

the NeuRA

magazine

Issue 26 | Spring 2018

Schizophrenia Breakthrough Discovered at NeuRA

New research findings
show immune cells
may play a role
in schizophrenia.

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- Critical Hip Fracture report highlights osteoporosis care gap
 - The Hon. Tanya Davies, MP congratulates NeuRA
 - Breakthrough in cleft lip and palate research for babies
 - Mental wellbeing at work: NeuRA launches free eBook



Message from our CEO

Professor Peter Schofield



Prof Peter Schofield

Mental Health Month this October allows us to focus and communicate important messages about the critical research, major projects, and significant breakthroughs NeuRA is achieving in bipolar disorder, schizophrenia, depression and anxiety, thanks to your continued

support. In September, we announced a major breakthrough in schizophrenia research, thanks to the tireless work of Professor Cyndi Shannon Weickert, who has dedicated her life's mission to finding a cure for schizophrenia following the diagnosis and loss of her twin brother.

In one of the biggest breakthroughs in schizophrenia research in recent times, NeuRA is proud to announce that Professor Shannon Weickert has identified immune cells in greater amounts in the brains of some people with schizophrenia. The study, published in *Molecular Psychiatry*, has the potential to transform global schizophrenia research and open new avenues for developing targeted immune cell therapies. To recognise the significance of this discovery you first need to understand most scientists have had a long-held belief that immune cells were independent from the brain pathology in psychotic illnesses. In her study, Professor Shannon Weickert challenged this assumption and made an exciting discovery, identifying immune cells as a new player in the brain pathology of schizophrenia.

This breakthrough shows that the NSW Government's support of Professor Shannon Weickert, as the NSW Chair of Schizophrenia Research, has delivered critical insights, and an innovative new research pathway that has the ability to alter the way in which we may be able to diagnose and treat schizophrenia. We hope that this critical discovery opens whole new avenues for therapy, because it suggests that the pathology of schizophrenia could be within the immune cells.

Schizophrenia costs the Australian community around \$2.6 billion annually in direct costs and loss of productivity, in addition to the heavy emotional burden and distress for families.

Thanks to the work of Professor Cyndi Shannon Weickert and her team, and the support of the NSW Government, the opportunities to make a difference in this area of mental health research are dramatically improving.

I hope we can continue to share our insights and work towards discoveries and cures in mental health for the community.

A handwritten signature in black ink, reading 'P. Schofield'.

Prof Peter R Schofield *FAHMS PhD DSc*
CEO

NeuRA Events

The Hon. Tanya Davies, MP Congratulates NeuRA

Professor Cyndi Shannon Weickert met with The Hon. Tanya Davies, MP at her Sydney office to brief the minister on her new research breakthrough in schizophrenia. Minister Davies congratulated Prof Shannon Weickert on her dedication to her research which could open new avenues of hope for those living with schizophrenia around the world.



NeuRA Scientists Visit the Southern Highlands

How to reduce your risk of dementia was the opening topic at the NeuRA **Ageing Well for Life** seminar in the Southern Highlands. The event attracted over 350 attendees at the Mittagong RSL. Speakers covered important topics including lifestyle, exercise and cognitive health programs to reduce risks of dementia.

85 Supporters Run for NeuRA

Thank you to the 85 passionate NeuRA supporters who ran 14km from Hyde Park to Bondi Beach in Sydney's famous City2Surf.



Running in distinctive red and white singlets, every step raised vital research funds for NeuRA. They ran in memory of a loved one, or for those who couldn't, or just to support friends and families living with a disease or disorder of the brain or nervous system.

Can Humans Live to 150?

The international *Living to 100 Conference* was recently held in Sydney hosted by the Centre for Healthy Brain



Ageing (CHeBA), UNSW Sydney. The conference brought together leaders in the field of ageing from around the globe to debate and unravel the secrets of successful ageing. The internationally acclaimed line up of speakers included NeuRA's CEO Professor Peter Schofield, NeuRA Senior Research Scientist, Dr Karen Mather and NeuRA Senior Research Facility Manager, Dr Claire Shepherd. Over the two-day conference experts deliberated on the latest research on exceptionally long-lived individuals, in particular centenarians and supercentenarians.

But a hotly debated question at the conference was, *Can humans live to 150?* While some experts were pessimistic, Professor Peter Schofield, who has been studying the brain for decades is more optimistic.

