He Kitenga
Talented Futures
HE KITENGA reflects the concept of discovery. The Maori word *kitenga* derives from *kite* which translates to words such as *see, perceive, find* and *discover*. This title reflects the University of Otago’s connection to New Zealand’s cultural heritage, as well as its commitment to national and international research and innovation.
Founded in 1869, the University of Otago is New Zealand’s oldest university. Today it has a nationwide presence and enjoys an international reputation for excellence. Over the past 150 years Otago has successfully balanced the traditions of its history with modern scholarship and world-class research.
Welcome to He Kitenga: Talented Futures

The driving force behind many major research discoveries and developments is a group of highly talented and dedicated researchers who are near the start of their careers. But who are these early career researchers and what do they do at the University of Otago? In this edition of He Kitenga we take a peek through the window to show you some of Otago’s diverse range of emerging talent. These are just a selection of Otago’s many early career researchers who all contribute to enhancing the University’s reputation for excellence in research. We have highlighted some of the individuals that capture the breadth of research strength here, from across the campuses and communities that we serve. Some are near the beginning of their research journeys, while others are already internationally-recognised and multi-award-winning researchers. Captured here are the disparate pathways into research that early career researchers follow. While some are part of large collaborative research teams that together make significant inroads into a shared area of research, others have independently forged new avenues of research at Otago. Diversity in experiences and pathways is a strength as these researchers support and encourage each other in their research journeys.

While their journeys and fields differ, our early career researchers do have some important traits in common: they all bring passion, drive, determination, idealism and a vital energy to the University; and they share a belief that we, as a University and a country, can do things better. In their own ways and in their own areas, each is working to make a difference. This issue of He Kitenga is divided into sections highlighting the different ways in which the researchers are making their mark: Activists and Action; Novel Approaches; Mental Health; Curing Cancer; Te Ao Māori; and Improving the World. Many fit into more than one category, but for the sake of this book, they have been listed according to their clearest driving force.

Training and supporting the next generation of national and global research leaders is a core function of the University of Otago. There are many challenges facing early career researchers including the significant disruption to research that occurred throughout the global COVID-19 pandemic and the ongoing uncertainty they face around future funding and job opportunities. There is a clear need for early career researchers to be supported into stable careers, to be given opportunities to develop and grow in leading research, and to be resourced so that they can continue to contribute research of the highest quality for our communities in Aotearoa New Zealand, the Pacific and around the world. As a university we strive to provide the environment in which these needs can be met and are also grateful to our funders and partners, many of whom we acknowledge herein, for the support they provide. Through partnership we can support our emerging researchers to deliver the maximum impact from productive and rewarding careers. These are our leaders and solution finders of the future. It will be exciting to see what they do next! We are extremely proud of our early career researchers and are delighted to showcase some of their stories with you. If any of their journeys or research expertise would be of help to you, or you would like to learn more, feel welcome to contact these individuals directly. They will be excited to hear from you.

Dr Rosie Brown
Convenor, Early Career Researchers Advancement Group

Professor Richard Blaikie
Deputy Vice-Chancellor (Research and Enterprise)
Career Scales Explained:

It is hard to define an early career researcher, or to know when someone has moved into the ranks of mid-career researchers. It is equally hard to define where exactly a researcher sits on the early career ladder.

For the 2021 edition of He Kitenga we asked our researchers to self-nominate their career position on an “early career scale”, from 1 – 10, where 1 was “they had just begun” and 10 was “they were on the cusp of being mid-career”.

For those who believed they had moved beyond the early career stage, and into mid-career, we have indicated this with a mid-career scale. These are unscientific scales, meant only to give a snapshot of our researchers’ careers to date.
Activists & Action
Race, justice and equality are key issues for Tourism Lecturer Dr Pooneh Torabian. “I see myself as a scholar-activist,” she says. “My research platform has been shaped by my lived experience as a non-Western racialised Iranian-Canadian woman and my research aims to expose injustices and inequalities and expand qualitative traditions.”

Torabian has a B.A in Tourism Management and an M.A in Tourism Marketing from the Allameh Tabatabai University in Tehran, Iran, as well as a Ph.D in Recreation and Leisure Studies from the University of Waterloo in Canada. Her PhD research was on Canadian dual citizenship and international (im)mobilities after September 11, 2001.

Since joining the University of Otago in 2019, her research has focused on a range of topics, including freedom of movement, citizenship, migration, the intersectionality of race and gender, arts and leisure, and storytelling and narrative inquiry.

Torabian was the lead researcher on a 2020 project looking at how arts and leisure can facilitate community integration and resettlement of refugee women in Dunedin. Afghan women attended four three-hour art workshops, each of which was run by an artist from the community. “With language being a barrier for some migrants, this series of workshops helped women with self-expression through art as an alternative way of communication,” she says.

“The women found the workshops to be therapeutic and some of them mentioned they were helpful in working through their trauma. The last workshop led to the formation of a group of women who get together to sew every Friday. We were thrilled to see that the workshops helped women with establishing a sense of belonging and network building. I see potential in expanding the scope of this project and am looking at different avenues to pursue funding.”

Torabian is now exploring Māori men’s experiences of participating in an art programme at the Otago Corrections Facility to see how arts and leisure help with rehabilitation and in connecting the men with their culture. She is also focusing on (im)mobilities of international students in New Zealand and is exploring the role race and nationality play in providing a basis for legalised forms of othering and exclusion in regards to student visas and travel.

Torabian is involved in two other collaborations: the first is concerned with Muslim migrant women’s politics of representation in New Zealand cities; and the second looks at the need for critical thinking in regenerative tourism.

“I plan to continue to develop my work with members of marginalised communities, such as migrants, people of colour and incarcerated women,” she says. “My ultimate goal is to bring about change through my research both within and beyond academia.”

FUNDING:
Centre for Global Migrations Otago Business School
Focusing on LGBTIQ+ homelessness

As a young campaigner on social justice and LGBTIQ+ rights, Dr Brodie Fraser has found working as a researcher in the Department of Public Health a perfect mix of their academic and activist interests.

A Postdoctoral Research Fellow in the Department of Public Health at the University of Otago, Wellington, Fraser works in the He Kāinga Oranga Housing and Health Research Programme. Their PhD research was the first to look at Takatāpui and LGBTIQ+ people’s experiences of homelessness in Aotearoa New Zealand. Their research found the community's experiences of homelessness to be diverse and multifaceted, highlighting the need for targeted support and the importance of focusing on addressing the structural, systemic causes of Takatāpui and LGBTIQ+ homelessness. Their postdoctoral research extends this work further to examine housing instability in these communities.

Fraser says they completed a PhD at Otago by chance, after a friend mentioned He Kāinga Oranga had a fully-funded scholarship available for research in the area. “I ended up in the perfect place, with colleagues who are all pushing to create change.” Fraser did a BA majoring in Political Science and minoring in Education, followed by a Master of Political Science at Te Herenga Waka-Victoria University of Wellington.

Being part of the community they are researching has both benefits and challenges, they say. “There is always a bit of debate among academics on bringing your own personal experience to your work or considering yourself an activist. For me, I do bring my personal experience and would consider myself to be an activist scholar. I think it does make me a really good academic and it is part of why I am able to do the work that I do and why I am so passionate about it.”

Fraser talks openly in the media about their research findings that discrimination in the housing market is placing Takatāpui and LGBTIQ+ people at higher risk of homelessness, despite the potential for confronting feedback from the general public. “If I’m feeling a bit dejected, it’s nice to zoom out a bit and see the wonderful change that has been achieved.”

Fraser draws inspiration from the other researchers in the He Kāinga Oranga housing team, and was an acknowledged team member in the Rutherford Medal award the group received from the Royal Society Te Apārangi last year, an acknowledgement of the difference its work has made to housing and health.

If universities do want to increase diversity, they need to increase the stipends paid to PhD students, especially if they want to support more Māori and Pacific students into postgraduate study.”

Fraser names Associate Professor Nevil Pierse (deputy director of He Kāinga Oranga), who was one of their PhD supervisors, as a particular mentor. “We have worked together a lot so I have really enjoyed going from being a student to being a colleague. I think that’s been quite a fun process for both of us. “I am really thankful that I am able to do the research that I do, and do it in the team that I’m in.”

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Dr Brodie Fraser
Dr Peter Gibbard: “What I’m really interested in is research that can help inform government policy and has real-world implications for consumers.”

A study into why people choose to switch electricity providers not only provides an interesting insight into consumer behaviour, but also has important real-world implications – a combination that speaks to the unique career of its lead researcher.

“Understanding better why people choose to stay with their existing suppliers, which in turn creates less movement on power prices, could influence where to direct government investment or policy. For instance, if it’s about the failure to search then perhaps there should be more marketing of a Powerswitch, for example, or if it’s about the hassle cost, then the government could look at ways that make it easier for people to switch. Or if people just prefer their retailer to other retailers, then there might not be any role for government policy at all.”

University of Otago’s Dr Peter Gibbard isn’t your typical academic. Until just two years ago, the Economics Lecturer was grounded firmly in the “real world” of Australia’s public sector, working as a principal economist at Australia’s Competition and Consumer Commission. Prior to that 10-year stint, he worked in the UK as an economic analyst in the Financial Stability Division of the Bank of England.

But the attraction of conducting further technical research meant a switch to academia, and in 2019 he obtained his PhD from the Australian National University’s Research School of Economics before accepting a job at Otago.

“What I’m really interested in is research that can help inform government policy and has real-world implications for consumers,” says Gibbard.

