

News from the Florey Institute of
Neuroscience and Mental Health

Spring 2021

BRAIN MATTERS

**SCIENCE
MEETS ART:**
NEW RESEARCH INTO
PROTECTING MENTAL
HEALTH EXAMINES
MOOD-BOOSTING
EXERCISE

THE
FLOREY



Director's Report

Advancing humanity through brain and mind science. It's an ambitious statement, but it's our guiding principle at the Florey Institute – applying our unique expertise towards solving the greatest brain and mind challenges of our era.

We know that achieving our ambitions can't happen in isolation. In this issue of Brain Matters you'll see examples of how the Florey partners to achieve our goals.

You'll read about how strong partnerships between researchers and families impacted by Niemann-Pick disease are progressing treatments for this rare and fatal condition that occurs in children.

Dr Emma Burrows and artist Hiromi Tango have collaborated on a 'living lab' which not only engages the public with mental health research through an exciting art installation, but also contributes important data to examine the impact of environment on motivation and mood. This collaborative artwork is housed at the newly opened Science Gallery Melbourne in Carlton. The gallery shares an objective with the Florey in seeking to engage young people with science and we're proud to be a partner in their inaugural exhibition.

We've also partnered with ABC Radio Melbourne for a short series of evening conversations between Florey researchers and radio host David Astle. Some of you may recall that David took part in a Florey world-first in 2019 as he became the first person to solve cryptic crosswords while undergoing testing in one of our MRI machines. Having already contributed his unique skills to aid our understanding of what happens in the brain during problem solving, over the coming months he'll be delving into the latest developments in brain science with Florey researchers.

Within the Florey, our Clinical Director Professor Trevor Kilpatrick and myself recently partnered to answer questions about long-COVID and its impacts on the brain. We already know the global toll of COVID has been terrible, with more than 209 million infections worldwide and tragically more than 4.2 million deaths at the time of writing to you. The Florey continues to contribute as much as we can to this global health crisis.

Finally, and as always, we consider you one of our partners. We rely on your support, your enthusiasm and your generosity towards our work. Thank you for contributing to a future where we can understand, prevent and treat brain and mind conditions.

Professor Steven Petrou PhD FAHMS
Director, Florey Institute of Neuroscience and Mental Health

Faces of the Florey



Professor Trevor Kilpatrick,
Clinical Director.

"We're still scratching at the surface of brain science, but there's hope that we're going to change lives for the better for a whole series of neurological conditions. We aren't there yet, but we're on mission."



Kevin Law, PhD candidate,
Stem Cells and Neural Development Lab.

"When it comes to treating brain injuries there is a massive gap in knowledge. I want to use my skills to bridge the gap and use stem cells as a potential therapeutic avenue for treating brain disease and injuries."

Our staff and students seek to discover the secrets of the brain, connected by a shared vision to advance humanity through brain and mind science.

Over the past few months, we've been showcasing our people and their unique stories on our social media channels. Here, we profile just a few of the people who make up the special place that is the Florey Institute.

[f](#) [@](#) [in](#) [t](#) Interested in reading more? Visit our social media channels to read more stories of how people at the Florey are working to improve the lives through our research.



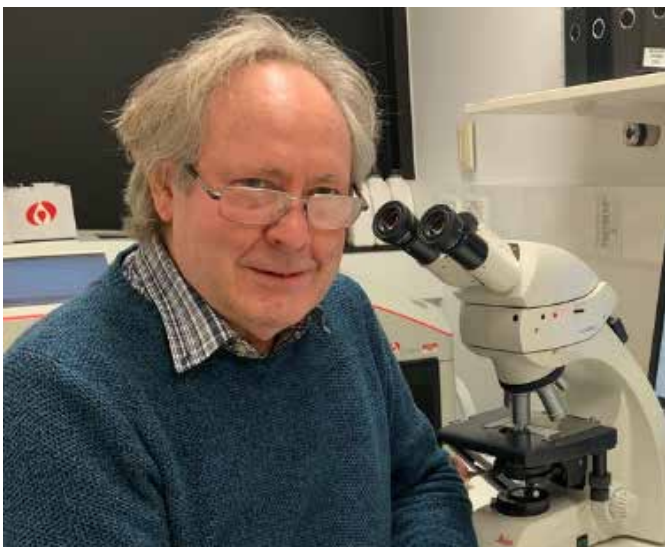
Dr Remika Mito,
Early Career Researcher, Imaging and Epilepsy Group.