"The things that may make it possible to conceive that humans will live to 150 are probably going to have to be quite innovative - they are probably going to need things like potential genetic therapies, drug therapies," Professor Schofield told SBS News.



Watch the SBS News video:
sbs.com.au/news/is-it-possible-to-live-to-150

Innovative Study Investigates Ladder Fall Risk

Every year, over 4,000 Australians are hospitalised following a fall from a ladder with men aged 60-64 being the most susceptible. The Falls, Balance and Injury research centre at NeuRA is conducting an innovative study to understand falls risk while using ladders and creating strategies to prevent serious injury.

"A fall from a ladder can change your life forever, especially when you are in your retirement phase and have a bucket list of activities to explore with your extra time," said Senior Principal Research Scientist Professor Stephen Lord.



Professor Stephen Lord

"Falls from a ladder can cause serious injuries to your chest, head and legs leading to disabilities and in some instances death."

The ladder study asks participants to replicate how they use a ladder to complete everyday household tasks such as changing a light bulb or cleaning gutters. A series of tasks are set up in the Falls Balance and Injury Lab to replicate real life and to measure the participant's aptitude for a range of tasks around the home.

The results are expected to confirm that the gap between perceived ability and actual physical ability widens as we age, making climbing ladders more dangerous in our senior years. The study will also highlight how simple distractions like naming animals and overstretching can throw people off balance. Following this study, NeuRA will produce guidelines for safe ladder use targeted to seniors.



Watch the Channel 7 video:
neura.edu.au/news/4000-australian-seniors-hospitalised-each-year-from-ladder-falls

NeuRA Presents in Dublin on Cerebral Palsy

The 8th World Congress of Biomechanics took place recently in Dublin, Ireland. Group leader Professor Rob Herbert, Dr Bart Bolsterlee and PhD candidate Arkiev D'Souza attended the conference to facilitate discussion on muscle mechanics and seek opportunities for future global collaboration. Arkiev D'Souza presented his work investigating muscle architecture and intramuscular fat in children with cerebral palsy which was well received. Dr Bart Bolsterlee showcased his work investigating the reliability of muscle architecture reconstructions in the muscles of the forearm. He also presented his latest publication on the muscle architecture measurements in the calf. These findings have various contributions to the field of biomechanics and will continue to drive NeuRA's global role in this important field of biomechanics for people of all ages.



Professor Rob Herbert



Prof Cyndi Shannon Weickert
and Helen Cai



Video Story Online

neura.edu.au/magazine/neura-magazine-26

Schizophrenia Breakthrough

Professor Cyndi Shannon Weickert

Professor Cyndi Shannon Weickert has been on a quest to determine the causes of schizophrenia for over 30 years. She has made a series of breakthrough discoveries that will have a global impact in the way we conceptualise the biological basis of this major mental illness.

Importantly, her recent work is poised to transform the treatment of those with schizophrenia. Her latest discovery has identified immune cells from the blood found at increased levels in the brains of a substantial subset of those with schizophrenia. These cells were not known to be in proximity to neurons and the identification of these culprit cells suggest they may play a role in disease development or decline associated with schizophrenia that was never previously considered.

The discovery will transform global schizophrenia research and open new avenues for developing targeted therapies.

Professor Shannon Weickert says researchers have long thought there were three main cellular types that could contribute to the mystery of what caused schizophrenia with the primary pathology residing in the neuron, the glia, or even the endothelial cells. Her research at NeuRA has identified a fourth player - the macrophage, a type of white blood cell, which was seen in the brain tissue of people with schizophrenia who had high levels of inflammation.

"What we believe is the glial cells are 'angry' and are emitting distress signals and changing the surface of the endothelial cells so that these can catch and reel in monocytes,

a type of white blood cell, from the bloodstream and into the brain tissue," says Professor Shannon Weickert.

These monocytes then transform into macrophages once inside the human brain. The macrophage, which means 'big eaters' in Greek, can be thought to be good as these cells digest cellular debris and microbes. However, these cells have a dark side as they can destroy healthy tissue when they go rogue.

"Through the microscope I saw massive amounts of these clusters of small brown-coloured cells packed along the blood vessels in the brain tissue, close to the neurons," Professor Shannon Weickert says.

