

MAURICE WILKINS CENTRE

New Zealand's Centre of Research Excellence
targeting human disease

Annual Report 2017

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.

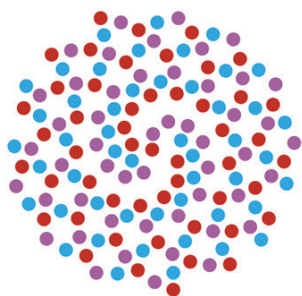
The Maurice Wilkins Centre is a multidisciplinary network that brings together leading biologists, chemists and computer scientists. At the end of 2017 it comprised 183 investigators throughout the country, and over 240 early-career affiliates, linking researchers from six Universities, three Crown Research Institutes and one private research institute. These investigators represent most of New Zealand's expertise in discovering new drugs, vaccines and diagnostic tools that proceed to clinical trials.

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

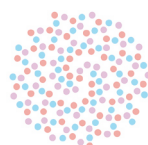
For more information on New Zealand Centres of Research Excellence see www.acore.ac.nz





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Director's Report



This report comes halfway through the Maurice Wilkins Centre's current funding cycle, so it comes at a time when we are reflecting on our performance but also looking ahead to future challenges.

As noted in the Highlights stories, the mid-term review of our performance was completed in 2017. This resulted in the highest level of endorsement from the review committee convened by the Royal Society Te Apārangi, but it also served as an opportunity to review our plans and re-configure to take advantage of new

opportunities.

Two particular changes initiated in 2017 stand out – the re-configuration of our Flagship programmes; and new forms of outreach initiatives connecting us with New Zealand communities.

In 2015 the MWC designated eight of its research themes as Flagship programmes, and allocated them additional resources to allow the teams involved to accelerate their progress towards defined research goals. These Flagship programmes embody one of the key roles of the MWC – bringing together multi-institutional teams of scientists from different disciplines that have the capability to generate breakthroughs in particular areas of medical need. This national approach to research questions enables increased scale and ambition in New Zealand research, through greatly improved sharing of ideas and resources, and co-ordination of research plans.

In 2017 all these Flagship programmes were reviewed, and the progress had been impressive – from the founding of new companies to take new treatments forward to the clinic, through to new ideas about the causation and optimal management of some of our most challenging diseases. As reported in one of our Highlight stories, participation in these national teams was also very positive for the career development of our early career scientists – not least because they were now closely connected to the top national expertise in their field of endeavour.

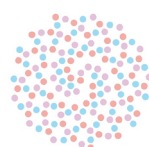
As we planned the Flagship programmes for 2018-20, it was obvious that even greater integration of these programmes was feasible. The four Cancer Flagships had all pivoted towards immune therapy for cancer, so as reported in the Highlights, we will now bring them together into a single Immuno-Oncology Flagship. This will allow an even greater level of co-operation between our leading researchers, bringing together knowledge of drug design, drug targeting to tumours, tumour immunology, vaccine design, pre-

clinical animal models and cancer genomics. Similarly two of the Flagships addressing infectious disease reflected that they were essentially focused on the same crucial issue – bacterial resistance to anti-microbial therapy – and so came together to form a new Anti-Microbial Resistance Flagship.

Why should this re-configuration be notable or important? Mainly because it points to the MWC community's increasing appetite to collaborate nationally at greater scale, effectively consolidating New Zealand's leading research "assets" in crucial fields of health research. This impetus delivers on one of the original aims of the Centres of Research Excellence (CoREs) – to break down barriers between institutions and research disciplines, and increase the efficiency and impact of New Zealand's research. But here it is driven by the researchers themselves rather than imposed top-down by science funding bodies. Under the CoRE structure, scientists can choose to collaborate at whatever scale works best for their science. The experience of MWC investigators is that highly communicative national networks of excellent colleagues generate increasing opportunities for exciting new collaborative research – and that the ability to use these networks for continuous peer review of ideas and experimental practice leads to snowballing scale and ambition. These effects offer a striking counterpoint to the fragmented nature of New Zealand's other research funding systems that tend to pit individual research teams against each other. We are therefore delighted to see our investigators continuing to expand their collaborative networks within the MWC, and look forward to the exciting new science that their pooled expertise will generate.

The MWC's outreach programmes also underwent review in 2017, and again were commended for their innovative approaches, especially in science education. As noted in the Highlights, our Deputy Director Professor Peter Shepherd was awarded the Royal Society Te Apārangi's Callaghan Medal, partly in recognition of his leadership of the MWC's professional development programme for secondary school biology teachers. But new opportunities continue to present themselves through the MWC's community links, and in 2017 two particularly exciting initiatives were launched.

In 2017 the MWC co-founded two joint research centres in the East Coast and Northland in partnership with leaders in Māori healthcare delivery and research. As described in the Highlights, the new partnerships with Ngāti Porou Hauora in Te Puia Springs, and The Moko Foundation in Kaitaia have both sprung from common interest – not only in addressing health issues disproportionately affecting Māori but also in improving understanding of science and medicine in affected communities. The new joint research centres aim to connect the powerful health initiatives already underway at both sites to the expertise of the MWC's scientists, enabling the local organisations to take their science to a new level. At the same time, the local centres will not only provide exciting new community-based research opportunities for MWC investigators, but will also provide opportunities for education. While some of these opportunities will revolve



around communication of scientific ideas and concepts to the public – and particularly to young people – the education of the MWC’s investigators in the actual health issues that most trouble communities that are remote from our large-city bases will be equally important. Hence in both research and education, the joint research centres represent genuine equal partnerships.

These initiatives represent a new phase of MWC’s engagement with Māori, answering the call for partnership from health-focused institutions founded and led by Māori, and ensuring that our research programme maintains its relevance to the health disparities faced by Māori. We welcome our new partners, Ngāti Porou Hauora Charitable Trust and The Moko Foundation, and celebrate the spirit in which these initiatives have been launched. We also note the need to continue listening and responding to community voices to ensure the MWC’s scientists help build knowledge within New Zealand communities as well as in the academic and industrial spheres.

Finally I’d like to thank all the excellent people who continue to drive the MWC to higher achievement, never content to rest on prior success. As always, it’s been a great pleasure to work with my brilliant scientific colleagues in the MWC – wonderful New Zealanders who inspire and delight with their fierce drive to discover. We scientists are supported and nurtured by our renowned administrative team, led by Research Operations Manager Rochelle Ramsay, without whom the MWC could not fulfil its ambitions. And this year, in light of the mid-term review, I’d like to pay particular thanks to our Board led by Bill Falconer, and our Science Advisory Board led Peter Andrews, who continue to ensure the MWC stays true to its mission and its responsibilities to New Zealand.

Rod Dunbar

Director

Mission and Strategic Outcomes

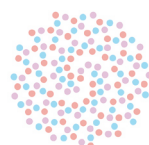
Mission

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 Peter Shepherd (left) and Professor Peter Tyler (right) receiving their awards at the Royal Society Te Apārangi Gala Dinner in 2017
Photos courtesy of the Royal Society Te Apārangi

Highlights

Honouring excellence

MWC investigators received several national and international awards in 2017, celebrating and honouring their contributions to science.

At the 2017 Royal Society Te Apārangi Annual Awards Gala Dinner, two MWC investigators, Professors Peter Tyler and Peter Shepherd, received highly prestigious awards. Professor Tyler, an MWC Associate Investigator based at Victoria University's Ferrier Institute, received the MacDiarmid Medal for his outstanding research in medicinal chemistry that has led to human benefit, especially the 2017 clinical approval of the anti-cancer drug Mundesine. "I'm very pleased to receive the award," said Peter. "I have been privileged to work with outstanding collaborators and fellow chemists." MWC

Deputy Director Professor Peter Shepherd, from the University of Auckland, received the Callaghan Medal for his pioneering work to raise the level of understanding of science by the New Zealand public through schools-based initiatives and public events linked to scientific conferences. "In our rush to find better ways to communicate science we have sometimes undervalued the most obvious way of doing this, which is through schools," said Peter.

MWC Associate Investigators Professors Vic Arcus and Richard Furneaux also received prestigious New Zealand awards in 2017 for their outstanding research. Professor Vic Arcus, from the University of Waikato, was awarded a James Cook Research Fellowship to support his work on 'Macromolecular Rate Theory (MMRT): The temperature dependence of biological rates from enzymes to ecosystems'. The James Cook Fellowship allows Professor Arcus to concentrate on his research full time for two years without the additional burden of administrative and teaching duties. Meanwhile, Professor Richard Furneaux of the Ferrier Institute, Victoria University of Wellington, won the BNZ Supreme Award at the 2017 KiwiNet Research Commercialisation Awards, for a range of chemistry projects over the past 25 years that have had successful commercial outcomes.

Professor Margaret Brimble, MWC Principal Investigator from the University of Auckland, received an Appreciation of Service Award at the International Union of Pure and Applied Chemistry (IUPAC) 2017 Conference held in São Paulo, Brazil, recognising her outstanding contribution to the global advancement of chemistry over the period that she chaired IUPAC. "This award was particularly exciting for us," said Margaret, "showing that chemists here in New Zealand are contributing to a big international organisation like IUPAC and to advancing chemistry worldwide."

MWC Founding Principal Investigator Professor Garth Cooper from the University of Auckland was conferred a Doctor of Science (DSc) degree by the University of Oxford's Medical Sciences Division. Professor Cooper received the Oxford DSc following an extensive independent examination of his scholarly output – "a formal examination of your life's work," he says – more than 200 publications over 30 years, mainly in the area of diabetes and metabolic disease.

A full listing of honours and awards won by Maurice Wilkins Centre investigators in 2017 can be found on page 84.





MWC researchers have been involved in development of a drug that has shown success in late stage non-small-cell lung cancer clinical trials
Image courtesy of © Sebastian Kaulitzki | Dreamstime.com

MWC welcomes landmark results for lung cancer drug

A novel lung cancer drug with strong development links to the MWC has shown impressive results in a large-scale international trial. Currently under review by the European Medicines Agency and under priority review with the US Food and Drug Administration, the drug's success highlights the impact of our scientists on the global stage.

MWC researchers based at the Auckland Cancer Society Research Centre (ACSRC) have long specialised in the development of drugs targeting a particular class of molecules within cancer cells called “tyrosine kinases”. One of the most important such molecules in cancer biology is called the epidermal growth factor receptor (EGFR), and this is the target of the new drug, dacomitinib, which blocks its action irreversibly.

In 2017, the development of this drug reached a major milestone when it was proven to be effective against a form of lung cancer in a late stage clinical trial (a large multinational phase III study called ARCHER 1050, in non-small-cell lung cancer). MWC Investigator Associate Professor Jeff Smaill, based at the ACSRC, welcomed the news.

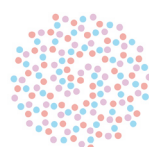
Jeff led the New Zealand side of a research collaboration with Pfizer in Ann Arbor that discovered dacomitinib. The project began with an earlier drug Jeff had made, called canertinib. This drug did not make it through to clinical use, but the subsequent collaboration with Pfizer sought to improve it by tweaking its chemical structure. The project resulted in the discovery of dacomitinib, and its selection for clinical development in 2003.

The story of this medicinal chemistry success was finally published in the Journal of Medicinal Chemistry in 2016. Later that year the team also published a book chapter describing the “scale up” of the chemistry – the development of processes that enabled them to produce 400 kg of the drug, so that it could enter the clinic.

“Chemists in New Zealand and the US spent about a year making well over a hundred compounds and testing them. Detailed evaluation eventually led to dacomitinib being the winner,” says Jeff. “Even though it was selected for clinical trials back in 2003, it's taken this long to come through the process, and finally show success in this large phase III trial.”

“It's very gratifying for the team of chemists in Auckland that did the hard work to see the final drug do well in phase III and come out as a leading compound of its type,” Jeff adds. “This shows us again that New Zealand scientists are making a big contribution globally – but it also shows that to develop drugs you need to have teams like ours with the right expertise – and you have to be in it for the long haul.”

Jeff and his long-term biology collaborator Associate Professor Adam Patterson lead an MWC Flagship programme developing novel third generation tyrosine kinase inhibitors that are activated only in the low oxygen environment of human tumours. Clinical trials of their first drug in this class, called tarloxotinib, began in 2012 and are anticipated to continue through 2019.





Top: Professor Peter Shepherd with Dr Lance O'Sullivan from the Moko Foundation

Bottom: MWC and Ngāti Porou Hauora representatives (Top, left to right) Rose Kahaki, Professor Peter Shepherd, Professor Dave Grattan, Dr Ofa Dewes, Connor O'Sullivan, (Bottom, left to right) Teepa Wawatai, Professor Tony Merriman, Dr Jennie Harrè Hindmarsh
Photographs courtesy of Peter Shepherd

Working with Māori in regional research centres

MWC Deputy Director Professor Peter Shepherd and Associate Investigator Professor Tony Merriman have been instrumental in forging relationships between the Centre and Māori communities in regional New Zealand, leading to the founding of two joint research centres in Northland and the East Coast.

Peter says such partnerships allow the MWC to target its research into areas of the country that have the greatest unmet healthcare needs.

“We are aiming to establish a permanent research presence in these local communities to tackle research questions most relevant to their needs. This is quite a different approach from what’s often occurred before, where researchers might collect samples in rural communities and return to the big cities to analyse them.”

Working with The Moko Foundation, a community organisation led by Northland GP Dr Lance O’Sullivan, a jointly managed research unit named Waharoa ki te Toi has been established in Kaitia. It will tackle key health challenges such as obesity, type-2 diabetes and rheumatic fever. The Moko Foundation will provide a local base and provide access to a range of innovative approaches to health monitoring and community links, while the MWC will bring access to top clinical and health researchers from across the country.

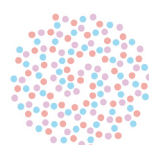
“This partnership is a different way to do health research and fits well with The Moko Foundation’s vision of connecting people with opportunities for a better Aotearoa New Zealand, by building meaningful and lasting partnerships through whakawhanaunga tanaga-based approaches,” says Lance, who is Chair of The Moko Foundation.

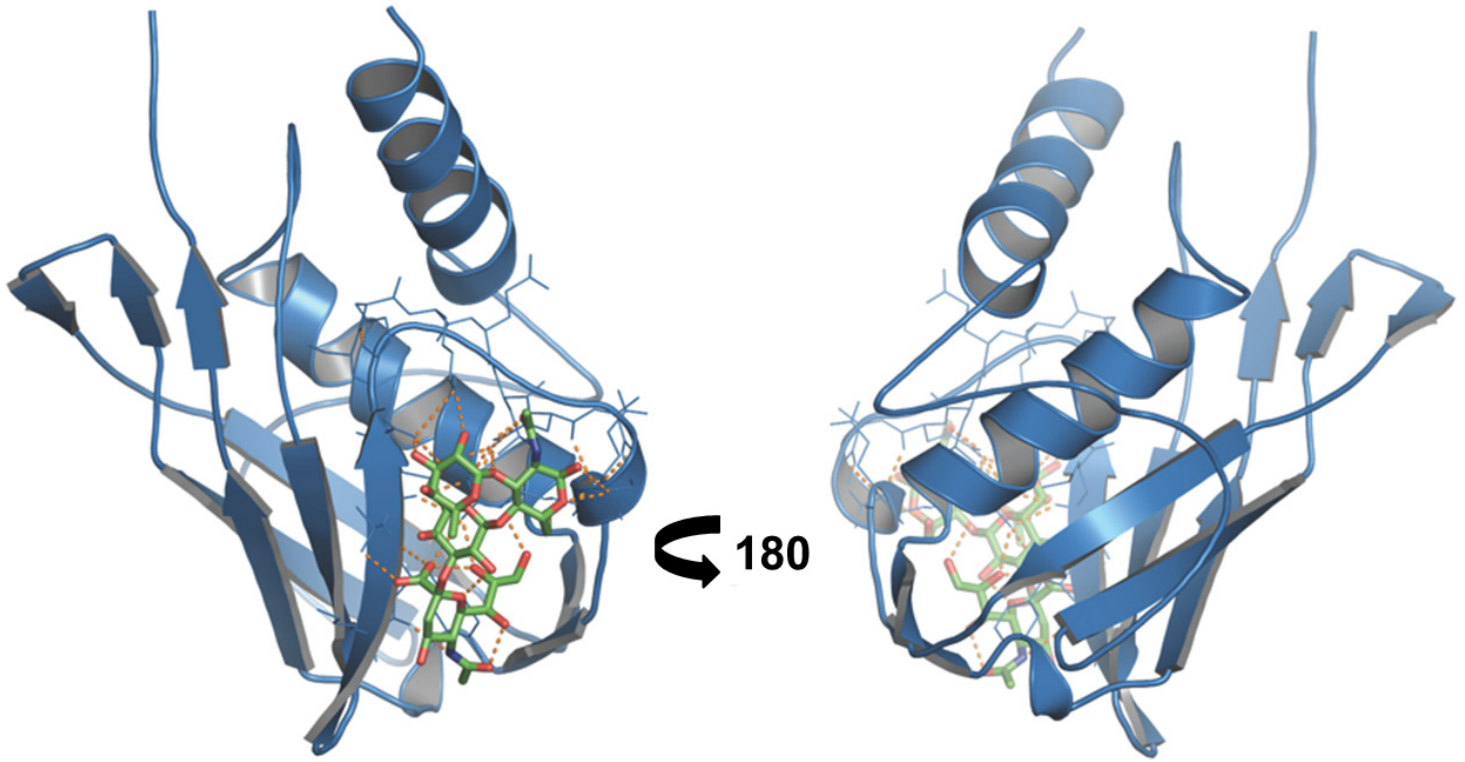
An agreement to establish a second such research centre has also been signed between the Ngāti Porou Hauora Charitable Trust and the MWC. Ngāti Porou Hauora is an iwi-led health provider based in Te Puia Springs, north of Gisborne, and brings strong clinical expertise to the research partnership. Similar to the Northland partnership, Ngāti Porou Hauora and MWC will collaborate for the benefit of the local area community by combining their respective knowledge, expertise and research capabilities.

Teepa Wawatai, Chair of the Ngāti Porou Hauora Charitable Trust Board, says, “Diabetes, gout, heart and kidney disease are four of the most important health issues affecting our people and Ngāti Porou Hauora is excited to be working as an equal partner in developing this very important research programme.”

The joint health research centre originates from the ‘10-year Gout and Related Conditions: Genetics and Environment research programme’ co-developed by Ngāti Porou Hauora and MWC Associate Investigator Professor Tony Merriman and his team from the University of Otago. The centre will take this programme to the next stage by informing better management of the health conditions that are preventing people from living well and living longer.

