New treatment for SCHIZOPHRENIA

Unlocking the secrets to HEALTHY AGEING

Facial recognition in FTD

Two New CLINICAL TRIALS TO TREAT BACK PAIN
About NeuRA

NeuRA (Neuroscience Research Australia) is a not-for-profit research institute based in Sydney, Australia. Our vision is to prevent and cure disease and disability of the brain and nervous system through leadership and innovation in neuroscience research. Find out more at neura.edu.au or call 02 9399 1000.

Message from our EXECUTIVE DIRECTOR

With the legislation to support the Medical Research Future Fund (MRFF) recently passed by Parliament, the health and medical research sector, and ensuing health benefits for the community, are about to enter a new era.

Australia is already a world-class innovator and our aspirations are for the future investments from the MRFF to provide long-term health and economic benefits. This new fund will enable a game-changing capacity to leave a legacy of greater health for our children and grandchildren to be realised. Below I describe some examples of NeuRA’s health and medical research contributions which could advance more rapidly with the support of the MRFF.

The recent successful outcomes of the CASSI trial, led by Dr Tom Weickert and Prof Cyndi Shannon Weickert are an important step forward for those living with schizophrenia. The CASSI trial tested a drug that acts on the brain’s oestrogen receptors and found that it improved memory and attention. These exciting findings were featured by the journal Molecular Psychiatry as one of two breakthroughs of the year at a major international psychiatry conference. The study findings provide great hope that we can radically improve day-to-day functioning and quality of life for those living with schizophrenia.

In a testament to the innovative landscape NeuRA currently provides, our researchers continue to be recognised for their outstanding contribution to real world health outcomes.

Three recent examples from our work on dementia include:

- Prof John Hodges was awarded the Bengt Winblad Lifetime Achievement Award in Alzheimer’s Disease Research at the Alzheimer’s Association International Conference in Washington for his extensive contribution and lifetime commitment to dementia research.

- Dr Muireann Irish has been awarded a prestigious L’Oréal Australia & New Zealand For Women in Science Fellowship awarded to women in the early stages of their careers who have shown scientific excellence in their field.

- In the push to find answers to the increasing dementia epidemic, Prof Glenda Halliday leads a group who received a substantial $6.5M Dementia Team Grant from the NHMRC to focus on new detection methods for frontotemporal dementia and dementia with Lewy bodies.

With forthcoming investments from the MRFF and the support of community donations, the potential to do so much more for the health and economic wellbeing of Australians is in our hands.

Prof Peter R Schofield FAAHMS PhD DSc
Executive Director and CEO

LIFETIME ACHIEVEMENT AWARD FOR NEURA RESEARCHER

Prof John Hodges, whose current research work focuses on frontotemporal dementia, was recently awarded the Bengt Winblad Lifetime Achievement Award in Alzheimer’s Disease Research for his work in cognition in neurodegenerative conditions. The award was presented at the 2015 Alzheimer’s Association International Conference in Washington DC. Lifetime Achievement Awards honour individuals who have made significant fundamental contributions to Alzheimer’s research, either through a single scientific discovery or a body of work.

TRIAL REVEALS NEW ADJUNCT TREATMENT FOR SCHIZOPHRENIA

Published findings from the Cognitive and Affective Symptoms in Schizophrenia Intervention (CASSI) clinical trial, led by Prof Cyndi Shannon Weickert, have offered hope for improved cognitive deficits in schizophrenia. The trial found that raloxifene, a drug used to treat cancer and osteoporosis, when taken daily alongside antipsychotic medication, stimulates brain activity and improved verbal memory, attention and processing speed in both men and women with schizophrenia. “This is absolutely the result we were hoping for,” says Prof Shannon Weickert. “Addressing these problems may make it easier for people with schizophrenia to maintain employment.”
UNLOCKING THE SECRETS TO HEALTHY AGEING

People who live to 100 or beyond are a unique group that remind us that dementia is not an inevitable part of ageing. PhD student Jessica Lazarus is investigating the potential role that epigenetic modification plays in allowing people to reach their centenary birthdays. In particular, she is interested in what these people do in their daily lives to stay healthy into older age. Epigenetic modifications involve biochemical changes across genes, which can switch the affected genes on or off. They are essential for normal human physiology, but may also be part of a disease process. They can be triggered by environmental factors, such as diet, smoking habits, and the use of pharmaceutical drugs and, importantly, are reversible. Jessica is currently comparing the epigenetic profiles of centenarians, who are cognitively healthy, to the profiles of a younger group (aged between 70 and 90 years) who have impaired cognition, using whole genome sequencing. Her work aims to identify new therapeutic targets to treat age-related neurodegenerative disease.

