BRAIN RESEARCH NEW ZEALAND

ANNUAL REPORT 2015

Brain Research
NEW ZEALAND
Rangahau Roro Aotearoa


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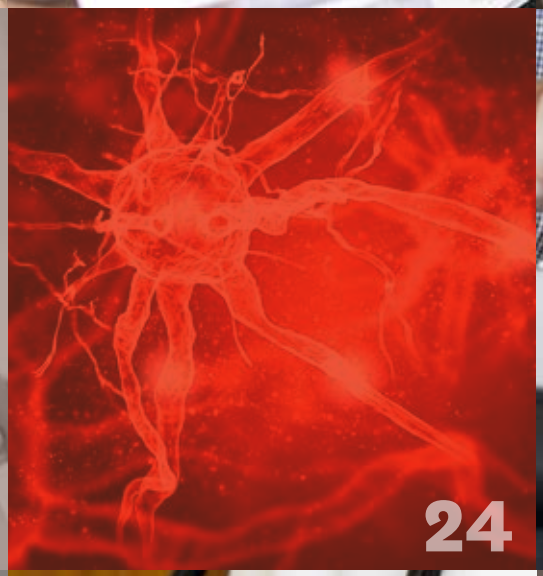
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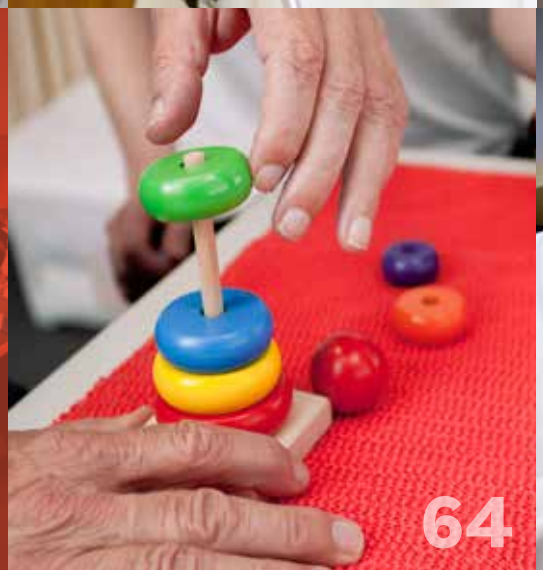
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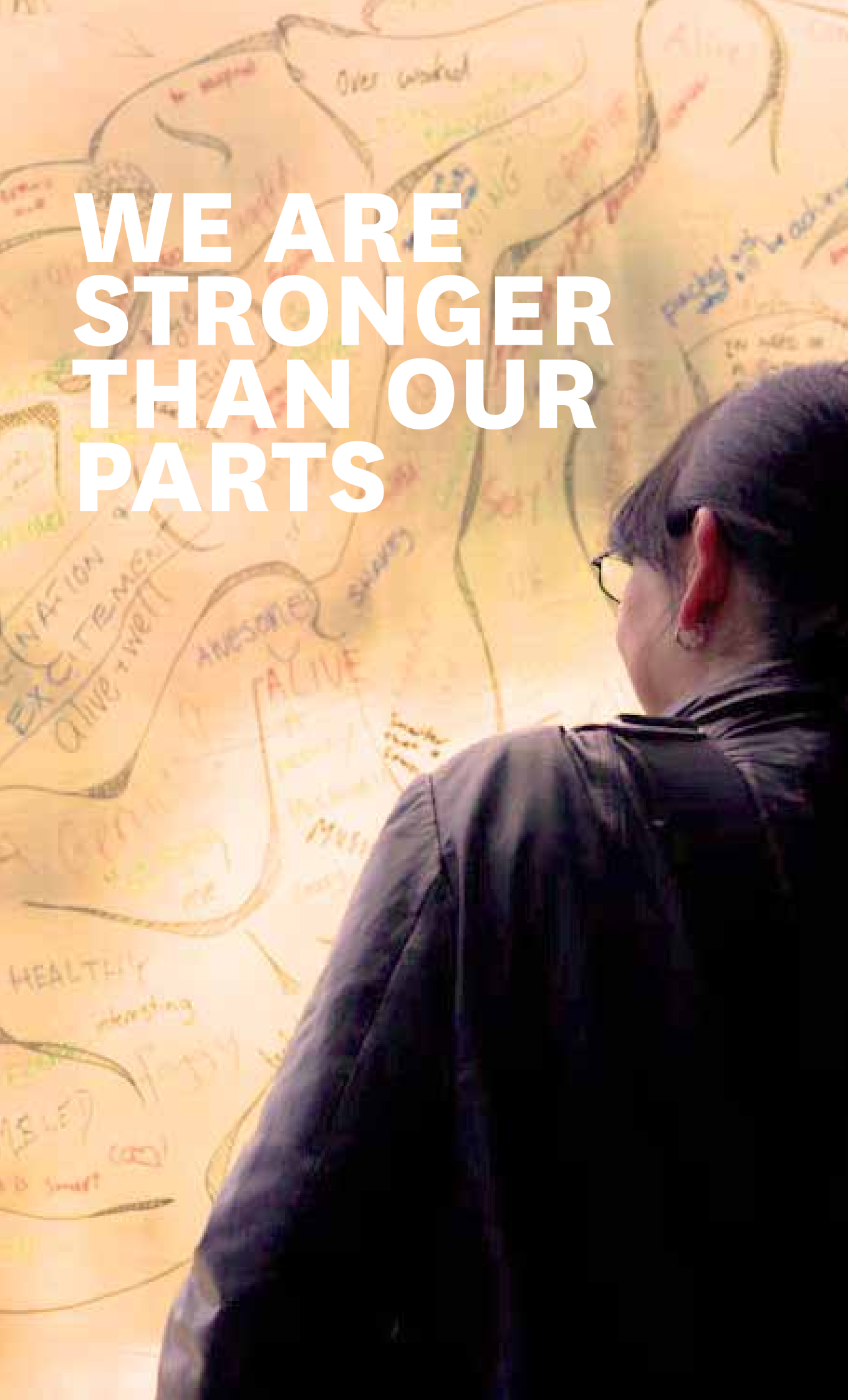
WE ARE STRONGER THAN OUR PARTS



CO-DIRECTORS' REPORT

2015 was a landmark year for Brain Research New Zealand – *Rangahau Roro Aotearoa*. It marked the launch of a new concept in Centre of Research Excellence organisational structure and funding, i.e., a CoRE co-hosted by New Zealand's two premier Universities, the University of Otago and the university of Auckland. The co-hosted nature of our CoRE recognises the immense strength in translational neuroscience already present at Auckland and Otago, and enshrines the ethos of inter-institutional collaboration that epitomises the foundation of everything we do.

BRNZ started planning as early as mid-2014 to establish key initial research projects to kick-start our CoRE, and to identify the first cohort of PhD students and postdoctoral scientists to receive scholarships and fellowships, respectively, that enable training in the study of the ageing brain and associated neurological disorders.

Our inaugural project funding round resulted in awarding grants for promising major research efforts and exciting seeding projects. Some examples of the research that we funded are documented on the pages that follow and include: Reprogramming of various cell types into nerve cells to serve as a source for replacing cells lost during brain disease; Individualised medicine and prediction of dementia in Parkinson's disease; Study of the role of a new class of molecules in the Alzheimer's disease pathology; Identifying the effects of autoantibodies on recovery from stroke; Testing a new approach for treating tinnitus; and Learning about how to live well with dementia.

A priority area for our CoRE in 2015 was the development of protocols and staffing needed to open the first of BRNZ's Dementia Prevention Research Clinics. These clinics are the first of their kind in New Zealand, and will sit at the translational interface between University science research and the clinical and public health care by the District Health Boards of patients with cognitive impairment and dementia. Taking advantage of the ideas being developed in our projects, these clinics will carry out longitudinal studies that will initially focus on people with mild cognitive impairment (MCI) and those who are in the very earliest stages of dementia. Their ultimate aim is to slow disease onset and progression by 5 years, which would reduce the prevalence of people living with dementia by 50%. This is a lofty goal, but it would deliver an enormous benefit to the quality of life for our increasingly ageing population and markedly reduce the costs of health care in New Zealand.

Overall, 2015 served as the launching pad for an exciting new era of translational neuroscience in New Zealand directed at one of the country's most pressing health issues, the ageing brain. We reflect with pride on having achieved an outstanding start to our CoRE, and look forward with excitement to further fulfilling our vision in the coming years.

Distinguished Professor Richard Faull, FRSNZ

University of Auckland

Professor Wickliffe Abraham, FRSNZ

University of Otago

STRATEGIC OUTCOMES

OUR STRATEGIC OUTCOME TARGETS

01
Better health outcomes for older people through community partnerships and the communication of our research

02
National and international recognition of our research

03
Improving our strategies in order to prevent detect and slow down age-related neurological disorders

04
Improving clinical practice by translating scientific knowledge into treatments, strategies and care pathways

05
Increasing our scientific, clinical, translational and leadership capabilities

06
Improving Māori health and wellbeing during ageing, incorporating Matauranga into research and training Māori neuroscientists and clinicians

OUTCOME 1

Better health outcomes,

improved quality of life and positive ageing for older persons and their families, including reduced physical, emotional, social and financial costs of ageing-related neurological disorders, through public dissemination of the latest research and the creation of partnerships with patients, families, community organisations and NGOs across NZ.

Official Launch

On 22 May 2015, Brain Research New Zealand – *Rangahau Roro Aotearoa* was officially launched at both the University of Auckland and the University of Otago.

In attendance were the Hon. Steven Joyce, Minister of Tertiary Education, Science and Innovation, the Vice-Chancellors of the University of Auckland (Professor Stuart McCutcheon) and the University of Otago (Professor Harlene Hayne), the Co-Directors of BRNZ Professors Wickliffe Abraham and Richard Faull, distinguished guests, researchers, students and many other key stakeholders including local community groups, MPs and healthcare professionals.

The official launch heralded the beginning of many BRNZ promotional and marketing activities in 2015 that put our CoRE on the national stage. This included the launch of our website and social media marketing campaigns, which allow us to share our news and expertise with New Zealanders young and old.

STROKE AND DEMENTIA – WHAT DOES THE COMMUNITY REALLY KNOW?

A critical factor for BRNZ in achieving our goal of enabling New Zealanders to live healthier and more independent lives as they age, will be increasing people's knowledge of the symptoms of, and risk factors for, cognitive decline (dementia) and stroke.

Effective community-based educational and preventive programmes require accurate assessment of the population's knowledge of stroke and dementia risk factors and signs. Recent studies have shown that this knowledge is lacking in adults, minority ethnic groups, people with lower levels of education, and those who live rurally. Despite compelling evidence that increasing country-specific knowledge about warning signs and risk factors can reduce stroke and dementia burdens, there had been no recent research on knowledge of the prevalence and risk factors of stroke and dementia in NZ, until the pioneering study of Professor Valery Feigin and Associate Professor Suzanne-Barker Collo.

Professor Valery Feigin is a world-class clinical epidemiologist based at AUT. In 2015, BRNZ provided Professor Feigin and co-investigator Associate Professor Suzanne Barker-Collo with funding to develop a pilot questionnaire to determine stroke and dementia awareness in the NZ population.

The survey involved taking a national random sample of 400 adults made up of Māori, Pasifika, Asians and NZ Europeans aged 20 years and older and surveying them using computer-assisted telephone interviewing (CATI). The preliminary survey results were highly informative. They highlighted that many people do not know the signs and symptoms of dementia or the risk factors for stroke. With the completion of this pilot survey, BRNZ has set the foundation for evidence-based and cost-effective interventions for primary prevention and management at the population level (e.g., the importance of hospitalisation within 4.5 hours of stroke onset for possible thrombolytic therapy). Reliable national survey data will also assist in knowledge transfer to policy makers, programme planners and funding agencies to make informed decisions about effective ways to promote healthy lifestyles that reduce the risk of stroke/dementia.

This survey, the first of its kind in New Zealand, is likely to lead to a major national stroke/dementia awareness survey with co-funding from the Health Research Council and the Ministry of Health. Importantly, this project reveals an opportunity to provide Māori participants with information on factors that influence stroke and dementia risk for Māori to enable development of specific solutions to reduce stroke and dementia risk in Māori individuals, families and communities.

NEW ZEALAND RANKS

2ND

IN THE WORLD INDEX OF GIVING

Philanthropy Matters – The New Zealand Dementia Prevention Trust

"Philanthropy" from the Greek philanthropos, or kindness, humanity, benevolence, loving to mankind.

Recent international figures from the Charities Aid Foundation show that New Zealand ranks second in the world index of giving.

Philanthropy played a critical role for our CoRE in 2015, with BRNZ receiving over $1million in donations from generous New Zealanders in support of our research. But we would not have achieved this level of fundraising success without the dedicated work of three distinguished New Zealanders: Mr David Mace ONZM, Sir Eion Edgar KNZM, and Sir Don McKinnon ONZ GCVO.

In July 2015, this work culminated in the establishment of a new charitable trust, the New Zealand Dementia Prevention Trust (NZDPT), which was set up specifically to help fund BRNZ's network of dementia research clinics. The NZDPT, chaired by Sir Eion Edgar, will provide financial support for the Dementia Prevention Research Clinics, which will enable us to trial new treatments that could slow down the onset and progression of dementia.

The cost of resourcing three dementia research clinics across New Zealand far exceeds BRNZ's funding envelope, but with the heart and willingness of some of New Zealand's most prominent figures behind our fundraising efforts, we can retain a firm hold on our ambition of improving both clinical outcomes for sufferers and the brain health of all ageing New Zealanders.

Raising Brain Awareness

Brain Day is part of Brain Awareness Week (BAW), a global campaign initiated by the Dana Foundation of New York to raise public awareness of the progress and benefits of brain research. Every March, BAW unites the efforts of over 2,200 organisations around the world in a celebration of the brain for people of all ages.

In New Zealand, the Neurological Foundation has been supporting Brain Awareness Week for 11 years, in partnership with university-based brain researchers, community groups and local schools.

Brain Research New Zealand was delighted to participate in Brain Day and Brain Week activities across the country in 2015. In Auckland, we partnered with the Centre for Brain Research, the Neurological Foundation, and local community groups to organise a raft of activities for Brain Day. This included discussion panels and talks covering most matters concerning the human brain, both healthy and afflicted. For those affected – directly or indirectly – by neurological disease, BRNZ researchers Professor Richard Faull, Professor Peter Thorne, Associate Professor Lynette Tippett and Dr Christine Ilse gave presentations or were involved in panels publicly discussing issues as diverse as multiple sclerosis, music therapy, stroke in younger adults, and living with brain injury.

