STROKE
The Florey is on the Case

Associate Professor Dominique Cadilhac
How might yoga assist in stroke recovery?
A message from the chairman

I am very pleased to report that former Florey Board member, Professor Anne Kelso AO, has been appointed to lead the National Health and Medical Research Council (NH&MRC). The NH&MRC is Australia’s leading expert body promoting the development and maintenance of public and individual health standards. Funding is critical to scientific and medical research in Australia, and coupled with the implementation of the Medical Research Future Fund, Anne has taken on a massive but fascinating task.

Professor Kelso’s energy and dedication to medical research will be appreciated by the research community in her role as NH&MRC CEO. Her experience in the fields of influenza and immunology has seen her develop significant global health experience and networks through her work with the World Health Organisation. Her leadership and direction in her various roles have been immeasurable.

Professor Kelso joined the Florey Board in 2010 and was an integral member of the team, working with us through critical changes at the Florey, including amalgamations, key investments in essential equipment, and helping us to forge strong relationships with the University of Melbourne and the Austin Hospital.

Although Professor Kelso has resigned from the Florey Board to focus on her new responsibilities, we look forward to continue our working relationship in the challenging world of research funding in Australia, and we thank her for her work with the Florey.

This significant position, at the centre of national research funding and policy, is perfectly suited to this very wise and strategic professional. We wish Anne well in this new endeavour at a time of great change in the sector.

Warm regards,

Professor Geoffrey Donnan, AO
Director, the Florey Institute of Neuroscience & Mental Health

Mr Harold Mitchell AC
Chairman, the Florey Institute of Neuroscience & Mental Health

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What makes my brain tick?

Like an incredibly ornate Lego sculpture, the brain is made up of tens of billions of neurons, which all make connections with thousands of other neurons to form a spectacular whole. Here, Tom Keeble writes of some breathtaking neuroscience happening at the lab bench. Dr Lucy Palmer’s work is helping us understand exactly how different brain regions connect and communicate. Her work has important implications for understanding brain injury outcomes, and developing diagnostic and therapeutic approaches to brain injury, as well as other “communication breakdowns”, such as attention deficit hyperactivity disorder (ADHD), schizophrenia and depression.

Amidst the regular drip-feed of news stories on breakthroughs in Alzheimer’s disease, or the latest advances in Parkinson’s treatments, it’s easy to forget that we still know remarkably little about the fundamental workings of the brain.

What exactly is happening in our grey matter when our fingertips touch the skin of our 10-month old son, but I don’t think he’s quite up to it – yet.”

Using a powerful array of genetic, chemical, electrophysiological and advanced microscopy tools (including a miniature periscope into the brain), Lucy is able to see, measure, and electrical, and chemical activity of individual dendrites that might be up to 100 micrometres deep in the brain. As you watch Lucy sitting at her ‘rig’, it’s clear she has a deep love of the hands on aspect of her work, bolting new bits of equipment to the specialised vibration-damping “air-table” and discussing the lasers that power her two-photon microscope. “As a girl I absolutely loved mucking around with Lega,” Lucy says. “I’m now trying to instil that same love in my grandmother’s hand, can be fully and wholly experienced.

In concert with a second class of neuron that inhibits firing, tuft dendrites are working a whole lot harder as signal processing and advanced microscopy tools (including a miniature periscope into the brain), Lucy is able to see, measure, and electrical, and chemical activity of individual dendrites that might be up to 100 micrometres deep in the brain. As you watch Lucy sitting at her ‘rig’, it’s clear she has a deep love of the hands on aspect of her work, bolting new bits of equipment to the specialised vibration-damping “air-table” and discussing the lasers that power her two-photon microscope. “As a girl I absolutely loved mucking around with Lega,” Lucy says. “I’m now trying to instil that same love in my grandmother’s hand, can be fully and wholly experienced.

What exactly is happening in our grey matter when our fingertips smooth a grandchild’s hair? Is that what we want patients to experience? Or do we want to understand more about how brain cells combine and process sensory information to create an accurate picture of the world around us.

