Brain Health Research Centre

Te Pokapū Rakahau Hauora Hinekaro

Newsletter May 2015

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Regular exercise improves brain function at any age

Dr Liana Machado

BHRC researcher Dr Liana Machado noticed over the years that university students were looking less and less fit. This led to her wondering whether the poor fitness could be negatively influencing their cognitive abilities. Brain cells depend very heavily on oxygen. And reduced oxygen is associated with poorer cognitive performance.

Utilising a sample of 52 healthy female university students, she assessed their physical activity levels, oxygen availability in the frontal lobe, and cognitive performance.

Statistical analyses positively linked physical activity levels with oxygen availability in the frontal lobe and cognitive inhibitory control. In addition, higher levels of oxygen in the blood were linked to better performance for the most difficult cognitive tasks.

Or in simpler language – regular physical activity improved brain function, even in people at their developmental prime. "It is well known that as we age the brain deteriorates in terms of structure and function, and thus it is not particularly surprising that the brains of older adults would benefit from regular engagement in physical activity. Given that the development of the brain peaks in young adulthood, it is quite surprising that there would be room for improvement in brain function in healthy young adults," she says.

Her study suggests that moderate physical activity (including brisk walking) at least 5 days a week for at least 30 minutes may be all that is needed to gain benefits with respect to brain function (vascular and cognitive). She is interested in learning whether the same applies to young men, and whether more vigorous activity is linked with greater cognitive performance.

News in Brief

BHRC Director appointed to Marsden Fund Council

Congratulations to Professor David Bilkey who has recently been appointed by the Minister of Business, Innovation and Employment to the Marsden Fund Council as convenor of the Economics and Human and Behavioural Sciences panel. The role of the Marsden Fund Council is to assess and recommend funding for research proposals each year, providing strategic direction, and ensuring the relevance and importance of Marsden-funded research is clearly understood," says Mr Joyce. It is a three year appointment.

Research Volunteers

Thank you to everyone who responded to our request for people willing to help with some of our students' research. We now have a database of volunteers, with a healthy active brain. This means our researchers will spend more time on their projects, and less time looking for volunteers. We are still looking for more people in their mid-70s to take part as controls in a Parkinson's study. If you have no known neurological conditions and would like to take part please contact Jane 03 479 4066 or bhrc@otago.ac.nz.

Thank you to our Brain Week partners

Otago Museum, the Neurological Foundation and the combined brain agencies in Dunedin all worked with us to develop a great week of events and activities for Brain Week 2015. We appreciate everyone's involvement and the public response to our week. A thank you to the Catalyst Foundation and U3A in Queenstown for helping bring Professor Dirk De Ridder to Wakatipu high School, where he was well received by the students.

If you would like an event to come to your town, please let us know. We are happy to work with you to find speakers and help facilitate brain events to raise awareness of research and a healthy brain.

Brain repair continues long term with stimulation

Professor Michael Nilsson

Current research points to significant plasticity of the brain, offering opportunities for ongoing function recovery, even years after stroke or brain injury. This was the message from BHRC researcher Dr Andrew Clarkson and visiting Professor Michael Nilsson, University of Newcastle in Australia, when speaking in Queenstown during Brain Week.

Prof Nilsson has been involved in a project in Spain which has highlighted that physical, social and cognitive stimulation, along with outdoor activity are the pillars of brain recovery. The first three months of rehabilitation are the most vital but improvement can continue with ongoing stimulation and therapy. "Art, music and dance all act in positive ways on our central nervous system. Nothing activates the brain quite like it. It liberates so many good substances." Professor Nilsson said.

Swedish research using military conscripts has shown that higher physical fitness levels at age 18 were highly correlated with higher IQ and lower dementia, stroke and depression incidents in later life. Physical activity levels at this age set up central nervous system resiliency for the rest of an individual's life, Professor Nilsson said.

Both researchers believe that in the future, rehabilitation for stroke, dementia and brain trauma should be highly individualised, in response to a person's particular brain, culture and body make up – rather than the generic approach currently undertaken.

Musica in Cerebro

Brain Week launched a collaboration between Mozart Fellow Jeremy Mayall and the BHRC. Together we were able to show the audience just what our brain waves sound like and how they look when listening to music. Volunteer PhD student Thomas Elston was wired to an EEG and those waves were beamed on to the big screen as he listened to the composition Jeremy had composed especially for Brain Week. Everyone was amazed at how instant the brain's response was to the Sforzandos, or cascading arpeggios. The audience was also able to experience their own thoughts and feelings being influenced by the music. We hope to repeat this event some time in the future.

Traditional games shown to have real purpose in children's ability to learn self-regulation

Dr Dione Healey from the Dept. of Psychology at Otago University was a guest speaker during Brain Week this year. An evening session on resilience and behaviour modification in children showcased Dr Healey's work in the development of a series of games designed for families to play together and help teach hyperactive children to regulate their own behaviour. ENGAGE (Enhancing Neurobehavioral Gains with the Aid of Games and Exercise) includes many games you will recognise including musical statues, leap frog and memory games. Others have similarities to charades, follow the leader and Simon says. These encourage taking turns, following instructions, participating together and interacting in a positive manner. The aim is also to help teach emotional self-regulation through relaxation and deep breathing exercises. Chat Bus director Averil Pearse, who co presented with Dr Healey, said she has found that many children do not know how to breathe deeply to help relax. Simply teaching this technique can help children cope in stressful situations.