"One of the most important things to me is the community at the Florey. To have stayed in a workplace for so long through my PhD and now my postdoc – what has drawn me is the people not just in my lab but all around."



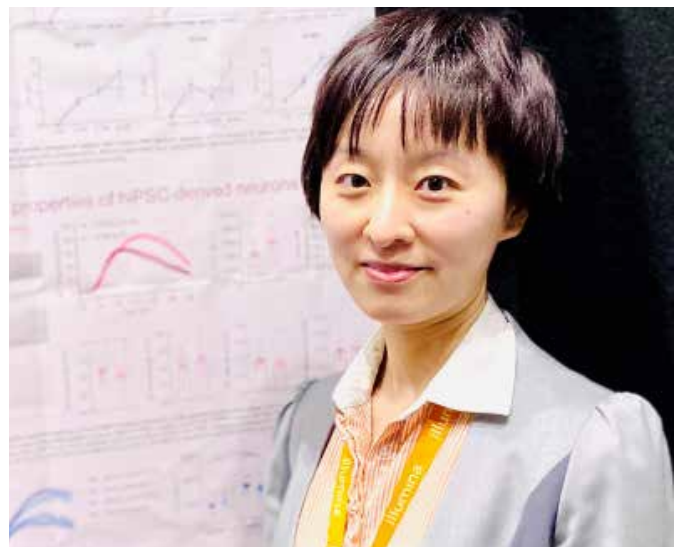
Dr Chaitra Chandrashekar,
Early Career Researcher, Peptide Chemistry Lab.

"I've published my first Florey publication on the chemical synthesis of insulin and creating next generation insulin with improved properties. I really hope others learn something useful that they can apply in their own research."



Dr Ian Birchall,
Histologist

"Did you know there are more connections in between neurons than there are stars in our galaxy? As brain research progresses, we can help to develop targeted treatments for a range of neurological diseases."



Dr Cherry Mao, Electrophysiologist,
Ion Channels and Human Diseases Lab

"I've always loved the tinkering aspect of science. Electrophysiology is a really cool technique and very challenging, but that's why I love it so much."



Dr Emma Burrows



Citizen science examines exercise as ‘mood medicine’

With almost half of all Australians experiencing a mental illness at some point in their lives, *Wheel*, a vibrant art installation at the Melbourne Science Gallery, shines an important light on the parallels between a healthy brain and regular exercise.

Dr Emma Burrows, Head of the Translational Behaviour Laboratory at the Florey Institute, partnered with renowned Japanese Australian artist Hiromi Tango to create an interactive ‘living lab’ artwork that explores how fun, laughter and play can encourage the levels of physical activity needed to boost our mood and protect our mental health.

Research demonstrates that regular exercise offers a range of benefits, with 30 minutes of daily exercise shown to improve cerebrovascular health, cognitive function and protect our mental health.

📍 Visit melbourne.sciencegallery.com to learn more about *Wheel* and the exhibition
MENTAL: Head Inside

“Through my work, I’ve seen the positive effects that exercise can play in boosting brain plasticity, mood and memory. What *Wheel* aims to illustrate is that exercise doesn’t have to be a gruelling task - we can all find different and novel ways to exercise that are joyful,” said Dr Emma Burrows.

The two creators were inspired by the notion that when exercise is fun it’s easier to commit to.

“The laughter of people using *Wheel* is infectious,” said Dr Burrows. “I like to think of exercise as mood medicine”.

The exhibit harnesses a concept known as ‘citizen science’ where members of the public engage at their own pace with a rainbow human-sized hamster wheel or a handwheel that are enriched with sensors to measure activity.

Dr Burrows aims to use the exhibit as a living lab model to collect data on participant exercise as well as information about mood before and after using *Wheel*.

“We know that exercising regularly impacts our mental health but maintaining this isn’t always easy, especially during a pandemic. Hiromi and I hope that *Wheel* can shed light on the ingredients that may help us to maintain regular activity over time to build a brain reserve that protects us throughout life.”