While in its early stages, the New Zealand-first study, supported by a Commerce Research Grant, aims to delve into the high degree of customer inertia that exists in Aotearoa New Zealand’s retail electricity market. Even in response to price changes, or government initiatives such as the “What’s My Number” marketing campaign designed to encourage consumers to compare electricity prices, many customers will not search for better deals, let alone switch from existing retailers.

Gibbard and his team are working with Powerswitch, Consumer NZ’s free, independent service, conducting analysis on industry data to identify the principal causes of customer inertia. This work will start with the most commonly cited reason for not switching – the “unawareness explanation” (consumers may be unaware of price differences between their provider and alternative providers), the “switching cost” explanation (perceived cost of switching, including the effort it takes), and the “product differentiation” explanation (the belief that distinct retailers provide differentiated products and, moreover, they prefer the product provided by their retailer).

Gibbard says consumer inertia has important implications for public policy around concerns about affordable energy, economic inequality (many low income families are particularly affected by the burden of high energy costs), economic growth and competitiveness and innovation in the electricity industry.

“The more people switch providers, the more this impacts on electricity prices by driving competition between suppliers. But if people are hardly ever switching, then prices are unlikely to go down. People’s behaviour of whether they switch or not impacts on the prices we end up paying for our electricity.”

FUNDING: Commerce Research Grant

EARLY CAREER SCALE:

STAFF AT OTAGO:

AWARDS INCLUDE:
 Commerce Research Grant (2022); Rhodes Scholarship (1995)
Time for action

Dr Anna High is taking a “law-in-action” approach to her areas of interest.

High is a co-director of the Centre for Law and Society at the University of Otago as well as a lecturer in the areas of Evidence Law, Jurisprudence and Chinese Law.

“Law in action means thinking about law as it’s applied in society, rather than just as it exists in the books,” says High.

“For example, when I was looking at the laws around child welfare in China, the books were clear – the government is responsible for child welfare and private orphanages are illegal. In practice, those laws were mediated by exigencies such as local needs, funding, politics and state-society dynamics.”

High studied Law and Chinese at the University of Queensland (LLB and BA). On graduating, she was awarded the 2008 Queensland Rhodes Scholarship, and completed the BCL, MPhil and DPhil at Oxford (Magdalen College). She then moved to the United States, first as a Visiting Assistant Professor at Marquette University in Milwaukee, and then as Distinguished-Scholar-in-Residence at Loyola University Chicago. Her monograph on orphan relief in China was awarded the 2020 Asian Law and Society Association Distinguished Book Award.

“The MPhil/DPhil dissertation was an opportunity to combine my China and law interests. Then my university roles confirmed that I wanted to pursue academia. Otago has been a welcoming and supportive place for me as an early career academic,” she says.

High now applies socio-legal and jurisprudential methods to a range of interest areas: her PhD was in Chinese law, looking at how law works in society at a grassroots level. More recently, with travel to China becoming less practical for family and pandemic-related reasons, she has developed an interest in dignity, sexual violence and evidence law.

She recently published an article with the Yale Journal of Law & Feminism on sexual dignity as a concept in rape law, which is an interesting framework for thinking about whether our laws around sexual violence are fit-for-purpose, she says.

“Among other things, the article discusses how powerful and capacious dignity is as an expressive tool in the context of sexual violence. But it comes with pitfalls, and uncritical talk of sexual dignity can be harmful.

“Sexual dignity is also a site of contest, with our understanding of the concept expanding and democratising over time. For example, women who were previously seen as lesser, and viewed by the law as essentially ‘unrapeable’, have been vindicated by recognition of their equal dignity as our approach to sexual violence has become more evolved and expansive.”

This work is part of a bigger Marsden Fast-Start Grant looking at models of consent in New Zealand sexual violence law.

“I’ve always been interested in the potential for law to protect vulnerable or disempowered social groups, and also in how such groups themselves engage with and are empowered by legal institutions,” says High.

“And while I don’t know for sure the directions my research might take me, I anticipate that they will continue to be a common theme and driver in years to come.”

FUNDING

Marsden Fund
New Zealand Law Foundation
Borrin Foundation

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Dr Anna High: "Law in action means thinking about law as it’s applied in society, rather than just as it exists in the books."
Novel Approaches
Dr Carolina Loch is interested in stories – specifically those which an animal’s teeth can tell about its life. Now she shares her own story, which has taken her from Brazil to Dunedin; from biologist to cutting-edge dental researcher.

Dr Carolina Loch

Extracting stories from teeth

Each of us carries our life story in our heads – quite literally. Our teeth hold records of how we have lived, much as a black box carries information about an aircraft’s flight. You should take advantage of every opportunity.

Dr Carolina Loch (deputy director of Dentistry’s Sir John Walsh Research Institute) is a world authority in unlocking the histories of teeth.

“You can get so much information: age, diet, health and disease. Lifestyle exposure to chemicals in the environment – I’m exploring the potential of teeth being a ‘black box’ that can unravel the secrets of a mammal’s life.”

Loch’s research has involved marine mammals and primates, including modern and ancient humans, revealing new truths about our present and our past.

Since her PhD in Oral Biology/Geology’s Professor Ewan Fordyce and the late Professor Jules Kieser (Sir John Walsh Research Institute) “Professor Kieser was one of the most inspiring and influential figures in my academic formation. It was an interesting journey for a biologist to end up in dentistry. I never expected that, but it shows the importance of being open to new ideas. You should take advantage of every opportunity.”

Loch’s PhD on the evolution of teeth in whales and dolphins led to pioneering work that has secured her place as the world expert in the field.

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Improving IT

Delving into the data traces left behind by software developers when they are producing a computer programme, or even a phone app, is providing Information Science lecturer and researcher Dr Daniel Alencar da Costa with a rich source of information to help those developers improve their products.

“Data science allows us to use this data to study patterns that might be useful,” he says.

As part of the software development process, every time a developer puts in a new piece of code they automatically create a log of the changes they perform. Alencar da Costa examines those data and looks to create insights for them.

“That’s basically what I do for developers. They are a sports team and I look into their traces and check how they can improve their performance or software development.”

He says his field offers plenty of room for creative contributions.

“For example, when you read a book, watch a movie or play a game, all these things are set – you cannot change or customise them. Being a researcher gives me the opportunity to create, customise or change existing solutions.

“You never know how a software will look until developers and designers start to prototype and develop it. Then, based on clients’ feedback, the software keeps changing and evolving. The opportunity to improve this creative process through my research is what excites me.”

Alongside his research, he is the coordinator of the Centre of Digital Excellence (CODE) curriculum development committee and the coordinator of the Pervasive Game Development paper. He also teaches papers related to software engineering and programming, and information assurance and security.

EARLY CAREER SCALE:

STAFF AT OTAGO:

AWARDS INCLUDE:

Best Emerging Researcher, Otago Business School (2019); Queen’s University Postdoc Travel Award (2018); ACM/SIGSOFT Distinguished Paper Award (2016); Brazilian Science Without Borders Scholarship (2014)
At first glance it is hard to see what Titan, Saturn’s largest moon, could teach us about the origin of life on Earth. With lakes of liquid methane several hundred metres deep and an ambient temperature of about minus 179 degrees Celsius, it is far from the green-blue globe that we think of as home. But at some time in the distant past similar conditions may have generated the building blocks of life here.

“Dr. Ennis explains: “We know that Earth is a world of complex chemistry where life has altered its environment, but Titan is an untouched laboratory that in many ways could mimic an early Earth.”

Such hydrocarbon seas then pool into standing liquids on the surface which we, as far as we know, unique amongst other planetary bodies.”

Ennis says the NASA and ESA Cassini-Huygens spacecraft mission from 2004-17 did a magnificent job detailing the chemical composition of Titan’s atmosphere and identifying the formation of aerosol particles and condensed liquid droplets.

“So that’s where we come in and try to simulate atmospheric chemical processes in the laboratory to better understand if more complex organic molecules – such as those involved in biological systems – are generated in Titan’s environment. Perhaps, if delivered to the surface, these organics can be altered into more advanced chemical systems in Titan’s lakes.”

Our understanding of Titan will be taken to a whole new level with NASA’s NZ$1.26 billion Dragonfly mission, which will blast off in 2027 and arrive at Titan in 2034 for a three-year surface mission using a drone to sample the chemistry of Titan and send data back to Earth.

In the meantime, an $875,000 Marsden Fund grant will allow Ennis and his team to work with the Australian Nuclear Science and Technology Organisation (ANSTO) and NASA’s famous Jet Propulsion Laboratory at Pasadena in California to investigate potential chemical targets for Dragonfly to unearth.

“We have a time window to optimise our laboratory studies and tease out various chemical reactions unfolding on Titan. We then hope to provide background data and predict what organics may be found in the atmosphere and surface for Dragonfly to then validate our findings,” says Ennis.

Dr. Courtney Ennis

“Dr. Courtney Ennis: “We know that Earth is a world of complex chemistry where life has altered its environment, but Titan is an untouched laboratory that in many ways could mimic an early Earth.”

FUNDING
Royal Society Te Apārangi Marsden Fund

EARLY CAREER SCALE:

STAFF AT OTAGO:

MARK A. DOMBEI
Research Fellow

AMENDS INCLUDE:
Dr Kate Thomas: “Many of the things that happen when we exercise also happen when we get hot.”

Turning up the heat

Dr Kate Thomas is turning up the heat in her research, both literally and metaphorically, pushing the boundaries, collaborating widely and winning awards and research grants.