“This is a natural progression from the work we have been doing,” says Tony. “By building greater critical mass of researchers and clinicians through the MWC, it will allow us to translate scientific knowledge into meaningful health benefits for the community.”





Representation of the 3D structure of the SEIX8 virulence factor from *Staphylococcus aureus* in complex with sLeX (in red/green)
*Image adapted from Langley et al (2017)*¹

1. Langley, R. J., Y. T. Ting, F. Clow, P. G. Young, F. J. Radcliff, J. M. Choi, R. P. Sequeira, S. Holtfreter, H. Baker, and J. D. Fraser, Staphylococcal enterotoxin-like X (SEIX) is a unique superantigen with functional features of two major families of staphylococcal virulence factors. *Plos Pathogens* (2017) 13(9): e1006549.

Investigating a bacterial ‘master’ of disguise

MWC researchers have revealed a unique protein in a common bacterium that helps it disguise itself from immune attack. This discovery could help in development of new antimicrobials or vaccines.

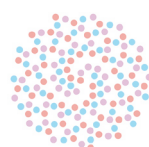
Staphylococcus aureus is found on many areas of the healthy human body including the skin, nose and airways. When wounds occur or the immune system is weakened, this bacterium can invade host tissue and cause a range of diseases from skin infections through to heart disease. Many types of *S. aureus* have also become resistant to antibiotics, such as the well-known methicillin-resistant *S. aureus* (MRSA) that causes such problems in both hospitals and the community. New antibiotics are needed to fight these kinds of serious infections, although vaccines to help prevent them would be even more beneficial. Studying the molecules made by *S. aureus* helps both approaches.

S. aureus makes proteins called ‘virulence factors’ that help it to invade host tissue and evade detection by the host immune system to avoid being destroyed. MWC research groups led by Professors John Fraser and Ted Baker have a long track record studying how these virulence factors work. This will allow the development of antivirulence therapies - antimicrobials that are designed to disarm the bacteria by targeting these virulence factors.

Two ‘families’ of these proteins are known as ‘superantigens’ (SAGs) and ‘superantigen-like’ (SSL) proteins. The SSLs attack the first lines of defence in the body, by disrupting the ‘innate’ immune system. The SAGs interfere with the body’s ability to produce effective antibodies against the bacterium – part of the ‘adaptive’ immune system. Together, these proteins help *S. aureus* cause disease and evade immune defences.

MWC Research Fellow Dr Ries Langley was working on SSL proteins when he came across a virulence factor known as ‘Staphylococcal enterotoxin-like X’ (SELX). “I first became interested in this protein as it had similar features to the SSL proteins and then another group published a paper describing it as a SAG. We used a number of different biological testing systems to work out what SELX does and showed that the protein had both SAG and SSL functions that were independent to each other.” This is the first and to date only virulence factor discovered that could work in a dual capacity to disrupt both the innate and adaptive parts of the host immune system.

Crucially, Ries and his colleagues were also able to generate a very detailed 3D map of the SELX protein using a technique called X-ray crystallography and advanced computer programmes. They were able to use this map to identify the key areas of the protein involved in protecting *S. aureus* from host defences and have published this and the functional data in 2017. Further study of how SELX and other virulence factors enable *S. aureus* to evade the immune system will help to inform the design and development of new vaccines and antimicrobials to fight ‘superbug’ infections in future.





School students measuring their fructose uptake as part of the 'Sugar in Schools' study
Photo courtesy of Rebekah Robinson & New Zealand Listener

‘Sugar in Schools’ study launched nationwide

The Maurice Wilkins Centre launched the ‘Sugar in Schools’ study in 2017 – a ground-breaking multi-year programme bringing science to thousands of schoolchildren across New Zealand, particularly those in regional communities.

Sugar in our diet breaks down in our gut to one part fructose, one part glucose – but although our bodies all take up glucose very well, we differ in how easily our bodies take up fructose. There is some evidence to suggest that higher levels of fructose in the body may increase the risk of diabetes or obesity. This new study aims to examine how individual children in New Zealand vary in their ability to take up fructose, especially those of Māori and Pacific Island descent who suffer higher rates of diabetes and obesity. The study is being rolled out in schools with regions including the Far North, Bay of Plenty and East Coast regions being prioritised

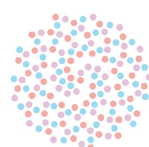
The students and their teachers are in charge of conducting the study themselves, with MWC scientists providing advice. This allows the students to experience being the ‘scientists’ while their science teachers provide context. The students measure fructose uptake using a test performed on their breath after drinking fructose.

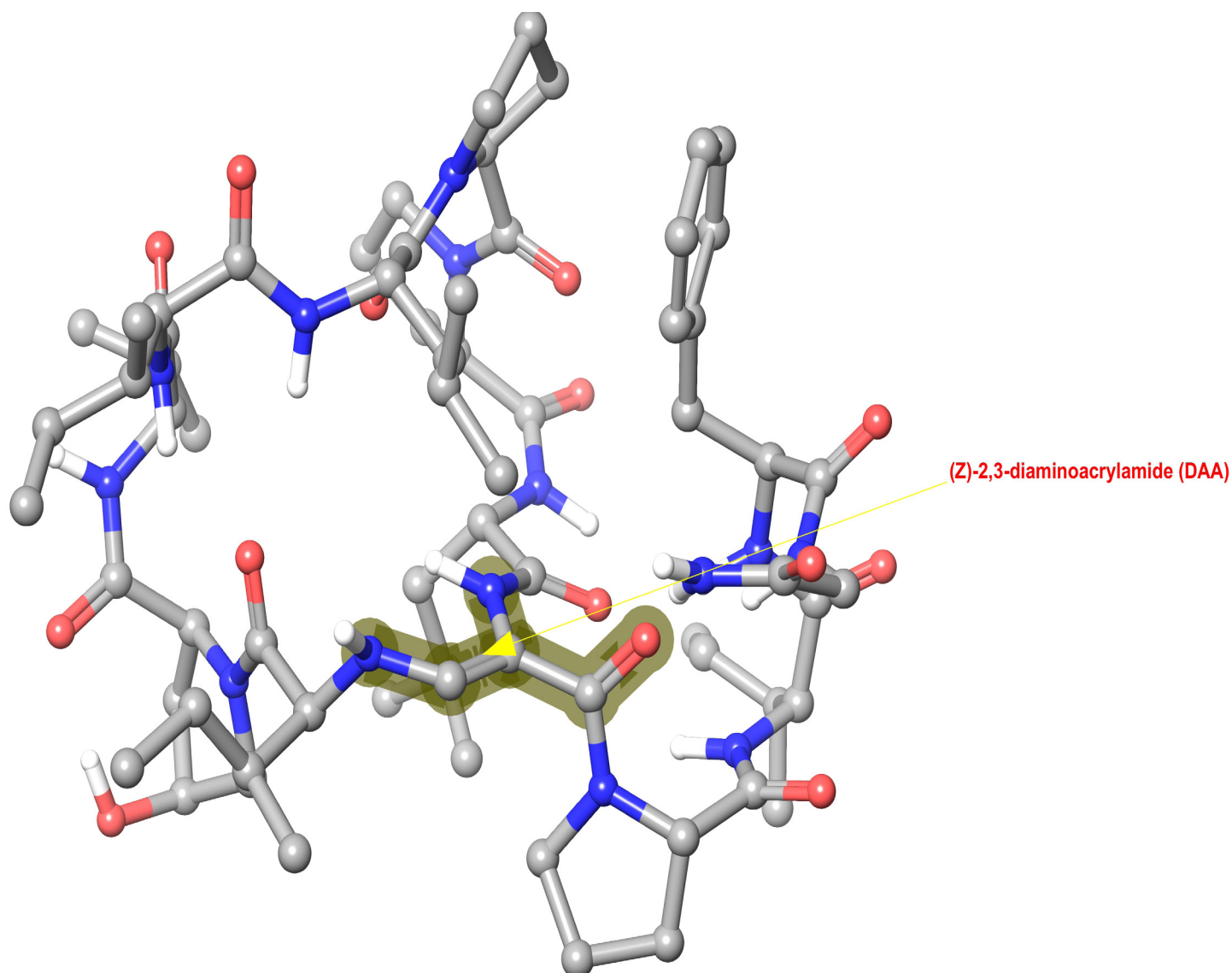
“We hit upon this idea of the fructose breath test, because it’s relatively easy to perform and it’s safe,” says Professor Peter Shepherd, Deputy Director of the Maurice Wilkins Centre.

An added benefit of the study is that it provides a way for upskilling teachers with the latest knowledge in metabolic diseases. “Biology teachers have a massive job to do,” says Peter. “They’re expected to cover everything from evolution to microbes to human health, across this huge spectrum of knowledge. So they value highly the professional development opportunities the MWC provides.”

The study’s launch event at Opotiki College featured free public talks and workshops aimed at changing attitudes within the community and boosting the interest and achievement of school students in science. Over the course of two days, 71 students from the college were enrolled into the study. The launch was also notable for being the first event of its kind organised through a collaboration known as Te Wheke – a unique collaboration of industry and local partners including Te Rangatahi o te Whenua Trust and Nga Uri o te Ngahere Trust.

During 2017, pilot studies were undertaken in 16 schools from Dunedin to Kaitaia, with 410 children tested in total. This included one study conducted by The Moko Foundation in Kaitaia in which the tests were performed in a wananga setting. The pilot studies involved Year 9 students being tested, with Year 13 students assisting, and over the next few years, many of the same students will be followed up. From 2018 communities in other parts of the country will be offered the opportunity to participate in the study, with a particular emphasis on bringing it to schools geographically remote from major population centres.





Representation of Callyaerin A, a naturally occurring *M. tuberculosis* inhibitor which has been synthesised for the first time by MWC investigators

Image courtesy of Margaret Brimble and Allan Zhang

1. Kalia, N. P., E. J. Hasenoeherl, N. B. Ab Rahman, V. H. Koh, M. L. T. Ang, D. R. Sajorda, K. Hards, G. Grüber, S. Alonso, G. M. Cook, M. Berney and K. Pethe, Exploiting the synthetic lethality between terminal respiratory oxidases to kill *Mycobacterium tuberculosis* and clear host infection. *PNAS* (2017) 114(28): 7426-7431.

2. Zhang S., De Leon Rodriguez L.M., Leung I.K.H., Cook G.M., Harris P.W.R., Brimble M.A. Total Synthesis and Conformational Study of Callyaerin A: Anti-Tubercular Cyclic Peptide Bearing a Rare Rigidifying (Z)-2,3- Diaminoacrylamide Moiety. *Angew Chem Int Ed Engl.* (2018) 57(14):3631-3635.

High-impact publications highlight TB research

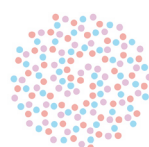
Researchers in the MWC's Tuberculosis Flagship Research Programme have had their long hours in the lab recognised through publications in world-leading journals.

Tuberculosis (TB), a highly contagious airborne disease caused by the bacterium *Mycobacterium tuberculosis*, is a leading cause of mortality worldwide – responsible for about 1.7 million deaths in 2016 according to the World Health Organisation. Of major concern is the increasing number of TB cases caused by multi-drug-resistant (MDR) or extensively-drug-resistant (XDR) strains. Only 50% of those that start treatment for MDR-TB are cured with current therapy. The MWC's TB Flagship brings together investigators from different institutions in New Zealand and supports a multipronged approach to tackling TB. Professor Greg Cook and his team at the University of Otago, for example, are looking for effective targets for anti-TB agents, while Professor Margaret Brimble's team at the University of Auckland are synthesising and assessing the potential of new agents to hit novel targets.

“The molecules within TB bacteria that generate energy are the most exciting new targets, and our team has identified several new drug-like molecules that can block energy production. We are currently testing variants of these molecules for their effects on TB bacteria, to identify drugs we can take towards clinical trials,” says Greg. “Our ultimate goal is to discover new drugs that act fast against MDR- and XDR-TB.

An innovative approach to combatting drug-resistant TB was also reported in the Proceedings of the National Academy of Sciences by Greg, his Otago colleague Dr Kiel Hards and a team of international collaborators¹. The team studied a promising drug that effectively targets a protein within TB's energy generating machinery. This drug stops the bacteria from growing but does not kill them. The team then used gene deletion techniques to show that the drug would be lethal to TB if a second protein within the same molecular pathway was also targeted. This work shows a clear pathway towards combination drug therapy that will kill all TB, including the strains that are resistant to current drugs.

Meanwhile, Professor Brimble, PhD student Shengping Zhang, MWC investigators Dr Paul Harris and Professor Cook, and colleagues, completed the first ever synthesis of callyaerin A, a naturally occurring product with high levels of potency against *M. tuberculosis*. Callyaerin A is a molecule with a unique structure with a feature that only occurs rarely in nature (technically it's a cyclic peptide with a rare (Z)-2,3-diaminoacrylamide motif). The team showed that this rare molecular feature is crucial to its activity against TB. The work was published in 2018 in leading chemistry journal *Angewandte Chemie* and designated as a ‘very important paper’ (VIP) and featured on the coveted cover page of the print version². The paper was also highlighted in Chemistry Views. “It's the first synthesis of a naturally occurring peptide active against TB containing that particularly challenging structural feature. So that in itself was a significant chemistry feat,” says Margaret.





Professor John Fraser

Photo courtesy of the University of Auckland

MWC salutes founding Principal Investigator

Professor John Fraser, Dean of the Faculty of Medicine and Health Sciences at the University of Auckland, has stood down from his position as Principal Investigator (PI) with the Maurice Wilkins Centre, moving into an Emeritus PI role.

Professor John Fraser, who has been with the Maurice Wilkins Centre since its formation in 2002, says the ability of the Centre to move with the times and its strong governance have been key to its success. “I always felt that we knew exactly where we were heading,” he says.

John has been at the University of Auckland since returning to New Zealand in 1988 from Harvard University, where he was undertaking postdoctoral research. At that time, John’s research was strongly focused on the discovery of bacterial super-antigens, their structural features and what made them such potent toxins. Funded by a Wellcome Senior Research Fellowship grant, his work achieved a seminal paper publication in *Nature* in 1989, which he describes as his biggest research achievement. “I was in the lab and it was the editor of *Nature* calling saying: ‘Can you send us a manuscript as soon as possible? We’ll make sure it gets published.’ I’m yet to meet anybody else that has had that experience – I don’t think they do that anymore!”

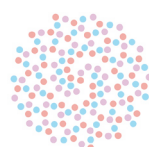
In the 1990s, John formed what would become a long-lasting and highly successful research collaboration in the area of microbial pathogenicity with Professor Ted Baker, Emeritus PI and the foundation Director of the Maurice Wilkins Centre.

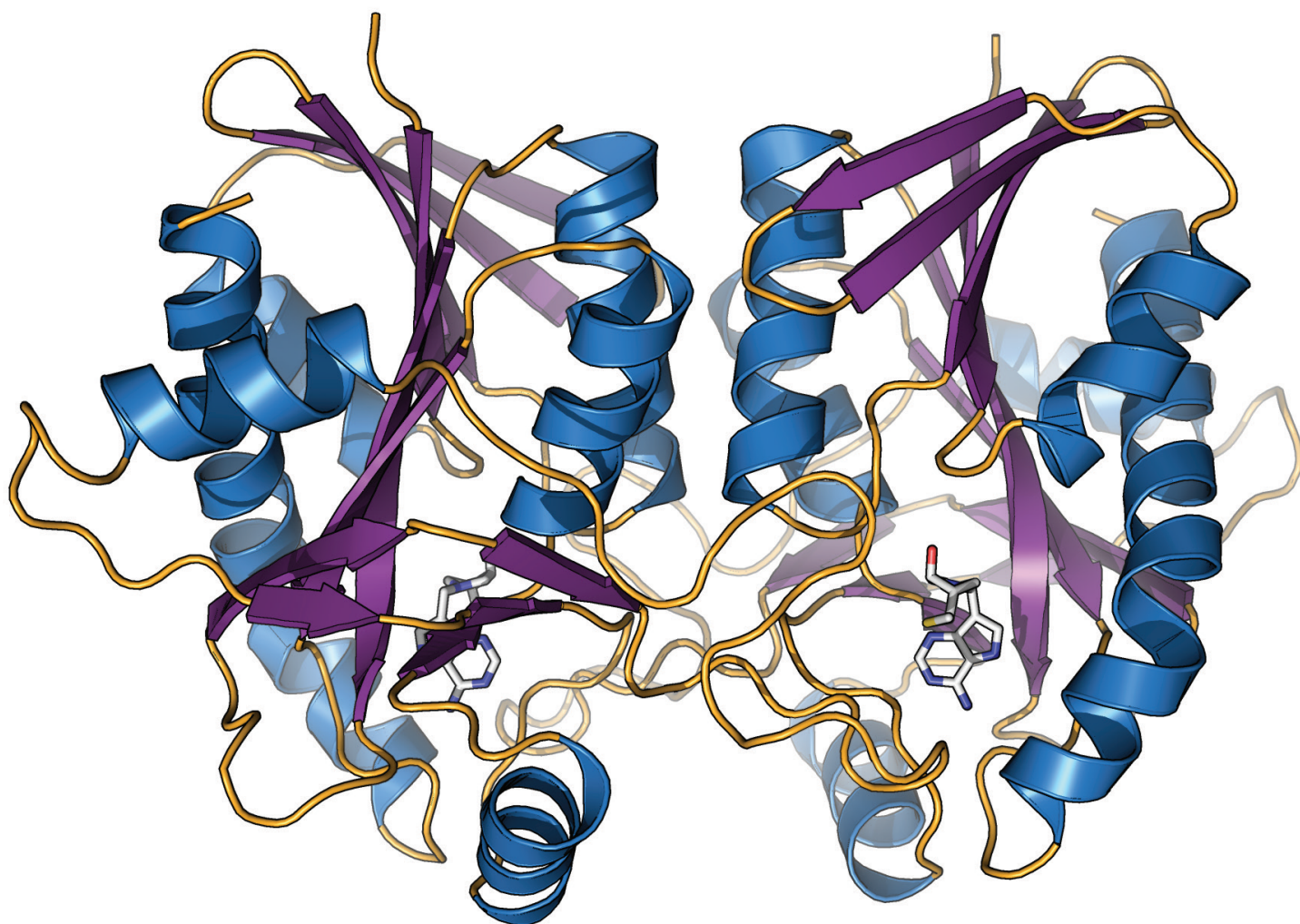
In the early 2000s, the Government invited submissions or proposals for the establishment of conglomerates of New Zealand’s top researchers in a variety of fields – Centres of Research Excellence (CoREs). That was the impetus for the idea for a biomedical sciences CoRE – the early beginnings of the Maurice Wilkins Centre.