IMPROVED MOTOR SKILLS FOR STROKE PATIENTS

Dr Ingvars Birznieks and his team have identified a remarkable new way of improving recovery after stroke. They found that some stroke patients have a distorted or ‘scrambled’ representation map of their hand. When a patient is touched in one location on the hand, they perceive the sensation as originating from another site. A recent study revealed that it is possible to correct this scrambled map, leading to improved motor functioning. “This new evidence means that we can now focus on creating new rehabilitation strategies that can help patients to regain normal sensation and fine motor skills after a stroke,” says Dr Birznieks.

People who have suffered a stroke and would like to be tested to find out if they suffer this sensory mismatch are invited to contact Dr Birznieks on (02) 9399 1000.
Dr James McAuley is in the midst of clinical trials for two new treatments, the aims of which are to demystify the purpose of pain and prevent the development of chronic back pain, which may bring relief to thousands of Australians.

Changing the way we think about pain and our perception of it may be a key factor in bringing relief to those with chronic low back pain, according to research conducted by Dr James McAuley. Four million Australians suffer from low back pain at any time. Around 40% of people with a new episode of low back pain will go on to develop chronic back pain, which is pain that has persisted for longer than three months.

The most common treatment for chronic low back pain is exercise, but research has shown this is often only marginally more effective than placebo. A new approach to managing – or, even better, alleviating – back pain is desperately needed.

Early pilot investigations conducted by Dr McAuley revealed that two novel treatments – an Explaining Pain program and sensorimotor retraining – have been effective in providing significant improvements to low back pain and functioning.

Dr McAuley is about to start clinical trials that would compare the two programs individually as well as together, to assess the benefits they can bring to patients. “We hope to develop targets for new interventions that lead to full recovery,” says Dr McAuley. “Current treatments give people the resources to function despite their pain. We want to move beyond that and relieve them of their pain altogether.”

The Explaining Pain program aims to clarify the nature and purpose of pain and make clear to patients at risk of developing chronic low back pain that a diagnosis does not mean their pain will be permanent. “For most people back pain is a normal, if distressing, part of life,” explains Dr McAuley. “Our program emphasises that pain is an adaptive response and reminds people that it will go away. Pain is our brain’s way of alerting us to a potential threat. Understanding all of the sources of that threat is often enough to reduce pain intensity and help recovery.”

For those who experience chronic low back pain, a more intensive approach is needed.

That is the point at which sensorimotor training can be introduced to reduce pain and improve mobility.

Sensorimotor retraining is based on the cortical-body matrix, which is an integrated network of neural pathways that detect pain and aims to return the body to a normal state of functioning.

There is compelling evidence that chronic back pain is associated with a disruption of this cortical-body matrix, and that correcting this disruption via a series of sensorimotor tasks can relieve pain.

“Current treatments give people the resources to function despite their pain. We want to move beyond that and relieve them of their pain altogether.”

“Earlier studies showed that people with chronic back pain felt that their back wasn’t moving as it should,” says Dr McAuley. “They felt they couldn’t control their back properly. Also, when we touched their back, they were unable to accurately identify where they were being touched or to discriminate between different types of touch.”

This led Dr McAuley and his team to believe there are issues around how a person perceives the functioning of their back and the associated pain. “So we developed the sensorimotor retraining treatment to change this perception. These tasks interrupt and correct the way the signals from the back are processed by the brain. With repetition people get better at accurately processing the signals and their symptoms decrease.”

People currently involved in the clinical trials show improvements after three months, giving hope to the hundreds of thousands of Australians who face this major health challenge daily.
Frontotemporal dementia (FTD) is the second most common cause of dementia in people under 65, affecting over 10,000 Australians. This condition encompasses a spectrum of clinical disorders characterised by atrophy of the frontal and temporal lobes. People with FTD can show changes in personality and behaviour, or they may lose the ability to produce or understand language. Some also go on to develop Parkinson-like symptoms or features associated with Motor Neurone Disease (MND). NeuRA’s FRONTIER group is dedicated to investigating all aspects of FTD, including its impact on the lives of patients and their families.

World FTD Awareness Week, being held 4 to 11 October, will provide a powerful opportunity to educate people about FTD and raise support for affected families.