Dr Kate Thomas is turning up the heat in her research, both literally and metaphorically, pushing the boundaries, collaborating widely and winning awards and research grants.

Grandma’s traditional suggestion of taking a hot bath as a remedy for a number of ailments might not be just an old wives’ tale.

Dr Kate Thomas (Surgical Sciences, Dunedin School of Medicine) is researching cardiovascular and cerebrovascular responses to exercise and environmental stressors such as heat, cold and hypoxia, to better understand and apply these stressors for health benefits for a range of common chronic conditions.

Working with colleagues from the School of Physical Education, Sport and Exercise Sciences, Professor Jim Cotter and Dr Ashley Akerman (now Ultronics, UK) and Professor Andre van Rij (Surgical Sciences), Thomas examined heat therapy compared with exercise in patients with Peripheral Arterial Disease (blockages in the arteries of the legs affecting blood flow to leg muscles). And the group completed walking exercises while the other half sat in a spa pool for up to 30 minutes three to five times a week.

Both interventions were associated with improvements in walking distance and reduced blood pressure after 12 weeks.

The paper by Thomas and collaborators describing this study was awarded Best Research Article 2020 by the American Journal of Physiology – Heart and Circulating Physiology, based on citations and downloads.

Zimbabwean-born, Thomas studied Exercise Physiology in South Africa, then worked with Professor Phil Alahakoon (Physiology, Otago, now University of British Columbia, Okanagan, Canada). This role included a trip to Nepal to undertake high-altitude physiology research.

“Working with Phil really opened my eyes to research. He’s brilliant and wildly enthusiastic about integrative physiology.”

On graduating with her PhD, Thomas was awarded a Health Research Council Emerging Researcher First Grant for three years – extended because of COVID. This funded Dr Stewart-Roxburgh’s PhD examining heat therapy and high-intensity upper limb exercise training for improving fitness and physical and subjective health in patients with severe lower limb ischaemia avoiding knee or hip replacement.

“Many of the things that happen when we exercise also happen when we get hot. There’s substantial overlap. Your body temperature rises, your blood pressure goes down, your heart rate goes up, the blood flow to your skin and muscles increases. We’re investigating the common mechanisms to find which of those elements are most useful on their own as potential therapy for people who find barriers to exercise, and to better understand the complexity of exercise itself.”

Thomas, Cotter and others have received funding from Potlatch Manawa Healthy Hearts for Aotearoa New Zealand (Collaborative Research Grant) to further study the effects of heat therapy on high blood pressure. “We’re fine-tuning our approaches for optimum effect: how long, how hot, how deep the water should be. Our goal is to develop effective, accessible, equitable lifestyle interventions to prevent or reduce the impact of chronic health conditions such as ischaemic, cerebrovascular disease and dementia. Although exercise is my primary interest, there are people who could benefit from alternative approaches to improve cardiovascular health.”

Thomas also has a Lottery Health Research Grant, with Dr Travis Gibbons (Otago University of British Columbia, Okanagan, Canada) and Professor Cliff Abraham (Psychology) examining the effects of exercise and intermittent fasting on markers of brain health.

“We use complex and invasive protocols in a young, healthy population to expose the mechanisms and then optimise these stressors for application in clinical populations. These are some of the most challenging, fascinating and fun experiments to perform. I’ve been lucky in choosing incredible mentors and supervisors, as well as exceptional postgraduate students. I love collaborating, learning from other disciplines, and I’m very excited when I find something I’m curious about. I just love the whole investigative process of research.”

**FUNDING**

Health Research Council Emerging Researcher First Grant

Potlatch Manawa Healthy Hearts for Aotearoa New Zealand (Collaborative Research Grant)

Lottery Health Council

HeartOtago

Healthcare Otago Charitable Trust
Shouldering responsibility

A judo injury as a teenager in Brazil is one of the more unusual impetuses for an academic career at the University of Otago. Born and raised in Brazil, Associate Professor Daniel Ribeiro (Physiotherapy) ruptured an elbow ligament while taking part in judo in his teens, and went through a musculoskeletal rehabilitation programme which helped restore movement and muscle strength. “It was not a nice experience having the injury and it was painful to regain movement,” Ribeiro recalls, “but the physiotherapist was amazing and I am passionate about sport and exercise, so I decided to train as a physiotherapist.”

He graduated in physiotherapy and undertook postgraduate studies in human movement sciences, then worked as a clinician and taught undergraduate students in Brazil, before completing a PhD at Otago and joining the staff in 2013. “Otago has an excellent reputation internationally, so when I saw an opportunity for PhD scholarships I applied for one and got it. My wife and I enjoyed Dunedin and we ended up staying.”

Based in the Centre for Health, Activity and Rehabilitation Research, Ribeiro is engaged in research that aims to improve clinical outcomes for people with musculoskeletal pain due to injuries and disorders, with a focus on shoulder pain. “A judo injury is a common musculoskeletal complaint that impacts on daily living and occupational activity, and can have a slow recovery despite the benefits of standard exercise therapy on shoulder pain and function,” he says. Part of the research focuses on understanding the underlying mechanisms of musculoskeletal disorders and why particular interventions work. This involves laboratory-based studies testing participants with no symptoms and volunteers with shoulder pain, mostly people on waiting lists who were not supported by ACC.

The lab-based studies are fine in helping to explain how an intervention might work,” Ribeiro says, “but we are also interested in designing and testing novel rehabilitation programmes that are needed to improve the effects of treatment and the speed of recovery, and to reduce the rates of recurrence, so that people can get back to their normal lives.”

Further research projects involve clinical trials to see if interventions that are tailored to an individual’s impairments are better than a one-size-fits-all approach; and to see if different healthcare pathways can reduce waiting lists, the onset of chronic conditions and the need for surgery. Ribeiro’s current research team includes Honours student Tom Fahey and PhD student Tim Wang. He is also collaborating with international researchers and colleagues from the School of Physiotherapy and the Division of Health Sciences, including Professor Haxby Abbott, Associate Professor Meredith Perry, Associate Professor Gisela Sole, Dr Cathy Chapple, Dr Ram Mani, Dr Ross Wilson and Dr Jimmy Zeng.

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Curing Cancer
Transforming cancer treatment

An Otago cancer researcher’s intrepid quest for new cancer therapies is professional and personal.

Dr Sarah Diermeier (Biochemistry) was 12 years old, living in Bavaria in Germany, when she determined to devote her life to cancer research after witnessing her aunt and then her grandmother suffer and die from cancer.

Diermeier says it had a huge impact on her. “I remember being really angry at the disease. Watching a relative going through cancer treatment is something that no one should have to do. Even if it is successful, the side-effects are absolutely horrible.

I decided that there needs to be a better way, so I went to the library and read up on what I needed to do to become a cancer researcher, all with the goal in mind of one day developing new cancer drugs that increase the survival of cancer patients but also are much better tolerated by cancer patients.”

This propelled her to complete a Ph.D. in Biochemistry at the University of Regensburg in Bavaria in 2013 and undertake postdoctoral studies at the Cold Spring Harbor Laboratory in New York.

She then started to work in the New York laboratory at the same time as an Otago Biochemistry graduate, Dr Rowan Herridge, also doing postdoctoral studies. They married and relocated to Otago, and subsequently joined the Department of Biochemistry in 2018.

Diermeier was soon awarded the Rutherford Discovery Fellowship, which was the launchpad for her research at Otago on the role of what are called long non-coding RNAs (lncRNAs) in the growth and spread of cancer, picking up on research she had carried out in New York.

“RNA therapeutics is a new area of research that has this vast under-explored potential,” says Diermeier. “I think there is a really good chance that we can come up with some fantastically efficacious new cancer drugs that have very low toxicity for the patient.”

Diermeier explains that she and her laboratory team are interested in specific lncRNA molecules that are present in cancer cells but not in normal healthy cells. The team’s interest is to develop innovative drugs that target these molecules, stopping the growth of cancer cells and preventing their spread to other areas of the body.

The research programme is currently focused on breast and colorectal cancer, which are major health concerns in Aotearoa New Zealand and worldwide. But Diermeier says that removing these harmful lncRNAs could also hold the key to treating many additional forms of cancers, without the side-effects of treatments such as chemotherapy, thereby increasing survival rates and patient wellbeing.

Diermeier adds that the knowledge they are acquiring could also be translated to other diseases, including neurobiological conditions such as Alzheimer’s and Parkinson’s, and cardiovascular disorders.

On the back of her research programme, Diermeier has led the formation of a new biotech start-up company, Amaroq Therapeutics, to develop the cancer drugs.

The company has secured a record $14 million investment through Otago Innovation – the Otago University company that helps Otago researchers commercialise their work – on the basis of Diermeier’s expertise in these IncRNAs and her ability to demonstrate their usefulness in targeting various forms of cancer. She is the company’s chief scientific officer.

Diermeier says the company is aiming to develop drugs that target specific cancers. One drug for treating a particularly aggressive type of breast cancer is already undergoing pre-clinical studies with the hope of it being available to patients as a part of a clinical trial by 2024.

Diermeier’s laboratory team involved in these studies includes recent PhD graduates Kathleen Lucere and Megan O’Malley, and PhD students Holly Pinkney and Kaitlyn Tippett. She is also collaborating with colleagues in the Departments of Biochemistry, Medicine and Pathology in Dunedin, and at Otago’s campuses in Christchurch and Wellington, along with former colleagues at Cold Spring Harbor Laboratory.

Diermeier has led the research programme and start-up company while also raising a family with three-year-old Sammut welcoming his baby brother, Lukas, in July.