An initial trial of Dr Healey's programme showed that using the ENGAGE programme led to significant reductions in ADHD symptoms and improvements in neurocognitive functioning. Indications are that improved behaviours were consistently maintained for 12 months after the intervention, suggesting long-term improvements in self-regulation abilities.

Dr Dione Healey

Message from our Director

Professor David Bilkey

The year has certainly kicked off to a great start and looking back, there are three things that stand out for me. The first the range of interesting visitors who have visited the centre to present in both public and researcher-oriented seminars. Most recently, Professor John Forsayeth from the Department of Neurological Surgery at the University of California in San Francisco gave a fascinating and wide-ranging talk on potential causal factors in Parkinson's disease. This was followed by a discussion with many of our younger researchers on the trials and triumphs of getting a potential treatment from the lab, into the clinic. He was an engaging speaker and really captured the attention of our emerging researchers.

A second, major focus of the year has been Brain Awareness Week. The BHRC contributed many speakers to the week. Topics were diverse, including how soldiers' head gear has developed since WW1, a debate on the merits of brain versus brawn, and a real-time viewing of the response the electrical signals in the brain have to novel music. This latter event, conducted in collaboration with the University of Otago Mozart fellow, Jeremy Mayall was a chance to meld science and art in a most enjoyable way. You can read more in a separate article in this newsletter.

Brain Week is an important part of the BHRC's mission for public outreach and we are already discussing ideas for even better engagement next year.

Finally, a particular treat has been the chance to announce this year's BHRC Young-Investigator award. Dr Owen Jones received the award for his work on how neurons in the brain might communicate with each other through pathways that just a few years ago were largely ignored. This work will be important for understanding both how the brain stores memories and what goes wrong at a neuronal level when that process fails. Well done Owen, we are glad that we are able to celebrate your successes and we look forward to seeing how your research develops over the next few years.

What's coming up?

Dunedin

'The neurobiology of reward and motivation'
5.30pm – 7pm, Wednesday 3 June
Public seminar
Dunedin Public Art gallery
Guest speaker:
Professor Lique Coolen,
University of Mississippi, USA.

Alexandra

'Understanding Pain'
10.30am – 3pm, Tuesday 9 June
Community House, Centennial Ave, Alexandra
Dr Louise Parr-Brownlie, from the Brain Health Research Centre will be speaking from 10.30 – 11.30am. A forum open to all. There are a number of other speakers throughout the day. For more details contact Jane 03 479 4066.

Queenstown

Research Week starts 29 August.
We are planning to host some seminars in Central Otago during this week. Mark your diaries, more details to follow

CONTACT INFORMATION
To support the work of our centre, donations can be sent to the address below.

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Supported by:
NEUROLOGICAL FOUNDATION OF NEW ZEALAND

BHRC supporter walks Pacific Crest Trail USA

Dr Julie Lawrence, a research fellow at Dunedin School of Medicine has always loved hiking and adventures. In early April she left NZ to take on the ultimate adventure, walking the Pacific Crest Trail. This trail follows the Sierra Nevada and Cascade mountain ranges stretching from the Mexican border to Canada and will take around five months to complete. Julie made the decision to raise funds for the BHRC as she walked. "Alzheimers is such a cruel disease, it strips away your memories, identity and humanity. By walking in memory of my father and raising money for brain research along the way it makes it all the more rewarding," Dr Lawrence said before leaving for her ultimate challenge. The BHRC is following Julie's progress and as we go to print Julie has walked 150 miles and was coping well with snakes, reduced water supply due to drought and primitive conditions. Follow Julie at: takingalongwalk.wordpress.com/ To date Julie has raised over $500.


Dr Julie Lawrence

If you would like to support Alzheimer's research by donating, go to: **givealittle.co.nz/fundraiser/brainhealthjulielawrence#**

World War One helped shape future brain treatments

In 2015, there has been a swell of interest in ensuring we remember those who lived and died at Gallipoli. During Brain Week, Associate Professor Ruth Empson used her own family history to explore what it might have been like to sustain a serious penetrating brain injury in the battlefields of WWI.

The Great War also accelerated improved understanding and treatment of head, facial and brain injuries. Dunedin born Sir Harold Gillies and the English neurologist Sir Gordon Holmes, played major roles in the development of rehabilitation strategies.

Neuroscience is continuing to help doctors understand recovery from traumatic brain injury 100 years on. Soldiers in places such as Iraq and Afghanistan, who are exposed to non-penetrating blast injury to the brain, also benefit from this research. Professor Empson said: "It is easy to forget that head injuries are also common in the civilian population in NZ where a head injury takes place every 15 minutes. One hundred years on, we still have much to learn about the long term consequences of head and brain injury."