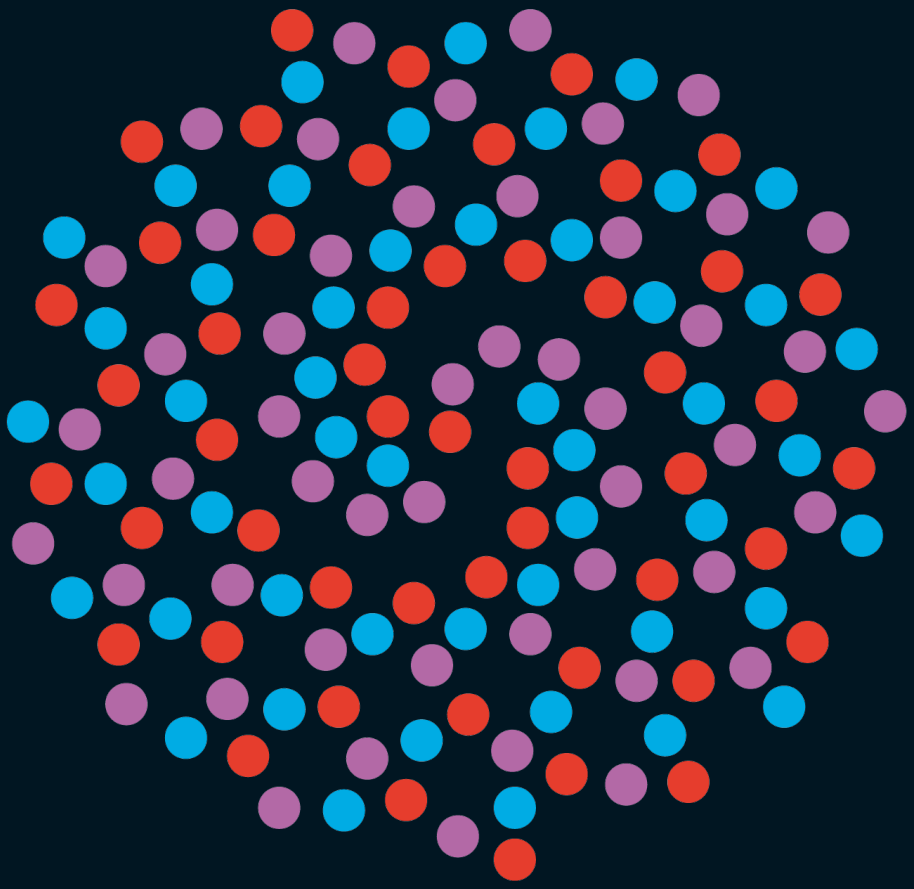

MAURICE WILKINS CENTRE

New Zealand's Centre of Research Excellence
targeting human disease

Annual Report

January 2020 - June 2021

Maurice Wilkins Centre

The Maurice Wilkins Centre is New Zealand's Centre of Research Excellence targeting major human diseases. It focuses on cancer, diabetes and infectious disease.

New Zealand has an outstanding reputation for biomedical research. The Centre aims to harness this expertise to develop drugs and vaccines, tools for early diagnosis and prevention, and new models of disease. In addition to translational research that directly targets human disease, the Maurice Wilkins Centre encourages innovative fundamental science that has the potential for high impact on human health.

The Maurice Wilkins Centre is a multidisciplinary network that brings together leading biologists, chemists and computer scientists. At the 30th June 2021 it comprised of 257 investigators throughout the country, over 300 early-career affiliates, and 31 clinical associates, linking researchers and clinicians from six Universities, three Crown Research Institutes, one private research institute and nine district health boards. These investigators represent most of New Zealand's expertise in discovering new drugs, vaccines and diagnostic tools that proceed to clinical trials. The Centre has also partnered with one Māori and three Pacific health organisations to improve the health outcomes of Māori and Pacific peoples.

As the national hub for molecular biodiscovery the Centre provides a point of contact for a broad range of national scientific expertise. It cultivates collaborations with international researchers and research institutions and also engages with industry and the medical profession. It is committed to building the economy, and building scale in the New Zealand biomedical sector.

For more information see www.mauricewilkinscentre.org

For more information on New Zealand Centres of Research Excellence see www.acore.ac.nz

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

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Director's Report

I have now been in the Director's role since the start of 2020 and much has happened during this time. I would like to take this opportunity to formally thank Professor Rod Dunbar for his leadership as Director of the MWC for the 10 years to the end of 2019. Under Rod's leadership we have seen extraordinary growth of the MWC to become a truly national multidisciplinary network of biomedical researchers. We have also witnessed the emergence of the next generation of leaders in biomedical research, mentored by our more senior MWC researchers. The highlight of the year for me personally was our symposium in late February where many of our early and mid-career researchers were able to showcase the success stories of the last two years and demonstrate the impact of our highly functional MWC mentoring network. A first for this symposium was the very moving mihi whakatau and waiata performed by our Māori and Pacific partners demonstrating the central role they will play as we continue to evolve as a Centre of Research Excellence.

This report brings the curtain down on MWC 3 and there have been many highlights in the last 12-18 months. Congratulations to Sir Bill Denny, a founding Principal investigator and celebrated scientist, who was Knighted in 2021 for his contribution to medical research (section 3.1). Many of our notable research highlights during this period and commentaries on our various outreach activities are captured in section 3.0. The inaugural Pacific People's Fono in the community - 'Måür lelei convened by Dr Ofa Dewes was an outstanding success and the ideal opportunity for our growing pool of talented Pacific early-career researchers to present their health research to the wider Pacific community (section 3.5).

The report contains a detailed summary on 2020-21 progress on our major research programmes in cancer, diabetes and metabolic disorders, infectious disease, and innovative and integrative technologies (section 4). Our established research programmes with various laboratories in China was strengthened in 2020 by the MWC being awarded MBIE Catalyst Strategic Funding of $9.5 million over five years. This award enabled the launch of the China-Maurice Wilkins Centre Collaborative Research Programme (C-MWC) under the Directorship of Rod Dunbar. C-MWC will further develop collaborative biomedical research projects with potential benefits to both countries and broaden the engagement between the biomedical research communities in both countries The programme is expected to not only have impact on health, but also provide strong economic benefits through generating intellectual property that enables commercialisation.

In 2020 we were successful in getting the MWC refunded for another 7.5 years. The start of the Covid-19 pandemic in early 2020 demonstrated the ongoing need for CoRE funding as our highly collaborative biomedical research network pivoted into the fight against the SARS-CoV-2 virus. Our MWC team got involved in all aspects of the New Zealand response from culturing the virus, vaccine and drug development, diagnostics and whole genome sequencing and nationwide serology testing (section 3.10). Many of our experts have provided media commentary on the

evolving pandemic (section 5.4.3). Several MWC teacher professional development workshops were repurposed over the last year to increase understanding around the COVID-19 pandemic, drawing on both MWC and national expertise to provide an in-depth training opportunity. These were very well received across the country with good attendance and interest.

2021 has been a difficult year in terms of having the necessary face-to-face meetings to get MWC 4 out of the starting blocks from July 1st. Good progress has been made on the establishment of the new research leadership forum (https://www.mauricewilkinscentre.org/about-us/our-people/research-leadership-forum/) that will guide much of our strategy and decision making in MWC 4. A large amount of planning has gone into establishing the guiding principles and models for theme (cancer, metabolic health and infectious disease) funding allocation and this process will be completed before the end of 2021 with the goal of contracts and statements of work being issued in early 2022. This has been a particularly challenging process with having to manage the 30% cut in our overall budget. The research leadership forum are still working on adjustments to the way we allocate flexible funding and we are planning for the first round of this funding in March 2022. Due to Covid-19, we will not be having an MWC symposium at the end of 2021. Like we did this year, we will look to hold it in February/March 2022 depending on where we are in terms of alert levels. This meeting will most likely be in Dunedin.

Thank you to Rochelle Ramsay and her hard working team who have assembled this report under the pretty tiring conditions of the 3-month Auckland lockdown. I want to acknowledge the support of my fellow deputy directors, Emily Parker, Margaret Brimble and Peter Shepherd in navigating and leading us successfully through the re-bid phase and the transition to MWC 4.

Gregory M. Cook | MSc(Hons), DPhil, FRSNZ

Sesquicentennial Distinguished Professor

Director of the Maurice Wilkins Centre for Molecular Biodiscovery

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

Mission and Strategic Outcomes

Mission

The Maurice Wilkins Centre will target major diseases affecting New Zealanders, particularly cancer, diabetes and infectious disease, by delivering world-class research that enables the discovery of new therapies, diagnostics and vaccines.

Strategic outcomes

MWC will fulfil its mission through the generation and translation of new scientific knowledge, training and outreach initiatives that will achieve:

1. Contributions to improved health and well-being of New Zealanders, and the global population, through clinically relevant world-class research
2. Contributions to the New Zealand economy through discovery of new therapies, diagnostics and vaccines and the development of new technology
3. Contributions to increased innovation across the New Zealand biomedical sector, by fostering inter-disciplinary and inter-institutional collaborations, and engagement with clinical researchers
4. A cohort of young scientists who are trained to contribute to scientific innovation and have skills valued by future employers
5. Enhanced scientific partnerships between New Zealand and other nations that leads to increased opportunities for New Zealand researchers
6. Contributions towards a greater understanding of biomedical science in the New Zealand community.

Professor Sir Bill Denny.

Highlights

A bountiful career of exceptional science

A cornerstone member of the Maurice Wilkins Centre was recognised this year with New Zealand's highest honour. Professor Bill Denny, a MWC founding Principal Investigator, was made a Knight Companion of the NZ Order of Merit in the 2021 Queen's Birthday honours list for his contribution to medical research. The knighthood is one glorious accolade atop an extensive list of awards and distinctions marking an exceptional career in medicinal chemistry which spans over four decades.

Among his many awards, Professor Denny has been named a Rutherford Medallist by the Royal Society of New Zealand, granted the Royal Australian Chemical Institute Adrien Albert Award, and received the first American Chemical Society Medicinal Chemistry Award outside of the United States of America in 30 years. He was later inducted into the American Chemical Society Medicinal Chemistry Hall of Fame.

Sir Bill is slow to take credit saying that world-changing success frequently occurs when many intelligent people put their minds to a common challenge. Still, the impact of his work is difficult to dismiss - his steady contribution to the NZ science community and the MWC is impressive.

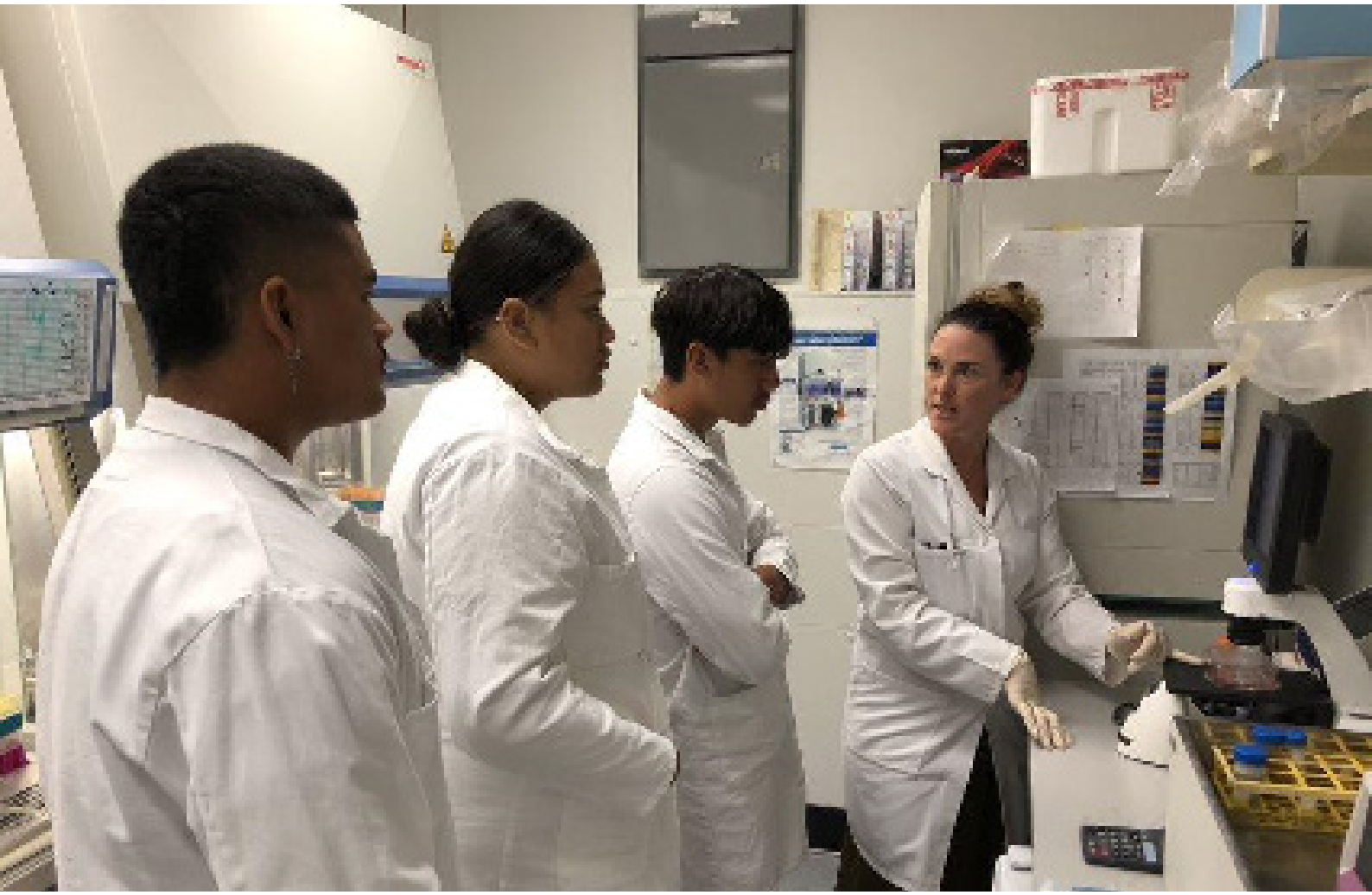
Sir Bill's engagement with MWC began in 2002 when he and others responded to the Government's appeal to form Centres of Research Excellence. He held the position of Principal Investigator from MWC's inception until June 2021. During this time, he managed MWC projects in both the cancer and infectious disease research themes, balanced directorships including the Auckland Cancer Society Research Centre, ESR and NZ Genomics, and served on the MWC Management Committee.

Collaboration is a common feature of MWC and Sir Bill's career. Both have helped foster a more open science system and develop a regional centre into a thriving national entity with strong domestic and international collaborations. Sir Bill recalls one early collaboration with Pfizer. This relationship secured a funding stream that bolstered the original MWC CoRE and widen its contingent of scientists over the years. More recently, Sir Bill's connections resulted in a serendipitous introduction to the Global Alliance for Tuberculosis and an entirely new focus on tuberculosis and leishmaniasis drug development.

"Relationships", Sir Bill says, "are critically important." He spearheaded many other longstanding international collaborations with Pharmol Pacific, Xenova, Cerus Corp, Supergen, Seattle Genetics and Genentech. Sir Bill forged such collaborations before an instantaneously connected world. They encompassed thousands of air miles, longhaul flights in economy class for 'one day meetings' with no guaranteed outcome. "The required effort essential for growth of New Zealand science."

His work has seen 17 new drugs brought to clinical trial providing more effective and less toxic treatments for hundreds of thousands of people. Even after setbacks, his intimate subject knowledge helped develop Canertinib, the world's first irreversible kinase inhibitor. This became the international design template for its class of tumour-seeking cancer drugs. Despite his humble presence, Sir Bill concedes, "I was quite pleased with the role we played". Sir Bill is also a co-founder of the NZ startup companies EPPTCO, Proacta Therapeutics, Pathway Therapeutics and Kea Therapeutics.

Sir Bill says MWC has been "a critical shaper of the way science is done in New Zealand". He pays homage to the directors for "making that happen". Now as Emeritus Principal Investigator, he reflects on a long, illustrious career. "Right from the beginning it's been fun and interesting. Looking back, I just wonder how I managed to do it all."



Te Ara Pūtaiao scholars visit a laboratory at The University of Auckland (L-R): MWC Associate Investigator Lennox Ashby, Mereana Thoma, Reihana Teriaki and Dr Kate Lee.

Photo courtesy of The Moko Foundation.

Collaboration a bridge to new knowledge

Four years ago, MWC and The Moko Foundation formed the Waharoa ki te Toi Health Research Centre in Kaitaia to drive outreach including to deliver the Fructose in Schools (FIS) and the genetic CREBRF studies locally. This was the genesis of a relationship which centred on the kaupapa of 'creation of knowledge'.

Conor Watene O'Sullivan, Health Research Coordinator for the Moko Foundation says the relationship has grown and evolved. "We have science going out to communities, and we have the knowledge that our communities hold being absorbed back into that science space. Our community knowledge complements and enriches the scientific research. Now, many people have had the benefit of a combination of touch points and experiences over time. It's this continuity that can lead to change and empowerment."

Over the last 18 months, with funding support from MWC, the Moko Foundation has been bridging the gap between western science and mātauranga Māori to create a mana enhancing model for cultural improvement.

"We are moving into this era of coming together; addressing the cultural gap between many different peoples and cultures - whether that is Māori and Pākehā, mātauranga Māori and western science, or rural communities connecting with urban centres. It is a huge job."

Cultural bridges are underpinned by the ideas of balance and reciprocal learning for both MWC and the Māori rural communities. One example is the guidance from Penetaui Klestovic as Pou Tikanga. Penetaui has helped Conor design surveys for researchers to understand their gaps in mātauranga Māori.

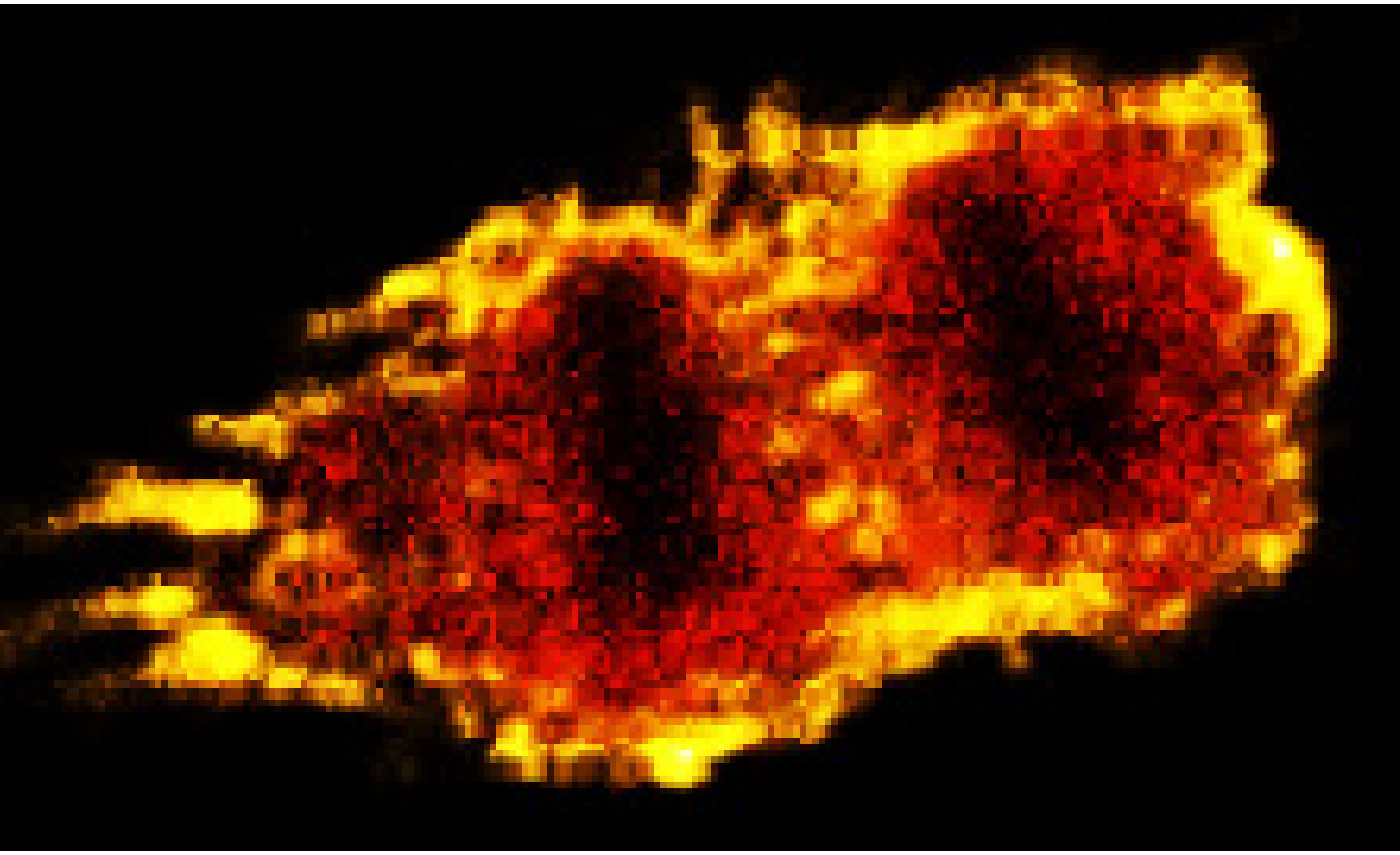
"From this, we have delivered tailored workshops to enhance the cultural knowledge base of MWC researchers who are specifically working in programmes across Māori, equity and genetic research. We have also provided alternative perspectives to the CREBRF research that reflect Māori-centric views on hauora and rangahau."

A recent tranche of MWC funding is also helping the Moko Foundation to increase Māori capacity and capability in science through workforce development. The joint effort is shaping a staged pathway for rangatahi into health and science careers. This begins with modifying science messaging to fit the local context, mentoring, providing financial scholarships for school leavers, and creating a pilot model for paid internships for medical health and science students to experience community-based research in a high-needs population.

This year, Karangatai Piripi has been supported through the Tā Hekenukumaingaiwi Puhipi internship, named in recognition of the centre's patron. This internship has enabled Karangatai to work with Conor in health research work across the FIS programme delivery.

Part of this pipeline is the Te Ara Pūtaiao scholarship - a week- long visit to University of Auckland laboratories for up to five Year 12 and 13 Far North students. The first recipients visited the Grafton Campus in March 2021, blessing the CREBRF samples and connecting with a Māori geneticist, and a medical student from Kaitaia. They also observed cell culture, DNA amplification techniques, and took part in strength testing, DEXA bone density and resting metabolic rate scanning.

Tracy Macfarlane, founder of The Moko Foundation, says looking ahead Waharoa ki te Toi may be a valuable platform for other communities. "Like Kaitaia, other communities have their own way of doing things. A great outcome for us would be to share with other providers around the motu to recreate what we have done in their own way."



A cancer cell undergoing cell division (anaphase shown). The lung cancer cell (A549) has the cytoskeletal protein "Actin" (yellow) stained with a dye and the Y-box binding protein "YB-1" (red) with an antibody. This picture demonstrates the role of YB-1 in a dividing cell. The image was acquired using a 60× oil-immersion objective.

Image courtesy of Dr Sunali Mehta.

Chasing a cancer suspect to cytokinesis

A potential new way to target aggressive cancers has been identified through a MWC project as part of the research programme investigating genomic approaches to cancer diagnosis and treatment.

Cancer is a major health burden across the globe. In New Zealand, the disease accounts for one in three deaths. One notable characteristic of cancer cells is their ability to continuously divide. This, at least partly, provides them with the potential to endlessly adapt and evolve. Work through MWC is bringing researchers one step closer to halting that endless division.

For 30 years, University of Otago cancer biologist and MWC Principal Investigator Prof Anthony Braithwaite has researched the regulation of cell proliferation, cell survival and the role of p53 protein, one of the most important proteins in cancer biology. In 2015, Prof Braithwaite was granted a prestigious James Cook Research Fellowship from the Royal Society of New Zealand to progress investigation into the lesser understood cold shock Y-box binding protein-1 (YB-1).