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Dr Sarah Diermeier

FUNDING

Brandon Capital Partners
Breast Cancer Society of New Zealand
Hendra Fund Feest Start Grant
House & Wilkes Centre
Ministry of Business, Innovation and Entrepreneurship
Breast Cancer Foundation NZ
Otago Innovation
Rutherford Discovery Fellowship
University of Otago
Re-coding the mysteries of cancer genetics

A modestly self-described “average” academic school student and “late bloomer” at university, Associate Professor Logan Walker now sits squarely at the cutting edge of international cancer genomics research.

Leading the cancer genomics efforts of the University of Otago, Christchurch’s Mackenzie Cancer Research Group, Associate Professor Logan Walker’s research focuses on improving the application of genomic technologies in health services to reduce the impact of cancer on the community.

“Genetic health, or healthcare based on knowing our genetic code, is an exciting and critical research area developing at rapid pace, with cheaper and more powerful DNA-based technologies revolutionising cancer diagnosis,” says Walker.

“However, the major challenge that comes with this is figuring out how to decode this information to benefit patients and their whānau. My research is focused on developing new methods to help evaluate the clinical significance of these genetic variants in our DNA code.”

Walker is understood to be the first Aotearoa New Zealand researcher to have been awarded both a Sir Charles Hercus Health Research Fellowship (2012-2016) and a Rutherford Discovery Fellowship (2016-2021), though there have been three more since.

“The Hercus Fellowship supported our initial work, decoding breast cancer genetics to assist the diagnostic community’s interpretation of genetic results. The Rutherford Fellowship funded the follow-up work, examining New Zealand’s genetic health services and identifying areas for further development,” Walker explains.

The Rutherford Discovery Fellowship is a personal family link for Walker – his wife Sherilyn’s parents are both descended from Sir Ernest Rutherford's family.

“The family link is my greatest claim to fame,” he jokes. “Sir Ernest apparently used to sit on Sherilyn’s grandmother’s bed and tell her ghost stories!”

The Canterbury farmer’s son says he showed no signs of scientific greatness himself at a young age.

“I only managed 33 per cent in a genetics test in my final year at Ellesmere College and was more focused on sport. I completed a BSc at Canterbury University, but it wasn’t until I was exposed to research during my Master’s degree, and later with my PhD here at the University of Otago, Christchurch, that I realised science was my true calling.”

His studies coincided with a personal health setback. Ironically, he was diagnosed with a genetic disease of his own – the autoimmune disorder ankylosing spondylitis (a form of rheumatoid arthritis).

“It started in my early 20s with a lot of back and body pain, which got so bad at times that I struggled to walk. I’ve lived with chronic pain and fatigue ever since, which has forced me to reassess my work-life balance – I make the most of the good days when I’m more physically able, but I’m lucky that much of my work can be done sitting at a computer or laptop.”

As well as a decade leading the cancer genomics efforts of the Mackenzie Cancer Research Group, he is co-director of Genetics Otago with Dr Louise Bird, and has been invited onto multiple international genetic expert panels.

Walker and his team are currently steering two of the largest international studies of breast cancer and endometrial cancer, aimed at discovering new genes to help determine whether women will develop both cancers.

“We’ve initiated projects aimed at developing novel preventative medicines to lower cancer risk in women genetically pre-disposed to breast and ovarian cancers. It’s early days but, if successful, these therapeutics will be transformative in controlling and reducing the social and economic impact of cancer.”

FUNDING

Breast Cancer Cure
Breast Cancer Foundation NZ
Cancer Research Trust NZ
Health Research Council of New Zealand
Mackenzie Charitable Foundation
Royal Society Te Apārangi

Associate Professor Logan Walker:

“37 The family link is my greatest claim to fame. Sir Ernest apparently used to sit on Sherilyn’s grandmother’s bed and tell her ghost stories!”
Mental Health
Dr Katie Douglas foresees a day when people will visit a mental health service, undergo an assessment and walk away with a course of psychological therapy tailored to their own profile of challenges and strengths.

“Psychological therapy is a cutting-edge area of research with so much potential. Depression and bipolar disorder are now recognised as ongoing, relapsing disorders, not just episodic ones,” says Douglas.

“Depression is so variable. Some people can go to the GP, get anti-depressants and get better. However, most people will need a more in-depth understanding of the causes of their low mood to be able to recover. If we can break depression down into its multiple parts, we can start targeting these parts in a more personalised way.”

With depression the leading cause of disability worldwide and bipolar disorder ranked fourth on the World Health Organization’s Global Burden of Disease index, new breakthroughs in mental health treatment are vital. Douglas, a Senior Research Fellow and registered Clinical Psychologist at the University of Otago, Christchurch’s Department of Psychological Medicine, has been awarded seven major research grants as Principal Investigator, including, in 2018, the prestigious Sir Charles Hercus Fellowship from the Health Research Council of New Zealand (HRC). She is currently leading three internationally-renowned research projects. Two are clinical trials relating to mood disorders. The first, the Enhancing Recovery Trial, combines individual psychological intervention with a group brain training programme over 12 months; the second is a bipolar disorder feasibility trial using a novel combination of bright light therapy and social rhythm therapy to improve mood by helping to stabilise circadian rhythms.

“Our interventions are focused on long-term recovery and depression prevention. The therapies we’re developing can potentially be delivered by a range of mental health professionals. Some can also be carried out at home or online. A computerised intervention, instead of face-to-face therapy, may be a better, more convenient fit for many people.”

Douglas says participant feedback has been encouraging.

“It’s extremely satisfying and heartwarming to see their progress. They can come into our studies in a very bad way, so to be able to see people engage in therapy, adopt strategies which work for them, then return to a fulfilling level of functioning is very satisfying.”

Douglas says a shortage of trained clinical psychologists is a huge problem, but studies aimed at trialling therapies that a range of other health professionals could potentially deliver may be one solution.

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The Christchurch-raised mother-of-three is also Principal Investigator on the UNITE trial (Understanding Neurocognitive Impairment following Trauma Exposure), funded by the Canterbury Medical Research Foundation, examining the long-term impact of the Canterbury earthquakes. A recent paper from that study has found that self-identified resilient people affected by “quake brain” two to three years after the quake events were able to shed those cognitive effects eight years later.

Douglas is also the current Chair of the Australasian Society of Bipolar and Depressive Disorders, and she and her team have cemented strong partnerships with many international research groups.

“We want to get to the point where we know which type of treatment works best for which type of person, and this will require very large samples of patients involving international research collaborations. The ultimate aim is to see the promising findings from our trials, replicated in larger numbers, then adopted into everyday clinical practice.”

FUNDING
Health Research Council of New Zealand
Canterbury Medical Research Foundation
University of Otago Research Grant

EARLY CAREER SCALE:

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FUNDING
Health Research Council of New Zealand
Canterbury Medical Research Foundation
University of Otago Research Grant

AWARDS INCLUDE:
Sir Charles Hercus Health Research Fellowship (2018); New Zealand College of Clinical Psychologists President’s Award (2012)
Connecting physical and mental health

Dr Matthew Jenkins

Dr Matthew Jenkins is bringing his background in Physical Education and Psychology to his research into helping those living with serious mental illnesses stay physically healthy.

A Senior Research Fellow in the Department of Psychological Medicine at the University of Otago, Wellington, his latest project is co-designing a healthy lifestyle programme for young people experiencing their first episode of psychosis.

“People with mental illness have a much lower life expectancy compared to the rest of the population, and are at higher risk of developing conditions like obesity and cardiovascular disease,” he explains. “We want to arrest that deterioration because once something like cardiovascular disease really kicks in, it’s either very hard to reverse or in some cases irreversible.”

The project, which is funded by a Lottery Health Research grant and a fellowship from Otago’s Division of Health Sciences, will begin with workshops with teenagers between the ages of 16 and 24 years old, where they’ll be asked what health means to them and how they can be supported to stay physically healthy.

“We’ve got Toi Tangata and the League of Live Illustration coming in, and as people are talking, their experiences will literally be drawn up on the walls. Having their voices come into it is going to be really powerful.”

Jenkins has a passion for community engagement, which he brings into his academic career. He is a regular volunteer with the Wellington City Mission, not just learning to make scones for their Tā Matariki Network of Universities

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Anxiety control

Research designed to better understand what happens inside our brains when we feel anxious could unlock more effective ways of treating anxiety disorders.

Dr. Joon Kim (Physiology) is aiming to produce the first evidence of how neural circuits in the brain control anxiety. He is experimenting with mice but says the research can readily translate to humans because the neurons in the brain that control stress are identical.

Kim is recording activity in stress neurons – called corticotropin-releasing hormone (CRH) neurons – in mice using a machine he and his mentor, Dr. Karl Iremonger, developed in the absence of any commercial products that could do the job. Special proteins are introduced in the mice to make their stress neurons glow when they are active, and this light is recorded via a tiny optical implant connected to the machine. The stress neurons are activated by playing harmless noise to the mice for a few minutes, which they perceive as a potential danger.

Kim says current anxiety research is mostly behavioural, and he wants to take a more mechanistic approach to what is happening in the brain when a person feels anxious. He has previously identified how acute elevations in stress neural activity in mice are associated with a switch from low- to high-anxiety behaviours.

Kim's current research is examining how CRH neurons cause this anxiety switch in the brain. This involves understanding how CRH neurons communicate with other neurons to cause this changed anxiety state. He says understanding how the brain flips this switch in anxiety states is essential to understanding when, and how, things go wrong.