"Before we thought it was primarily the cells that resided in the brain that were causing schizophrenia and for over

a century people have been focusing on neurons and glial cells, but we're the first to show these immune cells are in the brain, in proximity to the neurons and positioned to do damage."

The presence of immune cells in the brain tissue can produce inflammatory factors to further drive the neuronal damage in schizophrenia. Immune cells would only enter the brain to conduct immune surveillance, then may die out or re-enter the bloodstream. In schizophrenia, they may over-react and cause collateral damage.

Professor Shannon Weickert said these findings suggest schizophrenia researchers should be working with immunologists to develop treatments which target the immune system.

One in every 100 Australians lives with schizophrenia. No single cause for schizophrenia has been identified, and this has prevented the development of a cure. The current treatments for schizophrenia are designed to suppress these symptoms and do not target the cause of the disorder. These drugs only partially relieve symptoms and can produce unwanted side-effects.

"This opens whole new avenues for therapy. We may be able to find a way to block entry of these immune cells into the brain to see if that's going to seriously thwart symptoms and improve brain function for people with schizophrenia," says Professor Shannon Weickert.

The inflammation observed in 40 per cent of the study sample, indicates future therapies could benefit a large portion of the schizophrenia community.

NEW FINDING: SCHIZOPHRENIA RESEARCH

BIG INSIGHT

Scientists have found immune cells on the brain side of the endothelial wall in greater amounts in people with schizophrenia with inflammation.

Long-held belief

Most scientists have long-held a belief that red, white and immune blood cells are independent from the brain pathology in psychotic illnesses.

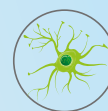
3 key original suspects



Endothelial cells



Glial cells



Neurons

Transmigration occurs

The endothelial cells extend sticky tentacles, capturing immune cells travelling by to help immune cells transmute across the blood brain barrier allowing entry into the brain.

Distress signals

In some people with schizophrenia, the glial cells, can become inflamed and produce distress signals which change the status of the endothelial cells.

New suspect
Immune cell

New finding

Some people with schizophrenia have increased immune cells on the brain side.

BLOOD

BRAIN

Novel Treatment for Inflammation Induced Depression

Dr Adam Walker recently joined NeuRA as a Research Fellow and Senior Lecturer at the UNSW School of Psychiatry to lead key projects investigating the effects of neuro inflammation on neuropsychiatric disorders.



Dr Adam Walker

Dr Walker's research programs will revolve around the idea that the immune system and the brain talk to each other and are both highly involved in regulating how the other functions.

He will look at how inflammation in the brain can lead to the onset of a range of psychiatric symptoms including depression and anxiety related behaviours, and poor cognition which can potentially push an individual into developing a chronic psychiatric illness.

One of his key projects will look at identifying novel treatments for inflammation induced depression.

"Current treatments for depression are ineffective for some people," says Dr Walker.

"We know that in numerous studies, anti-inflammatories are playing a role to reduce symptoms of depression in patients.

"We're looking at ways to target the blood-brain barrier and develop a novel antidepressant."

In a research partnership with Professor Cyndi Shannon Weickert at NeuRA, Dr Walker will investigate the cause of the neuro inflammation in some people with schizophrenia.

"Clearly the brain and the immune system are talking to each other in this case, but the cause is unknown. This is an interesting opportunity to look at how the brain and the immune system communicate with each other and to hopefully help some people through our research," says Dr Walker.

To find out more about Dr Walker's research projects including depression and mood changes associated with cancer, please visit his research page at www.neura.edu.au/staff/dr-adam-walker



Video story online
neura.edu.au/magazine/neura-magazine-26

Breakthrough in Cleft Lip and Palate Research

New genes identified in a significant proportion of affected people

An international research collaboration between Australia and the USA, led by Associate Professor Roscioli at NeuRA has identified new genes that cause cleft lip and palate. The genes, associated for the first time with cleft lip and palate, encode proteins that work together in a network, providing important insights into the biological basis of one of the most common physical malformations.

Representing about 70 per cent of cleft lip and palate cases worldwide, non-syndromic cleft lip and palate typically occurs in isolation without other physical abnormalities. This craniofacial malformation has long been considered to be caused by a combination of many common genetic variants and environmental factors, each contributing a small amount to the risk of a child being born with a cleft.