Supported by MWC funding, Affiliate Investigator Dr Sunali Mehta joined Prof Braithwaite's laboratory as a postdoctoral Research Fellow. Here, she gained a deeper understanding of the molecular mechanisms that drive tumour evolution. Sunali and her colleagues have been able to demonstrate the role of YB-1 in cancer progression. The protein is elevated in cancer and associated with very aggressive cancers. The team's findings show YB-1 is a critical regulator of cell division, and that the depletion of YB-1 prevents the formation of daughter cells and this, in turn, limits the growth of cancer cells.

Spurred by these findings and assisted by MWC support to access specialist international facilities, Sunali travelled to Australia, to conduct live cell imaging experiments and next generation sequencing analysis. These experiments, in Dr Anthony Cesare's laboratory at the Children's Medical Research Institute in Sydney, allowed her to pinpoint where in the cell cycle YB-1 plays a role. Her work precisely identified the protein's activity during cytokinesis – the last phase as the cell divides into two daughter cells.

Her next tranche of research is exploring YB-1's role in chromosomal instability.

"What we suspect is that YB-1 allows cancer cells to keep changing their DNA content with every cell division. If that is happening, then every time you treat a cancer which has high levels of YB-1, cancer cells can probably continue to evolve by changing chromosome content. The tumour will not respond to the current treatment. It will become resistant. By discovering if this is the mechanism, we could pursue new therapeutics to deal with that phenomenon."

On the basis of her successful track record with these MWC supported projects, Sunali attained her next career milestone, a promotion to MWC Associate Investigator.

Sunali says she has benefited greatly from the MWC support through her steady career progression, research engagement and discovery, and opportunities for service contribution through the MWC Early Career Researcher Committee. These have now led to major recognition as recipient of a $600,000 Sir Charles Hercus Fellowship in 2021.

Sunali is one of a number of MWC early-career investigators who secured fellowships and awards in 2020 and 2021. See the awards and honours section on page 90 for details of other recipients.

Image courtesy of Pixabay.com

Dual approach drives precision medicine

Two pioneering studies by MWC investigators are looking at the resilience and risk factors for type 2 diabetes in Māori and Pacific peoples, both ultimately aimed at understanding how genetic biomarkers can be used to provide a precision medicine approach specifically to improve health outcomes with and for Māori and Pacific peoples.

Research undertaken by University of Auckland PhD candidate and MWC Affiliate Investigator Hannah Burden, supervised by MWC associate investigator Dr Troy Merry, aims to reveal how a gene variant uniquely found in Māori and Pacific peoples actually protects against type 2 diabetes. Up to 30 percent of the Māori and Pacific population in New Zealand carry at least one copy of a CREBRF genetic variant. This is known to have a protective effect from developing type 2 diabetes, but it is not yet known how. Recent findings indicate that CREBRF regulates insulin release after a meal[1]. Hannah says, "This is the first evidence that the diabetes-protective allele is associated with enhanced early insulin release". Troy adds "This work may give greater insight for personalised treatments and prevention strategies tailored to Māori and Pacific people."

This dovetails into the 'Which One is Right' (WORTH) study led by Assoc Prof Rinki Murphy, a MWC Principal Investigator examining whether ethnicity or other biomarkers predict glucose-lowering responses to different type 2 diabetes medications, vildagliptin and pioglitazone. This study involves Māori and Pacific health providers Ngāti Porou Hauora, Te Hiku Hauora, Tongan Health Society, and a number of other community and primary health organisations such as Diabetes Foundation Aotearoa, Pinnacle and Procare. A key strength of the study was the rural and urban sites involving a range of clinicians: nurses, prescribing pharmacists, specialist diabetes nurse prescribers, general practitioners and endocrinologists.

The WORTH study showed no difference in response to glucose-lowering medications between Māori and Pacific compared with non-Māori and non-Pacific peoples. However, heavier people with a BMI above 30 or high blood lipids had a better glucose lowering response to pioglitazone. This has implications for prescribing. In practice, clinicians may not want to put heavier patients on a medication that potentially adds to their weight. However, these are exactly the people who will reap the greatest benefit in lowering their glucose and blood lipid levels from pioglitazone.

While the WORTH study shows ethnicity is not a good proxy for predicting glucose lowering responses, the research group is now examining whether diabetes medication responses in Māori and Pacific participants differ by CREBRF genotype. Rinki concludes, "These studies by MWC investigators are examples of many recent research initiatives which aim to increase health equity by ensuring Māori and Pacific people collaborate in and benefit from the global movement to develop 'precision medicine' approaches to prevent or treat type 2 diabetes".

MWC was critical to both these studies which are part of a wider programme, partly funded by the MWC and the HRC and involving collaboration with The Moko Foundation and Ngāti Porou Hauora (NPH) in association with Professor Tony Merriman, University of Otago and the Christchurch Heart Institute which ran multiplex assays to simultaneously measure many incretin hormones. As part of both these studies, a MWC grant supported the development of appropriate guardianship agreements for the use of participants' genetic material, its secure storage and traceability systems for the thousands of anonymized samples; building on NPH's pre-existing agreement with the University of Otago to ensure ongoing oversight and governance of such taonga.

1. Burden, H. J., et. al. (2021). Diabetologia 64:2779–89

2. Yeu, R.Q., et al. (2020). BMJ Open 10:e036518

MWC was proud to see our Pacific researchers from across the country at the Fono.

Top row (L-R) Taito Eddie Tuiavii (event co-host), Ms Lupe Isaia, Ms Sekotilani Aloi, Mr Dougie Atiola, Ms Tumanu Futi, Dr Tamasin Taylor, Mr Chris Puliuvea and Mr Sakiusa Baleivanualala.

Bottom row (L-R) Ms Zanetta Toomata, Ms Jaye Moors, Dr Ofa Dewes, Moananu Dr Karaponi Okesene-Gafa and Dr Natalie Netzler.

Pacific Fono in the community

The Maurice Wilkins Centre and National Science Challenges for a Better Start, Healthier Lives and Ageing Well came together in support of the inaugural Pacific People's Fono – 'Måür lelei: Health and Wellbeing Together' convened by MWC Associate Investigator Dr Ofa Dewes.

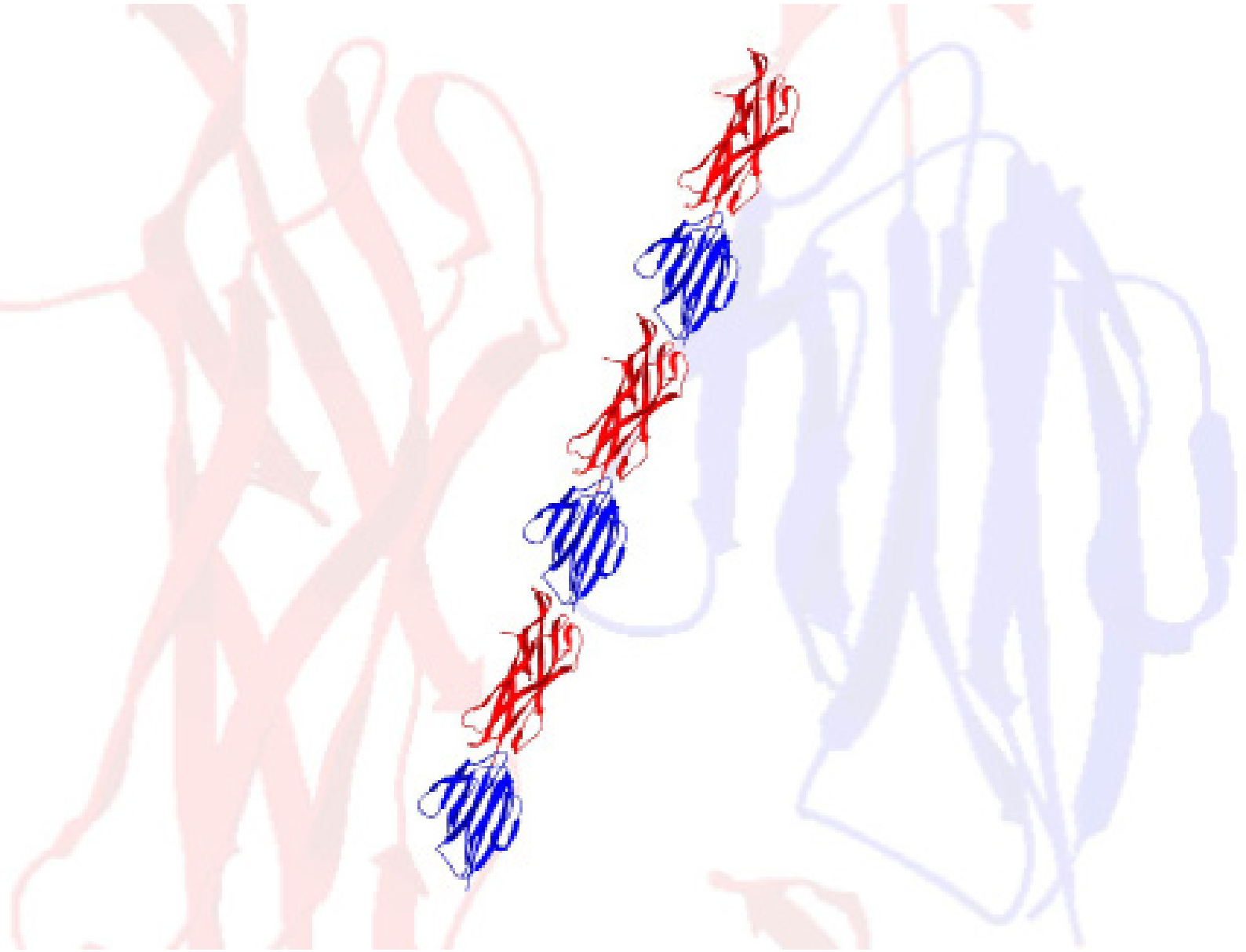
A diverse crowd was welcomed at the Fono, held at the beautiful Fale o Samoa in Mangere on the 25th of June 2021, including healthcare professionals, academics and postgraduate students, high school teachers, church and community leaders, and members of the public with an interest in Pacific health.

For our talented Pacific early-career researchers, the Fono provided a unique opportunity for them to present their health research to the wider Pacific community. The entertaining and thought-provoking presentations covered a wide range of topics including vaccines, cardiometabolic disease, bariatric surgery, antimicrobial resistance, traditional Pacific medicinal plants, aiga carers and the impact of chronic health conditions on the aiga and whānau. Attendees were encouraged to interact with presenters by asking questions in talanoa panels held at the end of every presentation. A common theme in the presentations was how current research could be used to address health challenges and inequities faced by Pacific Peoples, which was why it was valuable for the Fono to bring together members from the community and organisations experienced in these issues to share ideas.

The presentation topics sparked important discussions and engagement, and for many attendees, it was their first time learning about the research being conducted at our universities to improve health and wellbeing within Pacific communities. "My parents came to see me at the Inaugural Pacific People's Fono today. I presented on the genetics of cardiometabolic disease, and it was the first time they've ever seen me in my academic element" says University of Otago PhD student Jaye Moors. The Fono was a success, paving the way for future engagement. "We look forward to putting our research to work, in service, and in the pursuit of better health and wellbeing outcomes for Pacific Peoples" says Ofa.

The Honourable Minister Aupito William Sio, Minister for Pacific Peoples, Associate Minister of Education (Pacific Peoples) and Associate Minister of Health (Pacific Peoples), recorded a special video message for the Fono from Wellington, as he was unfortunately unable to attend due to the COVID-19 alert levels in Wellington on the day. MWC would like to thank everyone who contributed to making the Fono a success, firstly to lau Afioga Aupito, Honourable Minister, and to all our attendees and presenters, and everyone who contributed behind the scenes to help the day run smoothly.

For more details of the Fono see page 36.



TeeVax structure.

Image courtesy of Dr Jacelyn Loh

Pilin protein may combat the hairy problem of human pathogens

MWC investigations into the puzzle of a nanoscopic skyscraper – 'the pilus' have sparked separate lines of research into novel vaccine delivery platforms which can target different human pathogens. Two advanced, MWC supported research projects, TeeVax and PilVax, are looking at Group A Streptococcus and Mycobacterium tuberculosis (TB) respectively.

In 2007, MWC research groups looked at the pilus of Group A Streptococcus (GAS) – a hair-like protrusion from the bacterium's surface. These molecule-wide structures include a fibre-building pilin protein, also known as the T-antigen, which has long been used as a serological marker.

MWC Associate Investigators Senior Research Fellow Dr Jacelyn Loh and Prof Thomas Proft from the University of Auckland, and Assoc Prof Jo Kirman from the University of Otago, are exploiting the nature of this pilin protein. Jacelyn has been pursuing 'TeeVax' - a multivalent vaccine for GAS. "We have successfully fused together T-antigens from different strains of the GAS bacteria using traditional cloning techniques to develop a recombinant protein vaccine."

The researchers' findings published in Scientific Reports this year show the vaccine's ability to prompt a robust antibody response in rabbits which is cross-reactive to all the 21 GAS T-antigens[1]. "This signals the potential of broad spectrum protection from all the GAS strains." A subsequent non-human primate trial is now completed. Next, the researchers will explore the addition of new classes of adjuvants into the TeeVax formulation for an improved immune response.

Thomas says the fight against pathogens like GAS, TB, influenza and gonnococcus is far from straightforward. "The pilus structure provides a new mechanism to explore." "With TB, vaccine development is nothing new. Attempts so far have not been particularly successful. The same for Gonococcus. People can get infected several times and never develop any immunity. We thought a completely different technology might be the gamechanger. Again, it all starts with the pilus."

Working alongside Assoc Prof Jo Kirman, Thomas incorporated a TB Ag85B peptide into the fibres of the pilus of the non-pathogenic bacterium Lactococcus lactis[2]. "A nice harmless bacterium used for making cheese and yoghurt". "This is 'PilVax'. Not a protein, but a bacterium. No one has done this before. A novel platform working on mucosal surfaces, pioneering work."

Thomas says the platform has a number of advantages. Firstly, peptide ampliflication. The more peptides expressed along that long fibre, the better the immune response, and the peptides become part of a very stable structure. Results from Thomas' mouse work shows that PilVax produces antibodies, including mucosal IgA. "It's a good sign."

Moreover, the research presented a surprising result, peptide-specific CD4+ T cells at levels similar to mice immunized with BCG - the most commonly-used TB vaccine effective in children. "It is promising but more work needs to be done to show it really works in an animal model."

MWC researchers are now ready to explore PilVax constructs for TB, Gonococcus and influenza using the PilVax technology. Universities in the USA, South Africa, China and Japan with expertise in animal models are on board to progress protection studies once funding for the projects has been secured. Although Thomas says clinical trials are some way off, he imagines that, perhaps PilVax as a mucosal vaccine platform using a yoghurt bacteria might make "an ice-cream vaccine delivery a nice idea!"

1. Loh, J. M. S., et al. (2021) Sci Rep 11, 4353

2. Blanchett, S., et. al. (2021) Immunol. Cell Biol., 99: 767-781

Speakers and attendees at the MWC Teacher Professional Development day, Wakatipu High School.

On the front row: MWC Investigators Prof Vernon Ward and Dr Anna Brooks (2nd and 3rd from left) and Dr Jemma Geoghegan (4th from right).

Te Pūnaha Matatini Director Prof Shaun Hendy (3rd from right) and Dr Amanda Kvalsvig from the University of Otago, Wellington, (5th from right).

MWC teacher workshops focus on COVID-19

The MWC teacher professional development scheme aims to support biology teachers and help them to deliver current, high quality content for high school biology pupils. In 2020/21 the Centre adapted the programme to increase understanding around the COVID-19 pandemic, drawing on both MWC and national expertise to provide an in-depth training opportunity.

Building on the Centre's highly successful biology teacher outreach, MWC took the opportunity to focus biology teacher workshops in 2020/21 on the COVID-19 pandemic. The Centre brought some of Aotearoa New Zealand's foremost experts in virology, public health, mathematical modeling, genetics and immunology to seven locations across the North and South Islands. MWC Investigators gave talks alongside other prominent researchers from leading NZ universities and another Centre of Research Excellence - Te Pūnaha Matatini (TPM) - to deliver a comprehensive training programme.

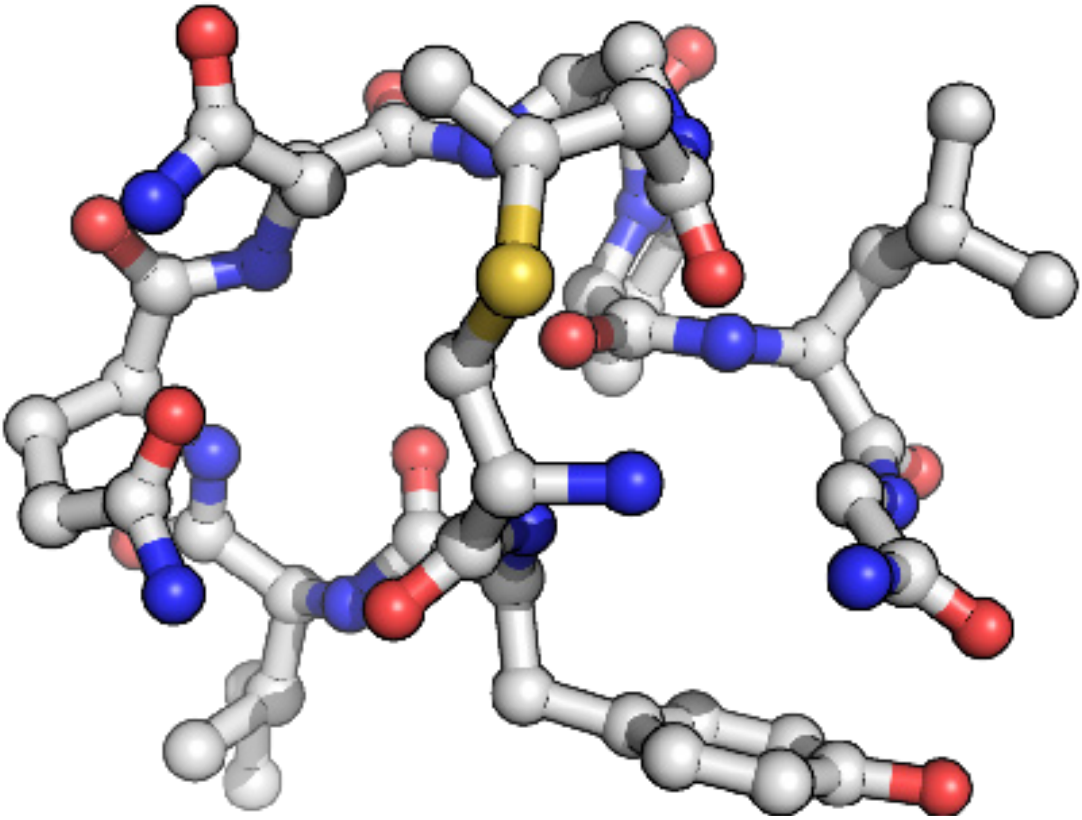
The first round of training days (held November 2020) proved popular with the teaching community, facilitating 350 attendees across all sessions. Teachers engaged in topics such as virus evolution and emergence, medical microbiology, and vaccine development and diagnostics. Top science communicators were on hand to explain the origins of the pandemic and the government's response in the form of MWC Investigators Professor Michael Baker and Associate Professor Siouxsie Wiles, and TPM's Professor Shaun Hendy. These researchers were recognized for their work around the pandemic in the 2020 Prime Minister's Prizes[1], including Puiaki Pūtaiao Matua a Te Primira Science Prize (Science Prize) and Te Puiaki Whakapā Pūtaiao (Science Communication Prize).

As the effects of the pandemic continued into 2021, teachers were left hungry for more information on COVID-19. Several workshop attendees returned to take part in the next professional development day in Queenstown in June 2021, with some individuals travelling from as far as Dargaville to attend. The session provided training for another 25 teachers and the programme built on earlier talks, deepening the teacher's COVID-19 knowledge by expanding on topics such as genomic tracing and presenting the new data on post COVID-19 condition, "Long-COVID".

Those attending were delighted with the depth and quality of the content citing the programme as an environment where they felt "stimulated and challenged by the material"and importantly, are "treated like scientists". The knowledge gained was put to immediate use in schools with teachers reportedly using COVID-19 as "an example of relevant evolution in action" in year 13 lessons and a case study for year 11 students on the topic of Microbes.

The scheme's success can be attributed to the fantastic people working behind the scenes including MWC Principal Investigator Prof Dave Grattan and Teacher Liaison Ms Rachel Heeney (Epsom Girls Grammar School) who manage the programme content and coordinate with schools across the country to find suitable spaces to meet with the teaching community. Through generous donations of time from MWC investigators and associated speakers, and space from local schools, the programme remains free to attend. Rachel explains the inherent value of the MWC training opportunities - "If you teach a teacher, we will share the knowledge and stories for years and years to come". MWC is proud to offer NZ teachers these unique opportunities to upskill and enhance the teaching offering in schools.

1. royalsociety.org.nz (April 2020) "Prime Minister's Science Prizes awarded"



A 3D representation of a vinyl sulfide cyclised analogue of oxytocin which was prepared as a proof-of-concept in the work. The newly formed carbon-sulphur bond is seen here in yellow joining together the two ends of the molecule to complete the ring.

Image courtesy of Dr Alan Cameron

Exciting building blocks unlock peptide potential

Coined 'bacterial super villains', the World Health Organisation has a list of 'priority pathogens' which have developed resistance to most drugs. With the rise of these super bugs, a huge spectre looms for human health, and WHO is calling for urgent novel drug development to combat the threat.

MWC investigators at the University of Auckland's School of Chemical Sciences, on the cutting edge of peptide chemistry, have developed a fascinating new technology, paving the way for rapid and low-cost access to new therapeutic molecules in drug discovery and development.

Dr Alan Cameron, an MWC Associate Investigator and Postdoctoral Research Fellow says peptide therapeutics is one of the fastest growing areas of modern medicine. He explains, "Peptides are strings of amino acids. Their ability to modify, join and have parts react independently of each other, make them exciting building blocks in medicinal chemistry. However, without modification, peptide-based drugs cannot easily penetrate cells and may degrade in minutes."

The MWC group has focussed on introducing a chemical modification which constrains the peptide into a rigid shape. In this work, Alan rigidified peptides by introducing a new complementary building block, an allenamide. The allenamide links two side chains. This one-component peptide stapling overcomes the existing drawbacks of peptide-based drugs and increases both potency and half-life. It does not require reagents, catalysts or other linkers.

"Essentially it provides a platform to design and synthesize antimicrobial molecules with a mix-and-match, click-in-place chemistry."

The work forms part of a highly collaborative MWC research programme to address Antimicrobial Resistance, predominantly geared towards developing novel antimicrobial peptides, and has already seeded numerous research projects for MWC affiliated PhD candidates.

Deservedly, the work has gained high praise by international peers. The group's paper co-authored by Dr Alan Cameron, Associate Professor Paul Harris and MWC Deputy Director Distinguished Professor Dame Margaret Brimble, was recently published in the field-leading journal Angewandte Chemie International Edition, a journal of the German Chemical Society[1]. The paper was honoured with VIP and HOT status, afforded only to the top 10% tier of articles.

Alan says this technology could easily be used for non-infectious as well as infectious diseases with many high impact evaluations of the novel technology already underway thanks to close collaborations across the MWC network.