The research fellow says current anxiety treatments are largely based on trial and error, and have a broad range of effects. However, by understanding the biological mechanisms by which the brain switches in anxiety states, his research could have the potential to provide new therapies that target the specific mechanisms in the brain that cause anxiety.

Kim was born in South Korea and emigrated to New Zealand with his family at the age of six. He went to school in Christchurch before studying Anatomy at the University of Otago. "During my third year I attended a lecture by Professor Greg Anderson on gene mutation that blew my mind. It made me interested in how the brain works."

He completed a PhD under Anderson and worked for several years as a research fellow in Iremonger’s laboratory, studying stress hormones, before launching his own research programme last year, thanks to Marsden Grant funding from the Royal Society Te Apārangi. A postgraduate student, Isaac Tripp, is assisting with the research.

And what stresses the stress researcher? "I don’t get stressed by work so much as little things like burning dinner or when fly fishing and you see a fish blatantly refusing your fly,” Kim confesses.
Te Ao Māori
Sovereign rights to health and wellbeing

A passion for upholding sovereign rights to health and wellbeing for tangata whenua has led Dr Paula Toko King to a career in Kaupapa Māori research that encompasses areas of racism, disability, care and protection, youth justice and prison.

Her work combines her interest in tangata whenua wellbeing and hauora Māori and has been heavily influenced by the late Dr Misena Jackson. She acknowledges the considerable guidance and support from hauora Māori leaders based in Te Whanganui-a-Tara, such as Dr Donna Cormack, Associate Professor Bridget Robinson (Associate Dean, Māori), Associate Professor Rico Harris, Dr Melisa McLeod, Associate Professor Venetia Ingham and Bernadette Jones.

“As soon as I went into this, I knew it was exactly what I was looking for all along.”

Dr Paula Toko King completed a medical degree at the University of Auckland and was on track to become a paediatrician, but her interest in preventing children returning again and again to prison has led her to switch to public health, a move prompted by seeing children return again and again with preventable illnesses.

“Māori and Pacific peoples and other groups who experience marginalisation by society end up getting the same illnesses that are related to social determinants of health equity.”

At the age of nine, King moved from the Great Forest of Tane (and) I always go back to that Māori way of life where tamariki were valued. This has been disrupted by colonisation, but we can go back to that.

“I want all tamariki and rangatahi in Aotearoa to experience that.”

Dr Paula Toko King

“Māori and Pacific peoples and other groups who experience marginalisation by society end up getting the same illnesses that are related to social determinants of health equity.”

“I thought there must be a better way than this.”

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Dr Paula Toko King
I’d love to get to the point where they’re no longer alternative housing models - they’re just part of the suite of housing models that we have.

Dr James Berghan

Creating Kaupapakāinga

It’s a kind of hybrid of co-housing and papakāinga but playing off the word papakāinga meaning focus or purpose,” Berghan explains. A former School of Surveying student, Berghan graduated in 2015 before heading to Hamilton where he became a Licensed Cadastral Surveyor. While completing Honours he had explored different development uses and cultural attachments to Māori land, and as he worked professionally he realised housing solutions needed to offer more than the usual paradigm of ownership and individualism.

“I saw with co-housing, and I started to ask whether there were lessons we could take from each of them that would enable urban papakāinga to be facilitated in a more easier way.”

Berghan sees there are strong similarities, especially around the ideas of the collective relationships and living more closely with your neighbours.

“It’s not going to be that other extreme where everything is shared and totally communal. It’s finding a balance between having individual, self-sufficient households that have all the facilities of a conventional home, but there are lessons such as access to shared lands (community gardens) and green spaces.”

It opens up opportunities for Māori who have lived away from the area to come back and reconnect with their whakapapa, he says.

While it is a housing project it has a lot of social and cultural gains attached to it. For instance, there are indigenous communities overseas who have done similar housing programmes which has helped to foster language revitalisation.

Berghan says the kaupapakāinga approach also covers how papakāinga might function if you’re not mana whenua.

“For example, there’s some other shared spaces that might bring a neighbourhood together, while reducing isolation and allowing sharing economies and being able to borrow things from neighbours, rather than having to own everything yourself.”

“That’s really starting to get into the co-housing space because many communities have a shared kaupapa, such as environmental sustainability,” he says.

“Could living with other Māori who don’t whakapapa to that area still support language revitalisation and provide access to some of those cultural supports, without being on your own mana whenua?”

Berghan takes a good example of this is a small cluster of eight kaumātua homes in Whakatane, built in a circle with a shared space in the middle.

“The kaupapakāinga don’t necessarily whakapapa to Whakatane-Tane, but they share a kaupapa of maintaining their whakapapa to Waikato-Tainui, but they share aspects of maintaining their independence but with easy access to the social and cultural benefits of living more closely with one another.”

There are of course all sorts of legal, financial and even socio-cultural challenges, including the perception shared models like this are extreme, even when they are not.

Legal and financial challenges, such as being able to get a mortgage on collective land are still an issue, although it is becoming easier as ownership models change and more off-the-shelf solutions appear. Local government also struggles at times with approaches that don’t fit the traditional ownership models, but Berghan hopes all that can change.

“I see a lot of the research we talk about these as alternative housing models, but I’d like to get to the point where they’re no longer alternative housing models – they’re just part of the suite of housing models that we have.”

Berghan is enjoying strong collaborations with other University of Otago departments, including Public Health at Dunedin and Population Health at the University of Otago, Christchurch, with the health benefit of such housing models increasingly recognised.

He is also working with Te Koronga: Indigenous Science Research Theme and the Department of Psychology, exploring the value of green spaces in providing relief from the built environment. This work ties back into research involving Geography, with projects looking at streetscapes and indigenous identity in cities, including the mana whenua presence in Dunedin’s George Street redevelopment.

Since being interviewed for this story Berghan has received a 2022 Curriculum Innovation award from the Lincoln Institute of Land Policy for his innovative teaching practices in a third-year urban design Surveying paper.

In one of only four awards worth $60,000, the others going to recipients from prestigious American universities, including the University of Michigan and Arizona State University.

FUNDING: Building Better Homes, Towns and Cities National Science Challenge, Aged Well National Science Challenge, Healthier Lives National Science Challenge, Te Koronga Indigenous Science Research Theme, Ngā Pae o te Māramatanga Centre of Research Excellence (NZARE) and Lincoln Institute of Land Policy.

EARLY CAREER SCALE:

Dr James Berghan

Curriculum Innovation Award from the Lincoln Institute of Land Policy (2022); Exceptional PhD Thesis (2020)

STAFF AT OTAGO:

Achievements include:

• Curriculum Innovation Award from the Lincoln Institute of Land Policy (2022); Exceptional PhD Thesis (2020)

AWARDS INCLUDE:

- Lincoln Institute of Land Policy
- Te Koronga Indigenous Science Research Theme
- Department of Psychology
- Geography
- Indigenous identity in cities
- Mana whenua presence in Dunedin’s George Street redevelopment
- Innovative teaching practices
- Third-year urban design Surveying paper
- Only four awards worth $60,000
- Recipients from prestigious American universities
- University of Michigan and Arizona State University

FUNDING:

- Building Better Homes, Towns and Cities National Science Challenge
- Aged Well National Science Challenge
- Healthier Lives National Science Challenge
- Te Koronga Indigenous Science Research Theme
- Ngā Pae o te Māramatanga Centre of Research Excellence (NZARE)
- Lincoln Institute of Land Policy
Giving back to the future

The desire to “give back” has been a driving force for Psychology Lecturer Dr Hitaua Arahanga-Doyle (Ngāi Tahu, Te Āti Haunui a Pāpārangi).

“My undergrad experience was all over the place. In fact, I changed my degree six times,” he says.

“During that time my awesome whānau helped me a lot, but also groups such as my ai – Ngāi Tahu – gave me scholarships and work experience, so I really felt like I needed to give back.”

Arahanga-Doyle graduated with a BCom in Marketing and a BA in Psychology from the University of Otago in 2013 and 2014 and returned in 2016 to complete a one-year honours programme in Psychology.

“It feels a bit clichéd but the biggest reason I returned was that I wanted to help people, in particular adolescents and young Māori students. That one year turned into a five-year PhD, which I graduated with in 2021.”

Arahanga-Doyle’s PhD research aimed to help first-year Māori students by investigating the efficacy of a brief intervention that integrated social psychology approaches around belonging with fundamental te ao Māori cultural values, particularly whanaungatanga.

His analysis of how students described their first-year experiences suggested Māori students were more likely to contextualise being independent as a challenge, compared to New Zealand European students who described it with a sense of expectancy.

“International research has shown how this cultural mismatch between the common independent norms of university and students can have a range of adverse effects.”

In 2019 Arahanga-Doyle was awarded a Fulbright Scholarship and chose to study at Stanford University and Northwestern University in the United States.

“I joined labs at those universities because reading their work was pivotal in how I thought about and approached psychological research in this area. I admired their diligence as well as their approach in trying to use social psychology as a novel, strengths-based tool to help people elevate and improve within particular contexts rather than fixating on deficits.”

Arahanga-Doyle is currently developing a new paper for the Psychology honours programme called PSYC422: Waenganui: Intersecting culture and the mind, which looks at how cultural norms, values and meanings are entangled within psychology, particularly from an Aotearoa New Zealand perspective.

“I’m a big believer in [Māori researcher and health specialist] Sir Mason Durie’s ‘research at the interface’ approach, which aims to harness the energy from two systems in order to create new knowledge that can be used to advance understanding.”

