Tensor Imaging technology with world-leading expertise in the mechanisms of motor impairment. Through their MUGgLE study - with UNSW and the Cerebral Palsy Alliance - researchers are investigating how muscles grow in both typically developing children and children with cerebral palsy.

The team is aiming to scan the lower legs of 320 children aged five to 14 years and infants aged zero to three months. So far, they are well on the way there, with over 250 scans done using cutting-edge MRI sequences.

The data obtained from these scans will enable local and international researchers to

"I wanted to learn more about my muscles and to help other people that are living with cerebral palsy and gain a better understanding for the future."

> – Trae, 12-year-old MUGgLE trial participant

access a ready-made database tracking the growth and development of muscles over time – a vital foundation on which they can build further investigations and research. In other words, a pretty magical resource to be gained from "sitting inside a squishy tube and watching tv" as 10-year-old participant Jack tells us!

We're currently looking for more children (5-14 years) with cerebral palsy to take part in this study. Participation involves visiting NeuRA for 1-2 hours and having an MRI of the leg. MRI scans are painless, harmless, don't use radiation and don't cause discomfort. **Interested in learning more?**

Visit: https://muggle.neura.edu.au

How do you treat pain in a limb that's no longer there?

AN OLYMPIC EFFORT TO SOLVE A DEBILITATING PROBLEM

When it comes to having a limb amputated, most people think loss of mobility would be the hardest thing to deal with. But for many who have had either a traumatic or surgical limb amputation, phantom limb pain is consistently rated as their most difficult, distressing and debilitating problem.

Around 75-90% of people with limb amputation report pain in their missing limb, and more than 60% of people with phantom limb pain continue to experience pain several decades after their amputation.

So, what is phantom limb pain and why does it occur? Professor James McAuley, Co-Director of NeuRA's Centre for Pain IMPACT, and Chief Investigator of the new TITAN trial, says a person has a 'phantom limb' when they continue to perceive sensations in a limb even when the body part is no longer there. Not only can they "feel" the limb in certain positions, they can also experience significant pain.

"While we are still in the early stages of understanding why this occurs, what we do know is the profoundly negative effect it can have on overall quality of life – causing emotional distress and impacting psychosocial functioning, people's ability to work and their basic needs such as sleep."

In terms of current treatments, the latest comprehensive review from independent, global network Cochrane was published in 2020. It concluded that even powerful analgesic medicines (antidepressants, antiepileptics and opioids) are no better than placebo at producing pain relief. Many also come with risk of negative side effects - from toxicity and kidney failure, to addiction and abuse. And current conventional, non-drug interventions that aim to improve function (like standard physiotherapy) produce only small, temporary effects.

To solve this problem, the TITAN teletrial will build on the team's rigorous work developing and pilot testing a new eight-week, non-drug treatment program.

The randomised, controlled doubleblind trial will see 170 individuals with phantom limb pain receive either real or placebo therapy. It will be delivered by clinicians via telehealth, both expanding the reach of the trial (and, if successful, delivery of treatment) and safeguarding against COVID-19 disruptions.

"Fundamental to our approach is a vast body of research that implicates dysfunction in brain processes in phantom limb pain, leading to the prevailing theory that phantom limb pain is a highly complex neuropathic pain disorder."

- Prof James McAuley

"While we are still in the early stages of understanding why this occurs, what we do know is the profoundly negative effect it can have on overall quality of life – causing emotional distress and impacting psychosocial functioning, people's ability to work and their basic needs such as sleep."

Importantly, as part of this trial, Associate Professor Sylvia Gustin, Co-Director of the Centre for Pain IMPACT, will also utilise pioneering techniques to establish how these interventions work.

This analysis will determine whether neurochemical and functional changes within the sensorimotor cortex, induced by the trial intervention, mediate a reduction in phantom limb pain.

Ultimately, this vital work will put to the test whether this promising intervention has the power to reduce pain intensity and lead to improvements in quality of life for people experiencing this debilitating problem. It will also shed new light on the precise processes in the brain that underlie intervention effects. This could provide the critical data needed to apply these interventions to other rare chronic pain problems.

For more information on NeuRA's Pain research visit https://www.neura.edu.au/ research-centre/impact-painresearch



Pain science meets metaverse: Ensuring communication and scientific connections continued through COVID-19

Before COVID-19, international scientific conferences were a significant annual event – with scientists flying in from all over the world to share new knowledge and their latest findings and insights.

Fast forward to November 2021, and it was Australia's turn to host the Back & Neck Pain Forum. With borders firmly shut and many communities still in lockdown, the only option was virtual.

To combat serious levels of Zoom-fatigue after almost two full years of online meetings, our Centre for Pain IMPACT team came up with something a little different. A virtual reality campus, where people could feel like they were being transported somewhere else from the comfort and safety of their own (home) office.

Each delegate could design their own avatar, attend each talk as if they were actually in the same auditorium, view and present posters as if they were doing so in person, and network in new and entertaining ways.

The conference ran across three timezones simultaneously and brought together 500 delegates from 36 countries.

But most importantly, it meant vital communication and collaboration could continue amongst the world's leading Pain scientists, researchers and clinicians and it meant Professor McAuley and his team could share their novel treatments for low back pain with a larger cohort than the conference had ever had before.

PROFILE: Professor Simon Gandevia

"Neuroscience – as we practice it at NeuRA – has grown well beyond what we could have predicted when we started." PROFESSOR SIMON GANDEVIA



Professor Simon Gandevia with a patient.

Just over 30 years ago four scientists sat around a kitchen table and decided it was time to stop talking and start taking action.