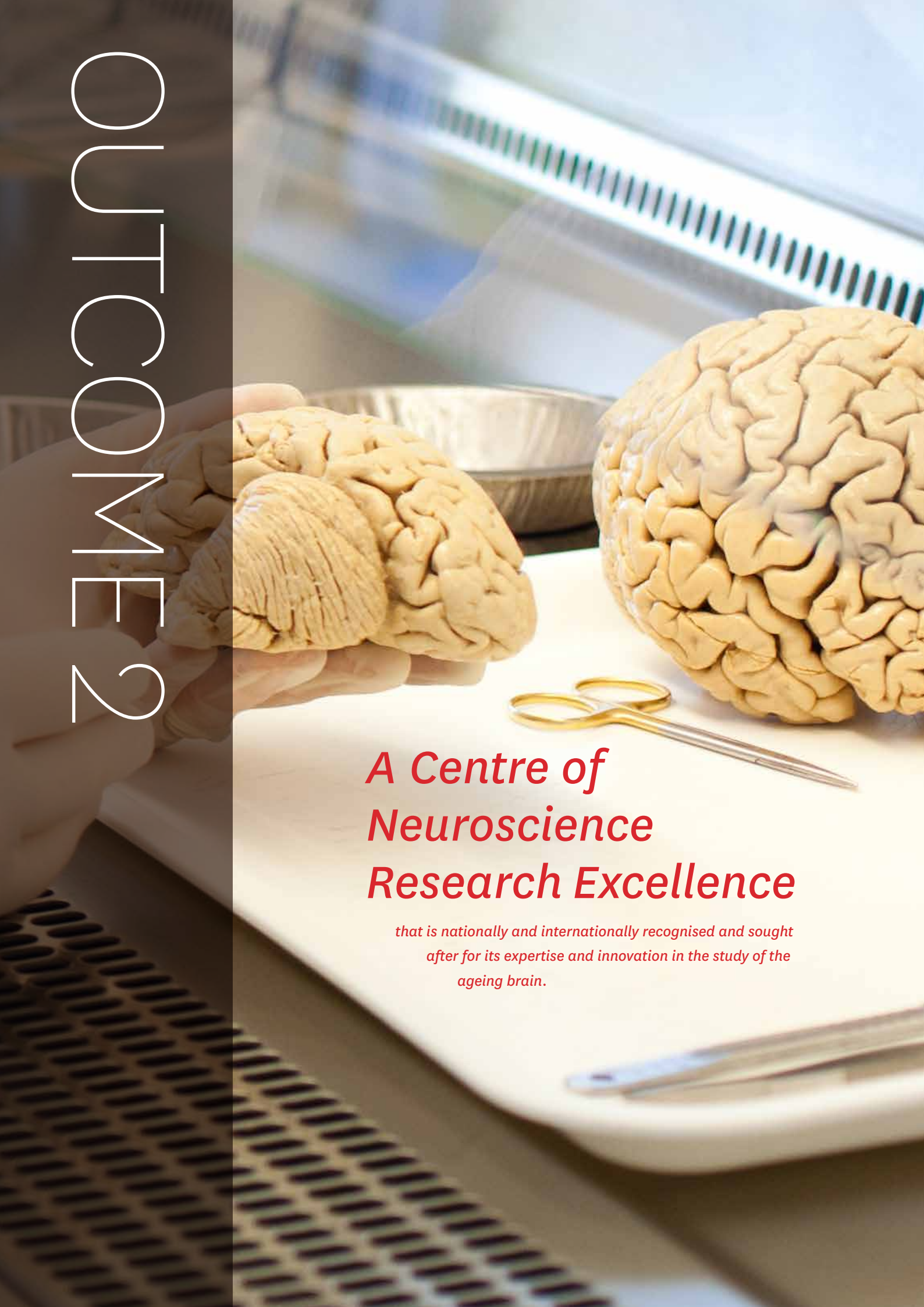
In Dunedin, we contributed to a week-long series of activities run by the Brain Health Research Centre and the Otago Museum. We also supported Brain Day, which was run in conjunction with the Neurological Foundation. The week's activities included visits to neuroscience labs, exhibitions about the brain, lectures on brain-related topics, social media campaigns, classroom workshops, and more.

We are proud of the role we played in making Brain Awareness Week 2015 a veritable success across New Zealand, particularly in increasing public awareness of current research and therapeutic interventions.

In the media

In 2015, our investigators frequently appeared in the media to advance conversations and foster public interest about our research. Examples of media coverage our BRNZ investigators received in 2015 include:

- North and South magazine. An article by Deputy Editor, Joanna Wane, titled "Fight for Life" featuring Professor Richard Faull and highlighting the tragedy and challenges of families who have inherited the Huntington's Disease gene.
- The Australian Women's Weekly. An article on Alzheimer's disease featuring the expertise of BRNZ Co-Director Professor Wickliffe Abraham.
- Radio New Zealand featured leading neurologist Professor Alan Barber, where his clot retrieval stroke treatment was heralded as a 'major scientific advance'. The New Zealand Herald and the Otago Daily Times also featured articles on Professor Barber's clot retrieval stroke treatment.
- Professor Donna Rose Addis' research featured in the media numerous times throughout 2015, including in a Time magazine articled called "Here's the Secret to Creative Problem-Solving". Professor Addis and her work also featured in Psychology Today, and in the Australian Women's Weekly.
- Associate Professor John Reynolds appeared on Paul Henry's TV3 breakfast show to give expert opinion on a new treatment for Parkinson's disease being trialed by Living Cell Technologies Ltd. Associate Professor Reynolds was also interviewed for Radio New Zealand's 'Our Changing World', along with PhD student Laura Boddington to discuss "How electrical stimulation might help stroke recovery".
- Dr Liana Machado, one of BRNZ's Otago-based investigators appeared in the media multiple times in 2015. Her research was covered by Newstalk ZB, Radio Live Drive and Radio New Zealand. Her research looking at the effects of diet on cognitive functioning was profiled on Radio New Zealand National's "Our Changing World", while on the "Saturday Morning with Kim Hill" programme she spoke about using transcranial direct current stimulation to enhance cognitive functioning.
- Dr Louise Parr-Brownlie was also frequently in the media in 2015. The New Zealand Herald featured her in an article "Innovative concept may give hope to Parkinson's sufferers", while the Otago Daily Times reported on a potential new site for deep brain stimulation to treat the disease. Dr Parr-Brownlie also featured on Radio NZ News in a news item on national radio about the potential of optogenetics for Parkinson's treatment.



OUTCOME 2

A Centre of Neuroscience Research Excellence

that is nationally and internationally recognised and sought after for its expertise and innovation in the study of the ageing brain.

At the heart of BRNZ...

...is a group of world-class investigators and clinicians from universities and hospitals across New Zealand, who are committed to our vision of delaying or preventing the deluge of ageing-related neurological disorders and neurodegenerative diseases.

For many of our members, 2015 was the first time they were engaged in multidisciplinary inter-institutional research so it was important that BRNZ established the environment and infrastructure that would promote research synergies and success.

In 2015, BRNZ's Co-Directors appointed a dedicated team of professional staff to run the day-to-day operations of the CoRE. This included a Business Manager and an Administrator at the University of Otago, along with an Administrator and a Marketing and Communications Advisor at the University of Auckland.

We also held our first annual scientific meeting for our Principal and Associate Investigators in Queenstown. This meeting provided an exciting opportunity for our members to establish an *esprit de corps*, to nurture fledgling collaborations and discuss their recent research results and developments. BRNZ's science meeting took place one day prior to the International Australasian Winter Conference on Brain Research (AWCBR). AWCBR is New Zealand's premier neuroscience gathering that attracts hundreds of neuroscientists from Australasia and across the world.

> *As in 2015, we look forward to holding our annual research meeting in conjunction with AWCBR in future years, as this affords us greater opportunity to forge links with like-minded researchers.*

Additionally, in 2015 BRNZ made formal contributions to the Australasian Neuroscience Society (ANS). Ruth Empson, for instance, served as the New Zealand representative on ANS's council. Professor Cliff Abraham also served on the board of the Australian Course in Advanced Neuroscience, and was a judge for the International Brain Bee competition held in Cairns, an event sponsored by ANS. We also agreed to provide financial assistance to ANS for future conferences, such as the 2016 Annual Scientific Meeting in Hobart, which is mutually beneficial to both parties as it allows BRNZ to further promote its research.

OUTCOME 3

Improved strategies for prevention,

early detection and slowing of progression of ageing-related neurological disorders, through identification of early biomarkers and an improved understanding of the mechanisms of ageing-related neurological disorders.

THEME 01

NEURODISCOVERY – GENES, CELLS AND NETWORKS

In 2015, we embarked on a programme of research aimed at investigating key brain disease mechanisms ranging from molecular to network levels of analysis, brain plasticity, disease biomarkers and potential therapeutic targets for treating ageing-related neurological disorders. The research is spread across four themes of intense research activity. Essential to each of our projects is their excellence, innovation, multidisciplinarity, and collaborative nature.

Theme 1 research in 2015 has been focusing on understanding the pathophysiology and mechanisms of disease, and the opportunities offered by naturally occurring protective molecules. For example, we are investigating the potential of pericytes, cells that line the blood vessels in the brain, to generate a host of helpful molecules that can enhance stroke recovery (see Case Study 1 below). We also have evidence that a brain protein called secreted amyloid precursor protein may have protective properties against Alzheimer's pathology, and we are now testing whether peptide fragments of this protein are equally helpful, as they may be more amenable to being translated to clinical trials. We are also testing natural plant products that may be neuroprotective, in a project being jointly run with the Plant and Food Crown Research Institute.

Another exciting line of research centres on the idea that damaged or degenerated cells in the brain may be able to be replaced by new nerve cells grown first in laboratory conditions, in part through reprogamming of skin cells in neurons, and then transplanted to the brain. The aim is to produce cells that use "dopamine" as a neurotransmitter, as these are the cells first lost in Parkinson's Disease. Early studies are very promising in that neural precursor cells have been generated in the lab and have been successfully transplanted into cultured brain tissue from animals, and we are now undertaking experiments to determine which type of brain cells these precursor cells actually become.

THEME 02

NEUROBIOMARKERS –DISEASE INDICATORS

In Theme 2, we are targeting the identification of biomarkers of ageing-related brain disorders. Establishing disease-specific biomarkers is critical for detecting disease early, as the earlier we can detect neurodegenerative brain disease, the earlier we can begin treatment to keep it at bay. Early detection also allows us to track the level of success of any new therapies. In one novel approach, we are using MRI-based measures of blood flow variations in the brain during cognitive tasks as a biomarker of ageing-related cognitive decline (see Case Study 2 below).

We are also supporting projects identifying biomarkers for Parkinson's Disease and Alzheimer's Disease in particular, but also for stroke, and auditory loss. A major longitudinal study of early phase Parkinson's Disease patients is already underway, combining neuropsychological testing, blood testing and brain scans (positron emission tomography) for the disease biomarker "amyloid". For Alzheimer's disease, an initial screen of Alzheimer's bloods has identified particular molecules called microRNA as a potential diagnostic biomarker. The researchers are now determining whether similar changes occur in the brain, as well as in mouse models of the disease. Other biomarkers being studied are the enzymes of the urea cycle, which we have shown to be abnormally upregulated in Alzheimer's disease, potentially to cope with the rise of ammonia in the brain to toxic levels.

THEME 03

NEUROPLASTICITY – BRAIN CHANGES AND ADAPTATION

The brain is highly "plastic", able to learn, adapt and respond to injury, and Theme 3 aims to harness this adaptive power of the brain's activity and molecules. In one exciting project, we are attempting to bypass the loss of dopamine cells in Parkinson's disease through modifying the activity of other brain areas. This is being tested through the novel use of fibre-optic light to stimulate light-sensitive brain cells with the right pattern of activity as a potential therapy for this debilitating disease (see Case Study 3 below).

Other efforts are aimed at harnessing the brain's natural plasticity mechanisms to delay the onset of dementia. One project has already shown that exercise enhances memory-related plasticity in the brain, supporting the concept that keeping physically fit during ageing will help preserve cognitive function. Other research programmes are testing how multi-sensory stimulation procedures may enhance sensory function and cognition in general. Ageing-related tinnitus, for instance, is highly debilitating, and BRNZ researchers are investigating in rodent models whether deep brain stimulation can be used to ameliorate the disruptive effects of tinnitus on behaviour.

THEME 04 PREVENTION, INTERVENTION AND DELIVERY


Photo courtesy of the ODT

Theme 4 is the effector arm for our CoRE, and includes our network of Dementia Prevention Research Clinics that will test preventative measures and early interventions to minimise functional decline associated with the ageing brain (see Outcome 4). The research we carry out in this theme takes the discoveries and ideas identified in Themes 1-3 and translates them into clinical and community-based interventions. Theme 4 projects typically involve hands-on research with patients, caregivers, community members and healthcare professionals, where our research truly touches lives.

A number of interventions, such as exercise, cognitive stimulation, and behavioural therapy show promise in delaying mild cognitive impairment (MCI), progression to dementia and primary stroke prevention, but they need systematic study as interventions in older populations. In 2015, we commenced testing the effects of a combination intervention of novel cognitive stimulation with physical activity, which also encourages social interaction, on cognitive decline in Parkinson's disease patients. Another project is investigating two activities that have the potential to slow ageing-related cognitive decline: physical activity and volunteering. Our researchers will investigate physical activity habits of older adults in New Zealand, and test whether more activity, or volunteering, is associated with better cognitive functioning and better regulation of brain blood flow. The outcomes of this project will help guide health promotion activities and have the potential to identify simple means to optimise independence and quality of life via healthy brain ageing. Turning to technology, our researchers are conducting a pilot study to test the efficacy of the Stroke Riskometer™ App as a tool to enhance stroke prevention by raising awareness about stroke, its risk factors, its warning signs and how to manage those risk factors.

Research Platforms

Along with project grants, BRNZ has invested heavily in research platforms that underpin multiple projects through the provision of resources, technical know-how, and access to clinical/cohort samples.

BARISTa: Biomarkers And Recovery In Stroke

Associate Professor Cathy Stinear and Associate Professor Debbie Young

The BARISTa platform was established to help researchers predict recovery from stroke, and to identify molecules that may relate to stroke damage and potential for repair. The BARISTa tissue bank collects blood samples from people who have recently experienced a stroke, as well as from healthy individuals, for comparison. In addition to blood samples, the platform also collects detailed clinical information, and together these form an invaluable resource for our investigators investigating biomarkers and therapies for stroke recovery.

MR imaging in the Dunedin longitudinal cohort

Professor Richie Poulton

BRNZ has provided platform funding to further the goals of the internationally acclaimed Dunedin Longitudinal Study. This research programme entails the continuing study of 1037 children, born in Dunedin in 1972-73, and is a crucial research asset to New Zealand. The funding provided by our CoRE is going towards functional and structural MRI scanning of study participants. This is the first time that this world-leading study has undertaken brain scans of its participants, some of whom are already undergoing early signs of ageing, even at age 43. This platform will provide our investigators with the opportunity to access the Dunedin Study database, amassed over 40+ years on many aspects on human health and development, to better understand individual differences in brain function and structure during ageing.

With repeated fMRI measures over time, we can test a range of hypotheses such as:

- Hypotheses of polygenic risk for accelerated ageing
- Identify treatable developmental origins of accelerated ageing
- Characterise individuals who show a resilient pace of ageing

Mārama – Optogenetics and Viral Vector Platform

Dr Louise Parr-Brownlie and Dr Stephanie Hughes

This platform uses inactivated viruses to deliver genes of interest to various regions of the brain, either to directly treat brain disorders through gene therapy or to deliver molecules such as light-sensitive proteins for research or therapeutic purposes. In the latter case, light of specific wavelengths is used to activate or switch off these proteins, and thus regulate the activity and plasticity of nerve cells. Mārama helps to facilitate research projects by examining how 'optogenetics' can be used to stimulate and restore brain activity which has been altered in models of Parkinson's and Alzheimer's disease, stroke, and during tinnitus and memory loss.

Alzheimer's disease biomarker discovery and drug testing platform

Professor Mike Dragunow

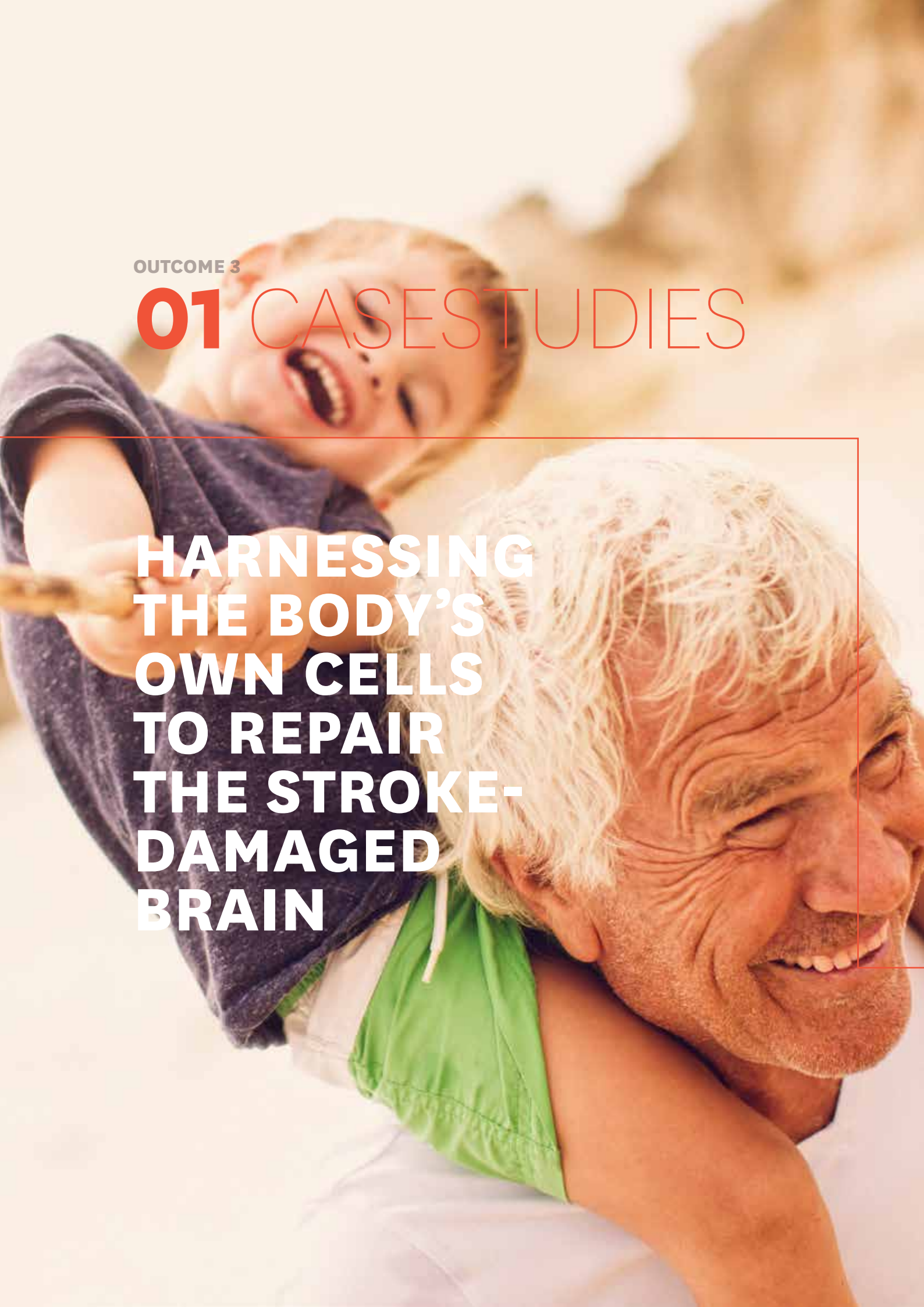
This platform provides our investigators access to high-throughput analysis of molecules in Alzheimer's disease brains, as well as for discovering and validating new therapeutic targets, and testing treatments on human brain cells in culture. The platform leverages existing techniques such as human brain tissue microarray (TMA), automated microscopy, high content image analysis and human brain cell culture.