Using next generation sequencing, the research team identified variants in four new genes, each representing a primary cause of non-syndromic cleft lip and palate. Variants in these genes were found to account for 15 per cent of the families who took part in the study and in nearly three per cent of a second, larger group of smaller families and isolated cases.

Published in the *American Journal of Human Genetics*, the study provides the first evidence that a significant



Associate Professor Tony Roscioli

number of non-syndromic clefts have a single gene basis and not a complex basis as previously thought.

Associate Prof Tony Roscioli said cleft lip/palate is one of the most common human malformations, occurring in one in 800 children.

“That equates to about 250 Australian children each year **and one affected child born every three minutes worldwide**,” said Associate Prof Roscioli.

“Knowing the genes and the way these impact lip and palate formation opens the door for further research to understand how these genes work and to develop treatments.”

Cleft lip and cleft palates are repaired with corrective surgery. Future research will investigate the biology and link the findings to potential therapies. These discoveries will allow geneticists to provide more accurate information to families.

Associate Professor Tony Roscioli is a specialist in clinical genetics at the Sydney Children’s Hospital and leads the Sydney Partnership for Health Education Research and Enterprise (SPHERE) GenomeConnect clinical academic stream. At NeuRA he leads the Centre for Research Excellence in Neurocognitive Disorders where he endeavours to transform the diagnosis and management of intellectual disability through genomics.

NEW GENES IDENTIFIED For cleft lip and palate

One in 800
children are born
each year with a
cleft lip or cleft palate

This is over
162,500
children globally

New research
has identified
four genes

15%
of families in
the study had
**variants in one
of the four genes**



New Report Reveals Osteoporosis Care Gap

Professor Jacqueline Close, Geriatrician and Co-Chair of the Australian and New Zealand Hip Fracture Registry (ANZHFR) based at NeuRA with Orthopaedic surgeon Professor Ian Harris, recently released findings from the 2018 Hip fracture Registry that showed Australia is still significantly behind other countries in closing the osteoporosis care gap.

Data from the report produced by the Australian and New Zealand Hip Fracture Registry, based at NeuRA, shows only 25 per cent of hip fracture patients leave hospital on active treatment for osteoporosis and only 24 per cent of hospitals provide individualised written information on prevention of future falls and fractures.

"There are huge opportunities to further improve hip fracture care including the prevention of future falls and fractures. Strong evidence exists to support treatment of osteoporosis in this population yet all too frequently we fail to offer treatments which can impact on people's lives," said Professor Close.

Professor Harris said hospitals are now sharing their waiting times from arrival to surgery, helping to generate a more transparent snapshot of performance against a national standard.

"Currently the most common delay for people waiting more than 48 hours for surgery is access to operating theatre time. This is something we must address," said Professor Harris.

Professor Harris, Orthopaedic Surgeon and Co-Chair of the ANZHFR, said data is a powerful driver of change in the health system. "The Registry is run by clinicians for clinicians and provides hospitals with real-time performance data, allowing them to see how they perform against other hospitals."

Although the incidence of minimal trauma hip fracture has decreased over time, the actual number of hip fractures continues to increase due to the rising number of older adults. Current projections suggest that by 2022 there will be more than 30,000 hip fractures each year with a projected cost of \$1.126 billion. Minimal trauma fractures are relatively common in people aged 50 and over.

It is estimated that, for Australians in this age group, one in four men and two in five women will experience a minimal trauma fracture. A hip fracture is one of the most serious types of minimal trauma fracture. In 2015-16, approximately 22,000 people aged 50 and over were hospitalised for a minimal trauma hip fracture with the need for hospitalisation highest for those aged over 85. Women were one and a half times more likely than men to be admitted to hospital with a hip fracture.



Video story online

neura.edu.au/magazine/neura-magazine-26

PATIENT LEVEL REPORT

53%

had a documented pain assessment within 30 min of arriving at ED



9,408
RECORDS



8%

were on active treatment for osteoporosis on admission

56
ANZ
HOSPITALS



25%

of patients were on active treatment for osteoporosis on discharge

30 hours is the time to surgery unless a person is transferred and then it is 54 hours



32%



had a preoperative assessment of cognition

78%

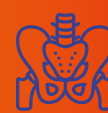
had a nerve block to manage pain before and/or after surgery



FACILITY LEVEL DATA

40%

of hospitals had access to planned operating lists for hip fracture patients



118
HOSPITALS



56%

of hospitals reported having a pain protocol for hip fracture patients

24%

of hospitals routinely provided written information on prevention of future falls and fractures