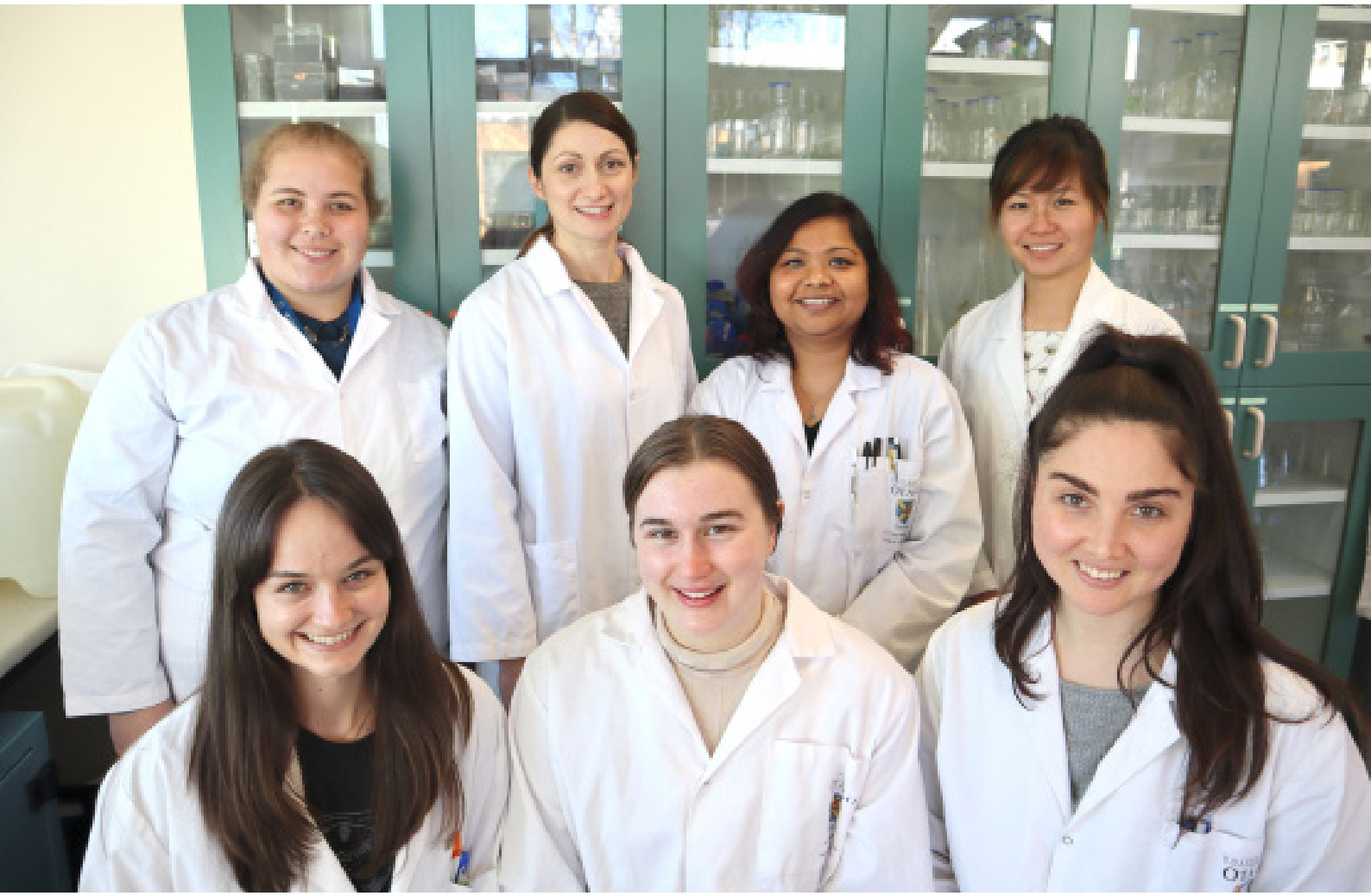
"Right now, the team is exploring how the allenamide staple can be used to prepare new peptide-based drugs to target multi-drug resistant bacteria which appear on WHO's priority-1 list."

"We are also investigating this platform to develop cyclised antimicrobial peptides with broad spectrum activities to specifically target Group A Streptococcus infections, a significant health issue in New Zealand, responsible for acute rheumatic fever and rheumatic heart disease."

The team is also working closely with Professor Alan Davidson and Dr Veronika Sander to evaluate the safety profile of allenamide-modified antimicrobial peptides in a kidney organoid model.

Dame Margaret Brimble, MWC Deputy Director, says this work demonstrates the collaborative power of MWC investigators who are doing exceptional world-leading science which may lead to important therapeutics to combat dangerous and virulent disease both now and in the future.

1. Cameron, A. J., et.al. (2020). Angewandte Chemie - Int. Ed., 59(41)



The team behind Amaroq Therapeutics- back row, (L-R): Ginny Niemi, MWC Associate Investigators Dr Sarah Diermeier and Dr Debina Sarkar, and Jolyn Chia. Front row, (L-R): Megan O'Malley, Kaitlyn Tippett, Kathleen Lucere.

Image courtesy of Dr Sarah Diermeier

New Otago biotech startup targets cancer

Amaroq Therapeutics, a new biotech startup company with the goal of developing targeted drugs for cancer, has been awarded significant investment funds in 2021.

Dr Sarah Diermeier, a Lecturer at the University of Otago and an MWC associate investigator, founded Amaroq Therapeutics in 2021 and is currently the Chief Scientific Officer. With the assistance of Otago Innovation, Amaroq Therapeutics has been awarded $14 million in investment funding – the largest investment ever secured by Otago Innovation. This investment was backed by Brandon Capital and supported by NZ Innovation Booster and Cure Kids Ventures.

The early research from Dr Diermeier's lab that contributed to this recent award discovered that long non-coding RNAs (lncRNAs) are likely a promising target for therapeutic intervention in cancers, an area that has never been previously explored in the clinic. LncRNAs are often referred to as "dark matter" of the genome and, unlike messenger RNAs, do not code for proteins. Instead, lncRNAs have recently been discovered to carry out important regulatory functions in cells, and thus have generated significant research interest in the international scientific community.

"Through exploring patient data, our research has shown that specific lncRNA molecules are highly expressed in cancer cells but not normal healthy cells. Removing these lncRNA molecules from cancer cells can slow down the process of the cells dividing. This gives us real hope that lncRNA molecules could hold the key for treating many forms of common cancer," explains Dr Diermeier.

Financial support from the MWC was instrumental in the progression from idea to startup. "MWC allowed us to get very early-stage funding when we had little more than an exciting new idea," explains Dr Diermeier. "MWC seed funding enabled the rapid development of a new technology and led to new IP, which turned out to be important assets when we raised our Venture Capital round to launch Amaroq".

With their recent investment, Amaroq Therapeutics aims to develop their first lead drug that will precisely target cancerous cells expressing lncRNAs identified by Dr Diermeier's lab, to phase I clinical trials within the next two years. Currently, the initial mission of Amaroq Therapeutics is to develop drugs that target triple-negative breast cancer, colorectal and liver cancers, which have limited targeted treatment options presently and represent a high unmet clinical need in New Zealand. Additionally, Amaroq aims to devote a significant portion of their efforts to overcoming the issue of chemoresistance, by identifying targets that may be able to re-sensitize cancer cells, performing synthetic lethality screens, and testing synergistic effects of lncRNA-targeting drugs with the current standard of care.

Moving forward, the team envisions that the therapeutic platforms being developed will eventually be able to be repurposed to target many other types of cancers. "We hope that our new treatments will significantly improve survival rates for cancer patients and are able to address issues such as resistance to chemotherapeutics.... That is my life goal – to have a drug in the clinic that has a positive impact on patient survival and wellbeing," says Dr Diermeier.

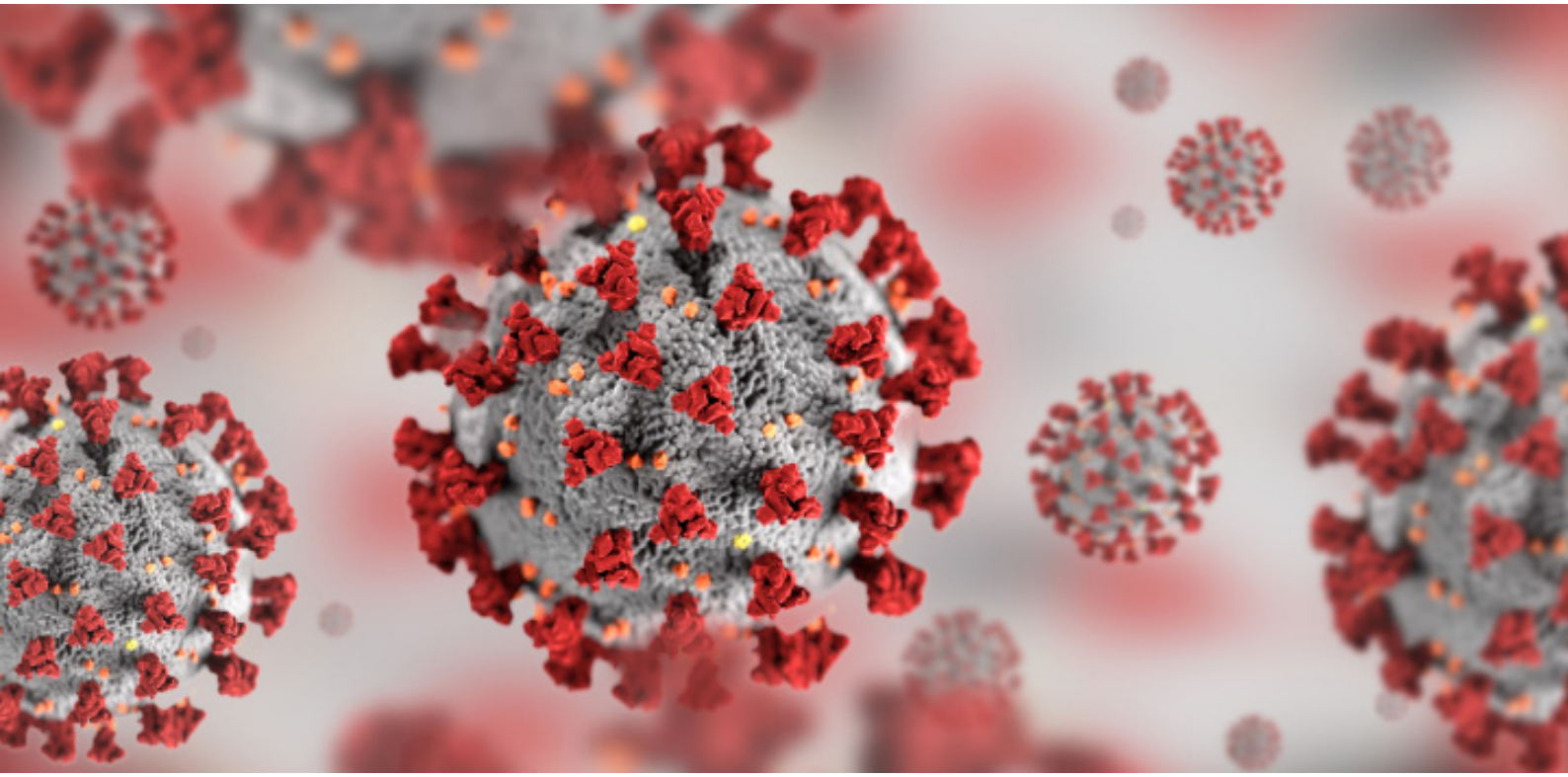


Photo 209125998 © Lukas Gojda courtesy of Dreamstime.com

MWC network plays key role in national response to COVID-19 pandemic

Investigators from across the Centre have been instrumental in developing the tools necessary to track and trace the virus, informing public health policy and measuring the ongoing effects of SARS-2-COV in Aotearoa New Zealand.

MWC investigators worked to develop and support the core science behind techniques to test and track the spread of COVID-19 in Aotearoa. Across the country our investigators have adapted their research streams and take on additional roles to combat the pandemic. Investigators of all levels have and continue to support this vital work, with PhD candidate Sandra Fitzgerald even pausing her studies to run diagnostic RT-PCR tests during the height of the pandemic.

Rapid viral genome sequencing of SARS-CoV-2 is another key element of the national response[1] supported by the MWC network. The technology has been used throughout the pandemic, together with epidemiological and modeling data, and geographic information to track the spread of the virus in Aotearoa. MWC Associate Investigator (AI) Dr Jemma Geoghegan has had a leading role in this work. Alongside genomic tracing, MWC AI Dr Joanne Hewitt worked together with colleagues at ESR to implement the use of wastewater-based epidemiology (WBE)[2] to identify and observe COVID-19 in the community. The technique has proved to be an effective way of detecting cases and have informed the Government's localised pandemic response.

The vast range of MWC expertise was also put to use with investigators at the University of Otago developing the means to diagnose, isolate, and grow SARS-CoV-2 in the lab early on in the pandemic. At the University of Auckland, researchers using multiplex bead-based immunoassays were able to adapt the technique to carry out serological assays[3,4] to detect COVID-19 antibodies in patient sera. This expertise was developed in the Centre by Alana Whitcombe (PhD candidate) and Associate Professor Nikki Moreland who were funded by MWC in 2019 to visit Telethon Kids Institute at the Perth Children's Hospital (Australia).

MWC acknowledges the immense value of our investigator network, and the ability of the NZ STEM community, to adapt quickly and work collaboratively as a key success factor in the fight against COVID-19[5]. Far from slowing down, the MWC community has continued to contribute to COVID-19 research in various fields. Ongoing studies to detect antibody persistence from COVID-19 infection were presented at the MWC Symposium in February 2021[4], and a nationwide serosurvey of 10,000 blood donors was completed to estimate the prevalence of antibodies[6]. MWC virologist Professor Miguel Quinones-Mateu has also partnered up with chemists at the Ferrier Institute (VUW) to screen known anti-viral compounds against COVID-19.

Further to this, Immunologist Dr Anna Brooks (MWC AI) is working with the community, having identified the need to carry out studies into the effects of "Long-COVID" in Aotearoa. Anna continues to act as a voice[7] for Long-COVID sufferers and has used MWC seed funding to start preliminary investigations, and to secure funding for future research. MWC commends and celebrates the hard work and initiative shown by all of our investigators, and Aotearoa New Zealand's scientific community, who continue to contribute to this very important response.

1. Geoghegan.J et al (2020) Nat Comm 11: 6351

2. Hewitt.J et al (2021) Preprint medrxiv, 21258577v1

3. McGregor.R et al (2020) PeerJ 8: e9863

4. Whitcombe, A. L. et al. (2021) Clin. Transl. Immunol. 10: e1261

5. Le Gros.G et al (2021) Nat Immunol 22:262–263

6. Carlton LH et al (2021), Epidemiol. Infect. 149: E173

7. sciencemediacentre.co.nz (April 2021), "Long COVID in New Zealand – Expert Q&A"

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY




Outreach

International engagement

The Maurice Wilkins Centre (MWC) is actively building international links for New Zealand biomedical science. As a national Centre of Research Excellence it is in a unique position to represent New Zealand on the global stage, providing a crucial connection between local and international researchers. In addition to investigators' links with scientists, laboratories and companies overseas (see pages 81 and 87) the Centre is building strategic relationships with institutions and government agencies at city, provincial and national level, in particular in the Asia-Pacific region. In 2020-21, the MWC continued focusing on deepening these relationships in China.

Award of MBIE Catalyst Strategic Funding

In 2020, the MWC was awarded MBIE Catalyst Strategic Funding of $9.5 million over five years to deepen New Zealand's scientific collaboration with China. This award enabled the launch of the China-Maurice Wilkins Centre Collaborative Research Programme (C-MWC) that will develop collaborative biomedical research projects with potential benefits to both countries and broaden the engagement between the biomedical research communities in both countries.

The C-MWC expects to allocate research funding to at least 12 projects over the life of the programme. It will allow the MWC and research partners in China to generate breakthrough scientific knowledge that can be translated into new treatments and diagnostic tests, especially in the areas where both countries have research strengths, such as cancer, metabolic, infectious, neurologic, and degenerative disease. The programme is expected to not only have impact on health but also provide strong economic benefits through generating intellectual property that enables commercialisation.

The programme will deepen the relationship between New Zealand and China in a crucial high technology field, thereby increasing New Zealand's international reputation for world-class research. New Zealand scientists will benefit, especially at an early career stage, through access to expertise, technology, and equipment or facilities not available within New Zealand, and through lifting their vision of what they can achieve through active engagement of leading scientists and institutions outside New Zealand.

C-MWC 2021 Project Funding

In the first half of 2021, the C-MWC successfully concluded its first round of project funding. This first round invited applications from biomedical investigators based in New Zealand who have existing research collaborations with China and are seeking to extend these partnerships towards tangible benefits in human health.

The funding round received a total of 20 eligible applications from a wide range of New Zealand institutions, requesting a total of $11.9 million of funding. The programme's Project Assessment Committee awarded a total of $3 million to the 6 proposals detailed below. This funding will support the New Zealand component of the research collaboration for up to 2 years.

The Committee was comprised of experts from across the country including leading biomedical scientists and experts on research commercialisation and Chinese institutions. An MBIE representative attended the Committee meeting as an observer, and the whole assessment process was reviewed and ratified by the MWC Board.

Recipients of the funding

Dr Mihnea Bostina, University of Otago
Dr Laura Burga, Dr Jemma Geoghegan, Profs Vernon Ward and Alex McLellan (University of Otago)
Prof Yiping Li, Institute of Human Virology and Zhongshan School of Medicine, Sun Yat-sen University
Structure-based engineering of broadly neutralizing antibodies against coronaviruses
$290,613

Prof Alan Davidson, University of Auckland
Dr Veronika Sander (University of Auckland), Dr Cherie Stayner (University of Otago), and Prof Motonari Uesugi (University of Kyoto)
Prof Xiao Chris Zhang, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences
Chemical screening in polycystic kidney organoids grown in microfluidic chips
$598,576

Drs Kiel Hards and Matthew McNeil, University of Otago
Prof Greg Cook and Dr Liam Harold (University of Otago)
Prof Zhengqiu Li, School of Pharmacy, Jinan University
Prof Tianyu Zhang, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences
Exploiting synergistic interactions in energy metabolism to combat drug resistant pathogens
$527,253

Assoc Prof Kerry Loomes, University of Auckland
Dr Aqfan Jamaluddin (University of Auckland)
Prof Donghai Wu, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences
Prof Ke Ding, School of Pharmacy, Jinan University
Prof Yong Xu and Dr Tao Nie, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences
Targeting energy expenditure as a treatment for metabolic disease
$290,613

Drs Rachel Perret and Rob Weinkove, Malaghan Institute of Medical Research
Prof Ian Hermans, Drs Brigitta Mester, Patricia Rubio-Reyes and Nathaniel Dasyam (Malaghan Institute of Medical Research)
Prof Peng Li and Dr Le Qin, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences
New methods to improve CAR T cell therapy for cancer
$492,946

Assoc Profs Jeff Smaill and Adam Patterson, University of Auckland
Dr Amir Ashoorzadeh, Mr Xiaojing Sean Lin, and Ms Raquel Ortega (University of Auckland)
Profs Xiaoyun Lu and Ke Ding, School of Pharmacy, Jinan University
Discovery of FGFR4-selective inhibitors for the treatment of liver cancer
$800,000

Industry engagement

Maurice Wilkins Centre investigators support innovation in the biotechnology and drug development sector by providing companies with the expertise and facilities that their research and development programmes require. MWC investigators also provide consultancy to industry as described on page 87.

In 2020 and 2021, MWC investigators provided expertise and/or facilities to:

- **Allergan Pharmaceuticals**
  Allergan, headquartered in Ireland, is a global pharmaceutical company with a focus on developing new medicines in critical therapeutic areas. Associate Investigator Associate Professor Kerry Loomes from the University of Auckland is working with Allergan to develop new therapeutic strategies to combat metabolic disease.

- **Amaroq Therapeutics**
  Founded and led by Associate Investigator Dr Sarah Diermeier in 2020, Amaroq is a biotechnology startup company based at the University of Otago with a focus on developing more precise cancer therapeutic drugs that target long non-coding RNAs specifically expressed in cancer cells. See the highlight story on the set up of this company on page 25.

- **Auckland Clinical Studies Ltd.**
  This company provides Phase I and II clinical research to local and international pharmaceutical and biotechnology companies. In 2020 and 2021, Maurice Wilkins Centre principal investigator Professor Rod Dunbar continued to collaborate with Auckland Clinical Studies, providing analytical services such as immune monitoring to support ongoing clinical trials sponsored by international pharmaceutical and biotechnology companies.

- **Avalia Immunotherapies Ltd.**
  Avalia Immunotherapies is developing immunotherapies that support the treatment of cancers and infectious diseases including chronic hepatitis B (cHB). The companies approach includes the use of licenced intellectual property discovered in MWC investigators laboratories (i.e. Professor Gavin Painter from the Ferrier Research Institute and Professor Ian Hermans from the Malaghan Institute of Medical Research). Both investigators are working with Avalia Immunotherapies to further advance the technology and progress it to clinical trials.

- **Comvita**
  Comvita New Zealand is an international natural health products company with offices across Asia, the USA and the UK. Comvita are working with MWC investigators Professor Dame Margaret Brimble and Associate Professor Kerry Loomes to identify the active components and biomarkers present in Manuka honey.

- **Rain Therapeutics**
  Rain Therapeutics is a company based out of the United States which aims to develop targeted cancer therapies. It has been conducting a Phase II clinical trial of the hypoxia-activated pro-drug, Tarloxotinib, which was invented by Associate Professors Adam Patterson and Jeff Smaill. These MWC investigators have served as consultants and members of the Scientific Advisory Board of Rain Therapeutics in support of this research.

- **SapVax LLC.**
  Sapvax LLC was founded in 2016 and is developing a pipeline of products for the treatment of different cancers, with an initial focus on tumours expressing NY-ESO-1. Professors Dame Margaret Brimble and Rod Dunbar are the academic founders of this company, which is headquartered in the USA, and in 2019 they continued to consult and carry out contract research for the company.

In addition to these examples above, Maurice Wilkins Centre investigators have established a variety of other relationships with companies and non-profit organisations that drive the translation of their research and expertise into new approaches to fight human disease.

Science education

Supporting high-quality science education in New Zealand schools not only encourages the next generation of scientists but also helps others to understand and value science. In 2020-21, MWC Investigators were involved in a number of science education activities across the country. These include, but are not limited to, the following initiatives that were supported by the Maurice Wilkins Centre:

Partnership with The Moko Foundation

In 2020 and 2021 the MWC partnered with The Moko Foundation to support the continuation of a community internship position and two pilot initiatives that aimed to encourage students from Northland to consider a career related to health or science.

These initiatives are outlined below and in the highlight story on page 11.

- **Tā Hekenukumaingaiwi Puhipi internship**

  Ms Karangati Piripi was the sixth community intern to take part in the successful Tā Hekenukumaingaiwi Puhipi internship scheme at Waharoa Ki Te Toi, a Kaitaia based research centre run by The Moko Foundation.

  Karangati was the first intern to take on the opportunity directly after leaving school, with previous interns all being tertiary undergraduate students. Highlights for Karangati during the internship include her translation of the "whanau take home sheet" for the Fructose in Schools Study into Te Reo and her effectiveness in engaging with community groups by applying her knowledge of Te Reo and Tikanga Māori in a community health research context.

  Karangati said that her experiences during the internship helped her to integrate a health research lens into her thinking going forward. She aims to become a Māori Mental Health councillor and is currently working at Waikato Hauora.

- **Te Ara Pūtaiao Scholarships for Secondary School students**

  In 2021 The Moko Foundation partnered with the MWC in a pilot scheme to support high school students who have shown an interest in pursuing a career in health and science to undertake a week-long trip to experience the university research environment. The aim of the scheme is to encourage students from rural backgrounds, and who have had limited exposure to science professions, to consider a career in science.
  Year 12 and 13 students with an interest in science were identified for the Te Ara Pūtaiao scholarships through the “Fructose in Schools” workshops run throughout 2020/21 in the far north. Three students were selected for the inaugural trip to Auckland in March 2021; Reihana Teriaki (Te Kura Kaupapa Maori o Te Rangianiwaniwa), Mereana Thomas (Te Kura Kaupapa Maori o Te Rangianiwaniwa) and Lennox Ashby (Taipa Area School).

  During the trip the students observed and took part in a range of laboratory activities at the University of Auckland set up by Dr Kate Lee and Professor Peter Shepherd. They met with many researchers including Māori scientists Dr Natalie Netzler and Ms Anezka Hoskin and Ms Te Oranoa – a 3rd year medical student from Kaitaia. The students were also introduced to the support networks available for Māori and Pacific students in Auckland.

  This scheme has already shown success with Lennox planning to attend the University of Auckland in 2022 to study a Certificate of Health Sciences and Year 12 student Reihana also looking to follow a similar path in 2023.

- **End of year scholarships for students studying science at tertiary level**

In another important initiative to encourage more Māori students to pursue careers in health and science, The Moko Foundation offers Māori students from the far north scholarships of $500 to assist them with the transition to study science at the tertiary level.