The platform studies underlying mechanisms and biomarkers for AD and directly tests compounds on AD-derived human brain cells. A postdoctoral fellow leads the image acquisition, analysis, collation and interpretation of the data for platform users and collaborators.

OUTCOME 3

01 CASESTUDIES

HARNESSING THE BODY'S OWN CELLS TO REPAIR THE STROKE-DAMAGED BRAIN



Ischemic strokes are a leading cause of death and long-term disability in New Zealand. Ischemic stroke occurs when a blood vessel carrying blood to the brain is blocked by a blood clot. Consequently, this prevents blood from reaching the brain. If a stroke occurs and blood flow cannot reach the region of the brain that controls a particular body function, then that part of the body will not work as it should.

In the critical first few hours following an ischemic stroke, the penumbra (the region at the borders of the stroke lesion) is adversely affected but still intact. With the right therapeutic intervention, the aim is to restore connectivity and function to the penumbra, and thereby reduce the risk of paralysis, memory loss, visual impairment or behavioural change for the patient after the stroke.

With BRNZ funding, four of our leading investigators have joined forces to determine whether they can harness a patient's own repair mechanisms to renew or repair the stroke-damaged brain. Here Associate Professor Ruth Empson discusses the research she is undertaking in collaboration with her fellow investigators Professor Mike Dragunow, Dr Stephanie Hughes, and Dr Andrew Clarkson.

Pericytes – "a local drugstore for the brain"

Pericytes are cells found in the blood vessels of the brain. These cells may play a vital role in normal brain function and in neurodegenerative diseases by acting as part of the interface between the blood and the brain. Recent work suggests that pericytes act like a local drugstore for the brain by making natural therapeutic molecules from the body available to the brain. There is growing evidence to suggest that when a brain injury occurs, the pericyte drugstore migrates to the area to encourage repair, but how the pericytes do this is not known.

In this project, our team aims to identify how pericytes in the brain behave after stroke using exciting new technologies to visualize their activity. We hypothesise that pericytes promote functional recovery after stroke by integrating and supporting the replacement and repair of lost brain cells and their connections.

This project links experts from two ends of the country. Professor Dragunow is a leading expert in human brain pericyte biology and directs the Hugh Green Biobank, which houses one of the world's largest collections of these cells for research and drug development. Ruth Empson is an Associate Professor at the University of Otago. Her expertise lies in understanding the motor networks of the brain using electrophysiology, live imaging using optical reporter technology and molecular approaches. She is eager to apply these technologies to understand how pericytes behave in the stroke-damaged motor networks of the adult brain. The work would not be possible without critical contributions from the other collaborators; Dr Stephanie Hughes' role is to help us correctly target the optical reporters to the pericytes and Dr Clarkson's role is to provide the stroke model.

> *"We are entering into a new realm of optical technology that allows us to visualise brain circuits in completely new ways," explains Assoc Prof Empson. "Worldwide, the revolution of genetic targeting of specific tools to probe brain activity is gaining incredible traction and this project is a novel application of this discovery process.*
>
> *Mike and I want to understand how the pericytes integrate into the brain by visualizing their activity with the state-of-the-art optical reporters being used in my lab; we think that their activity in the stroke penumbra will help restore brain connections and improve functional motor recovery."*

Aside from working with pericytes, A Prof Empson sees it as her duty to inspire and support the next generation of young scientists in BRNZ. "They are our greatest ambassadors because their work under the BRNZ umbrella is the future of New Zealand brain science and discovery. I love mentoring and encouraging NZ's next young scientists – it's sometimes challenging, but usually fulfilling!"

OUTCOME 3

02 CASESTUDIES

HEARTS AND MINDS: USING FMRI AND NEUROPSYCHOLOGY TO UNDERSTAND OLDER ADULTS' PRESENT AND FUTURE

To enhance the quality of life for older adults, it is vital that we understand the causes of cognitive decline in healthy ageing. fMRI has proved a valuable tool in addressing this question.

The slight moment-to-moment changes in the brain's blood flow and function may hold the key to understanding how the brain responds to cognitive demands and provide a unique biomarker for cognitive capacity. These small variations seen on a functional MRI scan, known as fMRI variability, provide a novel way of measuring age-related cognitive performance across the lifespan, enabling researchers to more accurately predict and understand cognitive changes in healthy ageing as well as cognitive decline in dementia patients.

The strength of this project, led by Professor Donna Rose Addis, Dr Tracy Melzer, and postdoctoral fellow Dr Reece Roberts, is that it brings together the University of Auckland, University of Otago, and New Zealand Brain Research Institute's combined expertise in dementia, neuropsychology, and fMRI research.

"It's really exciting when we can use MRI to track what's happening in the brain," Dr Tracy Melzer explains, "If we are able to identify a useful biomarker that is sensitive to cognitive changes in ageing, we may then be able to use this biomarker to assess dementia, and to quantify the effectiveness of treatments or drug interventions."

"As we age, particular aspects of our memory begin to decline, and we have found these memory changes are linked to the ability to imagine the future. In our lab, we use neuropsychological tests and functional MRI in order to understand how the brain remembers the past and imagines the future," explains Professor Donna Rose Addis. "We're interested in the functioning of brain networks and this new study will allow us to understand how the ability to turn these networks on and off – the variability of activity in these brain networks – relates to cognitive capacity. Ultimately, that can tell us something about healthy ageing and about disease processes, informing clinical practice or therapy testing."

"Humans have a unique and remarkable capacity for 'mental time travel' in that we can remember the past and imagine the future. This enables us to plan, solve problems, and cope with uncertainty. Given that memory and future thinking is so critical to our everyday lives, it's vital that we understand how these abilities change with age and disease, and ultimately how we might be able to remediate the loss of these abilities with novel interventions," explains Professor Donna Rose Addis.

Research Implications

The team hope to build a deeper understanding of how fMRI variability reflects underlying changes to blood flow within the brain. By doing so, Addis, Melzer, and Roberts hope to shine a light on the use of fMRI variability as a biomarker of cognitive performance over the life span. Research that attempts to analyse how moment-to-moment changes in blood flow links to fMRI variability and cognitive capacity in older adults has never been attempted before anywhere in the world, so their findings may be broad and significant.

The team hope to forge strong ties with the BRNZ's national network of Dementia Prevention Research Clinics, with potential for future joint collaborations involving measuring blood flow and brain function in forms of dementia, including Alzheimer's disease and frontotemporal dementia. Many of the questions posed in Addis and Roberts' research relating to healthy ageing are equally applicable to Dr Melzer's other research interest: Parkinson's disease.

"Our growing involvement with the Dementia Prevention Research Clinics will influence the direction of our research as well, and provide ample opportunity for more collaboration between Auckland, Christchurch and Dunedin," Dr Melzer explains.

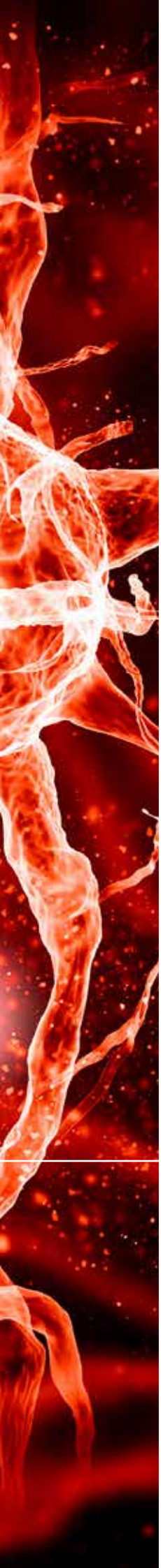
Their research could also lead to a large cohort study where they could potentially analyse the impact of physical exercise on brain variability, and whether or not exercise has a measurable protective effect for older people with mild cognitive impairment (MCI) and dementia.

Postdoctoral Fellow Dr Reece Roberts from The University of Auckland is also heavily involved in the project. This study will provide Dr Roberts with the opportunity to develop his expertise as an up-and-coming cognitive neuroscientist. The study provides him with the unique opportunity to cross disciplinary boundaries and learn about biomedical physics from Dr Melzer. By doing so, Dr Roberts will build his own collaborative research links across New Zealand.

OUTCOME 3

03 CASESTUDIES

PRECLINICAL TESTING TO TRANSLATE OPTOGENETIC STIMULATION TO PATIENTS



Using pulses of light to activate or silence specific cells such as neurons may seem farfetched. However, this is the basic principle of optogenetics – a revolutionary new technology that is at the forefront of modern neuroscience.

Optogenetics uses light pulses that are delivered through an implanted light-emitting device which activates specific light-sensitive proteins called channelrhodopsins. These light sensitive proteins are genetically inserted into a desired target population of neurons using viral vectors (akin to a 'Trojan horse' for gene delivery).

With a veritable toolbox of various types of channelrhodopsins capable of switching on or off neurons, BRNZ scientists are exploring the capability of this technology to treat neurodegenerative diseases.

In this preclinical project, BRNZ Principal Co-Investigators Dr Louise Parr-Brownlie and Dr Stephanie Hughes along with Associate Professor Deborah Young and support from Mārama (Viral Vector and Optogenetics Platform) are testing an optogenetic gene therapy approach for ameliorating the symptoms of Parkinson's disease.

The study will involve developing and testing a viral vector that can deliver a newly optimised channelrhodopsin, and determine whether motor deficits in rat models of Parkinson's disease (that reflect some of the movement deficits found in Parkinson's patients) can be ameliorated using this approach.

The team will also test and lead further development of a new implantable optogenetic light source device that is being developed by a third party research group in controlling this new channelrhodopsin in rat Parkinson's disease models.

Dr Parr-Brownlie hopes that one day the activation or silencing of cells with the use of optogenetics could restore movement or settle down involuntary movement in patients with neurological disorders, such as Parkinson's disease.

The research aims to advance a current established treatment for Parkinson's disease called deep brain stimulation.

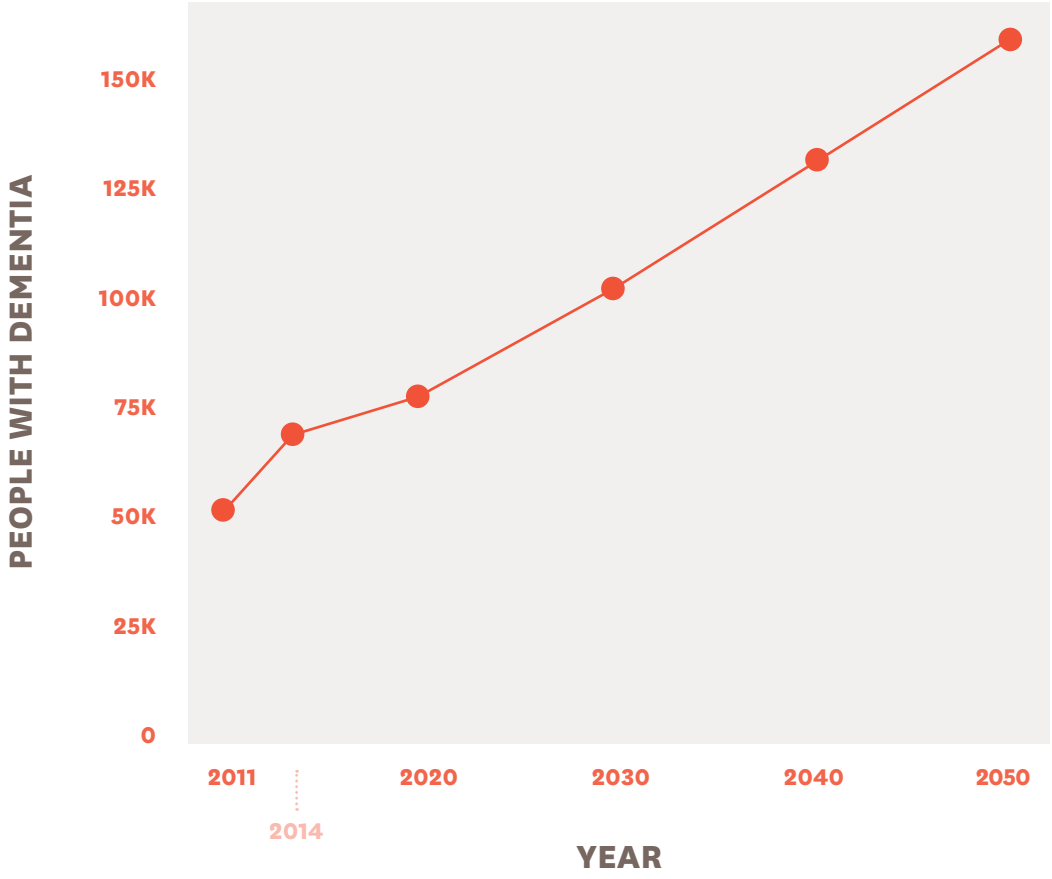
> *"What we've found already is that there are probably better ways to stimulate the brain compared to the deep brain stimulation that's currently used for patients,"*

Dr Parr-Brownlie explains. "The stimulation currently used involves applying electrical current in a very regular pattern, so it's almost like a clock ticking. Brain cells don't work like that, they often have little patterns of activity, so what we did is we replayed patterns of activity in the brain and used optogenetic stimulation," explains Dr Parr-Brownlie, "the technology is very specific, you can choose to stimulate one type of brain cell and not the other. As a result, we hope that we can reduce the side effects associated with deep brain stimulation by using optogenetic stimulation."

With translation of this research to clinical trials in mind, Dr Parr-Brownlie explained that "working with a third party research group to develop an implantable optogenetic stimulator device and having Professor Dirk De Ridder (a neurosurgeon) and translational expert Associate Professor John Reynolds on the team is critical for turning our exciting prospect into a reality. We hope to one day provide a treatment for many neurological disorders, in a similar way as a pacemaker does for heart conditions."

There is immense potential for using this technology to treat many different neurological disorders. The team hope that the study adds to mounting global evidence that these technologies are safe and that they could improve not only treatments for Parkinson's disease but could have broader application to other neurological and psychiatric conditions.

MORE STATS & NUMBERS...



147,359

New Zealanders are predicted to have dementia by 2050... that's

2.6%

of the population, more than TRIPLE current numbers!

BY 2026

MAORI DEMENTIA PATIENTS WILL INCREASE FROM 4 TO

5 PERCENT

OF TOTAL NZ DEMENTIA CASES

$1.2BILLION USD

spent on Dementia cases in 2014 in the Asia Pacific region.

THE DEMENTIA CLINIC IS...

THE **1ST** of its kind in New Zealand

INVOLVING

4 UNIVERSITIES
Auckland, Otago, Canterbury & AUT

+

3 DISTRICT HEALTH BOARDS

THREE CLINICS scheduled to open in
AUCKLAND, CANTERBURY & OTAGO

In 2014...

53,502
New Zealanders diagnosed with dementia

60%
women had dementia, compared to

40%
New Zealand men

OUTCOME 4

Improved clinical practice

by translating scientific knowledge into treatments, strategies and care pathways aimed at delaying or moderating ageing-related neurological disorders.