Following standout articles in the prestigious journals Science and Nature Neuroscience, Lucy has established the Neural Network Laboratory at the Florey to continue her cutting-edge investigation into the basic building blocks of our perception and behaviour. Her work focuses on the cells that live right at the outer edges of our brains, in the six cellular layers that make up our cortex. The location of the “body” of these cells determines the cortical layer in which they sit. These neurons send long thin, branched processes, called tuft dendrites, up into the outermost brain layers. At the other end, the cell’s axon, or main ‘transmission wire’, projects deep down into the brain, connecting with other brain regions to control our movements and responses – influencing our body’s feeling and sensing. The characteristic shape of these cells gives them their name – pyramidal neurons.

But it’s feedback information that binds the whole brain together, according to Lucy. “This is what gives you a complete representation of your sensory world!”

Pyramidal neurons receive input from a deeper brain region called the thalamus. The thalamus acts as a relay station for sensory information coming from our body, such as touch, which is then sent forward to the cortical layers where it arrives at the pyramidal neurons’ dendrites. Dendrites also receive “feedback” information from the thalamus, as well as other higher-order sensory cortical regions.

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Up until Lucy showed otherwise, neuroscientists thought dendrites merely received synaptic inputs from other brain regions, then passed the information on to the cell body. If enough ‘spikes’ of information arrived at the same time, the pyramidal neuron would fire, sending the signal onwards.

Now, thanks to the painstaking and technically demanding work of Lucy and her colleagues, we know that pyramidal cells’ tuft dendrites are working a whole lot harder as signal processing and integrating machines, able to generate their own ‘spikes’ of activity. In concert with a second class of neuron that inhibits firing, tuft dendrites regulate the brain’s response to touch – damping down pyramidal neuronal activity to fine tune our internal representation of the external environment. So that touch of a baby’s skin, or a grandmother’s hand, can be fully and wholly experienced.
A true game changer

Clot removal surgery after stroke is a true game-changer according to Florey Director Professor Geoffrey Donnan.

Local neurologists have found that a new treatment almost doubles the number of patients surviving ischaemic stroke without disability.

The clinical trial, overseen by Professor Stephen Davis from the Royal Melbourne Hospital and the Florey’s Professor Geoffrey Donnan, and spear-headed by Dr Bruce Campbell and Associate Professor Peter Mitchell, was stopped early because of its success.

The study, known as EXTEND-IA, showed a dramatic improvement in restoring blood flow back to the brain, which is critical in the recovery of stroke.

“In 89 per cent of patients blood flow to the brain was restored when new ‘clot removal’ therapy was used compared with 34 per cent of patients who had standard clot-dissolving therapy alone,” Professor Donnan says.

Endovascular therapy involves inserting a small tube into an artery in the groin and feeding it up into the brain to capture the clot and remove it.

“The addition of stent therapy to standard clot-dissolving treatment led to 71 per cent of patients returning to independent living, compared with 40 per cent in the standard treatment group.

“This is an extremely impressive outcome given these patients had the most severe forms of stroke. It dramatically reduces the burden of disability.”

The most common form of stroke is an ischaemic stroke, caused by a clot blocking a blood vessel that supplies the brain. Stroke is the leading cause of disability in adults and the number two cause of death worldwide.

In the trial of 70 patients, the intervention group received a clot-buster (known as thrombolysis) then underwent the procedure. A new, minimally invasive stent device was fed up through an artery and then physically removed the clot.

Importantly, Professor Donnan says, CT imaging of patients was used to identify those patients most likely to benefit from endovascular therapy; we reduced the time from stroke onset to treatment and, finally, we improved the rates of clot removal.”

The study was conducted at 10 sites across Australia and one in New Zealand and was published in the New England Journal of Medicine.

“The challenge now is to implement endovascular therapy as a standard treatment for stroke across the country,” Professor Donnan says.

The Royal Melbourne Hospital, adjacent to the Florey Institute, treats approximately 500 ischaemic stroke patients a year and is one of the few stroke centres in the world to treat patients within 20 minutes of arriving in the emergency department.

Meditation after stroke

This edition of Brain Matters explores many areas of stroke research happening across the Institute. Here, we speak to Associate Professor Dominique Cadilhac who is seeking funding to improve the health and emotional wellbeing of people who have had a stroke.

Yoga and mindfulness meditation could provide a vital link to promoting wellbeing for those who have suffered a stroke, and this is the basis of a new research program being undertaken by researchers at the Florey, Monash University and the several South Australian researchers.