“Really it was Ted that started it all off for us,” says John. “He called the group together and we sat around for several days deciding how we’d structure it. And it fell out very quickly, what areas we would work on... I can remember sitting at the kitchen table writing the application. Sunday afternoon, the week before it was due in, we were going through it all and it was coming down to the wire!”

“John is very generous,” says Ted. “He was vital to the establishment of this CoRE. We had complementary expertise, and both believed in research excellence as the foundation. And the highly coherent group of PIs we brought together made it all work.”

Looking back, Professor Fraser says the CoRE model has been integral to the development of the biomedical sciences field in New Zealand. “I think CoREs were transformative, particularly the Maurice Wilkins Centre. It has provided support more laterally throughout the country to provide opportunities for collaborative work, across multiple disciplines, which I think has been of huge benefit.”





A three-dimensional representation of a transition state analogue bound within the active site of a target protein
Image courtesy of Dr Scott Cameron

1. Moggre, G. J., M. B. Poulin, P. C. Tyler, V. L. Schramm and E. J. Parker, Transition State Analysis of Adenosine Triphosphate Phosphoribosyltransferase. *ACS Chemical Biology* (2017) 12(10): 2662-2670.

Smarter drug design

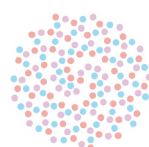
An advanced experimental technique linked to high powered computation is becoming an increasingly important tool for MWC researchers developing new drugs.

Discovery and development of new drugs involves many years of research and testing, and there is global interest in alternative methods capable of accelerating the path from identifying a target molecule to a drug in the clinic. MWC scientists throughout NZ are collaborating to improve a novel drug discovery technique – called “transition state analysis” – and open up new pipelines of effective medicines.

Enzymes are protein molecules that carry out chemical reactions in the body and in infectious agents. They are common targets for drugs because stopping an enzyme from working can switch off disease processes involving that particular enzyme. Most drugs are designed to fit tightly into a part of the enzyme called the active site and stop it from working. Transition state analysis involves a lot of very detailed analysis of the target enzyme. MWC Principal Investigator Emily Parker from Victoria University’s Ferrier Research Institute explains: “Some drug design techniques treat the active site as just a static shape that you need to slot the drug molecule into. However, the shape of an enzyme is not fixed, it changes all the time, as the atoms and bonds vibrate and move – this movement is part of their normal process. Understanding how they work and move allows us to design drugs that can fit into the enzyme very specifically and very tightly and stop the enzyme in its tracks.”

The use of this detailed information for drug design was established by Professor Vern Schramm at Albert Einstein College of Medicine in New York. Ferrier Institute Professors Peter Tyler, Gary Evans and Richard Furneaux, have been working with Professor Schramm for over 20 years using transition state analysis information to make drugs that block enzymes. This collaboration designed and synthesised the cancer drug Mundesine, which was approved in Japan during 2017 for the treatment of patients with peripheral T-cell lymphoma, the first approval for an agent of this type in the world.

Now with support from the MWC and the Ferrier Research Institute, Emily and Gary along with Professor Vic Arcus from the University of Waikato, have established the transition state analysis capability wholly in NZ. The MWC team, and in particular Dr Scott Cameron, are carrying out transition state analysis on enzyme targets critical to antimicrobial resistance as part of an MWC Flagship programme. MWC research fellow Dr Gert-Jan Moggré in Emily’s research group has analysed the transition state of adenosine triphosphate phosphoribosyl-transferase, an enzyme that is essential for bacterial survival and a target for drug development. This work was recently published in the journal ACS Chemical Biology¹. While the initial enzymes they are focussed on are in the antimicrobial resistance space, Emily and Gary say that transition state analysis can also be applied to enzymes that are important in cancer and diabetes. In the future, transition state analysis may well change the shape of drug design in the Maurice Wilkins Centre.





Young MWC investigators (left to right) Dr Htin Lin Aung (University of Otago), Dr Jodie Johnston (University of Canterbury) and Dr Ghader Bashir (University of Auckland)

Photos courtesy of Htin Lin Aung and Charlotte Johnson (University of Auckland)

Flagship launches careers of young investigators

The MWC Tuberculosis Flagship research programme has proved to be a great springboard for younger investigators to progress their careers.

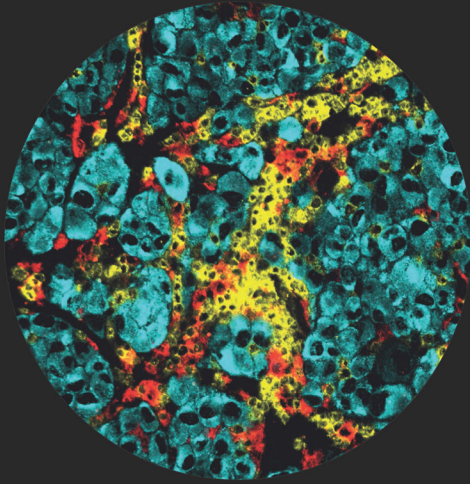
As in previous years a number of younger MWC investigators had great success in 2017 in gaining major awards and achieving career milestones. Particularly notable this year was the success of investigators who have been involved in the MWC's TB Flagship – Drs Jodie Johnston, Ghader Bashiri and Htin Lin Aung.

The MWC's Flagship programmes garner additional resources from the MWC to accelerate and build scale in highly outcome-focused national research programmes involving multiple research groups from different institutions and disciplines. Jodie and Ghader were both supported by the MWC's TB Flagship as part of its portfolio of key researchers. In both cases their MWC-supported work has proven crucial in the advancement of their careers to the next level. In 2017 Jodie was successful in gaining a permanent appointment as a Lecturer in the School of Biological Sciences at the University of Canterbury, a major milestone in the career progression of a researcher. Ghader commenced a Sir Charles Hercus Research Fellowship, awarded by the Health Research Council of New Zealand in late 2016, which provides four years of funding to enable him to pursue an independent research programme. Ghader said: "As an early-career investigator, the TB Flagship has provided enormous support in developing my career through creating a dynamic community to learn from, collaborate with and, ultimately, do great science."

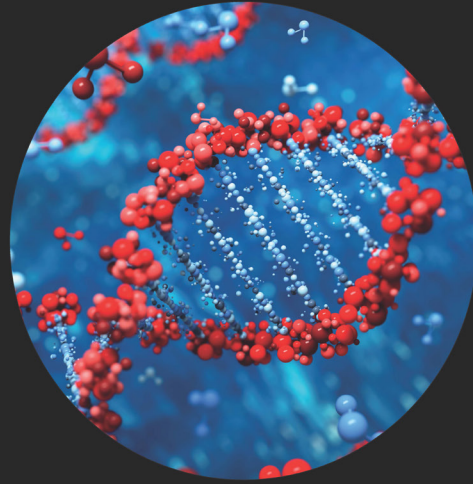
In November 2017 another postdoctoral fellow working on research aligned with the MWC TB Flagship, Dr Htin Lin Aung was awarded a 2018 Sir Charles Hercus Research Fellowship. Htin trained as an MWC-supported PhD student, supervised by Prof Greg Cook at the University of Otago and has also received MWC support as a postdoctoral fellow. "The TB Flagship community is delighted to see not only the great results that these investigators have produced but also the impact on their own careers" says Flagship co-leader Greg. "Flagships were designed to bring people together from different disciplines and institutions to address a common problem. It's obvious in the success of these investigators that they've extended themselves through the Flagship, in collaboration with some of the best people in NZ and that has paid dividends for their careers". Jodie comments "The multidisciplinary nature of the TB Flagship and the MWC means I have become better educated on other areas in science and understand how these areas might feed into my own work in ways that will add value to it."

Other younger investigators who had notable successes and career milestones this year include: Dr Aniruddha Chatterjee who was awarded a Rutherford Discovery Fellowship; Dr Brie Sorrenson who was awarded an Auckland Medical Research Foundation Postdoctoral Fellowship; Dr Joanna McKenzie, Dr Chris Guise and Dr Chris Walker who were all appointed as Lecturers at their respective institutions; and Dr Chris Walker who commenced a Sir Charles Hercus Research Fellowship at the University of Auckland. MWC is very proud to see so many younger investigators moving on to important career milestones.





Immune therapy for cancer



Genetics of metabolic disease



Anti-microbial resistance



Group A Streptococcus

The four flagships research programmes of the Maurice Wilkins Centre

Adapted images courtesy: Left column, top to bottom: Joanna Mathy; Sirirat Makprasert/Dreamstime.com. Right column, top to bottom: Leigh Prather/Dreamstime.com; Sebastian Kulitzki/Dreamstime.com

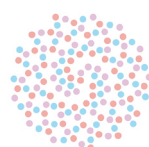
Mid-term review sets future direction

A comprehensive independent assessment found the Centre to be performing at a high level, producing distinct and positive benefits for New Zealand. It also enabled re-configuration of the MWC's major research programmes to take advantage of new opportunities.

The MWC undergoes regular reviews to ensure it is meeting its goals and performance criteria set by the government. These include the mid-term review at the half-way stage of each 6 year funding cycle, the most recent of which was conducted in 2017 by the Royal Society of New Zealand (RSNZ). As part of the process, an international scientific advisory board (SAB) was convened in late 2016 to review the MWC's progress and ongoing plans. In its findings, the SAB endorsed the Centre's work, as well as its strategic direction. "As in previous years, it is the unanimous view of the SAB that the quality of the science undertaken by the MWC is outstanding," the SAB report stated. "We are also delighted by the progress of the MWC in establishing a highly collaborative, multidisciplinary and multi-institutional structure that sets a standard to which universities and associated research organisations anywhere in the world might well aspire."

After considering the SAB assessment, other reports and an interview session with the MWC management team, the RSNZ panel's findings were very positive. It was particularly impressed with the Centre's level of research excellence and potential impact in New Zealand. MWC Director, Professor Rod Dunbar, says: "The mid-term point was an opportunity for us to review and revise our priorities for the remainder of the current funding cycle. The clear advice we received from the SAB was to maintain momentum in our successful larger-scale programmes for 2018-20 while continuing to foster the most exciting new research within our network." Subsequent discussion and workshops led to changes in the MWC's research themes for 2018-20. The Centre's current Flagship research programmes will all be continued, but have been re-configured into four larger-scale programmes, to take advantage of emerging synergies between the research teams; Immune therapy for cancer, Genetics of metabolic disease, Anti-microbial resistance and Group A Streptococcus. The consolidation of the MWC's themes provided the opportunity to support new research themes in exciting new areas. A new theme entitled 'Advanced cell and tissue culture technology' will bring together New Zealand's expertise, and have particular focus on new human stem cell technologies, immune cell therapy, and engineering of 3-dimensional human tissues. In addition, budget has been set aside to enable selection of new Flagship programmes in 2018.

The MWC is grateful to all those involved in thoughtfully reviewing its programmes, and ensuring they take the best advantage of both existing strengths and new opportunities.





Outreach

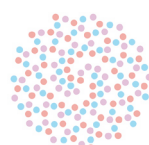
International engagement

The Maurice Wilkins Centre is actively building international links for New Zealand 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 72 and 76), 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 2017, the MWC focused on deepening these relationships in China.

China

The MWC continued its programme of engagement with China in 2017 by building on relationships initiated over 2012 to 2016:

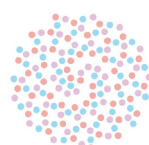
- **March:** Professor Rod Dunbar and International Liaison Advisor Mr Peter Lai travelled to Shanghai for further discussion about potential future collaboration with Shanghai Institute Materia Medica (SIMM) based on the previously signed MoC between the two parties. The discussion was focused on establishing a collaboration platform on fundamental science research, joint grant application, and possible collaborations in clinical trials research and new drug commercialisation. Key personnel from SIMM who met with the MWC representatives included Professor Yang Ye, Deputy Director General, Professor Shuhong Guan, Director, Technology Transfer Department, and Ms Dongying Lu, Technology Transfer Department.
- **March:** Professor Rod Dunbar, MWC Deputy Director Peter Shepherd and Mr Peter Lai visited the Guangzhou Institution of Biomedicine and Health (GIBH) to discuss further promotion of the current collaborations in the MWC-GIBH Joint Research Centre and the plan to establish a joint platform for Technology Transfer. In addition, Professors Dunbar and Shepherd were invited to give talks on the topic of science to inspire local high school students. Professor Guanghao Chen, Party Secretary and Deputy Director, Dr Hongming Hou, Deputy Secretary of Party Committee, Professor Shengxian Lu, Director, Local Cooperation Department, Dr Ting Li, Deputy Director, Research and Education Department, and Professor Donghai Wu hosted the meeting with the MWC representatives.



- **May:** Professor Peter Shepherd and MWC Principal Investigator Professor Bill Denny were invited to Beijing for a two day workshop jointly hosted by the Natural Sciences Foundation of China (NSFC) and the Health Research Council (HRC) of New Zealand. The workshop provided an opportunity for New Zealand scientists working in the research areas of neurodegenerative disorders, cardiovascular disease, diabetes and obesity to meet with senior Chinese scientists working in similar areas from Beijing and other parts of China.
- **June:** A delegation from Suzhou Industrial Park Administrative Committee (SIPAC) visited MWC, led by Dr Gang Guo, Director, Finance Bureau, Ms Jianru Guan, Vice Chairman, Science and Technology Association, and Mr Huihui Wu, Vice Director, Science and Technology Development Center. Suzhou Industrial Park (SIP) is a key bilateral cooperation project between China and Singapore governments. This was the first engagement between MWC and SIPAC, during which the main focus and expertise of the two parties were introduced respectively. The purpose of the visit was to identify potential future collaboration in technology transfer and commercialisation.
- **June:** MWC Investigators Associate Professor Adam Patterson and Associate Professor Jeff Smaill travelled to Guangzhou to meet with Professor Donghai Wu and Professor Yong Xu from GIBH, and Professor Ke Ding and Professor Xiaoyun Lu from Jinan University (JNU) respectively. Scientific seminars were given at both institutions. During this trip, Associate Professors Patterson and Smaill also visited Nanjing-based Jiangsu Aosaikang Pharmaceutical Co Ltd with MWC International Liaison Advisor Mr Peter Lai and Professor Ding from JNU. Discussions were held with Dr Qingcai Chen, CEO and Chairman of the Board, Mr Jun Zhao, Vice Chairman, Ms Zaiwei Zong, Vice Director, Drug Research, Ms Tingting Song, Project Director, Strategic Development, and Mr Ron Ma, Project Manager, Strategic Development. A presentation was given by Associate Professors Patterson and Smaill on hypoxia-activated prodrug technologies being developed in their laboratories.
- **August:** MWC hosted a delegation from Guangzhou Institution of Biomedicine and Health (GIBH) led by Professor Guanghao Chen, Party Secretary and Deputy Director, and Professor Qinghai Han, General Manager. The purpose of this visit was to deepen and strengthen the partnership, review current collaborative projects, and discuss further about the earlier agreed action plans regarding MWC-GIBH Joint Research Centre, including setting up cooperation committee, promoting staff and/or student exchange, and holding symposium in Guangzhou to identify matching scientists and expand collaboration.
- **November:** MWC were invited by Auckland City Council to participate in the Tripartite Economic Alliance Summit in Guangzhou. Professor Rod Dunbar, Mr Peter Lai, Associate Professor Kerry Loomes, and Associate Professor Rinki Murphy travelled to attend the summit. Professors Dunbar, Loomes, and Murphy delivered keynote talks at the International Symposium on Biomedicine and Health held in GIBH. The symposium aimed to share the new trends in biomedicine and health industry, explore more cooperation opportunities in key areas such as stem cells and immunotherapy, and build a new mechanism for tripartite industrial cooperation. The current cooperation between MWC and GIBH was highlighted at the summit.

- **November:** Professor Peter Shepherd travelled to Shenzhen to attend the 5th World Integrative Medicine Congress organised by Chinese Association of Integrative Medicine and Guangdong Pharmaceutical University. The congress aimed to provide an opportunity for clinicians and scientists from all over the world to gather and share scientific ideas and cutting-edge technology development. Professor Shepherd was invited to deliver a keynote talk under the topic of metabolic diseases, which was one of the six main themes of the congress.
- **December:** Professor Xiaoyun Lu from School of Pharmacy, Jinan University visited MWC Principal Investigator Professor Greg Cook and his laboratory in The University of Otago. The visit last 3 days and was based on previous engagement between MWC and Professor Ke Ding, Dean of School of Pharmacy, Jinan University. The main purpose of the visit was to work on an existing collaborative project on anti-tuberculosis drugs. In-depth discussion on compound mechanism research and future work plans was held. The project progress was effectively boosted, and the collaborative relationship between MWC and Jinan University was strongly promoted and strengthened through this visit.

MWC investigators continued to engage with scientists and institutions from other countries through visits to New Zealand by international scientists (see page 52), visits by New Zealand scientists to overseas laboratories (see page 45), and through investigators' links with scientists, laboratories and companies overseas (see pages 72 and 76).



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 78.

In 2017 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.

- **Auckland Clinical Studies Ltd.**

This company provides Phase I and II clinical research to local and international pharmaceutical and biotechnology companies. In 2017 Maurice Wilkins Centre investigators Professor Rod Dunbar, Dr Anna Brooks, Dr Dan Verdon and Dr Vaughan Feisst continued to work with Auckland Clinical Studies, providing analytical services such as immune monitoring to support ongoing clinical trials sponsored by a major pharmaceutical company.

- **Avalia Immunotherapies Ltd.**

Newly formed Avalia Immunotherapies is developing immunotherapies that support the treatment of cancers and other diseases. Investigators Professor Gavin Painter from the Ferrier Research Institute and Professor Ian Hermans from the Malaghan Institute of Medical Research have patented a new immunotherapy technology and will be working with Avalia Immunotherapies to further advance the technology and progress it to clinical trials. (Gavin Painter is Chief Technical Officer and Richard Furneaux is the Board Director for Avalia)

- **Comvita**

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

- **Connovation Ltd.**

This company is based in Auckland and undertakes research, development and manufacture of invasive animal pest control technologies. The company aims to develop smarter pest control products which are humane, cost effective and more specifically targeted to pest species. Maurice Wilkins Centre investigator Distinguished Professor Margaret Brimble is working with the company on designing and synthesizing new molecules as humane rodenticides to replace the widely used but controversial pesticide 1080.