One of BRNZ's major initiatives is the establishment of Dementia Prevention Research Clinics (DPRCs) in Auckland, Christchurch and Dunedin.

The goal of these clinics is to recruit individuals in the early stages of cognitive decline or dementia resulting from neurodegenerative disorders, and to provide them with thorough assessment and feedback on their condition together with the opportunity to be involved in research.

The Auckland-based DPRC is run by a team of exceptionally talented individuals: Associate Professor Lynette Tippett (Clinic Co-Director); Dr Phil Wood, (Co-Director) a geriatrician; Dr Christina Ilse, a full-time neuropsychologist; Karen Smith, a clinical research nurse with extensive experience in dementia care; and Dr Erin Cawston, a postdoctoral fellow whose medical diagnostic skills were key to the establishment of standardised protocols for the collection and biobanking of participant's blood specimens.

Setting up a research clinic like the DPRC is a highly complex process, but after over a year of dedicated effort, BRNZ's first clinic opened its doors at the University of Auckland. In 2015, BRNZ's Auckland clinic staff started the evaluation of patients referred through the hospital system.

When participants and their families attend one of the DPRCs, they undergo a detailed characterisation of their neurological and psychological condition, general health and lifestyle. Blood tests and MRI scans are also conducted as this biological data provides valuable information to neuroscientists for analysis and biomarker identification and monitoring. The Clinics not only collect information from each patient, they also listen to the experiences and needs of care-givers and family members.

Co-director of the Auckland Dementia Research Clinic, Associate Professor Lynette Tippett, says the Clinic will provide individuals and families with the chance to make a real difference in our knowledge about the underlying causes, treatment, management and prevention of Alzheimer's disease and related dementias.

"People who attend with early onset signs of dementia will be invited to participate in a range of preliminary clinical trials, developed as part of the research programme," she says. "These may include testing novel drugs, nutritional supplements, and cognitive, social and physical interventions that are designed to prevent, delay or ameliorate Alzheimer's disease and other related dementias." By looking at novel methods to delay the development and progression of Alzheimer's disease, this network of clinics has the potential to change the future of Alzheimer's disease in New Zealand.

Our Dementia Prevention Research Clinics have been designed to collect data that complements and informs world-wide efforts in Alzheimer's biomarker studies and therapeutic interventions. With all three clinics adopting standardised and internationally compatible research protocols, the data we generate from our research clinics will provide the springboard for important international collaborations, and generate opportunities for studies on a scale that would otherwise be impossible for a New Zealand-based study.

OUTCOMES

Increased scientific, clinical, translational and leadership capability

that will improve research output, patient outcomes, productivity and health industry research capacity.

BRNZ places a high premium on training the next generation of scientists and clinical leaders in translational neuroscience...

...and we are in the unique position of being able to expose them to interdisciplinary experiences across institutional boundaries.

This brings many benefits including the chance to work and negotiate with talented collaborators, receive mentoring from senior researchers and students, and feel part of a mission-led and vibrant research community.

As part of this strategy, we have plans for developing a cross-institutional Master of Clinical Neuroscience course, which will provide academic training for clinicians and scientists in translational neuroscience research.

We have also recruited four PhD students and five postdoctoral fellows, each of whom is immensely talented. To support them and other early career researchers in BRNZ, we have established an Early Career Advisory Group (ECAG), which has a number of roles: to advise the Directorate on issues relating to development of early career researchers, to run leadership programmes and research workshops, and to evaluate BRNZ PhD scholarship and Postdoctoral Fellowship applications. Being part of the evaluation process provides a valuable opportunity for early to mid-career researchers to learn a new skill and reflect on what makes a good grant application and how they might improve their own.

In 2015, ECAG also organised a highly successful Early Career Researcher session at BRNZ's annual meeting in Queenstown. The meeting was was chaired by ECRs from within the group and attended by over sixty young neuroscientists from across the country. The plan for this meeting was to allow the early career researchers we funded in 2015 to present their research to their peers and then engage in discussion with the ECR audience. The meeting also provided an opportunity for our younger members to network, to learn from each other and to benefit from the experience of our Centre's more senior researchers who were also present. There is a plethora of outstanding role models in the generation ahead of our ECRs within Brain Research New Zealand. By providing our younger researchers with the opportunity to be mentored by these established researchers and belong to BRNZ's network of leading neuroscientists and clinicians, we are giving them a strong foundation for a productive and successful research career.

An important part of BRNZ's legacy is to identify and shape the next generation of NZ's leaders in basic and clinical neuroscience. Leaders are not just top scientists, they must also be adept at advocating for neuroscience to improve understanding of the human and economic impact of ageing-related neurological disorders. In 2015, BRNZ's Directorate invited a number of our younger, up-and-coming

researchers into the CoRE's leadership groups to promote career development and succession planning. Dr Stephanie Hughes joined the Theme 1 Leadership group and presented the theme's research portfolio to the Science Advisory Board. Associate Professor Debbie Young took her place as our Centre's Community Engagement Advisor, while Dr Louise Parr-Brownlie played a leading role on the Maori Advisory Group and, along with Associate Professor Maurice Curtis, made a significant contribution to BRNZ's grant assessment process.

Prestigious Training Opportunities

In 2015 two of our talented early career researchers, Dr Chantelle Fourie and Dr Kevin Lee, attended the CAJAL Advanced Neuroscience Training Programme "Advanced Techniques for Synapse Biology" course in Bordeaux, France. This is an extremely prestigious course that selects only twenty participants from around the world each year. It offers a direct hands-on experience learning advanced techniques used in synapse biology through one-on-one interaction with world class experts in neurobiology. The course was aimed at advanced PhD students and junior postdoctoral fellows with outstanding qualifications – that is, the future leaders in this field. There are few other courses of this calibre in the world, so having two of our own young researchers accepted into the programme is a testament to the talent within BRNZ. The people that Drs Fourie and Lee met during their stay, both instructors and fellow students, gave them opportunities to network, share ideas and form international collaborations, all invaluable experiences these early career researchers.

A group photo of BRNZ's Early Career Researcher group at their first workshop in Christchurch.

OUTCOME 9

Improved Māori health and wellbeing during ageing by working with Māori communities

to understand their needs and value and build equal relationships, incorporating Mātauranga into innovative research and clinical methods, and by supporting Māori to determine their own pathways to brain health through training of Māori neuroscientists and clinicians.

In 2015,

Brain Research New Zealand – Rangahau Roro Aotearoa officially began its partnership with Māori to support Māori in determining their own pathways of neurological knowledge and well-being through training Māori neuroscientists/clinicians and developing mātauranga brain research.

> *BRNZ's Māori Advisory Group was formed as part of the Centre's drive to promote Māori participation and engagement in our research programme, processes and decision-making.*

The group plays a key role for BRNZ in that it provides advice to the Co-Directors on issues relating to Māori engagement and development. It opens up clear lines of communication and promotes not just better understanding, but also genuine participation and engagement with Māori. BRNZ's Co-Directors met with the Māori Advisory Group on a regular basis throughout 2015 to consult extensively on the recruitment of BRNZ's Māori Strategic Advisor, planning for the Māori PhD scholarship and the Eru Thompson postdoctoral fellowship, and on potential Governance Board successors to Te Rikawa Dallas Eru Tawha Thompson, or Eru Thompson, as he was known to the CoRE.

Towards the end of 2015, BRNZ made two significant Māori appointments.

Dr Hinemoa Elder agreed to join the CoRE as our Kaiwhakahaere Māori, or Māori Strategy Leader. Dr Elder is a psychiatrist with experience working with Māori whanau with traumatic brain injury. In her own research she questions in what ways western approaches to research and practice work for Māori and the methods needed to investigate issues that have salience for Māori. In her role with the Centre, Dr Elder will apply her skills, expertise and contacts to develop strategies for Māori engagement and Māori workforce development for BRNZ. She will also work directly with our researchers to foster a deeper understanding of Te Ao Māori to develop a Mātauranga Roro research programme to learn about traditional Māori understandings of the brain and mind.

The Venerable Lloyd Nau Pōpata, Archdeacon of Tāmaki Makaurau, Pou Tikanga – of Ngāti Kahu of Northland was also appointed late in the year to serve as the Māori representative on our governance board. Archdeacon Pōpata's background is in social work. He is a member of the Selwyn Foundation's leadership team, who oversee a network of retirement villages across the north island. Archdeacon Pōpata is excited to join our CoRE, and to see the effort being invested across multiple universities to ensure better outcomes for the ageing Kaumatua and Kuia within Aotearoa New Zealand.

Hui and iwi consultations

During 2015, BRNZ initiated hui and iwi consultations in our research programme studying neuro-rehabilitation and neuroplasticity with Māori whanau affected with Huntington's disease and dementia. Our researchers participated inthree formal hui in Raglan, Rotorua and New Plymouth with representatives from whanau from different iwi and hapu in each region. In addition, we had several informal hui recruiting sessions for Māori affected by Huntington's disease from seven whanau (Ngati Porou, Ngati Awa, Te Arawa, Nga Puhi, Ngati Whatua, Tainui, Maniapoto, Tauranga Moana/Ngai Te Rangi), who are actively participating in our neuroplasticity research studies.

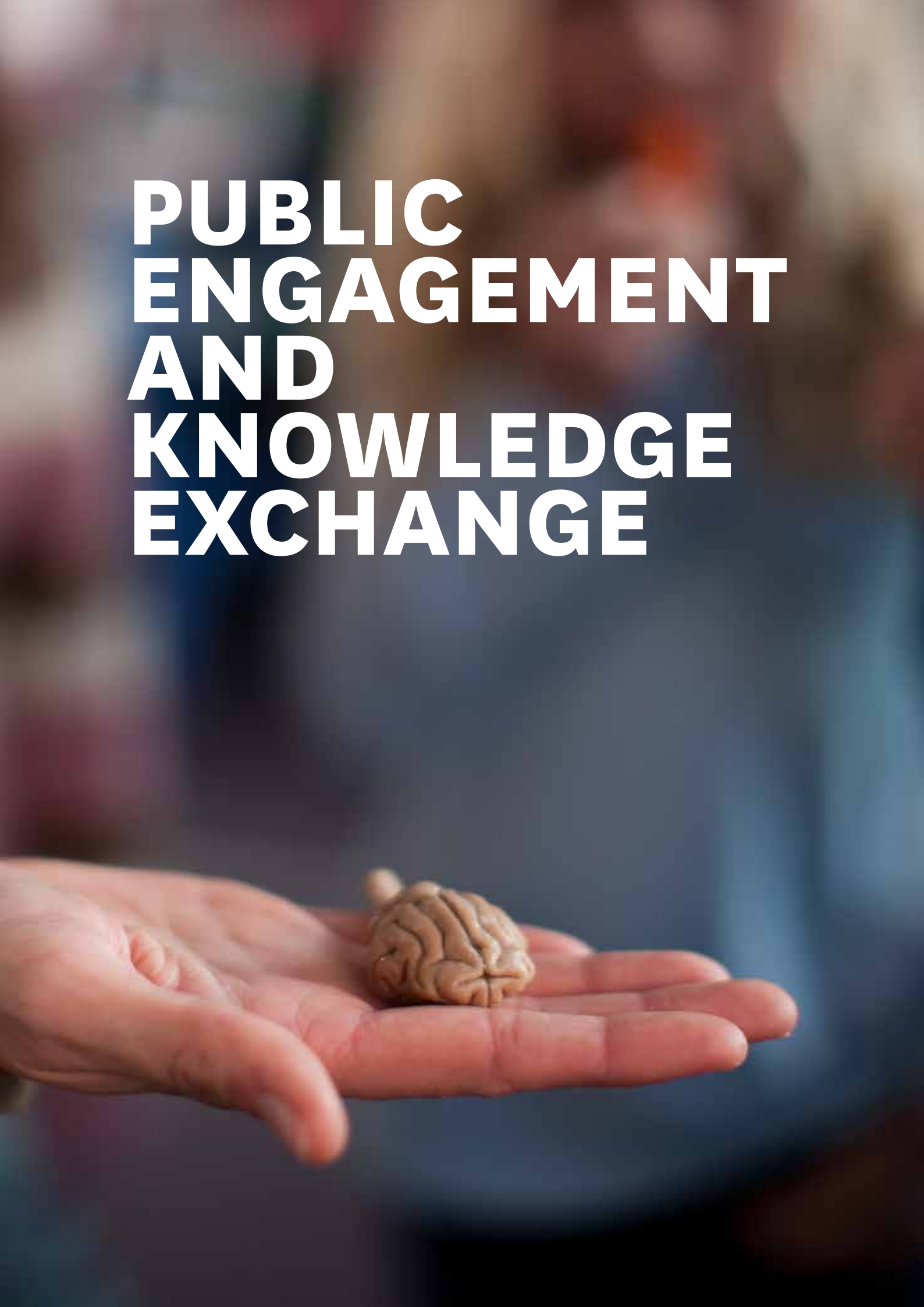
A TRIBUTE TO TE RIKAWA DALLAS ERU TAWHA THOMPSON

Kua hinga te tōtara i te wao nui a Tāne

A great totara has fallen in the forest of Tane

When BRNZ was established, Eru Thompson was appointed to the Governance Board to advise us on the development of the vision mātauranga for the CoRE . An active leader in the Māori community, a kaumātua and an acknowledged historian and tohunga of Waikato-Tainui, he passed away suddenly in November 2014. As someone who was sought after throughout Tāmaki Makaurau for his wisdom and knowledge, Eru Thompson's passing was an immense loss not only to BRNZ but to Māoridom in Aoteaaroa New Zealand. He will always be remembered for his extraordinary generous contributions to the recognition of Māori cultural attitudes in teaching and research in our field. Following tikanga Māori, and to allow his whānau time to grieve, BRNZ honoured Eru Thompson's contributions to by allowing a year to pass before resuming activities related to his role.

PUBLIC ENGAGEMENT AND KNOWLEDGE EXCHANGE



For Brain Research New Zealand, public engagement refers to the myriad ways in which our researchers share their knowledge and expertise with the public,

with the goal of generating interest in neuroscience and increasing public understanding of the issues surrounding brain health. We want people to be inspired by science and understand how findings from research can inform actions the real world.

IN THE COMMUNITY

As well as participating in Brain Day and Brain Week as outlined earlier in this report, BRNZ members gave numerous presentations to community groups and NGOs across New Zealand in 2015. Some examples of our work in this area include:

- A Public Panel Discussion on "The Business of Brain Research", hosted by the Neurological Foundation at Holy Trinity Cathedral, Parnell. This was an informal, one hour panel presentation titled "Change Makers in the World of Brain Research" where Professor Richard Faull sat alongside Max Ritchie (Executive Director of the Neurological Foundation) and Dr Barry Snow (a neurologist with significant expertise on Parkinson's disease). The panel was chaired by National Radio commentator Jim Mora. It was very successful, attracting a very large audience, and was followed by one hour of questions from the public.
- A lecture on "The Challenges and Excitement of Research on Human Ageing Neurodegenerative Diseases" given by Professor Richard Faull to the Whakatane Postgraduate Medical Society.
- A Neurological Foundation Public Lecture, at New Plymouth Boys' High School, entitled "An evening with Professor Richard Faull speaking on: Brain Research: Progress and Prospects".
- Participation in the Motor Neurone Disease Association of New Zealand's Annual General Meeting, in Auckland. Professor Faull attended as their patron and gave an introductory lecture with Dr Emma Scotter on the very latest developments in research at the Centre for Brain Research and on the international scientific community.
- Professor Alan Barber gave a public lecture titled "Update on stroke research and other neurological disorders" in association with the Neurological Foundation of New Zealand.
- Professor Wickliffe Abraham gave a presentation to U3A in Invercargill titled "Alzheimer's disease: Is there any good news?".
- Professor John Dalrymple-Alford gave a public lecture for Alzheimer's Canterbury, at the Living Well with Dementia one-day public meeting.
- Associate Professor John Reynolds was invited to give a public lecture in Wanaka on "Parkinson's Disease and Stroke – Towards new Treatments" in association with the Royal Society of New Zealand.
- Dr Louise Parr-Brownlie was an invited speaker at the Parkinson's Society's 2015 Annual General Meeting. Dr Parr-Brownlie's presentation focused on Illuminating a potential novel treatment for Parkinson's disease.
- Professor Ngaire Kerse gave a community presentation for the Fellowship New Zealand Inc., formerly Probus, in Panmure called "The biology of ageing".
- Professor Peter Thorne continued to be involved in the governance of the National Foundation for the Deaf and advocacy for people with hearing loss.
- Dr Rita Krishnamurthi - Presented to the Tamil Senior Citizen's Club on stroke knowledge and awareness, and presented to the Asian Network on stroke knowledge and awareness.