Stroke is a leading cause of death and disability globally and much research is being conducted at the Florey minimise its impact. It imposes a terrible burden of suffering for many survivors including physical impairments, psychological distress and the knowledge that another stroke could occur.

Dominique Cadilhac is acutely aware that many people who have had a stroke become depressed or suffer from connectivity in the brain and will also undergo blood tests to measure cortical levels, to detect changes in stress responses.

If funding is provided, the program would be designed to help people practise mindfulness meditation and yoga at home or in community settings.

Interested in helping to fund this project? Please call Margot on 1800 063 693.

Leading the way

Trailblazing stroke researcher Professor Julie Bernhardt has been honoured with a national award.

Professor Julie Bernhardt is the Change Champion of the Year in the NAB Women’s Agenda Leadership Award, 2015. Prof Bernhardt is the co-head of the Florey’s Stroke Division and the principal investigator of a massive international clinical trial involving more than 50 investigators with $5 million in funding. The trial has recently concluded and has supported early rehabilitation of stroke patients in hospital.

The award also recognises Julie’s inspiring leadership as a champion of female participation in science. In an industry typically dominated by men, Julie’s advocacy within the Florey’s senior faculty and across the organisation has been recognised. The award recognises the capacity of a man or a woman to “change the landscape for women within their organisation and across the Australian society”.

Professor Geoffrey Donnan and Professor Stephen Davis.

Professor Julie Bernhardt.
Brain recovery after stroke

The Royal Society has awarded Florey researcher, Dr Michele Veldsman, an opportunity to establish a new collaboration in Singapore.

Dr Michele Veldsman is excited to be taking state-of-the-art methods established within the Florey to Singapore where she will learn new ways of tracking disruptions to brain networks in patients with stroke and different types of dementia. The work, with the renowned Associate Professor Helen Zhou of Duke and National University of Singapore’s Graduate Medical School, will involve new ways to understand brain network changes after stroke. The award will also allow Michele to return to Singapore in 2016 to present the results of the collaboration to the International Society of Magnetic Resonance in Medicine. The brain is organised into functional networks of anatomically distinct regions that work in synchrony to coordinate movement, behaviour, memory and thought.

“We have collected imaging data from 135 stroke patients over three years following their stroke. Stroke breaks the highly interconnected wiring in the brain, but the brain is capable of reorganising these connections after stroke. “We will be asking: Do networks reorganise over time and do they reorganise or do they only degenerate?”

“We want to form a picture of long-term changes in the brain after stroke. This will help us develop more effective recovery and rehabilitation strategies that take into account how the brain changes over time. The work is also important because any methods we develop can also be applied to other neurological diseases that result in disruptions to brain networks, such as epilepsy, schizophrenia and autism.”

Dr Michelle Veldsman.

Sharing healthy brain knowledge with kids

Florey scientists regularly share their knowledge with hundreds of school children. Here, we learn of a few recent events.

Professor Trevor Kilpatrick has been awarded a generous incubator grant through the MS Research Australia Incubator grant program.

Professor Trevor Kilpatrick is proliferating a specific nerve cell receptor to understand how it prevents the development of multiple sclerosis. Professor Kilpatrick discovered that the receptor transduction protein TRPV1 regulates the function of Schwann cells that form the myelin sheaths around nerve axons; understanding the function of this receptor will lead to improvements in treatments for MS.

“We are excited to explore this study, as it summarises one of the key mysteries of MS: why does myelin degenerate in the spinal cord following an MS attack and how does the body regenerate myelin, and improve that activity. The effects of MS could potentially be markedly reduced. Our research may shed light on the biological mechanisms of the disease and its treatment implications. Multiple sclerosis is a chronic disease that affects many young people. In fact, 80% of anxiety disorders in young adults emerge during childhood and adolescence. Her collaboration with the Melbourne Neuropsychiatry Centre at the University of Melbourne will also help to take her science from the lab to the bedside.

“Tyrli felt honoured to receive this award,” says Despina. “It is an incredible opportunity for my career to be supported in this way, and I look forward to continuing my research to determine more effective treatments for adolescents who are particularly vulnerable to developing anxiety.”