Three scholarships were awarded in 2020 for students beginning their studies in 2021. The recipients were:

- Kona Hippolite - studying Physiotherapy at Auckland University of Technology.
- Nia Kara - studying for a Certificate of Health Sciences at Auckland University of Technology.
- Reiata Phillips Heihei - studying for a Certificate of Health Sciences at the University of Otago.

'Sugar in Schools' study

Since its inception in 2017, the MWC "Sugar in Schools" (Also known as 'Fructose in Schools') study has involved over 2900 students in schools across Aotearoa New Zealand. The study was led by Professor Peter Shepherd (MWC Deputy Director) in coordination with high school biology teachers Ms Helen Webber (2017-2018) and Ms Crystal Gerring (2019) who ran studies in numerous schools across the country.

In addition to the MWC studies, Dr Ofa Dewes (MWC Associate Investigator) and colleagues at The Moko Foundation led by Mr Conor Watene O'Sullivan, conducted further studies using external funding in 2019. This increased participation of schools throughout Auckland and in rural communities, including Kura Kaupapa Māori, in Northland.

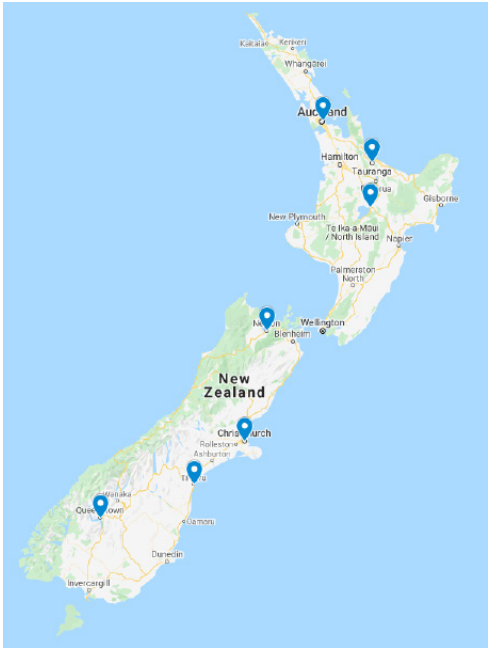
In 2020 and 2021, both Dr Dewes (funded by HRC) and The Moko Foundation (funded by MWC) have continued with the research. Despite the challenges cause by COVID-19 restrictions and home based schooling, these studies combined have collected data for another 544 students across Auckland, Wellington and the Far North.

Maurice Wilkins Centre biology teacher professional development days

Since 2012, the Centre has supported a very popular programme of free teacher professional development days, running 50 workshops at 22 different venues from Kaitaia to Invercargill.

In November 2020 and June 2021, the Maurice Wilkins Centre hosted seven workshops across the North and South Islands-

- Timaru, 9th November 2020
- Christchurch, 10th November 2020
- Nelson, 11th November 2020
- Taupo, 16th November 2020
- Tauranga, 17th November 2020
- Auckland, 18th November 2020
- Queenstown, 21st June 2021



MWC Principal Investigator Professor Dave Grattan and MWC Teacher Liaison Ms Rachel Heeney (Head of Biology at Epsom Girls Grammar School) who lead the programme identified a need to upskill the teaching community on the science of the SARS-2-COV virus and focussed the workshop content on the COVID-19 pandemic.

Aligning where possible to NCEA Level 1, 2 and 3 Biology achievement standards, topics included antiviral drug development, epidemiology and modelling, medical microbiology, vaccine development and diagnostics, science communications, virus evolution and genomics, and immune response systems. The programme was then revised and updated in 2021 to ensure that attendees received current content as both the pandemic and research relating to COVID-19 progressed.

To provide a comprehensive range of expertise for the sessions, the Maurice Wilkins Centre brought together the following MWC investigators and colleagues from leading NZ research institutions and universities to deliver a bespoke programme:

Professor Michael Baker (University of Otago, MWC), Distinguished Professor Dame Margaret Brimble (University of Auckland, MWC), Dr Anna Brooks (University of Auckland, MWC), Dr Jemma Geoghegan (University of Otago, MWC), Professor Dave Grattan (University of Otago), Professor Shaun Hendy (University of Auckland, Te Pūnaha Matatini), Professor Ian Hermans (Malaghan Institute of Medical Research, MWC), Associate Professor Amanda Kvalsvig (University of Otago, Wellington), Associate Professor Nikki Moreland (University of Auckland, MWC), Professor Vernon Ward (University of Otago, MWC), Associate Professor Siouxsie Wiles (University of Auckland, MWC) and Associate Professor James Ussher (University of Otago, MWC).

As in previous years, the events were extremely popular with the teaching community with over 350 attendees from more than 150 schools across all sessions. To maximise the reach of the scheme, MWC has ensured that the programme content is widely accessible to the teaching community and has made recordings of the presentations available on the MWC website.

Read more about our teacher professional development days on page 21.

Assoc Prof Amanda Kvalsvig explains the Government's use of the "elimination strategy" in Aotearoa New Zealand to biology teachers at the MWC workshop in Queenstown.

Public engagement

The Maurice Wilkins Centre actively engages with the public by sharing news of its research successes and by providing commentary on topical scientific issues. Throughout 2020-21, MWC investigators have also communicated with clinical and community groups around the topics of cancer, COVID-19 and diabetes.

MWC investigators communicate with New Zealanders through the news media, public lectures and presentations, and through school visits. In 2020-21, MWC investigators were involved in public events and national and regional media coverage on a variety of scientific topics. Examples of public engagement activities include are detailed in this section.

Pacific Fono in the community

In June 2021, the Maurice Wilkins Centre and National Science Challenges for a Better Start, Healthier Lives and Ageing Well came together in support of the inaugural Pacific People's Fono – 'Måür lelei: Health and Wellbeing Together' convened by MWC Associate Investigator Dr Ofa Dewes. A diverse crowd from across many sections of the community attended the Fono.
The Fono provided a unique opportunity for some of our talented Pacific and Māori early-career researchers (ECRs) to present their health research to the wider Pacific community, including Ms Sekotilani Aloi, Mr Sakiusa Bale, Ms Lupe Isaia and Ms Jaye Moors from the University of Otago, and Mr Chris Puliuvea, Dr Natalie Netzler, Dr Tamasin Taylor and Ms Zanetta Toomata from the University of Auckland. The presentations covered a wide range of topics including vaccines, cardiometabolic disease, bariatric surgery, antimicrobial resistance, traditional Pacific medicinal plants, aiga carers and the impact of chronic health conditions on the aiga and whānau.

Attendees were encouraged to interact with presenters by asking questions in talanoa panels held at the end of every presentation. Here, our ECR's were supported by MWC principal investigators Associate Professors Nikki Moreland and Rinki Murphy from the University of Auckland, who offered their expertise on discussions on the COVID-19 vaccine and the effect of indigenous genetics on metabolic disease.

Assoc Prof Rinky Murphy (left) and Ms Jaye Moors (right) answer questions at the inaugural MWC Pacific Fono.

The event was a huge success, connecting academics and clinicians with the Pacific community to support understanding of current healthcare challenges and solutions. Following on from the Fono, some of the MWC investigators who presented at the event were asked to provide additional interviews for radio and the Pacific Media Network. Investigators spoke about their research as well relaying the key messages and learnings from the day.

For more information about the Fono see our highlight story on page 17.

MWC & Catalyst Trust bring COVID-19 experts to Queenstown

In June 2021, the Maurice Wilkins Centre hosted a joint event with Catalyst Trust Queenstown to bring a panel of experts to the Wakatipu Basin on Sunday 21st June. MWC investigators Dr Anna Brooks (University of Auckland) and Dr Jemma Geoghegan and Prof Vernon Ward (University of Otago) teamed up with Prof Shaun Hendy (Te Pūnaha Matatini, University of Auckland) and Dr Amanda Kvalsvig (University of Otago Wellington) to deliver the public discussion on Aotearoa New Zealand's response to the COVID-19 pandemic.

Each of the researchers gave a short presentation on their area of expertise, describing the basic science behind COVID-19 virology, the modelling of the pandemic, NZ's elimination strategy, genomic tracing and immunology. A Q&A session followed, and the audience were able to actively engage with these complex topics and ask robust questions of the panel.

The free event was a huge success, with over 100 attendees filling up the Queenstown Memorial Centre and a flood of questions for the floor. The presentations from the event are also publicly available on the MWC website, (visit: https://www.mauricewilkinscentre.org/news/mwc-catalyst-trust-bring-covid-19-experts-to-queenstown/). MWC is proud to play a part in bringing science to local communities and increase awareness of the important role that our investigators and peers play in keeping New Zealand safe and well.

Speakers at the MWC and Catalyst Trust public event in Queenstown, (l-r) Ms Jane Smith (MWC Research Operations Coordinator), Dr Anna Brooks, Dr Jemma Geoghegan, Assoc Prof Amanda Kvalsvig, Prof Shaun Hendy, Prof Vernon Ward and Ms Rachel Heeney (MWC Teacher Liaison).

Other engagement through the media and events

Many MWC investigators engaged with the public through the media, events and initiatives. Some examples of this include;

MWC Investigators Dr Htin Lin Aung, Dr Megan Leask and Dr Phil Wilcox from the University of Otago and Mr Chris Puliuvea (PhD candidate) and Professor Peter Shepherd from the University of Auckland took part in The Moko Foundation's Hauora Hour online series in 2020-21. The initiative is kōrero about health, science and most importantly how this is relevant to Māori. These hour-long discussions are live streamed and the recordings made available with the aim to bring scientific questions, theories and findings to Māori communities.

As Chief Scientific Officer for the new biotech start up 'Amaroq Therapeutics', Dr Sarah Diermeier gave several digital and print media interviews, including live broadcasting, after securing an investment fund of $14M NZD to accelerate development. The University of Otago's spin out uses advanced RNA therapy to target cancer. Find out more in our highlight story on page 25.

Professor Emily Parker (Victoria University of Wellington) was profiled for the RNZ radio series 'Our Changing World' in September 2020. The podcast discussed the Parker lab's ongoing work to discover new natural medicinal compounds, with interviews from Emily and her PhD students Rudy Bundela and Rose McLellan. The Parker lab is currently interested in bioactive compounds produced by fungi known as indole terpenes.

After receiving a knighthood (KNZM) in the 2021 Queen's Birthday Honours, Distinguished Professor Bill Denny (University of Auckland) gave several media interviews discussing his long career in health research and the work behind his award for "services to medical sciences". Find out more about Bill's research in our highlight story on page 9.

The media often contact individuals from the MWC network to comment on current healthcare research or issues of public interest. In 2020 Dr Hilary Sheppard was invited to give an interviews on News Hub in September 2020 to discuss gene-editing technology and in April 2021 presented a talk on the same topic as part of the "Raising the Bar" lecture series in Auckland. Associate Professor Alex Tups gave a TVNZ interview on development of commercial anti-diabetic products in 2021, and Associate Professor Logan Walker was featured in a TV3 News story and Newshub article calling for "mandatory genetic screenings for women diagnosed with breast cancer".

Focussing on inspiring the next generation, our investigators have been involved in several national activities aimed at school aged children. For example MWC investigators from the University of Auckland, Professor Poul Nielsen and Associate Professor Chris Squire ran workshops at the Rotary National Science and Technology Forum in 2020, and again in 2021 along with Professor Cris Print and Dr Vinod Suresh. The University of Otago's Associate Professor Logan Walker led activities for Year 12/13 students at the Royal Society NZ's "Powering Potential" learning experience in Wellington (2020), and Dr Jemma Geoghegan (University of Otago) supported the SING Aotearoa programme in 2021.

Many investigators contributed to regional events including Associate Professor Jane Allison and Dr Anna Brooks who supported the MOTAT STEM Fair in Auckland in 2020 and 2021 respectively.

MWC investigators continued to engage with schools and Kura Kaupapa Māori across the country by giving talks, running workshops and other partnership initiatives such as internships and summer scholarships.

Our investigators gave numerous talks at public fora or events including Professor Antony Fairbanks (University of Canterbury) who gave the prestigious Ferrier Public Lecture in Wellington (April 2021) entitled *"Sugars and viruses; the roles that carbohydrates can play in both viral infection and immune evasion"*.

Supporting the New Zealand science community

Research symposium and workshops

- **Maurice Wilkins Centre Research Symposium February 2021**

The 2021 MWC Research Symposium was held on 10th - 12th February 2021 at the University of Auckland. The three day event was a gathering of the MWC network at the University of Auckland's brand new conference facility in the Faculty of Engineering.

Having successfully re-bid for CoRE funding in 2019/20, the symposium got underway with thought-provoking discussions in each of our research streams (cancer, metabolic disease and infectious disease), to set the scene for the MWC research programme from mid-2021 onwards. The second day featured presentations from MWC investigators on the innovative research going on in the labs across the country, as well as networking opportunities throughout the day.

The symposium provided MWC investigators with a much sought-after opportunity to connect with colleagues, link in with some of the newer members of the MWC network and spark the next phase of MWC research. Following a year of cancelled and virtual conferences, both national and international due to the ongoing Covid restrictions, it was extremely positive to see over 250 of our investigators from across New Zealand make the most of the in-person event.

MWC also hosted the Future Science Day as part of the 2021 symposium. Organised by the MWC Early Career Steering Committee, the ECR focussed programme provided a number of our talented doctoral candidates and research fellows with the opportunity to present posters, research talks and elevator pitches and gain exposure in the MWC community. For more information on the MWC Future Science Day 2021, see page 57.

- **MWC Cancer Immunology Flagship Meeting June 2021**

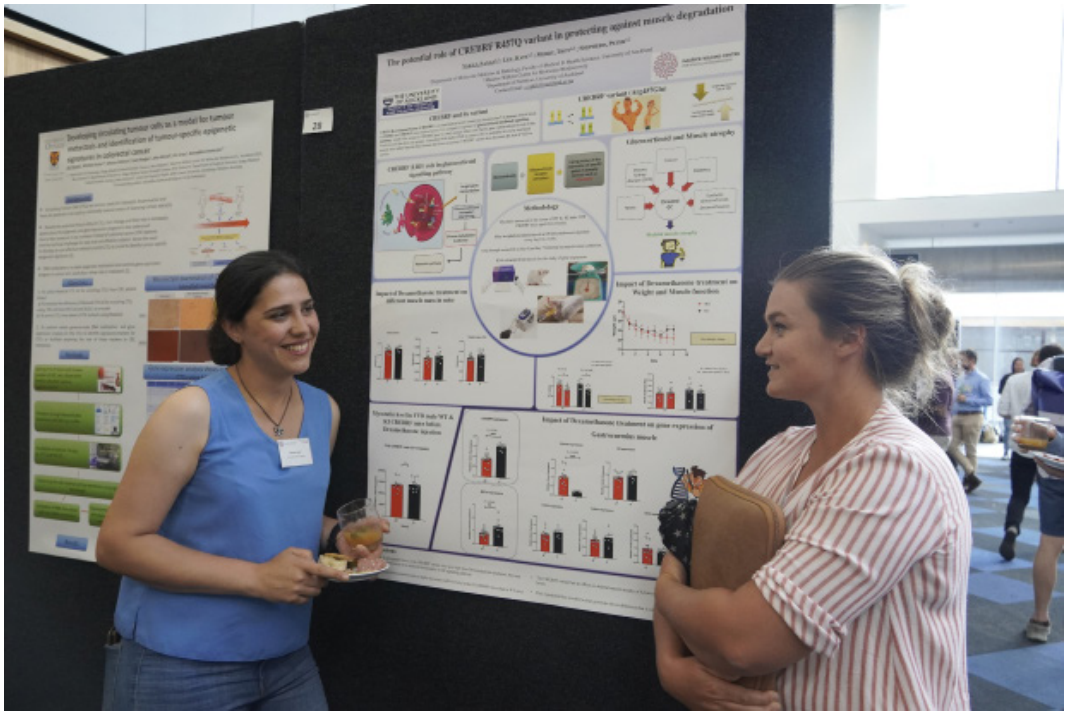
In June 2021 members of the MWC Cancer Flagship and the wider MWC network gathered at the University of Auckland for the Cancer Immunology Flagship meeting. The one-day event saw talks from 15 MWC investigators, ranging from theme leaders to PhD students, and showcasing the latest cancer research to emerge from the Centre. The meeting provided a much sought after networking opportunity for established researchers and early-mid career researchers alike, bringing together immunologists, geneticists, medicinal chemists and bioinformaticians.

Over 45 investigators from across NZ attended the Auckland meeting, discussing topics such as immunogenetics, tumor signaling pathways, novel therapeutics, epigenetics and cancer evolution. The research talks were live streamed throughout the day and the recordings and presentations made available to MWC investigators following the meeting.

- **Mass Spectrometry Research and Capability Showcase December 2020**

The MWC Early Career Steering Committee and the Mass Spectrometry Hub (MaSH) at the University of Auckland teamed up to run this event at the University of Auckland on the 4th December 2020 with a satellite venue at the University of Otago in Dunedin as well as a number of attendees online from other locations across the country. The showcase attracted over 60 registrants.

Speakers discussed how mass spectrometry had advanced their research and the facilities available to New Zealand researchers. Keynote speakers were Dr Karl Fraser (AgResearch) who spoke on 'Metabolomics: A tour of sample types and data analysis techniques' and Dr Tim Allison (University of Canterbury) who spoke about 'Native MS and its use to investigate protein structure and interactions.'



MWC Affiliate Investigators Ms Sanaz Vakili and Ms Hannah Burden at the Symposium in Auckland.

MWC Pacific Investigators at the Symposium, (L to R): Ms Sekotilani Aloi, Ms Lupe Isaia, Mr Dougie Atiola, Ms Theresa Alipia, Dr Ofa Dewes, Mr Chris Puliuvea, Mr Keresoma Leaupepe and Ms Zanetta Toomata.

- **Combined Specialist Meeting November 2020**

Associate Professor Rinki Murphy convened a combined specialist meeting organized by the Maurice Wilkins Centre on the 18th November 2020 to discuss equity of medication access for chronic metabolic conditions. A range of disciplines were represented at the meeting: primary care physicians, endocrinologists, renal physicians, cardiologists, public health physicians, diabetes nurse specialists/prescribers and nurse practitioner, pharmacist prescribers, medical education, PHARMAC representatives. After the meeting, a written summary of the discussion and feedback was sent to PHARMAC to inform their decision-making over funding two new classes of medications for the treatment of type 2 diabetes.

- **Mentoring Workshop October 2020**

In October 2020, the MWC Early Career Steering Committee (ECSC) hosted a one-day 'Mentoring and Equity in Research' workshop to provide practical advice and guidance aimed at enhancing the mentoring relationship. Led by ECSC members Dr Catherine Tsai and Dr Euan Rodger, the workshop was aimed at both mentors and mentees and addressed topics such as promoting equity and diversity, relationship management, and communication.

Over 35 MWC investigators attended the event in Wellington to hear from established MWC mentors and invited speakers: Associate Professor Jane Allison (University of Auckland), Professor Colin Brown (University of Otago), Professor Emily Parker (MWC Deputy Director, Victoria University of Wellington), Professor Poia Rewi (Te Mātāwai/Ngā Pae o te Māramatanga), and Associate Professor Tammy Steeves (University of Canterbury/Kindness in Science) and Professor Rachel Zajac (University of Otago).

Following the presentations, the speakers joined a panel discussion led by questions from the audience and emerging themes. There were also opportunities for attendees to network and ask questions over lunch and at the end of the panel session.

- **MWC Commercialisation Workshop June 2021**

The MWC hosted a full-day workshop at the University of Auckland on 11th June with the aims of increasing understanding of the commercialisation process and providing opportunities for ECR's to network with industry colleagues. The workshop was targeted at ECR's keen to learn about the IP process as well as the organisations and opportunities available to develop commercialisation potential in their own research.

Organisation of the workshop was led by MWC Early Career Steering Committee members Mr Rakesh Banerjee and Ms Abigail Bland, who developed the programme content with input from Ms Evelyn Body (Auckland UniServices), Dr Kate Lee (ECSC Chair) and Dr Marina Rajic (Massey Ventures). The comprehensive programme started with a panel discussion on the commercialisation process from university technology transfer companies and guest speaker Dr Jeanette Wood (Chair of RocketVax in Switzerland and MWC Scientific Advisory Board Member). Attendees then heard specialist talks from national commercialisation programmes (KiwiNet and Return on Science), intellectual property lawyers Blue Penguin IP, and investment company Bridgewest Ventures.

The Auckland based event had 40 attendees, where ECRs were able to mingle with industry experts and learn from MWC investigators who talked to their experiences with commercialising research. Feedback from workshop attendees was very positive, with attendees rating the event 4.3/5 stars. ECRs felt that they had 'got all the information [they] wanted to know' from the day and supported the running of similar workshops in the future to provide opportunities for more investigators and 'help strengthen networking' with industry colleagues.

Panel discussion at the MWC Commercialisation Workshop, (L to R): Mr David Christensen (Otago Innovation), Mr Jeremy Jones (Wellington UniVentures), Dr Sean MacKay (Massey Ventures), Dr Jeanette Wood and Ms Evelyn Body (Uniservices, University of Auckland).

The Maurice Wilkins Centre NZIC Prize for Excellence in Chemical Science

The New Zealand Institute of Chemistry awarded the 2020 Maurice Wilkins Centre Prize for Chemical Science to Associate Professor Geoff Waterhouse from the University of Auckland (UoA). This is the NZIC's premier prize and is awarded to a candidate based on the excellence and impact of their chemistry.

Geoff is an Associate Professor at the School of Chemical Sciences and aims to explore the fundamental relationships between the chemical, physico-chemical, structural, electronic and optical properties of solids and their function. His research group focuses primarily on the development of low cost catalysts for hydrogen production, carbon dioxide reduction, batteries and fuel cells.

Conferences, meetings and organisations

Scientific conferences, meetings and networks are important fora to share knowledge and form collaborative relationships. In addition to the symposia and workshops that the Centre and its investigators convene the MWC supports national and international scientific meetings held in New Zealand and sponsors speaking slots at international conferences where these help to raise the profile of New Zealand science.

While the 2020-21 period has been challenging, some events and initiatives were able to go ahead either online or in person. In 2020-21 the MWC provided support for:

- **Queenstown Research Week**

  This is the largest annual science event in New Zealand. In 2020 this event was held online with a reduced programme on the 1st September 2020 due to COVID-19 restrictions. The programme featured a cross section of local and international scientists and the meeting was well attended with over 400 registrants joining during the day.

The MWC is a premier academic sponsor for this event and continued this support in 2020 to enable a forum for Centre investigators to present to a national audience.

- **Nuclei Acid Chemical Biology Workshop**

This one day workshop was held at Massey University, Palmerston North, on the 10th March 2020 and featured local and international speakers. It was the first nucleic acid chemical biology workshop held in New Zealand and attracted over 80 participants from across the country and from diverse disciplines ranging from biophysics, physical chemistry to protein biochemisty and genetics.

The workshop featured three international speakers; Professor Naoki Sugimoto (KONAN University, Japan), Professor Tracy Bryan (University of Sydney, Australia) and Associate Professor Rakesh Veedu (Murdoch University, Australia).

The MWC provided support towards travel costs of these speakers as well as travel costs to enable six early career MWC affiliate investigators to attend the workshop from Canterbury, Auckland and Wellington.

- **Auckland Cancer Society Research Centre 2020 Symposium**

This event was held on the 14th and 15th February 2020 to celebrate the retirements of Distinguished Professor Bill Denny, Emeritus Distinguished Professor Bruce Baguley and Emeritus Professor Bill Wilson who were all instrumental in driving the success of the Centre and have been involved in the MWC since its establishment. The symposium on the 15th February, attended by 140 people, featured international and local speakers and covered a range of topics from basic research through to clinical trials, highlighted the achievements of Professors Denny, Baguley and Wilson.

The MWC contributed to the travel costs of Professor Jim Lorens, one of the invited international speakers at the symposium. Professor Lorens also presented a seminar in Dunedin during his visit – see page 60 for details.