WORKING WITH HEALTHCARE PROFESSIONALS

BRNZ is dedicated to helping New Zealand's health workforce stay up-to-date with new knowledge and equipped to provide the best dementia care to ageing New Zealanders. The following is a sample of the knowledge exchange BRNZ researchers provided to further the education of New Zealand's health professionals:

- Professor Alan Barber gave numerous presentations to GPs, nursing staff and clinicians at conferences and meetings across New Zealand. This included talks on:
- "Acute Stroke Management" at Auckland DHB's Open Evening for General Practice;
- "Advances in acute Stroke therapy and secondary Stroke prevention" to ProCare GPs Continuing Medical Education;
- "Clot Retrieval / Summary of 2015 International Stroke Conference Findings" at the Stroke Nurse Specialist Meeting in Auckland;
- "Stroke in NZ: Results of the 4th Auckland Regional Community Stroke Study" at NZ's General Practice Conference & Medical Exhibition;
- "Stroke and anti-thrombotic therapy in 2015" at the Cardiac Society of Australia and New Zealand Annual Scientific Meeting; and
- "Incidence and Attack Rates of Cerebrovascular Disease in Auckland, New Zealand, in 2011-2012" New Zealand Association of Neurologists Annual Scientific Meeting.
- Dr Louise Parr-Brownlie gave seminars on the Science of Pain for the WellSouth Primary Health Network, Continuing Medical Education, in Oamaru and Cromwell
- Dr Louise Parr-Brownlie was a plenary speaker at the Parkinson's Society Clinical Educators Conference, giving a lecture titled "Optogenetics: finding a novel treatment for Parkinson's disease, Wellington."

WORKING WITH SCHOOLS

Since 2007, the Universities of Auckland and Otago, in partnership with the Australasian Neuroscience Society and the Queensland Brain Institute, has been running the national secondary schools' Brain Bee Challenge (www.abbc.edu.au/abbc/index.html). The Brain Bee is a global neuroscience Q&A competition for Year 11 secondary school students that aims to motivate them to learn about the brain and inspire them to pursue careers in biomedical research. In the New Zealand Brain Bee Challenge, Year 11 students compete to determine who is the "best brain" on such topics as intelligence, memory, emotions, sensations, movement, stress, ageing, sleep, addiction, Alzheimer's and stroke. The University of Auckland and the University of Otago host the regional finals for the New Zealand competition, with individuals competing for a place at the Australia-New Zealand Brain Bee Final held in conjunction with the Australasian Neuroscience Society meeting. The

national Brain Bee Challenge winner then has the opportunity to compete in the International Brain Bee, held annually in various countries around the world. Brain Research New Zealand investigators are heavily involved in the NZ and Australasian Brain Bee challenge. In Auckland, Professor Louise Nicholson and Associate Professor Maurice Curtis direct the national programme, while at Otago, Associate Professor Ruth Napper directs the event. BRNZ Co-Director Professor Cliff Abraham served as a judge for the International Brain Bee in Cairns in 2015.

Other 2015 activities aimed at educating teachers and inspiring future generations of scientists and clinicians include:

- Māori high school students visit Otago laboratories as part of the REACH programme
- The Liggins LENS science programme for secondary schools in Auckland
- As part of the Hands-on-Science week at the University of Otago, Professor Cliff Abraham and Dr Liana Machado gave budding secondary school scientists a tour of their laboratories to provide them with an immersive and unforgettable experience. In 2015, over 240 school students came from across New Zealand to take part in research projects led by Otago academics from 21 science departments.
- Associate Professor Ruth Empson's Cerebellar Training for Otago University Advanced School Science Academy - engaging school students to engage with our human cerebellum research
- Keynote speaker presentations by Professor Donna Rose Addis at Aorere College and Manurewa Intermediate School about what it means to be a neuroscientist.
- Associate Professor Bronwen Connor's public lectures and workshops on Learning Difficulties for New Zealand School Principals and teachers

INTERNATIONAL VISITORS, MEETINGS AND CONFERENCES

Brain Research New Zealand's investigators have connections across the globe with world-leaders in neuroscience. These connections provide our Centre with the opportunity to invite international speakers to New Zealand to present at national and regional meetings and symposiums, both to share their knowledge and to forge new links with the Centre's investigators with a view to future collaboration.

In 2015, we hosted over fifteen international visitors and delegations. We also sponsored local scientific meetings and symposiums, affording researchers the opportunity to exchange ideas and establish new working relationships.

MEMORY SYMPOSIUM, UNIVERSITY OF OTAGO

In August Professor Ted Abel visited the University of Otago to speak at a sponsored symposium on the brain mechanisms of memory. Professor Abel, Director of the Biological Basis of Behaviour Program at the University of Pennsylvania is one of the

world's leading researchers in this area. His presentation shed light on the effect of sleep deprivation on brain function. During his visit, Professor Abel was interviewed on "Nine to Noon", a popular programme on Radio New Zealand, and discussed how the lack of sleep can affect your memory, the value of naps, and sleeping after traumatic events. Other prominent academics invited to present their research at symposium were: Dr Stephen Ferguson, a Professor in the Department of Cellular and Molecular Medicine at the University of Ottawa; Dr Serena Dudek, Senior Investigator with the National Institute of Environmental Health Sciences; and Dr Michel Baudry, Professor of Biomedical Sciences and Dean of the Graduate College of Biomedical Sciences at Western University of Health Sciences in Pomona, California.

AUDIOLOGY SYMPOSIUM. UNIVERSITY OF AUCKLAND

"A celebration and showcase of hearing and vestibular research in New Zealand"

In early September 2015, the Section of Audiology at the University of Auckland hosted a two-day symposium to highlight the excellent hearing and vestibular research undertaken across the country. The meeting coincided with the 25th anniversary of the establishment of the postgraduate clinical audiology degree which has not only been a catalyst for expanding the Audiology service in New Zealand, but also driven an increase in the amount of hearing research conducted across the country. The meeting demonstrated the extraordinary depth and breadth of the research in New Zealand and enabled extensive networking among research groups. Brain Research New Zealand provided support for twenty graduate students and emerging investigators to attend this important symposium.

PROFESSOR DAN MERFIELD – HARVARD MEDICAL SCHOOL

2015 also saw us sponsor the NeuroEng 2015: 8th Australasian Workshop on Computational Neuroscience, as part of Queenstown Research Week. This workshop brought together computational neuroscientists and researchers at the interface between neuroscience and engineering. BRNZ provided support for Dan Merfield, Professor of Otolaryngology and accomplished neuroengineer/psychophysicist at Harvard Medical School to attend and give a keynote presentation on his ground-breaking research. Historically, Professor Merfield's was the first lab to study vestibular implants to treat patients suffering severe bilateral vestibular loss and has a number of patents that have been licensed by a commercial entity intent on bring this device to market in the near future.

PROFESSOR PIERRE GREMAUD – NORTH CAROLINA STATE UNIVERSITY

BRNZ member Professor Tim David hosted Pierre Gremaud, Professor of Mathematics at North Carolina State University, at the University of Canterbury. During his visit, Professor Gremaud ran a workshop titled "'Uncertainty Quantification Introduction and Examples" where he discussed uncertainty quantification as a formal way of understanding the sensitivity of parameters in a complex model both from a numerical and experimental viewpoint. This workshop demonstrated how computational frameworks can be applied to a broad range of brain research contexts, an important arm of research for our CoRE.

PROFESSOR DAVID GLANZMAN

In 2015 BRNZ Co-Director Professor Wickliffe Abraham sponsored a William Evans Fellowship for Professor David Glanzman to spend six months at the University of Otago. Professor Glanzman is an internationally acclaimed researcher in the field of molecular mechanisms of learning and memory, a topic of great interest to many researchers within Brain Research New Zealand. Whilst at Otago, Professor Glanzman engaged with the complementary collaborative research effort of Professor

Abraham and Dr Joanna Williams, in the study of epigenetic regulation of synaptic plasticity in the hippocampus of rats. He also gave research seminars to a large number of staff and students across the University and contributed to guest lectures in the Departments of Psychology, Biology and Zoology. The University of Otago has a large contingent of CoRE members and these researchers and students alike benefited greatly from informal and formal interactions with Professor Glanzman at seminars, the Australasian Winter Conference on Brain Research, and lab meetings.

SERVICE

Brain Research New Zealand's researchers are dedicated members of the local and international science community and serve on a vast number of advisory boards, panels and editorial boards. They also hold leadership positions in many NGOs and New Zealand-based charities.

In 2015 BRNZ investigators gave a significant amount of their time and expertise to organisations around the world, including:

- Age Concern Otago
- Alzheimer's Foundation (Auckland)
- Alzheimer's Otago
- Alzheimer's Auckland Charitable Trust
- Alzheimer's New Zealand Charitable Trust
- Australasian Neuroscience Society
- Community Care Trust Otago
- Controlled Release Society
- Deafness Research Foundation
- Dunedin Multidisciplinary Health and Development Research Unit
- Huntington's Disease Association (Auckland)
- International Society of Vestibular Physiologists
- European Federation of Neurological Societies
- Health Research Council, Biomedical Advisory Board
- Human Frontiers Science Programme Organisation
- International Journal of Otolaryngology
- Journal of Chemical Neuroanatomy
- Motor Neurone Disease Association of New Zealand (Inc.)
- Ministry of Health National Stroke Network Leadership Group
- Multiple Sclerosis Otago
- Neurological Foundation of New Zealand
- Neuromuscular Research Foundation Trust
- Neurology Association of New Zealand
- Neurosurgical Society of Australasia
- Parkinson's Association Otago
- Society for Neuroscience (North America)
- Stroke Foundation Otago
- Stroke Foundation of New Zealand
- World Stroke Organization
- World Health Organisation Global Burden of Disease (GBD) 2013 TBI Panel
- World Health Organisation - Integrated Care for Older People

OUR PEOPLE

OUR PEOPLE

GOVERNANCE BOARD

BRNZ is privileged to have the support of highly reputable and experienced governance board members who are committed to helping us achieve our goals. Our Governance Board members are:

Sir Don McKinnon Chair of Brain Research New Zealand,

Mrs Wendy Fleming Chair of Alzheimer's New Zealand Charitable Trust, Vice-Chair of Alzheimer's Disease International and Past-Chair Alzheimer's New Zealand.

Mr Tony Offen Dunedin accountant, entrepreneur and member of the Council of the Neurological Foundation of NZ.

The Venerable Lloyd Nau Pōpata Archdeacon of Tāmaki Makaurau, Pou Tikanga – of Ngāti Kahu of Northland.

Professor Richard Blaikie Deputy Vice Chancellor (Research and Enterprise) at the University of Otago and Professor in Physics.

Professor Max Abbott Pro Vice Chancellor and Dean of the Faculty of Health and Environmental Sciences at AUT, and the Director of the National Institute for Public Health and Mental Health Research.

Professor John Fraser Dean of the Faculty of Medical and Health Sciences at the University of Auckland.

Professor Keith Hunter Pro-Vice-Chancellor (Sciences) at the University of Otago, and newly appointed Fellow of the Royal Society of New Zealand.

Professor Jim Metson Deputy-Vice-Chancellor (Research) at the University of Auckland.

SCIENCE ADVISORY BOARD

BRNZ's Science Advisory Board is made up of five internationally recognised experts in the neurosciences and neurology. The Board is chaired by **Professor Stephen Davis**, Professor of Medicine at the University of Melbourne, and President of the Australian and New Zealand Association of Neurologists.

Joining Professor Davis on the Scientific Advisory Board are:

Professor John Rostas (Emeritus Professor, Deputy Head of Faculty Research, Faculty of Health and Medicine, University of Newcastle, past-President of the Australian Neuroscience Society)

Professor Mark Bear (Professor of Neuroscience of the Picower Institute for Learning and Memory, Massachusetts Institute of Technology, and Howard Hughes Medical Institute)

Professor John Rothwell Institute of Neurology, University College London

Professor A. David Smith (Emeritus Professor, University of Oxford, Founding Director of Oxford Project to Investigate Memory and Ageing)

DIRECTORATE

Distinguished Professor Richard Faull

- Co-Director
- MBChB, PhD, DSc; FRSNZ, ONZM

Professor Wickliffe Abraham

- Co-Director
- BA with highest distinction, PhD; FRSNZ

Professor Peter Thorne

- Strategic development
- BSc, DipSci, PhD; CNZM

Associate Professor John Reynolds

- Leadership development and capability building
- MBChB, PhD

Professor Alan Barber

- Clinical engagement
- MBChB, FRACP. PhD

Associate Professor Lynette Tippett

- Dementia Prevention Research Clinics
- MSc (1st), DipClinPsych, PhD

MĀORI ADVISORY BOARD

BRNZ is fortunate to be able to call on the expertise of our Māori Advisory Board to provide guidance on the funding of neuroscience research that will have a positive impact on Māori health outcomes.

Associate Professor Papaarangi Reid (Te Rarawa) – DipComH, BSc, MBChB, DipObst, FNZCPHM

Associate Professor Suzanne Pitama (Ngati Kahungunu) – MA, PhD, PGDipEdPsych

Te Kaanga Skipper (Tainui)

Dr Waiora Port (Te Aupouri Ngāti Pinaki) – BA, MA, PhD

Dr Louise Parr-Brownlie (Ngāti Maniapoto and Ngāti Pikiao)– PhD

Dr Hinemoa Elder (Ngāti Kuri, Te Aupouri, Te Rarawa and Ngāpuhi) – MBCHB, FRANZCP, PhD

RESEARCHERS

NAME	POSITION TITLE	INSTITUTION	BRNZ STATUS
Richard Faull	Professor	University of Auckland	Co-Director, PI
Wickliffe Abraham	Professor	University of Otago	Co-Director, PI
Alan Barber	Professor	University of Auckland	Directorate member, PI
Peter Thorne	Professor	University of Auckland	Directorate member, PI
Lynette Tippett	Associate Professor	University of Auckland	Directorate member,
DPRC Leader, PI	Doctoral Degree	University of Auckland	Employed in NZ
John Reynolds	Associate Professor	University of Otago	Directorate member, Theme Leader, PI
Brian Hyland	Professor	University of Otago	Theme Leader and PI
Tim Anderson	Professor	University of Otago	Theme Leader and PI
Ngaire Kerse	Professor	University of Auckland	Theme Leader and PI
Donna Rose Addis	Professor	University of Auckland	Principal Investigator
Nigel Birch	Associate Professor	University of Auckland	Principal Investigator
Margaret Brimble	Professor	University of Auckland	Principal Investigator
Winston Byblow	Professor	University of Auckland	Principal Investigator
David Christie	Associate Professor	University of Auckland	Principal Investigator
Bronwen Connor	Associate Professor	University of Auckland	Principal Investigator
Garth Cooper	Professor	University of Auckland	Principal Investigator
Maurice Curtis	Associate Professor	University of Auckland	Principal Investigator
Mike Dragunow	Professor	University of Auckland	Principal Investigator
Jian Guan	Dr	University of Auckland	Principal Investigator
Ian Kirk	Professor	University of Auckland	Principal Investigator
Janusz Lipski	Professor	University of Auckland	Principal Investigator
Johanna Montgomery	Associate Professor	University of Auckland	Principal Investigator
Louise Nicholson	Professor	University of Auckland	Principal Investigator
Suzanne Purdy	Professor	University of Auckland	Principal Investigator
Grant Searchfield	Dr	University of Auckland	Principal Investigator
Russell Snell	Professor	University of Auckland	Principal Investigator
Cathy Stinear	Associate Professor	University of Auckland	Principal Investigator
Debbie Young	Associate Professor	University of Auckland	Principal Investigator
Valery Feigin	Professor	Auckland University of Technology	Principal Investigator
Nicola Kayes	Associate Professor	Auckland University of Technology	Principal Investigator
Andrew Clarkson	Dr	University of Otago	Principal Investigator
Nick Cutfield	Dr	University of Otago	Principal Investigator
Dirk De Ridder	Professor	University of Otago	Principal Investigator
Ruth Empson	Associate Professor	University of Otago	Principal Investigator
Leigh Hale	Professor	University of Otago	Principal Investigator
Stephanie Hughes	Dr	University of Otago	Principal Investigator
Steve Kerr	Associate Professor	University of Otago	Principal Investigator
Ping Liu	Associate Professor	University of Otago	Principal Investigator
Liana Machado	Dr	University of Otago	Principal Investigator
Ian McLennan	Professor	University of Otago	Principal Investigator
Tracy Melzer	Dr	University of Otago, Christchurch	Principal Investigator
Pauline Norris	Professor	University of Otago	Principal Investigator
Louise Parr-Brownlie	Dr	University of Otago	Principal Investigator
Richie Poulton	Professor	University of Otago	Principal Investigator
Holger Regenbrecht	Associate Professor	University of Otago	Principal Investigator
Ted Ruffman	Professor	University of Otago	Principal Investigator
Paul Smith	Professor	University of Otago	Principal Investigator
Warren Tate	Professor	University of Otago	Principal Investigator
Ian Tucker	Professor	University of Otago	Principal Investigator
Joanna Williams	Dr	University of Otago	Principal Investigator
Yiwen Zheng	Dr	University of Otago	Principal Investigator