In the lead-up to FTD Week, an exhibition of artworks by prominent Australian mother and daughter artists Ann and Sophie Cape, entitled *An Unending Shadow*, is being held at the Mosman Art Gallery. Together they have made a series of challenging new artworks exploring the phenomena of dementia and its impact within the community. The exhibition examines the emotional and psychological ‘spaces’ that people with dementia inhabit, as well as those of their family, friends and loved ones.

Ann and Sophie share personal experiences of having a relative living with dementia. Ann Cape and her husband are research participants with the NeuRA FRONTIER group.

In August, the Honourable Pru Goward, Minister for Mental Health and Medical Research, undertook an engaging tour of the Margarete Ainsworth Building, including the newly opened level 6 laboratories, which house the Sydney Brain Bank, and the Schizophrenia Research Lab on level 5.

She was accompanied by Member for Coogee, Bruce Notley-Smith. Together they gained a greater understanding of the research undertaken by NeuRA and the important contributions that medical research institutes make to New South Wales.

A new study into facial recognition in frontotemporal dementia (FTD) conducted by Dr Fiona Kumfor has revealed potential new ways for carers to deal with some of the lesser known symptoms of the disorder.

“Faces are very important to humans,” says Dr Kumfor. “Our ability to recognise, understand and extract information from faces happens automatically and very rapidly. It’s vital to successful social interactions. When you look at someone you’ll know who they are and be able to determine their age, gender and emotional state. You’ll also recall how you know them and when you saw them last.” These intricate abilities are dependent on a complex network of brain regions.

Dr Kumfor’s study found that people with semantic dementia (SD) and behavioural-variant FTD (bvFTD) had difficulties recognising, learning and remembering faces, although this happened for different reasons. Dr Kumfor compared these two groups’ ability to remember cars and faces. The SD group could remember cars, but couldn’t recall faces. The bvFTD group had problems recalling both cars and faces.

When explored further, it was found that different parts of the brain were responsible for these deficits in bvFTD. Specifically, the difficulty in remembering cars was due to shrinkage in parts of the brain important for memory. But importantly, difficulty in perceiving and remembering faces was found to be due to shrinkage of the fusiform face area and anterior temporal pole – brain regions that are specialised for understanding faces.

This tells us that strategies to improve face perception and face memory may help to improve the quality of life for patients as well as their interpersonal relationships with carers and families. Dr Kumfor, together with PhD student Rosalind Hutchings and Assoc Prof Olivier Piguet, are now undertaking research to understand how this breakdown in understanding faces occurs and the impact it has on behaviour and social interactions for people with FTD.

In the meantime, there are steps that carers can take to make social situations less stressful for patients and their families. “If someone with FTD is at a gathering with people they haven’t seen in a while, it may cause anxiety and they may be less likely to engage socially,” says Dr Kumfor. “Carers can help by introducing people and providing context for how they know each other. This may help trigger a memory or other additional information to help patients participate in social interactions.”

Facial recognition impaired in frontotemporal dementia

In August, the Honourable Pru Goward, Minister for Mental Health and Medical Research, undertook an engaging tour of the Margarete Ainsworth Building, including the newly opened level 6 laboratories, which house the Sydney Brain Bank, and the Schizophrenia Research Lab on level 5.

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Dr Muireann Irish recently received a L’Oréal For Women in Science Fellowship, which identifies and supports eminent women in science throughout the world. This award specifically recognises Dr Irish’s outstanding contribution to her field of cognitive neuroscience.

CONGRATULATIONS ON THE FELLOWSHIP. YOU MUST FEEL PROUD.
I feel incredibly honoured to have been selected as one of four recipients.

This award is a pivotal moment in my career, and a testament to the achievements that I have made.

HOW DOES THE FELLOWSHIP SUPPORT WOMEN IN SCIENCE?
The program highlights early career female scientists who have shown scientific excellence in their field and who can serve as positive and accessible role models to younger girls who might be interested in pursuing a career in science.

I feel incredibly lucky to have been chosen as one of the 2015 Fellows and I intend to use this opportunity to serve as an ambassador for women in science.

From a personal perspective, I want to convey a clear message to younger girls that you can be a successful scientist and have a family as well.

WHAT IS YOUR AREA OF INTEREST?
My main interest lies in understanding how the brain achieves sophisticated and truly remarkable feats of cognition including memory, imagination, and social processing.