“Through my research I try to bring a te ao Māori lens into areas of social psychology as best as I can.”
Having grown up as a self-confessed nerd with her nose in a rock pool, Rutherford Discovery Fellowship recipient Dr Alana Alexander (Ngāpuhi: Te Hikutu, Pākehā) always imagined herself on-board a boat studying dolphins and whales.

That was until she found just how seasick she could get.

Entering a research career working in genetics, she soon saw what an amazing window it could be into where tohorā (Southern Right Whales) were moving and what their lives were like.

“It was a way to study whales and dolphins without the sea sickness.”

Alexander is currently on a prestigious five-year Rutherford Discovery Fellowship from the Royal Society Te Apārangi, investigating past, present and future conservation impacts to whales and dolphins using genomics.

Although fisheries bycatch has heavily impacted Hector’s and Māui dolphins, toxoplasmosis is an emerging threat, especially for Māui dolphins, which now number about 54 adults. Normally carried by domestic cats, when they defecate near waterways, it is thought the parasite’s spores can work their way down to the ocean.

“We’re seeing an increasing number of dolphins dying with signs of toxoplasmosis, so we are looking to see if there is any difference in the dolphin’s genomics and its microbiome to see if there is something that makes it more susceptible.”

Alexander is also applying her genetic knowledge to pest control.

She is working to identify the genes involved in reproduction or survival in pests such as possums, which could then be used to try to manage them.

Significantly, she is looking to convert this scientific knowledge into a form that’s digestible for Māori communities, including making resources in te reo Māori.

“It means people can then use their own judgements about the tikanga and the appropriateness of those technologies, after they know how the science works.”

This is an area that also ties back into her research on whales and dolphins, where she will be seeking to use pūrākau (traditional narratives) as template to translate what she describes as the “nerd-speak of genomics” into insights for hapori Māori (Māori communities).

“I’m hoping that these ‘science pūrākau’ might be a powerful way to inspire and encourage some of the next generation to pick up the tools of genomics to learn about and care for taonga species.”

**FUNDING**
- Royal Society Te Apārangi
- Rutherford Foundation
- Predator Free 2050
- Genomics Aotearoa
- Coastal People Southern Skies

**EARLY CAREER SCALE:**

**STAFF AT OTAGO:**

**AWARDS INCLUDE:**
- Rutherford Discovery Fellowship (2022); Predator Free New Zealand Capability Development Funding (2021); Kaupapa Māori Award, Otago School of Biomedical Sciences (2020); OUSA New Supervisor of the Year and Division of Health Sciences Supervisor of the Year (2020)
Some green-lipped mussels should be able to tell us how we can mitigate the effects of climate change on these molluscs and improve their productivity.

Dr Nathan Kenny (Biochemistry) is leading a research project investigating genetic methods of mitigating the more pernicious effects of climate change on green-lipped mussels.

Kenny (Te Ātiawa and Ngāi Tahu) and his team are looking into the genetic basis of the resilience that some green-lipped mussels have against climate change-induced heat shock and ocean acidification eating away at their shells.

"Fortunately, there is variation in the population out there, and some green-lipped mussels are better at surviving climate change and its effects," Kenny explains. "I am interested in what it is about the genomes of the ones that are good at surviving that enables them to do that, while others die."

In doing so, he is taking advantage of emerging genetic and molecular tools such as single-cell sequencing, focusing on the earliest stages of the life of the shellfish, to acquire a thorough understanding of the development of these resilient traits.

Kenny says the research should enable the breeding of mussels that possess this natural resilience, and not only help lessen the effects of climate change on the molluscs, but also further improve aquaculture productivity, a bit like animal husbandry for shellfish.

For the lecturer and research group leader, the research is purely altruistic: the self-described “ecological footprint vegetarian” doesn’t eat mussels, although he appreciates their commercial, environmental and cultural value.

The green-lipped mussel aquaculture industry is currently worth more than $500 million per year to Aotearoa New Zealand’s economy, with big plans for expansion; the bio-valuation key site in water filtration and the food chain; and kuku or kūtai, as they are known in te reo Māori, are a taonga or treasured species for Māori.

With this in mind, the project embraces collaboration with iwi and recognition of iwi as kaitiaki (guardians) of the research data. The project has brought Kenny’s career full circle. He graduated from the University of Otago with an honours degree in Genetics, before completing a doctorate in Zoology at Oxford University, followed by postdoctoral work at the Chinese University of Hong Kong, the Natural History Museum in London, and Oxford Brookes University. He returned to Otago last year to take up a five-year Rutherford Discovery Fellowship, under which he is carrying out the mussel research project that continues his overriding interest in comparative changes in genomes that allow organisms to live in particular environments.

FUNDING

Rutherford Discovery Fellowship
Marsden Fund Fast-Start Grant
University of Otago Research Grant

AWARDS INCLUDE:

Genomics Aotearoa Indigenous Genomics Platform grant (2022); Marsden Fast-Start award (2021); Rutherford Discovery Fellowship (awarded 2020, begun 2021); Marie Curie Fellowship at the Natural History Museum, London (2017); Clarendon Scholarship at St Cross College, Oxford (2010).
The enduring legacy of whakapapa
You would be hard pressed to find an academic career more life-imprinted than that of Associate Professor Karyn Paringatai (Te Tumu – School of Māori, Pacific and Indigenous Studies).

Everything she teaches and researches within Māori Studies (language acquisition, pedagogies, performing arts, the impact of whakapapa knowledge on health outcomes and the socio-cultural aspects of Māori migration) stems from the deep cultural yearning she felt while growing up in Southland away from intergenerational contact with her ngāpitunui (ancestral kin).

"A lot of my work is about my own personal journey I grew up in Invercargill disconnected from my East Coast whakapapa. But I did nothing to sever that connection. It was always there – just had to find it." Paringatai says that being able to teach in the dark worked just fine in pre-European times. "Māori learned in the dark for hundreds of years and yet somehow, in a very short amount of time, we lost that with European arrival and the setting up of the school system. It’s not like it was something new – it was just about realising our priorities in terms of language learning and teaching. That’s the beauty of Māori Studies – we’re actively trying to do things in a way that is true to who we are and to the way our tīpuna did things." Paringatai won the Prime Minister’s Supreme Award for Tertiary Teaching Excellence for turning the lights off in 2014.

Since then, she’s continued to advance keapapa Māori activities within the University system. She now co-directs Poutama Ara Rau with two other distinguished Māori academics (Professor Jacinta Ruru and Professor Suzanne Pitama). Together they oversee a multidisciplinary team of over 50 University of Otago researchers all focused on advancing Māori pedagogies and mātauranga Māori.

In 2018, Paringatai received Marsden funding for her most personal and impactful project: ‘E kore au e ngaro – the enduring legacy of whakapapa’. This topic grew from a cataclysmic event in her own life: after her dad’s death, her aunties told her there was a history of stomach cancer running through her paternal whakapapa. Genetic testing confirmed she carried a variation in the CDH1 gene that gave her an 80 per cent chance of getting hereditary diffuse gastric cancer (a type that evades detection until it’s too late). Paringatai made the difficult decision to have her stomach removed in 2010. “Whakapapa finally became real, tangible and life-saving.”

The Marsden funding allowed Paringatai to research the impact of whakapapa knowledge on Māori health outcomes and bring, Professor Paity Guilford (Centre for Translation Cancer Research) into the frame. He had connections with the McLeod whānau of the Bay of Plenty – a family with a significant history of gastric cancer. They began working together 25 years ago to unmask the mutated gene’s hidden and ruthless doings. Guilford has since led the charge in updating international clinical practice guidelines, making genetic testing for the CDH1 gene more readily available for Māori whānau. Paringatai has had two successful mutations identified in the McLeod whānau, and she’s now working on a book manuscript that will expand this work and make the human stories behind the medical science more readily accessible to the wider public.

"It’s a real privilege to be in a position where I can make a difference to the health of Māori and bring the knowledge out there. I really want the whānau voice to be the main voice in this book." Since starting her Marsden project, Paringatai has had two children of her own. This has thrown her research into sharper relief. "The thing that really drives me now is my children. They’re in the same situation I was in – growing up away from their tribal area. It’s about what I need to do to make sure they’re not strangers there. I didn’t know I had this gene until I was in my 20s, so I need to be strategic about the conversations I have with my children in the future. They have a 50-50 chance of inheriting this gene from me, so I need to raise awareness within my own whānau and community and make sure the knowledge is out there.”

**FUNDING**

Marsden Fund

"Whakapapa finally became real, tangible and life-saving.”

Associate Professor Karyn Paringatai
Dr Chanel Phillips (Centre of Indigenous Science) recalls collecting pipis with her father and siblings as her first connection to the water, which she grew up in, on and around in the “winterless North” of Aotearoa New Zealand. Phillips (Ngāti Hine, Ngāpuhi) went on to study Physical Education at Otago, writing a Master’s thesis (with distinction) on the role of mahinga kai (traditional food gathering practices) for Māori physical education and health. She then completed a PhD (assessed to be of exceptional quality) on Māori perspectives of water safety, in which she looked at water safety messages within Māori oral narratives, and how they might be used today to teach water safety and help reduce the high drowning rate of Māori (who comprised 17 per cent of the population and 31 per cent of drownings last year).