NAME	POSITION TITLE	INSTITUTION	BRNZ STATUS
John Dalrymple-Alford	Professor	University of Canterbury	Principal Investigator
Tim David	Professor	University of Canterbury	Principal Investigator
Richard Roxburgh	Dr	Auckland District Health Board	Principal Investigator
Suzanne Barker-Collo	Associate Professor	University of Auckland	Associate Investigator
Michelle Glass	Associate Professor	University of Auckland	Associate Investigator
Cris Print	Associate Professor	University of Auckland	Associate Investigator
Ben Thompson	Associate Professor	University of Auckland	Associate Investigator
Srdjan Vlajkovic	Associate Professor	University of Auckland	Associate Investigator
Henry Waldvogel	Associate Professor	University of Auckland	Associate Investigator
Rita Krishnamurthi	Dr	Auckland University of Technology	Associate Investigator
Michael Black	Associate Professor	University of Otago	Associate Investigator
Jon Shemmell	Dr	University of Otago	Associate Investigator
Ed Mee	Dr	Auckland District Health Board	Associate Investigator
Barry Snow	Associate Professor	Auckland District Health Board	Associate Investigator
Phil Wood	Dr	Auckland District Health Board	Associate Investigator
Gary Cheung	Dr	Auckland District Health Board	Associate Investigator
Ari Bok	Dr	Auckland District Health Board	Associate Investigator
Arjan Scheepens	Dr	Plant and Food Research	Associate Investigator

STUDENTS

STUDENT NAME	LEVEL OF STUDY	UNIVERSITY	GRADUATE DESTINATION
Kaushalya Ambepitiya	Other	University of Auckland	Employed in NZ
Wojciech Ambroziak	Doctoral Degree	University of Auckland	Continuing Study
Christine Arasaratnam	Doctoral Degree	University of Auckland	Continuing Study
Daniel Austria	Other	University of Auckland	Unknown
Michael Bergin	Doctoral Degree	University of Auckland	Employed in NZ
Hao Chang	Doctoral Degree	University of Auckland	Further study in NZ
Amy Chapman	Doctoral Degree	University of Auckland	Continuing Study
Thomas Chen	Doctoral Degree	University of Auckland	Employed in NZ other
Vera Choi	Other	University of Auckland	Employed in NZ
Natacha Coppieters	Doctoral Degree	University of Auckland	Employed in NZ
Nishani Dayaratne	Doctoral Degree	University of Auckland	Employed in NZ
Aleea Devitt	Doctoral Degree	University of Auckland	Employed overseas
Dawei Fan	Doctoral Degree	University of Auckland	Continuing Study
Lyres Freeth	Other	University of Auckland	Continuing Study
Tessa Fuhrer	Other	University of Auckland	Continuing Study
William Fulton	Other	University of Auckland	Continuing Study
Tina Gao	Doctoral Degree	University of Auckland	Continuing Study
Bonnie Gardner	Doctoral Degree	University of Auckland	Continuing Study
Mandana Ghodratipour	Doctoral Degree	University of Auckland	Continuing Study
Phillip Grant	Other	University of Auckland	Further study in NZ
Francis Guinto	Other	University of Auckland	Employed in NZ other
Maria Hoelfliger	Other	University of Auckland	Further study in NZ
Nils Kahlcke	Doctoral Degree	University of Auckland	Employed overseas
Rashika Karunasinghe	Doctoral Degree	University of Auckland	Employed in NZ
Rohan King	Other	University of Auckland	Unknown
Shelly Lin	Doctoral Degree	University of Auckland	Unknown
Deirde MacVeigh	Doctoral Degree	University of Auckland	Employed in NZ
Gagandeep Mallah	Doctoral Degree	University of Auckland	Continuing Study
Nicole McKay	Other	University of Auckland	Continuing Study
Nasim Mehrabi	Doctoral Degree	University of Auckland	Employed in NZ

STUDENT NAME	LEVEL OF STUDY	UNIVERSITY	GRADUATE DESTINATION
Lakshini Mendis	Doctoral Degree	University of Auckland	Continuing Study
Ruth Monk	Other	University of Auckland	Further study in NZ
Janitha Mudannayeke	Doctoral Degree	University of Auckland	Continuing Study
Helen Murray	Doctoral Degree	University of Auckland	Continuing Study
Samantha Murray	Doctoral Degree	University of Auckland	Continuing Study
Jurasha Naidoo	Doctoral Degree	University of Auckland	Employed Overseas
Jin Ng	Doctoral Degree	University of Auckland	Continuing Study
Thulani Palpagama	Other	University of Auckland	Further Study in NZ
Stefano Patassini	Doctoral Degree	University of Auckland	Employed in NZ
Rebecca Payne	Doctoral Degree	University of Auckland	Continuing Study
Kate Riegle van West	Doctoral Degree	University of Auckland	Continuing Study
Justin Rustenhoven	Doctoral Degree	University of Auckland	Continuing Study
Natalia Samorow	Doctoral Degree	University of Auckland	Continuing Study
*Phil Sanders	Doctoral Degree	University of Auckland	Continuing Study
Tvesa Sehji	Other	University of Auckland	Further study in NZ
Marie-Claire Smith	Doctoral Degree	University of Auckland	Continuing Study
Leon Smyth	Doctoral Degree	University of Auckland	Continuing Study
Jennifer (Junru) Song	Doctoral Degree	University of Auckland	Continuing Study
*Meg Spriggs	Doctoral Degree	University of Auckland	Continuing Study
Brendan Swan	Other	University of Auckland	Continuing Study
Sheryl Tan	Doctoral Degree	University of Auckland	Employed overseas
Winston Tan	Doctoral Degree	University of Auckland	Employed overseas
Kathryn Todd	Other	University of Auckland	Continuing Study
Siddharth Vashishta	Other	University of Auckland	Further study in NZ
Simon Walker	Doctoral Degree	University of Auckland	Continuing study
Iruni Wanigasekara	Other	University of Auckland	Further study in NZ
Whitney Whitford	Other	University of Auckland	Continuing study
Jane Wu	Doctoral Degree	University of Auckland	Continuing Study
Angela Wu	Doctoral Degree	University of Auckland	Continuing Study
Jingshu Xu	Doctoral Degree	University of Auckland	Continuing Study
Panzao Yang	Doctoral Degree	University of Auckland	Continuing Study
Andrew Yee	Doctoral Degree	University of Auckland	Continuing Study
Stanley Yune	Other	University of Auckland	Continuing Study
Kristina Zawaly	Doctoral Degree	University of Auckland	Continuing Study
Deirdre Gough	Other	AUT University	Continuing study
Halina Kalaga	Doctoral Degree	AUT University	Continuing study
Susan Mahon	Doctoral Degree	AUT University	Continuing study
Bronwyn Tunnage	Doctoral Degree	AUT University	Continuing study
Claudia Zagreanu	Doctoral Degree	AUT University	Continuing study
Phillip Aitken	Doctoral Degree	University of Otago	Continuing Study
Yasser Almalki	Doctoral Degree	University of Otago	Continuing Study
Mustafa Almuqbel	Doctoral Degree	University of Otago	Continuing Study
Deanna Barwich	Other	University of Otago	Unknown
Laura Boddington	Doctoral Degree	University of Otago	Continuing Study
Christopher Brett	Other	University of Otago	Continuing Study
Allyson Calder	Doctoral Degree	University of Otago	Continuing Study
Stella Cameron	Doctoral Degree	University of Otago	Continuing Study
Polly Chen	Doctoral Degree	University of Otago	Continuing Study
Jody Cicolini	Doctoral Degree	University of Otago	Continuing Study
David Bergin	Doctoral Degree	University of Otago	Employed in NZ
Phoebe Drake	Other	University of Otago	Continuing Study
Megan Elder	Doctoral Degree	University of Otago	Continuing Study
Simon Feng	Doctoral Degree	University of Otago	Continuing Study
Matthew Fields	Other	University of Otago	Unknown
Samuel Flannery	Other	University of Otago	Continuing Study
Timothy Galt	Other	University of Otago	Continuing Study

STUDENT NAME	LEVEL OF STUDY	UNIVERSITY	GRADUATE DESTINATION
Anthony Garvey	Other	University of Otago	Continuing Study
Manju Gayarathny	Doctoral Degree	University of Otago	Continuing Study
Nicola Guy	Other	University of Otago	Continuing Study
Chris Heinrich	Doctoral Degree	University of Otago	Continuing Study
Roanne Hurley	Doctoral Degree	University of Otago	Continuing Study
Mohamed Fasil Ibrahim	Doctoral Degree	University of Otago	Continuing Study
Kyongho Jang	Other	University of Otago	Unknown
Nick Lawson	Other	University of Otago	Continuing Study
Louisa Lim	Other	University of Otago	Unknown
Rosie Melcher	Other	University of Otago	Continuing Study
Stephanie Mercer	Doctoral Degree	University of Otago	Continuing Study
Normala Mesbah	Doctoral Degree	University of Otago	Continuing Study
James Miller	Other	University of Otago	Continuing Study
Jodi Morrissey	Doctoral Degree	University of Otago	Continuing Study
Martin Park	Other	University of Otago	Continuing Study
Nikita Potemkin	Other	University of Otago	Continuing Study
Emmet Power	Doctoral Degree	University of Otago	Continuing Study
Samantha Ross	Doctoral Degree	University of Otago	Unknown
Anurag Singh	Doctoral Degree	University of Otago	Continuing Study
Lucy Stiles	Doctoral Degree	University of Otago	Continuing Study
Valerie Tan	Doctoral Degree	University of Otago	Continuing Study
Tim Wright	Other	University of Otago	Unknown
Monica Xiong	Other	University of Otago	Continuing Study
Mohamad Yahaya	Doctoral Degree	University of Otago	Continuing Study
Michael Yung	Other	University of Otago	Employed in NZ
Lisa Zhou	Doctoral Degree	University of Otago	Continuing Study
Sophie Barnett	Other	University of Canterbury	Further study in NZ
Annabelle Bos	Other	University of Canterbury	Further study in NZ
Christine de Lancea	Doctoral Degree	University of Canterbury	Continuing Study
Katharina Dormanns	Doctoral Degree	University of Canterbury	Continuing Study
Simon Dyson	Other	University of Canterbury	Employed in NZ
Jeremy Goh	Doctoral Degree	University of Canterbury	Continuing Study
Michelle Goodman	Doctoral Degree	University of Canterbury	Continuing Study
Samantha Groves	Other	University of Canterbury	Unknown
Jenny Hamilton	Doctoral Degree	University of Canterbury	Continuing Study
Guneet Kaur	Other	University of Canterbury	Continuing Study
Allanah Kenny	Doctoral Degree	University of Canterbury	Continuing Study
Megan Livingstone	Doctoral Degree	University of Canterbury	Continuing Study
Siobhan Lockie	Other	University of Canterbury	Continuing Study
Shaun London	Other	University of Canterbury	Continuing Study
Elshin Mathias	Doctoral Degree	University of Canterbury	Continuing Study
Meisha Nicolson	Other	University of Canterbury	Continuing Study
Jaijus Pallippadan Johny	Doctoral Degree	University of Canterbury	Continuing Study
Maddie Pascoe	Other	University of Canterbury	Unknown
Brook Perry	Doctoral Degree	University of Canterbury	Continuing Study
James Perry	Doctoral Degree	University of Canterbury	Employed overseas
Susan Rapley	Doctoral Degree	University of Canterbury	Continuing Study
Megan Stark	Other	University of Canterbury	Continuing Study
Tim Van Ginkel	Doctoral Degree	University of Canterbury	Continuing Study
Kyla Wood	Doctoral Degree	University of Canterbury	Continuing Study

*Directly funded by BRNZ

BRNZ AFFILIATED STUDENTS 2015

136

TOTAL NUMBER OF STUDENTS
DOING RESEARCH
AFFLILIATED WITH BRNZ

53	83
MALE	FEMALE

64 UNIVERSITY OF AUCKLAND

43 UNIVERSITY OF CANTRBURY

24 UNIVERSITY OF OTAGO

5 AUCKLAND UNIVERSITY OF TECHNOLOGY

ONE OF BRNZ'S OUTCOMES

To boost the number of maori researchers affiliated with the core.

AND

To focus our research towards improving health outcomes for maori with neurodegenerative disorders.

49 DOING EITHER HONOURS OR MASTERS

87 DOING A DOCTORAL DEGREE

BRNZ

IS THE ONLY CENTRE OF RESEARCH EXCELLENCE CO-MANAGED BY THE TWO LARGEST UNIVERSITIES IN THE COUNTRY:

AUCKLAND & OTAGO

WHERE OUR STUDENTS END UP IN 2015

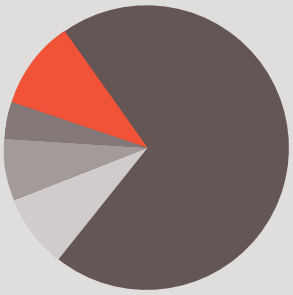
95 CONTINUED STUDY (70%)

14 EMPLOYED IN NZ (10%)

6 EMPLOYED OVERSEAS (4%)

10 FURTHER STUDY ELSEWHERE IN NZ (7%)

11 UNKNOWN (8%)



BRAIN RESEARCH NEW ZEALAND IN COLLABORATION WITH

EXTERNAL RESEARCH INCOME, BY SOURCE

A number of projects in BRNZ's research portfolio in 2015 are co-funded by other national funding bodies such as the Neurological Foundation, the National Science Challenges, and the New Zealand Lottery Grants Board. In 2015 Brain Research New Zealand investigators were awarded new co-funding grants totalling ~$500,000.

INTERNATIONAL FUNDING

In 2015 Brain Research New Zealand investigators secured new funding of ~$460,000 from international sources to support ageing-related research conducted in 2015, including Natural Sciences and Engineering Council of Canada (NSERC), the Ontario Research Fund, Canada Foundation for Innovation and the United States National Institutes of Health (NIH) /National Institute of Ageing (NIA).

ALIGNED FUNDING

Brain Research New Zealand's investigators are prolific and highly respected researchers, as exemplified in the extent of funding granted to them by external funding bodies for research related to the ageing brain or diseases of the ageing brain. In 2015, BRNZ's researchers were awarded over $5,400,000 in funding for research aligned to the CoRE's research programme.