How you can improve your mental health through exercise

Regular physical activity facilitates the release of hormones and endorphins in the brain that can have a range of mental health benefits.

- Aim for at least 30 minutes of physical activity every day to lower stress and promote a better sleep cycle.
- View everyday activities as a good opportunity to be active, for example, taking the stairs, walking the dog or playing with your children.
- Consider including another person, a good podcast, or new locations where possible in your exercise to make it enjoyable and help with motivation.



Professor Steven Petrou



Professor Trevor Kilpatrick

COVID-19 and the brain: your questions answered

COVID-19 has upended our lives since it first emerged in late 2019. The global scientific community has rallied with enormous momentum to find effective ways to understand, diagnose, treat and prevent through vaccination against the virus. Yet major scientific questions remain unanswered about the SARS-COV-2 virus; how it may be impacting the brain and other systems in the body, and whether long-term physical and mental health impacts may occur.

The Florey Institute's Director, Professor Steven Petrou, and Clinical Director, Professor Trevor Kilpatrick, answer your questions and share the latest scientific consensus on COVID-19's impact on the brain.

How could COVID-19 reach the brain?

Once a person is infected with COVID-19, the virus itself uses a spike protein to adhere to a protein on the surface of cells within the body. This can occur in different parts of the body including the respiratory system or the blood. While there is currently no conclusive evidence that the virus can travel into the brain from the bloodstream, research suggests that once in the body the virus may 'hitchhike' its way to the brain using nerves that connect our brains and noses. This hypothesis makes sense when we consider that one of the most common symptoms of COVID-19 is loss of smell.

[Read more about our work in COVID-19 by visiting the Florey's website at \[florey.edu.au\]\(https://florey.edu.au\).](#)

Can COVID-19 impact the brain?

From the range of neurological symptoms being reported in people infected with COVID-19, including loss of smell, headaches and, in severe cases, acute inflammation of the brain, it's clear that the virus is creating neurological effects.

While we continue learning about COVID-19's mechanism of action, its indirect neurological effects are also important to consider. Research shows that the virus can damage blood vessels that may result in disruption of blood, oxygen or nutrient supply to the brain, and studies tell us that activation of the immune system by the virus can also trigger the production of toxic molecules that disrupt brain function. The effect of COVID-19 on nerves controlling gut function should also be front of mind as we know the composition of gut bacteria can influence brain function.

What is long-COVID syndrome?

'Long-COVID' is a term recognising that a significant percentage of people infected with COVID-19 experience long-lasting symptoms. The severity and range of symptoms has been reported to vary widely between individuals and include most commonly extreme fatigue, 'brain fog' and ongoing complications with breathing.

We can learn a great deal from other respiratory viruses where long-term symptoms existed. After the SARS outbreak in 2002 and the MERS outbreak in 2012, research showed that 1 in 5 people infected with the virus experienced depression, anxiety, memory difficulties and fatigue. COVID-19's long-term consequences on mental health is a significant public health concern and we believe it is imperative to start monitoring, researching and investing into research now.

How is the Florey helping in the fight against COVID-19?

Our researchers are working to contribute to the scientific understanding of the mechanisms that underpin COVID-19's impact on the brain. We also have teams working to develop new tools for diagnosis and treatment. Florey researchers Professor Kevin Barnham and Dr Leah Beauchamp were amongst the first in the world to warn of the possible neurological impacts of COVID-19. We also have researchers working to develop critically needed treatments, including Professor Clive May and Dr Yugeesh Lankadeva who continue to trial a specially formulated 'megadose' of vitamin C in an ICU hospital-setting, which helped save the life of a young man who was critically ill with sepsis from COVID-19. Right across the Florey Institute, we are considering how we can continue to contribute to this global health crisis.

What can I do?

While questions remain about COVID-19 and its impacts on the brain, there is an abundance of scientific evidence pointing to things that we can all do to prevent infection and transmission of the virus. Practicing good hygiene, wearing face masks, maintaining social distancing where appropriate, and receiving the vaccine when eligible are all important actions we can individually take for the benefit of ourselves, our loved ones and our community.

Your continued support to the Florey ensures that our researchers can continue to use their expertise to build the scientific understanding and develop new measures in the fight against COVID-19.