- **International Day of Immunology Public Lecture on COVID-19 2021**

The Australian and New Zealand Society for Immunology celebrated the 2021 International Day of Immunology on the 30th April by hosted a virtual public lecture on COVID-19 vaccines including how they work, how they are developed and understanding informed choices for vaccination. The panel of experts included MWC associate investigator Professor Graham Le Gros from the Malaghan Institute of Medical Research in Wellington.

The virtual public lecture was viewed live by over 1000 people and is available online at https://www.facebook.com/DayofImmunology. The MWC was one of a large number of sponsors that supported this public lecture.

- **Molecules special issue "Cancer and Tuberculosis Drug Discovery: A Theme Issue in Honor of Prof. William A. Denny"**

The MWC provided support for this special issue of the journal 'Molecules' which featured a biography of Professor Bill Denny as well as nine scientific papers and reviews relating to areas of Professor Denny's expertise over his career. The issue is available at https://www.mdpi.com/journal/molecules/special_issues/William_Denny. See the highlight story on page 9 for more details of Professor Denny's career.

Service

Maurice Wilkins Centre investigators support both the national and international science communities through service in leadership roles and on many advisory boards and panels.

National roles

In 2020-21 Maurice Wilkins Centre investigators served in advisory and governance roles in many New Zealand organisations including;

Between January 2020 and June 2021, Maurice Wilkins Centre investigators served in advisory and governance roles in many New Zealand organisations including;

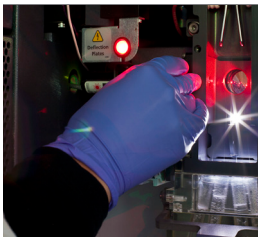
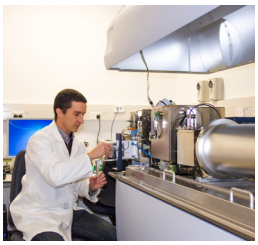
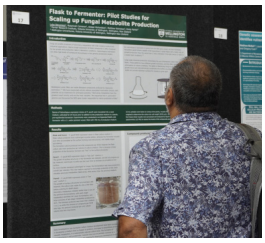
- Auckland Medical Research Foundation
- Auckland Academic Health Alliance
- Auckland Regional Tissue Bank
- Australasia New Zealand Society for Extracellular Vesicles (ANZSEV)
- Australasian Cytometry Society
- Australasian Genomic Technologies Association (AGTA)
- Australasian Leukaemia and Lymphoma Group (ALLG)
- Australasian Society for Biophysics
- Australia and New Zealand Bone and Mineral Society
- Australia and New Zealand Society for Immunology
- Australasian Wound and Tissue Repair Society
- Cancer Society of New Zealand
- Cancer Research Trust
- Canterbury Society Tissue Bank
- Coeliac Society NZ
- Cure Kids
- Institute of Environmental Science and Research (ESR)
- Environmental Protection Authority
- Food Standards Australia New Zealand (FSANZ)
- Diabetes Auckland
- Diabetes Foundation Aotearoa
- Freemason Roskill Trust
- Genesis Oncology Trust
- Gut Cancer Foundation
- Health Research Council of New Zealand
- Kea World Class NZ Awards Selection Panel

- Leukaemia & Blood Cancer New Zealand
- L'Oreal-UNESCO Women in Science Fellowships in Australia and New Zealand
- Melenoma Network of New Zealand (MelNet)
- Ministry of Business, Innovation and Employment
- Ministry of Health
- Ministry of Primary Industries
- Neurological Foundation of New Zealand
- New Zealand Breast Cancer Association
- New Zealand Association of Breast Cancer Research
- New Zealand eScience Infrastructure
- New Zealand Institute of Chemistry
- New Zealand Journal of Primary Health Care
- New Zealand Marine Science Society
- New Zealand Microbiological Society
- New Zealand Microbiology Network
- New Zealand Society for Oncology
- New Zealand Society for the Study of Diabetes
- New Zealand Society of Endocrinology
- Pharmaceutical Management Agency (PHARMAC)
- Physiological Society of New Zealand
- Queenstown Molecular Biology Society (Queenstown Research Week)
- Royal Society of New Zealand
- Synthetic Biology Australasia
- Te Aho O Te Kahu / Cancer Control Agency
- Te Manawa Museum of Art, Science and History
- The Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists
- Tongan Health Society

International roles

In 2020-21 members of the MWC served in more than 160 advisory, editorial and governance roles in international organisations based in Austria, Australia, Canada, China, France, Germany, Italy, Singapore, Spain, Switzerland, The Netherlands, the United States of America and the United Kingdom.

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

Organisational development

Flagship research programme

The MWC Flagship programme enables MWC investigators to bring together nationally-integrated collaborative teams to accelerate multi-disciplinary research with potential for clinical impact.

In 2020-21, the Centre supported six ongoing Flagship research programmes;

- Addressing antimicrobial resistance
- Group A streptococcus
- Immuno-oncology
- Using genetic risk for metabolic disease to understand disease mechanisms and guide treatment
- Antivirals, vaccines and molecular tools for viral pathogens
- Therapeutics for metabolic disease

The MWC provides support for Flagship teams to meet regularly including research staff and students working on a particular Flagship programme. This provides emerging researchers with opportunities to gain wider knowledge of their research area. Due to COVID-19 restrictions at various times over 2020 and during the first half of 2021 most meetings were held online, however members of the Immuno-oncology Flagship did hold an in person meeting in June 2021. See page 39 for more details of this meeting.

Flexible research programme

One of the Maurice Wilkins Centre's main objectives is to encourage collaborations between investigators from different scientific disciplines, achieved through the contestable Flexible Research Programme.

Two rounds of this programme were held in 2019; in April and September. Three categories of support were open for applications from MWC investigators in 2019; new initiatives involving postgraduate students, access to specialised facilities and equipment and access to specialised international facilities and training (see page 58 for details).

Four rounds of this programme were held in 2020-21; in February, April and August 2020 and April 2021. Four categories of support were open for applications from MWC investigators in 2020-21; new initiatives involving postgraduate students, access to specialised facilities and equipment; support for clinician initiated collaborative research involving MWC investigators and COVID-19 PhD student stipend extensions.

Details of investigators awarded funding through this programme are listed in the following sections.

Inter-disciplinary PhD training

The Maurice Wilkins Centre fosters new interdisciplinary collaborative research involving Centre investigators by supporting fully funded PhD student projects that will also promote progress in scientific areas of importance to the MWC.

A total of 24 PhD students have been awarded scholarships through this training programme since 2015 with 15 students continuing study in 2020-21. Ten of these students completed their PhD study by the 30th June 2021, with three further students on schedule to complete by the end of 2021. Two students withdrew from their PhD study over this reporting period.

The ten students who completed their PhD study in 2020-21 were:

2020

- **Dr Taylor Cooney** (Victoria University of Wellington). *Investigation of antigen loading in synthetic peptide vaccines for cancer immunotherapy* (Supervisor: Professor Gavin Painter)
- **Dr Zhe (Regan) Fu** (University of Auckland). *Banishing tumour hypoxia to restore immunotherapy responsiveness* (Supervisor: Associate Professor Adam Patterson)
- **Dr Muhammad Aqfan Jamaluddin** (University of Auckland). *Development of CGRP receptor peptide antagonists as potential therapeutics* (Supervisor: Associate Professor Kerry Loomes)
- **Dr Joanna Mathy** (University of Auckland). *Novel mechanism for macrophage-mediated immunosuppression identified in human metastatic melanoma* (Supervisor: Professor Rod Dunbar)
- **Dr Hayley Prescott** (Massey University). *Studies Toward Evaluating Gcn2 as a Drug Target* (Supervisor: Associate Professor Evelyn Sattlegger)
- **Dr Nathan Skinner** (University of Otago). *Exploring the role of the circadian timing system in the control of metabolism and the consequence of lighting disruptions* (Supervisor: Professor Dave Grattan)
- **Dr Luke Stevenson** (Victoria University of Wellington). *Discovery and Biosynthesis of Natural Products from New Zealand Soil Metagenome Libraries* (Supervisor: Professor David Ackerley)

2021

- **Dr Naomi Davies** (University of Auckland). *Clinical, metabolic, and microbial responses to sleeve gastrectomy and Roux-en-Y gastric bypass: results from a randomised clinical trial* (Supervisor: Associate Professor Rinki Murphy)
- **Dr Nour Ghamri** (University of Auckland). *Identification of predictive biomarkers to a novel class of anti-cancer drugs* (Supervisor: Dr Frederik Pruijn)
- **Dr Jordan McCone** (Victoria University of Wellington). *A structure-based approach to kinase inhibition based on the natural product (-)-TAN-2483B* (Supervisor: Associate Professor Joanne Harvey)

New initiatives involving post-graduate students

The Maurice Wilkins Centre supports new collaborative research involving MWC investigators by providing working expenses for new interdisciplinary postgraduate student projects that also promote progress in scientific areas of importance to the MWC.

14 projects awarded funding in previous years were ongoing in 2020-21 and 14 new projects were awarded working expenses in 2020-21 (**project leader, host institution and student names are in bold**):

2020

- Development of new synthetic biological tools for cloning and expression of antibiotic biosynthetic gene clusters from microbial genomes; **Jeremy Owen,** Peter Fineran, **Peng Hou**, **Victoria University of Wellington**.
- Exploring synthetically lethal interaction in mycobacterial bioenergetics; **Matthew McNeil**, Kiel Hards, Greg Cook, Emily Parker, Wanting Jiao, Shaun Lott, Ghader Bashiri, Jodie Johnston, **Heath Ryburn**, **University of Otago**.
- Developing Vitamin B12 Analogues for Targeted Uptake of Antimicrobial Agents; **Nicola Brasch**, Matthew McNeil, Greg Cook, Scott Ferguson, **Jessica Frederickson**, **Auckland University of Technology**.
- Generation of patient-derived head and neck cancer organoids; **Stephen Jamieson**, Tet-Woo Lee, Alan Davidson, **Amy Lai**, **University of Auckland**.
- Development of covalent fluorescent ligands for cannabinoid type 2 receptor; **Andrea Vernall**, Michelle Glass, Joel Tyndall, **Ian Liddle**, **University of Otago**.
- Investigating RNase HI as a target for novel anti-bacterial co-therapy; **Shaun Lott**, Stephanie Dawes, Greg Cook, **Meet Bhavin Shah**, **University of Auckland**.
- Imaging Mucosal Associated Invariant T cells in Tissue: development of a multi-probe BaseScope method; **James Ussher**, Tania Slatter, **Henry Cao**, **University of Otago**.
- Biophysical characterisation of malic enzyme isoforms and the small molecule inhibitor, NPD-39; **Kerry Loomes**, Chris Squire, **Ben Krinkel**, **University of Auckland**.
- Targeting Thioredoxin reductase with metal based anti-cancer compounds; **David Goldstone**, Christian Hartinger, **Liam Eade**, **University of Auckland**.
- Targeting Isochorismate Synthase Enzymes from the MST Family; **Jodie Johnston**, Tim Allison, Esther Bulloch, Thu Ho, **Tina Du**, **Joel Brunke**, **University of Canterbury**.

2021

- Assigning regulatory function to Māori and Pacific intronic variant at JAZF1; **Megan Leask**, Julia Horsfield, Phil Wilcox, Tony Merriman, Dave Grattan, Sharon Ladyman, **Milly Morice**, **University of Otago**.
- Electron microscopy to visualize polymicrobial biofilms and membrane structures before and after treatment with colistin and the antibiofilm peptide DJK-5; **Daniel Pletzer**, Mihnea Bostina, **Deborah Yung**, **University of Otago**.
- Targeting the truncated p53 isoform, Δ133p53, to combat cancer; **Joanne Harve**y, Cath Drummond, Wanting Jiao, Paul Teesdale-Spittle, Antony Braithwaite, **Goutham Rajendran**, **University of Otago**.
- Targeting redox homeostasis to eradicate drug resistant Mycobacterium tuberculosis; **Matthew McNeil**, Htin Lin Aung, Ghader Bashiri, Kiel Hards, Greg Cook, **Natalie Waller**, **University of Otago**.
- Epigenetic regulation of bacterial persistence in the multidrug-resistant bacterial pathogen Enterococcus faecalis; **Xochitl Morgan**, Rachel Darnell, **Georgia Campbell**, **University of Otago**.

Access to specialised facilities and equipment

The Centre provides support for investigators to access specialised facilities and equipment across New Zealand. The scheme is intended to cover the costs of user charges attracted by these facilities or equipment, as well as travel and accommodation necessary to enable MWC investigators to work in facilities away from their host institution.

As part of the development of this scheme, a register of New Zealand facilities and equipment was set up within the members section of the MWC website. Over 97 facilities and items of equipment were registered in 2020-21. It is intended that MWC investigators use this register as a resource to identify and compare facilities and equipment across New Zealand that they can use for their research.

12 projects awarded funding in previous years were ongoing in 2020-21 and 17 new applications to this scheme were approved in 2020-21 (**project leader, host institution and student names are in bold**):

2020

- Non-invasive detection of changes in tumour oxygenation following tarloxotinib treatment using oxygen-enhanced magnetic resonance imaging (OE-MRI); **Adam Patterson**, James O'Connor, Kaye Williams, **University of Auckland**.
- Using human kidney organoids to determine nephrotoxicity of novel polymyxin analogues; **Veronika Sander**, Alan Davidson, Paul Harris, Margaret Brimble, Greg Cook, **University of Auckland**.
- Synthesis of new antibiotics, brevicidine and laterocidine and analogues; Paul Harris & Greg Cook, Margaret Brimble, **Yann Hermant**, **University of Auckland**.
- Selective DNA-PK inhibitors; **Michael Hay**, Lydia Liew, Ben Dickson, Jack Flanagan, Kevin Hicks, Stephen Jamieson, **University of Auckland**.
- Using MμSIC to image entire murine lymph nodes; **Inken Kelch**, Anthony Phillips, Gib Bogle, Rod Dunbar, **University of Auckland**.
- Do sugary drinks promote Group A Streptococcal infections?; **Jacelyn Loh**, Troy Merry, Nikki Moreland, Julie Bennett, Michael Baker, **University of Auckland**.
- Characterising the Group A Streptococcus pilus interaction with human cells using a high-throughput glycan array; **Thomas Proft**, Jacelyn Loh, Catherine Tsai, **University of Auckland**.
- Assessment of third generation pretomanid derivatives for TB therapy based on nanoparticle drug delivery; **Andrew Thompson**, **University of Auckland**.
- Kinase inhibition of fungal metabolite TAN-2483B; Joanne Harvey, Jack Flanagan, Peter Shepherd, Paul Teesdale-Spittle, **Jordan McCone**, **Victoria University of Wellington**.
- Predicting and Improving Cardio-Metabolic Health Outcomes in Adults Born Very Low Birth Weight; **Vicky Cameron**, Anna Pilbrow, **University of Otago**.
- Dexamethasone induced muscle wasting in the CREBRF R457Q mouse model; Kate Lee, Peter Shepherd, **Sanaz Vakili**, **University of Auckland**.
- How does PI3K inhibition increase whole-body metabolism?; **Chris Hedges**, Troy Merry, Sharon Ladyman, Peter Shepherd, **University of Auckland**.
- Exploration of the immunostimulatory activity of the hypoxia-activated prodrug tarloxotinib; **Regan Fu**, Ian Hermans, Adam Patterson, Jeff Smaill, **Malaghan Institute of Medical Research**.

2021

- Development of cytometry assays to detect historic COVID-19 immune correlates, and investigate immune dysregulation in COVID-19 survivors; **Anna Brooks**, William Kelton, Alicia Didsbury, **University of Auckland**.
- Utilising mitochondrial genome association studies to identify novel mitochondrial encoded peptides; Troy Merry, Anna Gosling, Tony Merriman, **Alex Chan**, **University of Auckland**.
- Two are better than one: Screening for inhibitors of O-acetylserine sulfhydrylase to inhibit cysteine biosynthesis in Neisseria gonorrhoeae; **Joanna Hicks**, Wanting Jiao, Vic Arcus, Jack McGarvie, **University of Waikato**.
- Real-time in vivo measurement of inflammation in zebrafish; **Alex Tups**, Julia Horsfield, Dave Grattan, Kaj Kamstra, **Richard Marks**, **University of Otago**.

Support for for clinician initiated collaborative research

In 2020 the Centre introduced this new category to the Flexible Research Programme with the aim of providing support for projects that promote collaboration between clinical associates or clinically-active MWC investigators and other MWC investigators, as well as progress scientific areas of importance to the MWC.

4 new applications to this scheme were approved in 2020-21 (**lead clinician, lead research collaborator and their host institutions' names are in bold**):

2021

- Mismatch repair characterisation of the Dunedin Colorectal Cohort (DNCRC): a pilot project; **Janet Rhodes** (**University of Otago** / **Southern District Health Board**), **Roslyn Kemp**, Valentine Marion, **University of Otago**.
- COVID19 RAAS study; **Rinki Murphy** (**University of Auckland** / **Auckland District Health Board** and **Counties Manukau District Health Board**), **Miguel Quiñones-Mateu**, Nikki Moreland, Ry Tweedie-Cullen,Susan Morpeth, Michael Maze, Colin McArthur, **University of Otago**.
- Translational Techniques to Link Genetic Variants to Altered Gut Function; **Greg O'Grady**, **Peter Shepherd**, **University of Auckland**.
- Immune profiling of Inflammatory Bowel Disease-associated dysplasia; **Tamara Mullaney** (**Canterbury District Health Board**), **Rachel Purcell**, **University of Otago Christchurch**.

COVID19 PhD Student Stipend Extensions

The Centre provided stipend and tuition fee support for PhD students whose research is aligned with the MWC research programme and has been severely impacted by COVID19.

20 applications to this scheme were approved in 2020-21 (**project leader, host institution and student names are in bold**):

- Functional analysis of Spy0136, a putative immune evasion factor from Group A Streptococcus; **Thomas Proft**, Jacelyn Loh, Paul Young, **Haniyeh Aghababa**, **University of Auckland**.
- Δ133TP53 in Glioblastoma: immune cell infiltration and treatment response; **Antony Braithwaite**, Tania Slatter, **Ramona Eiholzer**, **University of Otago**.
- Plasma genomic biomarkers for New Zealand cancer patients; **Cris Print**, Annette Lasham, **Sandra Fitzgerald**, **University of Auckland**.

- Synthesis of S-lipidated Analogues of Natural Antimicrobial Peptides; **Paul Harris**, **Margaret Brimble**, Jeremy Owen, Greg Cook, Yann Hermant, **University of Auckland**.
- Exploring the Evolution and Function of the first Enzyme in Histidine Biosynthesis; **Emily Parker**, Gerd Mittelstädt, **Parastoo Khajeaian**, **Victoria University of Wellington**.
- DNA Based Inhibitors of APOBEC3 Enzymes: Development and Evaluation of Pre-shaped Single-Stranded DNAs; **Vyacheslav Filichev**, Elena Harjes, **Harkrishnan Mohana Kurup**, **Massey University**.
- Quorum Sensing Regulation of CRISPR-Cas systems; **Peter Fineran**, Greg Cook, James Usser, Maui Hudson, **Howard Maxwell**, **University of Otago**.
- Deep Learning Analysis to Identify Missing Heritability of Complex Diseases; **Andrew Munaksci**, Paul Atkinson, Mark Walterfang, **Eliatan Niktab**, **Victoria University of Wellington**.
- Development of beta-cell models from human induced pluripotent stem cells to study gene SNPs that increase risk of Type-2 diabetes; **Alan Davidson**, Peter Shepherd, **Jake Oh**, **University of Auckland**.
- Synthetic Studies towards the Marine Toxin Portimine; **Margaret Brimble**, Daniel Furkert, Vernon Ward, **Esperanza Pearl**, **University of Auckland**.
- Regulation of expression of the oxidoreductase STEAP4 by the Δ133p53β isoform: An approach to develop a targeted therapy for prostate cancer; **Antony Braithwaite**, Tania Slatter, Sunali Mehta, Jeffery Smaill, Adam Patterson, **Sakalita Ray**, **University of Otago**.
- Synthetic sulfated saccharides in cell signalling; **Peter Tyler**, Ralf Schworer, Cameron Scott, Gary Evans, Emily Parker, **Daniel Sheppard**, **Victoria University of Wellington**.
- Characterisation of growth hormone signal transduction in primary melanoma cell lines; **Jo Perry**, Peter Shepherd, **Karla Sousa**, **University of Auckland**.
- The structure-activity relationship of multidentate metal-based anticancer compounds derived from an imidazole-triazolyl scaffold; **Christian Hartinger**, Muhammad Hanif, Stephen Jamieson, Euphemia Leung, **Kelvin Tong**, **University of Auckland**.
- Chemo-Enzymatic Strategies for the Synthesis of Antibacterial Peptides; **Margaret Brimble**, Paul Harris, Ghader Bashiri, **Elyse Williams**, **University of Auckland**.
- The development of 3D breast cancer-adipocyte models for studying tumour microenvironment; **Tim Woodfield**, Elisabeth Phillips, Khoon Lim, Margaret Currie, **Jessika Wise**, **University of Otago**.
- An investigation into the endogenous regulation of mitochondrial derived peptides (MDPs) through exercise; **Troy Merry**, Christina Buchanan, Margaret Brimble, Paul Harris, **Jonathan Woodhead**, **University of Auckland**.
- Designing new agents for the peloruside binding site; **Paul Teesdale-Spittle**, Joanne Harvey, Jack Flanagan, John Miller, Peter Northcote, **Ethan Woolly**, **Victoria University of Wellington**.
- Targeting hypoxia in pancreatic cancer with a novel prodrug; **Frederik Prukin**, Moana Tercel, **Wouter van Leeuwen**, **University of Auckland**.
- Cell culture models of water and ion transport across the alveolar epithelium; **Vinod Suresh**, James Sneyd, Martin Fronius, **Alireza Tavakolinejad**, **University of Auckland**.

New investigators

Associate and affiliate investigators

During 2020 and the first half of 2021, 25 new associate investigators were invited to join the Centre, bringing the total number of associate investigators to 236 at the 30th June 2021. In line with the MWC strategy of supporting future leaders five of these new associate investigators were previously MWC affiliate investigators and on review in 2020-21 had developed their careers to the stage that they were approved for promotion to associate investigator. In addition, 105 postdoctoral and postgraduate students were appointed as affiliate investigators in 2020 to the 30th June 2021, with the total cohort now numbering over 300.

New associate investigators appointed in 2020:

- Dr Philip Carter, The Institute of Environmental Science and Research
- Dr Martin Fronius, Department of Physiology, University of Otago
- Dr Jemma Geoghegan, Department of Microbiology and Immunology, University of Otago
- Dr Brent Gilpin, The Institute of Environmental Science and Research
- Dr Natasha Grimsey, Department of Pharmacology and Clinical Pharmacology, University of Auckland
- Dr Elena Harjes, School of Fundamental Sciences, Massey University
- Dr William Kelton, Te Huataki Waiora School of Health, University of Waikato
- Professor Nigel Perry, Department of Chemistry, University of Otago
- Dr Daniel Pletzer, Department of Microbiology and Immunology, University of Otago

New associate investigators appointed in 2021:

- Dr Alan Cameron, School of Chemical Sciences, University of Auckland
- Dr Mike Garratt, Department of Anatomy, University of Otago
- Dr Anna Gosling, Department of Anatomy, University of Otago
- Dr Iain Hay, School of Biological Sciences, University of Auckland
- Dr Roger Hurst, Environmental Science and Research
- Dr Iman Kavianinia, School of Chemical Sciences, University of Auckland
- Dr Farah Lamiable-Oulaidi, Ferrier Research Institute, Victoria University of Wellington
- Dr Erwin Lamping, Faculty of Dentistry, University of Otago
- Dr Dominic Lomiwes, Environmental Science and Research
- Dr Jonni Koia, School of Science, University of Waikato
- Dr Natalie Netzler, Department of Molecular Medicine and Pathology, University of Auckland
- Dr Shanthi Parkar, The Institute of Environmental Science and Research
- Professor Nicolette Sheridan, School of Nursing, Massey University
- Associate Professor Matthew Stott, College of Science, University of Canterbury
- Professor Mark Vickers, Liggins Institute, University of Auckland
- Dr Adele Williamson, School of Science, University of Waikato

Clinical associates

The MWC investigator cohort includes practising clinicians with clinical challenges and ideas being actively promulgated through the MWC's research programmes. Members of the Clinical Advisory Board, who are leading clinician-scientists, also provide clinically-focused review of our research programmes and enable new collaborations between MWC investigators and other clinicians within their clinical networks.