Despina is passionately engaged in educating the public about neuroscience, especially in attention and anxiety disorders. This passion has won her engaging in community outreach, being invited to present in schools to over 1000 teenagers along with disadvantaged youth about neuroscience and mental health research. “It is important to reach out to young people and de-stigmatise mental illness.”

The Florey is grateful for the Baker Foundation, in making the Women in Science Fellowship available.

MS Research Australia incubator grant recipient, Professor Trevor Kilpatrick

‘Women in Science’ Fellowship awarded

The Florey’s Dr Despina Ganevlia has won the Baker Foundation’s ‘Women in Science’ Fellowship.

The award, co-funded by the Florey, recognises the particular challenges facing women working in scientific fields, and encourages women to soar and progress into leadership positions within research institutes.

This generous award acknowledges the excellence of Despina’s work and her rising star in the field. After completing her PhD with Despina over the past three years, as she aims to develop”.

Despina is also actively involved with the Equality In Science (EqSci) committee. As co-chair of the leadership working group, she is already involved in support of women within the scientific and research community in the Parkville area, and is actively working to identify and establish within the Florey scientists have also been speaking to year 12 students who visit the year-round Minds into program, in conjunction with the profile of the Lazarus and short brain function and this way the brain is affected during mental illness. Students and scientists which provides a unique opportunity for students to participate in the social and clinical psychology.

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Dr Michele Veldsman.

Bequests make a big impact

So many of us would love to be able to write a large cheque to help find answers to a brain condition affecting someone we know. But of course it’s not always possible.

But there is way you can make a lasting contribution, one that will live well beyond that cheque you’d like to write today. Just think... how good it would feel to know you had made a significant impact on our understanding of dementia or had helped to develop a new treatment for epilepsy.

The next time you review your Will, we would ask you to consider including a bequest to The Florey. The simple act of making a bequest to the Florey in your Will is probably one of the most visionary, generous and effective means of making a life-changing contribution you will ever make. Even a small percentage of your estate after you have taken care of your family, friends and those to whom you donate, will make a major impact on our understanding of the causes of brain disease.

You can also include a bequest gift without renewing your entire Will. Ask your legal advisor about adding a codicil.

We are often asked if a bequest can be directed to a particular area of research. The answer is “yes”. Supporting a particular project or research area of interest is always welcome, however, an unrestricted bequest to the Institute will add significantly to the corpus of our endowment fund where it will combine with others to create a powerful, long term investment. This may be named for your family or a future leader, and will support the development of our vision for brain research.

American and European Research Institutes are incredibly well funded thanks to the foresight and generosity of their funders over hundreds of years. The Florey is just 50 years old – but with the support of our visionary Brain Trust bequestors, we are well on the way.

So if you are at that time in your life when you’re ready to make new plans, please think of The Florey. If you would like to discuss the possibility of a bequest or gift, our Bequest Manager Irene Crebbin will be happy to talk to you about planning a personal visit to provide further information. Please contact Irene on (03) 8344 1478 on Tuesday, Wednesday and Thursday or by email at irene.crebbin@florey.edu.au.

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EAT TO CHEAT AGEING

Special guest speaker, dietitian and author Ngaire Hobbins

Thursday 16 July 2015
Day session — 11am, or
Evening sessions — 6pm

Ngaire Hobbins is a fully qualified and widely experienced dietitian passionate about encouraging people to relish great food in order to get the most out of life.

During her long career, Ngaire has become inspired to counter the poor awareness of the unique nutritional needs of our bodies in our senior years so that we can thrive instead of suffering unnecessary physical and mental frailty and decline.

“When you really think about it, pretty much everything you hear about health on radio and TV, in magazines and newspapers and even from lots of health professionals, is aimed at younger adults,” says Ngaire. “Of course it’s absolutely critical that people do all they can to help themselves live active, healthy lives and that doesn’t change as you get older. But your body changes, and with that your nutritional needs. This is rarely taken into account when messages about health and diets are promoted.”

In writing Eat To Cheat Ageing, Ngaire examined the scientific research to get a clear picture of the issues faced by ageing bodies and brains, then combined her clinical experience and skills at translating scientific language into consumer friendly speak. The result is a book to help older people make the most of life.

Cost
Free – donations appreciated

Bookings essential
By phone 8344 9679
Online www.florey.edu.au

Venue
Ian Potter auditorium,
The Florey, 30 Royal Parade, Parkville.
(opposite the Royal Melbourne Hospital).

