2018 Brain Week **"Your Amazing Brain"** programme

Tuesday 6 March – Sunday 11 March, Dunedin

TUESDAY 6 MARCH

7pm

- Alumni, Books and Conversation with Otago Lecturers - Musicophilia
  Professor David Bilkey
  The University Bookshop
  Seating limited, RSVP to events@unibooks.co.nz
  (6.30pm for 7pm start)

WEDNESDAY 7 MARCH

11am

- Successful Aging: Lessons learnt from LiLACS NZ
  Prof Ngaire Kerse
  Community House, 301 Moray Place

1-3pm

- Working with People with Mild Cognitive Impairment: The Ronnie Gardner Method workshop
  Prof Ngaire Kerse
  Age Concern, 26 Bath Street
  This will involve movement so make sure you are wearing loose clothing and sensible shoes. Booking essential: contact Jane Reynolds 03 479 4066 or bhrc@otago.ac.nz

5.30pm

- Living to 100 (with all your marbles)
  Dr Liana Machado, Prof Cliff Abraham, Prof Ngaire Kerse, moderated by Associate Prof Christine Jasoni
  Hutton Theatre, Otago Museum

THURSDAY 8 MARCH

11am-2pm

- BHRC Inflatable Brain with community brain agencies
  Upper Octagon

5.30pm

- Brain Tools from the Future: Genes, Machines and Viruses
  Prof Allan Herbison, Prof John Reynolds, and Dr Louise Parr-Brownlie, moderated by Associate Prof Christine Jasoni
  Hutton Theatre, Otago Museum

FRIDAY 9 MARCH

1.30pm

- Brain 101: A Users Guide
  Dr Blake Porter
  Community House, 301 Moray Place

SATURDAY 10 MARCH – BRAIN DAY!

- "Your Brain: The Secrets that Matter"
  Hutton Theatre, Otago Museum

10-11am

- Parkinson's Disease and the Chamber of Secrets
  Dr Louise Parr-Brownlie

11am-12pm

- Movement Matters, for your Brain and your Body
  Professor Ruth Empson

1-2pm

- An Anatomical Head: its impact on trauma research
  Professor Darryl Tong

2-3pm

- Concussion in Sport
  Professor John Sullivan

Meanwhile in the Atrium:

- Brain Displays All Day Long!

11am, 12pm, 1pm, 2pm

- Supersize Your Brain - How to Get better at Anything
  Dr Owen Jones
  Barclay Theatre

SUNDAY 11 MARCH

- "The Importance of Social Engagement in Ageing"
  Hutton Theatre, Otago Museum

12pm – free light lunch courtesy of Collaboration of Ageing Research Excellence (CARE)

1pm

- "Mrs Palfrey at the Claremont – Movie and Discussion"

3.30pm

- "How to optimise Brain Health"
  Prof Ted Ruffman, Dept of Psychology

4.30-5pm

Entertainment from "Dunedin 60+ Club"
Entertainers Group

Sponsored By:

Brain Health Research Centre Te Pokapū Rakahau Hauora Hinekaro | Brain Research New Zealand Rangahau Roro Aotearoa | OTAGO museum | Neurological Foundation of New Zealand

Brain Health Research Centre

Te Pokapū Rakahau Hauora Hinekaro

University of Otago Te Whare Wānanga o Otāgo New Zealand

Newsletter Autumn 2018

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

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Do you see what I see?

The saying goes: what you see is what you get. But according to visiting academic Prof Jeff Zacks, Washington University of St Louis, what you see isn't even really what you see. During his public talk, *Flicker: your brain on movies*, Jeff discussed the relationship between films, audiences, and our visual systems. Film has been created and shaped purely for human entertainment. It is optimised to get the best reaction from the audience, and so by examining film Jeff has been able to extrapolate information about how we process the visual world around us.

Our visual systems are masters of deception, used to creating consistent streams of visual information from fragments. "We're functionally blind for about a third of our waking lives," Jeff says, "between blinking and [eye movement] our vision is pretty choppy." The inconsistent nature of our vision has forced the brain to come up with systems of coping, some of which are copied by film.

