



Brain Health Research Centre

Te Pokapū Rakahau Hauora Hinekaro

Newsletter April 2016

For regular updates visit our website: otago.ac.nz/bhrc



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Recent awards



Dr Simon Fisher has been awarded the annual BHRC Young Investigator Award for 2016. Working in Associate Professor John Reynolds' Anatomy laboratory, his work focused on the action discovery process, which is how the brain learns new tasks.

Dr Fisher examined the way areas within the basal ganglia, a part of the brain responsible for movement, determine what is and is not important when learning a new task. The information Dr Fisher has produced has greatly improved our understanding of how the brain learns to control movement. This area of research is hugely important in helping understanding movement disorders such as Parkinson's disease.

We are very proud of the work Dr Fisher has completed and look forward to seeing how his work evolves as he continues his career in research.

Food and the brain

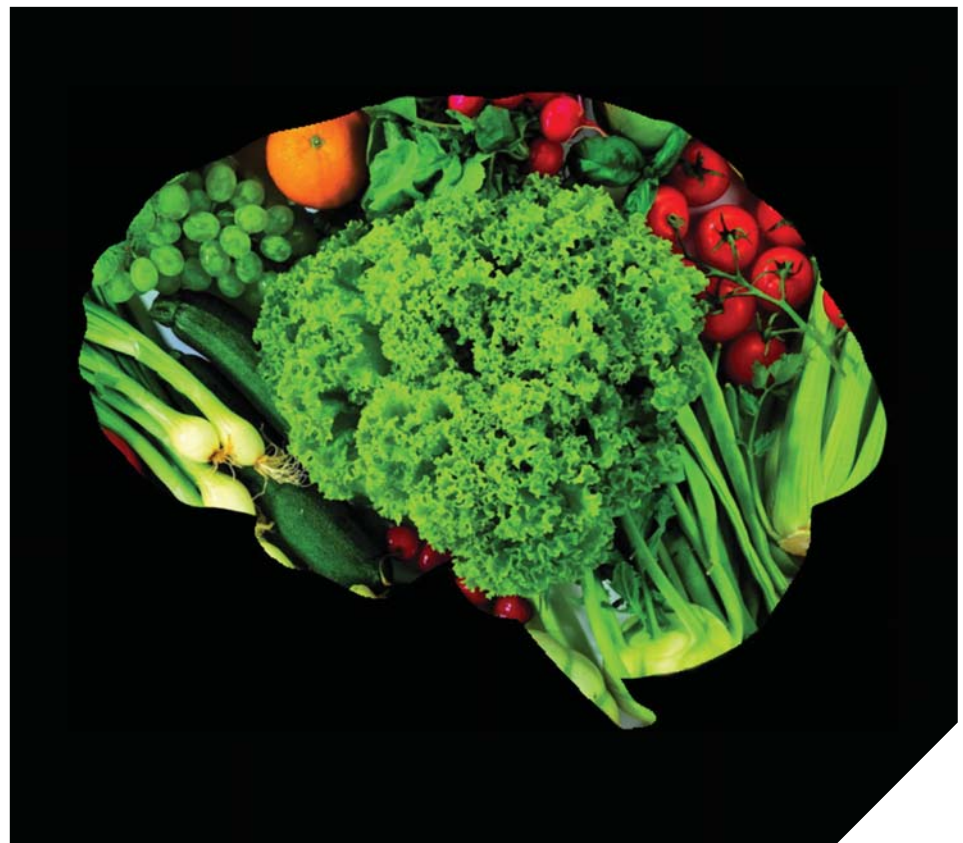
From the extra spoonful of sugar in your coffee to the shortcut you took on your walk to work, your brain is constantly calculating energy flow in and out of your body. The level of accuracy is to within 16 calories. This is the equivalent of 1/4 of an apple a day. Most people eat more than 1 million calories per year. To maintain our body weight the brain needs to match energy input to energy output. To gain a single kilogram over the course of a year the brain has to be miscalculating by 6000 calories, even then, it would be 99.4% correct.

Your brain is biased towards keeping your weight up, it doesn't understand that nowadays food is plentiful and exercise sparse. It is waiting for a new famine, working to keep your energy high just in case, which is why dieting can be so difficult.

