



# Brain Health Research Centre

Te Pokapū Rakahau Hauora Hinekarō

Newsletter June 2017

For regular updates visit our website: [otago.ac.nz/bhrc](http://otago.ac.nz/bhrc)



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## Giant Grant for New Parkinson's Disease System

Sometimes, great research starts as an impossible dream. At least, that's how John Reynolds' Parkinson's disease treatment project began.

Current methods of treating the disease, while effective for a short time, come with significant side-effects. John and his colleagues Brian Hyland and Jeff Wickens believed that those side-effects could be minimised if there was a way to release the necessary chemical, dopamine, in patterns similar to those found in unaffected brains. In theory it sounds simple to make the brain release dopamine the way it used to, however, the main issue in Parkinson's disease is that the cells responsible for making that chemical die off. Dopamine doesn't exist in the parkinsonian brain the way it did before, so you have to find a way of getting dopamine in from the outside.

The team dreamt of a device that could deliver dopamine directly to the brain, and release it in a natural pattern. And then John and his Otago colleagues set to building it. The project was, and still is, huge. They needed to work out how to get the dopamine-like neurochemicals to release at the right place and at the right time, and how to release it as naturally as possible.

Those original projects, and the funding to test them, began in 2007 and quickly became a collaborative challenge spanning departments

of Anatomy, Physiology, Chemistry and Pharmacy. The work turned into a series of puzzle piece projects which, once completed, will all slot together to prove that this novel treatment delivery system was more than just an optimistic theory. The work moved forward for seven years, slowly fitting itself together, but in 2014 John and his team found themselves treading water. All of the puzzle pieces were complete, but the funding bodies weren't biting.

In an interview with Kathryn Ryan, on RadioNZ, John explained their situation and a couple of hours later he received a phone call from a charitable trust offering him the money to prove that the finished device would work. It was the last thing he had expected, but it saved their momentum and allowed the research to continue.

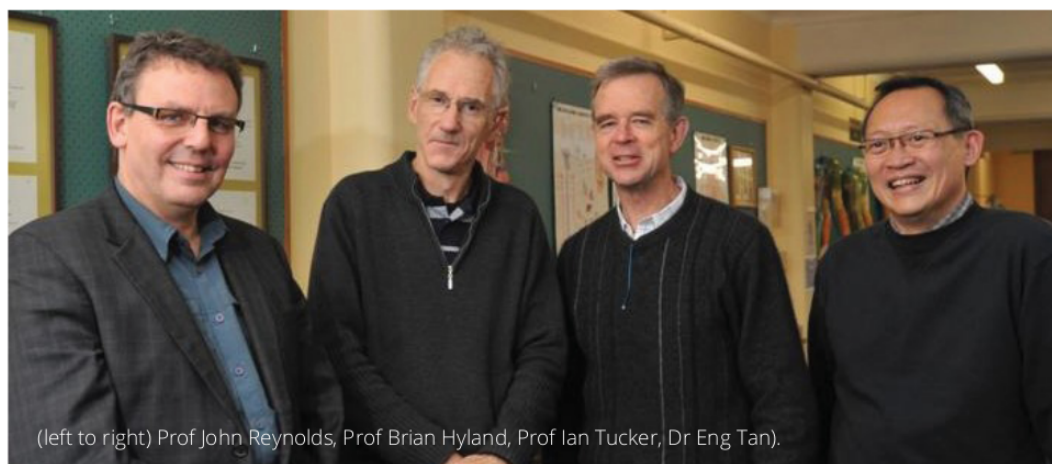
That donation gave them the time and resources to prove their product could be successful. So successful, in fact, that last year John and his Chemistry colleague Eng Tan were awarded a \$4.8 million dollar grant by the Ministry of Business, Innovation and Employment's Endeavour Fund to turn their device into a human ready product. It has been a long road, and the work is far from over, but thanks to the support of the government and the community this dream is getting closer to becoming a reality.