Thank you

The Florey thanks our recent donors who kindly donated $500 or more between January and May 2015.

The Rebecca L Cooper Medical Research Foundation Ltd • Pierce Armstrong Foundation • Harold Mitchell Foundation • Lord Mayor’s Charitable Foundation • Motor Neuron Disease Research Institute of Australia Inc • Sylvia and Charles Viertel Charitable Foundation • Motor Neuron Disease Association of Victoria • Gandel Philanthropy • The Baker Foundation • The Florey Foundation • Macquarie Bank • TSA Group • Bloomberg L P • Golf Select • The Dowd Foundation • The Yulgilbar Foundation • Rotary Club of Box Hill Central • Golf Victoria • Alzheimer’s Australia Dementia Research Foundation • StepAhead Australia • H & K Johnston Family Foundation • Everyday Hero • OK Foundation • Stafford Fox Medical Research Foundation • Reliable Plumbing Services • Joy to the World Foundation • Sid & Fiona Myer Family Foundation • The Myer Foundation • Mr Andrew Abercrombie • Mr Michael Atkin • Mrs Alexandra Ali • Mr Charles Allen AO • Miss Marilyn Armstrong • Mr Nick Barton • Mr Walter Beale • Mr & Mrs Roger & Jennifer Beer • Mr Neville Beer • Mr Marc Besen AC & Mrs Eva Besen • Mr Graeme Bowker • Miss Elizabeth Butt • Ms Jenni Carr • Mrs Faye Clarke • Mr & Mrs J L & E S Cleland • Mr John Collatt • Mr Mark Costello • Dr Andrew Guthbertson • Dr Christopher Deelely • Mr Mark Dewsnup • Mr Gordon Dickinson • Robert Dimattina • Mrs Rose Downer • Mr Craig Drummond • Mr Anthony Duggan • Mr Andrew Erikson • Mr David Eterovic • Mrs Evelyn Fawcett • Dr Andra K Fryday • Ms Rosemary Geer • Ms Shirley Gionfriddo • Ms Andrea Goldsmith • Mrs Helen K Groves AO • Prof Andrea Hull AO • Mr & Mrs George R & J M James • Mr & Mrs John Johnston • Mr & Mrs D & M Kaufmann • Mr Peter Kelly • Ms Dorothy Levinson • Mr Brian Little • Mr Chris Lynch • Mrs Pat & Mr Ken McLaren • Mr Ian McNally • Dr Alan & Mrs Maureen McPhate • Amanda Minns • Ms Hazel Moyes • Dr Bruce & Mrs Judy Munro • John Murphy • Dr Brendan Murphy • Mrs Evelyn Fawcett • Dr Andra K Fryday • Ms Rosemary Geer • Ms Shirley Gionfriddo • Ms Andrea Goldsmith • Mrs Helen K Groves AO • Prof Andrea Hull AO • Mr & Mrs George R & J M James • Mr & Mrs John Johnston • Mr & Mrs D & M Kaufmann • Mr Peter Kelly • Ms Dorothy Levinson • Mr Brian Little • Mr Chris Lynch • Mrs Pat & Mr Ken McLaren • Mr Ian McNally • Dr Alan & Mrs Maureen McPhate • Amanda Minns • Ms Hazel Moyes • Dr Bruce & Mrs Judy Munro • John Murphy • Dr Brendan Murphy • Mrs Dennis & Mrs Farlie Nassau • Mrs Helen Ng • Christina Nicholas • Mr John & Mrs June Nixon-Smith • Mrs Sue O’Neill • Mrs Judith Ovebeek • Mr John Paterson • Mrs Janet Povlakos • Mr Nigel Peck AM & Mrs Patricia Peck • Mr Roland Pless • Mr Tom Pouton • Mr Ralph & Mrs Ruth Renard • Carol Richardson • Mr Donald Sanders AO • Graham Senior • Mr David Shaw • Joan Shmith • Mr Stephen Spargo • Mr Rob Stewart • Ms Betty Stinson • Dr & Mrs Gregory & Wendy Taggart • Mr Robin Taylor • Mrs Jean Thomas • Dr Michael Troy • Mr Brian Watson • Professor James Wiley • Mrs Simone Winter