

Neuroscientist Louise Parr-Brownlie

Born

Tāmaki Makaurau, 1969.

Affiliations

Louise affiliates to Ngāti Maniapoto and Te Arawa. Her great-grandparents met and married in Tāmaki Makaurau/Auckland, “so the whānau became disconnected from our marae. I’m just starting to reconnect.”

Schools and subjects

Glamorgan Primary, Northcross Intermediate, Long Bay College, on Auckland’s North Shore. “There was no te reo Māori offered at my high school, not even any waiata or kapa haka. I always loved science and maths, so I took all maths and all science subjects.”

How she got into science

“I loved sport; I represented orienteering at national level at school, and played netball into my 30s. So I trained as a scientist at uni through sport; I studied physical education, where I did all the sciences – kinesiology, exercise physiology, motor control and biomechanics (which is physics).”

Training and jobs

Bachelor’s in Physical Education; **Master’s** in Science; **PhD**, all at the University of Otago. Louise studied how individual brain cells code information for movement, and how that changes in Parkinson’s disease.

Field of science

Neuroscience.

Louise, right, with her laboratory team: Mariana Te Pou, left, Alexander Woolrych, Lily Bentall, Elodie Kip and Conor Underwood. Photo: University of Otago.

Research topics

Brain pathways controlling movement in Parkinson’s disease (PD)

“We’re trying to understand the single cell changes that underlie the deficits in PD. A whole network in the brain need to fire well together to get movement; if one part isn’t working right, we stop moving well. We looked at different parts of the movement-related sites in the brain for those changes. We get lots of data, analyse it, and then move further back or forward in the chain.”

Māori community perspectives on brain treatments

We worked with two Māori communities, interviewing family members who went into hospital about what was helpful with brain injury. We’re still analysing the data, but karakia were important, as well as whakapapa,

Louise with her dog Zig, a Huntaway Labrador cross.



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links to tūpuna and significant places – particularly wai (water), being in or near a river, as well as baths to relax. Some recited karakia to keep their memory strong.”

Much of their experience with the health system was similar to other studies – “not being listened to, not understanding information given to them, and no karakia. Karakia make the body become noa, so surgery can happen, and reverse that process afterwards.”

Testing optogenetics

“Optogenetics involves controlling the activity of brain cells with light,” says Louise, who has studied this technique in rats. “Brain cells generally don’t respond to light. We insert genes into particular cells that then express a light-sensitive protein – an opsin. When we send a light pulse, those cells are active briefly.

Louise in her lab. Photo: Sharron Bennett, ADInstruments.



“This technology is about 15 years old. Michael J. Fox has a brain stimulator that uses electrical pulses; optical stimulation is the next generation. It’s more specific to particular cells

and cell types, so it doesn’t activate nearby cells, meaning fewer side effects.

“We’ve worked with bioengineers at the University of Auckland to find the best patterns of stimulation to reduce PD symptoms. Most studies have only used 10-30 minutes of stimulation. We’ve followed up to ten Parkinsonian rats for several months of stimulation, assessing any change in performance, movement, sleep, ability to eat and move around their cages. They were able to recover fine movements like reaching and grasping, but not postural movements – there were no significant changes in their gait.

“We’ve used optogenetics to test how the brain works; now we want to use it for potential treatments.” A current project aims to correct the abnormal pattern of cell activity in part of the brain of Parkinsonian rats by stimulating it to fire in a healthy pattern.

Equity in medical technology

While this technique is very promising, Louise realised that it would increase the gaps in health and treatments between Māori and tauīwi. “A lot of Māori won’t want things in their brain; optogenetics could only be offered to people under 70, who don’t have diabetes and haven’t had a stroke.

“I talked with MPs at parliament, about how a lot of cool health tech is not equitable for Māori. An alternative technology to optogenetics used overseas – focused ultrasound, using a modified MRI scanner – can aim 1,000 ultrasound beams in one place for 20 seconds. They can have whānau with them saying karakia. Immediately the person comes out, we know if there’s been an improvement.

“There is no incision, no infection, no brain bleeds; it avoids many side effects and needs to be available for older people. These MRI scanners are \$10 million each, while a deep brain stimulator costs \$100,000 a year for each person. MPs need to start making equity a criterion for new medical technology.”

Promising future research

“We try to make future treatments from our knowledge of changes in brain activity with PD.” Louise is studying inflammation of nerve cells in the brain, spinal cord and limbs, because reducing and protecting against inflammation could prevent or slow the progression of PD and other degenerative brain diseases.

“We’re studying the impact of specific vitamins, curcumin (part of the turmeric spice), as well as keto and fasting diets in rats. If it’s effective, we’ll immediately move to human trials.”



Louise and her niece Madi with a lion at Orana Wildlife Park in Christchurch.



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Mātauranga Māori

“I’m not a Mātauranga Māori expert, I bridge between that and Western science,” she says. “My role as Director of the National Science Challenge for Ageing Well is half my work. It’s a Western framework, but now that the governance group is half Māori, how we do science and what we value has completely changed.

“We’re funding a study of Māori brain health, going back to karakia, oriori, carvings, mōteatea, exploring what Māori have used historically, doing wānanga with Māori communities. The funded research team wants to produce reports useful for those communities, possibly a carving reflecting that knowledge, as well as the usual reports for health providers, and researchers.

“Biomedical science is very siloed, while the Māori world is holistic, with different explanations tied to whakapapa, and multiple ways of viewing things. I teach about this. An example is getting biomedical scientists to understand that historical events impact down the generations. Epigenetics shows that short-term changes from trauma can alter the ways that genes are expressed, so events five generations ago can stay in the gene line. So I talk about structural racism, colonial violence, abuse of Māori in state care, and ask what impact do students think that has?”

What she likes about science

“Discovery is really cool – finding something that no one else knows – and you never know when that’s going to happen. Making a difference to people’s lives, with new tech, new results, new treatments. Mentoring the next generation of scientists is fun.

“I’m getting into policy now; I love that. The last budget gave only \$3m in new funding for older people, but the number of people over 65 is going to double in the next 20 years. The support structures we’ll need aren’t there, and it doesn’t look like they will be. We also don’t have enough homes for people with disabilities. Being able to influence those things is really important.”

Links

Ella Williams, 2022, [Shining a light for World Parkinson’s Day](#), ADInstruments.

Native Affairs, 2015, [Brainy doctor](#), Maori Television.



Louise at the University of Otago with team member and post-doctoral researcher, Dr Conor Underwood. Photo: ADInstruments.

Ngā Kupu

Kakā – Inflamed, inflammation

Karakia – Prayer, ritual chant

Kori – Movement

Mate roro – Brain damage

Noa – Free of tapu, unrestricted

Mōteatea – Lament, sung poetry

Oriori – Lullaby

Raru ā-io – Neurological problem

Tūpuna – Ancestors

Wairoro – Brain

Whakapapa – Descent, genealogy

Whiringa kai – Diet.

From Paekupu and Te Aka Maori Dictionary



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