Professor Dave Grattan (Centre for Neuroendocrinology, Otago University), shared

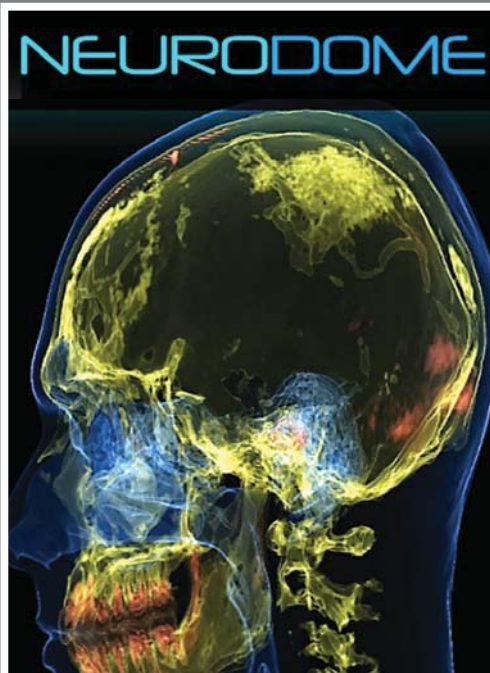
his research in this area during Brain Week. The reward centres in our brain that are activated by food are moderated by how much our body needs food when we eat it. If we are extremely hungry when we eat, there is a much greater reward than when we're not hungry.

This feedback system is linked to several other hormonal systems in our body. The hormone leptin is produced by fat and signals to your brain when you have had enough food. If your body doesn't produce leptin, or your leptin levels drop because you have lost weight, the brain believes that you are starving and will make food more rewarding. The hormone ghrelin is produced when the stomach is empty. This makes you feel hungry and incentivises eating. There is some evidence of ghrelin dysfunction in eating disorders such as anorexia. It is via this combination of hormones and reward pathways that the brain is able to do such a good job at maintaining body weight.



Brain Week wrap up

Brain Week 2016 has been a blast for everyone involved. From the inflatable Brain in the Octagon to the Brain Day events at the Otago Museum. Held in conjunction with Neurological Foundation events, everything was well attended. Over 1300 people attend at least one event or activity during the week. We would like to thank the Otago Museum, Neurodome USA, The Neurological Foundation and all our BHRC speakers and volunteers.



The intricacies of epilepsy



Associate Professor Beulah Leitch and Associate Professor Graeme Hammond-Tooke, both members of our centre, were guest speakers at our recent clinical issues seminar.

Their presentation covered the clinical aspects of epilepsy and the long history of epilepsy in human societies. Some of whom had gods dedicated to the illness. Even in the 21st Century, this is a condition that is not only difficult to diagnose but also particularly difficult to treat. The range of seizure types experienced by sufferers includes physical seizures impacting single parts of the body, or the whole body, to seizures that can remove or alter a person's cognition.

Clinicians use MRI, CT, and X-ray to determine whether the seizure is being caused by an injury of

some type and if no other cause can be found then the individual is diagnosed with epilepsy. Due to the breadth of seizure types there can be no 'catch-all' treatment and the reality is that up to 30% of sufferers will be treatment resistant.

By keeping communication lines open between researchers and clinicians we stand a much better chance of developing more effective treatments for difficult disorders, such as epilepsy. We would like to thank both Assoc. Prof Hammond-Tooke and Assoc. Prof Leitch for doing their part in maintaining that communication.

More information about this seminar, including the information covered by Assoc. Prof Beulah Leitch, will be available on our website: www.otago.ac.nz/bhrc



The science behind muscle deterioration

Associate Professor Phil Sheard, winner of the 2016 Otago School of Medical Sciences distinguished academic teacher award, spoke to members of MS Otago during Brain Week in March. His topic related to how muscles weaken with age. He explained that as we age the muscle fibres that make up our muscles are degraded in two different ways: muscle fibre atrophy (shrinkage), and muscle fibre death.

Fibre atrophy occurs when the nerves driving the muscle fibre detach or die. Muscle atrophy might, therefore be primarily a consequence of a problem with the nerve, a possibility he is actively investigating. Loss of the nerve prevents the fibre from contracting with the rest of the muscle, and because the fibre is not being used, it shrinks. Muscle fibre death is as the name suggests, and seems to be the result of the fibre losing its ability to recycle proteins in the normal manner. By contrast with atrophy, dying fibres usually still have their nerve attached.

As we age, the number of fibres that die or shrink progressively increases. This reduces the amount of strength we can get from our muscles as more and more of the muscle becomes unusable. However, there is some good news. Both of these effects can be minimised by exercise. The more a muscle is used, the more those fibres are maintained, and the less they will deteriorate. Muscles will continue to grow weaker over time, but we do have some control over the extent of this weakness and the rate of its progression. Even when we have been diagnosed with neurological conditions that can impair our muscles, 30 minutes of exercise each day can make a difference in helping us to stay mobile and more active for longer.