## Brain in brief

### Your Imaginative Brain

What would we see inside your brain? This year the BHRC are running an artwork competition inspired by our 2017 theme 'Neuroscience: A Window into the Brain'. The winners will be announced 7 June, 5.30pm at the Dunedin Public Art Gallery, before a public lecture by Professor Donna Rose Addis titled 'The Imaginative Brain'.

Visit our website to download the entry form and read more information: [otago.ac.nz/BHRC](http://otago.ac.nz/BHRC)



(left to right) Prof John Reynolds, Prof Brian Hyland, Prof Ian Tucker, Dr Eng Tan).

# Brain Week 2017

We're very proud to report that Brain Week 2017 was a smash hit! Over 1000 individuals attended events about brain health and disease across the week, packing into lecture theatres and community rooms across Dunedin! The week began with the giant inflatable brain on display in the Octagon where passers-by, a gaggle of primary school children, and workers on their lunch breaks gathered around to learn more about how their brains worked. As always, the real draw were the Brain Day lectures and displays at Otago museum.

We would like to thank the Neurological Foundation of New Zealand, Otago Museum, our incredibly generous BHRC speakers, and the great network of Dunedin community groups for their hard work. We look forward to another exciting week of brain-themed lectures next year.

If you missed any of our brain week lectures, or would like a refresher, visit our website for articles on the events. [otago.ac.nz/BHRC](http://otago.ac.nz/BHRC)



## Welcome CNE Members

We would like to officially welcome members of the University of Otago Centre for Neuroendocrinology as associate members of the BHRC. This new partnership opens up further opportunity for communication and collaboration between neuroscientists here at the University of Otago, and we could not be more pleased to have these amazing researchers coming on board. Keep an eye out for articles about their work, and if you'd like to learn more about them in the meantime visit our staff webpage: [otago.ac.nz/bhrc/staff](http://otago.ac.nz/bhrc/staff)

## News in brief | Online articles

If you would like to read more about our researchers and the work they're doing visit our website, Facebook page, or follow us on twitter. We publish a new article online every Wednesday to keep you up to date with what is happening here at the Brain Health Research Centre.

[otago.ac.nz/bhrc](http://otago.ac.nz/bhrc)

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# 2017 Helen Rosa Thacker Scholar – Richard Prentice

Richard Prentice is in his second year of a PhD in pharmacy, working with Dr Shakila Rizwan. His project, which won him the 2017 BHRC Helen Rosa Thacker Scholarship, tests a new way of delivering epilepsy medication. If Richard's experiments prove successful they could vastly improve the lives of thousands of people living with epilepsy.

In order to minimise the chance of having a seizure, people diagnosed with epilepsy take anti-epileptic medications. In most cases these medications have to be swallowed and absorbed into the blood before they can make their way into the brain. It is a slow and inefficient process. "People have to have a high level of the drug in their system at all times," Richard explains, "in order to allow a very small amount to make it to the brain and be there to counteract seizures." This wouldn't be an issue except that the side-effects of

anti-epileptics range from mild, like fatigue, to extreme, such as liver failure.

The system which Richard and his supervisors are testing is different. Instead of going through the blood, they're taking advantage of the only relatively open route to the brain; the nose. This method could eliminate the need to have high doses of anti-epileptics in the rest of the body at all times, vastly reducing negative side-effects and complications.

The Helen Rosa Thacker Scholarship provides \$5000 in funding which Richard will use to visit with his co-supervisor, Associate Professor Nigel Jones, in Melbourne. His time spent with Assoc Prof Jones will provide him with the skills necessary to test this new method of administering anti-epileptics.

## Beth Cobden Cox grant funds results

In 2015 the Ellis family contacted the BHRC to establish the Beth Cobden Cox Research Grant in memory of their wife and mother who passed away from fronto-temporal dementia (FTD). The grant is intended to support research into FTD, in the hopes of identifying the causes of the disease.

Associate Professor Ping Liu, a BHRC researcher who primarily looks at Alzheimer's disease and schizophrenia, was awarded the inaugural grant and now, less than a year later, has made significant progress.