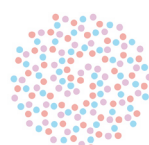
- **New Zealand Pharmaceuticals Ltd.**

New Zealand Pharmaceuticals Ltd. manufactures pharmaceutical intermediates and diagnostic products for the pharmaceutical and biotechnology companies. Professors Gary Evans and Richard Furneaux are working with New Zealand Pharmaceuticals Ltd on bile acid chemistry.

- **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 Margaret Brimble and Rod Dunbar are the academic founders of this company, which is headquartered in the USA, and in 2017 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 2017 Maurice Wilkins Centre investigators were involved in a number science education initiatives including;

- **Biology Teacher Professional Development Days**

In 2017 the Centre ran seven of the highly successful MWC Biology Teacher Professional Development days. Professor Peter Shepherd, Maurice Wilkins Centre Deputy Director, and Ms Rachel Heeney, Head of Biology at Epsom Girls Grammar School, led events in Wellington, Christchurch, Westport, New Plymouth, Dunedin, Opotiki and Auckland.

The days featured presentations from scientists on key topics relevant to the NCEA Level 3 curriculum and were attended by over 280 biology teachers. The content of the workshops is developed after feedback from the biology teacher community before, during and after the workshops through a dedicated Facebook page.

Each year the aim is to hold at least one of these workshops in a more isolated area of New Zealand where teachers often find it difficult to access professional development. The format of the workshops can be easily customised to fit the needs at each location. The workshop held in Opotiki was expanded to also include free public talks for the community and school students as well as launching the 'Sugar in Schools' study. The Westport workshop was attended by Year 12 and 13 biology students as well as their biology teachers as the content was directly relevant to the NCEA standard that they were working on in the classroom at the time.

Teachers at the Dunedin and Auckland workshops were also treated to a presentation from Dr Giles Yeo from the University of Cambridge and presenter of the BBC series "Why Are We Getting So Fat?"

- **'Sugar in Schools' study**

The MWC launched a nationwide 'Sugar in Schools' study in July, led by Professor Peter Shepherd. Pilot studies were done in 2017 at selected schools and students in Opotiki were the first to take part in the study.

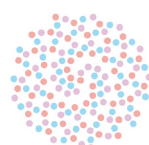
The aim of the study is to enrol thousands of kids across New Zealand, have them measure their fructose absorption rate and then look for patterns and differences across all those in the study as well as learning about their metabolism.

The study uses a novel experimental protocol where school teachers and students perform the bulk of the experimental work allowing maximum data production with limited resources. Ms Helen Webber, a high school biology teacher herself, has been using this study as the topic for a Masters degree and has developed material for teachers as well as visiting schools and training teachers and students to carry out the experiment.

The next step is to collaborate with communities in other parts of the country, especially schools located furthest away from the main population centres.

- **Maurice Wilkins Centre biology teacher development scholarships**

In 2017 the MWC provided sponsorship for scholarships for high-school biology teachers to attend the Queenstown Research Week in August. The aim of the scholarships is to give New Zealand teachers the opportunity to attend an international conference on contemporary biological research and to network with colleagues and practising biologists from around the world. Recipients of the awards in 2017 were; Angie Pratt from Hastings Christian School, Hastings, Gerd Banke from Nayland College, Nelson, Susan Prentice from Horowhenua College, Levin and Sara Loughnane, St Peters School, Cambridge.



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 2017, MWC investigators have also communicated with community groups affected by cancer, rheumatic fever and diabetes.

MWC investigators communicate with New Zealanders through the news media, public lectures and presentations, and through school visits. In 2017, 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:

- **Public talks by Dr Giles Yeo**

The MWC sponsored a nationwide series of free public talks by renowned metabolic disease specialist Dr Giles Yeo from the University of Cambridge in the UK, in Auckland, Wellington and Dunedin.

Dr Yeo's talk "Are your genes to blame when your jeans don't fit?" discussed latest metabolic science and the potential use of genetics to tailor lifestyle interventions that are more likely to work for certain people. His presentation in the main feature of an MWC Diabetes and Obesity Symposium in Wellington on the 11th April that was attended by members of the public with interests in these topics and an 'Update on the Science of Diabetes and Obesity' event held in the evening at Parliament (see page 38 for more details). Dr Yeo's public talks in Dunedin and Auckland were well attended by members of the public.

- **Patient group organisation workshop**

On the 21st of November, Professor Peter Shepherd hosted a one-day workshop to provide updates on medical research advances in various fields to leaders of patient groups and medical charity organisations.

This event was held at the University of Auckland and featured presentations on the latest developments in obesity and factors influencing bodyweight, the gut microbiome and immune therapy for cancer. In addition to Prof Shepherd the workshop also featured presentations from Prof Dave Grattan, Dr Xochitl Morgan, Prof Rod Dunbar, and Prof Tony Merriman.

- **'Sugar in Schools' study launched**

The NZ Herald published an article highlighting the start of an MWC study led by Professor Peter Shepherd, looking at fructose absorption in high school students (13th July 2017). It was also featured in Opotiki News (3rd August 2017) and the Oamaru Mail (8th September 2017). At the launch event in Opotiki, Professor Shepherd gave public lecture on diabetes.

- **MWC rheumatic fever research in the Listener**

Dr Nikki Moreland was interviewed for a cover story published by the New Zealand Listener entitled 'Traumatic Fever: startling revelations about how rheumatic fever stalks our kids'. Nikki also provided comments for a story on Noted about the link between skin infections and rheumatic fever.

- **TVNZ ‘What’s Next’ series on the future of medicine and technology**

Professor Rod Dunbar was interviewed as part of TVNZs ‘What’s Next’ series, discussing the possible future paths for medicine and technology in New Zealand and around the world.

- **Other engagement through the media or events**

Many MWC investigators engaged the public through the media and some examples of this include;

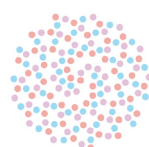
Professor Bill Denny and MWC Associate Investigator Dr Francis Hunter featured in a NZ Herald article about phase two trials of a new drug, PR-104, developed in Auckland (30th April 2017). Professor Denny also featured in a NZ Herald article on the establishment of the UniServices-based startup company Kea Therapeutics, to develop a new anaesthetic drug to clinical trial.

Professor Rod Dunbar featured in a NZ Herald article about the MWC partnership with Guangzhou Institute of Biomedicine and Health.

Associate Professor Rinki Murphy was interviewed by Simon Gault as part of a three part documentary series on Prime TV called “Why are we fat?” The New Zealand Herald also featured articles on Associate Professor Murphy’s research into the effect of gut microbiome on regulating diet and metabolism (4th January 2017) and the PROFAST study investigating the effects of intermittent fasting and probiotics on fat distribution in pre-diabetic patients (28th April 2017).

Dr Monica Gerth spoke about her MWC-funded research on an antibiotic alternative, an enzyme that could “calm” bacteria before they cause disease, in an article in the Otago Daily Times: “Keep calm and carry on,” published in May 2017.

Many more MWC investigators gave or hosted public lectures and presentations and were featured in media coverage of their research or commentary on their areas of expertise throughout 2017.



Supporting the New Zealand science community

Research symposium and workshops

- **Maurice Wilkins Centre Research Symposium**

The 2017 Maurice Wilkins Centre Research Symposium was held on 4th December at the University of Otago in Dunedin and was opened by MWC Board Member Professor Tate. This year it was the turn of mid-career and senior MWC investigators to present recent research from across the Centre in four sessions; Cancer - Tumour microenvironment, Cancer – Approaches to therapy, Infectious diseases and Diabetes and metabolic disorders.

The day ended with a strategy forum for senior MWC investigators and then a poster session in the evening organised by the Early Career Steering Group.

The symposium was well attended and everyone enjoyed the Dunedin environment.

- **Maurice Wilkins Centre Diabetes and Obesity Symposium**

On the 11th of April, the Maurice Wilkins Centre in conjunction with Diabetes NZ held a symposium on “New Advances in Understanding Obesity and Type-2 Diabetes” at the Royal Society of NZ in Wellington. The symposium featured keynote speaker Dr Giles Yeo from the University of Cambridge whose TV Series “What Diet is Right For You” has for the first time addressed the issue of how to develop targeted weight loss strategies based on peoples individual genetic predisposition. This was followed by a series of talks from the Centre’s scientific leaders in this research area.

The symposium was attended by over 70 people and was targeted at health professionals and government agency staff with an interest in the type-2 diabetes and obesity epidemic but was also open to members of the public, media, school teachers and anyone with an interest in these issues.

- **‘Update on the Science of Diabetes and Obesity’ at Parliament Buildings**

Mr Simon O’Connor, Chair of the Health Select Committee and MP for Tamaki hosted this event on the evening of the 11th April which was attended by MWC researchers, government and community stakeholders and MPs.

The event provided an update on what we now know about how genetics and biology drive the development of diabetes and obesity differently in different people and how we can use this information to inform better strategies for prevention and treatment of these conditions. The main feature was a short presentation by Dr Giles Yeo entitled “Are your genes to blame when your jeans don’t fit?”

- **Maurice Wilkins Centre thematic workshops and Flagship meetings**

During 2017 the Maurice Wilkins Centre held two ‘thematic’ workshops on specific research topics of relevance to the Centre. The aim of these workshops is to bring together New Zealand researchers in a particular research area to brainstorm future directions and decide how best to achieve outcomes to benefit New Zealand. Many of the ideas that come from these workshops inform the strategic direction of the Centre’s research programme.

Workshops were held on the following topics;

- ***Diabetes and metabolic disorders – 11th April in Wellington***
- ***Cancer Immune Therapy and Tumour Microenvironment – 16 June 2017 in Auckland***

- **Maurice Wilkins Centre Technology workshops**

The Centre aims to hold at least two technology workshops each year which are designed to inform investigators about the technologies and facilities that are available across New Zealand, the most recent applications of the technology and give investigators information on how they could use the technology in their own research projects.

In 2017 the following workshops were held;

- ***Membrane Protein Technology workshop – 13th July***

This meeting was convened by MWC Investigators Associate Professors Alok Mitra and Renwick Dobson and Dr Colm Carraher.

The workshop programme was focussed on current challenges in studying membrane proteins and how recent technological advances are attempting to overcome them. Dr Jacqui Gulbis from The Walter and Eliza Hall Institute of Medical Research in Melbourne gave a presentation on 'Analysing functional hypotheses using recombinant potassium channels'. Local speakers from across New Zealand spoke about a wide range of technologies and methods focussed on working with membrane proteins.

- ***NMR and Mass Spectrometry workshop – 30th October***

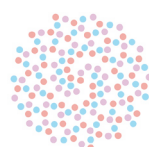
The MWC Early Career Steering Committee convened a workshop on 30th October in Auckland to introduce early career researchers to mass spectrometry and NMR techniques. The workshop was well attended and included talks from representatives of the Auckland and Otago mass spectrometry facilities in the morning session, highlighting what services they offer alongside researchers presenting experiments where these techniques have been used.

The afternoon session focused on NMR, with speakers from the Auckland and Massey NMR facilities and research based on this technique. The workshop concluded with an open discussion between attendees and speakers about the application of these techniques to their research.

The Maurice Wilkins Centre NZIC Prize for Excellence in Chemical Science

The New Zealand Institute of Chemistry awarded the 2017 Maurice Wilkins Centre Prize for Excellence in Chemical Science to two scientists; Professor Jadranka Travas-Sejdic, University of Auckland, and Associate Professor James Crowley, University of Otago.

Jadranka is a global leader in the research field of polymeric electronic materials for biosensors and bioelectronics. James is also recognised for his significant contributions to the fields of synthetic organometallic, coordination and supramolecular chemistry, specifically in the design, synthesis and exploitation of functional metal complexes.



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 Maurice Wilkins Centre 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.

In 2017 the Maurice Wilkins Centre provided support for:

- **Queenstown Research Week**

Queenstown Research Week is the largest annual science event in New Zealand and in 2017 this event returned to Queenstown. The programme for the week included seven satellite meetings on; reproductive biology, genome biology, plant-microbe interactions, proteins, cell signalling, mitochondrial biology and infectious diseases as well as the main Queenstown Molecular Biology Society meeting and meetings run by three other organisations. There were over 1600 registrations for the scientific meetings held over the course of the week which was a record number. The MWC is a premier academic sponsor for this event that provides an important opportunity for Centre investigators to meet and hear about the latest national and international research. The MWC often also provides support for international speakers who are attending QRW to also spend time in other locations around New Zealand either at the start or end of their trip which maximises the benefits of bringing these speakers to the country. In 2017, the MWC enabled Prof John Blanchard, Prof Jon Sayers and Dr John Burke to visit other locations in New Zealand. The Centre also provides sponsorship for New Zealand secondary school teachers to attend the Queenstown Molecular Biology meeting (See page 34)

The MWC provided additional sponsorship for the student poster session run as part of the joint Infectious Disease Satellite and Webster Centre symposium.

- **New Zealand Society for Oncology**

The annual conference of the New Zealand Society of Oncology was held in Auckland from the 14th to the 15th of October and was attended by 220 researchers and clinicians from across New Zealand. The MWC provided sponsorship for the 'Tumour microenvironment in progression and therapy' plenary session which featured invited speakers Professor Adrian Harris from the University of Oxford, UK and Associate Professor Roslyn Kemp from the University of Otago.

- **New Zealand Microbiology Society Conference**

The New Zealand Microbiology Society held their annual conference in Auckland in 2017 and MWC provided sponsorship for invited speaker Professor Mark Walker, Director of the Australian Infectious Disease Research Centre, to attend and present his research on Group A Streptococcus.

- **SING Aotearoa Genomics workshop**

The MWC provided sponsorship for a Summer Internship for Indigenous Genomics (SING) workshop that was held in Auckland in January for 20 Maori participants from across New Zealand. The format was based on an existing SING workshop run in the

USA which brings indigenous people and academics working in the field of genomics together to discuss how the study of genetic material can be used as a tool for indigenous peoples' communities. The workshop was run by Associate Professor Maui Hudson and Dr Phil Wilcox and included presentations from international speakers as well as MWC principal investigators Professors Peter Shepherd and Cris Print.

- **Story Collider Live Show and workshop**

The Story Collider is a non-profit organisation based in the USA that works with both scientists and non-scientists to develop storytelling skills and personal stories about science. In 2017 members of the Story Collider organisation visited New Zealand, hosted by the Science Communicators Association of New Zealand, and held workshops in Wellington and Auckland and a live show in Wellington. The MWC contributed sponsorship to this event along with most of the other New Zealand CoREs through the Associate of Centres of Research Excellence (aCoRE). MWC Associate Investigator Dr Melanie McConnell was chosen as one of the storytellers at the live show.

- **Lancefield International Symposium on Streptococci and Streptococcal Diseases**

The 20th Lancefield International Symposium on Streptococci and Streptococcal Diseases was held in Fiji from the 16th to the 20th of October. The symposium focussed on new 'cutting edge' research and advances in rheumatic fever. The MWC provided sponsorship to enable MWC researchers to attend the symposium and present their research and also sponsored the attendance of Dr Lance O'Sullivan, a GP from Kaitia, who has been working with MWC investigators in this research area.

- **NZASI Annual Conference**

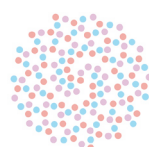
The MWC provided sponsorship for the New Zealand branch of the Australian Society of Immunology Annual Conference. Held for the first time in Christchurch, over 90 delegates attended the meeting, which featured talks from several MWC investigators.

- **Association for Women in Sciences**

The Association for Women in Sciences (AWIS) provides a network for women interested in or working in the sciences. In 2017 the MWC provided sponsorship for the AWIS conference, held in Auckland on the 13th and 14th of July and for a scholarship for a woman to study science or engineering.

- **NZ Breast Cancer Symposium**

The MWC also provided sponsorship for the New Zealand Breast Cancer Symposium was held at Auckland University of Technology from the 12th to 14th of November. The symposium aimed to promote basic and clinical research on breast cancer.



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

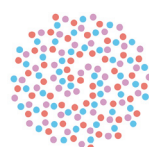
In 2017 Maurice Wilkins Centre investigators served in advisory and governance roles in many New Zealand organisations including:

- Auckland Medical Research Foundation
- Auckland Regional Tissue Bank
- Australia NZ Neuro-Endocrine Tumour Group
- Australian and New Zealand Council for the Care of Animals in Research and Teaching
- Biomolecular Interaction Centre (University of Canterbury)
- Cancer Society of New Zealand
- Cancer Trials New Zealand
- Diabetes Auckland
- Freemasons Roskill Trust
- Gastro Intestinal Cancer Institute
- Genesis Oncology Trust
- Genetics Otago
- Greenlane Research and Educational Fund
- Health Research Council of New Zealand
- Institute of Environmental Science and Research
- Kea World Class NZ Awards Selection Panel
- Kiwi Innovation Network Limited
- Landcare Research Ltd
- Leukaemia and Blood Cancer NZ
- L’Oreal-UNESCO Women in Science Fellowships in Australia and NZ
- Marsden Fund Council
- Maurice and Phyllis Paykel Trust
- Melanoma Network of New Zealand
- Ministry of Business Innovation & Employment
- Ministry of Health
- New Zealand Association of Scientists

- New Zealand Society for the Study of Diabetes
- New Zealand eScience Infrastructure
- New Zealand Genomics Ltd
- New Zealand Health Quality & Safety Commission
- New Zealand Institute for Cancer Research Trust
- New Zealand Institute of Chemistry
- New Zealand Institute for Rare Disease Research Ltd
- New Zealand Microbiology Society
- New Zealand Neurological Foundation
- New Zealand Organization for Rare Disorders
- New Zealand Society for Biochemistry and Molecular Biology
- New Zealand Society for Medical Sciences
- New Zealand Society for Oncology
- Otago Medical Research Foundation
- Otago Postgraduate Medical Society
- Queenstown Molecular Biology Meetings Society
- Royal Society of New Zealand
- Tertiary Education Commission
- The Eureka Trust
- The Physiological Society of New Zealand
- Wellington Health and Biomedical Research Society

International roles

In 2017 members of the Maurice Wilkins Centre served in more than 120 advisory, editorial and governance roles in international organisations based in the United States of America, Australia, the United Kingdom, Belgium, Canada, France, Germany, Japan, Singapore and Switzerland.





Organisational development

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 2017; in March and October. Four categories of support were open for applications from MWC investigators in 2017; interdisciplinary PhD training (Oct round only), new initiatives involving postgraduate students, access to specialised facilities and equipment and access to specialised international facilities and training (see page 45 for details).