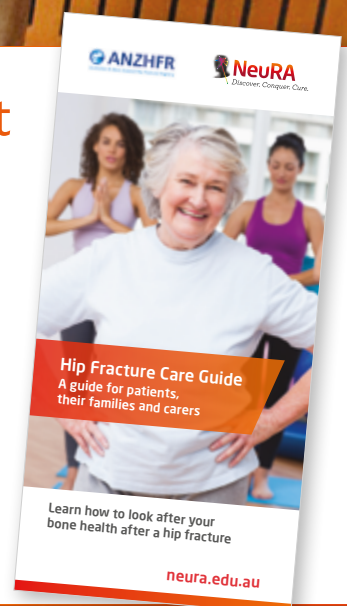
NeuRA Hip Fracture Care Guide Booklet

This booklet has been put together to help shine a light on important steps for your hip fracture care and recovery as well as osteoporosis planning, while providing your family with a framework to support your care in the coming months and years ahead.

Topics covered in the Hip Fracture Care Guide include:

1. What is a hip fracture?
2. What is the treatment for a hip fracture?
3. How to look after your hip after a fall and fracture
4. How to look after your bone health in the future
5. How can you prevent a fall in future
6. General Practitioner follow up Q&A
7. How to make your osteoporosis plan a priority.

Visit NeuRAtalks.org for more information



Join Us in Spain in 2019 to Walk for a Cure

Lace up your hiking boots and step back in time as you embark on a 10-day adventure through Spain's most famous pilgrimage trail. On arrival in Madrid, Spain's colourful capital city, you will set off on a guided tour, exploring the city's highlights from past to present. You will then travel beyond city limits to follow the footsteps of the Romans, the Knights Templar, pilgrims and modern-day adventurers on the Camino de Santiago. From Sarria to Santiago, you will be swept away by Spain's spectacular landscapes through the tranquil Galician countryside.

You will pass medieval villages where you'll discover Romanesque churches and traditional restaurants that specialise in home-cooked Spanish delicacies. In the eve, you will experience Spain's colourful culture and cuisine alongside NeuRA's inspiring supporters. Best of all, you will unleash your inner superhero by raising vital funds for NeuRA to support the lives of thousands of Australians living with mental illness.

For more information go to inspiredadventures.com.au/events/neura-el-camino-2019

BEQUEST FOR CURES

A BEQUEST Can Help Fund Future Breakthroughs



Leaving a gift in your will for NeuRA is one special way you can influence significant and meaningful medical research. When you become a bequest partner, you are provided with a unique connection to future breakthroughs and cures.

Whatever the size, every gift is important, helping NeuRA plan for the future with confidence and security. If you would like to discuss leaving a gift in your will please contact our Bequests Manager, Stephanie Grove 02 9399 1270 | s.grove@neura.edu.au

NeuRA Announces Ageing Well Seminar – Central Coast 25th Oct



Neuroscience Research Australia (NeuRA) will be hosting a FREE seminar on dementia at Mingara Recreation Club on 25th October. The event includes a series of three 20-minute seminars and a question and answer panel where audience participation is encouraged.

The health, economic and personal impact of dementia is staggering. In Australia, there are over 1,500 new cases of dementia diagnosed each week. It's predicted that there will be almost one million Australians with the condition by 2050 and this will impact 10 times as many family members and friends. This unprecedented demographic shift will result in dramatic changes in the need for health and care services. It also highlights the critical need for preventive health approaches and intervention to enable older adults to retain their independence.

This seminar by NeuRA is a timely opportunity to hear from leading Australian researchers about strategies to reduce the risk of dementia, as well as the latest in dementia and Alzheimer's disease research and steps to prevent falls and gain better balance in senior years.

The seminar series will address the steps you need to take to reduce your risk of dementia.



Book Now

www.neura.edu.au/centralcoast



Mental Wellness in the Workforce
launching **October 2018**

Watch our new seminar series *Heads at Work* which explores mental wellbeing this month at www.neurataalks.org. Key talks include impact of poor sleep hygiene on mental wellbeing, potential data and statistical mistakes, higher incidents in car accidents in the morning, and the critical role sleep plays in our overall mental wellness as we age. The series also includes tips on how to develop greater resilience in your life to cope with stress, anxiety and new pressures in the workforce, and how pain can be a trigger for depression, anxiety and stress, and what you can do to combat this.