Exploring memory and the phenomenon of future thinking

Dr Chris Tailby will tell you that accessing a memory is not as easy as reviewing a file stored somewhere on the brain's hard drive.

"Multiple brain pathways are working when we recall information about an event or feeling and different sensory information such as specific smell or a tangential conversation can act to trigger memory. Our current understanding is that the brain freshly reconstructs all the elements of a memory every time it is recalled," Dr Tailby, Head of the Epilepsy Cognition Lab, explained.

He believes part of the reason the brain recreates memory in this way is to enable a type of adaptive thinking in which humans have evolved to pre-experience things. This is a phenomenon studied by Dr Tailby and other researchers at the Florey Institute known as future thinking, or 'prospaction'. This is where the brain flexibly recombines past experiences and stored knowledge to problem solve and simulate future scenarios before they occur.

▶ Did you hear Dr Tailby speak on ABC Radio Melbourne? You can find his interview with David Astle on the Florey's YouTube channel.

"Our brain seeks to test drive different future scenarios and draws upon memory to do this. Example situations when we might do this is before a job interview or a first date," he said.

So why is a common neurological process like memory not yet fully understood by scientists? Dr Tailby explains that our brain is enormously complex, making memory difficult to isolate.

"We're only at the tip of the iceberg in understanding the intricate system that works to drive neurological processes like memory," he said.



Dr Chris Tailby

"Cognitive neuroscience is the final frontier, the great unknown of our time. Our research into understanding how memory works enables us to discover ways to treat memory afflicted diseases like dementia and epilepsy, or to help ease the burdens that come with aging."

A flicker of hope for children with tumour disease

Neurofibromatosis (NF) tumours can develop anywhere in the nervous system, including the brain, spinal cord and other nerves in the body. It can affect major organs and lead to a variety of serious and debilitating health effects including blindness, bone abnormalities, disfigurement, chronic pain, cancer, epilepsy, learning difficulties and autism. The outcome for each person is different and significant medical research is vital to explore treatment options.

Now, a flicker of hope has emerged to shine a light on NF. Inspired by Zoe, who was diagnosed with NF at 4 months of age, the Petropoulos family established The Flicker of Hope Foundation to raise awareness about NF along with funds for essential medical research.

The Flicker of Hope Foundation recently presented the Florey with a cheque for \$300,000 to commence new world leading research into neurofibromatosis. This research will be carried out by Professor Tony Hannan and his team who will be investigating the impacts of NF on cognition.

This is an extraordinary fundraising effort by The Flicker of Hope Foundation and their generous corporate and personal supporters.

It's also a testament to what can be achieved by people working together for a common goal - a brighter future for those living with NF.



Prof Tony Hannan accepts cheque from The Flicker of Hope Foundation

You're helping find answers for childhood dementia

Mandy Whitechurch doesn't welcome Christmas. Each one signifies another year passing, and another year closer to the end of her childrens' lives.

Her two boys both have Niemann-Pick disease type C (NP-C), a devastating and fatal genetic condition for which there are few treatments and no cure. The parents of children with this rare condition live with the painful knowledge that their child will decline physically and intellectually with a form of childhood dementia. Few survive for more than 10 years after first showing symptoms. Mandy's boys were diagnosed 14 years ago.

Families like Mandy's are why the Florey Institute, with the help of donors like you, is pursuing research that might offer hope to families with NP-C.

The Florey's Dr Ya Hui Hung, Senior Research Officer in the Oxidation Biology Unit, is investigating a potential treatment for this currently incurable disease by working closely with families and doctors treating patients with NP-C.

Dr Hung's work has already contributed to the mapping of the metallobiology landscape and identified early neurological impacts in models of NP-C which may have clinical implications for humans. She is now researching a gene therapy approach using messenger RNA (mRNA) to correct the action of the faulty genes that cause NP-C.



Dr Ya Hui Hung



Mandy Whitechurch with sons Matthew (top) and Timmy (bottom)



Matthew Whitechurch receiving an MRI scan at the Florey as part of NP-C neuroimaging research led by Prof Mark Walterfang

Join our Florey Public lecture on Thursday 21 October 2021, 11 - 12pm AEDT to hear how Mandy and Dr Hung collaborate to fight Niemann-Pick disease type C.