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5. Bacon, C.J., Kerse, N., Moyes, S., Hayman, K., Teh, R.O., Kepa, M., Dyall, L. (2015) Vitamin D Status of Māori and non-Māori Octogenarians from Life and Living in New Zealand: A Cohort Study (LiLACS NZ). Asia Pacific Journal of Clinical Nutrition, (in press).
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9. Barker, M.D. & Purdy, S.C. (2015) An initial investigation into the validity of a computer-based auditory processing assessment (Feather Squadron). International Journal of Audiology, 55(3), 173-183.
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12. Barker-Collo, S., Jones, K., Theadom, A., Starkey, N., Dowell, A., McPherson, K., Ameratunga, S.A., Dudley, M., Te Ao, B., & Feigin, V. (2015) Bionic Research Group. Neuropsychological outcome and its correlates in the first year after adult mild traumatic brain injury: A population-based New Zealand study. Brain Injury, 29(13-14), 1604-1616.
13. Barker-Collo, S., Krishnamurthi, R., Witt, E., Feigin, V., Jones, A., McPherson, K., Starkey, N., Parag, V., Jiang, Y., Barber, P.A., Rush, E., Bennett, D., & Aroll, B. (2015) Improving Adherence to Secondary Stroke Prevention Strategies Through Motivational Interviewing: Randomized Controlled Trial. Stroke, 46(12), 3451-3458.
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20. Bennett, D.A., Brayne, C., Feigin, V.L., Barker-Collo, S., Brainin, M., Davis, D., Gallo, V., Jetté, N., Karch, A., Kurtzke, J.F., Lavados, P.M., Logroscino, G., Nagel, G., Preux, P.M., Rothwell, P.M., & Svenson, L.W. (2015) Development of the standards of reporting of neurological disorders(STROND) checklist: A guideline for the reporting of incidence and prevalence studies in neuroepidemiology. Neurology, 85(9), 821-828.
21. Bergin, D.H., Jing, Y., Zhang, H., & Liu, P. (2015) A single intracerebroventricular Aβ 25-35 infusion leads to prolonged alterations in arginine metabolism in the rat hippocampus and prefrontal cortex. Neuroscience, 298, 367-379.
22. Bergin, J.M., Bird, P.A., Vlajkovic, S.M., Thorne, P.R. (2015) High frequency bone conduction auditory evoked potentials in the guinea pig: Assessing cochlear injury after ossicular chain manipulation. Hearing Research, 330(Pt-A), 147-154.
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9. Barnett, S., Perry, B., Mercer, S., & Dalrymple-Alford, J.C. (2015) Anterior thalamic nuclei lesions, environmental enrichment and histone H3 acetylation in the extended hippocampal system. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.2.
10. Boddington, L. J., Gray J. P. & Reynolds, J. N. J. (2015) Electrical theta-burst stimulation modulates interhemispheric inhibition after photothrombotic stroke. In Proceedings of the Society for Neuroscience 45th Annual Meeting SfN. Abstract 575.13/B100.
11. Brimble, M. A. (2015) NNZ2566 - A new drug for traumatic brain injury, Fragile X Syndrome and Rett Syndrome Paediatrics Conference, Auckland, New Zealand.
12. Burrell, M. H., Atcherley, C. V., Heien, M. L., & Lipski, J. (2015) A novel electrochemical approach for prolonged measurement of absolute levels of extracellular dopamine in brain slices. In Proceedings of the Society for Neuroscience 45th Annual Meeting SfN. Abstract 387.15/B61.
13. Campbell, B., Mitchell, P., Kleinig, T., Dewey, H., Churilov, L., Yassi, N., Yan, B., Dowling, R., Parsons, M., Oxley, T., Wu, T., Brooks, M., Simpson, M., Miteff, F., Levi, C., Krause, M., Harrington, T., Faulder, K., Steinfort, B., Priglinger, M., Ang, T., Scroop, R., Barber, P.A., McGuinness, B., Wijeratne, T., Phan, T., Chong, W., Chandra, R., Bladin, C., Badve, M., Rice, H., de Villiers, L., Ma, H., Desmond, P., Donnan, G., & Davis, S. (2015) Reperfusion and clinical outcome in the EXTEND-IA randomized trial. International Journal of Stroke.
14. Campbell, B.C.V., Mitchell, P.J., Kleinig, T.J., Dewey, H.M., Churilov, L., Parsons, M.W., Brooks, M., Miteff, F., Krause, M., Harrington, T.J., Scroop, R., Barber, P.A., McGuinness, B., Wijeratne, T., Phan, T.G., Chong, W., Bladin, C.F., Badve, M., Donnan, G.A., & Davis, S.M. (2015) Severe hypoperfusion in the absence of a large ischemic core should not exclude patients from reperfusion therapies. International Journal of Stroke, 10(S2), 77-438, ESOC-0961.
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17. Cicolini, J., Jing, Y., Waldvogel, H.J., Faull, R.L.M., & Liu, P. (2015)The urea cycle is induced in Alzheimer's brains. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.46.
18. Cinco, P., Jing, Y., Waldvogel, H.J., Curtis, M.A., Zhang, H., Abraham, W.C., Faull, R.L.M., & Liu, P. (2015) Arginine decarboxylase and agmatinase immunoreactivity in Alzheimer's superior frontal gyrus. The 27th Alzheimer's Association International Conference, Alzheimer's & Dementia, 11(7), Supplement, P773.
19. De Ridder, D. (2015) Mimicking the brain in neurostimulation. Australian and New Zealand College of Anaesthetists Faculty of Pain Medicine Spring Meeting: Adventures in Pain, Queenstown, New Zealand, Session 1.
20. Devan, H., Carman, A., Hendrick, P., Ribeiro, D., & Hale, L. (2015) Perceptions of low back pain in people with lower limb amputation: A focus group study. Physiotherapy, 101(Suppl. 1), e314.
21. Devitt, A.L., Tippett, L.J., Schacter D.L., & Addis, D.R. (2015) The influence of ageing on conjunction errors in autobiographical memory. Rotman Research Institute Conference, Toronto, March 2015.
22. Dinnunhan, M.F.K., Ohline, S.M., Wake, K.L., Schoderböck, L., Hughes, S.M., & Abraham, W.C. (2015) Reawakening adult-generated hippocampal granule cells: the effects of enriched environment on an established trend. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.38.
23. Elder, M., Peppercorn, K., Schuman, E., Tate, W., Abraham, C., & Williams, J. (2015) Secreted amyloid precursor protein alpha regulates protein synthesis in primary hippocampal neuronal cultures. Journal of Neurochemistry, 134(Suppl. 1), WTH09-09.
24. Empson, R. (2015) Facilitating dynamic live cell imageing in New Zealand. Proceedings of the 27th National Conference on Microscopy.
25. Empson, R., Power, E., & Morales, A. (2015) Moderation of enhanced mGLUR1 mediated synaptic signalling restores motor learning in a mouse model of human spino-cerebellar ataxia. Journal of Neurochemistry, 134(Suppl. 1), MTU11-12.
26. Freestone, P. S., Todd, K. L., Sun, Y., & Lipski, J. (2015) An optogenetic study of endocannabinoid mediated modulation of dopamine neuron activity. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 3.2.
27. Freestone, P. S., Todd, K. L., Sun, Y., & Lipski, J. (2015) Optogenetic stimulation of the subthalamic nucleus modulates downstream dopaminergic neurons in the Substantia Nigra pars compacta via endocannabinoids. In Proceedings of the Society for Neuroscience 45th Annual Meeting SfN. Abstract 801.06/R9.

28. Freestone, P. S., Todd, K., Sun, Y., & Lipski, J. (2015) Applying optogenetic tools to study the Basal Ganglia network. NeuroEng, NZ.

29. Gao, T., Babu, R.J., Dai, S., Bobier, W.R., Anstice, N.S., Black, J.M., & Thompson, B. (2015) Treatment of amblyopia in adults with refractive correction alone. American Academy of Optometry Program, 150043 (http://www.aaopt.org/treatment-amblyopia-adults-refractive-correction-alone).

30. Guan, J., McCowan, L., Shorten, P., Liu, K., Thomason, J., Mitchell, E., Taylor, R. & Murphy, R. (2015) The role for cGP in autocrine regulation of IGF-1 in obesity and hypertension. Med Sci, Queenstown, New Zealand, 29-31st August 2015.

31. Hale, L., Potiki-Bryant, K., Tikao, K., Milosavljevic, S., Wright-Tawha, T., & Mirfin-Veitch, B. (2015) Enabling access to physiotherapy services for Hauā Māori (Māori living with disability)Physiotherapy, 101(Suppl. 1), e504-505.

32. Hamilton, J., Perry, B., Lee, J., & Dalrymple-Alford, J.C. (2015) Thalamic brain lesions, theta and memory. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.6.

33. Hegemann, R., & Abraham, W. C. (2015) The role of action potential firing in metaplasticity. Journal of Neurochemistry,134(Suppl. 1), WTH09-15.

34. Hoermann, S., Collins, J., & Regenbrecht, H. (2015) Learning from rehabilitation: A bi-manual interface approach. Proceedings of the IEEE Symposium on 3D User Interfaces (3DUI), (pp. 163-164).

35. Hoermann, S., Ferreira dos Santos, L., Morkisch, N., Jettkowski, K., Sillis, M., Cutfield, N., Schmidt, H., Hale, L., Krüger, J., Regenbrecht, H., & Dohle, C. (2015) Computerized Mirror Therapy with Augmented Reflection Technology for Stroke Rehabilitation - A Feasibility Study in a Rehabilitation Center Proceedings of ICVR 2015 (the International Conference on Virtual Rehabilitation), Valencia, Spain, 199-206.

36. Innes, C., Kelly, P., Hlavac, M., Melzer, T., & Jones, R. (2015) Decreased regional cerebral perfusion in moderate-severe obstructive sleep apnoea during wakefulness. Australasian Physical & Engineering Sciences in Medicine, 38(1).

37. Janssen, J., Hale, L., Mirfin-Veitch, B., & Harland, T. (2015) Are physiotherapists ready to conduct research as part of their daily practice? Physiotherapy, 101, Suppl. 1, e670.

38. Jing, Y., Zhang, H., & Liu, P. (2015) Blood arginine metabolic profile is altered in male Sprague-Dawley rats. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 1.

39. Jones, O.D. & Abraham, W.C. (2015) Astrocytes regulate synaptic plasticity in the hippocampus New Zealand Medical Journal, 128 (1421).

40. Jones, O.D. & Abraham, W.C. (2015) Astrocytes mediate heterodendritic metaplasticity in hippocampus. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 1.3.

41. Kahlcke, N., Furkert, D. P., Glass, M., & Brimble, M. A. (2015) Development of new chemical probes for investigation of the CB1-D2 receptor complex. 40th Congress of the Federation-of-European-Biochemical-Societies (FEBS) - The Biochemical Basis of Life, Berlin, GERMANY.

42. Karunasinghe, R.N. & Lipski, J. (2015) Response of glial cells in an in vitro model of stroke. HOPE-Selwyn Foundation Knowledge Exchange Conference.

43. Kerse, N., McDonald, M., Rolleston, A., Hayman, K., & Muru-Lanning, M. (2015) Mental health and wellbeing in advanced age: LiLACS NZ. Australian and New Zealand Journal of Psychiatry. 2015 May;49:69.

44. Krishnamurthi, R., Bhattacharjee, R., Hussein, T., Purohit, M., Feigin, V. (2015) The Stroke Riskometer: Reducing The Burden Of Stroke Using Mobile Technology (RIBURST). 5th International Conference on Neuropidemiology, Neuroepidemiology 2015;45:298–337(1300).

45. Krishnamurthi, R.V., Barker-Collo, S., McPherson, K., Parag, V., Parmar, P., Jones, A., Witt, E., Starkey, N., Arroll, B., Bennett, D.A., Rush, E., Taylor, D., Theadom, A., Anderson, C., Barber, P.A., Feigin, V.L., for the ARCOS IV Group. (2015) 10-Year Trends In Incidence Of First-Ever Stroke And Stroke Sub-Types From The Auckland Regional Community Stroke Study 2002-2011. 5th International Conference on Neuropidemiology, Neuroepidemiology 2015;45:298–337(1299).

46. Kyrke-Smith, M., Abraham, W. C., & Williams, J. (2015) Regulation of HDAC1 and HDAC2 following long-term potentiation. Journal of Neurochemistry, 134 (Suppl. 1), WTH09-19.

47. Levi, C., Davey, A., Lasserson, D., Parsons, M., Barber, P.A., Dewey, H., Cadilhac, D., Quain, D., Rothwell, P., & Magin, P. (2015) Presentation patterns of patients with transient ischemic attack (TIA) and minor stroke, compared with those of stroke/TIA mimic. International Journal of Stroke, 10(S2), 77-438, ESOC-0904.

48. Levi, C., Lasserson, D., Davey, A., Quain, D., Dewey, H., Cadilhac, D., Barber, P.A., Donnan, G., Spratt, N., & Magin, P. (2015) Investigation and management of transient ischemic attacks and minor strokes presenting in general practice compared to emergency departments – INSIST cohort study findings. International Journal of Stroke, 10(S2), 77-438, ESOC-0902.

49. Machado, L. (2015) Exercise-cognition links in young adults: Optimizing brain health and function through simple non-invasive methods. Brain Health Research Centre's annual conference, Dunedin Public Art Gallery, Dunedin, invited speaker.

50. Machado, L., & Brett, C. (2015) Manual versus saccadic assessment of inhibition and switching deficits: Evidence the saccadic system exhibits resistance to ageing. European Conference on Eye Movements, Fri-33.

51. Magin, P., Najib, N., Tapley, A., Lasserson, D., Quain, D., Dewey, H., Parsons, M., Cadilhac, D., Barber, P.A., & Levi, C. (2015) A comparison of rural and urban health-seeking behaviour and processes of care in patients with transient ischemic attack and minor stroke. International Journal of Stroke, 10(S2), 77-438, ESOC-0903.

52. Maleka, M. D., Stewart, A., Hale, L., & Becker, P. (2015) The construct validation of the Maleka Stroke Community Reintegration Measure (M-SCRIM). Physiotherapy, 101(Suppl. 1), e942-943.

53. McKay, N. & Kirk, I.J. (2015) BDNF genotype impacts the integrity of white matter structures within recognition memory circuits. Proceedings of the Organization for Human Brain Mapping (OHBM) 21st Annual Meeting, Poster 1780.

54. Melzer, T. R., Myall, D. J., MacAskill, M. R., Livingston, L., Pitcher, T. L., Watts, R., Keenan, R. J., Dalrymple-Alford, J. C., & Anderson, T. J. (2015) Multimodal MRI changes in Parkinson's disease over one year. Movement Disorders, 30(Suppl. 1), 41.

55. Melzer, T., Myall, D., Livingston, L., Wood, K., Pitcher, T., Watts, R., Keenan, R., MacAskill, M., Dalrymple-Alford, J., & Anderson, T. (2015) White matter lesions contribute to future dementia in Parkinson's disease. Proceedings of the Organization for Human Brain Mapping (OHBM) 21st Annual Meeting, Poster 1167.

56. Mohammad, Y., Clarkson, A. N., Boyd, B. J., & Rizwan, S. B. (2015) Aqueous mixtures of phytantriol-oleoylethanolamide and pluronic F127 result in an intriguing variety of self-assembled lipid nanoparticles as revealed by Cryogenic Transmission Electron Microscopy (cryo-TEM). Proceedings of the 27th National Conference on Microscopy.

57. Moloney, E., Tippett, L.J., Roxburgh, R., & Addis, D.R. (2015) A role for the cerebellum in autobiographical memory retrieval? Australasian Neuromuscular Network Conference, Auckland, April 2015.

58. Morrissey, J., Mockett, B.G., Peppercorn, K., Tate, W.P., Hughes, S.M., & Abraham, W.C. (2015) Fragments of amyloid precursor protein enhance rat hippocampal LTP. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.49.

59. Mudannayake, J., Fong, D., Mouravlev, A., & Young, D. (2015) Adeno-associated viral vector serotype 5 (AAV5) mediates efficient neuronal and astrocytic therapeutic transgene expression in the substantia nigra pars compacta (SNpc). In Proceedings of the Society for Neuroscience 45th Annual Meeting SfN. Abstract 55.05/I6.

60. Mudannayake, J., Fong, D., Mouravlev, A., & Young, D. (2015) Genetic manipulation of astrocytes as a new cell target for CNS gene therapy. Programme from Understanding the Function of Glia in the Healthy and Diseased CNS satellite meeting of ISN, Sydney, Australia.

61. Myall, D. J., Wood, K. L., Livingston, L., Pitcher, T. L., Melzer, T. R., MacAskill, M. R., Anderson, T. J., & Dalrymple-Alford, J. C. (2015) Individualised medicine using an abbreviated cognitive screen for dementia prediction in Parkinson's disease. Movement Disorders, 30(Suppl. 1), 883.

62. Naidoo, J., Fong, D., Mouravlev, A., & Young, D. (2015) Neuroprotective efficacy of a calpain-dependent gene regulation system expressing X-linked inhibitor of apoptosis protein in a model of Parkinson's disease. In Proceedings of the Society for Neuroscience 45th Annual Meeting SfN. Abstract 182.02/BB62.

63. Ohline, S., Hegemann, R., Wake, K., Wilson, A., Schoderboeck, L., Hughes, S., & Abraham, W. (2015) Adult born neurons: Do cells "retire" and does developmental age matter? Journal of Neurochemistry, 134(Suppl. 1), 182.

64. Ohline, S.M., Taylor, C.J., Moss, T., Ulrich, K., Abraham, W.C. (2015) The persistence of long-term potentiation in the ventral hippocampus to medial prefrontal cortex projection in awake rats. From synapses to circuits and behaviour, Satellite conference to the Australian Neuroscience Society.

65. Oorschot, D., Zhang, R., Lin, N., Wastney, T., Parr-Brownlie, L. C., Reynolds, J. N. J., & Sizemore, R. J. (2015) A stereological transmission electron

microscopy study: Marked differences in the number and type of synapses innervating the somata and primary dendrites of three neuronal subtypes in the rat brain. Proceedings of the 27th National Conference on Microscopy.