In 2020 the Centre introduced a new category to the Flexible Research Programme with the aim of providing support for projects that promote collaboration between clinical associates or clinically-active MWC investigators and other MWC investigators as well as progress scientific areas of importance to the MWC. Four projects were approved in 2020 and are detailed on page 51.

In 2018 the MWC launched a new 'Clinical Associate' membership category as part of a commitment to expand its clinical networks to include a wider group of practising clinicians who wish to be involved with the MWC. Three new clinical associates were appointed from the start of 2020 to the 30th June 2021 bringing the total number of clinical associates to 31;

- Professor Lesley McCowan, Auckland District Health Board/University of Auckland
- Dr Rosemary Hall, Capital and Coast District Health Board University of Otago
- Dr Tamara Mullaney, Canterbury District Health Board/University of Otago

Human capability development

The multidisciplinary and collaborative nature of the Maurice Wilkins Centre research programme provides an excellent training environment for the young scientists and students who are our future science leaders.

Support for postgraduate students

The MWC supports a large cohort of postgraduate students within its associated research groups by providing funds for stipends, working expenses and travel, as well as opportunities to access specialised research facilities and equipment. Over 2020 and the first half of 2021, the MWC provided direct full or partial financial support for 104 postgraduate students at the University of Otago, University of Canterbury, Victoria University of Wellington, Massey University, University of Waikato, Auckland University of Technology and the University of Auckland. 50 postgraduate students who received MWC support prior to or during this reporting period completed their degrees in 2020 or the first half of 2021, including 10 PhD students who were recipients of MWC PhD scholarships – see page 48 for details of these 10 graduates.

In 2020 and early 2021 the Centre also awarded scholarships to 20 PhD students who were in their third or fourth year of study and whose research had been severely impacted by **COVID**19. The scholarships provided stipend and tuition fee support for up to three months to give the students additional time to work towards completing their PhD study. Recipients of these scholarships are listed on page 51.

Support for emerging scientists

The success of the core MWC research programmes is dependent on the skills and expertise of a large cohort of research and post-doctoral fellows, many of whom are in the early to mid-stage of their careers.

From 1st January 2020 to the 30th June 2021, the MWC provided full or partial salary support for 54 research and post-doctoral fellows (25 FTE) at the University of Otago, Victoria University of Wellington, the Malaghan Institute of Medical Research, the University of Waikato and the University of Auckland.

The MWC also provided partial support for 30 research technicians and assistants (11 FTE) to carry out specific roles in the core MWC research programme over this reporting period.

Many of the members of this cohort have been involved in Flagship research communities and this has given them the opportunity to widen their networks and develop their careers. The MWC has provided fora for emerging scientists to present their work in, such as Flagship meetings and the Early Career Researchers Symposium.

Emerging scientists are also encouraged to apply to the MWC for funding through the flexible research programme to access specialised facilities, equipment and training both in New Zealand and internationally (see pages 50 and 58). This programme is a good way for emerging scientists to start learning how to write research grants. Applicants are given feedback on unsuccessful applications which allows them to work on revising these and re-submitting to future rounds.

Early Career Steering Group

The Early Career Steering Committee's (ECSC) mission is to provide career development opportunities for early career researchers (ECRs) within the MWC, this includes the delivery of workshops and events to support the MWC ECR community.

Members of the ECSC in 2020 were: Dr Kate Lee (Chair, University of Auckland), Mr Rakesh Banerjee (University of Otago), Ms Abigail Bland (University of Otago), Dr Rebekah Bower (University of Auckland), Dr Simon Jackson (University of Otago), Dr Euan Rodger (University of Otago) and Dr Catherine Tsai (University of Auckland).

The Committee membership was updated in May 2021: Dr Kate Lee (Chair, University of Auckland), Mr Rakesh Banerjee (University of Otago), Ms Abigail Bland (University of Otago), Dr Simon Jackson (University of Otago), Dr Natalie Netzler (University of Auckland), Chris Puliuvea (University of Auckland), Dr Luke Stevenson (Victoria University of Wellington), Dr Catherine Tsai (University of Auckland) Theresa Alipia (University of Auckland) and Ms Annmaree Warrender (University of Waikato).

ECSC meeting in Auckland to welcome new members. Back row (L to R): Dr Kate Lee (Chair), Dr Luke Stevenson, Dr Euan Rodger and Dr Simon Jackson (University of Otago). Middle row (L to R): Dr Abigail Bland, Mr Rakesh Banerjee, and Ms Annmaree Warrender. Front row (L to R): Prof Emily Parker (MWC Deputy Director), Dr Natalie Netzler, Mr Chris Puliuvea, and Ms Theresa Alipia.

Between January 2020 - June 2021, the ECSC led several initiatives aimed to upskill early career researchers, provide networking opportunities and exposure in the scientific community, and explore potential career pathways. These included:

- **MWC Mentoring Programme**
  The Committee continued to manage and develop the MWC Mentoring Programme. See section below for more information.
- **Future Science Day**
  The Early Career Steering Committee hosted the Future Science Day in conjunction with the MWC Symposium in February 2021. For more information on the MWC Future science day 2021, see the report later in this section.

- **MWC Commercialisation Workshop**
  In June 2021, the ECSC organised this workshop aimed to increase knowledge and understanding of the commercialisation process and provide opportunities for ECRs to network with industry colleagues. For more information see page 41.

MWC Mentoring Programme

The MWC mentoring scheme was piloted in 2019 and initially matched nine mentors and mentees for a one year period. Since its establishment, the scheme has supported 29 mid to early-career researchers, from PhD students up to senior lecturers, and is currently supported by 26 active mentors from the MWC network. This scheme has been extremely successful in matching MWC mentors of all career levels with mentees to build lasting relationships. The vast majority of pairings maintain contact either formally or informally after one year, and continue to add value to the careers of MWC ECRs.

Through the scheme, MWC offers the opportunity to build relationships with researchers from across NZ, and between 45-67% mentor/mentee pairings are based at different institutions. In March 2021, new mentees who were in a different location to their mentors were offered travel support to facilitate an initial in-person meeting with their mentors. The additional provision was well received with two thirds of eligible mentees making use of the support offered to ensure that they were able to establish a good connection with their mentors. MWC mentor and mentee pairs were also given the opportunity to catch up at the MWC Symposium & Future Science Day in February 2021.

The ECSC continues to provide support to mentoring pairs through regular check-ins with both mentors and mentees, and by offering bespoke training to ensure that mentors are best able to support their mentees. This includes the one-day '*Mentoring and Equity in Research*' workshop run in October 2020. The event was aimed at both mentors and mentees and talks from the workshop are available on the MWC website ensuring that the content is accessible for all involved in the programme. For more information on the workshop, see page 41.

In May 2021, the Committee began a review of the mentoring scheme to ensure its accessibility and inclusivity for Māori and Pacific researchers. Going forward, the ECSC plans to build on the programme by expanding the number of mentor/mentee pairings and providing further resources for both mentors and mentees to facilitate strong mentoring relationships.

Maurice Wilkins Centre Future Science Day

The Maurice Wilkins Centre Future Science Day was held over 11th-12th February 2021 at the University of Auckland. The event was organised by the MWC Early Career Steering Committee (ECSC) and held in conjunction with the MWC Symposium. After disruptions in 2020 caused by the COVID-19 pandemic, the event offered a much-needed opportunity for ECRs to present posters, give research talks and network with the research community.

ECR's were encouraged to submit abstracts, and presentations by investigators from all three of MWCs research themes (Cancer, Diabetes and Metabolic Disease, and Infectious Disease) were selected for a comprehensive programme of 19 research talks. In addition to the research talks, over 30 ECR's were also given the opportunity to present posters at the conference to the 240 attendees. Prizes were offered for the best poster presentations and research talks, including the 'People's choice' awards (where attendees vote for their favourite research talk and poster presentation), introduced by the ECSC in 2019. Prize winners in 2021 were:

Poster Winners (L to R): Mie Riisom (Poster People's Choice), Annmaree Warrender (Poster Highly Commended), Rachel Darnell (Poster Highly Commended).

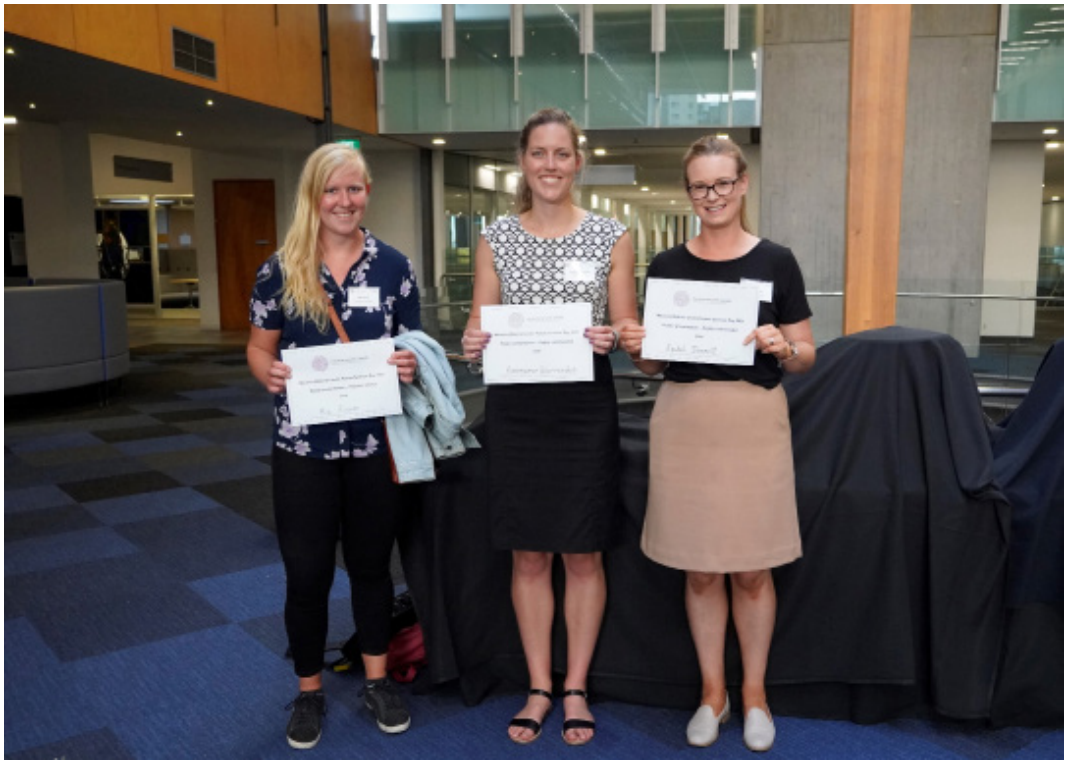
Research Talk Winners (L to R): Alana Whitcombe (Research Talk 1st), Kiel Hards (Research Talk Runner Up), Tayla Rees (Research Talk People's Choice), Lupe Isaia (Research Talk People's Choice), George Chang (3 Minute Talk 1st) and Niloofar Zandvakili (3 Minute Talk Runner Up).

Technical training opportunities

In order to maintain a world class research programme, it is important that Maurice Wilkins Centre investigators and students keep up to date with international developments in their fields.

The MWC provides support for early career investigators to access specialised international facilities and training, and share what they learn with their New Zealand colleagues. This contestable programme supports investigators' travel to national and international workshops and laboratories to learn new technical skills. A criterion for a successful application is that the investigator must present a plan for how they will disseminate their new knowledge and skills to other members of the New Zealand science community on their return.

Due to the COVID-19 pandemic and associated travel restrictions over 2020 and 2021, the Centre put this programme on hold and reallocated funding to support students and projects that were delayed by the COVID-19 disruptions during this period.



Poster Winners at the MWC Symposium (L to R): Mie Riisom, Annmaree Warrender and Rachel Darnell.

ECSC and Research Talk Winners. Back row (L to R): Euan Rodgers, Kiel Hards, Rakesh Banerjee, Simon Jackson, Rebekah Bower and Kate Lee. Front row (L to R): Catherine Tsai, Alana Whitcombe, Tayla Rees, Lupe Isaia, George Chang and Niloofar Zandvakili.

International visits

The Maurice Wilkins Centre runs an international engagement programme to build partnerships with priority international institutions that benefit the Centre's investigator network. Due to the COVID-19 pandemic and associated travel restrictions, the MWC was unable to host any international scientists or delegations after early 2020 and international travel for MWC investigators was also restricted. MWC investigators continued to maintain international partnerships through online contact and attended international conferences virtually.

In early 2020 the MWC hosted the following international scientists;

- **Professor Pinchas Cohen, University of Southern California, USA**
  Professor Cohen is a world leader in mitochondria and aging. He visited New Zealand in February 2020 and presented seminars on 'Mitochondrial systems biology in health and disease' at the University of Auckland and the Malaghan Institute for Medical Research in Wellington before giving the annual Fraser Lecture at the University of Otago, Christchurch. During his visit he met with groups of MWC investigators at each of these locations.

- **Professor Jim Lorens, University of Bergen, Norway**
  Professor Lorens research is focussed on immune-oncology and drug resistance. He visited New Zealand in February 2020 to speak at the Auckland Cancer Society Research Centre 2020 Symposium – see page 43. MWC also organised for Professor Lorens to travel to Dunedin to present a seminar 'The role of AXL in cancer therapy resistance: bench to beside' at the University of Otago Department of Pathology on the 17th February.

External funding

Many of the projects within the Maurice Wilkins Centre research programme are supported by co-funding from other sources. The Centre also targets a proportion of its research budget to initiate and develop new projects to the point where they will become successful in securing competitive funding.

New Zealand public good funding

In 2020-21 Maurice Wilkins Centre investigators were awarded new grants worth more than $43 million from New Zealand public funding sources (other than the TEC) for research projects to be carried out over the next one to five years, including over $16 million from the Health Research Council of New Zealand, $3 million from the Marsden Funds and $22 million from the Ministry of Business, Innovation and Employment Endeavour Fund.

New Zealand commercial funding

In 2020-21 Maurice Wilkins Centre investigators secured new funding of over $800,000 from New Zealand trusts or companies to support research.

International funding

In 2020-21 Maurice Wilkins Centre investigators secured new funding of over $770,000 from international sources to support research.

Governance and management

Maurice Wilkins Centre Board

Between January 2020 - June 21 the MWC Board Members were; Mr Bill Falconer (Chair), Professor Conan Fee (University of Canterbury), Professor Dave Harper (Victoria University of Wellington), Professor John Hosking (University of Auckland), Professor Jim Metson (University of Auckland), Ms Maxine Simmons (Biocatalyst Ltd), and Professor Warren Tate (University of Otago).

Ms Maxine Simmons' term with the Board ended in late 2020 after joining the Board in 2007 as an independent representative. Her experience in the scientific and commercial community has been very valuable to the MWC Directors and leadership team over this time as well as her enthusiasm for the Centre to reach its' potential. Maxine's contribution to the Centre was acknowledged at a MWC Celebration Event in June 2021, held to mark the achievements of the last six years of the MWC. The event was attended by the MWC Management PIs, Directorate and Board members. The MWC gratefully acknowledges Maxine's contribution to the Board and the Centre over the last 14 years.

Professor Conan Fee and Professor John Hosking also completed their terms as MWC Board Members in June 2021 after joining the Board in 2015 and 2014 respectively. Their advice and support of the MWC leadership team over this time has been appreciated. The MWC also thanks Conan and John for their service to the Board and the Centre.

MWC Celebration Event in Auckland (L to R): Emily Parker, Rochelle Ramsay, Warren Tate, Mike Eccles, John Hosking, Peter Shepherd, Maxine Simmons, Adam Patterson, Bill Falconer, Cris Print, Rod Dunbar, Nikki Moreland, Margaret Brimble, Shaun Lott, Antony Braithwaite, Rinki Murphy, Kurt Krause and Greg Cook.

The MWC Board met five times in 2020; March, May, July, September and December, and in March and May of 2021. In the first half of 2020, the Board continued to provide advice and direction on MWC leadership as well as on strategy and preparations for the CoRE re-bid interview and selection process in August 2020.

During 2020 the Board monitored progress with delivery of the final year of the 2018-2020 MWC CoRE research and outreach programmes and approved funding recommendations for allocation of contestable resources to new research projects.

The Board advised on the 2020 implementation of the China–Maurice Wilkins Centre Collaborative Research Programme (C-MWC), funded by a Catalyst:Strategic grant from the Ministry of Business, Innovation and Employment, and recommended appointment of the Programme Director. In 2021 the Board approved the funding recommendations for the first round of collaborative research projects supported by this programme.

In the latter half of 2020 and in 2021 the Board has continued to provide advice and guidance to the MWC Directorate on strategy and implementation of the plan for the new MWC CoRE grant that started on the 1st July 2021. This has included advice on the revised management structure, the process for and appointment of the inaugural Research Leadership Forum members and strategy for future engagement with Māori and Pacific peoples.

Management Committee

The Maurice Wilkins Centre Management Committee consists of the following principal investigators; Distinguished Professor Greg Cook (Director, University of Otago), Professor Emily Parker (Deputy Director, Victoria University of Wellington), Distinguished Professor Dame Margaret Brimble (Deputy Director, University of Auckland), Professor Peter Shepherd (Deputy Director, University of Auckland), Distinguished Professor Bill Denny, Professor Rod Dunbar and Associate Professor Rinki Murphy (University of Auckland), Professors Antony Braithwaite, and Dave Grattan (University of Otago), and Professor Ian Hermans (Malaghan Institute of Medical Research).
The Management Committee controls the operation of the Centre, under the guidance of the MWC Board and the Scientific and Clinical Advisory Boards. The Committee met nine times during 2020, and once in June 2021.

The committee continued to review research progress against the 2018-2020 MWC plan and manage the MWC research, training and outreach programmes including the allocation of resources through the Flexible Research Programme. The committee assisted with preparation of a plan for the six month extension of the 2018-2020 MWC programme to the 30th June 2021 as well as reviewing and advising on implementation of the China–Maurice Wilkins Centre Collaborative Research Programme (C-MWC). A number of committee members were also involved in preparations for the CoRE re-bid interview and selection process in August 2020 and the subsequent 2021-2024 MWC plan.

Non-management Principal Investigators

This role includes leading specific areas of the research programme and other initiatives of strategic importance as required. In 2020-21 the majority of this group were active in leading aspects of the MWC research programme, particularly the Flagship research programmes. Members of this group were also involved in developing future research strategy for the Centre alongside the MWC leadership team.

Ten non-management Principal Investigators continued in this position in 2020-21:

Professor Vic Arcus (University of Waikato), Professor Gary Evans (Victoria University of Wellington), Professors Mike Eccles, Debbie Hay, Kurt Krause and Tony Merriman (University of Otago), Professor Cris Print, Associate Professors Shaun Lott, Adam Patterson and Nikki Moreland (University of Auckland).

Investigator Strategy Forum

This forum, convened by the MWC Director, is a representative body for all MWC principal and associate investigators and meets twice a year with one forum involving all principal investigators (management, non-management and emeritus) and a second forum which all principal and associate investigators are invited to attend.

In 2020 during preparation for the CoRE re-bid interview several strategic meetings involving the existing and new principal investigators as well as some key associate investigators were held.

The second forum, attended by principal, associate and affiliate investigators, was held as part of the 2021 MWC Research Symposium in Auckland on the 10th of February. The forum was run as three separate meetings, each focusing on future strategy for one of the research themes of the new CoRE grant from the 1st July.

Scientific Advisory Board and Clinical Advisory Board

The members of the Scientific Advisory Board (SAB) for 2015 to June 2021 were; Professor Peter Andrews (Australia), Dr Christopher Cooper (USA), Professor Suzanne Cory (Australia), Dr Jilly Evans (USA), Professor Adrian Harris (UK), Professor David James (Australia), Dr Warwick Tong (Australia), Professor Mark Walker (Australia) Dr Jeanette Wood (Switzerland) and Dr Giles Yeo (UK).

The Scientific Advisory Board met virtually with the Director and Deputy Directors on the 28th July 2020 to provide valuable support and advice from an international perspective to the team prior to the CoRE rebid interview in early August.

Over 2020 and 2021 the Clinical Advisory Board (CAB) consisted of; Professor Mark McKeage (Auckland DHB and University of Auckland), Associate Professor Rinki Murphy (Auckland DHB, Counties Manukau DHB and University of Auckland), Dr Helen Lunt (Canterbury DHB and University of Otago), Dr Sally Roberts (Auckland DHB and University of Auckland), Professor John McCall (Southern DHB and University of Otago), Dr Deborah Williamson (The Royal Melbourne Hospital and University of Melbourne), Associate Professor Jeremy Krebs (Capital and Coast DHB and University of Otago) and Dr James Ussher (Southern Community Laboratories and University of Otago)

The CAB did not formally meet during 2020 and early 2021, however a number of the members were involved in development of the ongoing research strategy of the MWC as part of the CoRE re-bid process.

Project Review Committee

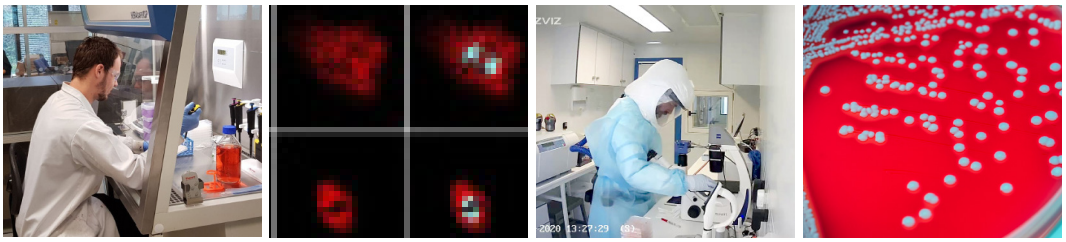
The Project Review Committee was convened twice in 2020, to review applications submitted in 2020 for inclusion in the Flexible Research Programme and make recommendations to the Management Committee and MWC Board on which applications to approve.
In February/March 2020, the Project Review Committee consisted of 11 principal investigators and 3 associate investigators from the University of Otago, Victoria University of Wellington, the Malaghan Institute of Medical Research and the University of Auckland. The committee was split into three sub-committees with each meeting separately to review applications for support through either Category 2,3 and 4 of the Flexible Research Programme (see section beginning on page 47 for details of categories).

In April 2020, the Project Review Committee consisted of 4 principal investigators and 2 associate investigators from the University of Otago, Victoria University of Wellington and the University of Auckland. The committee reviewed applications for Category 6 of the Flexible Research Programme.

Two further rounds of the Flexible Research Programme were held over this reporting period. In September 2020 the MWC offered stipend and tuition fee support for PhD students who had been severely impacted by COVID-19 delays. In March 2021 MWC also invited applications for Categories 2 and 3 with priority for projects that had been adversely affected by COVID-19 delays in 2020. For both these rounds the MWC Director and Deputy Directors reviewed the applications and made recommendations for funding.

Projects funded through the Flexible Research Programme are listed from page 48 of this report.

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY



Research Outputs

Publications

In 2020 and 2021, research outputs from Maurice Wilkins Centre investigators included more than 1450 peer-reviewed scientific papers published in international journals, and numerous patents granted, published or filed. The Maurice Wilkins Centre contributed support to the following 131 scientific papers and reviews and 28 patents granted, published or filed.

Papers and Reviews

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10. Bracegirdle, J., Gordon, D. P., Harvey, J. E., & Keyzers, R. A. (2020). Kinase-Inhibitory Nucleoside Derivatives from the Pacific Bryozoan Nelliella nelliiformis. Journal of Natural Products, **83**(2), 547-551.