In the process, she devised a pioneering Māori water safety and health model, Wai Puna (wellspring of water and knowledge), which she says provides a holistic connection to water that goes far beyond learning water safety skills alone and practices such as wearing a life jacket. Phillips explains that Wai Puna is centred on strengthening traditional connections with water, and improving water safety knowledge, attitudes and behaviour through understanding whakapapa (ancestral) links to water, mātauranga (traditional knowledge) derived from ancestors’ experiences with water, and tikanga (practices) in the water. Wai Puna in turn has laid the foundations for a research project at Otago funded by the Health Research Council, tasked with creating a water safety programme for Māori families.

The lecturer in Māori Physical Education and Health says that she and other team members have been working with Māori communities in Otago, Waikato and Northland, drawing on their environmental and cultural knowledge around water-based activities – such as fishing, food gathering and diving – to develop key Māori water safety skills and competencies. The aim is to roll out the programme nationwide.

Phillips is a principal investigator, along with her Otago colleague and mentor, Associate Professor Anne-Marie Jackson, and Dr Jordan Waiti of Waikato University.

A University of Otago researcher is having a major influence on the rethinking and rewriting of the country’s approach to water safety. Phillips says. There are, however, signs of what she describes as “a significant shift” in outlook. Her Wai Puna model has underpinned Water Safety New Zealand’s latest water safety sector strategy, Waikawe Aotearoa; and it is influencing the Ministry of Transport’s current policy development review for recreational safety and search and rescue.

The model has also been used in the monitoring and evaluation of a Māori water safety initiative funded by the Accident Compensation Corporation (ACC); and in the development of a Māori water safety resource for children.

In addition to her researching and teaching roles, Phillips is a co-director of Te Koronga Indigenous Science Research Theme.
Improving the World
A passion for plants

Dr Matt Larcombe

Understanding how plants evolve and why they exist where they do is becoming increasingly important as climate change alters environments. It’s a strong motivation for Dr Matt Larcombe (Botany), whose recent Marsden Fast-Start grant is to investigate the processes that control plant diversification.

The three-year project has been extended because of disruption during COVID, but Larcombe is about half-way through a large experiment at Invermay looking at how competition affects evolution.

As a plant evolutionary ecologist, he deals with issues such as diversification, hybridisation, biogeography and conservation, working with Otago colleagues and collaborators around the world.

His Fast-Start project to understand what controls long-term diversity patterns involves masses of data gathering on species distribution and climate, ecological niche modelling and phylogenetics (studying genetic relationships). Research is a dream job for Larcombe, who grew up in Tasmania and fell in love with the bush at an early age.

In 2016 he joined Otago as a postdoc, and since the Marsden-work started, he has won University of Otago Research Grants for two more projects close to home.

“Since 2020 we’ve been looking at symbiotic relationships between beech trees and the diverse fungi that attach to their root systems. They need each other to survive but their relationship is influenced by the environment and is likely to be impacted by climate change.”

“We need to understand how the relationship works to determine if the forest trees and their fungi will be able to track habitats as the climate changes.”

As climate changes the distribution of habitat over geological time scales, species can get isolated and then thrown back together again, and this can influence speciation. So, the Alps give us a chance to study evolution in action.”

Larcombe and colleagues are also contributing to New Zealand’s One Billion Trees programme by taking a scientific approach to restoring native forests. They aim to improve efficiency by growing trees directly from seeds rather than planting saplings.

“There’s still a way to go but if we can get it working and scaled up, it could allow us to reforest degraded landscapes more effectively and help promote forest migration under climate change.”

FUNDING
Royal Society of New Zealand, Te Arupu Karitaheuhou, Marsden Fund (New Zealand)
Bringing the heart online

Dr Susan Wardell (Social Anthropology) has been researching moral and social aspects of the digital world and suggests that the internet is a far more human space than we might realize. “COVID has shifted more and more of social life online, but it’s not all bad. Most of my research and teaching deals with things that are dark or fraught in some way. But somehow that always takes me closer to topics like care and empathy too. It’s all the stuff that makes us human.”

Wardell completed a BA(Hons) in Social Anthropology and Communication Studies at Otago before working as a research assistant on a Marsden-funded project on moral reasoning and disability. That led to her examining a viral crowdfunding campaign for a baby with Down’s syndrome and sparked an ongoing interest in care and emotion in digital spaces, particularly in relation to health. For her PhD in Social Anthropology and Communication Studies she compared burnout in two Christian youth work organizations – in post-quake Christchurch and urban Kampala, Uganda – which featured in her first book, Living in the Tension.

“When I started my PhD I thought I would become a research academic, which I was very much looking forward to. I thought teaching was just something people had to do on the side, but instead I fell deeply in love with it.”

Wardell completed a B(Arts) in Social Anthropology and Communication Studies at Otago before working as a research assistant on a Marsden-funded project on moral reasoning and disability. That led to her examining a viral crowdfunding campaign for a baby with Down’s syndrome and sparked an ongoing interest in care and emotion in digital spaces, particularly in relation to health. For her PhD in Social Anthropology and Communication Studies she compared burnout in two Christian youth work organizations – in post-quake Christchurch and urban Kampala, Uganda – which featured in her first book, Living in the Tension.

“No one has been awarded a Marsden Fast-Start grant (2020-2023) to study medical crowdfunding in Aotearoa, analyzing campaign pages and conducting case studies and interviews with campaigners and audiences/donors. “Looking at medical crowdfunding reveals real social needs and inequalities. It also raises questions of moral emotion in digital spaces, in terms of how the ‘crowd’ might respond. It is important to tell these stories, not just to academics but also the public – and there are lots of opportunities out there.”

Wardell draws on her literary and creative talents to get her findings into the public domain, publishing and winning awards across several literary genres, as well as acting as Poetry Editor for the journal Anthropology and Humanism: “I feel so lucky. I thought my interests in poetry, fiction and art would just be a sideline career to my academic work, but I have found that it’s possible to marry them together. “Now I am going to challenge myself to bring more creative and experimental forms into the process of disseminating my research. That really excites me.”

FUNDING

University of Otago Teaching and Learning Grant
University of Otago Research Grant
Marsden Fast-Start grant

AWARDS INCLUDE:

OUSA Supervisor of the Year (2019); 1st Place, ‘Writer’ Competition, Staff Poetry category – University of Otago (2020); 1st Place, Headlands Tāne a Māra Creative Nonfiction Prize (2021); 1st Place, Micro-Madness International Micro Fiction Competition (2019); 1st Place, Ethnographic Poetry Competition - Society for Humanistic Anthropology (2020)
Enhancing cultural understanding

Dr Joseph Watts: "Understanding from a cultural perspective what a person means when they describe a particular state of mind could go a long way in reducing misunderstandings between cultures."

Dr Joseph Watts has a PhD in Psychology from Auckland University and has been a lecturer in Otago’s Religion programme since 2020. He is a core member of Otago’s Centre for Research on Evolution, Belief and Behaviour and an External Research Associate of the Max Planck Institute for the Science of Human History.

He says religious systems are fascinating because they pervade so many aspects of human life.

"Studying Religion provides the freedom to study anything from the micro-cognitive processes of the human mind-up to the macro-structures of international relations."

He is currently leading a Marsden-funded project titled “Cross-cultural Patterns in Theory of Mind: Using text analytics to identify structure and variation in mental state attributions in the Pacific". The project, in collaboration with Victoria University’s Dr Jason Low and Auckland University’s Dr Simon Greenhill, aims to investigate the semantic structure of mental state vocabulary across six languages, with a particular focus on Pacific languages.

Researchers have spent thousands of hours reading through historic dictionaries, children’s stories and other documents as well as consulting with language experts to create extensive word lists relating to the mind across French, English, Spanish, Tongan, Samoan and Māori. On average, around five to seven per cent of all the words in each language represent states of mind.

While still in the early stages of analysis, Watts and fellow Religion programme colleague Rachael Richter-Gravier have identified a distinction in how different cultures perceive and communicate their mental states, beliefs, desires and emotions. For example, the same state of mind in one language may carry positive connotations, while in another be perceived negatively. One early finding indicates a greater emphasis in te reo Māori on emotional states of mind, compared with European languages.

"People have an exceptional capacity to infer the beliefs, emotions, intentions and desires of one another and this capacity is known as Theory of Mind,” explains Watts. “This has been often regarded as a human universal that provides the foundation of social learning, empathy, cooperation and communication. However, there is growing recognition that the way people conceptualise and communicate mental states varies across languages, particularly in the Pacific. This cross-cultural variation has the potential to challenge long-held beliefs about the nature of Theory of Mind and its importance in human social and cognitive abilities.”

Watts grew up in rural Whanganui, completing his undergraduate studies at Massey and Victoria University of Wellington and his BA (hons) and PhD in Psychology at the University of Auckland.

Prior to joining the University of Otago, he was a Research Fellow in the Social and Evolutionary Neuroscience Group at Oxford University, and a Postdoctoral Researcher in the Department of Linguistic and Cultural Evolution at the Max Planck Institute for the Science of Human History.

Dr Watts, who says he is driven by curiosity, hopes this latest study could impact the way therapy is informed, adapted and conducted or, more broadly, create greater understanding between different cultures.

"Understanding from a cultural perspective what a person means when they describe a particular state of mind could go a long way in reducing misunderstandings between cultures."

He adds that he is grateful to have a fantastic team of colleagues in Otago’s Religion programme.

FUNDING:
Marsden Fund

AWARDS INCLUDE:
University of Otago Early Career Research Award (2022); Vice-Chancellor’s Prize for Best Doctoral Thesis (2017)
Dr Isaiah Immanuel

Diabetes disparity

Improving type 1 diabetes control in Pasifika children

Growing up in a village near the Fijian city of Lautoka, Dr Isaiah Immanuel witnessed first-hand the poorer outcomes for people living with chronic disease caused by delays in care and treatment.