We piece together fragmented scenes into a consistent stream, and movies take advantage of this by introducing cuts into scenes. We repeatedly identify and forget information in our visual field, not noticing if something changes outside of our field of view and forgetting anything that isn't important to the actions we're viewing. Lastly, we break everything we see up into events, and the edges of those events sit together to create the pace of a movie scene and direct our attention.

Vision isn't seamless, it isn't perfect, but boy is it a good trick.

Brain in brief | The misbehaving brain

Our brains consume all of the information they can, from the outside world and from inside our bodies, in order to help us to navigate situations and survive the day. We know that, for example, when we see an object hurtling toward us that we should move out of its way, and that behaviour is decided upon and driven by our brains. But what happens when our brains get it wrong? What if it decides there is something coming toward you when there isn't? This can cause your brain to misbehave, to drive actions, thoughts, or emotions that are unnecessary. Over the next year we'll be discussing some examples of how the brain misbehaves, and why this happens.

Roche Hanns Möhler Scholar

Stephanie Mercer is a PhD student examining a possible intervention for Alzheimer's disease, she's also our 2018 Roche Scholarship recipient. The Roche Hanns Möhler scholarship was established to assist PhD students in the last year of their PhD, by extending their research for six-months. This extension of time and funds is made available by Roche Pharmaceuticals New Zealand so that these students can get the most out of their research.

The intervention Steph is looking into targets a cellar process called autophagy ('auto' meaning 'self', and 'phagy' meaning 'to eat'). This is a system your body uses to consume cellular material that is no longer useful. This 'self eating' prevents unhelpful materials from building up in, and between, cells. "What we see in Alzheimer's disease," Steph says, "is that this process winds down or gets a bit dysfunctional, and it's thought that this might be one of the mechanisms by which we see build-up of toxic proteins in the brain."

The treatment Steph has chosen to examine may repair this process, allowing the brain to free up the space and energy taken up by those toxic proteins, and reducing the harm they cause to surrounding cells. What is particularly exciting is that this treatment is already available for a different health condition, and so it would be much easier to introduce it as an Alzheimer's treatment than an entirely new drug. "We're really pleased with how things have been going so far. Our early results have been quite encouraging, but this scholarship will really allow us to build up our numbers so that we can explore this to its full potential."

Helen Rosa Thacker Scholar

Ash Gillon, our 2018 Helen Rosa Thacker Scholarship recipient, is currently completing his PhD in Associate Professor Phil Sheard's lab. In the lab Ash is surrounded by others who are investigating the same overall issue; age related muscle weakness, also known as sarcopenia. "As as you get older you become weaker and that's just become accepted as the norm," Ash says, "but no one really knows what is driving that process."

While the lab is focused on the problem as a whole, each individual is examining a different piece of the puzzle. The piece Ash has focused on is the motor neuron, the nerve cell responsible for activating muscles. "So we're looking at how the motor neuron in the spinal cord is changing," Ash says, "and how those changes could be causing death or denervation of muscles."

If the problem is muscle weakness, why look at the nerves? "If the fibre isn't being activated, then the muscle weakens and potentially the fibres could start to die off." This pattern of nerve loss leading to muscle loss is also seen in neurodegenerative diseases like ALS, where the nerves die and so the muscles become incapable of activating.
"The similarity to ALS is what really put us on to the nerves," Ash says.

Ash is hopeful that the work he's doing will be helpful for the development of preventative treatments for sarcopenia in the future. "The aim with this," he says, "is to keep people independent for as long as possible."

Māori Summer Scholarship results

The recipient of our 2017/18 Māori summer scholarship, Joseph Cahill-Lane, has recently finished his project with Professors Paul Smith and Mike Paulin.

Your balance is sensed by organs in your inner ear, called semi-circular canals. These canals have cells that move according to how your head moves in space, and then send their raw information to your brain for processing. "Calculating acceleration are processes your phone can do with one sensory, and it only tells the phone when something is happening," Joseph says, "but the secondary cells in the mammalian brain are receiving around 1000 signals per second even when your head is completely still."

Joseph's project was to create a computational model of the mammalian system. "It is either this incredibly inefficient way of sending information, frenetically telling the brain that nothing is happening, or it's secretly doing something else."

The answer appears to be the latter. This huge number of signals may be the result of having an incredibly sensitive vestibular system, and needing to weed out the effect of Brownian Motion (the random movement of molecules through space).