In 2017 the MWC began an initiative to review all applications for access to specialised facilities and equipment and access to specialised international facilities and training that were under \$10,000 in value on a continuous basis to enable MWC investigators to take advantage of new opportunities more quickly than before.

The MWC also launching a new 'category 5' which aims to enable publication of MWC research in high quality journals by supporting the preparation of new data requested by reviewers or editors as well as other costs associated with publications.

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.

The MWC planned to support 22 PhD students through this category of the programme and these scholarships were all allocated by 2015, however budget savings allowed the MWC to strategically offer an additional fully costed PhD scholarship in 2017 targeted at the 'Drug targets in viral disease' sub-theme in order to strengthen MWC activities in that field.

The project awarded funding in 2017 was (**project leader, host institution and student names are in bold**):

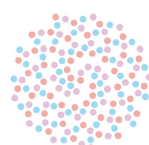
- The Synthesis of Novel Antiviral Imino-C-Nucleosides; **Gary Evans**, Richard Kingston, **Matthew Fisk**, **Victoria University of Wellington**

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.

15 projects awarded funding in 2015 and 2016 were ongoing in 2017 and seven new projects were awarded working expenses in 2017 (**project leader, host institution and student names are in bold**):

- Capability development in antibody-drug conjugate (ADC) synthesis and characterisation - feasibility for combination with a hypoxia-activated payload; **Moana Tercel, Frederik Pruijn, Wouter van Leeuwen, University of Auckland.**
- Screening NZ fungi for new antibiotics against Mycobacteria; **Siouxie Wiles**, Brent Copp, **Daniel Mulholland, Steven Li, University of Auckland.**
- Utilising genetic interaction network analysis to elucidate the anti-cancer and diabetogenic mechanisms of statins; **Paul Atkinson**, Andrew Munkacsi, Mike Berridge, **Cintya Del Rio Hernandez, Victoria University of Wellington**
- Efficacy and safety of combined BRAF/MEK and VEGFR2 inhibition versus BRAF/MEK inhibition alone - a preclinical trial; **Peter Shepherd**, Bruce Baguley, Stephen Jamieson, Rod Dunbar, **Khanh Tran, University of Auckland.**
- Energy Generation and Persistence: Understanding and Inhibiting Menaquinone Production in Three Human Pathogens; **Jodie Johnston**, Stephanie Dawes, Daniel Furkert, **University of Auckland.** (currently provisionally approved awaiting appointment of student)
- Hypoxia-activated TDB pro-drugs; **Bridget Stocker**, Bill Wilson, Mattie Timmer, **Amy Foster, Victoria University of Wellington.**
- The molecular basis by which TRAP transporters function; **Ren Dobson**, Antony Fairbanks, **James Davies, University of Canterbury.**



Access to specialised facilities and equipment

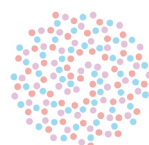
In September 2015 the MWC launched a new contestable scheme, as part of its Flexible Research Programme, to support access to specialised facilities and equipment across New Zealand for all MWC investigators. The scheme is intended to cover the costs of user charges attracted by these facilities or equipment, 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 80 facilities and items of equipment were registered in 2017. It is intended that MWC investigators will use this register as a resource to identify and compare facilities and equipment across New Zealand that they can use for their research.

30 projects awarded funding in 2015 and 2016 were ongoing in 2017 and 18 new applications to this scheme were approved in 2017; **(project leader, host institution and student names are in bold):**

- Can the colony stimulating factor 1/c-Kit receptor inhibitor PLX3397 attenuate the immune/inflammatory response in mice to promote insulin sensitivity; **Troy Merry**, Anna Brooks, Peter Shepherd, **University of Auckland**
- Cytokine-fingerprinting of NZM melanoma cell lines by a low-cost approach; **Peter Shepherd**, Bruce Baguley, Cris Print, Mike Eccles, **University of Auckland**
- Identification of the effects of combination therapies on the interaction between melanoma cells and the tumour microenvironment using species specific gene expression profiling by RNASeq; **Peter Shepherd**, Cris Print, **University of Auckland**
- Hypoxia activated prodrugs of PARP inhibitors; **Benjamin Dickson**, Stephen Jamieson, Kevin Hicks, Bill Wilson, Michael Hay, **University of Auckland**
- Synthesis of targeting peptide ligands for cancer therapy; **Sarah Hook**, **Margaret Brimble**, Paul Harris, **University of Auckland**
- Characterisation of adipose tissue progenitor cells: in search of the beige/brite fat precursor cells; **Anna Brooks**, Rod Dunbar, Kerry Loomes, **University of Auckland**
- Analysis of proteins involved in the replication of viral pathogens; **David Goldstone**, Richard Kingston, **University of Auckland**
- Sequencing ACSRC panel on Glioblastoma cell lines; **Bruce Baguley**, Peter Shepherd, Cris Print, **University of Auckland**
- Analysing the expression profile of sub-populations of fibroblast in melanoma infiltrated human tissue; **Jennifer Eom**, **University of Auckland**
- Targeting the Unfolded Protein Response; **Lydia Liew**, Stephen Jamieson, Dean Singleton, Jack Flanagan, Michael Hay, **University of Auckland**
- Use of CRISPR-mediated functional genomics to identify genetic vulnerabilities in NRAS-driven melanoma; **Francis Hunter**, Cris Print, Stefan Bohlander, Peter Shepherd, Bill Wilson, Mike Eccles, Stephen Jamieson, **University of Auckland**

- Defining the adipocyte pre-cursor and stem cell populations in human adipose tissue using single-cell RNAseq; **Anna Brooks**, Rod Dunbar, **University of Auckland**
- Identification of specific inhibitors targeting MetX, an essential enzyme in the methionine synthesis pathway of Mycobacterium tuberculosis; **Yoshio Nakatani**, Greg Cook, Yosuke Shimaki, Emily Parker, Wanting Jiao, Margaret Brimble, **University of Otago**
- A CRISPR/Cas9 genetic screen to identify therapeutic targets for cohesin-mutant myeloid malignancies; **Julia Horsfield**, Francis Hunter, Jisha Antony, **University of Otago**
- Linking the kinome by chemistry; **Jack Flanagan**, Peter Shepherd, Bill Denny, Christina Buchanan, Gordon Rewcastle, **University of Auckland**
- Characterisation of molecular interactions using surface plasmon resonance to identify the mode-of-action of EGFR tyrosine kinase prodrugs; **Matthew Bull**, Adam Patterson, Jack Flanagan, Jeff Smaill, **University of Auckland**
- Can exercise alter transcription responses of non-muscle metabolic tissues? **Troy Merry**, Jonathan Woodhead, Stewart Masson, **University of Auckland**
- Targeting the primary cilium and hedgehog signaling in high grade brain cancer; **Anna Wiles**, Tania Slatter, Sue McGlashan, Antony Braithwaite, **University of Otago**



New investigators

In 2017, the Maurice Wilkins Centre added to its national network of investigators with 17 investigators invited to join the Centre as associate investigators. In line with the MWC strategy of supporting future leaders, 12 of these new associate investigators were previously MWC affiliate investigators and on review in 2017 had developed their careers to the stage that they were approved for promotion to associate investigators.

In addition 44 postdoctoral researchers and postgraduate students were appointed as affiliate investigators in 2017.

New associate investigators appointed in 2017;

- Dr Ghader Bashiri, School of Biological Sciences, University of Auckland
- Dr Aniruddha Chatterjee, Department of Pathology, University of Otago
- Dr Daniel Furkert, School of Chemical Sciences, University of Auckland
- Dr Olivier Gasser, Malaghan Institute of Medical Research
- Associate Professor Marilyn Hibma, Department of Pathology, University of Otago
- Dr Jodie Johnston, School of Biological Sciences, University of Auckland
- Klaus Lehnert, School of Biological Sciences, University of Auckland
- Dr Andrew Munkacsi, School of Biological Sciences, Victoria University of Wellington
- Dr Jeremy Owen, School of Biological Sciences, Victoria University of Wellington
- Dr Fiona Radcliff, Department of Molecular Medicine and Pathology, University of Auckland
- Professor Bernd Rehm, Massey University
- Dr Dave Rennison, School of Chemical Sciences, University of Auckland
- Professor Stephen Robertson, Department of Women's and Children's Health, University of Otago
- Dr Hilary Sheppard, School of Biological Sciences, University of Auckland
- Dr Penny Truman, School of Health Sciences, Massey University
- Dr Robert Weinkove, Malaghan Institute of Medical Research
- Dr Paul Young, School of Biological Sciences, University of Auckland

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 2017 the MWC provided direct full or partial financial support for 77 postgraduate students at the University of Otago, University of Canterbury, Victoria University of Wellington, Massey University, University of Waikato and the University of Auckland. 17 postgraduate students who received MWC support prior to or during 2017 completed their degrees in 2017.

In 2017 one new PhD student started their studies with support from the MWC for a fully funded PhD scholarship previously awarded through the Flexible Research Programme (Interdisciplinary PhD training). One further student was recruited to start in early 2018.

Support for emerging scientists

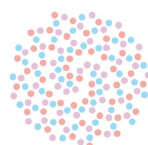
The success of the core MWC research programmes is dependent on the skills and expertise of a large cohort of research and post-doctoral fellows, many of whom are in the early to mid-stage of their careers.

In 2017 the MWC provided full or partial salary support for 41 research and post-doctoral fellows (17.2 FTE) at the University of Otago, the University of Canterbury, the Malaghan Institute of Medical Research, the University of Waikato and the University of Auckland.

The MWC also provided partial support for 11 research technicians (5.3 FTE) to carry out specific roles in the core MWC research programme over 2017.

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 (see story on page 19). 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 page 49). This programme is a good way for emerging scientists for 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 MWC Early Career Steering Group began the year by surveying all MWC early career researchers to find out what types of support they would like from the MWC and what topics they would like to be upskilled in through workshops. The group received a lot of great feedback from the survey which led to the distribution of their first newsletter and organisation of a technical workshop on NMR and Mass spectrometry in October 2017 (see page 39).

The group also planned the programme for the 2017 Early Career Researchers Symposium including a great poster session.

Members of this group in 2017 were: Dr Dan Furkert (University of Auckland), Dr Chris Guise (University of Auckland), Dr Joanna McKenzie (University of Waikato), Dr Wanting Jiao (Victoria University of Wellington), Dr Jodie Johnston (University of Auckland) and Dr Sunali Mehta (University of Otago).

Early Career Researcher Symposium

The Maurice Wilkins Centre Early Career Researchers Symposium kicked off with a poster session on the evening of the 4th December in Dunedin. There was plenty of lively discussion and many great research posters which made the

The morning of the following day featured short research talks presented by nine early career researchers who were selected from all the submitted research abstract. These talks were of a very high standard that impressed the audience.

This was followed by a panel discussion about issues that affect early career researchers. In the afternoon there was a provoking skills session on 'The art of publication writing'.

All early career MWC researchers were invited to present research at the symposium with travel prizes offered for both the poster and presentation sessions.

Travel prizes were awarded to;

Research talks: 1st – Kyle van de Bittner (Victoria University of Wellington), 2nd – Anna Cooper (University of Otago)

Research posters: 1st – Lauren Yule (University of Auckland), 2nd – Jared Freeman (University of Auckland), Highly commended – Tamasin Taylor (Auckland University of Technology), Aqfan Jamaluddin (University of Auckland), Jeremy Raynes (University of Auckland), Commended – Megan Jamieson (University of Auckland), Phillip Grant (University of Auckland)

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 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.

During 2017, seven investigators travelled under this scheme:

Dr Anna Brooks attended a Millennium Sciences hosted 10x Genomics workshop in Brisbane, and then a single cell workshop and consortium at the WEHI in Melbourne in November 2017. In Brisbane, Anna had the opportunity to meet the 10x team - Brian Fritz (Senior Product Manager) and Deanna Church (Senior Director of Applications) to discuss the recent acquisition of this highly anticipated single cell platform at the University of Auckland. The workshop also included presentations from some of the leading Australian academics who have been using this technique.

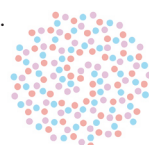
In Melbourne, Anna attended a single cell workshop which involved hands on training/ demonstrations of the 10x chromium equipment, and met with an application specialist. The inaugural "Oz single cell" consortium that followed the workshop confirmed that this 10x platform is the most widely used platform to perform single cell transcriptomics. During the consortium Anna gained tips and hints about sample processing and caveats of data analysis approaches. This information was highly valuable for preparation of the first single cell experiment at the University of Auckland Genomics centre. The process of cell preparation through to single cell capture using this new technology will be presented at a MWC Flow Cytometry Workshop later in the year to promote this new capability.

Ms Nicole Herr attended an 'NMR Relaxation and Macromolecular Dynamics' course at Griffith University in Australia. NMR spectroscopy is a powerful tool that allows the study of biochemical systems at the atomic level. For Nicole's current PhD research, with Dr Richard Kingston and Dr. Esther Bulloch, she is using NMR spectroscopy to characterise the essential "P protein" from the Menangle virus replicative complex. The biological function of the P protein is linked to its high degree of flexibility, and associated structural disorder.

NMR can be used to study protein dynamics. Nicole's participation at the 6-day workshop at Griffith University in Australia gave her insight into the applications of the technique, as well as the practicalities of data collection and analysis. She had the opportunity to learn from two of the leading experts in this field namely Prof. Malcolm H. Levitt (University of Southampton) and Prof. Arthur G. Palmer III (Columbia University).

The knowledge Nicole gained will allow her to dynamically characterise the Menangle virus P protein. Nicole is currently visiting the Institute of Complex Systems in Juelich, Germany, where she is accessing high field-strength NMR spectrometers, and applying what she has learnt. The training Nicole received at the workshop will inform future work in NZ, and significantly enhance the local NMR knowledge base.

Mr Aqfan Jamaluddin visited Professor Susan Brain's lab in the School of Cardiovascular Medicine and Sciences at King's College in London. The aim of his trip was to learn about the utilisation of a 'laser speckle blood flow imager' and 'blood flow and temperature probe monitor' that is extensively used in in vivo animal studies. The visit allowed Aqfan to gain first hand familiarisation with the equipment and the protocols associated with using this equipment to look at dermal vasodilation in mice or rats and tap into the expertise of the King's College team to start to design a study to be done in New Zealand. Aqfan plans to use the experimental designs from Prof Brain's lab as a template to initiate research into modified CGRP peptide antagonist activity towards vasodilation using high resolution Laser Doppler Imaging in New Zealand.



Mr Aidan Joblin-Mills travelled to the Broad Institute at Harvard University and Massachusetts Institute of Technology to undertake an anti-lipotoxicity compound screen. Aidan was fortunate to work within the Broad's high-throughput screening facility where the automated robotics for large-scale collaboration projects are stationed. The facility contains over 100,000 small molecule aliquots, many of which are internally generated by chemists utilising a diversity-orientated synthesis (DOS) approach, in turn generating sets of fragment-based libraries for disease screening.

The screening identified 221 compounds to be further investigated back in NZ. From this DOS screening, a particular Azetidine Monoketopiperazine structure was enriched for a set of derivative fragments, which has led to further collaborative investigations by a Broad researcher into the particular DOS set, as to determine optimal fragments for anti-lipotoxicity mode of action. A particular HDAC3 inhibitor found in previous Broad insulin assays was identified within the toxicity screen, which has now become a particular focus in Aidan's lab in screening against our alternate DGAT-deficient model of lipotoxicity.

Dr Sunali Mehta visited Dr Anthony Cesare's laboratory at the Children's Medical Research Institute (CMRI) in Sydney. The objective of this trip was to use the live cell imaging facility at CMRI to investigate whether inhibiting phosphorylation of YB-1 (an oncogene) at novel sites interferes with its ability to facilitate cytokinesis (a physical process of cell division that occurs at the end of the cell cycle).

Results from the live cell imaging run suggest that phosphorylation of YB-1 is important for the process of cytokinesis. Completion of this work in an accurate and timely manner has accelerated the progress of this project making a substantial contribution towards a publication. These findings have also provided an opportunity for therapeutically targeting YB-1 as a cancer therapy. This visit has also allowed Sunali to develop a strong relationship between the two laboratories which will help in fostering future collaborations.

Associate Professor Roslyn Kemp and **PhD student Kirsten Ward Hartstonge** spent 5 days at the QIMR Berghofer Institute in Brisbane, Australia. The purpose of this trip was to use a Perkin-Elmer Vectra microscope (there are none of these in NZ) to image some fluorescently-labelled colorectal cancer tissue samples (FFPE). These had been previously stained using the Opal technique.

With the help of Justin Ross from Perkin-Elmer, they learned how to use the Vectra microscope to view and image both whole slides and areas of interest at higher resolution. Roslyn and Kirsten also learned how to analyse these images to view the immune cell infiltrate in different areas of the tumour sample, which we plan to apply to 2 patient cohorts in the near future. During their time in Brisbane, Roslyn and Kirsten were able to determine how to improve their current protocol using insight from Justin and the senior microscopy analysts at QIMR. This was an essential part of optimising the Opal technique and protocol for future aims.

International visits

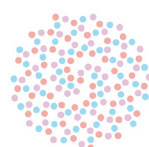
The Maurice Wilkins Centre runs an international engagement programme to build partnerships with priority international institutions that benefit the Centre's investigator network. In 2017 this once again involved MWC investigators travelling to China and hosting visiting delegations in New Zealand. The Centre also hosts visits from international and national scientists and officials.

International Scientists

The Maurice Wilkins Centre hosts visits from international scientists so that they can share their knowledge and research experiences with the New Zealand research community and establish research links.