11. Brooks, A. E. S., Iminitoff, M., Williams, E., Damani, T., Jackson-Patel, V., Fan, V., James, J., Dunbar, P. R., Feisst, V. Sheppard, H. M. (2020). Ex Vivo Human Adipose Tissue Derived Mesenchymal Stromal Cells (ASC) Are a Heterogeneous Population That Demonstrate Rapid Culture-Induced Changes. Frontiers in Pharmacology, **10**, 1695

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15. Calvert, M. B., Furkert, D. P., Cooper, C. B., & Brimble, M. A. (2020). Synthetic approaches towards bedaquiline and its derivatives. Bioorganic and Medicinal Chemistry Letters, **30**(12), 127172

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Presentations

The significance of the research being done by Maurice Wilkins Centre investigators and their teams is demonstrated by more than 170 invitations to give international and national presentations between January 2020 – June 2021. Due to the ongoing COVID 19 pandemic, most talks were presented virtually, though some were given in-person in early 2020, or where international meetings were held within the trans-Tasman travel bubble. The presentations included invited lectures at conferences and seminars at academic institutions in Australia, Belgium, Canada, China, Columbia, Germany, India, Italy, Malaysia, Portugal, Singapore, the United Arab Emirates, the United Kingdom and the United States of America, as shown in the diagram below.

Presentation highlights

The highlights listed below include plenary and keynote lectures of note and are in addition to numerous invited presentations at New Zealand based events and international meetings.

- Distinguished Professor Dame Margaret Brimble delivered the Cornforth Lecture at the University of Sussex (UK) Life Sciences Symposium in January 2021. The lecture showcased the Brimble lab's research on the synthesis of peptides, lipopeptides and glycopeptides as a platform for the discovery and development of peptide therapeutics. Margaret has also given invited talks to national audiences.
- Distinguished Professor Greg Cook was a keynote speaker for the Cornell Antimicrobial Resistance Seminar Series in October 2020. Greg presented his talk 'New strategies to combat AMR at the human-animal interface' to an online audience. Greg has also given two invited talks to national audiences.
- Professor Debbie Hay gave several plenary presentations in 2020/21, including 'Discovery and development of novel amylin agonists for obesity and diabetes' at the Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists (ASCEPT) and Australasian Pharmaceutical Science Association (APSA) Joint Virtual Scientific Meeting (November 2020). Debbie talked to CGRP receptor biology at the virtual 14th European Headache Federation Congress (July 2020). Additionally, Debbie gave the presentation

'Small molecules and antibodies targeting the CGRP system' at the virtual scientific meeting for the Nomenclature and Standards Committee of the International Union of Basic and Clinical Pharmacology (NC-IUPHAR) in April 2021. Debbie has also given three invited talks to international and national audiences.

- Professor Emily Parker gave the online keynote presentation 'Reconstructing Fungal Indole Diterpene Biosynthesis' at the Royal Society of Chemistry meeting, Directing Biosynthesis Online in April 2021.
- Professor Cris Print gave the virtual keynote presentation 'A clinical-research-industry collaboration to bring blood genomics to cancer patients in New Zealand' at OncomineWorld: A virtual NGS education meeting held in Singapore (April 2021). Additionally, Cris gave a plenary presentation at the NZ Society for Oncology Precision Health Meeting (Wellington) in November 2020. Cris was invited twice in 2020 to give plenary presentations at Australasian Genomic Technologies Association Meetings (AGTA) events. Firstly, Cris presented in September at the AGTA Live event on the use of cancer genomic technologies, and secondly at the Thomas Ashworth Symposium AGTA Live symposium where Cris talked to 'New opportunities for plasma diagnostics in New Zealand' in October. Cris has also given four invited talks across New Zealand.
- Professor Peter Shepherd was a keynote speaker at Deep History of Obesity Meeting in May 2021, University of Cambridge (UK), where he presented 'The CREBRF R457Q variant: An example of a population specific gene variant impacting on obesity and type-2 diabetes risk'. Peter also delivered the Pat Usher Lecture for the Division of Endocrinology, at Harvard Medical School in September 2020.
- Dr Mihnea Bostina presented the plenary talk 'Viruses and Electron Microscopy' at the Cryo-Electron Microscopy Workshop in February 2020. The workshop was held at the Indian Institute of Science (Bangalore, India). Mihnea was also invited to speak at the 12th Asia-Pacific Microscopy Conference in Hyderabad, India (February 2020).
- Dr Sarah Diermeier acted as a session chair and gave the plenary presentation 'Mammary tumor associated RNAs as new therapeutic targets in cancer' at the Keystone eSymposia "Non-coding RNAs: Biology and Applications", held May 2021. Sarah was also a plenary speaker at Queenstown Molecular Biology Meeting (QMB) in September 2020 and has given invited talks to national audiences.
- Professor Peter Fineran gave a joint keynote presentation with post-doctoral researcher Dr Lucia Malone at the Association for General and Applied Microbiology (Vereinigung für Allgemeine und Angewandte Mikrobiologie - VAAM) Annual Conference in April 2021. Peter presented the virtual talk 'A jumbo plan to evade CRISPR-Cas defences' at the FG Mikrobielle Viren (Viruses of Microbes Special Group) session. Peter has also given seven invited talks to international and national audiences.
- Professor Christian Hartinger gave the plenary address 'With Metal-based Pharmacophores and Bioactive Ligands Towards Multitargeted Anticancer Agents' at the Camerino Summer School (web edition), based in Italy. The "International School of Chemistry" meeting took place in September 2020.
- Having presented at the 2020 symposium, Associate Professor Dong-Xu Liu was invited back as a keynote speaker at the 5th Hangzhou Xianghu International Breast Cancer Symposium in May 2021 (China). Dong-Xu presented that talk 'Progress on Non-invasive Biomarkers for Early Diagnosis of Breast Cancer' and also gave a plenary talk at the International Breast Cancer Diagnosis and Treatment Seminar - Ice City, (Harbin, China), in November 2021.
- Dr Sally Roberts was a keynote speaker at the MEDLAB Middle East congress held in Dubai (United Arab Emirates) June 2021. Sally gave the virtual address 'Laboratory Leadership

during COVID-19' via video conference. At the New Zealand Medical Association (NZTA) Rotorua General Practice Conference & Medical Exhibition meeting in June 2021, Sally gave the plenary presentation 'Keeping Safe- Preventing COVID-19 Transmission in the Workplace'.

- Professor Tim Woodfield was a keynote speaker at the (virtual) World Biomaterials Congress in December 2020. The event was held in Glasgow (UK) and Tim gave the presentation 'Designing bioink, bioresin and spheroid bioassembly platforms'. In addition, Tim gave two national keynote addresses in Wellington. The first was at the New Zealand Collagen Symposium (March 2021), entitled 'Designing gelatin-based bioinks for 3D Bioprinting and Regenerative Medicine'. The second at the NZ Orthopaedic Association (NZOA) Annual Conference in October 2020. Tim spoke to 'Current status in stem cell therapies and 3D printing in orthopaedics' at the NZOA Special Session on Regenerative Medicine.
- Professor Antony Fairbanks delivered the 2021 Ferrier Public Lecture in April, entitled 'Sugars and viruses; the roles that carbohydrates can play in both viral infection and immune evasion'. In addition, Antony presented another two times to national audiences in 2021 and was invited to give a virtual talk at Sikkim University (Gangtok, India) in July 2020.
- Professor Colin Green gave The John Blandford Lecture at the Australia and New Zealand Cornea Society in Auckland (February 2020). Colin's talk was entitled 'The Journey from Bench to Bedside: Trials, Tribulations and Triumphs'.
- Professor Merilyn Hibma gave a keynote address at the Australasian Extracellular Vesicle Conference (February 2020), held in Auckland. Merilyn's address was entitled 'Immune regulation mediated by HPV extracellular vesicles'. Merilyn has also given two invited talks to national audiences.
- Dr Anna Pilbrow presented a plenary talk at the Cardiac Society of Australia and New Zealand (CSANZ) New Zealand Branch's Annual Meeting in June 2021. The meeting took place in Rotorua and Anna's talk was entitled 'A precision medicine approach to predicting progression for coronary artery disease to heart failure'. In addition, Anna was invited twice to present to national audiences.
- Dr Timothy Allison gave a keynote presentation 'Native MS and its use to investigate protein structure and interactions' at the Mass Spectrometry Research and Capability Showcase in Auckland (December 2020).
- Dr Robert Weinkove gave the plenary presentation 'Chimeric antigen receptor (CAR)T-cell therapy for myeloma' at the Myeloma Forum in Queenstown, November 2020. Robert also gave several talks to both national and international audiences as an invited speaker.

Collaborations

The Maurice Wilkins Centre contributes to and benefits from an extensive network of national and international collaborations that have been built up by our investigators over a number of years. The research funded through the Centre has strengthened many of these existing links and helped to establish new collaborations.

The international and national reach of these collaborations is shown in the diagram below.

New academic collaborations

- Cardiovascular Research Institute Basel (Switzerland)
- Chinese Academy of Sciences (China)
- City University Hong Kong (Hong Kong)
- Copenhagen University Hospital (Denmark)
- Daegu Gyeongbuk Institute of Science and Technology (South Korea)
- deCODE Genetics (Iceland)
- Delft University of Technology (NL)
- Dresden University (Germany)
- Durham University (UK)
- European Spallation Source (Sweden)
- Harbin Medical University (China)
- Hudson Institute (USA)
- Icahn School of Medicine at Mount Sinai (USA)
- John Curtin School of Medical Research (Australia)
- Justus-Liebig University Giessen (Germany)
- Kanazawa University (Japan)
- Konan University (Japan)
- Lawson Health Research Institute (Canada)
- Lund University (Sweden)
- Macquarie University (Australia)
- MRC Mitochondrial Biology Unit (UK)
- Oslo University Hospital (Norway)

- Pohang University of Science and Technology (POSTECH) (South Korea)
- Radboud University (Netherlands)
- Rice University (USA)
- Roche Pharmaceuticals, Switzerland (Switzerland)
- University College Dublin (Ireland)
- Università degli Studi "G. d'Annunzio"Chieti-Pescara (Italy)
- University College London (UK)
- University of Ghent (Belgium)
- University of Tokyo (Japan)
- University of Arizona (USA)
- University of California Riverside (USA)
- University of Copenhagen (Denmark)
- University of Guelph (Canada)
- University of Kentucky (USA)
- University of Lille (France)
- University of Saskatchewan (Canada)
- University of Texas (USA)
- University of Toronto (Canada)
- University of Victoria (Canada)
- Utrecht University (Netherlands)
- Vaccine Formulation Institute (Switzerland)
- Wadsworth Center (USA)
- Yamasaki University (Japan)

Continuing academic collaborations

Asia Pacific

- Australian National University (Australia)
- Baker Heart and Diabetes Institute (Australia)
- Centre for Cancer Biology (Australia)
- Children's Medical Research Institute (Australia)
- Edith Cowan University (Australia)
- Flinders University (Australia)
- Garvan Institute of Medical Research (Australia)
- Griffith University (Australia)
- La Trobe University (Australia)
- Menzies Institute for Health Research (Australia)
- Monash University (Australia)
- Murdoch Children's Research Institute (Australia)
- National Health and Medical Research Council (Australia)
- Peter MacCallum Cancer Centre (Australia)
- QIMR Berghofer Medical Research Institute (Australia)
- Queensland University of Technology (Australia)
- Telethon Kids Institute (Australia)
- The Peter Doherty Institute for Infection and Immunity (Australia)
- University of Adelaide (Australia)
- University of Melbourne (Australia)
- University of New South Wales (Australia)
- University of Newcastle (Australia)
- University of Queensland (Australia)
- University of Sydney (Australia)
- University of Technology Sydney (Australia)
- University of Wollongong (Australia)
- Walter and Eliza Hall Institute (Australia)
- Fudan University (China)
- Fujian University of Traditional Chinese Medicine (China)
- Guangzhou Institute of Biomedicine and Health (China)
- Jinan University (China)
- National Center for Protein Sciences (China)

- Peking University (China)
- Qingdao University (China)
- Shenzhen University (China)
- Shanghai Jiao Tong University (China)
- Xinjiang University (China)
- Zhejiang University (China)
- University of Guam (Guam)
- University of Hong Kong (Hong Kong)
- Indian Institute of Science (India)
- Indian Statistical Institute (India)
- Pondicherry University (India)
- Shiv Nadar University (India)
- Universitas Gadjah Mada (Indonesia)
- Universitas Padjadjaran (Indonesia)
- Hokkaido University Hospital (Japan)
- Keio University (Japan)
- Kyushu University (Japan)
- Nagasaki University (Japan)
- National Defence Medical College (Japan)
- Okinawa Institute for Science and Technology (Japan)
- RIKEN Institute (Japan)
- Tokyo Institute of Technology (Japan)
- Tottori University (Japan)
- Seoul National University (South Korea)
- National University of Malaysia (Universiti Kebangsaan Malaysia) (Malaysia)
- University of Malaya (Malaysia)
- Ministry of Health and Sports (Myanmar)
- University of Sarghoda (Pakistan)
- University of Papau New Guinea (Papau New Guinea)
- Samoa Cancer Society (Samoa)
- A*Star (Singapore)
- Institute of Medical Biology (Singapore)
- Nanyang Technological University (Singapore)
- National University of Singapore (Singapore)
- National Cheng Kung University (Taiwan)

UK and Europe

- Medical University of Innsbruck (Austria)
- Medical University of Vienna (Austria)
- University of Graz (Austria)
- University of Vienna (Austria)
- University of Antwerp (Belgium)
- Université Libre de Bruxelles (Belgium)
- University of Namur (Belgium)
- VIB-KU Leuven Center for Brain & Disease Research (Belgium)
- Czech Academy of Sciences (Czech Republic)
- University of Eastern Finland (Finland)
- Centre National de la Recherche Scientifique (France)
- Claude Bernard University (France)
- Commissariat Ã l'Energie Atomique et aux Energies (France)
- Institut national de la recherche agronomique (France)
- Micalis Institute (France)
- Paris VI (France)
- University of Lyon (France)
- Université de Montpellier (France)
- Université de Picardie Jules Verne (France)
- University of Strasbourg (France)
- University of Paris-Sud (France)
- Braunschweig University of Technology (Germany)
- Charité - Universitätsmedizin (Germany)
- Free University of Berlin (Germany)
- Hamburg University of Applied Sciences

(Germany)

- Jacobs University (Germany)
- Kerckhoff Klinik (Germany)
- Max Planck Institute (Germany)
- RWTH Aachen University (Germany)
- Technical University of Dortmund (Germany)
- The Helmholtz Association of German Research Centers (Germany)
- University Medical Center Hamburg-Eppendorf (UKE) (Germany)
- University of Freiburg (Germany)
- University of Hamburg (Germany)
- University of Hannover (Germany)
- Universität des Saarlandes (Germany)
- University of Würzburg (Germany)
- Fondatione Bruno Kessler (Italy)
- Vilnuis University (Lithuania)
- University of Maastricht (Netherlands)
- University Medical Center Utrecht (Netherlands)
- Norwegian University of Life Sciences (Norway)
- University of Bergen (Norway)
- University of Oslo (Norway)
- Consejo Superior de Investigaciones Científicas (Spain)
- Karolinska Institute (Sweden)
- Research Institutes of Sweden (Sweden)
- Uppsala University (Sweden)
- University of Gothenburg (Sweden)
- École polytechnique fédérale de Lausanne (EPFL) (Switzerland)
- University Hospital Zurich (Switzerland)
- University of Zurich (Switzerland)
- Eurogout (Switzerland)
- Birckbeck, University of London (UK)
- Defence Science and Technology Laboratory (UK)
- Guy's Hospital (UK)
- Imperial College London (UK)
- Keele University (UK)
- London School of Hygiene and Tropical Medicine (UK)
- Queen Mary University of London (UK)
- UK Research and Innovation (UK)
- University of Aberdeen (UK)
- University of Bath (UK)
- University of Birmingham (UK)
- University of Bristol (UK)
- University of Cambridge (UK)
- University of Dundee (UK)
- University of East Anglia (UK)
- University of Edinburgh (UK)
- University of Exeter (UK)
- University of Leeds (UK)
- University of Lincoln (UK)
- University of Liverpool (UK)
- University of Manchester (UK)
- University of Nottingham (UK)
- University of Oxford (UK)
- University of Reading (UK)
- University of Southampton (UK)
- University of Warwick (UK)

North America

- British Columbia Cancer Agency (Canada)
- McGill University (Canada)
- Hospital for Sick Children (Canada)
- Montreal Neurological Institute and Hospital (Canada)
- Queen's University (Canada)
- University Laval (Canada)

- University of British Columbia (Canada)
- University of Montreal (Canada)
- University of Ottawa (Canada)
- University of Western Ontario (Canada)
- York University (Canada)
- AbbVie (USA)
- American Heart Association (USA)
- Arizona State University (USA)
- Albert Einstein College of Medicine (USA)
- Arkansas State University (USA)
- Binghamton University (USA)
- Brown University (USA)
- Cedars-Sinai Hospital (USA)
- Cleveland Clinic (USA)
- Cold Spring Harbor Laboratory (USA)
- Colorado State University (USA)
- Columbia University (USA)
- Connecticut College (USA)
- Cornell University (USA)
- Dartmouth College (USA)
- Emory University (USA)
- Fralin Life Science Institute, Virginia Tech (USA)
- Georgia Institute of Technology (USA)
- Georgia State University (USA)
- Global Alliance for TB Drug Development (USA)
- Hackensack Meridian Health Centre for Discovery and Innovation (USA)
- Harvard University (USA)
- Indiana University (USA)
- Johns Hopkins University (USA)
- Kent State University (USA)
- La Jolla Institute for Allergy and Immunology (USA)
- Massachusetts Institute of Technology (USA)
- Mayo Clinic Arizona (USA)
- Mercer University (USA)
- Michigan State University (USA)
- Moffitt Cancer Center (USA)
- National Institutes of Health (USA)
- New York University (USA)
- Penn State University (USA)
- Phoenix Children's Hospital (USA)
- Rockefeller University (USA)
- Rochester Institute of Technology (USA)
- Rutgers University (USA)
- Sanford Burnham Institute of Medical Research (USA)
- Space Foundry Ltd (USA)
- Stanford University (USA)
- Stevens Institute of Technology (USA)
- St Jude Children's research Hospital (USA)
- Stony Brook University (USA)
- Temple University (USA)
- Texas A&M University (USA)
- University of Alabama (USA)
- University of California, Irvine (USA)
- University of California, Davis (USA)
- University of California, Los Angeles (USA)
- University of California, San Diego (USA)
- University of Chicago (USA)
- University of Colorado (USA)
- University of Connecticut (USA)
- University of Georgia (USA)
- University of Illinois, Chicago (USA)
- University of Illinois, Urbana-Champaign (USA)
- University of Iowa (USA)
- University of Houston (USA)
- University of Maryland (USA)
- University of Miami (USA)
- University of Michigan (USA)
- University of Minnesota (USA)

- University of Missouri (USA)
- University of North Carolina (USA)
- University of Oklahoma (USA)
- University of Pennsylvania (USA)
- University of Pittsburgh (USA)
- University of Southern California (USA)
- University of Texas South Western (USA)
- University of Texas (USA)
- University of Utah (USA)
- University of Wisconsin (USA)
- Vanderbilt University (USA)
- Wake Forest University (USA)
- Washington University (USA)
- Weill Cornell Medical College (USA)
- Winona State University (USA)
- Yale University (USA)

South America

- Instituto de Biología y Medicina Experimental (Argentina)
- Federal University of Minas Gergais (Brazil)
- Federal University of Sao Paulo (Brazil)

Africa

- University of KwaZulu-Natal (South Africa)

Additional Regions

- Ben Gurion University of the Negev (Israel)
- Novosibirsk State University (Russia)
- Russian Academy of Sciences (Russia)

Uptake of Maurice Wilkins Centre research and expertise

The primary focus of the Maurice Wilkins Centre is on finding new ways to effectively target human disease. The Centre drives the translation of its research and expertise from the laboratory through a variety of partnerships with commercial and non-profit organisations, in New Zealand and overseas.

The creation of spin-out companies is an important pathway for the development of the Centre's research, and this often brings in international partners and funds. Maurice Wilkins Centre investigators maintain close links with such companies and further work is regularly contracted back to their research groups.

The Maurice Wilkins Centre also partners with established companies, and the knowledge and expertise developed by its investigators in scientific fields vital to the biotechnology and pharmaceutical sectors are highly sought after. Examples of contract research and the provision of facilities to industry are outlined on page 31 of this report. The Centre's investigators also act as consultants for a number of national and international companies.

In 2020 and 2021 the expertise of Maurice Wilkins Centre investigators was sought by:

- Abbott Diagnostics NZ Ltd
- Aeroqual Ltd
- Allergan Pharmaceuticals (USA)
- Amaroq Therapeutics Ltd
- Amgen Inc (USA)
- Aprea Therapeutics Inc (USA)
- Auckland Clinical Studies Ltd
- Auxilio Pharmaceuticals Ltd
- Avalia Immunotherapies Ltd
- Bayer Leverkusen (Germany)
- Biotelliga Ltd
- Bridgewest Ventures NZ
- Callaghan Innovation
- Cancer Research UK
- Canterbury Scientific Ltd
- Carr's Supplements NZ Ltd
- CoDA Therapeutics (NZ) Ltd
- Comvita Ltd
- Convert Pharmaceuticals SA (Belgium)
- Dairy Goat Cooperative Ltd
- Demuris Ltd (UK)
- Deosan NZ Ltd
- DockBio Holdings Ltd
- Elanco Animal Health Inc
- Eli Lilly and Company (USA)
- Evgen Pharma (UK)
- FIMECS Ltd (Japan)
- Firebrick Pharma Pty Ltd (Australia)
- Fisher and Paykel Healthcare Ltd
- Gilead Sciences Ltd (USA)
- GlycoSyn Ltd
- Hikurangi Bioactives Ltd
- ImmunoGenesis Inc (USA)
- InflammX Therapeutics Inc (USA)
- JunoFem Ltd
- Kea Therapeutics Ltd
- Kimer Med Ltd
- LifeArc (UK)
- Living Cell Technologies Ltd (Australia)
- Metavention Inc (USA)
- Mote Research Ltd
- Nacuity Pharmaceuticals Inc (USA)
- New Zealand Leather and Shoe Research Association

- New Zealand Pharmaceuticals Ltd
- OcuNexus Therapeutics Inc (USA)
- Ora Foods Ltd
- Orbis Diagnostics Ltd
- Quality Scientific Solutions LLC
- Rain Therapeutics Inc (USA)
- Rekover Therapeutics Ltd
- Roche Diagnostics NZ Ltd
- Ruakura Technologies Ltd
- SapVax LLC (USA)
- SCY Consulting Ltd
- South Pacific Sera Ltd
- Sphingotec GmBH Ltd (Germany)
- Suzhou Lixin Pharmaceutical Co. Ltd (China)
- Synthase Biotech Ltd
- Union Therapeutics A/S (Denmark)
- Upstream Medical Technologies Ltd
- Urigo Ltd
- Waste Management NZ Ltd
- Wellington Zhaotai Therapies Ltd
- Zoetis NZ Ltd
- Zoono Group Ltd

The establishment of partnerships with international non-profit organisations is another way in which the Maurice Wilkins Centre achieves uptake of its research and expertise. For example, Maurice Wilkins Centre investigators are involved with international organisations such as the

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

Awards and honours

MWC investigators, affiliates and students were acknowledged with a number of international and national honours in 2020-21:

- **Queen's Birthday Honours, Knights Companion of the New Zealand Order of Merit (ONZM)**

MWC Principal Investigator Distinguished Professor Bill Denny was knighted in the 2021 Queen's Birthday Honours for services to medical research. Bill was appointed an Officer of the New Zealand Order of Merit in 2003 for his contributions in the field of anticancer drug research and has continued to contribute greatly to a vast number of research fields, successfully bringing 15 drug candidates through from the discovery phase into clinical trials. A more detailed report of Bill's research can be found in the highlight story on page 9.

- **Kiwibank, New Zealander of the Year**

Microbiologist and MWC Associate Investigator Dr Siouxsie Wiles received the 2021 Kiwibank New Zealander of the Year Award. Siouxsie is an award-winning science communicator and worked with cartoonist Toby Morris throughout the COVID-19 pandemic to make the science of the pandemic understandable to the public. Their cartoons are widely viewed and even utilised by the New Zealand Government as part of their official pandemic communications.