For example, we can mentally travel backwards and forwards in subjective time to revisit past events in exquisite detail or to simulate future events which have not yet happened.

We also possess the ability to mentally take the perspective of others, whereby we can intuitively understand the emotions, thoughts, and feelings that other people may have.

These functions afford us incredible flexibility in our daily lives, however the underlying neural circuitry that supports these functions remains unclear.

My research aims to clarify the brain networks and mechanisms that allow us to engage in these complex and uniquely human functions, with a special emphasis on the vulnerability of these processes in dementia.

DO YOU HAVE ANY ADVICE FOR ASPIRING FEMALE SCIENTISTS?
I think it is really important to remember that science needs diversity. We need to cast aside the stereotype of a scientist as being an older male professor in a lab coat. My number one ingredient for a career in science is a burning curiosity to learn. Science is an unending quest for knowledge and having that insatiable desire to know more is essential.

A key issue for women in science is the impostor syndrome, and feeling a lack of confidence in their work. My advice would be to speak up. Your opinions and your contributions are just as valuable as anyone else’s. Also, put your hand up and say ‘Yes’ when an opportunity presents itself.

You may feel uneasy at first but I promise you will feel fantastic afterwards. I find that if you show you want to get involved and be engaged, people are only too happy to help. So my advice is to go for it.

Dr Muireann Irish

Dr Claudio Toma
Your donations AT WORK

Amanda, Dr Bill Brooks and NeuRA say “thank you”.

You may remember reading about Amanda Ayliffe in the last NeuRA Magazine. Aged just 46, Amanda is starting to feel the early symptoms of familial Alzheimer’s disease.

Amanda is participating in a landmark, global, Alzheimer’s prevention trial aimed at stopping the progression of the disease before symptoms become a problem.

We asked for your support of this incredible project, and you responded in an incredible way. We’d like to take this opportunity to thank the hundreds of donors who generously gave gifts in support of the trial and the full range of NeuRA’s Alzheimer’s research.

Your gifts have brought us closer to conquering this life-robbing disease and may one day help a family just like yours. To read more about Amanda’s story, visit neura.edu.au/amandasstory.

Help us see it through TO A CURE

Can you help NeuRA See it Through to a Cure?

To fund NeuRA’s vital research, we need dedicated supporters like you. Whilst a one-off donation is most welcome, what we really need is your pledge of a small, monthly ongoing donation. Making this commitment will allow us to plan ahead, to know what funds are coming in, to attract the best young scientists and support their work with essential laboratory supplies and state-of-the-art equipment.

We cannot rely on government funding. As an independent, not-for-profit medical research institute, we always apply for research funding. It’s not always granted, and even when we’re successful, current levels of government support do not fully fund research projects.

You can help make a huge difference with, for example, a monthly donation of just $25 (80 cents a day). This commitment would fund the analysis of a patient’s blood sample, which is critical to discovering the causes and creating new treatment possibilities for various diseases.

To join, simply complete the enclosed donation form and return to NeuRA. Alternatively, please call 1300 888 019 or visit neura.edu.au/seeitthrough.

DONATION & RESEARCH VOLUNTEER FORM

Step 1: How I choose to give my gift:
- [ ] Yes, I would like to donate to research at NeuRA
- [ ] Yes, I am interested in participating in research at NeuRA

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- [ ] Mail this coupon in the reply paid envelope
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- [ ] Make a secure online donation at neura.edu.au/donate
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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 96
Fluorescence microscopy is a technique used by scientists to visualise glowing proteins, which are molecules that play a critical role in the body. They do most of the work in cells and are needed for the structure and function of the body’s tissues and organs. Fluorescence microscopy allows scientists to examine whether a specific protein is present in a cell or tissue, how much of the protein is present, and where the protein is located within that cell or tissue. This information is not available with normal microscopes, making fluorescence microscopy a highly useful tool for researchers.

In this technique, stem cells were grown on a special plate for use with a microscope. Fluorescent dyes were then used to stain a specific protein, (for example, DNA) making that protein glow under the microscope. Using a combination of dyes, we can stain different proteins in different colours, creating images like this one.

This allows scientists to simultaneously look at the presence and location of multiple proteins, saving time and money. In this particular image, we used dyes that stain proteins that are only found in stem cells. This way, we knew that any cells glowing under the microscope were stem cells. From images like this, we were able to confirm that we had successfully turned skin cells into stem cells.

Lauren Schramko, Honours