Maurice Wilkins Centre investigators hosted the following visitors to the centre in 2017:

- Prof Kapil N Bhalla, University of Texas MD Anderson Cancer Center, Houston, USA
- Prof John S. Blanchard, Albert Einstein College of Medicine, New York, USA
- Dr John Burke, University of Victoria, Canada
- Dr Thomas Cox, University of New South Wales, Australia
- Prof Benjamin G. Davis, University of Oxford, UK
- Prof Philippe Lambin, University of Maastricht, Netherlands
- Prof Xiaoyun Lu, Jinan University, China
- Dr Gerard Manning, Genentech, San Francisco, USA
- Prof Michael Murphy, University of Oxford, UK
- Prof Christian Naus, University of British Columbia, Canada
- Prof David J. Newman, National Cancer Institute, Frederick, USA
- Prof Jon T. Njardarson, University of Arizona, Tucson, USA
- Dr Jean Francois Pouliot, Merck Oncology, Kenilworth, USA
- Prof Venki Ramakrishnan, Medical Research Council Laboratory of Molecular Biology, Cambridge, UK
- Prof Alison Rodger, Macquarie University, Australia
- Prof Jon R Sayers, University of Sheffield, UK
- Prof Marc Vooijs, Maastricht University, Netherlands
- Prof Mark Walker, University of Queensland, Australia
- Dr Giles Yeo, University of Cambridge, UK



International and national officials and delegations

In 2017 Maurice Wilkins Centre investigators hosted or participated in visits by the following officials and delegations:

- **National Natural Science Foundation of China (NSFC) Delegation, May 2017**
Ms Xiangping Zhang, Director General, Service Bureau
Mr Xinghe Shi, Vice Director, Service Bureau
Ms Yin Liu, Deputy Director, Office of Science Communication Center
- **Suzhou Industrial Park Administrative Committee (SIPAC) Delegation, June 2017**
Dr Gang Guo, Director, Finance Bureau
Ms Jianru Guan, Vice Chairman, Science and Technology Association
Mr Huihui Wu, Vice Director, Science and Technology Development Center
Ms Ying Ye, Information and Resource Division, Science and Technology Development Center
Mr Dawei Cao, Bio-Pharma Division, International Cooperation Division, Science and Technology and Informatisation Bureau
- **Guangzhou Institution of Biomedicine and Health (GIBH) Delegation, August 2017**
Prof Guanghao Chen, Party Secretary and Deputy Director
Prof Qinghai Han, General Manager
Prof Donghai Wu, South China Institute for Stem Cell Biology and Regenerative Medicine
- **University of Technology Malaysia (UTM) Delegation, November 2017**
Dr. Harisun bt. Yaakob, Senior Lecturer, Institute of Bioproduct Development
Dr Mariani Binti Abdul Hamid, Senior Lecturer, Institute of Bioproduct Development
- **Republic Polytechnic Singapore Delegation, November 2017**
Mr Yeo Li Pheow, Principal CEO
Mr Ashley Chua, Senior Director (Special Projects) & Director, School of Applied Science
Dr Lim Boon Whatt, Director, Office of Technology Development
Dr Lim Tian Hoe, Senior Manager, Office of International Relations

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 2017 Maurice Wilkins Centre investigators were awarded new grants worth more than \$30 million from New Zealand funding sources (other than the TEC) for research projects to be carried out over the next one to five years, including over \$15 million from the Health Research Council of New Zealand, \$5 million from the Marsden Fund and \$5 million from the Ministry of Business, Innovation and Employment Endeavour Fund.

New Zealand commercial funding

In 2017 Maurice Wilkins Centre investigators secured new funding of over \$400,000 from New Zealand companies to support research.

International funding

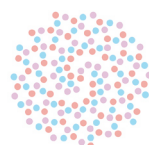
In 2017 Maurice Wilkins Centre investigators secured new funding of \$1 million from international sources to support research.

Governance and management

Maurice Wilkins Centre Board

In 2017 the MWC Board Members were; Mr Bill Falconer (Chair), Professor Conan Fee (University of Canterbury), Professor John Hosking (University of Auckland), Professor Jim Metson (University of Auckland), Ms Maxine Simmons (Biocatalyst Ltd), Professor Warren Tate (University of Otago) and Professor Mike Wilson (Victoria University of Wellington).

The MWC Board met three times in 2017; April, July and November. The Board reviewed and advised on strategy for the 2018-2020 plan and advised on international activities, engagement with Māori led research organisations and planning for the long term future of the MWC. They also reviewed and approved recommendations from the Management Committee for allocation of resources to reconfigured large-scale collaborative 'Flagship' programmes and from the May and October MWC Project Review Committees for allocation of resources to projects submitted for inclusion in this programme. The Board monitored progress of the MWC research programme through the year for compliance with the funding mandate and budget.



Management Committee

The Maurice Wilkins Centre Management Committee consists of the following principal investigators; Professors Rod Dunbar (Director), Peter Shepherd (Deputy Director), Margaret Brimble, Bill Denny and John Fraser (University of Auckland), Professors Anthony Braithwaite, Greg Cook and Dave Grattan (University of Otago), Professor Emily Parker (Victoria University of Wellington) 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 2017 and its focus was on strategy for 2018-2020 and drafting the MWC Plan for this period as well as implementation of the final year of the 2015-2017 MWC Plan and reviewing progress to date. This included developing a strategy and process for reconfiguration of large-scale collaborative 'Flagship' programmes for 2018-2020. The committee also worked on new initiatives including a new process for consideration of lower value flexible research programme applications, a new category of support to enable publication of MWC research in high quality journals and a clinical associate membership scheme for the MWC. The committee continued its functions in managing the MWC research, training and outreach programmes.

Non-management Principal Investigators

This role includes leading specific areas of the research programme and potentially other initiatives of strategic importance. Seven non-management principal investigators continued in this position in 2017; Professor Vic Arcus (University of Waikato), Professor Mike Eccles (University of Otago), Professor Gary Evans (Victoria University of Wellington), Associate Professor Shaun Lott, Associate Professor Rinki Murphy, Associate Professor Adam Patterson and Professor Cris Print (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.

The first forum, attended by principal investigators and associate investigators who were involved in leading Flagship projects, was held in Auckland on the 3rd of July. Progress of the current Flagship programmes was reviewed and a process for reconfiguration of these programmes for 2018-2020 and allocation of resources to these was discussed. The flexible research programme was reviewed and recommendations made for modifications to enable more efficient access to the funding in some of the categories.

The second forum, attended by principal and associate investigators, was held in Dunedin on the 4th of December, alongside the MWC Research Symposium. The purpose of this forum was to update investigators on progress in 2017, identify areas of future strategic opportunity and address general items raised by investigators.

Scientific Advisory Board and Clinical Advisory Board

The members of the Scientific Advisory Board (SAB) for 2015 to 2017 are; Professor Peter Andrews (Australia), Dr Christopher Cooper (USA), Professor Suzanne Cory (Australia), Dr Jilly Evans (USA), Professor David James (Australia), Dr Warwick Tong (Australia) and Dr Jeanette Wood (Switzerland).

The SAB did not meet in 2017 as this Board meets biennially and the last meeting was held at the end of 2016.

Members of the Clinical Advisory Board (CAB) for 2015 to 2017 are; Professor Ian Reid (Chair, Auckland DHB and University of Auckland), Professor Mark McKeage (Auckland DHB and University of Auckland), Associate Professor Rinki Murphy (Auckland DHB, Counties Manukau DHB and University of Auckland), Dr George Laking (Auckland 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)

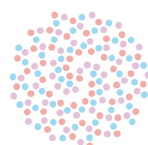
The majority of members of the CAB were consulted with or involved in the design of the re-configured MWC Flagship research programmes in 2017. The annual meeting of the CAB was deferred until 2018.

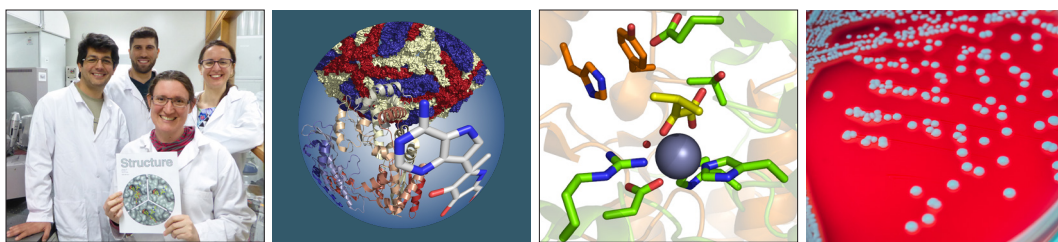
Project Review Committee

The Project Review Committee was convened twice, in May and October 2017, to review applications submitted in 2017 for inclusion in the Flexible Research Programme and make recommendations to the Management Committee and MWC Board on which applications should be approved.

In May the Project Review Committee consisted of 4 principal and 6 associate investigators from the University of Otago, Victoria University of Wellington, Massey University and the University of Auckland. They reviewed applications for Categories 2, 3 and 4 of the Flexible Research Programme.

In October the Project Review Committee consisted of 4 principal and 6 associate investigators from the University of Otago, University of Canterbury, Victoria University of Wellington and the University of Auckland. The committee reviewed applications for Categories 1, 2, and 3 of the Flexible Research Programme.





Research Outputs

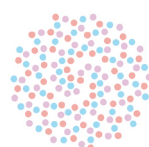
Publications

In 2017 research outputs from Maurice Wilkins Centre investigators included more than 470 peer-reviewed scientific papers published in international journals, and numerous patents granted, published or filed. Maurice Wilkins Centre contributed support to the following 95 scientific papers and reviews and 17 patents granted, published or filed.

Papers and reviews

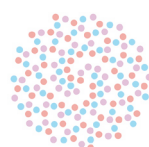
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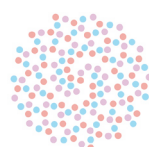
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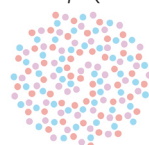
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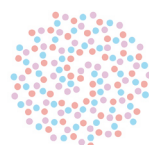
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Patents

Patents granted

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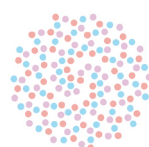
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Presentations

The international significance of the research being done by Maurice Wilkins Centre investigators and their teams is demonstrated by more than 200 invitations to give international and national presentations in 2017. The presentations included invited lectures at conferences and seminars at academic institutions in Australia, Belgium, Brazil, Canada, China, Croatia, Fiji, France, Germany, Greece, India, Indonesia, Italy, Japan, Malaysia, Norway, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan, Thailand, Tunisia, the Netherlands, the United Kingdom and the United States of America, as shown in the diagram below.

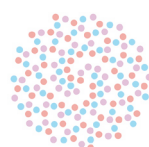


Presentation highlights

Significant presentations given by Maurice Wilkins Centre investigators in 2017 include:

- Distinguished Professor Margaret Brimble gave the plenary presentation “Synthesis of Cysteine-rich Antimicrobial Peptides and Proteins” at the Modern Solid Phase Peptide Synthesis and its Applications Symposium, held on Fraser Island, Australia, and was a keynote speaker at the 25th Meeting of Croatian Chemists and Chemical Engineers in Zagreb, Croatia, with the presentation “Development of Peptide and Peptidomimetic Therapeutic Agents from a New Zealand Perspective”. She also gave the Macquarie University Innovation Lecture “The Nature of Chemistry – Saving Lives and Creating Jobs”, at Macquarie University, Sydney, Australia.
- Distinguished Professor Bill Denny gave the plenary presentation “Cancer development in academia: novelty and translation” at the Joint NSFC/HRC Workshop on Non-communicable Diseases, in Beijing, China.

- Professor Peter Shepherd was invited to give the plenary presentation “New strategies for diabetes drugs” at the World Integrated Medicine Congress in Dongguan, China. He also gave the keynote presentation “New Combination Therapies for Cancer” at the New Zealand Society for Oncology Meeting in Auckland.
- Professor Greg Cook was invited to give the Marvin P. Bryant Memorial Lecture at the Congress on Gastrointestinal Function in Chicago, USA, giving the presentation “Bacterial energetics: the sixth antimicrobial target space for drug development”. He also gave the plenary presentation “Advancing bacterial type-II NADH:quinone oxidoreductases as new target space for drug development” at the Gordon Research Conference on Bioenergetics in Health and Disease at the Proctor Academy, New Hampshire, USA.
- Professor Rod Dunbar gave the plenary presentation “Engineering full thickness human skin” at the Biotherapeutics Association of Australasia Annual Conference, in Auckland, along with the plenary presentation “New approaches to engineering human skin” at the Dystrophic Epidermolysis Bullosa Research Association International Congress in Wellington.
- Professor Antony Braithwaite was invited to give the keynote presentation “Functions of the D133p53b isoform immune regulation” at the 3rd International P53 Isoform Workshop in Bergen, Norway.
- Professor Debbie Hay was invited to give the plenary presentation “Towards next generation amylin agonists for diabetes and obesity” at the Asia-Pacific Diabetes and Obesity Symposium in Hong Kong, China. She also gave the plenary presentation “Novel neuropeptide receptors in pain physiology – migraine” at the 38th International Union of Physiological Sciences in Rio de Janeiro, Brazil.
- Associate Professor Tim Woodfield was invited to give the plenary presentation “Designing Bioink platforms for 3D Bioprinting and Bioassembly” at the International Symposium of Materials on Regenerative Medicine in Taoyuan, Taiwan in August 2017. He also gave the keynote presentation “Bioassembly of Cancer Spheroids for Biofabrication & in vitro Screening of 3D Tumour Models” at the International Conference on Biofabrication in Beijing, China.



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

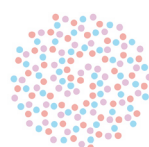
- Binghamton University (USA)
- Braunschweig University of Technology (Germany)
- Centennial Institute (USA)
- Czech Academy of Sciences (Czech)
- École polytechnique fédérale de Lausanne EPFL (Switzerland)
- ETH Zurich (Switzerland)
- Federal University of Minas Gerais (Brazil)
- Geisel School of Medicine at Dartmouth (USA)
- Keele University (UK)
- Lowy Cancer Research Institute (Australia)
- Massachusetts General Hospital (USA)
- Montreal Neurological Institute and Hospital (Canada)
- Ohio State University (USA)
- Paris VI (France)
- Paul Scherrer Institut (Switzerland)
- Peking University (China)
- Penn State University (USA)

- Phoenix Children's Hospital (USA)
- Rhodes University (South Africa)
- Research Institutes of Sweden (Sweden)
- Russian Academy of Sciences (Russia)
- St Francis Hospital (USA)
- Technische Universität Wien (Austria)
- Texas A&M University (USA)
- The Broad Institute (USA)
- Tottori University (Japan)
- Universitas Padjadjaran (Indonesia)
- University of Adelaide (Australia)
- University of Adelaide (Australia)
- University of Alabama (USA)
- University of Bath (UK)
- University of Bremen (Germany)
- University of Copenhagen (Denmark)
- University of Dundee (Scotland)
- University of Exeter (UK)
- University of Frankfurt (Germany)
- University of Freiburg (Germany)
- University of Geneva (Switzerland)
- University of Graz (Austria)
- University of Notre Dame (USA)
- University of Ottawa (Canada)
- University of Reading (UK)
- University of St Andrews (UK)
- University of Texas Southwestern Medical Center (USA)
- Winona State University (USA)
- Zhejiang University (China)

Continuing academic collaborations

North America

- British Columbia Cancer Agency (Canada)
- Albert Einstein College of Medicine (USA)
- Allergan (USA)
- Arkansas State University (USA)
- Brown University (USA)
- Cedars-Sinai Hospital (USA)
- Colorado State University (USA)
- Cornell University (USA)
- Emory University (USA)
- Georgia Institute of Technology (USA)
- Global Alliance for TB Drug Development (USA)
- Harvard University (USA)
- Johns Hopkins University (USA)
- La Jolla Institute for Allergy and Immunology (USA)
- MD Anderson Cancer Center, University of Texas (USA)
- Mercer University (USA)
- Moffitt Cancer Center (USA)
- National Institutes of Health (USA)



- Northern Arizona University (USA)
- Rochester Institute of Technology (USA)
- Sanford Burnham Medical Research Institute (USA)
- Stanford University (USA)
- Stony Brook University (USA)
- Stowers Institute for Medical Research (USA)
- University of California (USA)
- University of Central Florida (USA)
- University of Colorado (USA)
- University of Georgia (USA)
- University of Houston USA)
- University of Illinois at Chicago (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 Southern California (USA)
- University of Tennessee (USA)
- University of Texas South Western (USA)
- University of Toledo (USA)
- University of Utah (USA)
- University of Virginia (USA)
- University of Washington (USA)
- Vanderbilt University (USA)
- Wake Forest University (USA)
- Weill Cornell Medical College (USA)
- Yeshiva University (USA)

South America

- University of Sao Paulo (Brazil)

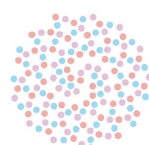
UK and Europe

- University of Eastern Finland (Finland)
- Pasteur Institute (France)
- Université de Picardie Jules Verne (France)
- Helmholtz Centre for Ocean Research (Germany)
- University of Munich (Germany)
- Hamburg University of Applied Sciences (Germany)
- Jacobs University (Germany)
- Johannes Gutenberg University (Germany)
- Julius Kuhn-Institut (Germany)
- Max Planck Institute for Infection Biology (Germany)
- Max Planck Institute for Molecular Genetics (Germany)
- University of Wurzburg (Germany)
- University of Pavia (Italy)
- Vilnius University (Lithuania)
- University of Leiden (Netherlands)
- University Medical Centre Utrecht (Netherlands)
- University of Maastricht (Netherlands)
- University of Bergen (Norway)
- University of Oslo (Norway)
- University of Minho (Portugal)
- University of Gothenburg (Sweden)
- Uppsala University (Sweden)
- Swiss Federal Institute of Technology (Switzerland)
- University of Liverpool (UK)
- University of London (UK)
- Aston University (UK)
- Birmingham University (UK)

- Essex University (UK)
- Francis Crick Research Institute (UK)
- Manchester Metropolitan University (UK)
- Queen Mary University of London (UK)
- University of Aberdeen (UK)
- University of Bristol (UK)
- University of Cambridge (UK)
- University of Huddersfield (UK)
- University of Leeds (UK)
- University of Lincoln (UK)
- University of Manchester (UK)
- University of Nottingham (UK)
- University of Oxford (UK)
- University of Reading (UK)
- University of Sheffield (UK)
- University of Southampton (UK)
- University of St. Andrews (UK)
- Macquarie University (Australia)
- Monash University (Australia)
- Murdoch Children's Research Institute (Australia)
- Peter MacCallum Cancer Centre (Australia)
- Queensland Institute for Medical Research (Australia)
- Queensland University of Technology (Australia)
- Telethon Kids Institute (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)
- JINAN University (China)
- Fujian University of Traditional Chinese Medicine (China)
- Guangzhou Institute of Biomedicine and Health (China)
- Shanghai Institute of Materia Medica (China)
- University of Hong Kong (Hong Kong)
- Indian Institute of Science (India)
- Korea Basic Science Institute (Korea)
- Samsung Biomedical Research Institute (Korea)
- Seoul National University (Korea)
- National University of Singapore (Singapore)

Asia Pacific

- Garvan Institute (Australia)
- Australian Institute of Marine Science (Australia)
- The Peter Doherty Institute for Infection and Immunity (Australia)
- Australian National University (Australia)
- Children's Medical Research Institute (Australia)
- Commonwealth Scientific and Industrial Research Organisation (Australia)
- Griffith University (Australia)
- Heart Research Institute (Australia)
- Hudson Institute of Medical Research (Australia)
- Institute for Molecular Bioscience (Australia)
- Latrobe University (Australia)



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.