The two clinicians and two physiologists had come to the conclusion that something needed to be done about the mismatch between clinical practice in hospitals and what academics were researching in universities. They decided then and there that together they were as well placed as any to bridge the gap. And with that, the Prince of Wales Medical Research Institute, now NeuRA, was born.

Since he sat at that table, it's safe to say NeuRA's Deputy Director, Professor Gandevia, has achieved a lot.

He's contributed extensively to the fields of motor impairment and human sensorimotor and respiratory clinical neurophysiology. He is the only person to have published more than a hundred

papers in the Journal of Physiology, the world's leading physiology journal. And he has achieved the rare feat of writing a review in Physiological Reviews on human muscle fatigue that has been cited more than 3,000 times.

He was elected a Fellow of the Australian Academy of Science in 1998 and the Australian Academy of Health and Medical Sciences in 2016. He recently headed an NHMRC program in Motor Impairment, and is the Chair of NeuRA's Reproducibility and Quality Sub-Committee.

Despite these many achievements, it's clear when speaking to Simon Gandevia, that what he's most proud of over the past 30 years are his collaborations with other NeuRA researchers and the findings they've made together. Landmark respiratory work with Professors Jane Butler and Lynne Bilston, assessing control and movement of the human tongue. More than 15 years investigating fundamental physiological

mechanisms and mechanisms of motor impairment with Professors Janet Taylor, Rob Herbert and Stephen Lord. And with Professor Jane Butler, Dr Euan McCaughey, and now the broader Spinal Cord Injury Research Centre team, on a non-invasive neurostimulation technique that could help people with spinal cord injuries regain lost function, or even walk again - which is the culmination of decades of collective research.



Planning Meeting 1990: Simon Gandevia, lan McCloskey, Erica Potter and David Burke.

Throughout all this, he has never stopped seeing patients.

"Being able to work with patients is a privilege I'm very grateful for. It allows me to see where the research has led up to, but where it's still deficient in a real clinical setting. It lets me tackle things from the perspective of, for example, 'we need to know more about how we actually breathe' to 'here's a person in intensive care, they can't breathe, what can we do to help them?'. There's an interaction between those two things and I've always tried to sit in that place where they overlap as a strategy throughout my career."

FUN FACT:

Professor Gandevia played a key role in POWMRI acquiring an MRI machine for research in 2002 which became the foundation of NeuRA Imaging.

"An MRI machine is something we didn't know about when we started in 1991. But the technology has evolved and developed. We can now use it to see way more than we ever thought possible.

I wasn't an MRI-ologist -I just knew we had to have it - so seeing the expansion that's happened since then has been really terrific."

So, what excites him most about the 30 years ahead? "The interaction between genes and the cellular environment and then, more broadly, the whole person's environment to see how function - real physiological function - can be altered and what drives it."

This interaction - between genes and the environment - has been a simple thing to say for decades but we now know a lot more about how this really works, and which of those things may even be transmitted to our children, or which of those environmental things may influence our children - and even our children's children."

It is that opportunity to transform the health future that has been the hallmark of NeuRA's research in past years, and will remain so in the years to come. •

CLINICAL IMPACT: 10 years of the Australian and New Zealand Hip Fracture Registry



Hip fracture is a common and life-changing injury sustained by older people, whose bones are weaker and prone to breaking from a fall. There are approximately 22,000 new hip fractures in Australia and 4,000 in New Zealand each year, with one in four adults over the age of 50 dying within the first 12 months of suffering this kind of fracture.

This year, 2022, marks 10 years since NeuRA researchers Professors Jacqueline Close and lan Harris led the development of the Australian and New Zealand Hip Fracture Registry (ANZHFR) - a clinical registry that collects data on the care provided to older people who have been admitted to hospital with a fracture, as well as the outcomes of this care.

Data is provided to participating hospitals in real time using a clinical dashboard, and summarised each year in an annual report. Teams then use the data to identify gaps in care, drive quality improvement activity and report performance against the national standards. All public hospitals in Australia and New Zealand that operate on hip fracture patients contribute data.

The development of the ANZHFR led to the publication of the Hip Fracture Care Clinical Care Standard by the Australian Commission on Safety and Quality in Health Care in collaboration with the Health Quality and Safety Commission New Zealand.

It has resulted in hospitals seeing improvements in management of pain, time to surgery, assessment by a geriatrician and early mobilisation. And it has improved outcomes for people who fracture their hip in both countries. •

You can learn more about the work of our Falls, Balance and Injury Centre at: https://www.neura.edu.au/ research-centre/falls-balance-injury

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Thank you for generously supporting our research into diseases

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NeuRAtalks: Virtual close encounters with our leading researchers



Have you had the chance to join us for NeuRAtalks? Now's the perfect time to start!

On 11 May 2022, you're invited to our next discussion on **Resilience**, Wellbeing and Mental Health. Register today at: https://talks.neura.edu.au/register

You can also access previous talks on our YouTube channel and view them at your leisure:

- Meet our future leaders: Hayley Leake, Kerith-Rae Dias and Dr Steve Kassem
- Schizophrenia: Where are we now?
- **Staying mobile:** Managing Falls and Pain
- Maintaining your brain health: Dementia Webinar

youtube.com/c/NeuraEduAu/videos

Thanks for your continued support

Thank you so much to all of you who supported our last three fundraising appeals and gave by email, online or over the phone.

Our spring appeal raised **\$52,194.40** to further our neurostimulation studies to help people with spinal cord injury regain or improve functions such as walking.

Our Christmas appeal raised **\$110,258.14** to help people with chronic pain retrain their brains to reduce pain.

And our summer appeal raised **\$22,120.00** towards the development of better therapies for people with schizophrenia.

We are very grateful for your generosity, and look forward to keeping you informed of progress through this magazine. •