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

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twitter.com/brains_NZ

What is anxiety?

What is anxiety? For many the word is synonymous with fear but, as far as Professor Neil McNaughton is concerned, the two are actually polar opposites. "Fear is the avoidance of a situation perceived as dangerous," Neil says, "while anxiety occurs when we experience fear, but have to move toward that perceived danger in order to receive a reward." It's a highly adaptable system, designed to keep us aware of danger whenever it is present. Under normal circumstances this adaptability would be helpful, but for people who experience anxiety disorders it can be devastating. "At least 40% of people who live with anxiety disorders," Neil's colleague Prof Paul Glue says, "are, or will become, unresponsive to treatment."

The issue, as Neil and Paul see it, is that we don't have a good working understanding of anxiety. By harmonising their individual aims they hope to clarify what exactly anxiety is.

Neil is focusing his efforts on developing a biomarker of anxiety. His preliminary results suggest that this biomarker may work as an indicator for the usefulness of certain kinds of anxiety medications, which could be helpful in the development of more targeted treatments.

Paul, on the other hand, is focusing on understanding the mechanism and usefulness of the drug ketamine for people with anxiety. So far, the drug has proven to be a potent and long-lasting anxiolytic even for those who are, or have become, unresponsive to other kinds of anxiety medication.

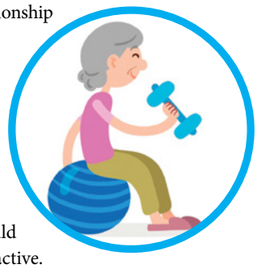
Together, Neil and Paul are building a framework through which we could better understand exactly what anxiety is. With that kind of tool, perhaps we will be better equipped to help those who live with anxiety disorders.

Keeping our strength

Associate Professor Phil Sheard spends his time researching muscles or, more specifically, the nerves that activate the muscle fibres and how their relationship changes with age. "You lose 1-2% of muscle mass per year from the age of 50," Phil says, "but I suspect that the process starts much earlier." This weakening of the muscle is called sarcopenia, and it's a normal part of ageing.

Sarcopenia is a major reason for falls in the elderly population, and as such is a major contributor to disability and mortality in those over 65. "The imperative to understanding ageing," Phil says, "is not to help us to live longer, but to allow us to retain our cognitive and physical independence for longer." Muscle weakness, and the potentially disabling effects of a fall, can rob people of their independence.

As we age our muscles begin to undergo atrophy, mainly due to loss of contact with the nerves that control the activity of muscle fibres. Without those nerves the muscle fibre can't contract, and so it shrinks due to disuse. This process is slowed by consistent exercise regimes, which appear to not only support the relationship between muscle and nerve, but also help to maintain the integrity of the nerve itself.



When it comes to sarcopenia, exercise isn't a cure-all, but it is an effective intervention to slow the progression of that weakening. The simple message is that we should do what we can to be a little more active. Our muscles, and nerves will thank us by sticking around longer into our old age.

Message from our Director

Professor David Bilkey

Thank you for reading our first newsletter of 2018. These first few months of 2018 have already been eventful for the Brain Health Research Centre, with a hugely popular public lecture by visiting academic Professor Jeff Zacks and an international conference under our belts. We're excited to continue on a high as we move toward Brain Week. This year Brain Week is bigger than ever, with more talks and events than we've ever put on before. With seminars, panel discussions, interactive workshops, and a movie all in the mix there really is something for everyone. We're starting off on Tuesday the 6th March at 7pm with a talk, by yours truly, structured around Oliver Sacks' fascinating book 'Musicophilia'. Wednesday will be all about ageing well, and we are thrilled to have Professor Ngaire Kerse coming down from Auckland to share her expertise. Thursday brings out one of our most exciting panel discussions where neuroscience experts will discuss techniques and tools that seem too futuristic to be true, while Friday takes us back to basics with an easy and fun Brain 101. Saturday 10th is officially Brain Day, with a full day of activities and talks happening in the Museum, and on Sunday we cool off a little and bring things back to what is important; staying social and connected with others.

It's going to be a big week, with more information than we know what to do with, but we're sure that you'll have a fantastic time. Enjoy the activities, and thank you for your continued support of the centre.