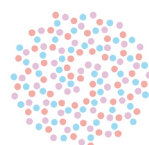
The Maurice Wilkins Centre also partners with established companies, and the knowledge and expertise developed by its investigators in scientific fields vital to the biotechnology and pharmaceutical sectors are highly sought after. Examples of contract research and the provision of facilities to industry are outlined on page 42 of this report. The Centre's investigators also act as consultants for a number of national and international companies.

In 2017 the expertise of Maurice Wilkins Centre investigators was sought by:

- Abcam (UK)
- Adrenomed
- Aeroqual Ltd
- Alder Biopharmaceuticals (USA)
- Allergan Pharmaceuticals (USA)
- AntibioTx
- Astra Zeneca
- Auckland Clinical Studies Ltd
- Auckland UniServices Ltd
- Avalia Immunotherapies Ltd
- AzurRx
- Beca Ltd
- Biotelliga Ltd
- BLIS Technologies Ltd
- Boehringer Ingelheim GmbH
- Caldera
- Claridges Organic Ltd
- Coda Therapeutics (NZ) Ltd
- Comvita Ltd
- Connovation Ltd
- Convert Pharmaceuticals
- Dairy Goat Cooperative Ltd
- Deosan NZ
- Enztec Ltd
- EpiGen New Zealand
- Fisher and Paykel Healthcare
- Fonterra Co-operative Group
- Gilead Sciences Ltd
- GlycoSyn
- Intarcia Therapeutics, Inc
- Ironwood Pharmaceuticals
- Izon Ltd
- Kea Therapeutics Ltd
- Landcare Research NZ Ltd
- Mastaplex Limited
- Mote Research Ltd

- Metavention (USA)
- New Zealand Leather and Shoe Research Association
- New Zealand Pharmaceuticals Ltd
- Nucleus Scientific Inc (USA)
- OcuNexus Therapeutics Inc. USA
- Ossis Ltd
- Pheromite
- Plant and Food Research
- SapVax LLC
- Syngenta
- Synthase Biotech Ltd
- Thermo Fisher Scientific
- Upside Biotechnologies
- Wellington Zhaotai Therapies Limited
- Zespri International Limited

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 Global Alliance for TB Drug Development.



Awards and honours

International and national honours awards to Maurice Wilkins Centre investigators, affiliates, and students in 2017:

- **MacDiarmid Medal**

The Royal Society of New Zealand awarded Professor Peter Tyler, MWC Associate Investigator based at the Ferrier Institute, Victoria University of Wellington, the MacDiarmid Medal in recognition of outstanding scientific research that demonstrates the potential for application for human benefit.

- **Callaghan Medal**

Professor Peter Shepherd Deputy-Director of the MWC, was awarded the Callaghan Medal by the Royal Society of New Zealand for pioneering activities to increase the understanding of science by the New Zealand public.

- **BNZ Supreme Award**

Professor Richard Furneaux, MWC Associate Investigator at Ferrier Institute, Victoria University of Wellington, won the BNZ Supreme Award at the 2017 KiwiNet Research Commercialisation Awards.

- **James Cook Fellowship**

Professor Vic Arcus, a Principal Investigator from the University of Waikato was awarded a James Cook Fellowship from the Royal Society of New Zealand. Vic will use the fellowship to continue his research in explaining the temperature-dependent behaviour of enzymes in ecosystems.

- **IUPAC Service Award**

Professor Margaret Brimble, a Principal Investigator and Director of Medicinal Chemistry at the University of Auckland, received an Appreciation of Service Award at the International Union of Pure and Applied Chemistry (IUPAC) Conference held in Sao Paulo, Brazil. This award recognises Professor Brimble's outstanding service to IUPAC and the advancement of chemistry worldwide.

- **Doctorate in Science by Oxford**

Professor Garth Cooper, a founding Principal Investigator of the MWC was conferred a Doctor of Science (DSc) degree by the Medical Sciences Division of the University of Oxford in the UK. The Oxford DSc is awarded following an extensive independent examination of a suppliant's scholarly output throughout their career. Only two to three of these degrees are awarded each year.

Rutherford Discovery Fellowship

Dr Aniruddha Chatterjee, an Associate Investigator from the University of Otago, was awarded a Rutherford Discovery Fellowship from the Royal Society of NZ for his project "Investigating the origin and consequences of epigenetic alterations in cancer metastasis".

- **Sir Charles Hercus Health Research Fellowship**

Affiliate Investigator Dr Htin Aung from the University of Otago was awarded a Sir Charles Hercus Research Fellowship by the Health Research Council that will enable him to continue his work combatting tuberculosis at local and international frontlines.

Shorland Medal

Professor Colin Green, MWC Associate Investigator, was part of a team of clinical scientists from the University of Auckland that was awarded the NZ Association of Scientists' Shorland Medal for its research into treatment for babies with brain injuries. The Shorland Medal recognises major and continued contribution to basic or applied research that has added significantly to scientific understanding or resulted in significant benefits to society

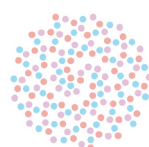
- **Hill Tinsley Medal**

Professor Christian Hartinger from the School of Chemical Sciences at the University of Auckland was awarded this year's Hill Tinsley Medal. Professor Hartinger is a leading scientist in the fields of medicinal bioinorganic, bioanalytical and bioorganometallic chemistry, and is particularly well known for his work on the development of metal-based anticancer drugs.

- **NZSBMB Custom Science Award for Research Excellence**

Associate Professor Wayne Patrick from the University of Otago was awarded the New Zealand Society for Biochemistry and Molecular Biology's (NZSBMB) top honour – the Custom Science Award for Research Excellence.

The Maurice Wilkins Centre also congratulates the numerous investigators and students who received local and institutional honours throughout 2017.



Summary

Broad category	Detailed Category	2015	2016	2017
FTEs by Category	Principal investigators	1.70	1.72	1.75*
	Associate investigators	2.09	2.50	2.38*
	Postdoctoral fellows	7.29	13.98	14.80*
	Research technicians	0.57	0.63	5.28*
	Administrative/support	2.81	3.27	3.66*
	Research students	14.58	18.44	22.92**
	Total	29.04	40.54	50.79
Headcounts by category	Principal investigators	19	20	20
	Associate investigators	145	155	164
	Postdoctoral fellows	20	24	43
	Research technicians	2	4	15
	Administrative/support	7	5	8
	Research students	23	69	77
	Total	216	277	327
Peer reviewed research outputs by type	Journal articles	84	93	95
	Book chapters	1	1	2
	Conference Proceedings	9	-	-
	Total	94	94	97
Value of external research contracts awarded by source	Vote Science and Innovation contestable funds	2,831,00	2,350,770	2,658,865
	Domestic- other non-Govt	372,977	431,677	673,257
	Overseas	2,067,798	1,153,198	222,207
	Other	117,500	153,769	167,019
	Total	5,389,275	4,089,414	3,721,348
Commercial activities	Patent applications	4	10	16
	Patents granted	5	0	1
Students studying at CORE by level	Doctoral degree	21	58	66
	Other	2	11	11
	Total	23	69	77**
Number of students completing qualification by level	Doctoral degree	-	5	10
	Other	1	7	7
	Total	1	12	17
Immediate post-study graduate destinations	Employed in NZ	1	4	7
	Employed overseas	-	5	5
	Further study in NZ	-	-	2
	Other	-	-	1
	Unknown	-	3	2
	Total	1	12	17

*In addition to the directly funded FTE in the above table in 2017, Principal investigators contributed to an additional 1.88 FTE in time only and 0.52 FTE was co-funded; Associate investigators contributed an additional 3.82 in time only and 3.83 FTE was co-funded; Postdoctoral fellows, Research technicians and Administrative/Support staff had additional 4.54 FTE, 2.44 FTE and 0.1 FTE was co-funded respectively.

**Research students had an additional 41.48 EFT co-funded from other sources.

Summary Financial Statement 2017

Funding summary for the year ended 31 December 2017

Actuals

\$0

Funding received

Tertiary Education Commision grant	7,082
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Total funding received	7,082
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Salaries and salary related costs	2,233
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Overheads	2,349
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Project costs	1,781
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Travel	326
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Postgraduate students	649
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Total expenditure	7,339
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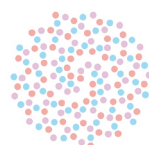
Net surplus/(Deficit)	-257
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This report covers the period from 1 January 2017 - 31 December 2017

and details funding received and fund distributed to collaborative partners of the CoRE.

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

In 2016 the CoRE carried forward a net surply of 1,827. This surplus has been added to the 2017 income to fund the CoRE's research programme in 2017. The CoRE therefore has a net surplus of 1,570 that will be carried forward into 2018 to fund future expenditure of the CoRE.



Directory

Governing Board

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

Scientific 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)

Prof Rod Dunbar (Director)	School of Biological Sciences	University of Auckland
Prof Peter Shepherd (Deputy Director)	Department of Molecular Medicine and Pathology	University of Auckland
Prof Antony Braithwaite	Department of Pathology	University of Otago
Prof Margaret Brimble	School of Chemical Sciences	University of Auckland
Prof Greg Cook	Microbiology and Immunology	University of Otago
Prof Bill Denny	Auckland Cancer Society Research Centre	University of Auckland
Prof John Fraser	Faculty of Medical and Health Sciences	University of Auckland
Prof Dave Grattan	Department of Anatomy	University of Otago
Prof Ian Hermans	Malaghan Institute of Medical Research	
Prof Emily Parker	Department of Chemistry	University of Canterbury

Principal investigators (non-management)

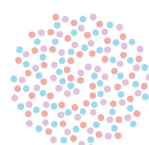
Prof Vic Arcus	Department of Biological Sciences	Waikato University
Prof Michael Eccles	Department of Pathology	University of Otago
Prof Gary Evans	Ferrier Institute	Victoria University
Assoc Prof Shaun Lott	School Of Biological Science	University of Auckland
Assoc Prof Rinki Murphy	Department of Medicine	University of Auckland
Assoc Prof Adam Patterson	Auckland Cancer Society Research Centre	University of Auckland
Assoc Prof Cris Print	Department of Molecular Medicine and Pathology	University of Auckland

Principal investigators (emeritus)

Prof Ted Baker	School of Biological Sciences	University of Auckland
Prof Garth Cooper	School of Biological Sciences	University of Auckland
Prof Peter Hunter	Auckland Bioengineering Institute	University of Auckland

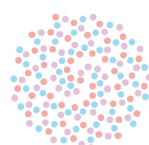
Associate investigators

Name	Department	Home Institution
Associate Professor David Ackerley	School of Biological Sciences	Victoria University of Wellington
Associate professor Jane Allison	School of Biological Sciences	Massey University
Associate Professor Bob Anderson	Auckland Bioengineering Institute	University of Auckland
Associate Professor Iain Anderson	Auckland Cancer Society Research Centre	University of Auckland
Dr Catherine Angel	School of Biological Sciences	University of Auckland
Professor Paul Atkinson	School of Biological Sciences	Victoria University of Wellington
Professor Bruce Baguley	Auckland Cancer Society Research Centre	University of Auckland
Professor Michael Baker	Department of Public Health	University of Otago, Wellington
Dr Adam Bartlett	Department of Surgery	University of Auckland
Dr Ghader Bashiri	School of Biological Sciences	University of Auckland
Professor Chris Battershill	Faculty of Science and Engineering	University of Waikato
Professor Mike Berridge		Malaghan Institute of Medical Research
Associate Professor Mik Black	Department of Biochemistry	University of Otago
Dr Gib Bogle	Auckland Bioengineering Institute	University of Auckland
Professor Stefan Bohlander	Department of Molecular Medicine and Pathology	University of Auckland
Mr Michael Booth	Waitemata Specialist Centre	Waitemata District Health Board
Dr Reuben Broom	Department of Medical Oncology	University of Auckland
Professor Peter Browett	Department of Molecular Medicine and Pathology	University of Auckland
Dr Christina Buchanan	Department of Molecular Medicine and Pathology	University of Auckland
Professor Vicky Cameron	Department of Medicine	University of Otago, Christchurch
Professor Chris Charles	Department of Medicine	University of Otago, Christchurch
Dr Aniruddha Chatterjee	Department of Pathology	University of Otago
Associate Professor Lai-Ming Ching	Auckland Cancer Society Research Centre	University of Auckland
Associate Professor Brent Copp	School of Chemical Sciences	University of Auckland
Professor Jillian Cornish	School of Medicine	University of Auckland
Associate Professor Margaret Currie	Department of Pathology	University of Otago, Christchurch
Associate Professor Gabriele Dachs	Department of Pathology	University of Otago, Christchurch
Professor Nicola Dalbeth	School Medicine	University of Auckland
Associate Professor Alan Davidson	Department of Molecular Medicine and Pathology	University of Auckland
Professor Catherine Day	Department of Biochemistry	University of Otago



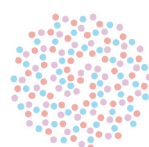
Associate Professor Renwick Dobson	School of Biological Sciences	University of Canterbury
Professor Paul Donaldson	School of Medical Sciences	University of Auckland
Professor Rob Doughty	Department of Medicine	University of Auckland
Associate Professor Richard Douglas	Department of Surgery	University of Auckland
Professor Antony Fairbanks	Department of Chemistry	University of Canterbury
Dr Jack Flanagan	Auckland Cancer Society Research Centre	University of Auckland
Dr Daniel Furkert	School of Chemical Sciences	University of Auckland
Professor Richard Furneaux	Ferrier Research Institute	Victoria University of Wellington
Dr Austen Ganley	School of Biological Sciences	University of Auckland
Dr Olivier Gasser		Malaghan Institute of Medical Research
Professor Juliet Gerrard	School of Biological Sciences	University of Auckland
Dr Monica Gerth	School of Biological Sciences	University of Otago
Associate Professor Michelle Glass	Department of Pharmacology	University of Auckland
Dr David Goldstone	School of Biological Sciences	University of Auckland
Professor Colin Green	School of Medicine	University of Auckland
Associate Professor Dave Greenwood		Plant and Food Research
Dr Angus Grey	Department of Physiology	University of Auckland
Dr Yongchuan Gu	Auckland Cancer Society Research Centre	University of Auckland
Dr Chris Guise	Auckland Cancer Society Research Centre	University of Auckland
Dr Chris Hall	Department of Molecular Medicine and Pathology	University of Auckland
Professor Mark Hampton	Free Radical Research Group	University of Otago, Christchurch
Dr Paul Harris	School of Chemical Sciences	University of Auckland
Professor Christian Hartinger	School of Chemical Sciences	University of Auckland
Dr Joanne Harvey	School of Chemical and Physical Sciences	Victoria University of Wellington
Associate Professor Debbie Hay	School of Biological Sciences	University of Auckland
Associate Professor Michael Hay	Auckland Cancer Society Research Centre	University of Auckland
Associate Professor Nuala Helsby	Department of Molecular Medicine and Pathology	University of Auckland
Associate Professor Marilyn Hibma	Department of Pathology	University of Otago
Associate Professor Tony Hickey	School of Biological Sciences	University of Auckland
Dr Kevin Hicks	School of Medical Sciences	University of Auckland
Professor Sarah Hook	School of Pharmacy	University of Otago

Associate Professor Julia Horsfield	Department of Pathology	University of Otago
Professor Brian Hyland	Department of Physiology	University of Otago
Professor Geoff Jameson	Institute of Fundamental Sciences	Massey University
Dr Stephen Jamieson	Auckland Cancer Society Research Centre	University of Auckland
Jodie Johnston	Department of Chemistry	University of Auckland
Professor Bill Jordan	School of Biological Sciences	Victoria University of Wellington
Dr Mia Jullig	School of Biological Sciences	University of Auckland
Dr Roslyn Kemp	Department of Microbiology and Immunology	University of Otago
Dr Jackie Kendall		University of Auckland
Professor 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
Dr Joanna Kirman	Department of Microbiology and Immunology	University of Otago
Professor Kurt Krause	Department of Biochemistry	University of Otago
Dr Jeremy Krebs	Department of Medicine	University of Otago
Associate Professor Anne La Flamme	School of Biological Sciences	Victoria University of Wellington
Dr Goetz Laible		AgResearch
Associate Professor Dave Larsen	Department of Chemistry	University of Otago
Dr Ben Lawrence	School of Medical Sciences	University of Auckland
Professor Graham Le Gros		Malaghan Institute of Medical Research
Dr Elizabeth Ledgerwood	Department of Biochemistry	University of Otago
Associate Professor Klaus Lehnert	School of Biological Sciences	University of Auckland
Associate Professor Kerry Loomes	School of Biological Sciences	University of Auckland
Dr Donia Macartney-Coxson		Environmental Science and Research
Dr Peter Mace	Department of Biochemistry	University of Otago
Professor John McCall	Department of Surgical Sciences	University of Otago
Dr Melanie McConnell	School of Biological Sciences	Victoria University of Wellington
Associate Professor Sally McCormick	Department of Biochemistry	University of Otago
Professor Mark McKeage	Department of Pharmacology	University of Auckland
Dr Kim Mellor	School of Medicine	University of Auckland
Professor Andrew Mercer	Department of Microbiology and Immunology	University of Otago
Associate Professor Tony Merriman	Department of Biochemistry	University of Otago