The symptoms of FTD appear to be caused by proteins called 'tau', which normally help your cells to form correctly. However, in diseases like Alzheimer's and FTD these proteins clump together and make it

difficult for cells to function. One of Ping's American colleagues found that a naturally occurring chemical, called spermidine, stopped these clumps from forming. Ping set out to determine whether spermidine concentrations in the brain were altered in FTD.

Using an animal model of FTD Ping discovered something quite remarkable. All the chemical precursors for spermidine were higher than normal, but the level of spermidine itself hadn't changed. This means that the brain had increased all the ingredients to make spermidine but for some reason it just wasn't being produced. In the next stage of testing Ping hopes to learn what exactly is preventing this chemical from being created. This information could finally provide some answers about the cause of this devastating disease.



## Message from our Director

Professor David Bilkey

I hope that you will enjoy reading about the exceptional brain research that is being conducted by BHRC groups at the University of Otago. In this newsletter you will find out about Professor John Reynold's group's success in gaining support for their Parkinson's disease treatment project as just one example of how these projects are evolving. Projects like this depend on hard work conducted by teams of researchers led by people like John who have the vision to try something bold and innovative. Critically, these projects and the teams of people that drive them are also dependent on having adequate financial support. Many researchers struggle to maintain funding for their research programmes and leading a research group can often feel like a continued battle to keep one's team together through these financial constraints. As you will see as you read the article about John's work, however, sometimes support can come when you least expect it. In his case, members of our community were prepared to back him through a time when things looked a little dire. This kind of support is valued highly by all of us, and it can make a big difference. If you would like to help too, please

give us a call or have a look at the information on the back of this newsletter.

Speaking of teams, it is with pleasure that I welcome members of the University of Otago's Centre for Neuroendocrinology on board as associate members of the BHRC. You'll be hearing much more about the exciting research that this group is conducting over the next few months as we highlight some of their work. Finally, it is with regret that we all say goodbye to one of our team members, Irene Mosely, who is leaving the BHRC. As you will read in this newsletter, Irene has performed a stellar job over the last four years, working with us to help develop our connections into the wider community, including having a major role in organising Brain Week. We have very much enjoyed having her working with us and wish her all the best for the future!

The brain is a storm of electrical energy. Signals sent from one brain cell to another result in a change in their electrical charge. The change in each individual brain cell is too small to be detected from outside the skull, but if electrodes are placed on the scalp we can detect the electrical changes produced by large groups of brain cells. This is the basis of electroencephalography, or EEG, one of the basic methods of examining brain function.

By using EEG scientists and clinicians can examine electrical activity in the brain and determine whether it is normal or abnormal. The information it provides it not as anatomically precise as a technique like MRI, but it does capture events on a much finer timescale and in some cases it is a much more practical choice. An EEG monitor can be worn for hours in order to track brain activity and doesn't restrict movement as much as other techniques. This makes it ideal for identifying unpredictable problems like epilepsy and sleep disorders. It is easier for a person to fall asleep with electrodes on their scalp than in a loud MRI machine.

Looking into the brain doesn't have to mean seeing it with perfect clarity; sometimes the best tool is the one which gives you the most flexibility.

Alas, Irene Mosley, our wonderful communications coordinator, is leaving us. Irene has worked tirelessly with the BHRC over the past four years to coordinate public outreach, raise



and brain health in general. She has also worked to help secure funding for some of our research projects. Her enthusiasm and skill helped to develop Brain Week in Dunedin, and foster strong relationships between the BHRC and the wider Otago community.

Irene's guidance and strategic eye have been an invaluable asset. We wish her the very best as she moves on to new projects. Irene is currently Chair of the Taieri Communities Facility Trust, charged with the task of developing a new aquatic complex at Mosgiel. Having seen the incredible work she's capable of, we're sure that her future will be very bright indeed.

Brain Health Research Centre  
University of Otago

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The Brain Health Research Centre has over 200 researchers all based at the University of Otago. Supporting our researchers keeps your donation in Otago and helps our team continue their work. There is so much about the brain that we are still finding out. Your donation helps us unlock those mysteries.



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Gifts of \$5 are tax deductible. An official receipt will be issued.  
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**Brain Health  
Research Centre**

Te Pokapū Rangahau Hauora Hīnengaro

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