66. Perry, B., Mercer, S., Barnett, S., & Dalrymple-Alford, J.C. (2015) Unequal effects of anterior thalamic nuclei and mammillothalamic tract leisons. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.4-B.

67. Poulton, R. (2015) Lifecourse research and its policy utility. AFRM/NZRA Combined Conference, Wellington, New Zealand, October, 2015, Keynote Address.

68. Poulton, R. (2015) Smoothing the transition through adolescence. Australian Adolescent Success Conference, Gold Coast, Australia, August, 2015, Keynote Address.

69. Poulton, R. (2015) Translating research findings into policy and practice. Cook Islands Health Conference, Rarotonga, July, 2015, Keynote Address.

70. Poulton, R. (2015) Dunedin Lifecourse findings: promoting uptake in a policy context. Australasian Human Development Conference, Wellington, July, 2015, Keynote Address 1.

71. Power, E., Morales, A., & Empson, R. M. (2015) Moderation of enhanced metabotropic glutamate receptor (mGluR1) mediated synaptic signalling restores motor learning in a mouse model of human spino-cerebellar ataxia type 1, SCA1. Proceedings of The Physiological Society, 33, SA24.

72. Roberts, R. P., Hach, S., Tippett, L.J., & Addis, D.R. (2015) The Simpson's Paradox and fMRI: Comparing Functional Connectivity Measures Derived from Within-Subject and Across-Subject Correlations. Australasian Cognitive Neuroscience Society Conference, Auckland, New Zealand, Session 3A.

73. Roberts, R.P., Hach, S., Tippett, L., Addis, D.R. (2015) Is intraindividual BOLD signal variability independent from mean BOLD signal? Proceedings of the Organization for Human Brain Mapping (OHBM) 21st Annual Meeting, Poster 1705.

74. Ryan, B., Logan, B., Abraham, W.C., & Williams, J.M. (2015) Regulation of microRNAs at dentate gyrus synapses after long-term potentiation induction in vivo. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.18.

75. Ryan, M., Mockett, B., Guevremont, D., Abraham, W. C., & Williams, J. (2015) Distinct microma expression in a transgenic mouse model of Alzheimer's disease. Journal of Neurochemistry, 134(Suppl. 1), WTH13-39.

76. Samorow, N., Addis, D.R., Tippett, L.J. (2015) Age predicts declines in cognitive, but not affective, Theory of Mind in healthy older adults. Rotman Research Institute Conference, Toronto, March 2015.

77. Sangi, M., Thompson, B., Guo, X., & Turuwhenua, J. (2015) A Model for Analyzing the Role of Camera Parameters in the Clinical Assessment of Eye Movements. 18th European Conference on Eye Movement Research, Journal of Eye Movement Research, 8(4):196.

78. Searchfield, G.D, Spiegel, D.P., Linford, T., Thompson, B., Petoe, M.A., Kobayashi, K., Poppe, T., Sundram, F., & Russel, B. (2015) Multisensory Attention Training and Fluoxetine for Treatment of Tinnitus. 9th International Tri Tinnitus Conference Tinnitus: From Cochlea to Brain and Back.

79. Singh, A., Jones, O.D., & Abraham, W.C. (2015) TNF-β mediated heterodendritic metaplasticity in the rat hippocampus. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.31.

80. Smith, P.F. (2015) Vestibular contributions to higher cognitive function. Audiology 25th Anniversary Research Symposium, "A Celebration and Showcase of Hearing and Vestibular Research in New Zealand", Auckland.

81. Smith, P.F. (2015) Vestibular contributions to hippocampal function. Vestibular Symposium, NeuroEng 2015 (The Australian Association of Computational Neuroscience and Neuromorphic Engineering.

82. Smith, P.F. (2015) Vestibular control of hippocampal structure. Spring Hippocampal Research Conference Program, Taormina, Sicily, Session #23.

83. Spriggs M.J., & Kirk, I.J. (2015) Facial recognition and the BDNF Val66Met polymorphism. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.13-A .

84. Spriggs, M.J., & Kirk, I.J. (2015) The genetics of human memory: influence of the BDNF Val66Met polymorphism and COMT Val158Met polymorphism. Australasian Cognitive Neuroscience Society Conference, Poster Session Friday .

85. Tate W.P. (2015) C terminal 16mer of secreted amyloid precursor protein alpha as a peptidomimetic . Brain Health Research Centre's annual conference, Dunedin Public Art Gallery, Dunedin, invited speaker.

86. Theodore, R., Tustin, K., Poulton, R., & Kiro, C. (2015) Māori university graduates: Analysis of the Graduate Longitudinal Study New Zealand. Verbal presentation at the Thirteenth Annual Hawaii International Conference on Education, Honolulu, Hawaii.

87. Tippett, L. J., Badzakova, G., Bruneau-Herman, P. S., Davison, J. W., Hogg, V., & Roxburgh, R. H. (2015) Longitudinal investigation of presymptomatic Huntington's Disease: Shifting the focus from frontal-striatal circuits to posterior-striatal circuits Journal of the International Psychological Society, V21, S2, session 4.

88. Turner, C. E., Byblow, W. D., Barker-Collo, S., Kydd, R., & Gant, N. (2015) Effect of creatine supplementation on cognition during hypoxia in mild traumatic brain injury. American Society of Neurorehabilitation, T53.

89. Turner, C. E., Byblow, W. D., Barker-Collo, S., Kydd, R., & Gant, N. (2015) Effect of creatine supplementation on cognition during hypoxia in mild traumatic brain injury. In Proceedings of the Society for Neuroscience 45th Annual Meeting SfN. Abstract 309.21/G38.

90. Vlajkovic, S.M. (2015) Recent progress in hearing research: from molecules to disease. Audiology 25th Anniversary Research Symposium, "A Celebration and Showcase of Hearing and Vestibular Research in New Zealand", Auckland (Keynote Speaker).

91. Vlajkovic, S.M., Paek, S.Y., Quinn, M., Boison, D., Housley, G.D., & Thorne, P.R. (2015) Cochlear response to acute and chronic noise exposure in adenosine receptor-deficient mice. Proceedings of the 52nd Inner Ear Biology meeting, Rome, Italy, P63.

92. Walker, F.R., Jones, K., Zouikr, I., Patience, M., Clarkson, A., Isgaard, J., Spratt, N., & Nilsson, M. (2015) Understanding 'stress x microglial interactions' in stroke-induced secondary neurodegeneration: A major opportunity for the preservation of viable brain tissue. Brain, Behavior, & Immunity, 49(Suppl. 1),e19-e20.

93. Walker, F.R., Jones, K., Zouikr, I., Patience, M., Clarkson, A., Isgaard, J., Spratt, N., & Nilsson, M. (2015) Understanding 'stress x microglial interactions' in stroke-induced secondary neurodegeneration: A major opportunity for the preservation of viable brain tissue. Journal of Neurochemistry, 134(Suppl. 1), WTH01-21.

94. Wickner, C., Englert, C., Addis, D.R. (2015) Developing a tool for Autobiographical Interview scoring. KiwiCAM Conference, Wellington New Zealand, Poster #3.

95. Wiebels, K., Roberts, R.P., & Addis, D.R. (2015) Decoding mental time travel using machine learning techniques. KiwiCAM Conference, Wellington New Zealand, Session 5, presentation 2 .

96. Wiebels, K., Roberts, R.P., Addis, D.R. (2015) Controlling for behavioural confounds in partial least squares analyses. Australasian Cognitive Neuroscience Conference, Auckland, New Zealand, Saturday Poster Session.

97. Wood, K.-L., Myall, D. J., Livingston, L., Melzer, T. R., Pitcher, T. L., MacAskill, M. R., Anderson, T. J., & Dalrymple-Alford, J. C. (2015) Progression to dementia in Parkinson's disease over four-years: Risk with alternative MCI criteria. New Zealand Medical Journal, 128(1421).

98. Wood, K-L., Myall, D.J., Livingston, L., Melzer, T.R., Pitcher, T.L., MacAskill, M.R., Geurtsen, G.K., Anderson, T.J., & Dalrymple-Alford, J.C. (2015) Progression to Dementia in Parkinson's disease over four-years: Risk with alternative MCI criteria. Health Research Society of Canterbury.

99. Wood, K-L., Myall, D.J., Livingston, L., Melzer, T.R., Pitcher, T.L., MacAskill, M.R., Geurtsen, G.K., Anderson, T.J., & Dalrymple-Alford, J.C. (2015) Neuropsychiatric status and different MCI criteria in Parkinson's disease. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 5.3 .

100. Xu, J., Begley, P., Church, S., Patassini, S., Waldvogel, H., Lin, W., Faull, R.L.M, Dowsey, A.W., & Cooper, G.J.S. (2015) Metabolic Perturbations In The Brains Of Patients With Alzheimer's Disease Determined By Gas-Chromatography Mass-Spectrometry. Neurodegenerative Diseases, 15 (Suppl 1), 1-1969, ADPD5-0533.

101. Yang P., Waldvogel, H.J., Faull, R.L.M., Dragunow, M., & Guan, J. (2015) Vascular degeneration of Parkinson disease. Proceedings of the International Australasian Winter Conference on Brain Research, 33, 7.29-A.

102. Yarragudi, S. B., Walker, G. F., Clarkson, A. N., & Rizwan, S. B. (2015) Scanning electron microscopy as a tool to understand the effects of process variables on microparticle formation. Proceedings of the 27th National Conference on Microscopy. www

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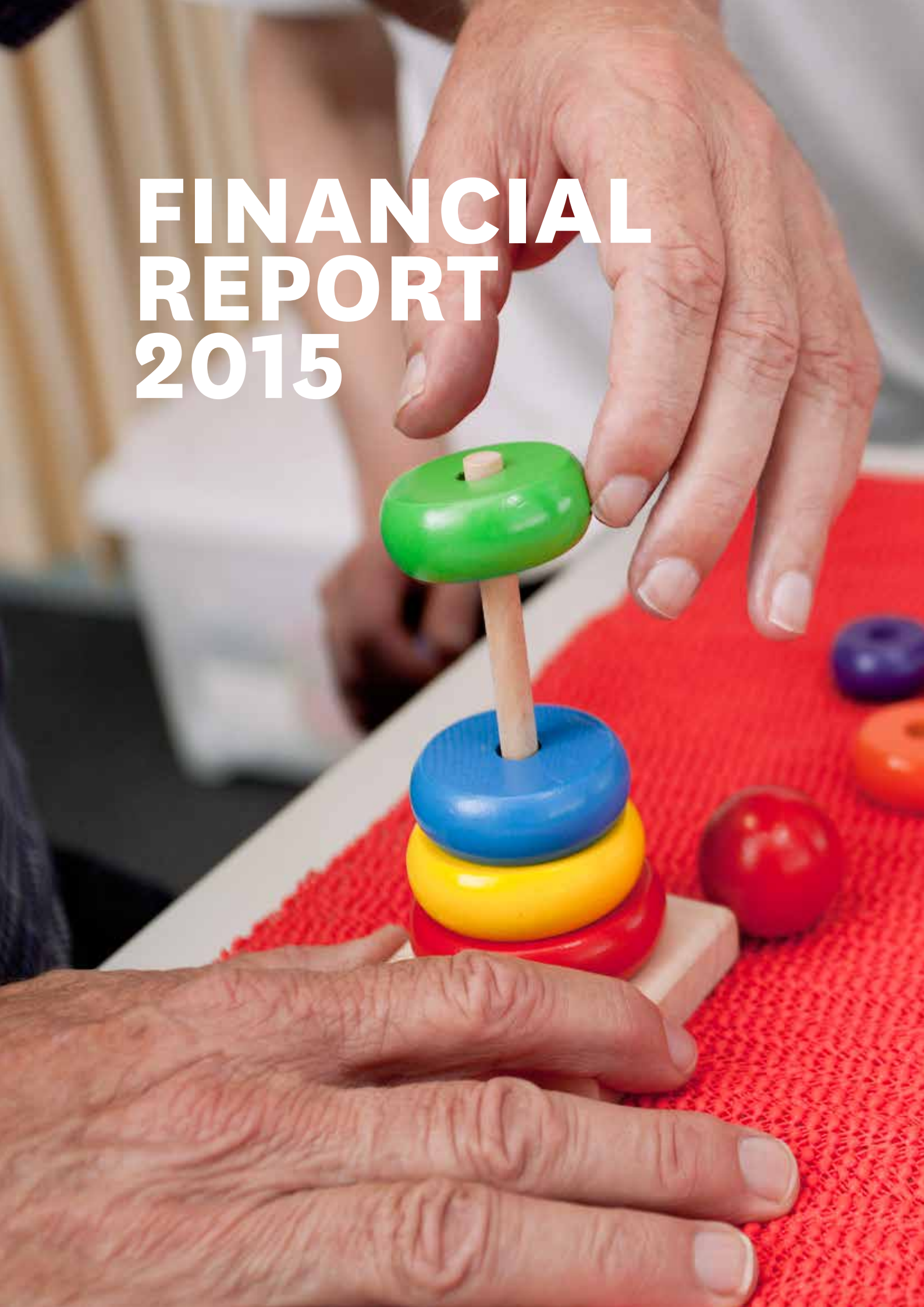

Funding summary for the year ended 31 December 2015

FUNDING RECEIVED	2015
Tertiary Education Commission grant	4,972,000
Total Funding received	**4,972,000**

EXPENDITURE[2]	2015
Salaries[3]	1,298,751
Overheads[4]	1,202,474
Project costs[5]	386,540
Student support (PhD and other)[6]	135,667
Travel	100,211
Extraordinary Expenditure[7]	64,000
Subcontractors[8]	100,257
Total Expenses	**3,287,900**

NET SURPLUS CARRIED FORWARD	1,684,100

*All amounts are shown exclusive of Goods and Service tax (GST)

NOTES

1. This financial report is for the period 1st January to 31st December 2015. This report only contains details of funding and expenditure relating to the CoRE grant that the Centre receives from the Tertiary Education Commission. It does not contain details of philanthropic funding, or operating funding to Centre investigators from other funding agencies.

2. This funding summary details funding received and funds distributed to collaborative partners of the CoRE.

3. Summary: Brain Research New Zealand support research staff FTEs 2015
   - Principal Investigators 2.72
   - Postdoctoral Fellows 3.53
   - Research Technicians 3.54
   - Other 2.15

4. The extraordinary expenditure budget is for board and science meeting expenses.

5. 2015 Costs include an AUT subcontract, and funding paid for clinical tenths.

6. This balance of funding will be used to fund initiatives supporting the BRNZ research programme from January 2016 to the December 2017.

TABLE OF STATISTICS

BROAD CATEGORY	DETAILED CATEGORY	YR 1 YR 2 YR 3 YR 4 YR 5 YR 6
VALUE OF CORE FUNDING FROM TEC ($M)		**$4,972**
FTES BY CATEGORY	Principal investigators	2.69
	Associate investigators	0.03
	Postdoctoral fellows	3.53
	Research technicians	3.26
	Administrative/support	1.5
	Research students	126.8
	Total	**137.813**
HEADCOUNTS BY CATEGORY	Principal investigators	54
	Associate investigators	15
	Postdoctoral fellows	60
	Research technicians	39
	Administrative/support	9
	Research students	136
	Total	**313**
PEER REVIEWED RESEARCH OUTPUTS BY TYPE	Books	1
	Book chapters	14
	Journal articles	214
	Conference papers	102
	Other	2
	Total	**333**
VALUE OF EXTERNAL RESEARCH CONTRACTS AWARDED BY SOURCE	Vote Science and Innovation contestable funds	0
	Other NZ Government	0
	Domestic – private sector funding	0
	Overseas	$464,210
	Other	$35,485
	Total	**$499,695**
COMMERCIAL ACTIVITIES	Number of licenses	0
	Income from licenses	0
	Patent applications	2
	Patents granted	0
	Invention disclosures	0
	Number of new spinouts	0
	Capitalisation value of spinouts	0
STUDENTS STUDYING AT CORE BY LEVEL	Doctoral degree	86
	Other	50
	Total	**136**
NUMBER OF STUDENTS COMPLETING QUALIFICATIONS BY LEVEL	Doctoral degree	12
	Other	15
	Total	**27**
IMMEDIATE POST-STUDY GRADUATE DESTINATIONS	Further study in NZ	11
	Further study overseas	0
	Employed in NZ	14
	Employed overseas	5
	Unknown	
	Other	7
	Total	**37**

UNLOCKING THE SECRETS OF THE AGEING BRAIN

MAEA TE MEA NGARO

Brain Research
NEW ZEALAND
Rangahau Roro Aotearoa

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