Dr Troy Merry	Department of Molecular Medicine and Pathology	University of Auckland
Associate Professor Peter Metcalf	School of Biological Sciences	University of Auckland
Professor John Miller	School of Biological Sciences	Victoria University of Wellington
Associate Professor Alok Mitra	School of Biological Sciences	University of Auckland
Dr Nicole Moreland	School of Biological Sciences	University of Auckland
Dr Xochitl Morgan	Department of Microbiology and Immunology	University of Otago
Associate Professor Kathy Mountjoy	Department of Physiology	University of Auckland
Dr Andrew Munkacsi	School of Biological Sciences	Victoria University of Wellington
Professor Martyn Nash	Auckland Bioengineering Institute	University of Auckland
Professor Poul Nielsen	Auckland Bioengineering Institute	University of Auckland
Associate Professor Gillian Norris	Institute of Fundamental Sciences	Massey University
Associate Professor Peter Northcote	School of Chemical and Physical Sciences	Victoria University of Wellington
Dr Justin O'Sullivan	Liggins Institute	University of Auckland
Associate Professor Bjorn Oback		AgResearch
Dr Pawel Olszewski	Faculty of Science and Engineering	University of Waikato
Dr Jeremy Owen	School of Biological Sciences	Victoria University of Wellington
Professor Gavin Painter	Ferrier Research Institute	Victoria University of Wellington
Associate Professor Brian Palmer	Auckland Cancer Society Research Centre	University of Auckland
Dr Wayne Patrick	School of Biological Sciences	University of Otago
Lecturer Grant Pearce	School of Biological Sciences	University of Canterbury
Associate Professor Chris Pemberton	Department of Medicine	University of Otago, Christchurch
Dr Lifeng Peng	School of Biological Sciences	Victoria University of Wellington
Dr Jo Perry	Liggins Institute	University of Auckland
Dr Anthony Phillips	School of Biological Sciences	University of Auckland
Associate Professor Thomas Proft	Department of Molecular Medicine and Pathology	University of Auckland
Dr Frederik Pruijn	Auckland Cancer Society Research Centre	University of Auckland
Dr Fiona Radcliff	Department of Molecular Medicine and Pathology	University of Auckland
Associate Professor Jasna Rakonjac	Institute of Fundamental Sciences	Massey University
Dr Dave Rennison	School of Chemical Sciences	University of Auckland
Associate Professor Gordon Rewcastle	Auckland Cancer Society Research Centre	University of Auckland
Dr Johannes Reynisson	School of Chemical Sciences	University of Auckland
Dr Sally Roberts	Department of Molecular Medicine and Pathology	Auckland District Health Board
Professor Carol Robinson	School of Chemical Sciences	University of Auckland

Professor Franca Ronchese		Malaghan Institute of Medical Research
Dr Evelyn Sattlegger	Institute of Natural and Mathematical Sciences	Massey University
Associate Professor Andrew Shelling	School of Medicine	University of Auckland
Dr Hilary Sheppard	School of Biological Sciences	University of Auckland
Professor Bruce Smaill	Auckland Bioengineering Institute	University of Auckland
Dr Jeff Smaill	Auckland Cancer Society Research Centre	University of Auckland
Professor Rob Smith	Department of Chemistry	University of Otago
Professor Russell Snell	School of Biological Sciences	University of Auckland
Professor James Sneyd	Department of Mathematics	University of Auckland
Dr Julie Spicer	Auckland Cancer Society Research Centre	University of Auckland
Dr Chris Squire	School of Biological Sciences	University of Auckland
Dr Bridget Stocker	School of Chemical and Physical Sciences	Victoria University of Wellington
Dr Vinod Suresh	Auckland Bioengineering Institute	University of Auckland
Dr John Taylor	School of Biological Sciences	University of Auckland
Associate Professor Mike Taylor	School of Biological Sciences	University of Auckland
Associate Professor Paul Teesdale-Spittle	School of Biological Sciences	Victoria University of Wellington
Associate Professor Matt Templeton		Plant and Food Research
Dr Moana Tercel	Auckland Cancer Society Research Centre	University of Auckland
Dr Andrew Thompson	Auckland Cancer Society Research Centre	University of Auckland
Dr Mattie Timmer	School of Chemical and Physical Sciences	Victoria University of Wellington
Dr Penny Truman	School of Health Sciences	Massey University
Dr Alex Tups	Department of Physiology	University of Otago
Professor Peter Tyler	Ferrier Research Institute	Victoria University of Wellington
Associate Professor Joel Tyndall	School of Pharmacy	University of Otago
Dr James Ussher	Department of Microbiology and Immunology	University of Otago
Professor Vernon Ward	Department of Microbiology and Immunology	University of Otago
Dr Robert Weinkove	Malaghan Institute of Medical Research	
Lecturer Phillip Wilcox	Department of Statistics	University of Otago

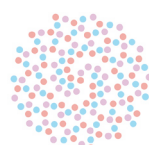


Dr Siouxsie Wiles	Department of Molecular Medicine and Pathology	University of Auckland
Professor David Williams	School of Chemical Sciences	University of Auckland
Dr Geoff Williams	School of Chemical Sciences	University of Auckland
Dr Debbie Williamson	Environmental Science and Research	
Professor William Wilson	Auckland Cancer Society Research Centre	University of Auckland
Professor John Windsor	Department of Surgery	University of Auckland
Associate Professor Tim Woodfield	Department of Orthopaedic Surgery and Musculoskeletal Medicine	University of Otago, Christchurch
Associate Professor Sarah Young	School of Biological Sciences	University of Otago
Dr Paul Young	Department of Pathology	University of Auckland
Dr Shaoping Zhang	School of Biological Sciences	University of Auckland

Affiliate Investigators

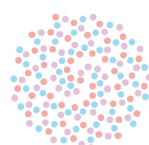
Name	Department	Home Institution
Dr Maria Abbattista	Auckland Cancer Society Research Centre	University of Auckland
Mr Antonio Ahn	Department of Pathology	University of Otago
Ms Soumeiya Ali Jaballah	School of Biological Sciences	University of Auckland
Ms Abeer Al-Zubaidi	School of Biological Sciences	University of Auckland
Dr Emma Andrews	Department of Biological Sciences	University of Waikato
Dr Jisha Antony	Department of Pathology	University of Otago
Ms Shereen Asha Murugayah	Department of Biochemistry	University of Otago
Dr Jonathan Astin	Department of Molecular Medicine and Pathology	University of Auckland
Dr Htin Aung	Department of Microbiology and Immunology	University of Otago
Dr Ghader Bashiri	School of Biological Sciences	University of Auckland
Mr Sean Bisset	Institute of Fundamental Sciences	Massey University
Mr Sam Blanchett	Department of Molecular Medicine and Pathology	University of Auckland
Dr Adrian Blaser	Auckland Cancer Society Research Centre	University of Auckland
Dr Rebekah Bower	School of Biological Sciences	University of Auckland
Mr Alistair Brown	School of Biological Sciences	Victoria University of Wellington
Mr Matthew Bull	Auckland Cancer Society Research Centre	University of Auckland
Dr Esther Bulloch	School of Biological Sciences	University of Auckland
Ms Erica Burns	School of Biological Sciences	University of Auckland

Mr Jason Busby	AgResearch Structural Biology Lab/School of Biological Sciences	University of Auckland
Dr Leyla Bustamante	Ferrier Research Institute	Victoria University of Wellington
Dr Mark Calcott	School of Biological Sciences	Victoria University of Wellington
Dr Scott Cameron	Ferrier Research Institute	Victoria University of Wellington
Mr Colm Carraher	Plant & Food Research	
Ms Aparajita Chakraborty	School of Biological Sciences	University of Auckland
Dr George Chang	School of Biological Sciences	University of Auckland
Dr Ashika Chhana	Department of Medicine	University of Auckland
Ms Alice Chin	Department of Pathology	University of Otago
Dr Peter Choi	Auckland Cancer Society Research Centre	University of Auckland
Mr Hans Choi	School of Chemical Sciences	University of Auckland
Dr Daria Chudakova	School of Biological Sciences	University of Auckland
Ms Fiona Clow	Department of Molecular Medicine and Pathology	University of Auckland
Thomas Collier		Massey University
Dr Lisa Connor	Malaghan Institute of Medical Research	
Miss Taylor Cooney	Ferrier Research Institute	Victoria University of Wellington
Mr Jack Copping		Massey University
Ms Julie Cree	Department of Molecular Medicine and Pathology	University of Auckland
Dr Matthew Cumming	Department of Biochemistry	University of Otago
Mr Michael Currie	Biological Sciences	University of Canterbury
Ms Naomi Davies	School of Medicine	University of Auckland
Dr Stephanie Dawes	School of Biological Sciences	University of Auckland
Dr Luis De Leon Rodriguez	School of Chemical Sciences	University of Auckland
Dr Ofa Dewes	Molecular Medicine and Pathology	University of Auckland
Dr Ben Dickson	Auckland Cancer Society Research Centre	University of Auckland
Dr James Dickson	School of Biological Sciences	University of Auckland
Ms Alicia Didsbury	School of Biological Sciences	University of Auckland
Dr Ivo Dimitrov	Auckland Cancer Society Research Centre	University of Auckland
Ms Waruni Dissanayake	Department of Molecular Medicine and Pathology	University of Auckland
Ms Elyce du Mez	School of Biological Sciences	University of Auckland
Mr Elliott Dunn	School of Biological Sciences	University of Auckland
Dr Patrick Edwards	Institute of Fundamental Sciences	Massey University
Ms Jennifer Eom	School of Biological Sciences	University of Auckland



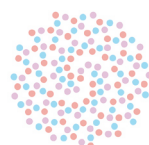
Dr Gloria Evans	Department of Obstetrics & Gynaecology	University of Otago, Christchurch
Mr Tayaza Fadason	Liggins Institute	University of Auckland
Ms Yifei (Effie) Fan	Ferrier Research Institute	Victoria University of Wellington
Dr Vaughan Feisst	School of Biological Sciences	University of Auckland
Dr Scott Ferguson	Microbiology and Immunology	University of Otago
Dr Laura Ferrer	Malaghan Institute of Medical Research	
Mr Shaun Ferris	School of Chemical Sciences	University of Auckland
Dr Vyacheslav Filichev	Institute of Fundamental Sciences	Massey University
Mr Mohammad Firoozinia	Department of Chemistry	University of Canterbury, Victoria University of Wellington
Dr Damien Fleetwood	AgResearch Structural Biology Lab/School of Biological Sciences	University of Auckland
Dr Nicholas Fleming	Department of Pathology	University of Otago
Dr Martina Foglizzo	Department of Biochemistry	University of Otago
Mr Richard (Yang) Fong	Institute of Fundamental Sciences and Massey Genome Service	Massey University
Mr Jared Freeman	School of Biological Sciences	University of Auckland
Mr Zhe (Regan) Fu	Auckland Cancer Society Research Centre	University of Auckland
Mr Simon Fung	Auckland Cancer Society Research Centre	University of Auckland
Dr Daniel Furkert	School of Chemical Sciences	University of Auckland
Mr Jakob Gaar	School of Chemical Sciences	University of Auckland
Michael Garelja	School of Biological Sciences	University of Auckland
Dr Olivier Gasser	Malaghan Institute of Medical Research	
Ms Nour Ghamri	Auckland Cancer Society Research Centre	University of Auckland
Mr Joseph Gingell	School of Biological Sciences	University of Auckland
Mr Phillip Grant	School of Chemical Sciences	University of Auckland
Dr Carol Greene	School of Medicine	University of Auckland
Dr Tracy Hale	Institute of Fundamental Sciences	Massey University
Dr Cyril Hamiaux		Plant & Food Research
Dr Muhammad Aqfan Hanif	School of Chemical Sciences	University of Auckland
Dr Elena Harjes	Institute of Fundamental Sciences	Massey University
Mr Liam Harold	Department of Microbiology and Immunology	University of Otago
Dr Kimiora Henare	Auckland Cancer Society Research Centre	University of Auckland

Mr Luke Henderson	School of Medicine	University of Otago
Ms Nicole Herr	School of Biological Sciences	University of Auckland
Dr Joanna Hicks	Faculty of Science and Engineering	University of Waikato
Ms Kerry Hilligan	Malaghan Institute of Medical Research	
Ms Ngoc Anh Thu (Thu) Ho	AgResearch Structural Biology Lab/School of Biological Sciences	University of Canterbury
Dr Jennifer Hollywood	Department of Molecular Medicine and Pathology	University of Auckland
Dr Teresa Holm	Department of Molecular Medicine and Pathology	University of Auckland
Dr Jiwon Hong	School of Biological Sciences	University of Auckland
Mr Chris Horne	Biomolecular Interaction Centre	University of Canterbury
Mr Lin Hou	Auckland Cancer Society Research Centre	University of Auckland
Mr Amadeus Huang	School of Biological Sciences	University of Auckland
Mr Greg Hung	School of Chemical Sciences	University of Auckland
Mr Francis Hunter	Auckland Cancer Society Research Centre	University of Auckland
Dr Matloob Husain	Department of Microbiology and Immunology	University of Otago
Dr Victoria Jackson	Auckland Cancer Society Research Centre	University of Auckland
Ms Elsie Jacobson	Liggins Institute	University of Auckland
Dr Jagdish Kumar Jaiswal	Auckland Cancer Society Research Centre	University of Auckland
Mr Muhammad Aqfan Jamaluddin	School of Biological Sciences	University of Auckland
Ms Megan Jamieson	School of Chemical Sciences	University of Auckland
Dr Wanting Jiao	Ferrier Research Institute	Victoria University of Wellington
Mr Aidan Joblin-Mills	School of Biological Sciences	Victoria University of Wellington
Dr Jodie Johnston	School of Biological Sciences	University of Auckland
Dr Jiney Jose	Auckland Cancer Society Research Centre	University of Auckland
Ms Maria Kalyukina	School of Biological Sciences	University of Auckland
Mr Mohinder Kaplish	Department of Anatomy	University of Otago
Dr Iman Kavianinia	School of Chemical Sciences	University of Auckland
Dr Marina Kazantseva	Department of Pathology	University of Otago
Ms Inken Kelch	School of Biological Sciences	University of Auckland
Dr Jeremy Keown	School of Biological Sciences	University of Auckland
Dr Sarah Kessans	Department of Chemistry	University of Canterbury
Ms Parastoo Khajeaian	Department of Chemistry	Victoria University of Wellington



Mr Zin Khant Aung	Department of Anatomy	University of Otago
Dr Bronwyn Kivell	School of Biological Sciences	Victoria University of Wellington
Mr Nicholas Knowlton	Department of Molecular Medicine and Pathology	University of Auckland
Dr Andrew Kralicek	Plant & Food Research	
Dr Katrin Kramer	Department of Pathology	University of Otago
Ms Preeti Kundu	Ferrier Research Institute	Victoria University of Wellington
Dr Sharon Ladyman	Department of Anatomy	University of Otago
Dr Ries Langley	Department of Molecular Medicine and Pathology	University of Auckland
Dr Annette Lasham	Department of Molecular Medicine and Pathology	University of Auckland
Dr Kate Lee	School of Biological Sciences	University of Auckland
Dr Verne Lee	AgResearch Structural Biology Lab/School of Biological Sciences	University of Auckland
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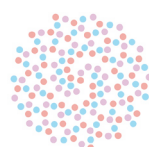


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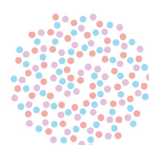
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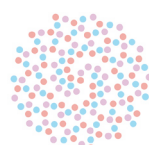
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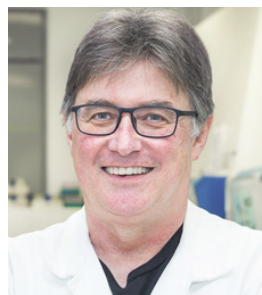


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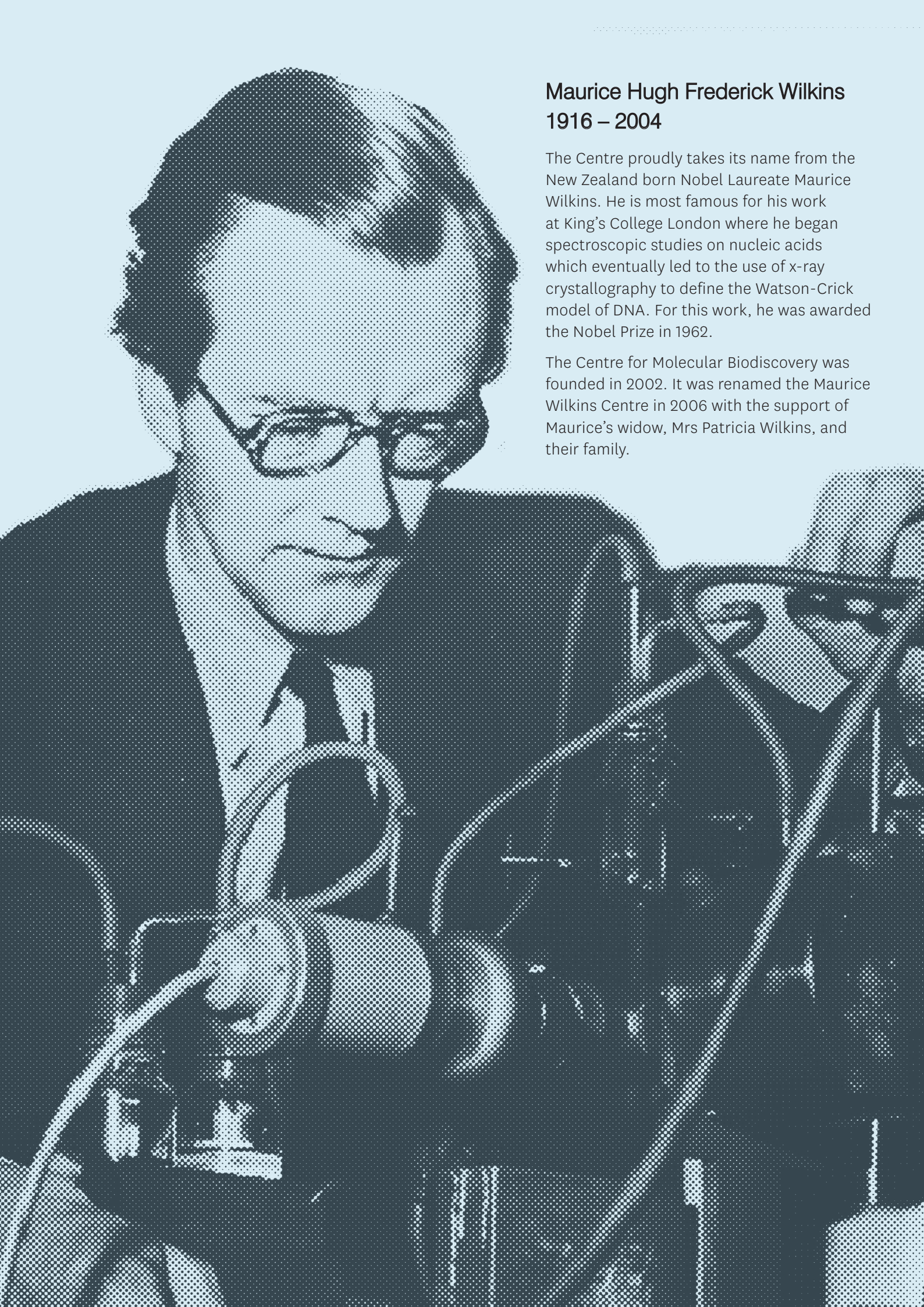
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Maurice Hugh Frederick Wilkins 1916 – 2004

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.