Mandy will give you a personal insight into what it's like having children living with this genetic condition. She is the Founder, Vice President, Adult Patient Liaison and past President of the Australian NPC Disease Foundation (ANPDF), which supports parents and families with NP-C and raises funds for research.

Through the hard work of Mandy and others, ANPDF contributes 75% of the funding to Dr Hung's NP-C research – a mammoth achievement by dedicated parents and friends to raise awareness of the disease and most importantly, find answers for their children.

Mandy and Dr Hung will be joined by Professor Mark Walterfang from the Royal Melbourne Hospital, a neuropsychiatrist, who will tell you about his clinical experience managing NP-C and neuroimaging research on brain changes in NP-C.



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How you can improve lives through brain and mind research



If someone you love has a brain disease or disorder, you'll appreciate how important it is to prevent illness, advance treatment and bring to light cures for the one in four people affected.

A gift in your will to the Florey will support the great minds of tomorrow discover the secrets of the brain.

For more information about including a gift to the Florey in your will, contact Nola Wilmot – Gifts in Wills on 03 9035 9710 or nola.wilmot@florey.edu.au.

Thank you

The Florey thanks our recent donors who kindly donated \$250 or more between 23 June and 17 August 2021:

David & Slavka Abraham | Christine Adams | Kellie Adams | Elisabeth Allan | Pauline Atkins | Australian NPC Disease Foundation | Matthew Benson | Jonathan Benson | Debbie Black | Jarrod Byham & Sally Emerson | Rob Clarke | Patricia Clennett | Deirdre Collier | John & Christine Collingwood | Computer Transition Systems | Brian Connor AM | Maria Cootes | David Copolov AO | Kevin Cosgrave | Rocco Costa | Greg Costello | Brian M Davis Charitable Foundation | Susan Duncan | Andrew Erikson | Carolien Evans | Flicker of Hope Foundation Ltd | John Floyd | Valmae Freilich | Dorothy Gannon | NB Gantner Family Trust | Peter & Janet Gilbertson | Louise Gourlay AM | Peter Gray & Colette Reeves | Roy Hardcastle | Barry Hirst | Doug Hooley | Investment Access Pty Ltd | Kate Joel | Terry & Janet Kinsella | Noel Langford | Brian Little | Peter & Lois Lumley | Beris McKemmish | John & Marilyn Meyer | Virginia Morrison | Pamela Noble | Alice O'Brien Research Trust | Judith Overbeek | The Owies Family Trust | Patricia Peck | Andrew Pollard | M Joan Pryse | Deborah Reich | The Roebuck Foundation | Somnivre Pty Ltd | Judith Florence Stembridge | Russell Stewart | Gary Stiliano | Lyndall Sullivan | Katrina Tull | Carol Turecek | Bruce Turnbull | Henri van Reesema | David Vernon | Wendy Wagstaff | Karen Wells | John Wilde | Susanna Woodall | Meredith Woods

Gifts in Wills: Estate of Kenneth William Berckelman | Estate of Henrietta Ethel Schefferle | Estate of Beatrice Olive Williams

Donations from community fundraisers: Kellie Adams - Belmont Hotel Fundraiser for NPC Disease research | Matt Eddy - Mindful Miles | Jacinta Costello - Ladies Back on Your Bike for MS research

Donations in memory of: Nathan and Murray Black | Owen Gilderdale | Barry Hall | Carlo Iovenitti | Roger Knott | Christine Makin | Kathy Marshall | Barry Mather | Don Pollard | Jack Roberts | Walter Robinson | George Strum | John York

About us

The Florey Institute of Neuroscience and Mental Health is the largest brain research centre in the Southern hemisphere specialising in diseases of the brain and mind. Over 4.7 million Australians each year are directly affected by the illnesses we study. We are a world leader in discovery science, imaging technologies, clinical trials, population studies, data analytics and more. Our scientists share a common goal – to improve the lives of people through our brain and mind research.

We study:

- Addiction
- Alzheimer's and other dementias
- Anxiety
- Autism
- Bipolar disorder
- Cardiovascular disease
- Concussion
- COVID-19
- Depression
- Digestive diseases
- Epilepsy
- Huntington's disease
- Motor neurone disease
- Multiple sclerosis
- Parkinson's disease
- Schizophrenia
- Stroke
- Traumatic brain & spinal cord injury

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