Dr Justine Gatt

How to train your brain to become more resilient

Dr Hannah Hensen

What really happens when we are asleep?

Associate Professor James McAuley

Pain and the brain game - a NEW perspective

NeuRA Discovery Partners Provide Hope

Discovery Partners

Did you know? **The number one issue facing medical research today is funding.**

Senior Researchers at NeuRA spend up to a quarter of every year applying for funding, with only a small percentage of applications being successful (less than 1 in 5 applications are approved).

This is just one reason we'd like to thank our Discovery Partners. They provide hope and assurance.

Discovery Partners - people just like you - chose to spread out their annual giving over the 12 months of each year. In giving this way, they allow researchers to confidently plan for the future, knowing today what funds will be available tomorrow. This allows innovative discovery to flourish.

We'd like to sincerely thank our Discovery Partners and invite you to consider supporting NeuRA's research in this way.

Visit: foundation.neura.edu.au/discoverypartners for more information.

DONATION & RESEARCH VOLUNTEER FORM

All gifts over \$2 are tax deductible

- ☐ Yes, I would like to donate to research at NeuRA
☐ Yes, I am interested in participating in research at NeuRA

Title:

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Surname:

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Postcode:

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Step 1: How I choose to give my gift:

- ☐ Please accept this one-off gift to support research at NeuRA
☐ I would like to invest in the future and become a *Discovery Partner* with a regular donation of \$ _____ ☐ monthly / ☐ quarterly (*please select*)

☐ \$50 ☐ \$100 ☐ \$250 or

☐ A cheque payable to the NeuRA Foundation is enclosed OR

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☐ Visa ☐ Mastercard ☐ American Express ☐ Diners

Card No:

Expiry Date:

Cardholder's Name:

Cardholder's Signature:

Please send me:

- ☐ Details about how I can support NeuRA in my Will

- Mail this coupon in the reply paid envelope
- Call us on **1300 888 019** to make a donation over the phone
- Make a secure online donation at neura.edu.au/donate

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

NeuRA Invests in New Projects to Cure Chronic Pain – the Single Biggest Cause of Disability



Dr Siobhan Schabrun has joined NeuRA as a Group leader and is an NHMRC Career Development Fellow with an undergraduate degree in physiotherapy and a PhD in neuroscience.

"One of the things you realise working as a physiotherapist is how little we can do to help people living with back pain, and how little we understand why their pain becomes chronic," says Dr Schabrun.

"Musculoskeletal pain is a major global health problem - it has an economic burden second only to cancer.

"Low back pain is the single biggest cause of disability world-wide."

Dr Schabrun's research at NeuRA seeks to understand why some people develop persistent musculoskeletal pain and why others do not. She is also working on the design and development of new treatments which target brain plasticity in order to achieve better treatment effects.

"The understanding that the brain has plasticity and can re-wire has only been around for a few decades. This has changed the way we understand and look at pain," explains Dr Schabrun.

In her forthcoming trial UPWARD at NeuRA, Dr Schabrun hopes to identify predictive markers for developing chronic pain in people experiencing acute low back pain.

"Following the participants for 12 months, we can track a number of factors including changes in their brain and spinal cord, markers in their blood and saliva, and psycho-social aspects."

"The idea is to look at which of these factors predict chronic pain, particularly focusing on neuroplasticity."

Another newly funded project, called UNMAPPED, will begin in 2019 and will allow researchers to look at what happens in the brain as pain develops in someone who was initially pain free.

"One of the strongest predictors to persistent pain is how much pain you have early on," says Dr Schabrun.

"The unmapped study will allow us to look at predisposition to developing chronic pain through the intensity of the pain experienced early by the participants. This will benefit the community in the future as we work to avoid persistent pain developing into chronic pain and provide hope for thousands of people here in Australia currently living with constant back pain," says Dr Schabrun.



Free eBook Mental Wellness in the Workforce

Go to neurataalks.org to download today (launching 10th October 2018)

Thank you for your support

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

NeuRA (Neuroscience Research Australia) Foundation
T 1300 888 019 F +61 2 9399 1082
ABN 57 008 429 961

Margarete Ainsworth Building
139 Barker Street, Randwick NSW 2031 Australia

www.neura.edu.au