Now, the medical graduate and father-of-five is shining a light on the inequities of care that Pasifika youth in Aotearoa New Zealand are struggling to overcome in the management of their type 1 diabetes.

Based at the University of Otago, Christchurch, he is conducting a one-year study, funded by Research for Children Aotearoa, to discover why Pasifika youth with type 1 diabetes are experiencing problems maintaining good control of their disease.

Utilising the Department’s paediatric endocrine data, study results gathered so far suggest there has been little progress from five years ago in three key areas: the HBA1C glucose markers in the patient’s blood, patient use of insulin pumps, and their regularity in receiving continuous glucose monitoring.

“Five years ago, Pasifika children and youth were four to five times less likely to be using their insulin pump for glucose control compared to European New Zealand patients. Analysis of the current data shows only around one in seven Pasifika patients are using an insulin pump, which is still low.

“Continuous glucose monitoring is another issue. Having access to a monitor can save the young person from the pain of having to prick their finger to extract blood five to six times daily. The fact is, most Pasifika families struggle to afford one of these monitors. The cheapest on the market is around $4,000 with some up to $10,000. The database shows our young Pasifika patients are five times less likely to be using continuous glucose monitoring as a result.”

Immanuel says these disparities matter. While there may only be an estimated 115 Pasifika children and teens with type 1 diabetes in Aotearoa New Zealand (making up 7 per cent of total paediatric disease incidence) their levels of hospitalisation due to a lack of diabetes control are higher than they should be in percentage terms.

“A lack of disease control can be life-threatening. In type 1 diabetes the body cannot produce the insulin it needs to utilise the glucose we get from food. This causes glucose to hang around the body (in toxic concentration levels which are harmful over time. If children don’t get their insulin, they can present to hospital very sick and even die within a week. Long-term they can lose their sight, kidney function and suffer nerve damage.”

Immanuel says his interviews with specialist paediatric diabetes nursing teams in Auckland and Wellington have been invaluable in exposing the challenges some Pasifika families face in accessing vital care and support.

“Type 1 diabetes requires a lot of management and often both parents work long, unsociable hours. Although some services are government funded and already at the table, some Pasifika families are struggling to even get to the table.”

Immanuel says specialist diabetes nurses are reporting difficulties engaging with some families due to language and cultural barriers.

He hopes the results of his study will help suggest a model of care aimed at bridging the gaps for Pasifika families.

FUNDING: Research for Children Aotearoa
Global nutrition: going the last mile

After working remotely for Otago since 2021, Dr Anne Williams has recently arrived in Dunedin bringing her expertise in global nutrition and micronutrient surveillance with her.

It was the comfortable lot of fishermen in Alaska that set Dr Anne Williams thinking about what corner of biology she ought to inhabit.

After gaining a BSc from the University of Washington’s School of Aquatic and Fishery Sciences, she spent five years working as a field biologist at the International Pacific Halibut Commission in Southeast Alaska. It was this experience that influenced her swerve towards public health.

“I’ve always been really motivated by quantitative science. As a fisheries biologist my primary interest was in the health of the fish stock. Yet the user group that was benefitting most from my efforts was commercial fishermen who seemed to be doing OK in the world.”

Williams swapped fish catch calculations for public health advancement.

“I was motivated to do solution-oriented work that benefitted disadvantaged segments of society. I was drawn to working with women and children.”

That led to a PhD in Nutritional Biology at the University of California, where she researched child nutrition in East Africa. After completing a postdoc at Emory University, Williams spent five years with the International Micronutrient Malnutrition Prevention and Control programme (IMMPaCt) at the United States Centers for Disease Control and Prevention. It was there that she honed her expertise in micronutrient surveillance.

In best case scenarios, this kind of work can lead to healthier populations. Surveillance is a cornerstone of public health, yet population micronutrient assessment is rare. This makes health advocacy tricky: “You can’t advocate for unmeasured conditions.”

Williams recently shifted to Otago hoping she could galvanise nutritional surveillance measures within the Western Pacific.

“The trick is to really go the last mile because that’s one of the hardest parts of the equation.”

Driven by a concern that the Pacific population’s nutritional profile is under-researched, Williams hopes to build partnerships and better understand the main nutrition challenges this region faces.

“There’s quite a bit of nutrition research happening in Asia and Africa but the Western-Pacific region is riddled with data gaps. I would love to see that change.”

Alongside her research, Williams is teaching a Global Nutrition paper – something new to Otago.

“I’d eventually like to foster student exchanges, but my short-term focus is to motivate students to get involved in global health nutrition work and not shy away from its complexity.”

FUNDING
Global Alliance for Improved Nutrition

Dr Anne Williams
Research Awards 2022
Professor Jacinta Ruru

Yesterday’s early career winner – today’s Distinguished Research Medal winner

In 2011, Professor Jacinta Ruru (Raukawa, Ngāti Ranginui) was one of two winners of the Rowheath Trust Award and Carl Smith Medal, recognising the outstanding research performance of early-career staff at Otago.

Eleven years later, the influential Māori legal scholar has been awarded the University’s top research honour - its Distinguished Research Medal.

Professor Ruru says she is “incredibly humbled and moved” to receive the award for 2022.

“It is an amazing testament to all those I’ve worked with over the years to develop a research programme in the study of law that makes sense to me and my whānau, to us as Māori. Law has a huge role to play in recreating a more reconciled and well future for us all in Aotearoa New Zealand.”

For more than 20 years, Professor Ruru has been thinking and writing about how environmental law could recalibrate to be more respectful of Māori rights, interests and responsibilities.

Considered a trailblazer, Professor Ruru was the first Māori woman to be recognised as a Fellow of the Royal Society Te Apārangi (at the same time as Professor Linda Tuhiwai Smith) and is Aotearoa New Zealand’s first Māori professor of law. Professor Ruru joined the University’s Faculty of Law in 1999. She has received many significant awards, including the University of Otago Sesquicentennial Distinguished Chair, the Prime Minister’s Supreme Teaching Excellence award and a local Kiwibank hero award. She is also a Member of the New Zealand Order of Merit.

Professor Ruru is the first Humanities scholar to receive the Distinguished Research Medal in a decade and the first female Humanities recipient since 2003.
Leading structural biologist Associate Professor Peter Mace is the recipient of the 2023 Rowheath Trust Award and Carl Smith Medal, awarded to early-career research staff who demonstrate outstanding scholarly achievement that enhances the understanding, development and wellbeing of individuals and society. Associate Professor Mace (Biochemistry) leads research which focuses on understanding signaling networks that regulate how cells respond to stress. The overall goal is to translate this knowledge into more effective disease therapy.

“We’re really rewarding to have this recognition, not just for myself, but for all the hard work put in by my research staff and students, who go above and beyond,” he says. “It’s great validation that you are doing internationally-significant research – that you’re on the right path.”

As well as his key research contributions, Associate Professor Mace has held important leadership roles in the structural biology community in New Zealand and is the current President for the New Zealand Society for Biochemistry and Molecular Biology.

“Great validation that you are doing internationally-significant research – that you’re on the right path.”

Associate Professor Mace

Dr Philip Adamson
(University of Otago, Christchurch)

Dr Philip Adamson’s growing body of internationally-recognized work focuses on the prevention and treatment of heart attacks. The Christchurch campus-based clinical cardiology and endocrinology researcher within the Department of Medicine’s Christchurch Heart Institute is currently principal investigator on three cardiovascular trials focused on coronary atherosclerosis – hardening of the heart’s arteries.

Dr Anna Gosling
(Department of Anatomy)

As an environmental scientist, Dr Amandine Sabadel is a leader in the field of evolutionary virology, and concurrently holds a position as a stable isotope ecologist consultant with NIWA. Her award-winning research identified that leading-edge compound-specific stable isotope analysis techniques, her expertise in reconstructing energy links between organisms, and between organisms and their environments.

Dr Sebastian Gehricke
(Department of Accountancy and Finance)

Despite having achieved his PhD less than four years ago, Dr Sebastian Gehricke is already making his mark. His focus has become sustainable finance research, which aligns with his off-grid lifestyle and a field where academic research can have real-world impacts on people and the planet. The Senior Lecturer has published extensively, attained significant funding, supervised several postgraduate and co-leads a successful research theme.

Dr Dr Philip Adamson
(University of Otago, Christchurch)

Dr Philip Adamson’s growing body of internationally-recognized work focuses on the prevention and treatment of heart attacks. The Christchurch campus-based clinical cardiology and endocrinology researcher within the Department of Medicine’s Christchurch Heart Institute is currently principal investigator on three cardiovascular trials focused on coronary atherosclerosis – hardening of the heart’s arteries.

Dr Anna Gosling
(Department of Anatomy)

As an environmental scientist, Dr Amandine Sabadel is a leader in the field of evolutionary virology, and concurrently holds a position as a stable isotope ecologist consultant with NIWA. Her award-winning research identified that leading-edge compound-specific stable isotope analysis techniques, her expertise in reconstructing energy links between organisms, and between organisms and their environments.

Dr Sebastian Gehricke
(Department of Accountancy and Finance)

Despite having achieved his PhD less than four years ago, Dr Sebastian Gehricke is already making his mark. His focus has become sustainable finance research, which aligns with his off-grid lifestyle and a field where academic research can have real-world impacts on people and the planet. The Senior Lecturer has published extensively, attained significant funding, supervised several postgraduate and co-leads a successful research theme.

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