For more information about this lecture, and other Brain Week events, visit our website: www.otago.ac.nz/bhrc/news/



Message from our Director

Professor David Bilkey

As you will see from reading through this newsletter, we have already had a very busy year. Brain Awareness Week has been a major focus and it is great to see it increase in popularity each year. One of the stand-out events for me this year was the Neurodome showing, held in the Perpetual Guardian Planetarium. This was an animation of brain anatomy and physiology that was derived from real data. It allowed for a head-spinning look inside the brain, highlighting some of the important structures and processes. Thanks to the Otago Museum for supporting this initiative and I'm very much hoping that we can proceed with similar events in the future, as it turned out that there were many more people wanting to see the show than we had spaces for. Apologies to those who missed out! A further highlight from the last few weeks is being able to award the BHRC Young-Investigator Award. Simon Fisher received this for his work on how the brain learns to perform actions and then

associate those actions with outcomes. Simon presented his work to a full-house at the University and in doing so made it abundantly clear why he deserved this honour. It's also been great to add some new members to the BHRC team. Welcome to Blaise Turner-Parker and Lynnette Holland in the office and Assoc. Prof Colin Brown as a member of our research team. Finally, thank you for your support. Conducting research in NZ is difficult at the moment because of funding constraints. As a result, we are particularly appreciative when we receive support from individuals such as yourself, who can see the importance of what we are trying to do, and are prepared to back us in that endeavour.

A handwritten signature in white ink that reads 'David Bilkey'.

What's coming up?

Oamaru

BHRC scientists Dr Louise Parr Brownlie (pain) and Dr Margaret Ryan (memory) will be speaking at the Brain Health Forum at Oamaru Hospital Meeting room on Thursday 12 May, 10.30am til 3.30pm. Please register by contacting liaison.dunedin@brain-injury.org or calling 03 471 6154. Numbers limited. Gold coin donation.

Dunedin

“Science for a healthy brain” – Wed 8 June, 5.15pm – 7pm Dunedin Public Art Gallery. Our annual conference opens this year with a range of speakers. More details to follow. To register contact Lynette on 03 479 4046 or email: bhrc@otago.ac.nz

International Science Festival – Saturday and Sunday 9-10 July. Our giant brain and some of our team will be on site at the St David Lecture Theatre Complex to answer your questions and share the latest from our researchers as part of this week.

Queenstown

The Catalyst Trust's “Question It” week will have a Neuroscience theme in 2016 with several events and activities. Save the date 29 August – 2 September. More information will be released as the programme is finalised.

CONTACT INFORMATION

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Staff news



If you call or email our centre you will likely be greeted by Lynette Holland, our new administrative assistant. Lynette is filling in while Jane Reynolds is taking time out. After having moved to Dunedin mid 2015 with her family she is enjoying getting to grips with all things brain-related at the centre. Blaise Turner-Parker has also joined our team, as a science writer. Blaise graduates in May this year with a Bachelor of Science majoring in Psychology. She also has a diploma in Neuroscience and will be adding regular contributions to our website, newsletter and Facebook page.

Professor Colin Brown, originally from Scotland, has been part of the University of Otago Physiology Department for the past 11 years and has now joined the BHRC. He and his team are investigating how the brain controls bodily functions including birth, lactation, and hydration, particularly through the hormones oxytocin and vasopressin. We look forward to bringing you more information about his work and progress in the near future.



Help us to help you

The Brain Health Research Centre has over 200 researchers all based in Dunedin. 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.



Yes, I would like to support the Brain Health Research Centre

I would like to give the following gift:

\$30 \$100 \$250 Other \$ _____

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Street address: _____

Suburb: _____ Town/City: _____

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My cheque is enclosed made payable to the BHRC University of Otago Foundation Trust, or please debit my: Visa Mastercard

Card number: Expiry: /

Name on Card: _____ Signature: _____

Gifts of \$5 are tax deductible. An official receipt will be issued. You can also donate online, account number 03 0175-0660254-00 or phone 64 3 479 4150. Brain Health Research Centre, University of Otago, PO Box 56, Dunedin 9054, New Zealand.



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- I would like to make regular donations by automatic payment
- Please accept this one-off gift to support the BHRC
- Please send me information on how I can support the BHRC through a gift in my will
- Please send a card, informing of my gift to brain research, given in their name to:

Thank you for generously supporting the Brain Health Research Centre