- **Prime Minister's Science Awards, Te Puiaki Whakapā Pūtaiao**

Professor Michael Baker (MWC Associate Investigator) received the Prime Minister's 2020 Science Communication Prize for his contribution to the COVID-19 response. Michael has provided expert commentary on the coronavirus and the developing pandemic having given more than 2,000 interviews since January 2020. He has also taken numerous opportunities to address and correct misinformation in the public domain. Michael received two other awards in 2020 for his contribution to the COVID-19 response and to public health in New Zealand more widely. These were the Critic and Conscience of Society Award (from Universities New Zealand) and the Public Health Champion Award (Public Health Association).

- **The Royal Australian Chemical Institute, Alan Sargeson Lectureship**

MWC Associate Investigator, Dr Muhammad Hanif, received the award in 2021 which acknowledges significant and innovative individual contributions to the field of Inorganic Chemistry. Muhammad's research interests lie in medicinal inorganic chemistry and bioinorganic chemistry.

- **Web of Science Group, Highly Cited Researcher Award**

Having written multiple highly cited papers, ranking in the top 1% of citations for Pharmacology & Toxicology, Professor Debbie Hay (MWC Associate Investigator) was recognised with a Web of Science Highly Cited Researcher Award in 2020. Debbie's research focuses on G protein-coupled receptors (GPCRs), some of the most important drug targets.

- **Genetics Society of AustralAsia (GSA), Award for Excellence in Education**

Dr Phillip Wilcox (MWC Principal Investigator) received the 2021 GSA Award for Excellence in Education for his work as an outstanding genetics educator. Phil's research interests span applied genomics and statistical genetics. He is heavily involved in the delivery of programmes supporting indigenous engagement in research, including the Summer Internship for Indigenous peoples in Genomics (SING) programme.

- **Roche, Translational Cancer Research Award and Fellowship**

MWC Associate Investigator Dr Rachel Purcell was named a Roche Fellow for 2020 and announced as the joint winner of the 2020 NZ Society for Oncology (NZSO) Roche Translational Cancer Research Fellowship at the NZSO Annual Virtual Conference. The prize was awarded to Rachel to advance knowledge of how inflammatory bowel disease (IBD) related colorectal cancer develops, aiming to ultimately improve treatment for patients.

- **Health Research Council, Sir Charles Hercus Fellowship**

The Sir Charles Hercus Fellowship is intended to build New Zealand's future capability to conduct world-class research. This prestigious award provides four years of full support for outstanding emerging researchers who are committed to a career in health research in New Zealand.

In 2020, two MWC Investigators were awarded fellowships which they started in 2021; Dr Adam Middleton, (University of Otago) for the project 'Protein degradation: from understanding to application' and Dr Sunali Mehta (University of Otago) for the project 'Adapting to a CINister genome: regulating chromosomal instability and metastasis'. A more detailed report of Sunali's research can be found in the highlight story on page 13.

- **Royal Society Te Apārangi, Rutherford Discovery Fellowship**

In 2020, Dr Jemma Geoghegan (MWC Associate Investigator) was awarded the prestigious Rutherford Discovery Fellowship for her research project entitled 'Ecological barriers and drivers of virus emergence'. Jemma is an evolutionary biologist and virologist with a strong research focus in emerging infectious disease.

Alongside the awards listed above, many of our early to mid-career investigators were recognised by their home institutions and have gained other notable awards or opportunities in 2020–21. Examples of these include:

- **Maurice and Phyllis Paykel Trust (MMPT), Post-Doctoral Fellowship**

After completing his PhD at Victoria University in Melbourne, MWC Affiliate Investigator Dr Chris Hedges has returned to New Zealand and is now based in Dr Troy Merry's lab at the University of Auckland. Chris was awarded a MPPT post-doctoral fellowship to support his research investigating markers of mitochondrial adaptation to exercise in humans.

- **Ministry of Education, Teach NZ Scholarship**

Dr Hamish Angus was awarded a Teach First NZ scholarship in November 2020 to begin his career in the education sector. Hamish completed his PhD in Professor Roslyn Kemp's lab at the University of Otago where he studied 'Crohn's disease: an in vitro analysis of T lymphocyte function and response to commensal microbes'.

- **Royal Society Te Apārangi, Catalyst Grants**

Dr Catherine Tsai (MWC Early Career Committee member and Affiliate investigator) was awarded a short-term JSP Post-Doctoral Fellowship at University of Tokyo in combination with a Royal Society Te Apārangi Catalyst Grant in 2020. Due to COVID-19 restrictions, Catherine's travel to Toyoko has been delayed to May 2022 where she will investigate the development influenza vaccine.

Summary

Broad category	Detailed Category	2015	2016	2017	2018	2019	2020	2021
FTEs by Category	Principal investigators	1.70	1.72	1.75	1.72	1.90	2.10*	1.03*
	Associate investigators	2.09	2.50	2.38	1.49	8.22	4.77*	2.08*
	Postdoctoral fellows	7.29	13.98	14.80	8.89	7.80	9.69*	8.07*
	Research technicians	0.57	0.63	5.28	4.80	9.34	4.93*	5.93*
	Administrative/support	2.81	3.27	3.66	2.86	2.65	2.99*	2.01*
	Research students	14.58	18.44	22.92	17.91	9.41	5.18**	1.42**
	Total	29.04	40.54	50.79	37.67	39.32	29.66	20.54
Headcounts by category	Principal investigators	19	20	20	24	24	24	24
	Associate investigators	145	155	164	184	243	254	257
	Postdoctoral fellows	20	24	43	39	33	38	34
	Research technicians	2	4	15	28	41	27	21
	Administrative/support	7	5	8	7	6	7	6
	Research students	23	69	77	75	69	93	75
	Total	216	277	327	357	416	443	417
Peer reviewed research outputs by type	Journal articles	84	93	95	92	113	89	42
	Book chapters	1	1	2	1	4	-	-
	Conference Proceedings	9	-	-	-	-	-	-
	Total	94	94	97	93	117	89	42
Value of external research contracts awarded by source (000)	Vote Science and Innovation contestable funds	2,831	2,351	2,659	4,680	4,330	3,781	1,575
	Domestic- other non-Govt	373	432	673	586	406	467	511
	Overseas	2,068	1,153	222	599	244	233	116
	Other	118	154	167	830	1,494	487	165
	Total	5,390	4,090	3,721	6,695	6,474	4,968	2,367
Commercial activities	Patent applications	4	10	16	9	17	15	8
	Patents granted	5	0	1	2	2	3	2
Students studying at CoRE by level	Doctoral degree	21	58	66	70	62	73	58
	Other	2	11	11	5	7	20	18
	Total	23	69	77	75	69	93	76
Number of students completing qualification by level	Doctoral degree	-	5	10	14	11	22	14
	Other	1	7	7	3	3	6	9
	Total	1	12	17	17	14	28	23
Immediate post-study graduate destinations	Employed in NZ	1	4	7	12	6	17	17
	Employed overseas	-	5	5	3	5	5	-
	Further study in NZ	-	-	2	2	1	4	3
	Other	-	-	1	0	1	1	3
	Unknown	-	3	2	0	1	1	-
	Total	1	12	17	17	14	28	23

*In addition to the directly funded FTE in the above table in 2020-21, Principal investigators contributed to an additional 0.92 FTE (2020) and 0.13 FTE (2021) in time only, and 0.1 FTE (2020) was co-funded. Additional confunding for: Associate investigators was 6.75 FTE (2020) and 1.74 FTE (2021), Postdoctoral fellows was 7.16 FTE (2020) and 2.45 FTE (2021), Research technicians was 5.28 FTE (2020) and 1.35 FTE (2021), and Administrative/ Support staff was 0.79 FTE (2020) and 0.6 FTE (2021).

**Research students had an additional 75.37 EFT (2020) and 33.68 EFT (2021) co-funded from other sources.

2021 figures are for 1st January to 30th June 2021 only.

Summary Financial Statement 2020-21

Funding summary for the period 1st January 2020 - 30th June 2021

Actuals

($000)

Funding received	
Tertiary Education Commision grant	10,623
Surplus/(Deficit) carried forward*	-895
Total funding received	**9,728**
Salaries and salary related costs	3,468
Overheads	3,712
Project costs	2,284
Travel	-25
Postgraduate students	289
Total expenditure	**9,728**
Net surplus/(Deficit)	-

This report covers the period from 1st January 2020 - 30th June 2021 and details funding received and fund distributed to collaborative partners of the CoRE. The current period expenditure includes prior period adjustments.

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

*In 2020 the CoRE carried forward a net deficit of -895. This deficit has been added to the 2020-21 income.

Directory

Governing Board

Mr Bill Falconer (Chair)
Prof Conan Fee
Prof John Hosking
Prof Jim Metson
Ms Maxine Simmons
Prof Warren Tate
Prof Dave Harper

Scienctific Advisory Board

Prof Peter Andrews (Chair)
Dr Chris Cooper
Prof Suzanne Cory
Dr Jilly Evans
Prof David James
Dr Warwick Tong
Dr Jeanette wood

Principal investigators (management)

Name	Department	Home Institution
Prof Gregory Cook (Director)	Department of Microbiology and Immunology	University of Otago
Prof Dame Margaret Brimble (Deputy Director)	School of Chemical Sciences	University of Auckland
Prof Emily Parker (Deputy Director)	Ferrier Research Institute	Victoria University of Wellington
Prof Peter Shepherd (Deputy Director)	Department of Molecular Medicine and Pathology	University of Auckland
Prof Antony Braithwaite	Department of Pathology	University of Otago
Prof Bill Denny	Auckland Cancer Society Research Centre	University of Auckland
Prof Rod Dunbar	School of Biological Sciences	University of Auckland
Prof Dave Grattan	Department of Anatomy and Structural Biology	University of Otago
Prof Ian Hermans	Malaghan Institute of Medical Research	
Assoc Prof Rinki Murphy	Department of Medicine	University of Auckland

Principal investigators (non-management)

Name	Department	Home Institution
Prof Vic Arcus	Department of Biological Sciences	University of Waikato
Prof Michael Eccles	Department of Pathology	University of Otago
Prof Gary Evans	Ferrier Research Institute	Victoria University of Wellington
Prof Debbie Hay	Department of Pharmacology and Toxicology	University of Otago
Prof Kurt Krause	Department of Biochemistry	University of Otago
Assoc Prof Shaun Lott	School of Biological Sciences	University of Auckland
Prof Tony Merriman	Department of Biochemistry	University of Otago

Dr Nikki Moreland	Department of Molecular Medicine and Pathology	University of Auckland
Assoc Prof Adam Patterson	Auckland Cancer Society Research Centre	University of Auckland
Prof Cris Print	Department of Molecular Medicine and Pathology	University of Auckland

Principal investigators (emeritus)

Name	Department	Home Institution
Prof Ted Baker	School of Biological Sciencecs	University of Auckland
Prof Garth Cooper	School of Biological Sciencecs	University of Auckland
Prof Peter Hunter	Auckland Bioengineering Institute	University of Auckland
Prof John Fraser	Faculty of Medical and Health Sciences	University of Auckland

Associate investigators

Name	Department	Home Institution
Prof David Ackerley	School of Biological Sciences	Victoria University of Wellington
Assoc Prof Jane Allison	School of Biological Sciences	University of Auckland
Dr Timothy Allison	School of Physical and Chemical Sciences	University of Canterbury
Prof Bob Anderson	Auckland Cancer Society Research Centre	University of Auckland
Prof Greg Anderson	Department of Anatomy	University of Otago
Dr Catherine Angel	School of Biological Sciences	University of Auckland
Dr Amir Ashoorzadeh	Auckland Cancer Society Research Centre	University of Auckland
Dr Jonathan Astin	Department of Molecular Medicine and Pathology	University of Auckland
Prof Paul Atkinson	School of Biological Sciences	Victoria University of Wellington
Dr Htin Aung	Department of Microbiology and Immunology	University of Otago
Prof Bruce Baguley	Auckland Cancer Society Research Centre	University of Auckland
Prof Michael Baker	Department of Public Health	University of Otago, Wellington
Assoc Prof Adam Bartlett	Department of Surgery	University of Auckland
Dr Ghader Bashiri	School of Biological Sciences	University of Auckland
Prof Chris Battershill	Faculty of Science and Engineering	University of Waikato

Prof Mike Berridge	Malaghan Institute of Medical Research	
Assoc Prof Mik Black	Department of Biochemistry	University of Otago
Dr Cherie Blenkiron	Department of Molecular Medicine and Pathology	University of Auckland
Prof Stefan Bohlander	Department of Molecular Medicine and Pathology	University of Auckland
Dr Michael Booth	Waitemata Specialist Centre	Waitemata District Health Board
Dr Mihnea Bostina	Department of Microbiology and Immunology	University of Otago
Prof Nicola Brasch	Department of Chemistry	Auckland University of Technology
Dr Anna Brooks	School of Biological Sciences	University of Auckland
Prof Peter Browett	Department of Molecular Medicine and Pathology	University of Auckland
Prof Colin Brown	Department of Physiology	University of Otago
Dr Rosemary Brown	Department of Anatomy	University of Otago
Dr Christina Buchanan	Department of Molecular Medicine and Pathology	University of Auckland
Dr Alan Cameron	School of Chemical Sciences	University of Auckland
Prof Vicky Cameron	Department of Medicine	University of Otago, Christchurch
Assoc Prof Rebecca Campbell	Department of Physiology	University of Otago
Prof Richard Cannon	Faculty of Dentistry	University of Otago
Dr Philip Carter	The Institute of Environmental Science and Research (ESR)	
Assoc Prof Aniruddha Chatterjee	Department of Pathology	University of Otago
Prof Lai-Ming Ching	Auckland Cancer Society Research Centre	University of Auckland
Assoc Prof Davide Comoletti	School of Biological Sciences	Victoria University of Wellington
Dr Lisa Connor	School of Biological Sciences	Victoria University of Wellington
Prof Jillian Cornish	School of Medicine	University of Auckland
Prof Murray Cox	Institute of Fundamental Sciences	Massey University
Assoc Prof Margaret Currie	Department of Pathology	University of Otago, Christchurch
Assoc Prof Gabriele Dachs	Department of Pathology	University of Otago, Christchurch
Prof Nicola Dalbeth	School Medicine	University of Auckland

Dr Kirsty Danielson	Department of Surgery and Anaesthesia	University of Otago, Wellington
Prof Alan Davidson	Department of Molecular Medicine and Pathology	University of Auckland
Dr Stephanie Dawes	School of Biological Sciences	University of Auckland
Prof Catherine Day	Department of Biochemistry	University of Otago
Dr Ofa Dewes	Molecular Medicine and Pathology	University of Auckland
Dr Sarah Diermeier	Department of Biochemistry	University of Otago
Prof Renwick Dobson	School of Biological Sciences	University of Canterbury
Prof Paul Donaldson	School of Medical Sciences	University of Auckland
Dr Catherine Drummond	Department of Pathology	University of Otago
Prof Antony Fairbanks	Department of Chemistry	University of Canterbury
Dr Vaughan Feisst	School of Biological Sciences	University of Auckland
Assoc Prof Vyacheslav Filichev	Institute of Fundamental Sciences	Massey University
Prof Peter Fineran	Department of Microbiology and Immunology	University of Otago
Dr Jack Flanagan	Auckland Cancer Society Research Centre	University of Auckland
Dr Nicholas Fleming	Department of Pathology	University of Otago
Dr Martin Fronius	Department of Physiology	University of Otago
Dr Daniel Furkert	School of Chemical Sciences	University of Auckland
Prof Richard Furneaux	Ferrier Research Institute	Victoria University of Wellington
Dr Allan Gamble	School of Pharmacy	University of Otago
Dr Austen Ganley	School of Biological Sciences	University of Auckland
Dr Jemma Geoghegan	Department of Microbiology and Immunology	University of Otago
Dr Brent Gilpin	The Institute of Environmental Science and Research (ESR)	
Prof Michelle Glass	Department of Pharmacology	University of Otago
Dr David Goldstone	School of Biological Sciences	University of Auckland
Dr Pramod Gopal	Plant and Food Research	
Dr Anna Gosling	Department of Anatomy	University of Otago
Dr Gus Grey	Department of Physiology	University of Auckland
Dr Natasha Grimsey	Department of Pharmacology and Clinical Pharmacology	University of Auckland
Dr Yongchuan Gu	Auckland Cancer Society Research Centre	University of Auckland
Dr Chris Hall	Department of Molecular Medicine and Pathology	University of Auckland

Prof Mark Hampton	Free Radical Research Group	University of Otago, Christchurch
Dr Kiel Hards	Department of Microbiology and Immunology	University of Otago
Dr Elena Harjes	School of Fundamental Sciences	Massey University
Dr Lawrence Harris	Ferrier Research Institute	Victoria University of Wellington
Assoc Prof Paul Harris	School of Chemical Sciences	University of Auckland
Prof Christian Hartinger	School of Chemical Sciences	University of Auckland
Assoc Prof Joanne Harvey	School of Chemical and Physical Sciences	Victoria University of Wellington
Assoc Prof Michael Hay	Auckland Cancer Society Research Centre	University of Auckland
Assoc Prof Nuala Helsby	Department of Molecular Medicine and Pathology	University of Auckland
Dr Joanne Hewitt	Environmental and Food Virology/ Norovirus Reference Laboratory	Institute of Environmental Science & Research (ESR) Ltd
Prof Merilyn Hibma	Department of Pathology	University of Otago
Assoc Prof Tony Hickey	School of Biological Sciences	University of Auckland
Dr Joanna Hicks	Faculty of Science and Engineering	University of Waikato
Prof Philip Hill	Department of Preventive and Social Medicine	University of Otago
Dr Samantha Holdsworth	Department of Anatomy and Medical Imaging	University of Auckland
Dr Teresa Holm		University of Auckland
Prof Sarah Hook	School of Pharmacy	University of Otago
Dr Roger Hurst	Plant and Food Research	
Prof Julia Horsfield	Department of Pathology	University of Otago
Dr Sue Huang	The Institute of Environmental Science and Research (ESR)	
Dr Matloob Husain	Department of Microbiology and Immunology	University of Otago
Prof Brian Hyland	Department of Physiology	University of Otago
Dr Karl Iremonger	Department of Physiology	University of Otago
Assoc Prof Keith Ireton	Department of Microbiology and Immunology	University of Otago
Dr Chris Jackson	Department of Medicine	University of Otago
Dr Simon Jackson	Department of Microbiology & Immunology	University of Otago
Prof Geoff Jameson	Institute of Fundamental Sciences	Massey University

Dr Stephen Jamieson	Auckland Cancer Society Research Centre	University of Auckland
Dr Wanting Jiao	Ferrier Research Institute	Victoria University of Wellington
Dr Jodie Johnston	Department of Chemistry	University of Canterbury
Assoc Prof Peter Jones	Department of Physiology	University of Otago
Assoc Prof Rajesh Katare	Department of Physiology	University of Otago
Dr Iman Kavianinia	School of Chemical Sciences	University of Auckland
Dr William Kelton	Te Huataki Waiora School of Health	University of Waikato
Prof Roslyn Kemp	Department of Microbiology and Immunology	University of Otago
Prof Martin Kennedy	Department of Pathology	University of Otago, Christchurch
Dr Robert Keyzers	School of Chemical and Physical Sciences	Victoria University of Wellington
Dr Richard Kingston	School of Biological Sciences	University of Auckland
Assoc Prof Joanna Kirman	Department of Microbiology and Immunology	University of Otago
Assoc Prof Bronwyn Kivell	School of Biological Sciences	Victoria University of Wellington
Dr Jonni Koia	School of Science	University of Waikato
Assoc Prof Jeremy Krebs	Department of Medicine	University of Otago, Wellington
Prof Anne La Flamme	School of Biological Sciences	Victoria University of Wellington
Dr Sharon Ladyman	Department of Anatomy	University of Otago
Honorary Assoc Prof Goetz Laible	AgResearch	
Assoc Prof Regis Lamberts	Department of Physiology	University of Otago
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MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

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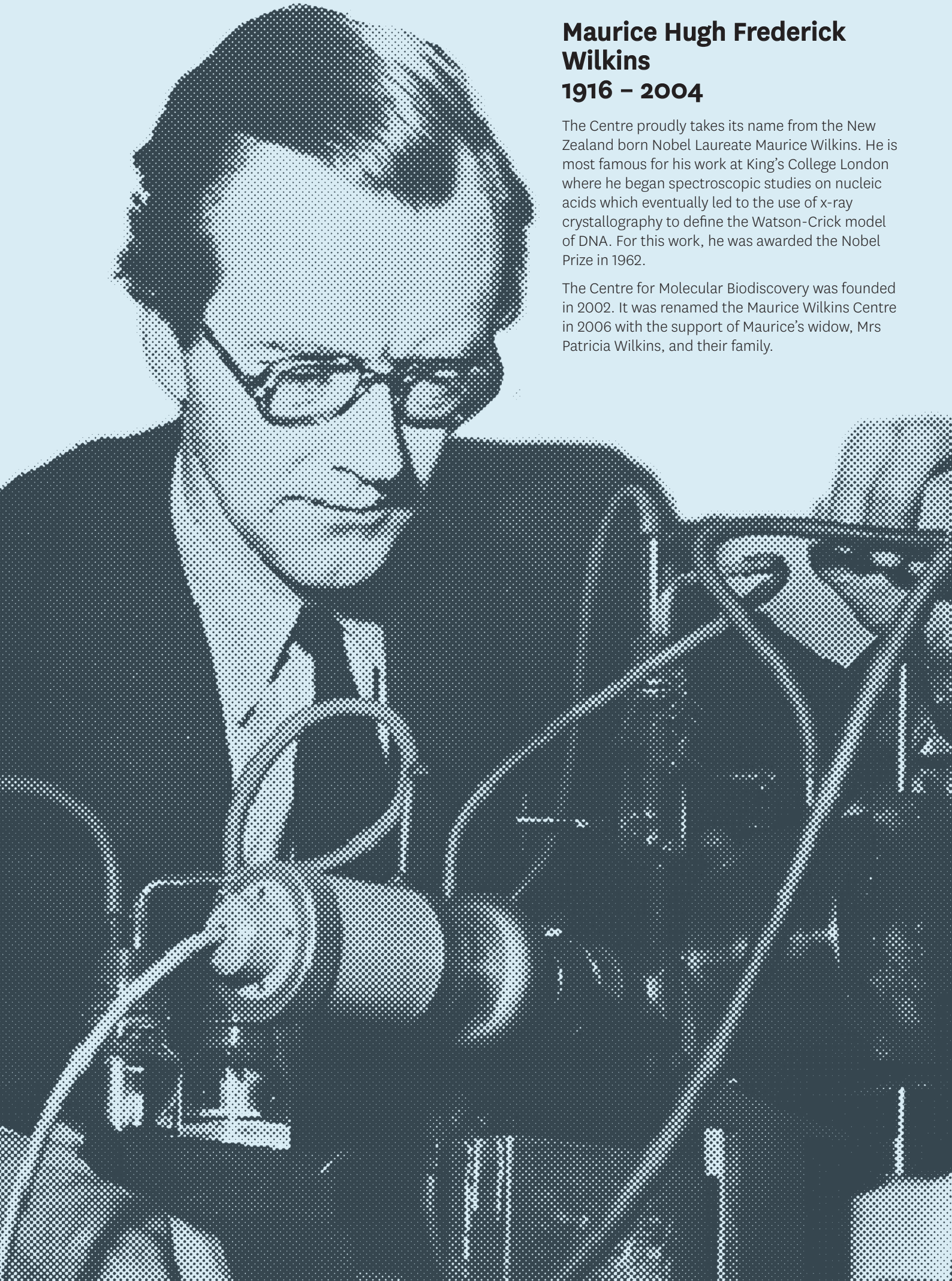

Maurice Hugh Frederick Wilkins
1916 – 2004

The Centre proudly takes its name from the New Zealand born Nobel Laureate Maurice Wilkins. He is most famous for his work at King's College London where he began spectroscopic studies on nucleic acids which eventually led to the use of x-ray crystallography to define the Watson-Crick model of DNA. For this work, he was awarded the Nobel Prize in 1962.

The Centre for Molecular Biodiscovery was founded in 2002. It was renamed the Maurice Wilkins Centre in 2006 with the support of Maurice's widow, Mrs Patricia Wilkins, and their family.